(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 825 612 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
26.05.2021 Bulletin 2021/21

(51) Int Cl.:
F24C 7/06 *(2006.01)* ***A47J 37/06*** *(2006.01)*
F24C 7/08 *(2006.01)*

(21) Application number: **20202782.7**

(22) Date of filing: **20.10.2020**

(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
Designated Extension States:
BA ME
KH MA MD TN

(30) Priority: **31.10.2019 TR 201916794**

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(54) A COOKING DEVICE WITH AN INFRARED HEATING ASSEMBLY AND AN OPERATION METHOD THEREOF

(57) The cooking device according to the present invention comprises at least one inner body (B) having at least one base (B1), at least one upper wall (B2) located opposite to the base (B1), at least two side walls (B3) located between the upper wall (B2) and the base (B1), wherein at least one cooking compartment (B4) is formed between the base (B1) and said walls and the inner body (B) comprises at least one placement opening for access into said cooking compartment (B4); at least one infrared heating element (1) which is located to extend between said side walls (B3); and at least one guiding element (2) located to extend along the longitudinal axis of the heating element (1) and to at least partially cover the length of the heating element (1), partially surrounding the heating element (1), having at least one opening that extends along the longitudinal axis between the opposite ends thereof, wherein the guiding element (2) is configured to enable the ray, which is emitted from the heating element (1) when the heating element (1) is energized, to pass through said opening to reach the cooking compartment (B4), and is rotatable around the longitudinal axis for changing the position where the opening is provided.

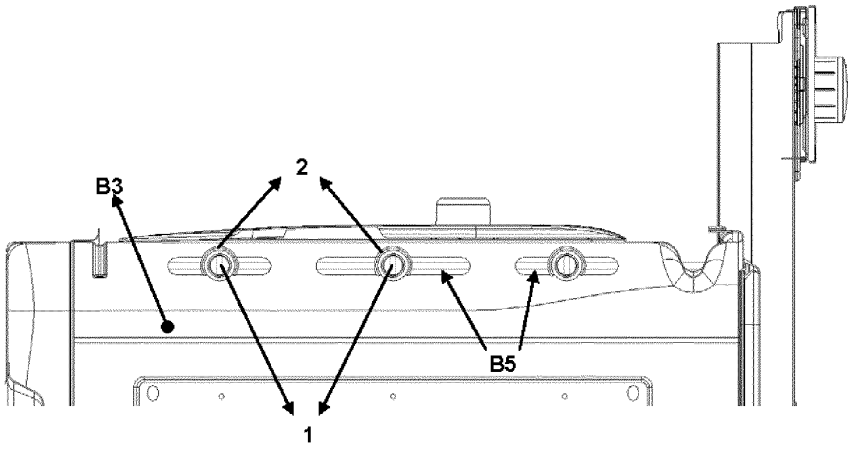

Figure – 3

EP 3 825 612 A2

Description

Technical Field

[0001] The present invention relates to cooking devices with an infrared heating assembly, and operation methods thereof.

Background of the Invention

[0002] Although food products can be consumed raw without being cooked, they can also be consumed by cooking via a cooking device. In the known art, there are various cooking devices for cooking the food products. These cooking devices usually comprise at least one cooking compartment in which foods to be cooked are placed by means of a carrying element, which may be trays, pots, pans, grills, etc. The food can also be cooked when heat supplied to the cooking compartment by at least one heating assembly reaches the food in the carrying element.

[0003] In cooking devices with a closed chamber structure, such as an oven, various heating assemblies can be used to provide heat to the cooking compartment, and these heating assemblies can be located in the cooking device such that they are at the bottom and/or top of the cooking compartment. An example of such heating assemblies is resistance-type heating assemblies. When such heating assemblies are energized, first the heating assembly itself is required to be heated, and then the heated heating assembly transfers its heat to the surrounding air. Thus, air in the cooking compartment and therefore the food product to be cooked is heated by convection. However, the time to reach a desired temperature is quite long in cooking devices heating by convection because the heating assembly itself should be heated first for the convection. In addition, transfer of heat to the food also extends the cooking time.

[0004] In order to solve said problem, infrared heating assemblies are used in the known art, in which the heating assembly emits heat through radiation. When energized, infrared heating assemblies instantly radiate and transmit heat to food through light. Thus, the need for heating the cooking compartment first for the cooking process is eliminated, and the cooking efficiency and effectiveness can be increased by decreasing the cooking time. However, in such cooking devices, the food must be located such that it can receive the light emitted from the heating assembly. Moreover, in order for the cooking process to be performed properly, the ray emitted by the heating assembly must reach all surfaces of the food homogeneously. Otherwise, one side of the food may be overcooked (even burning) while the other side may remain uncooked (or much less cooked). This negatively affects the cooking efficiency.

Brief Description of the Invention

[0005] The cooking device according to the present invention comprises at least one inner body having at least one base, at least one upper wall located opposite to the base, at least two side walls located between the upper wall and the base, wherein at least one cooking compartment is formed between the base and said walls and the inner body comprises at least one placement opening for access into said cooking compartment; at least one infrared heating element which is located to extend between said side walls; and at least one guiding element located to extend along the longitudinal axis of the heating element and to at least partially cover the length of the heating element, partially surrounding the heating element, having at least one opening that extends along the longitudinal axis between the opposite ends thereof, wherein the guiding element is configured to enable the ray, which is emitted from the heating element when the heating element is energized, to pass through said opening to reach the cooking compartment, and is rotatable around the longitudinal axis for changing the position where the opening is provided.

[0006] The operation method according to the present invention comprises the steps of: operating the heating elements with a certain pattern according to the data regarding the food to be cooked when a command for cooking a food is issued by means of at least one control element provided at the cooking device; and rotating the guiding element based on the operating status of the respective heating element.

[0007] Thanks to the cooking device and operation method according to the present invention, it is possible to cook the foods in a shorter time, effectively, efficiently and homogeneously by using an infrared heating element.

Object of the Invention

[0008] An object of the present invention is to provide a cooking device having an infrared heating assembly, and an operation method thereof.

[0009] Another object of the present invention is to provide a cooking device in which heat emitted by radiation is transmitted homogeneously to the cooked food inside, and an operation method thereof.

[0010] Yet another object of the present invention is to provide a cooking device which allows the food to be cooked homogenously, and an operation method thereof.

[0011] A further object of the present invention is to provide a cooking device which decreases the cooking time and also provides an efficient and effective cooking process, and an operation method thereof.

Description of the Drawings

[0012] Exemplary embodiments of the cooking device according to the present invention are illustrated in the attached drawings, in which:

Figure 1 is a perspective view of the developed cooking device in a semi-assembled state.
Figure 2 is a side-sectional view of a part of the developed cooking device where the heating assembly thereof is provided.
Figure 3 is another side-sectional view of the part of the developed cooking device where the heating assembly thereof is provided.
Figure 4 is a side-sectional view of a detail of the heating assembly of the developed cooking device.
Figure 5 is a front-sectional view of the developed cooking device in a semi-assembled state.
Figure 6 is a top sectional view of the heating assembly in a schematic illustration of the developed cooking device.

[0013] All the parts illustrated in figures are individually assigned a reference numeral and the corresponding terms of these numbers are listed below:

Outer body	(D)
Inner body	(B)
Base	(B1)
Upper wall	(B2)
Side wall	(B3)
Cooking compartment	(B4)
Channel	(B5)
Carrying element	(T)
First cooking area	(P1)
Second cooking area	(P2)
Third cooking area	(P3)
Fourth cooking area	(P4)
Heating element	(1)
First heating element	(1a)
Second heating element	(1b)
Third heating element	(1c)
Guiding element	(2)
Assembly element	(3)
Ball screw	(4)
Motor	(5)
Reflecting element	(6)
Pivot element	(7)

Description of the Invention

[0014] Food products can be consumed raw or cooked by means of a cooking device. Such cooking devices for cooking food products generally comprise at least one cooking compartment, wherein a food is cooked by supplying heat to the food in the cooking compartment by means of at least one heating assembly that can be located in various parts of the cooking compartment. Said heating assemblies may be in the form of a resistance, but the cooking time can be long when such heating devices are used. In this context, with the developing technology, infrared heating assemblies have been used in cooking devices for providing heat to the food. However, since infrared heating devices transmit heat directly to the food by light, food in the cooking compartment may not be cooked homogeneously. Accordingly, with the present invention, there is developed a cooking device which comprises an infrared heating assembly, ensures that the heat is transmitted to the food homogeneously, and at the same time, increases the cooking efficiency and effectiveness while decreasing the cooking time, and an operation method thereof.

[0015] The cooking device according to the present invention, as illustrated in figures 1-6, comprises at least one inner body (B) having at least one base (B1), at least one upper wall (B2) located opposite to the base (B1), at least two side walls (B3) located between the upper wall (B2) and the base (B1), wherein at least one cooking compartment (B4) is formed between the base (B1) and said walls and the inner body (B) comprises at least one placement opening for access into said cooking compartment (B4); and at least one infrared heating element (1) preferably having a cylindrical form and located in the inner compartment (B) to extend between said side walls (B3) and preferably to be closer to the upper wall (B2) (or to the base (B1)). The cooking device according to the present invention also comprises at least one guiding element (2) located to extend along the longitudinal axis of the heating element (1) and to at least partially cover the length of the heating element (1), partially surrounding the heating element (1), having at least one opening that extends along the longitudinal axis between the opposite ends thereof, wherein at least a part of the inner surface of the guiding element (2) facing the heating element (1) is preferably reflective, wherein the guiding element (2) is configured to enable the ray, which is emitted from the heating element (1) when the heating element (1) is energized, to preferably only pass through said opening to reach the cooking compartment (B4), and is rotatable around the longitudinal axis for changing the position where the opening is provided. Although said movement of the guiding element (2) may be performed manually by the user, the cooking device preferably comprises at least a first movement mechanism in order for the guiding element (2) to perform said rotational movement. Said rotation of the guiding element (2) may be performed continuously for a certain period during the cooking period by means of the said first movement mechanism and/or may be performed in variable periods according to the data regarding the cooked food (e.g. weight, type, volume, texture, desired cooking amount, etc. of the food). In addition, reflectivity of said guiding element (2) can be achieved by making the respective part of the guiding element (2) from a material that can reflect rays and/or by coating this part with a material that can reflect light.

[0016] In an exemplary embodiment of the invention, when user wants to cook a food, she/he places the food in the cooking compartment (B4) by means of a carrying element (T) (e.g. tray, grill wire etc.) and operates the cooking device. When the cooking device is operated, the infrared heating element (1) is energized and enabled to radiate. The ray emitted from the heating element (1) does not directly reach the food in the cooking compartment (B4) since said guiding element (2) surrounds the heating element (1), but reaches the food through said opening. Preferably, thanks to the reflective inner surface of the guiding element (2), the rays emitted from the heating element (1) can be focused on said opening. When the guiding element (2) is rotated by means of the first movement assembly around the axis along which the heating element (1) extends, position of said opening is changed, and thus, rays from the heating element (1) are enabled to reach all surfaces of the food while at the same time preventing them from being focused on one part of the food. Therefore, with the infrared heating element (1), it is prevented that one side of the cooked food can be prevented from being overcooked (and even burning) and the other part not being cooked or undercooked, and the food is enabled to be cooked homogeneously. Therefore, both the cooking time can be decreased and the cooking efficiency and effectiveness can be improved.

[0017] In a preferred embodiment of the invention, said heating element (1) can move, preferably in a plane parallel to the upper wall (B2), so as to approach and move away from said placement opening. For said movement, the cooking device of the invention comprises at least one channel (B5) which is located on at least one (preferably on both in an opposite manner) of the side walls (B3) (preferably located at an area where the upper wall (B2) or the base (B1) converges with the side wall (B3)), enables at least one end of the heating element (1) to be connected with at least a second movement assembly, extends substantially parallel to the upper wall (B2) (for example, extending between the placement opening and at least a rear wall provided opposite to the placement opening), and allows said movement of the heating element (1). Thanks to said movement of the heating element (1), the food can be cooked much more homogeneously. In this embodiment, the cooking device of the invention also preferably comprises at least one assembly element (3) which is connected from one side thereof to the end of the heating element (1) connected with the second movement assembly, and passing through the channel (B5) from another side thereof (for example, extending towards at least one outer body (D) in which the inner body (B) is placed [preferably, connected to the outer body (D) so that it is movable in the channel (B5)]). In this embodiment, the second movement assembly preferably comprises at least one ball screw (4) which passes through at least one threaded hole provided at the part where the assembly element (3) is connected to the heating element (1), wherein the ball screw (4) is rotatable around its own axis such that, as a result of this rotational movement, the assembly element (3) moves linearly in said channel (B5) by means of the threaded hole and accordingly the heating element (1) approaches and moves away from the placement opening; and at least one motor (5) which is connection with the ball screw (4) and enables the ball screw (4) to rotate around its own axis. In another alternative embodiment, the second movement assembly may comprise a belt mechanism and/or a gear wheel mechanism and/or an electromagnet assembly. In this embodiment, the cooking device further comprises at least one cover to prevent direct access to said second movement mechanism through the cooking compartment (B4). This cover also prevents the inner temperature of the cooking compartment (B4) from spreading to the outer environment. Said movement of the heating element (1) may be performed continuously for a certain period during the cooking period by means of the second movement mechanism and/or it may also be performed in variable periods according to the

data regarding the cooked food (e.g. weight, type, volume, texture, desired cooking amount, etc. of the food). Furthermore, said movement of the heating element (1) may be performed manually by the user.

[0018] In another alternative embodiment, said heating element (1) comprises at least one main body in the form of a glass tube with circular cross-section; and a plurality of wires located in the main body, connected to an energy source, and emit heat in the form of light by radiating with the energy received from the energy source. These wires may be made of metal materials or they may be made of fibers/threads such as carbon fiber.

[0019] In another embodiment of the invention, the cooking device also preferably comprises at least a first sensor measuring a temperature in the center of the cooking compartment (B4); and at least one control unit which is in connection with the first sensor, compares the temperature value measured by the first sensor with a first threshold value, stops operation of the heating element (1) if the measured temperature value equals to or higher than the first threshold value and enables the heating element (1) to be operated if the measured temperature value is below the first threshold value (the control unit may be a control unit that controls and adjusts the general operation of the cooking device or it may also be a separate control unit independent of the unit that adjusts the general operation of the cooking device). Thus, temperature of the cooking compartment (B4) can be kept at a certain temperature value and homogeneous cooking of the food can be achieved more effectively. The first threshold value may be a value determined by the user or it may be determined by the control unit itself among the values pre-stored in the control unit in accordance with the food to be cooked according to the data input by the user by means of a control element (e.g. weight, type, volume, texture, desired cooking amount etc. of the food) or according to the data regarding the food which is collected by means of various sensors in the cooking device (e.g. weight, type, volume, texture, desired cooking amount etc. of the food).

[0020] In another alternative embodiment, the cooking device according to the invention preferably comprises at least one reflecting element (6) located on the base (B1) or the upper wall (B2) to be on the opposite side of the heating element (1), wherein the rays reaching the cooking compartment (B4) from the heating element (1) reach the reflecting element (6), from where they are re-reflected onto the cooking compartment (B4). Therefore, rays emitted from the heating element (1) but cannot reach some surfaces of the food can be reflected from the reflecting element (6) to reach these surfaces. This reflecting element (6) is preferably located inclined to make a certain angle with the base (B1) or the upper wall (B2). Yet in another embodiment, the reflecting element (6) is preferably in the form of a plate and comprises at least one pivot element (7) which is located at a part between two ends thereof (preferably equidistant from both ends). The parts on both sides of said pivot element (7) can move independently of each other by rotating in the axis of the pivot element (7). By this way, the reflecting element (6) has at least two flap parts that can move independently from each other, and the rays emitted from the heating element (1) can be directed to the food effectively by adjusting the angle of each flap part. Said movement of the flap parts comprised by the reflecting element (6) can be performed manually by the user or it may be performed by means of at least a third movement mechanism, which may be a motor, automatically for one time and/or continuously during the cooking period with a certain period and/or in accordance with the data regarding the cooked food in variable periods during the cooking period.

[0021] In another preferred embodiment, the cooking device preferably comprises at least a second sensor which determines the location of the food inside the cooking chamber (B4). By means of the second sensor, position of opening of the guiding element (2) and/or angle of the reflecting element (6) can be adjusted according to the determined position of food such that rays emitted from the heating element (1) reach the food homogeneously and the food is cooked homogeneously.

[0022] In another embodiment of the invention, the cooking device according to the invention preferably comprises at least three heating elements (1) as a first heating element (1a) located closest to the placement opening, a second heating element (1b) located parallel to the first heating element (1a) farther away from the placement opening, and a third heating element (1c) located parallel to the second heating element (1b) farthest from the placement opening. In this embodiment, the cooking device also preferably comprises at least a third sensor which detects cooking state of the food in the cooking compartment (B4); and at least one control unit which determines cooking state of the food according to the data detected by the third sensor and adjusts operating status of the heating elements (1) accordingly. The third sensor may be a sensor that can detect temperatures in different parts of food (such as a thermal camera or laser temperature sensor) or it may also be a sensor that can detect colors in different parts of food.

[0023] The operation method according to the present invention for the cooking device comprising at least three infrared heating elements (1) as the first heating element (1a), the second heating element (1b) and the third heating element (1c) and at least three guiding elements (2) each of which is connected with a heating element (1) comprises the steps of: operating the heating elements (1) with a certain pattern according to the data regarding the food to be cooked (e.g. weight, type, volume, texture, desired cooking amount, etc. of the food) when a command for cooking a food is issued to the cooking device by means of at least one control element provided at the cooking device; and rotating the guiding element (2) based on the operating status of the respective heating element (1) preferably according to said data.

[0024] In a preferred embodiment, the pattern (first pattern) comprises the steps of: operating only the first heating element (1a) during a first period; stopping operation of the first heating element (1a) at the end of the first period and

operating only the second heating element (1b) for a second period following the first period (this second period may be the same or different from the first period); stopping operation of the second heating element (1b) at the end of the second period and operating only the third heating element (1c) during a third period following the second period (this third period may be the same or different from the first period and/or the second period); stopping operation of the third heating element (1c) at the end of the third period and returning to the step in which only the first heating element (1a) is operated; and controlling operation of the heating elements (1) during the cooking period by this cycle. With first pattern, each cooking area in the cooking compartment (B4) is heated homogenously and at a low temperature. Thus, foods such as vegetables can be cooked using this first pattern.

[0025] In another preferred embodiment, the pattern (second pattern) comprises the steps of: operating only the second heating element (1b) during a first period; stopping operation of the second heating element (1b) at the end of the first period and operating only the first heating element (1a) and the third heating element (1c) for a second period following the first period (this second period may be the same or different from the first period); stopping operation of the first heating element (1a) and the third heating element (1c) at the end of the second period and returning to the step in which only the second heating element (1b) is operated; and controlling operation of the heating elements (1) during the cooking period by this cycle. Second pattern can be used effectively for cooking foods spread over a large carrying element (T) (such as cakes on a tray).

[0026] In another preferred embodiment, the pattern (third pattern) comprises the steps of: operating only the first heating element (1a) and the second heating element (1b) during a first period; stopping operation of the first heating element (1a) at the end of the first period and operating only the second heating element (1b) and the third heating element (1c) for a second period following the first period (this second period may be the same or different from the first period); stopping operation of the second heating element (1b) at the end of the second period and operating only the first heating element (1a) and the third heating element (1c) during a third period following the second period (this third period may be the same or different from the first period and/or the second period); stopping operation of the first heating element (1a) and the third heating element (1c) at the end of the third period and returning to the step in which only the first heating element (1a) and the second heating element (1b) are operated; and controlling operation of the heating elements (1) during the cooking period by this cycle. With this third pattern, each cooking area in the cooking compartment (B4) is heated homogeneously and at a higher temperature. Thus, foods such as chicken can be cooked using third pattern.

[0027] In another preferred embodiment, the pattern (fourth pattern) comprises the steps of: operating only the first heating element (1a) during a first period; stopping operation of the first heating element (1a) at the end of the first period and operating only the third heating element (1c) for a second period following the first period (this second period may be the same or different from the first period); stopping operation of the third heating element (1c) at the end of the second period and returning to the step in which only the first heating element (1a) is operated; and controlling operation of the heating elements (1) during the cooking period by this cycle. With this fourth pattern, foods such as pies that are desired to be cooked at low temperatures but where it is important to cook the edges well can be cooked effectively.

[0028] In a further preferred embodiment, the pattern (fifth pattern) comprises the steps of: operating only the first heating element (1a) and the second heating element (1b) during a first period; stopping operation of the first heating element (1a) at the end of the first period and operating only the second heating element (1b) and the third heating element (1c) for a second period following the first period (this second period may be the same or different from the first period); stopping operation of the third heating element (1c) at the end of the second period and returning to the step in which only the first heating element (1a) and the second heating element (1b) are operated; and controlling operation of the heating elements (1) during the cooking period by this cycle. This fifth pattern is especially ideal for cooking processes where food is concentrated in the middle part of the carrying element (T) and therefore it is important to cook the middle part well.

[0029] In another preferred embodiment, the pattern (sixth pattern) comprises the steps of: operating all heating elements (1) during a first period; stopping operation of the first heating element (1a) and the third heating element (1c) at the end of the first period and operating only the second heating element (1b) for a second period following the first period (this second period may be the same or different from the first period); returning to the step in which all the heating elements (1) are operated at the end of the second period; and controlling operation of the heating elements (1) during the cooking period by this cycle. This sixth pattern can be used as an alternative to the fifth pattern.

[0030] In another preferred embodiment, the pattern (seventh pattern) comprises the steps of: operating all heating elements (1) during a first period; stopping operation of the second heating element (1b) at the end of the first period and operating only the first heating element (1a) and the third heating element (1c) for a second period following the first period (this second period may be the same or different from the first period); returning to the step in which all the heating elements (1) are operated at the end of the second period; and controlling operation of the heating elements (1) during the cooking period by this cycle. This seventh pattern is another alternative for the cases where better cooking of the edges of the food in the carrying element (T) is desired.

[0031] In a further preferred embodiment, the pattern (eighth pattern) comprises the steps of: operating all heating

elements (1) during a first period; stopping operation of the first heating element (1a) and the second heating element (1b) at the end of the first period and operating only the third heating element (1c) for a second period following the first period (this second period may be the same or different from the first period); at the end of the second period, re-operating all the heating elements (1) for a third period following the second period (this third period may be the same or different from the first period and/or the second period); stopping operation of the first heating element (1a) and the third heating element (1c) at the end of the third period and operating only the second heating element (1b) for a fourth period following the third period (this fourth period may be the same or different from the first period and/or the second period and/or the third period); at the end of the fourth period, re-operating all the heating elements (1) for a fifth period following the fourth period (this fifth period may be the same or different from the first period and/or the second period and/or the third period and/or the fourth period); stopping operation of the second heating element (1b) and the third heating element (1c) at the end of the fifth period and operating only the first heating element (1a) for a sixth period following the fifth period (this sixth period may be the same or different from the first period and/or the second period and/or the third period and/or the fourth period and/or the fifth period); at the end of the sixth period, returning to the step in which all the heating elements (1) are operated during the first period; and controlling operation of the heating elements (1) during the cooking period by this cycle. This eighth pattern can also be used in cases where it is desired to operate all heating elements (1) at certain intervals and the food is desired to be fried and/or to be crispy.

[0032] In a further preferred embodiment, the pattern (ninth pattern) comprises the steps of: operating all heating elements (1) during a first period; stopping operation of the first heating element (1a) and the second heating element (1b) at the end of the first period and operating only the third heating element (1c) for a second period following the first period (this second period may be the same or different from the first period); at the end of the second period, re-operating all the heating elements (1) for a third period following the second period (this third period may be the same or different from first period and/or the second period); stopping operation of the second heating element (1b) and the third heating element (1c) at the end of the third period and operating only the first heating element (1a) for a fourth period following the third period (this fourth period may be the same or different from first period and/or the second period and/or the third period); at the end of the fourth period, returning to the step in which all the heating elements (1) are operated during the first period; and controlling operation of the heating elements (1) during the cooking period by this cycle. This ninth pattern can also be used for cases where it is desired to operate all heating elements (1) at certain intervals and the edges of the food are desired to be well cooked.

[0033] Operating status of the heating elements (1) according to the above-mentioned different patterns are exemplified in the following tables 1a-1c, wherein "+" indicates the case where the respective heating element (1) operates, and "-" indicates the case where the respective heating element (1) does not operate. In the tables, 9 steps are given as an example while this number of steps may increase or decrease depending on the cooking period.

Table 1a

Example 1st Pattern					**Example 2nd Pattern**					**Example 3rd Pattern**			
	1a	**1b**	**1c**			**1a**	**1b**	**1c**			**1a**	**1b**	**1c**
Pre-heating (preferably)	+	+	+		Pre-heating (preferably)	+	+	+		Pre-heating (preferably)	+	+	+
1st Step	+	-	-		1st Step	-	+	-		1st Step	+	+	-
2nd Step	-	4	-		2nd Step	+	-	+		2nd Step	-	+	+
3rd Step	-	-	+		3rd Step	-	+	-		3rd Step	+	-	+
4th Step	-	+	-		4th Step	+	-	+		4th Step	+	+	-
5th Step	+	-			5th Step	-	+	-		5th Step	-	+	+
6th Step	-	+	-		6th Step	+	-	+		6th Step	+	-	+
7th Step	-	-	+		7th Step	-	+	-		7th Step	+	+	-
8th Step	-	+	-		8th Step	+	-	+		8th Step	-	+	+
9th Step	+	-	-		9th Step	-	+	-		9th Step	+	-	+

Table 1b

Example 4th Pattern					Example 5th Pattern					Example 6th Pattern			
	1a	1b	1c			1a	1b	1c			1a	1b	1c
Pre-heating (preferably)	+	+	+		Pre-heating (prefe rably)	+	+	+		Pre-heating (preferably)	+	+	+
1st Step	+	-	-		1st Step	+	+	-		1st Step	+	+	+
2nd Step	-	-	+		2nd Step	-	+	+		2nd Step	-	+	-
3rd Step	+	-	-		3rd Step	+	+	-		3rd Step	+	+	+
4th Step	-	-	+		4th Step	-	+	+		4th Step	-	+	-
5th Step	+	-	-		5th Step	+	+	-		5th Step	+	+	+
6th Step	-	-	+		6th Step	-	+	+		6th Step	-	+	-
7th Step	+	-	-		7th Step	+	+	-		7th Step	+	+	+
8th Step	-	-	+		8th Step	-	+	+		8th Step	-	+	-
9th Step	+	-	-		Step	+	+	-		9th Step	+	+	+

Table 1c

Example 7th Pattern					Example 8th Pattern					Example 9th Pattern			
	1a	1b	1c			1a	1b	1c			1a	1b	1c
Pre-heating (preferably)	+	+	+		Pre-heating (preferably)	+	+	+		Pre-heating (preferably)	+	+	+
1st Step	+	+	+		1st Step	+	+	+		1st Step	+	+	+
2nd Step	+	-	+		2nd Step	-	-	+		2nd Step	-	-	+
3rd Step	+	+	+		3rd Step	+	+	+		3rd Step	+	+	+
4th Step	+	-	+		4th Step	-	+	-		4th Step	+	-	-
5th Step	+	+	+		5th Step	+	+	+		5th Step	+	+	+
6th Step	+	-	+		6th Step	+	-	-		6th Step	-	-	+
7th Step	+	+	+		7th Step	+	+	+		7th Step	+	+	+
8th Step	+	-	+		8th Step	-	+	-		8th Step	+	-	-
9th Step	+	+	+		9th Step	+	+	+		9th Step	+	+	+

[0034] In a preferred embodiment of the invention, operation method according to the invention also comprises at least one pre-heating step in which all the heating elements (1) are operated for a certain pre-period, before the step of operating said heating elements (1) with a certain pattern. Thus, it can be ensured before the cooking process that temperature of the cooking compartment (B4) is suitable for cooking process. Said periods and/or pre-period provided at the patterns may be a value determined by the user or it may be a value determined by the control unit itself among the values pre-stored in the control unit in accordance with the food to be cooked according to the data input by the user by means of a control element (e.g. weight, type, volume, texture, desired cooking amount etc. of the food) or according to the data regarding the food which is collected by means of various sensors in the cooking device (e.g. weight, type, volume, texture, desired cooking amount etc. of the food).

[0035] In an example of the invention shown in Figure 6, the first heating element (1a), the second heating element (1b) and the third heating element (1c) are located in the cooking device parallel to each other and side by side so that they remain in an upper area of the carrying element (T) where the food will be placed. Positioning the heating elements (1) in such a configuration divides the cooking compartment (B4) into 4 areas as the first cooking area (P1), the second cooking area (P2), the third cooking area (P3) and the fourth cooking area (P4), wherein the first cooking area (P1) between the first heating element (1a) and the placement opening is effectively heated by the first heating element (1a),

the second cooking area (P2) between the first heating element (1a) and the second heating element (1b) is effectively heated by the first heating element (1a) and the second heating element (1b), the third cooking area (P3) between the second heating element (1b) and the third heating element (1c) is effectively heated by the second heating element (1b) and the third heating element (1c), and the fourth cooking area (P4) between the third heating element (1c) and the rear wall is also effectively heated by the third heating element (1c). Therefore, depending on positioning of food in the carrying element (T), heating conditions of respective cooking areas (for example, temperature values, heating times, etc.) can be adjusted independently of each other by means of operation patterns of the movable guiding element (2) and the heating elements (1), and the food is enabled to be cooked in a short time. For example, if the user wants the parts of the food located in the second cooking area (P2) and the third cooking are (P3) to be cooked better, the second heating element (1b) must be used during the cooking process. Similarly, if the remaining parts of the food located in the first cooking area (P1) are desired to be cooked better, the first heating element (1a) must be used during the cooking process. Accordingly, the user transmits, by means of a control element (e.g. provided at the cooking device or at a mobile device), to the cooking device the data regarding the food and/or the data regarding heating element (1) operation pattern she/he wants to use for the cooking process and/or only a command for initiating the cooking process, and accordingly, the cooking device performs the cooking process according to the data input by the user and/or the data detected by the cooking device itself through the sensors thereof. For example, if a large part of the food to be cooked is in the first cooking area (P1), the user can transmit this information to the cooking device by means of the control element or the cooking device can detect this situation by itself with the sensors thereof, and accordingly, a pattern in which the first heating element (1a) is the most effective among the operation patterns of the heating element (1) can be automatically selected by the cooking device. Or, the user can examine all patterns in the cooking device or the patterns suggested by cooking device to cook this food, and choose the pattern she/he wants to use among them.

[0036] The step of operating the heating elements (1) with a certain pattern in the operation method according to the present invention is controlled by the first sensor provided at the cooking device, wherein if the value measured by the first sensor is below the first threshold value, the heating elements (1) operate with the determined pattern and if the value measured by the first sensor is equal to or higher than the first threshold value, all heating elements (1) are stopped. Therefore, when temperature value is below the first threshold value, operation of heating elements (1) with the determined pattern is controlled independently, while at the same time, operation of heating elements (1) is controlled together with the temperature monitoring process performed by the first sensor.

[0037] In a preferred embodiment of the operation method, the heating elements (1) can be moved independently of each other or in groups of two or all together in a certain period or variable periods so as to approach and move away from the placement opening, while operating with a certain pattern.

[0038] In a preferred embodiment of the operation method, while heating elements (1) operate with a certain pattern, guiding elements (2) connected with the heating elements (1) can be rotated independently of each other or in pairs or all together on the axis of the respective heating element (1).

[0039] Thanks to the cooking device and operation method according to the present invention, it is possible to cook the foods in a shorter time, effectively, efficiently and homogeneously by using the infrared heating element (1).

Claims

1. A cooking device which comprises at least one inner body (B) having at least one base (B1), at least one upper wall (B2) located opposite to the base (B1), at least two side walls (B3) located between the upper wall (B2) and the base (B1), wherein at least one cooking compartment (B4) is formed between the base (B1) and said walls and the inner body (B) comprises at least one placement opening for access into said cooking compartment (B4); and at least one infrared heating element (1) which is located to extend between said side walls (B3), **characterized by** comprising at least one guiding element (2) located to extend along the longitudinal axis of the heating element (1) and to at least partially cover the length of the heating element (1), partially surrounding the heating element (1), having at least one opening that extends along the longitudinal axis between the opposite ends thereof, wherein the guiding element (2) is configured to enable the ray, which is emitted from the heating element (1) when the heating element (1) is energized, to pass through said opening to reach the cooking compartment (B4), and is rotatable around the longitudinal axis for changing the position where the opening is provided.

2. A cooking device according to claim 1, **characterized in that** the ray emitted from the heating element (1) passes only through said opening to reach the cooking compartment (B4).

3. A cooking device according to claim 1, **characterized in that** the heating element (1) is movable so as to approach said placement opening and move away from said placement opening.

4. A cooking device according to claim 3, **characterized in that** the cooking device comprises, for said movement of the heating element (1), at least one channel (B5) which is located on at least one of the side walls (B3), enables at least one end of the heating element (1) to be connected with at least a second movement assembly, extends substantially parallel to the upper wall (B2) between the placement opening and at least a rear wall provided opposite to the placement opening, and allows said movement of the heating element (1); and at least one assembly element (3) which is connected from one side thereof to the end of the heating element (1) connected with the second movement assembly, and passes from another side thereof through the channel (B5); and **that** the second movement assembly comprises at least one ball screw (4) which passes through at least one threaded hole provided at a part of the assembly element (3) where it is connected to the heating element (1), wherein the ball screw (4) is rotatable around its own axis such that, as a result of this rotational movement, the assembly element (3) moves linearly in said channel (B5) by means of the threaded hole and accordingly the heating element (1) moves so as to approach and move away from said placement opening; and at least one motor (5) which is connection with the ball screw (4) and enables the ball screw (4) to rotate around its own axis.

5. A cooking device according to claim 1, **characterized by** comprising at least one reflecting element (6) which is in the form of a plate and is located at the base (B1) or the upper wall (B2) in an inclined manner to make a certain angle with the base (B1) or the upper wall (B2) such that it is opposite to the heating element (1), wherein the reflecting element (6) comprises at least one pivot element (7) which is located at a part between the two ends thereof and at least a third movement assembly which enables the flap parts on both sides of the pivot element (7) to rotate independently of each other in the axis of the pivot element (7), wherein the rays reaching the cooking compartment (B4) from the heating element (1) reach the reflecting element (6), from where they are re-reflected onto the cooking compartment (B4).

6. A cooking device according to claim 1, **characterized by** comprising at least a second sensor which determines the location of the food inside the cooking chamber (B4) and enables the position of opening of the guiding element (2) to be adjusted according to the determined position of food such that rays emitted from the heating element (1) reach the food homogeneously and the food is cooked homogeneously.

7. A cooking device according to any of the preceding claims, **characterized by** comprising at least three heating elements (1) as a first heating element (1a) located closest to the placement opening, a second heating element (1b) located parallel to the first heating element (1a) farther away from the placement opening, and a third heating element (1c) located parallel to the second heating element (1b) farthest from the placement opening; and at least three guiding elements (2) each of which is connected with a heating element (1).

8. A cooking device according to claim 7, **characterized by** comprising at least a third sensor which detects cooking state of food in the cooking compartment (B4) and detects the temperatures or colors at different parts of food; and at least one control unit which determines cooking state of food according to the data detected by the third sensor and adjusts the operating status of the heating elements (1) accordingly.

9. An operation method for a cooking device according to claim 7 or 8, **characterized by** comprising the steps of: operating the heating elements (1) with a certain pattern according to the data regarding the food to be cooked when a command for cooking a food is issued by means of at least one control element provided at the cooking device; and rotating the guiding element (2) based on the operating status of the respective heating element (1).

10. An operation method according to claim 9, **characterized in that** said pattern comprises the steps of: operating only the first heating element (1a) during a first period; stopping operation of the first heating element (1a) at the end of the first period and operating only the second heating element (1b) for a second period following the first period; stopping operation of the second heating element (1b) at the end of the second period and operating only the third heating element (1c) during a third period following the second period; stopping operation of the third heating element (1c) at the end of the third period and returning to the step in which only the first heating element (1a) is operated; and controlling operation of the heating elements (1) during the cooking period by this cycle.

11. An operation method according to claim 9, **characterized in that** said pattern comprises the steps of: operating only the second heating element (1b) during a first period; stopping operation of the second heating element (1b) at the end of the first period and operating only the first heating element (1a) and the third heating element (1c) for a second period following the first period; stopping operation of the first heating element (1a) and the third heating element (1c) at the end of the second period and returning to the step in which only the second heating element (1b) is operated; and controlling operation of the heating elements (1) during the cooking period by this cycle.

12. An operation method according to claim 9, **characterized in that** said pattern comprises the steps of: operating only the first heating element (1a) and the second heating element (1b) during a first period; stopping operation of the first heating element (1a) at the end of the first period and operating only the second heating element (1b) and the third heating element (1c) for a second period following the first period; stopping operation of the second heating element (1b) at the end of the second period and operating only the first heating element (1a) and the third heating element (1c) during a third period following the second period; stopping operation of the first heating element (1a) and the third heating element (1c) at the end of the third period and returning to the step in which only the first heating element (1a) and the second heating element (1b) are operated; and controlling operation of the heating elements (1) during the cooking period by this cycle.

13. An operation method according to claim 9, **characterized in that** said pattern comprises the steps of: operating only the first heating element (1a) during a first period; stopping operation of the first heating element (1a) at the end of the first period and operating only the third heating element (1c) for a second period following the first period; stopping operation of the third heating element (1c) at the end of the second period and returning to the step in which only the first heating element (1a) is operated; and controlling operation of the heating elements (1) during the cooking period by this cycle.

14. An operation method according to claim 9, **characterized in that** said pattern comprises the steps of: operating all heating elements (1) during a first period; stopping operation of the second heating element (1b) at the end of the first period and operating only the first heating element (1a) and the third heating element (1c) for a second period following the first period; returning to the step in which all the heating elements (1) are operated at the end of the second period; and controlling operation of the heating elements (1) during the cooking period by this cycle.

15. An operation method according to any of the claims 9 to 14, **characterized in that** the step of operating the heating elements (1) with a certain pattern is controlled by a first sensor provided at the cooking device and comprises the steps of: comparing the value measured by the first sensor with a first threshold value, and if the measured value is below the first threshold value, operating the heating elements (1) with the determined pattern and if the measured value is equal to or higher than the first threshold value, stopping the all heating elements (1).

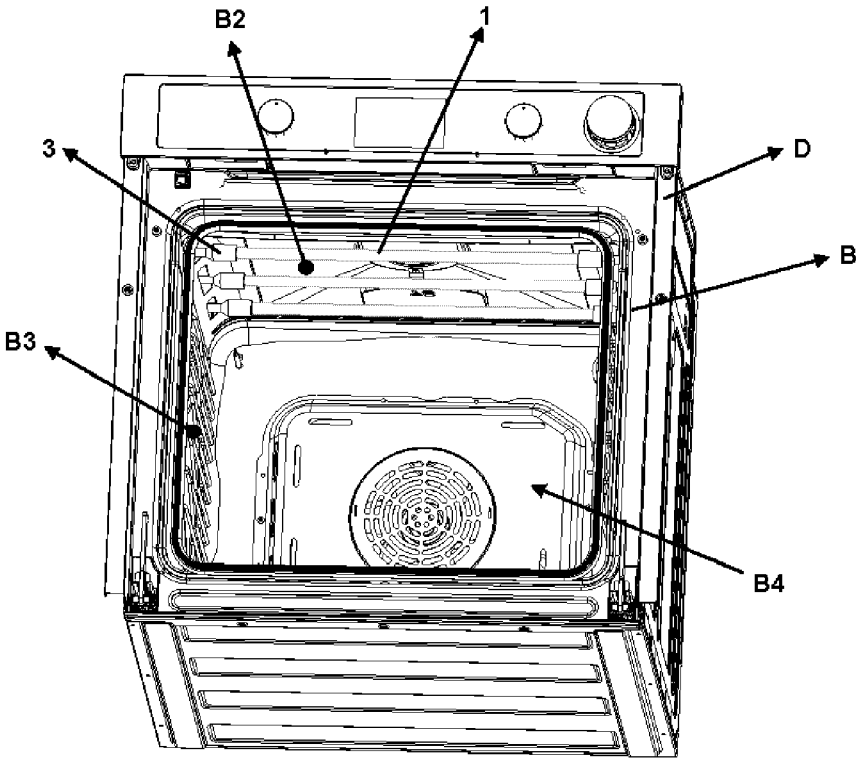

Figure – 1

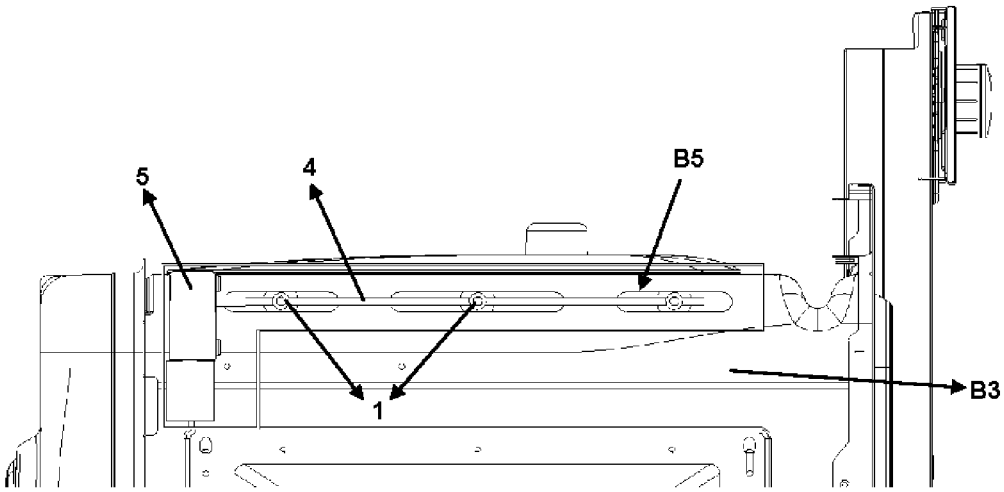

Figure – 2

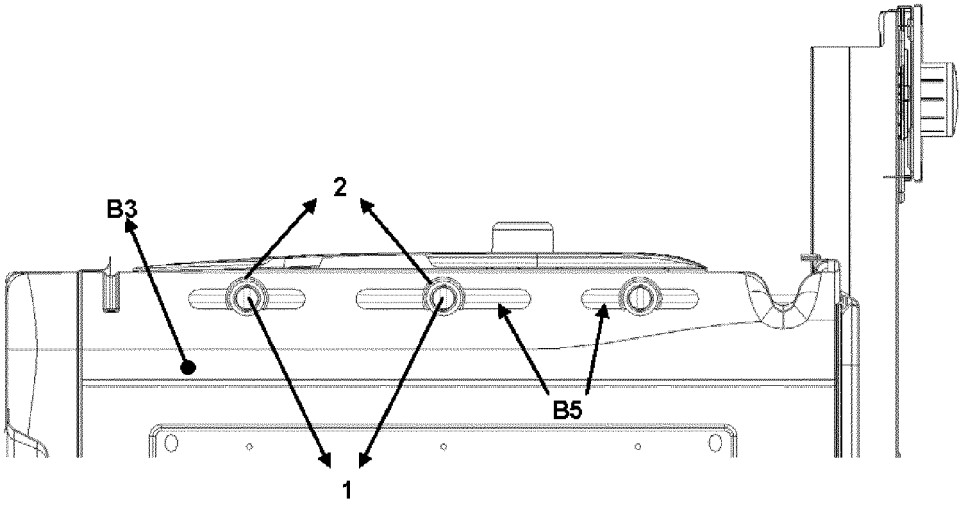

Figure – 3

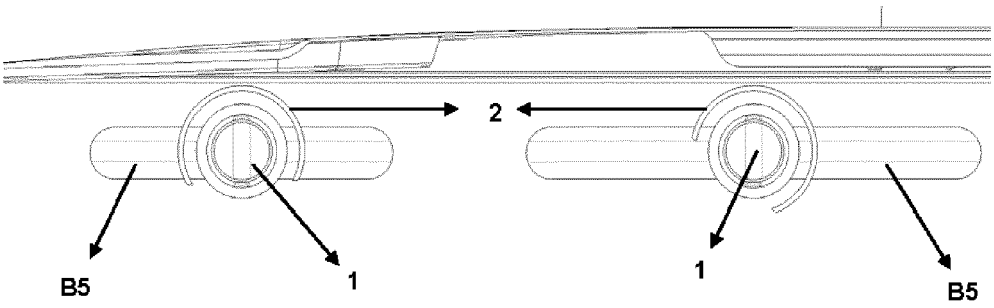

Figure – 4

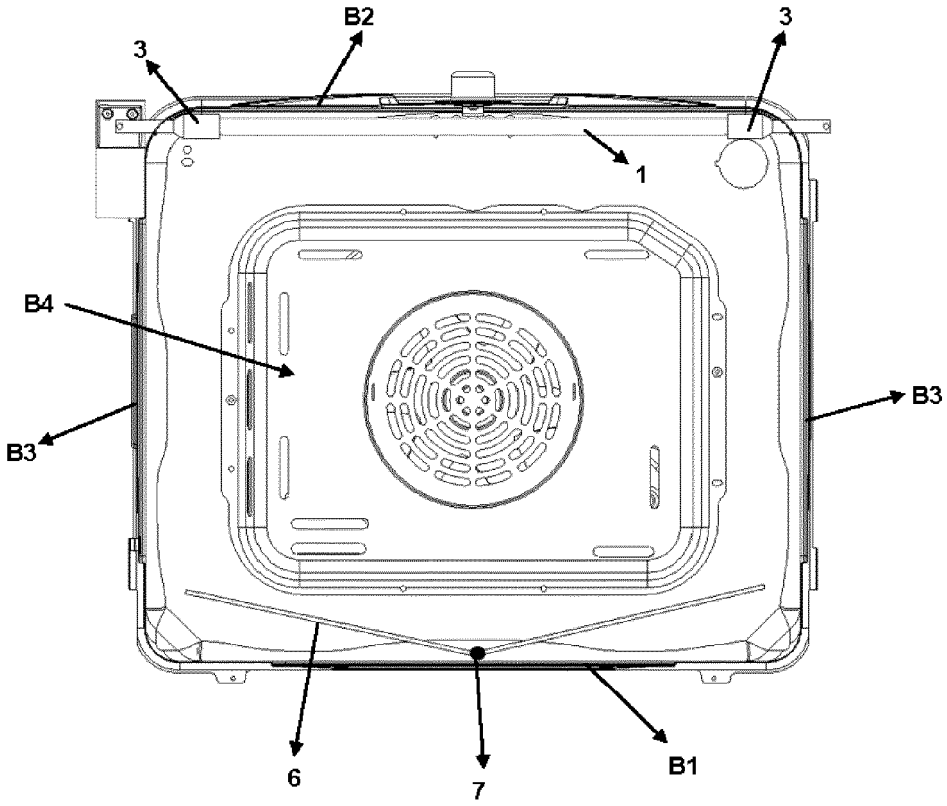

Figure – 5

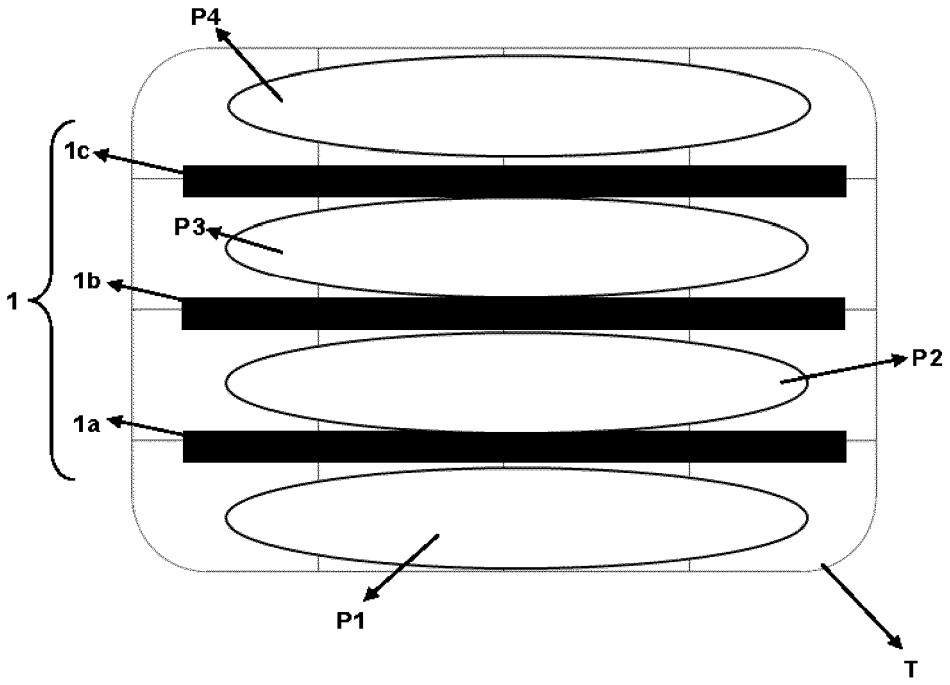

Figure – 6