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(54) OVEN FOR COOKING FOODS AND STEAM GENERATION DEVICE FOR AN OVEN FOR COOKING FOODS

(57) Oven for cooking foods comprising a support structure (2), which at least partially delimits a cooking chamber (3) and is provided with a lower wall (4), and a steam generation device (5), which is mechanically associated with the support structure (2) and is placed in fluid communication with the cooking chamber (3) in order to introduce a steam flow at its interior.

The steam generation device (5) is provided with a containment tank (6) for containing a liquid dose, and such containment tank (6) is provided with at least one maximum level height (7) and is placed at least partially below the lower wall (4), with heating means (8), which are at least partially housed in the containment tank (6) in order to generate the steam flow, and with supply means (10) for supplying liquid into the containment tank (6) in order to restore the liquid dose substantially to the maximum level height (7).

In addition, the heating means (8) comprise at least one electrical heating element (9), which is extended within the containment tank (6) on a lying plane (α) parallel to the lower wall (4), the containment tank (6) has a capacity of 0.5 - 3.8 dm^3 for the liquid dose and the electric power density per unit of volume of containment tank (6), absorbed by the electrical heating element (9), is comprised between 1.1 kW/dm^3 and 2.5 kW/dm^3. In addition, the containment tank (6) comprises an upper cover (13) provided with a through opening (14) placed above said maximum level height (7) and which places the interior of the containment tank (6) directly in fluid communication with the cooking chamber (3) of said support structure (2).

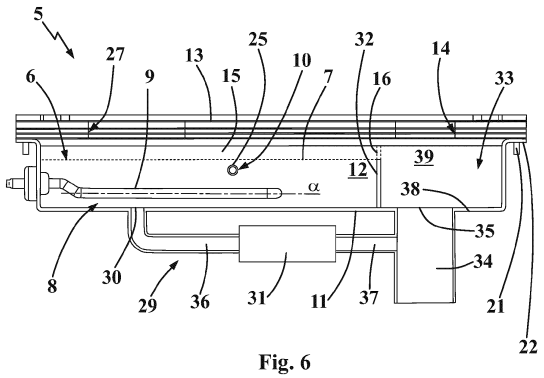

Fig. 6

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Description

Field of application

[0001] The present invention regards an oven for cooking foods and a steam generation device for an oven for cooking foods according to the preamble of the respective independent claims.

[0002] The present oven and the relative steam generation device are advantageously intended for use professionally, for example in the fields of dining, gastronomy, pastry-making and bread-making, or in the home, so as to cook foods placed within the oven itself, in particular by means of cooking with steam.

[0003] Therefore, the present invention in inserted in the industrial field of production of household appliances, in particular ovens, both of professional and home type.

State of the art

[0004] Known on the market are ovens for cooking foods, in particular for professional use, which conventionally comprise a support structure, known in the technical jargon of the field with the term "mitten", which internally delimits a cooking chamber, and within which the foods to be cooked are intended to be placed.

[0005] The support structure is on the front part provided with an access opening to the cooking chamber in order to allow the introduction of the foods to be cooked into the cooking chamber itself and to extract such foods from the latter once cooked.

[0006] Also provided for is a door hinged to the support structure and movable in order to close the access opening during the cooking of the foods.

[0007] The oven also comprises heating means, arranged for heating the air within the cooking chamber, and a fan, which is placed within the cooking chamber, or within suitable technical space made inside the support structure and separated from the cooking chamber, for example by means of a perforated wall.

[0008] The aforesaid fan is selectively drivable in order to cook the foods by means of the forced convection of a flow of hot air into the cooking chamber, or on the contrary deactivatable in order to cook the foods only by natural convection.

[0009] In addition, the oven comprises a steam generation device employable for carrying out a a steam cooking of the foods.

[0010] The aforesaid steam generation device is placed in fluid communication with the cooking chamber of the support structure and is arranged in order to introduce water vapor at its interior in order to steam cook the foods.

[0011] More in detail, such device comprises a containment tank, which is susceptible of being filled with a quantity of water up to a pre-established level height. The containment tank of the stem generation devices of known type has substantially vertical extension and is mechanically coupled to the support structure of the oven, for example on the side of the cooking chamber.

[0012] In addition, such containment tank comprises an upper cover, on which one or more heating elements are mounted, with vertical extension, which are immersed in the water contained in the containment tank.

[0013] During use, the electrical heating elements absorb electrical energy in order to transfer heat, by means of Joule effect, to the water mass in order to bring it to boiling and to generate water vapor.

[0014] The oven for cooking foods of known type described briefly up to now has in practice shown that it does not lack drawbacks.

[0015] The main drawback lies in the fact that such steam generation device is not able to generate, in reduced times, a suitable quantity of water vapor.

[0016] Indeed, a vertical extension of the containment tank involves a reduced free surface of the water even in the case of high internal volumes (measured between the level height and the bottom of the tank).

[0017] Therefore, the steam bubbles due to the evaporation of the water, having to cross a free surface with reduced extension, are limited and slowed during the passage of the water mass to the air present in the containment tank.

[0018] In addition, a long time interval is necessary for bringing the water mass up to the boiling point.

[0019] Indeed, as the temperature of the water in contact with the electrical heating elements increases, steam bubbles are locally formed which flow upward from the same electrical heating element towards the free surface of the water mass.

[0020] Nevertheless, the steam bubbles that are formed at the lower portion of the electrical heating element (in proximity to the bottom of the tank) must nearly completely traverse the vertical extension of the containment tank before reaching the free surface of the water and exiting therefrom.

[0021] Such steam bubbles, during the travel towards the free surface, transfer a quantity of heat to the part of the water mass at lower temperature.

[0022] Such effect causes a decrease of the temperature of the steam bubbles which can determine the return to the liquid state of the same steam bubbles.

[0023] In such case, in the transient from the turning on of the electrical heating elements to the attainment of the boiling point of the water mass, only several steam bubbles, formed at the interface between the electrical heating element and the water mass, are able to exit outward from the water mass.

[0024] Therefore, a reduced quantity of steam bubbles which exit from the water mass does not involve an increase of the pressure within the containment tank, which facilitates the flow of the water vapor from the tank to the cooking chamber.

[0025] Therefore, the pressure of the steam in the containment tank slowly increases both in the aforesaid transient and during the boiling of the water mass and, hence,

such pressure remains at values similar to or slightly higher than those of the pressure in the cooking chamber for long time intervals starting from the turning on of the electrical heating elements.

[0026] The aforesaid pressure of the steam in the containment tank is therefore not sufficient for ensuring that the steam itself autonomously accesses into the cooking chamber due to pressure difference between the containment tank and the same cooking chamber.

[0027] Therefore, it is necessary to maintain the fan of the oven actuated when the electrical heating elements are power supplied, so as to suction the water vapor from the containment tank in order to forcibly introduce it into the cooking chamber.

[0028] However, the actuation of the fan produces inside the containment tank, above the free surface of the water, a decrease of the air pressure, which lowers the boiling point of the water. In such conditions, the water vapor is not formed at 100 °C (i.e. the boiling point of the water in ambient pressure conditions at 1 atmosphere), but at a lower and non-controllable temperature, e.g. around 90°C.

[0029] Therefore, the steam cooking executed with the ovens of known type in turn results hard to control, and hence imprecise, since the water vapor is introduced into the cooking chamber at a non-controlled temperature lower than the 100 °C water boiling point at atmospheric pressure.

[0030] Also known from the patent GB 2218328 is an oven for cooking foods provided with a steam generation device; such device comprises a tank for the containment of water placed below the cooking chamber, an electrical heating element inside the containment tank and arranged for evaporating the water contained therein and a tube which connects the interior of the containment tank with the technical space of the same oven, in a manner such that, during use, the generated steam accesses the cooking chamber by traversing the aforesaid technical space.

[0031] Also such oven does not lack drawbacks, since, when a steam cooking is activated, the fan of the oven placed within the technical space is actuated so to be able to suction the generated steam within the containment tank and convey it inside the cooking chamber, and such steam has no other way of accessing the cooking chamber if not through the technical space. Therefore, such fan, when actuated, produces a reduced pressure within the containment tank that lowers - in a hard to control and hard to know manner - the temperature at which the water in the containment tank reaches boiling, and hence the temperature of the same steam that accesses the cooking chamber.

Presentation of the invention

[0032] In this situation, the problem underlying the present invention is therefore that of eliminating the problems of the abovementioned prior art, by providing an oven for cooking foods and a steam generation device for an oven for cooking foods, which are capable of generating a great quantity of steam in limited time intervals.

[0033] A further object of the present invention is to provide an oven for cooking foods and a steam generation device, which are capable of generating a quantity of steam capable of autonomously flowing into the cooking chamber of the oven without having to drive any fan.

[0034] A further object of the present invention is to provide an oven for cooking foods and a steam generation device, which are capable of generating a quantity of steam which is greater than the quantity of steam produced by the above-described conventional ovens. A further object of the present invention is to provide an oven for cooking foods and a steam generation device, which are capable of generating a quantity of steam at the boiling temperature of water at atmospheric pressure.

[0035] A further object of the present invention is to provide an oven for cooking foods and a steam generation device, which are entirely reliable in operation.

[0036] A further object of the present invention is to provide an oven for cooking foods and a steam generation device, which are simple and inexpensive to attain.

Brief description of the drawings

[0037] The technical characteristics of the invention, according to the aforesaid objects, can be clearly seen from the contents of the below-reported claims and the advantages thereof will be more evident in the following detailed description, made with reference to the enclosed drawings, which represent a merely exemplifying and non-limiting embodiment of the invention, in which:

- figure 1 shows a perspective view of an oven for cooking foods, object of the invention;
- figure 2 shows a perspective view of a steam generation device for the oven for cooking foods of figure 1, in accordance with a first embodiment;
- figure 3 shows a perspective view of the steam generation device of figure 2, with several parts removed in order to better show other parts thereof;
- figure 4 shows a perspective view of the steam generation device of figure 2, with several parts removed in order to better show other parts thereof;
- figure 5 shows a perspective view of the steam generation device of figure 2, with several parts removed in order to better show other parts thereof;
- figure 6 shows a sectional view in side section of the steam generation device of figure 2, with several parts removed in order to better show other parts thereof;
- figure 7 shows a perspective view of a steam generation device, in accordance with a second embodiment;
- figure 8 shows a perspective view of the steam generation device of figure 7, with several parts removed in order to better show other parts thereof;

- figure 9 shows a perspective view of the steam generation device of figure 7, with several parts removed in order to better show other parts thereof;
- figure 10 shows a perspective view of the steam generation device of figure 7, with several parts removed in order to better show other parts thereof.

Detailed description of a preferred embodiment

[0038] With reference to the enclosed figures, reference number 1 overall indicates an oven for cooking foods according to the present invention.

[0039] The present invention has particular application in the industrial field of the production of ovens, both of professional and home type.

[0040] The present oven 1 comprises a support structure 2, known in the technical jargon of the field with the term "mitten", which at least partially delimits a cooking chamber 3 and is provided with a lower wall 4.

[0041] More in detail, such support structure 2 preferably comprises an upper wall 17, opposite the lower wall 4 and parallel thereto, and a perimeter wall 18, which is projectingly extended from the aforesaid lower wall 4 and at least partially encloses, together with the lower and upper walls 4, 17, the cooking chamber 3.

[0042] Preferably, the aforesaid support structure comprises a dividing wall at its interior, in order to separate the same cooking chamber 3 from a technical space, within which a fan is in particular placed, selectively activatable in order to execute a cooking of the foods placed in the cooking chamber 3 with forced convection or with natural convection of the air.

[0043] Advantageously, the support structure 2 comprises an access opening 19 to the cooking chamber 3, preferably made on the perimeter wall 18, which allows the insertion and extraction of the foods from the cooking chamber 3.

[0044] Advantageously, in addition, the present oven 1 comprises a door 20, hinged to the support structure 2 and movable for opening and closing the access opening 19.

[0045] More in detail, the door 20 can be hinged to the support structure 2 on the lower part, as illustrated in figure 1, or it can be hinged to the side or on the upper part, in accordance with embodiment variants not illustrated in the enclosed figures, in order to be able to move the same door 20 respectively as a wing or as a flap.

[0046] The present oven 1 also comprises a steam generation device 5, which is mechanically associated with the support structure 2 and is placed in fluid communication with the cooking chamber 3 in order to introduce a steam flow into the same cooking chamber 3. Such steam generation device 5 is provided with a containment tank 6 for containing a liquid dose, and such containment tank 6 is provided with a maximum level height 7. More in detail, with the expression "maximum level height" it must be intended hereinbelow the maximum level within the containment tank 6 that can be reached by the liquid dose when the containment tank 6 itself is completely filled.

[0047] In accordance with the embodiments illustrated in the enclosed figures, the containment tank 6 of the steam generation device 5 advantageously comprises at least one overflow opening 16 placed at the maximum level height 7. In particular, such overflow opening 16 is adapted to make the liquid exit from the containment tank 6 when the liquid reaches the aforesaid maximum level height 7.

[0048] In this manner, in operation, if a quantity of liquid is introduced in the containment tank 6 that is greater than the liquid dose expected, the excess liquid exceeds the maximum level height 7 and, thus, must flow through the overflow opening 16, exiting from the same containment tank 6.

[0049] Therefore, more in detail, it is the same overflow opening 16 which defines the level at which the maximum level height 7 is placed.

[0050] In addition, the steam generation device 5 comprises heating means 8, at least partially housed in the containment tank 6 in order to generate the aforesaid steam flow.

[0051] The steam generation device 5 also comprises supply means 10 for supplying the liquid in the containment tank 6 in order to restore the liquid dose substantially at the maximum level height 7.

[0052] Preferably, the supply means 10 are arranged in order to restore a liquid dose formed by water, in a manner such that the steam flow is a water vapor flow, for cooking the foods.

[0053] In accordance with an embodiment not illustrated in the enclosed figures, in the event in which the overflow opening 16 is for example not provided for, the steam generation device 5 preferably comprises means for limiting the quantity of liquid, and such limitation means are arranged for interrupting the flow of liquid from the supply means 10 when the liquid inside the containment tank 6 has reached the maximum level height 7 of the same containment tank 6. As an example, such limitation means comprise a float, which is arranged for obstructing the supply means 10 when the liquid inside the same containment tank 6 has reached the maximum level height 7.

[0054] Preferably, the containment tank 6 is made of metallic material, e.g. stainless steel.

[0055] In addition, the containment tank 6 is placed at least partially below the lower wall 4 of the support structure 2.

[0056] More in detail, such containment tank 6 is preferably placed completely below the lower wall 4 of the support structure 2.

[0057] Otherwise, the containment tank 6 is placed mainly below the aforesaid lower wall 4 and partly projects within the same cooking chamber 3, traversing a suitable mounting opening made on the lower wall 4.

[0058] The aforesaid placement of the containment tank 6 facilitates the access of the steam flow into the

cooking chamber 4, and such steam flow naturally tends to flow upward. In addition, the heating means 8 comprise at least one electrical heating element 9, which is extended within the containment tank 6 on a lying plane α that is substantially horizontal and parallel to the lower wall 4.

[0059] Preferably, each electrical heating element 9 comprises at least one heating body 91, which is housed in the containment tank 6 and is arranged in order to generate heat by means of Joule effect and transfer the aforesaid heat to the liquid dose contained in the containment tank 6, an electrical power supply outlet 93, which is placed outside the containment tank 6 and is arranged for supplying electric current to the heating body 91, and a support body 92, which carries the aforesaid heating body 91 mounted thereon and the electrical power supply outlet 19 and is mechanically connected to the containment tank 6.

[0060] More in detail, the placement of the electrical heating element 9 of the heating means 8 on a substantially horizontal lying plane α allows placing each portion of the electrical heating element 9 at the same distance from the maximum level height 7 of the containment tank 6, and preferably proximal with respect to the latter, at which, during use, the surface of the liquid dose is situated.

[0061] In this manner, providing for the electrical heating element 9 on a lying plane α in proximity to the maximum level height 7, each steam bubble which is formed at the interface between electrical heating element 9 and liquid dose must follow only a brief section from the electrical heating element 9 to the maximum level height 7.

[0062] In addition, such particular placement of the electrical heating element 9 allows attaining a containment tank 6 having a reduced depth, which can therefore be placed below the lower wall 4 of the containment structure 2 without overall affecting the overall vertical size of the present oven 1.

[0063] According to the idea underlying the present invention, the containment tank 6 has a capacity of 0.5 - 3.8 dm^3 for the liquid dose and the electric power density per unit of volume of the containment tank 6, absorbed by the at least one electrical heating element 9, is comprised between 1.1 kW/dm^3 and 2.5 kW/dm^3.

[0064] Still according to the idea underlying the present invention, the containment tank 6 of the steam generation device 5 also comprises an upper cover 13 provided with at least one through opening 14, which is placed above the maximum level height 7 and places the interior of the containment tank 6 directly in fluid communication with the cooking chamber 3 of the support structure 2.

[0065] The reduced capacity of the containment tank 6, comprised between 0.5 and 3.8 dm^3, i.e. substantially comprised between 0.5 and 3.8 liters of water, in particular ensures that the liquid dose contained in the containment tank 6 has a reduced thermal inertia.

[0066] This means that, during the actuation of the heating means 8, the aforesaid liquid dose is easily brought to the boiling temperature by the electrical heating element 9.

[0067] The aforesaid reduced capacity, together with the electric power density absorbed per unit of volume comprised between 1.1 kW/dm^3 and 2.5 kW/dm^3, facilitates the transfer of heat from the electrical heating element 9 to the liquid dose, reducing the time necessary for boiling the liquid dose itself.

[0068] In particular, such characteristics effectively allow generating a great quantity of steam in a little time, and such steam has a temperature higher than that of boiling in atmospheric pressure conditions. Indeed, in operation, the great quantity of steam produced in a short time tends to be collected within the containment tank 6 between the maximum level height 7 and the upper cover 13 on which the through opening 14 is made above the same maximum level height 7, hence involving an increase of the air pressure within the containment tank 6 itself and an increase of the temperature at which the same liquid dose, in particular water, passes to the gaseous state. In operation, the same steam produced then naturally tends to access the cooking chamber 3, under the thrust of the same pressure thereof, without requiring the use of any fan downstream of the containment tank 6 and upstream of the cooking chamber 3 in order to suction the steam from the containment tank 6 and forcibly introduce it into the cooking chamber 3. More in detail, in addition, the same through opening 14 which places the interior of the containment tank 6 directly in fluid communication with the cooking chamber 3 ensures that the steam that exits from the containment tank 6 in order to access the cooking chamber 3 does not have to cross other areas of the oven 1, i.e. in particular it does not have to cross the technical space within which the fan of the oven 1 is placed. In particular, if the interior of the containment tank 6 was in fluid communication with the cooking chamber 3 through the technical space where the fan of the oven 1 is situated, such fan, when actuated, would generate a decrease of the air pressure within the containment tank 6, lowering - in a manner that is hard to control or know - the temperature at which the liquid dose inside the containment tank 6 evaporates.

[0069] More in detail, the containment tank 6 of the steam generation device 5 internally delimits a free interspace 15 extended between the maximum level height 7 and the upper cover 13.

[0070] In particular, therefore, the high quantity of steam produced by the electrical heating element 9 is capable of inducing, during use, in the free interspace 15 between the maximum level height 7 and the upper cover 13, an air pressure such to increase the temperature at which the liquid dose, which is situated in the containment tank 6, passes to the steam state.

[0071] Therefore, during use, the arrangement of an electrical heating element 9 with the above-described absorbed power characteristics, the sizing of the containment tank 6 and the use of an upper cover 13 with through opening 14 which places the interior of the containment tank 6 (i.e. in particular the free interspace 15) directly in

fluid communication with the cooking chamber 3 ensure that the steam produced by the steam generation device 5 has temperature higher than that of boiling of the liquid dose in atmospheric pressure conditions and, thus, allow executing an improved steam cooking of the foods placed in the cooking chamber 3.

[0072] In addition, more in detail, the supply means 10 allow continuously restoring the liquid dose in the containment tank 6, in order to meet the high quantity of liquid dose which passes to the steam state per unit of time and avoid that the user will have to manually and continuously fill up the same containment tank 6 with the liquid dose.

[0073] Preferably, the upper cover 13 comprises only one through opening 14, preferably circular and provided with a diameter at least equal to 30 mm, and still more preferably, substantially equal to 50 mm, in a manner such to allow an easy passage of the steam from within the containment tank 6 to the cooking chamber 3.

[0074] Otherwise, the upper cover 13 comprises multiple through openings 14, which are placed next to each other and each have diameter at least equal to several millimeters, e.g. comprised between 3 and 10 mm.

[0075] More in detail, the upper cover 13 with the at least one through opening 14 limits as much as possible that possible grease or residues can drip from the foods placed in the cooking chamber 3 and come to contaminate the liquid dose inside the containment tank 6.

[0076] In accordance with the first and second embodiments illustrated in the enclosed figures, the containment tank 6 advantageously comprises a box-like body provided with a bottom wall 11 and with a lateral wall 12 projectingly extended from the bottom wall 11 up to at least the maximum level height 7. In particular, the upper cover 13 is mechanically coupled to the lateral wall 12.

[0077] In accordance with the embodiments illustrated in the enclosed figures, at least part of the lateral wall 12 has extension, starting from the bottom wall 11, greater than the maximum level height 7, in a manner such that the upper cover 13 mounted thereon can delimit an empty space (i.e. in particular the free interspace 15) above the maximum level height 7 itself.

[0078] In accordance with a different embodiment not illustrated in the enclosed figures, the entire lateral wall 12 has extension, starting from the bottom wall 11, substantially equal to the maximum level height 7 and the upper cover 13 has at least one concavity, at which the through opening 14 is made and which is directed towards the bottom wall 11, in a manner such to delimit, above the maximum level height 7, an empty space (i.e. in particular the free interspace 15), in which, during use, the steam produced can be collected before flowing into the cooking chamber 3 through the through opening 14 itself.

[0079] Preferably, the upper cover 13 comprises multiple retention pins 21, projectingly extended from the upper cover 13 towards the bottom wall 11, and the box-like body of the containment tank 6 comprises at least one retention flange 22 on which multiple reception openings 23 can be made, which are engaged by the aforesaid retention pins 21 in order to maintain the upper cover 13 in position on the lateral wall 12. Advantageously, in order to maximize the surface of the liquid dose within the containment tank 6, the containment tank 6 has main extension in the two directions of the horizontal plane.

[0080] In particular, the width and the length of the containment tank 6 in plan view are advantageously of an order of magnitude greater than the depth of the containment tank 6.

[0081] Advantageously, the ratio between the horizontal section of the containment tank 6, at least at the maximum level height 7, and the volume of the containment tank 6 is substantially comprised between 1.8 and 3.2 dm^2/dm^3.

[0082] Such ratio between horizontal section and volume of the containment tank 6 allows obtaining a surface of the liquid dose that is much more extensive than the volume which the latter occupies, thus facilitating the passage of the steam from the liquid dose to the air.

[0083] In accordance with the first and second embodiments illustrated in the enclosed figures, the bottom wall 11 of the containment tank 6 has substantially rectangular shape and the lateral wall 12 is projectingly extended from the aforesaid bottom wall 11 substantially perpendicular thereto with four first sides 24 that are two-by-two parallel. Advantageously, the four first sides 24 together delimit a volume with substantially parallelepiped shape and determine a horizontal section of the containment tank 6 that is substantially rectangular, and preferably constant with the variation of the level of the liquid dose.

[0084] More in detail, the bottom wall 11 of the containment tank 6 has a width comprised between 210 mm and 250 mm and a length comprised between 260 mm and 300 mm. Preferably, the maximum level height 7 is placed at a distance from the bottom wall 11 which is comprised between 20 mm and 60 mm.

[0085] In accordance with the first embodiment of a steam generation device illustrated in the enclosed figures 2 to 6, the width of the containment tank 6 is substantially equal to 234 mm, its length is substantially equal to 280 mm, while the aforesaid distance between the maximum level height 7 and the bottom wall 11 is substantially equal to 40 mm.

[0086] In this manner, therefore, the volume delimited between the four first sides 24 is substantially equal to 2.6 dm^3, and is therefore adapted to contain a liquid dose slightly greater than 2.5 liters of water.

[0087] In addition, preferably, the surface of the aforesaid bottom wall 11 and the horizontal section of the containment tank 6 at the maximum level height 7 have a same extension of about 6.55 dm^2 and thus preferably determine a ratio between horizontal section and volume substantially equal to 2.55 dm^2/dm^3, the containment tank 6 having parallelepiped shape.

[0088] Advantageously, the lying plane α of the at least one electrical heating element 9 is placed at a distance

from the maximum level height 7 preferably lower than 55 mm and, preferably, substantially lower than 40 mm.

[0089] In accordance with the first embodiment, the aforesaid lying plane α is preferably placed at a distance from the maximum level height 7 substantially equal to 28 mm. In addition, since such maximum level height 7 is placed at about 40 mm from the bottom wall 11, in accordance with the preferred embodiment, the lying plane α of the electrical heating elements 9 is preferably also placed at about 12 mm from the bottom wall 11, in a manner such that the electrical heating elements 9 also heat the bottom wall 11.

[0090] In such a manner, the bottom wall 11 distributes the heat received from the electrical heating elements 9, this preferably being made of stainless steel with good thermal conductivity characteristics.

[0091] In accordance with the second embodiment of a steam generation device illustrated in the enclosed figures 7 to 10, the width and the length of the containment tank 6 are substantially equal respectively to 234 mm and 280 mm, such as for the first embodiment, while the distance between the maximum level height 7 and the bottom wall 11 is substantially equal to 50 mm, in a manner such that the volume delimited between the four first sides 24 is substantially equal to 3.2 dm^3 and thus adapted to contain a liquid dose slightly greater than 3.2 liters of water.

[0092] Therefore, since the containment tank 6 has parallelepiped shape, the ratio between horizontal section, both at the maximum level height 7 and at the bottom wall 11, and the volume is substantially equal to 2 dm^2/dm^3.

[0093] In addition, still in accordance with such second embodiment, the lying plane α of the at least one electrical heating element is placed at a distance from the maximum level height 7 substantially equal to 33 mm and, hence, also at about 17 mm from the bottom wall 11 in order to heat it in turn and better distribute the heat.

[0094] Preferably, the heating means 8 comprise two electrical heating elements 9, which are placed alongside each other within the containment tank 6 on a same lying plane α and are each adapted to absorb an electric power of about 2 kW.

[0095] Consequently, for the first embodiment, the electric power per unit of volume is preferably around 1.6 kW/dm^3, while for the second embodiment it is preferably around 1.25 kW/dm^3.

[0096] More in detail, the technical specifications reported above for the first and second embodiments of the heat generation device 5 allow obtaining a flow rate of produced steam substantially comprised between 180 and 220 g/min and, hence, on average of about 50 g/min for each kW of electric power absorbed by the electrical heating elements 9 of the heating means 8.

[0097] In order to bring the liquid dose substantially to the maximum level height 7 or maintain it there during use without the level of the liquid dose falling below the lying plane α of the electrical heating elements 9, the steam generation device 5 advantageously comprises a logic control unit (not illustrated) operatively connected at least to the supply means 10 in order to drive them to supply the containment tank 6 with the liquid. More in detail, the logic control unit advantageously comprises a timer module programmed for driving the supply means 10 at regular time intervals.

[0098] Preferably, the logic control unit comprises at least one printed circuit board and an electronic processor mounted on the aforesaid printed circuit board. In addition, the timer module is preferably integrated directly in the electronic processor of the logic control unit by means of a suitable functional software.

[0099] In particular, the time intervals set by the timer module are preferably adjusted with reference to the producible steam flow, in a manner such to compensate for the portion of liquid dose that has evaporated during use, i.e. in particular during the actuation of the at least one electrical heating element 9 with the containment tank 6 at least partially filled with the liquid.

[0100] Preferably, such timer module is programmed for controlling, at each minute, the supply means 10 to restore the liquid dose with a liquid flow rate of about 20 g/s for a time interval of 10 s.

[0101] Of course, without departing from the protective scope of the present invention, the introduction of the liquid dose within the containment tank 6 can be controlled in a different manner. For example, the steam generation device 5 can comprise at least one level sensor (not illustrated) placed within the containment tank 6, operatively connected to the logic control unit and arranged for sending a level signal to the logic control unit with the liquid within the containment tank 6 at a pre-established lower threshold level.

[0102] In such case, the logic control unit can be arranged for reading the level signal sent by the liquid level sensor and controlling the supply means 10, based on the aforesaid level signal, to restore the liquid dose to the maximum level height 7 with a specific quantity of liquid.

[0103] More in detail, such level sensor can for example be a pressure switch, which is placed within the containment tank 6 at the lower threshold level and arranged for detecting at least one pressure variation due to the passage of the surface of the liquid dose from above to below the aforesaid lower threshold level.

[0104] In addition, the steam generation device 5 preferably comprises a safety sensor (not illustrated), which is operatively connected to the logic control unit and is arranged for detecting a safety parameter and sending an alarm signal to the logic control unit itself with the aforesaid safety parameter which has reached a pre-established threshold value. In particular, such safety sensor is a temperature sensor, which is operatively connected to the logic control unit, is in thermal contact with the at least one electrical heating element 9 of the heating means 8 in order to detect the temperature thereof and is arranged for sending the aforesaid alarm signal to the

logic control unit with the temperature of the electrical heating element above the pre-established threshold value. More in detail, the aforesaid threshold value is set to a temperature greater than that of boiling of the water, e.g. 180°C.

[0105] In operation, in the event in which the surface of the liquid dose falls below the lying plane α and the supply means 10 are not driven to restore the liquid dose to the maximum level height 7, e.g. due to a failure or malfunctioning, the temperature sensor measures the temperature within the containment tank 6 and if the threshold value is exceeded it sends the alarm signal.

[0106] Preferably, the supply means 10 comprise at least one supply duct 25, which is at least partially extended within the containment tank 6 and terminates with at least one supply mouth 26 through which the liquid is supplied within the containment tank 6, in particular in order to re-establish the liquid dose at the maximum level height 7.

[0107] More in detail, the supply duct is extended along a main extension direction substantially parallel to the bottom wall 11 of the containment tank 6 and above the lying plane α of the at least one electrical heating element 9.

[0108] Preferably, the aforesaid supply duct 25 is placed in fluid communication with a water supply source, e.g. the water distribution system or a water tank, so as to provide water within the containment tank 6, which is made to evaporate by the heating means 8 in order to produce steam and steam cook the foods placed in the cooking chamber 3.

[0109] In addition, the supply means 8 preferably comprise a mixer (not illustrated), which is placed in fluid communication, on one side, with the supply duct 25 and on the other side with the water supply source and a tank of at least one cleaning substance.

[0110] In this manner, it is possible to selectively supply the containment tank with water or a cleaning mixture formed by water and at least one cleaning substance.

[0111] Preferably, the logic control unit is operatively connected to the mixer of the supply means 10 and is arranged for controlling them to selectively supply water or the cleaning mixture.

[0112] Therefore, in case of supplying a cleaning mixture, the electrical heating elements 9 of the heating means 8 transfer heat to the cleaning mixture, bringing it to evaporation and thus producing a cleaning steam flow, which is capable of cleaning the cooking chamber 3 of the containment structure 2, for example following the cooking of the foods.

[0113] Otherwise or in addition, the upper cover 13 of the box-like body of the steam generation device 5 preferably comprises an insertion opening 27, through which it is possible to manually insert a cleaning agent, thus in order to form the cleaning mixture. In addition, the box-like body of the steam generation device 5 preferably comprises a closure body 28, which is removably coupled to the upper cover 13 at the insertion opening 27 in order to selectively free or obstruct the aforesaid insertion opening 27, in particular so as to allow the manual introduction of the cleaning substance into the containment tank 6 through the insertion opening 27 and reclose it immediately afterward.

[0114] In accordance with the first and second embodiments illustrated in the enclosed figures, the steam generation device 5 advantageously comprises a first discharge duct 29, which is mechanically connected to the containment tank 6 and is extended starting from a first discharge opening 30 in fluid communication with the interior of the aforesaid containment tank 6, and a controllable valve 31, which is placed to intercept the first discharge duct 29 and is actuatable between an open configuration, in which the controllable valve 31 frees the discharge duct 29 in order to make the liquid dose flow from the containment tank 6, and a closed configuration, in which the controllable valve 31 obstructs the discharge duct 29 in order to retain the liquid dose within the containment tank 6.

[0115] Preferably, the first discharge opening 30 of the first discharge duct 29 is placed at the bottom wall 11.

[0116] In addition, the controllable valve 31 is preferably a solenoid valve, which is operatively connected to the logic control unit in order to be driven between the closed configuration and the open configuration.

[0117] Advantageously, so as to prevent the surface of the liquid dose from exceeding the maximum level height 7, the overflow opening 16 is made on the lateral wall 12 of the box-like body at the maximum level height 7.

[0118] Preferably, three of the first sides 24 of the lateral wall 12 of the box-like body are extended beyond the maximum level height 7, in a manner such to define the free interspace 15 together with the upper cover 13, and the remaining of the four first sides 24 is a leveling side 32 extended from the bottom wall 11 up to the maximum level height 7 in order to define a substantially rectangular overflow opening 16 and extended between the maximum level height 7 and the upper cover 13.

[0119] In addition, the steam generation device 5 preferably comprises a discharge space 33 mechanically coupled to the containment tank 6 and in fluid communication with the latter through the aforesaid overflow opening 16, such that the liquid that is in excess with respect to the maximum level height 7 flows from the containment tank 6 to the discharge space 33.

[0120] Preferably, the steam generation device 5 comprises a second discharge duct 34, which is mechanically connected to the discharge space 33 and is extended starting from a second discharge opening 35 in fluid communication with the interior of the aforesaid discharge space 33 in order to make the excess liquid that has crossed the overflow opening 16 from the containment tank 6 flow therethrough.

[0121] In addition, the first discharge duct 29 preferably comprises a first section 36, which is extended from the first discharge opening 30 to the controllable valve 31, and a second section 37, which is extended from the

controllable valve 31 to the second discharge duct 34 downstream of its second discharge opening 35.

[0122] Preferably, the aforesaid discharge space 33 comprises a containment body, which is provided with a terminal wall 38 and with a delimitation wall 39, which is extended projectingly from the aforesaid terminal wall 38.

[0123] Similar to the box-like body of the containment tank 6, the terminal wall 38 of the containment body 6 of the discharge space 33 has substantially rectangular shape, or alternatively square shape, and the delimitation wall 39 is extended projectingly from the aforesaid terminal wall 38 substantially perpendicular thereto with four second sides 40 that are two-by-two parallel.

[0124] In order to facilitate the assembly of the steam generation device 5, at least the bottom wall 11 and the terminal wall 38 are preferably made in a single body, e.g. by means of a single plate, and the two first sides 24 adjacent to the leveling side 32 are made in a single body, each with a second side 40 adjacent to the leveling side 32.

[0125] In addition, the leveling side 32 is preferably in common with the lateral wall 12 and with the delimitation wall 39.

[0126] In accordance with the first and second embodiments illustrated in the enclosed figures, the upper cover 13 of the box-like body of the containment tank 6 is extended to also cover the discharge space 33 and is mechanically coupled also to the delimitation wall 39 of the containment body of the discharge space 33, at least two of the first sides 24 of the lateral wall 12 being made in a single body with two corresponding second sides 40 of the delimitation wall 39.

[0127] In addition, the through opening 14 of the upper cover 13, through which the steam flow flows into the cooking chamber 3, is preferably made above the discharge space 33.

[0128] In operation, the steam flow produced is thus collected in the free interspace 15 of the containment tank 6 between maximum level height 7 and upper cover 13, flows through the overflow opening 16 made on the lateral wall 12 in order to access the discharge space 33 and exits therefrom through the through opening 14 of the upper cover 13.

[0129] In this manner, in case of fall of dirt and/or of foreign bodies during the cooking through the through opening 14 of the upper cover 13, these are not deposited within the containment tank 6, contaminating the liquid dose, but are deposited within the discharge space 33, where they can be removed by the possible excess liquid that crosses the overflow opening 16 and flows into the second discharge opening 35.

[0130] In accordance with the second embodiment, the steam generation device 5 advantageously comprises ventilation means 60 in fluid communication with the containment tank 6 and arranged for insufflating an air flow within the containment tank 6.

[0131] In particular, the air flow insufflated by the ventilation means 60 within the containment tank 6 involves an increase of the air pressure within the same containment tank 6, thus facilitating the passage of the steam flow generated by the heating means 8 to the cooking chamber 3 of the present oven 1.

[0132] In addition, since the air pressure within the containment tank 6 can be increased by simply actuating the ventilation means 60, also the temperature at which the liquid dose boils can be slightly increased with respect to the temperature at which the same liquid dose would boil in the case of pressure equal to atmospheric pressure.

[0133] More in detail, the ventilation means 60 comprise at least one ventilator (not illustrated) in order to generate the air flow and an insufflation duct 62 extended between such ventilator and the containment tank 6 in order to introduce the air flow within the latter. In addition, the containment tank 6 advantageously comprises at least one insufflation opening 63 connected to the insufflation duct 62 in order to allow the entrance of the aforesaid air flow at its interior.

[0134] Preferably, the insufflation opening 63 is made on the lateral wall 12 of the containment tank 6, for example on the first side 24 to which the support bodies 92 of the electrical heating elements 9 are coupled and above such electrical heating elements 9.

[0135] In particular, the insufflation opening 63 is at least partially extended above the maximum level height 7 in order to introduce the air flow into the free interspace 15 between the maximum level height 7 and the upper cover 13.

[0136] Advantageously, the containment tank 6 comprises a barrier 64 provided with at least one first wall 65 extended frontally with respect to the insufflation opening 63, preferably parallel to the first side 24 on which the same is made, with vertical extension lower than that of the insufflation opening 63.

[0137] More in detail, such barrier 64, being placed across from the insufflation opening 63 with lower vertical extension, allows the entrance of the air flow produced by the ventilation means 60 but, when the ventilation means 60 are not activated, it at least partly obstructs the passage of the steam flow from within the containment tank 6 to the insufflation duct 62 through the insufflation opening 63.

[0138] In accordance with the second embodiment, the insufflation opening 63 is partly extended also below the maximum level height 7 and the barrier 64 comprises at least one second wall 66 extended between the lateral wall 12, in particular the first side 24 on which the insufflation opening 63 is made, and the first wall 65, so as to prevent the liquid dose from flowing from the containment tank 6 to the insufflation duct 62 through the insufflation opening 63 part that is extended below the maximum level height 7.

[0139] More in detail, as illustrated in the enclosed figures 9 and 10, the insufflation opening 63 has extension along a horizontal direction that is smaller than the width of the containment tank 6 and the second wall 66 of the

barrier 64 comprises a smaller side 67, substantially parallel to the bottom wall 11, and two lateral flanks 68, which are extended transverse to the aforesaid smaller side 67, to the first wall 65 of the same barrier 64 and to the first side 24 on which the insufflation opening 63 is made, so as to isolate the latter from the liquid dose.

[0140] Advantageously, the insufflation duct 62 comprises an initial section 69, provided with a first transverse section and connected to the ventilator, and a plenum section 70, which is provided with a second transverse section having extension greater than the first transverse section and connected to the insufflation opening 63.

[0141] In particular, such plenum section 70 reduces possible turbulences of the air flow, reducing the speed thereof before it traverses the insufflation opening 63 and accesses the containment tank 6, i.e. in particular the free interspace 15.

[0142] Preferably, the ventilation means 60 comprise a check valve 71 placed to intercept the insufflation duct 62, which is arranged for allowing the passage of the air flow with the ventilator activated and for preventing the steam flow from flowing through the insufflation duct 62 with the ventilator deactivated.

[0143] In particular, such check valve 71 is placed to intercept the aforesaid insufflation duct 62 at its initial section 69.

[0144] More in detail, the check valve 71 can be driven between a passage configuration, in which the check valve 71 frees the insufflation duct 62 in order to allow the air flow to flow through the latter when the ventilator is activated, and an obstruction configuration, in which the check valve 71 obstructs the insufflation duct 62 when the ventilator is deactivated in order to prevent the steam flow from flowing through the insufflation duct 62 itself.

[0145] Preferably, the ventilation means 60 are operatively connected to the logic control unit and the logic control unit is arranged for selectively controlling the aforesaid ventilation means 60 to insufflate the air flow within the containment tank 6.

[0146] In particular, the ventilator and the check valve 71 are operatively connected to the aforesaid logic control unit, which is arranged for driving the check valve 71 into passage configuration with the ventilator activated and for driving the check valve 71 into obstruction configuration with the ventilator deactivated.

[0147] Also forming the object of the present invention is a steam generation device 5 for an oven 1 for cooking foods, advantageously of the type described up to now and regarding which the same numeric reference numbers will be maintained for the sake of description simplicity.

[0148] In the present description, all the characteristics described with reference to the steam generation device 5 of the oven 1 for cooking foods must be intended as referable without variations also to only the steam generation device 5, object of the present invention.

[0149] The steam generation device 5, object of the invention, is intended to be mechanically associated with a support structure 2 of an oven 1 for cooking foods and to be placed in fluid communication with a cooking chamber 3 at least partially delimited by the aforesaid support structure 2 in order to introduce a steam flow at its interior.

[0150] Such steam generation device 5 is provided with a containment tank 6 for containing a liquid dose, and such containment tank is provided with a maximum level height 7, and with heating means 8, which are at least partially housed in the containment tank 6 in order to generate the steam flow.

[0151] In addition, the steam generation device 5 is provided with supply means 10 for supplying the liquid in the containment tank 6 in order to restore the liquid dose substantially to the maximum level height 7.

[0152] The containment tank 6 is also intended to be placed below a lower wall 4 of the support structure 2 of the oven 1 for cooking foods.

[0153] The heating means 8 comprise at least one electrical heating element 9, which is extended within the containment tank 6 on a lying plane α that is substantially horizontal and intended to be placed parallel to the lower wall 4.

[0154] According to the idea underlying the present invention, the containment tank 6 has a capacity of 0.5-3.8 dm^3 for the liquid dose and the electric power density per unit of volume of containment tank 6, absorbed by the at least one electrical heating element 9, is comprised between 1.3 kW/dm^3 and 2.5 kW/dm^3.

[0155] In addition, still according to the idea underlying the present invention, the containment tank 6 comprises an upper cover 13 provided with at least one through opening 14 placed above the maximum level height 7 and arranged for placing the interior of the containment tank 6 directly in fluid communication with the cooking chamber 3 of the support structure 2.

[0156] The oven 1 for cooking foods and the steam generation device 5 thus conceived therefore achieve the pre-established objects.

Claims

1. Oven for cooking foods, which comprises:

- a support structure (2) at least partially delimiting a cooking chamber (3) and provided with a lower wall (4);
- a steam generation device (5), which is mechanically associated with said support structure (2), is placed in fluid communication with the cooking chamber (3) in order to introduce a steam flow in said cooking chamber (3) and is provided with:

  - a containment tank (6) for containing of a liquid dose, said containment tank (6) being provided with a maximum level height (7);
  - heating means (8), which are at least par-

tially housed within said containment tank (6) in order to generate said steam flow;
- supply means (10) for supplying said liquid into said containment tank (6) in order to restore said liquid dose substantially at said level height (7);

said containment tank (6) being placed at least partially below the lower wall (4) of said support structure (2);

said heating means (8) comprising at least one electrical heating element (9), which is extended within said containment tank (6) on a lying plane (α) that is substantially horizontal and parallel to said lower wall (4);
said oven (1) for cooking foods being **characterized in that** said containment tank (6) has a capacity of 0.5 - 3.8 dm^3 for said liquid dose;
the electric power density per unit of volume of said containment tank (6), absorbed by said at least one electrical heating element (9), being comprised between 1.1 kW/dm^3 and 2.5 kW/dm^3;
the containment tank (6) of said steam generation device (5) also comprising an upper cover (13) provided with at least one through opening (14), which is placed above said maximum level height (7) and places the interior of said containment tank (6) directly in fluid communication with the cooking chamber (3) of said support structure (2).

2. Oven for cooking foods according to claim 1, **characterized in that** said containment tank (6) has main extension in the two directions of the horizontal plane.

3. Oven for cooking foods according to claim 2, **characterized in that** the ratio between the horizontal section of said containment tank (6) at at least said maximum level height (7) and the volume of said containment tank (6) is substantially comprised between 1.8 and 3.2 dm^2/dm^3.

4. Oven for cooking foods according to any one of the preceding claims, **characterized in that** said steam generation device (5) comprises at least one logic control unit operatively connected at least to said supply means (10) in order to drive them to supply said containment tank (6) with said liquid.

5. Oven for cooking foods according to claim 4, **characterized in that** said logic control unit comprises a timer module programmed for driving said supply means (10) at regular time intervals.

6. Oven for cooking foods according to any one of the preceding claims, **characterized in that** the containment tank (6) of said steam generation device (5) internally delimits a free interspace (15) extended between said maximum level height (7) and said upper cover (13).

7. Oven for cooking foods according to any one of the preceding claims, **characterized in that** the containment tank (6) of said steam generation device (5) comprises at least one overflow opening (16) placed at said maximum level height (7) and adapted to make said liquid exit from said containment tank (6) when the liquid reaches said maximum level height (7).

8. Oven for cooking foods according to any one of the preceding claims, **characterized in that** said containment tank (6) comprises a box-like body provided with at least one bottom wall (11) and with at least one lateral wall (12) projectingly extended from said bottom wall (11) up to at least said maximum level height (7);
said upper cover (13) being mechanically coupled to said lateral wall (12).

9. Oven for cooking foods according to claim 7 and 8, **characterized in that** said at least one overflow opening (16) is made on said lateral wall (12) at said maximum level height (7).

10. Oven for cooking foods according to any one of the preceding claims, **characterized in that** said steam generation device (5) comprises ventilation means (60) in fluid communication with said containment tank (6) and arranged for insufflating an air flow within said containment tank (6).

11. Steam generation device (5) for an oven for cooking foods, which is intended to be mechanically associated with a support structure (2) for said oven (1) for cooking foods and to be placed in fluid communication with a cooking chamber (3) at least partially delimited by said support structure (2) in order to introduce a steam flow in said cooking chamber (3) and is provided with:

- a containment tank (6) for containing liquid dose, said containment tank (6) being provided with a maximum level height (7);
- heating means (8), which are at least partially housed in said containment tank (6) in order to generate said steam flow;
- supply means (10) for supplying said liquid in said containment tank (6) in order to restore said liquid dose substantially to said maximum level height (7);

said containment tank (6) being intended to be

placed at least partially below a lower wall (4) of said support structure (3) of said oven (1) for cooking foods;

said heating means (8) comprising at least one electrical heating element (9), which is extended within said containment tank (6) on a lying plane (α) that is substantially horizontal and intended to be placed parallel to said lower wall (4);
said steam generation device (5) being **characterized in that** said containment tank (6) has a capacity of 0.5-3.8 dm^3 per said liquid dose;
the electrical power density per unit of volume of said containment tank (6), absorbed by said at least one electrical heating element (9), being comprised between 1.3 kW/dm^3 and 2.5 kW/dm^3;
the containment tank (6) of said steam generation device (5) also comprising an upper cover (13) provided with at least one through opening (14) placed above said maximum level height (7) and arranged in order to place the interior of said containment tank (6) directly in fluid communication with the cooking chamber (3) of said support structure (2).

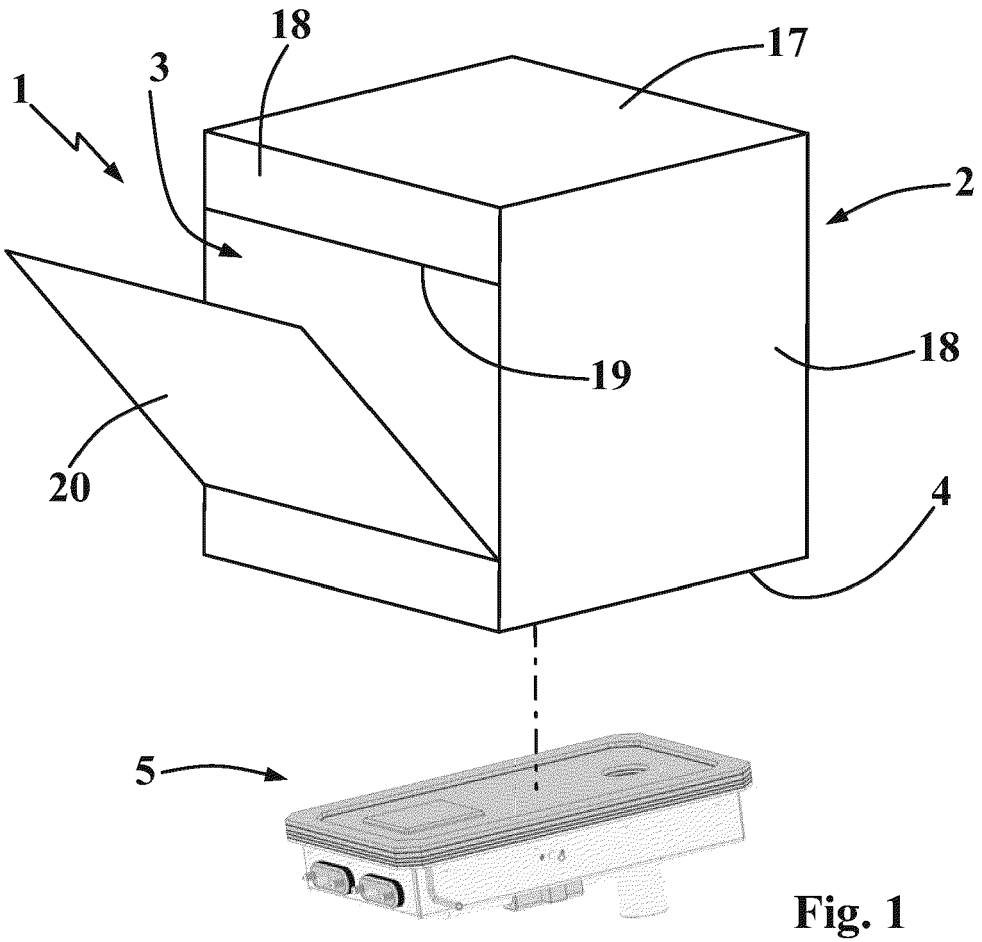

Fig. 1

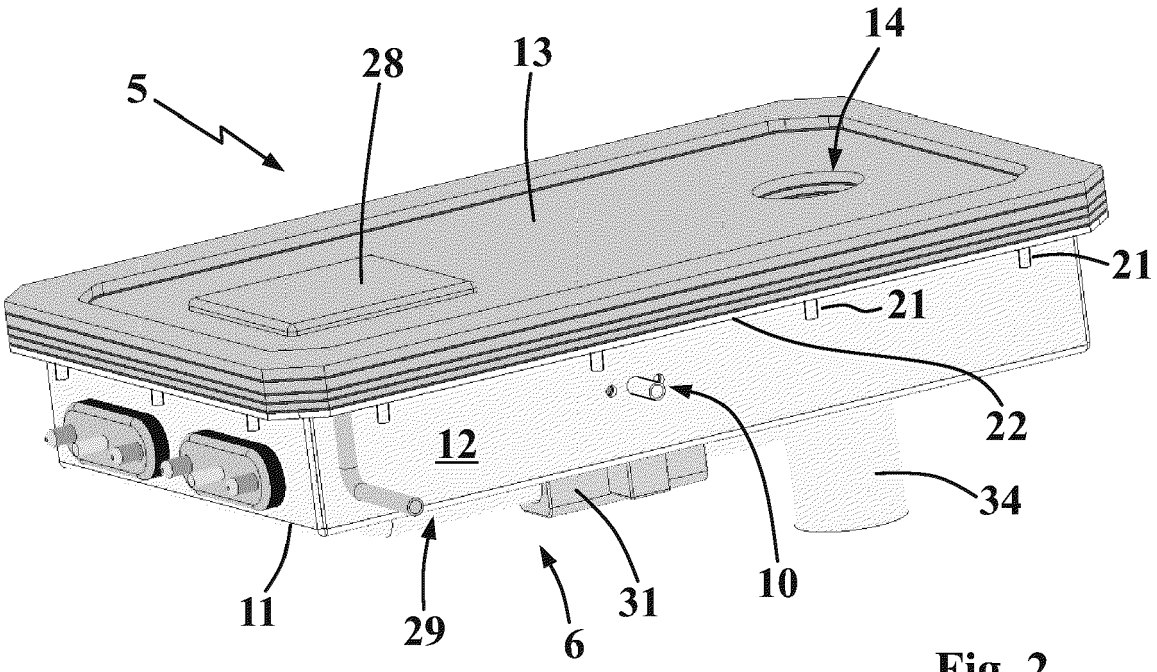

Fig. 2

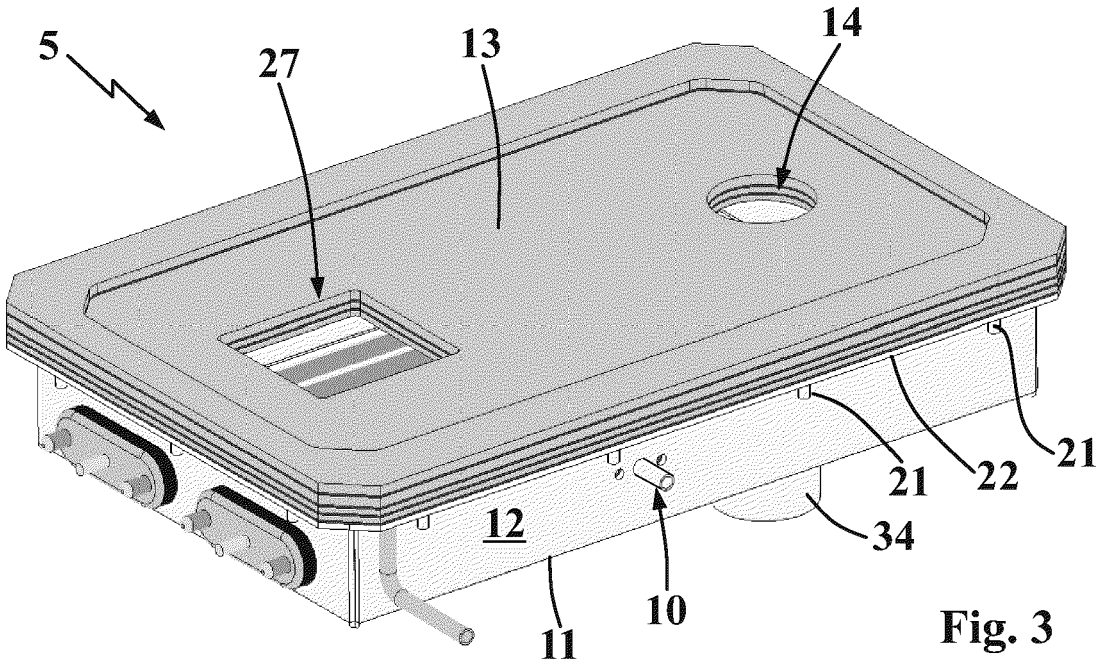
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Fig. 3

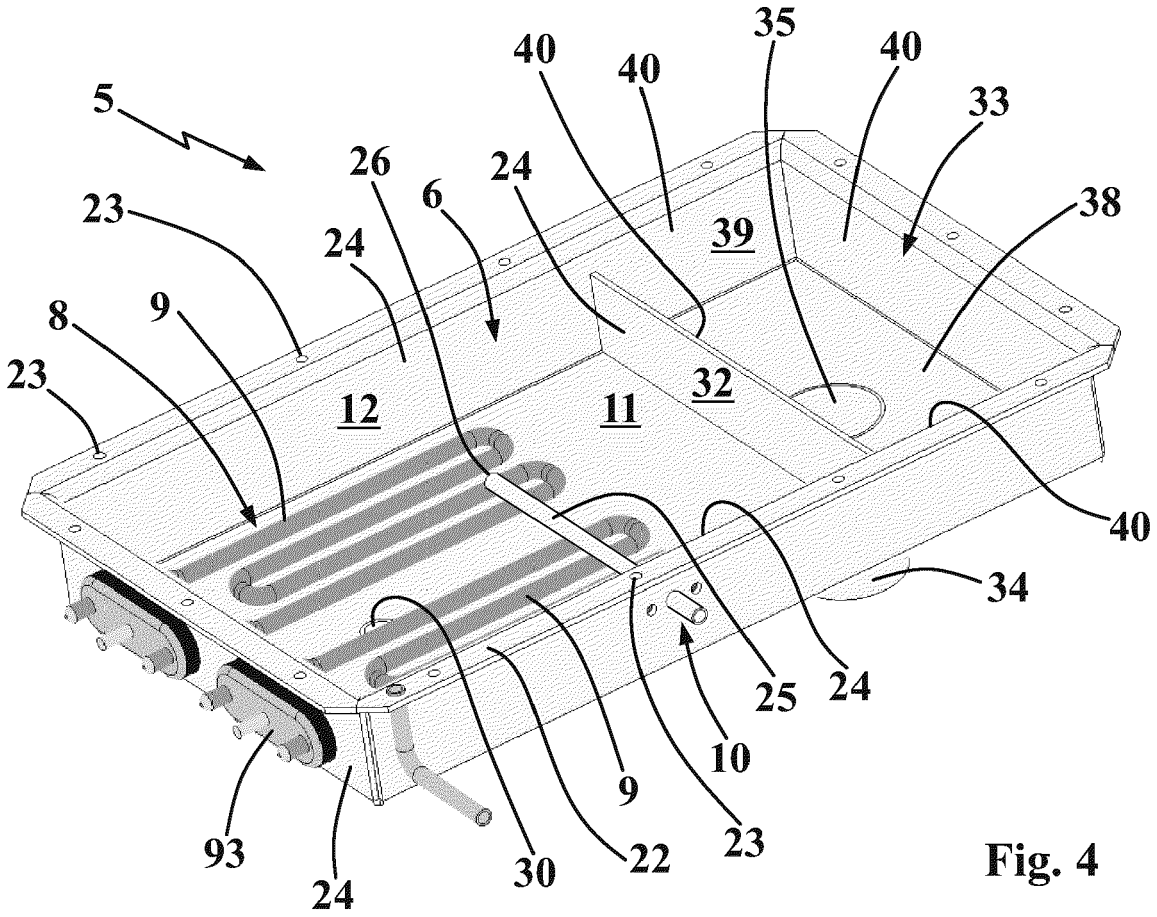
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Fig. 4

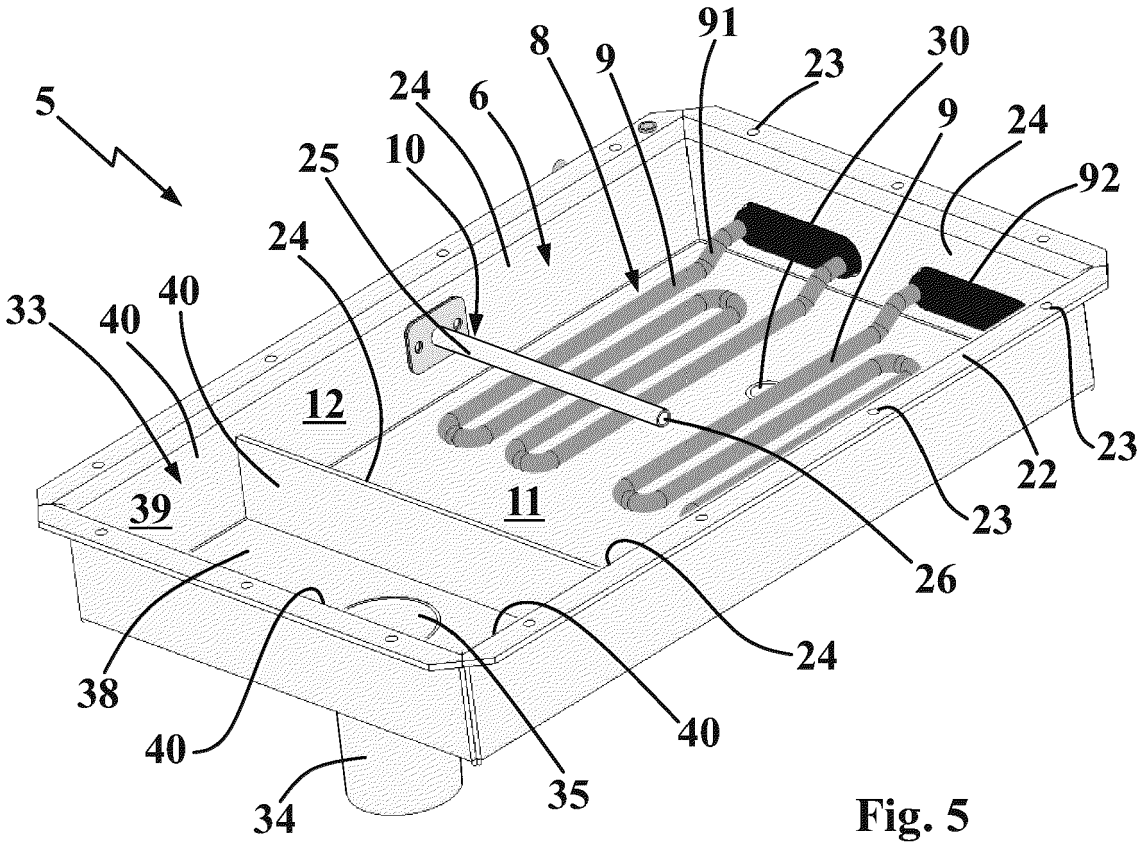
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Fig. 5

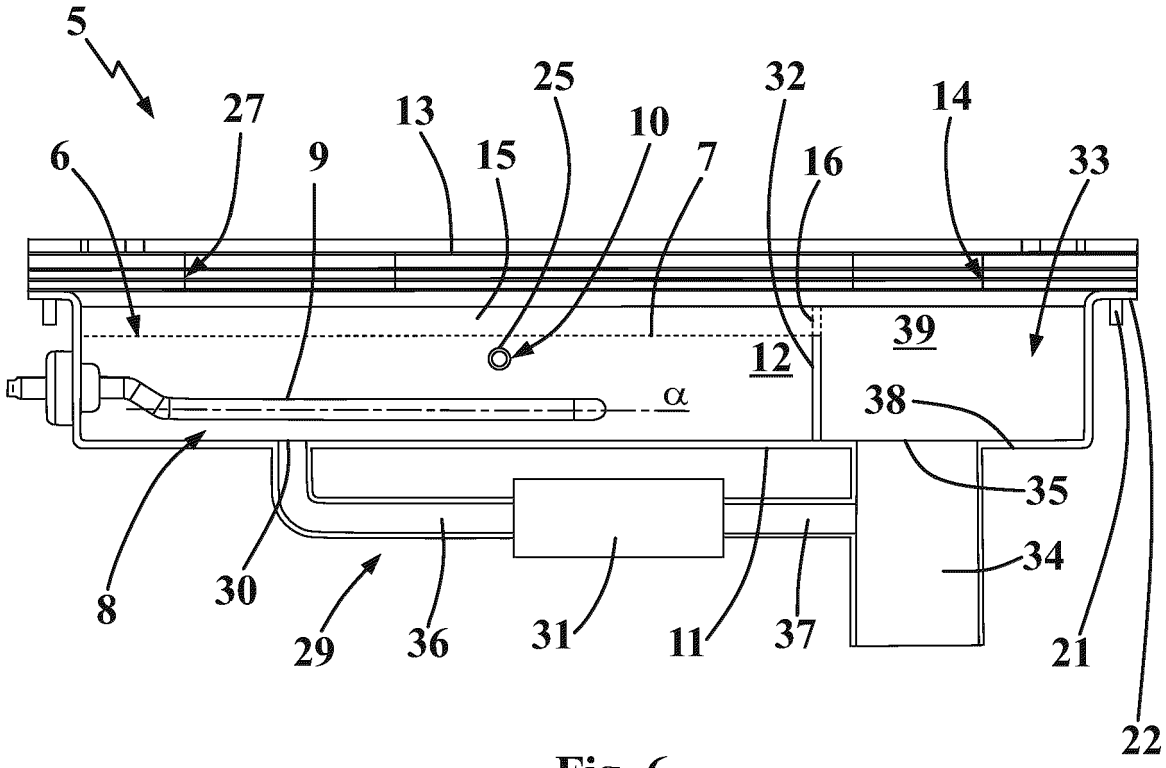
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Fig. 6

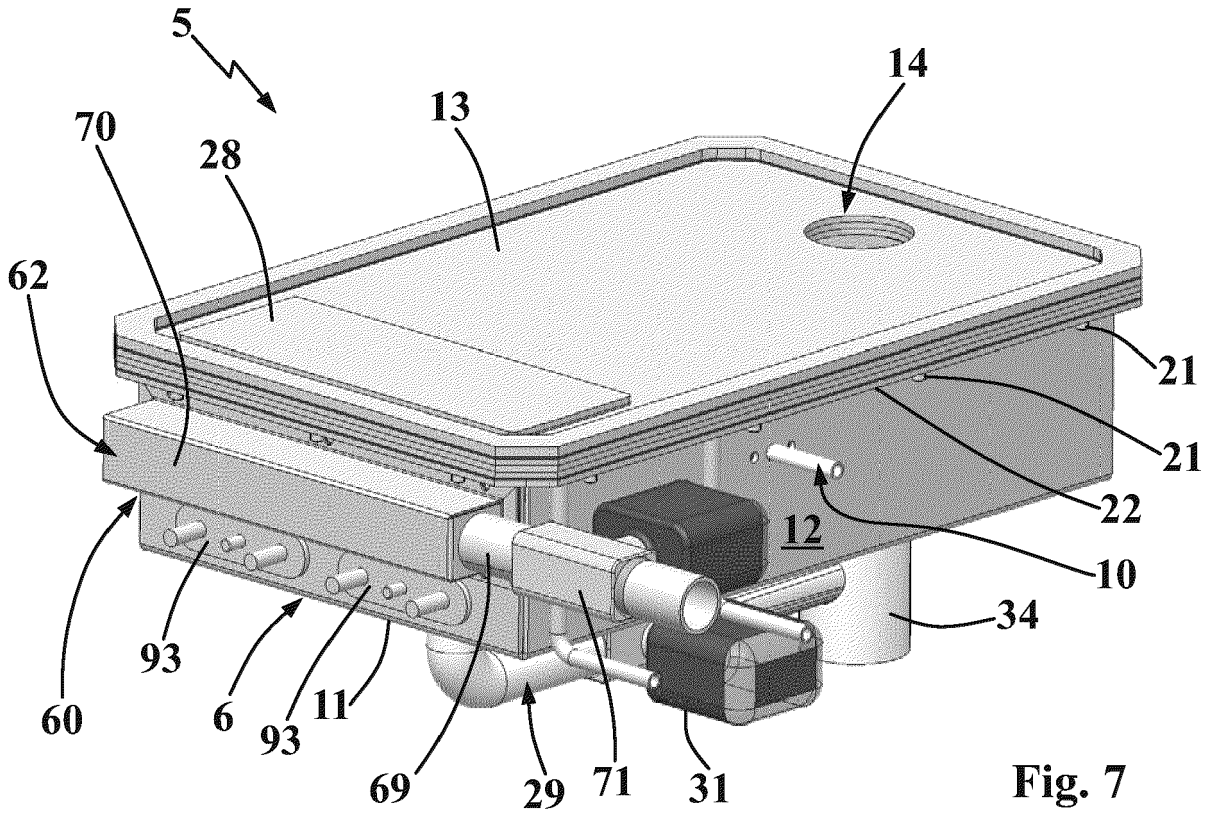
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Fig. 7

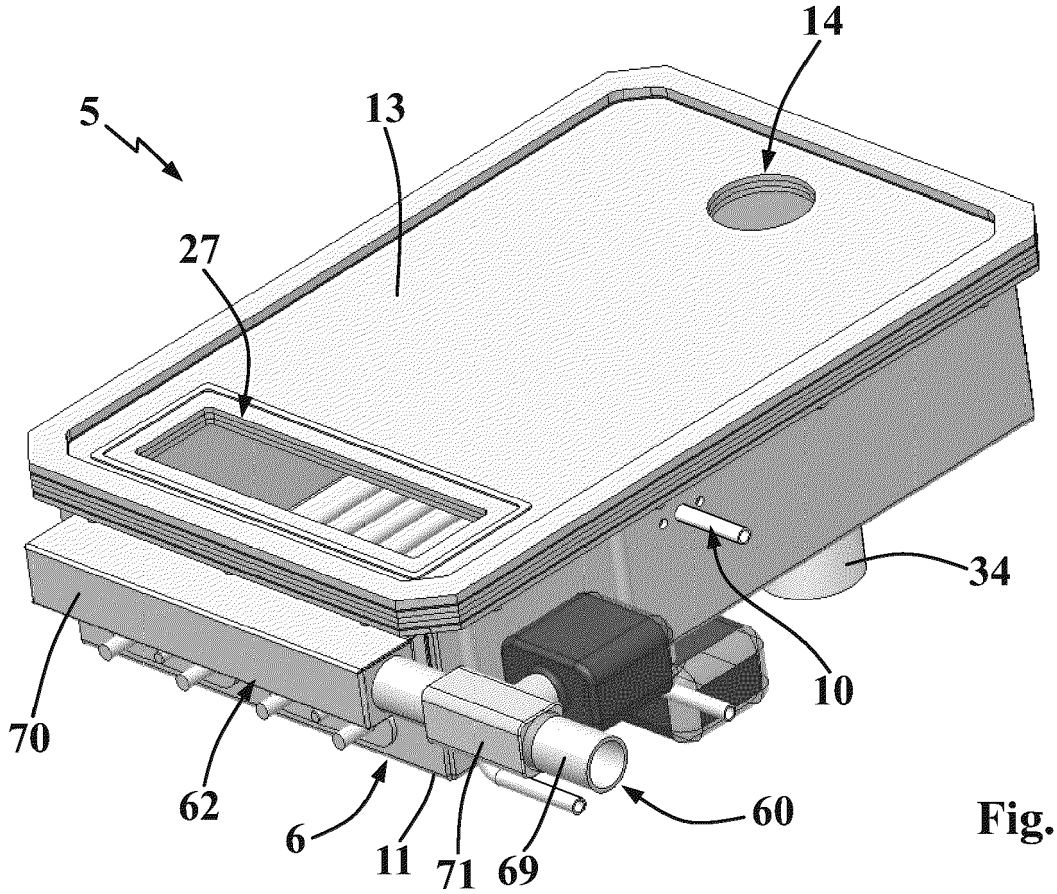
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Fig. 8

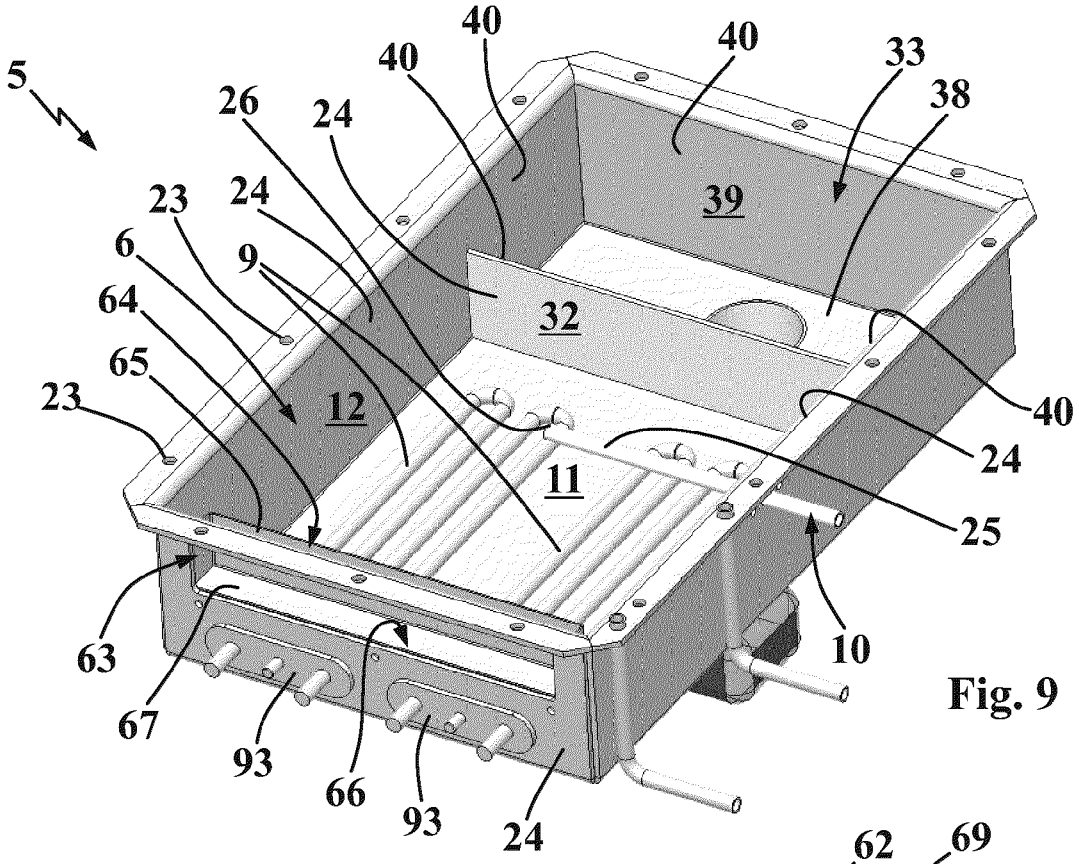
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Fig. 9

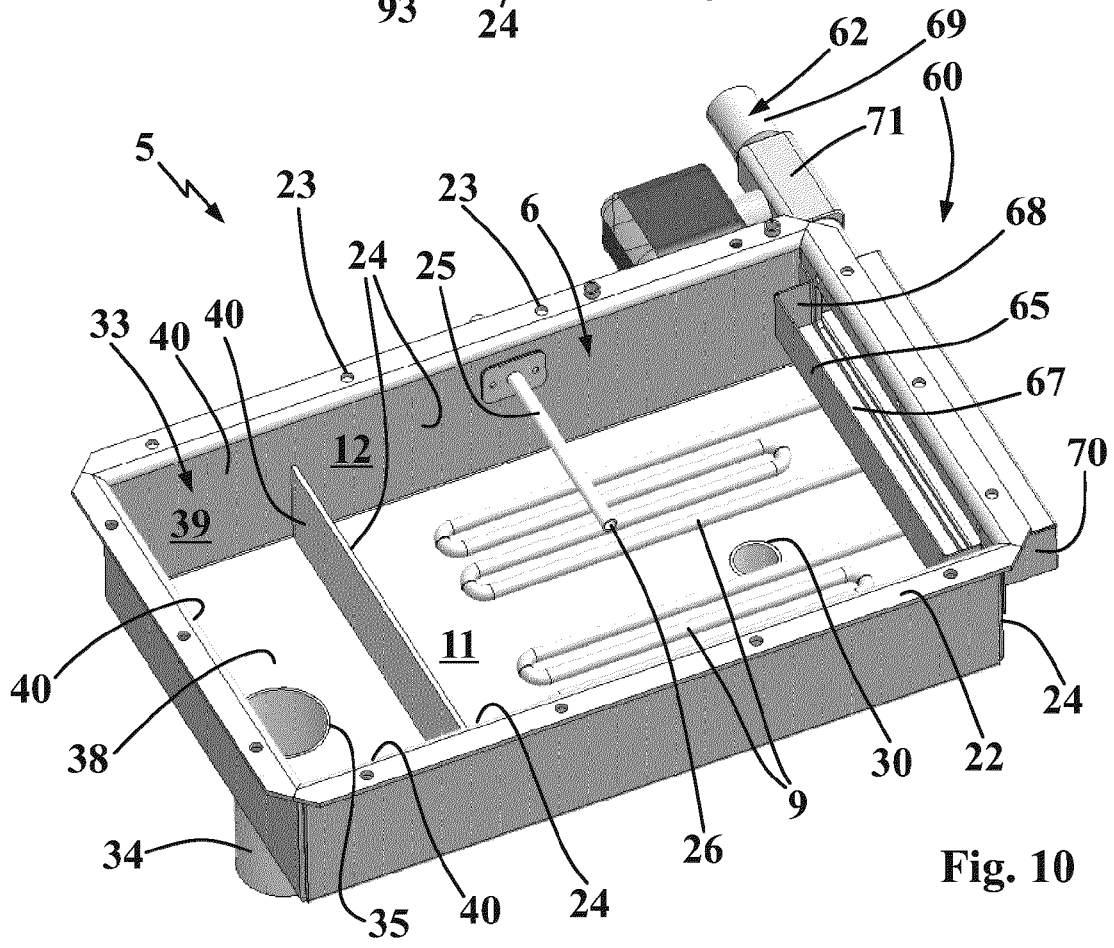
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Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 22 16 4821

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 037 183 A1 (TEKA PORTUGAL S A [PT]) 18 March 2009 (2009-03-18) * figures 1-5 *	1-11	INV. F24C15/32
A	EP 3 531 028 A1 (SMEG SPA [IT]) 28 August 2019 (2019-08-28) * figures 1, 3 * * paragraph [0040] *	1-11	
A	GB 2 218 328 A (E & R MOFFAT LIMITED [GB]) 15 November 1989 (1989-11-15) * page 1, line 2 - page 1, line 6 * * figure 1 * * page 5, line 26 - page 5, line 29 *	1-11	
A	CA 2 484 213 C (CLEVELAND RANGE INC [US]) 13 April 2010 (2010-04-13) * figures 1-3 *	1-11	
Y	EP 1 975 517 A2 (EGO ELEKTRO GERAETEBAU GMBH [DE]) 1 October 2008 (2008-10-01) * paragraph [0022]; figure 4 *	10	TECHNICAL FIELDS SEARCHED (IPC) F24C
Y	JP 2008 307077 A (PANASONIC CORP) 25 December 2008 (2008-12-25) * figure 1 * * paragraphs [0037], [0038] *	1-11	
Y	EP 2 543 932 A1 (STEEL S R L [IT]) 9 January 2013 (2013-01-09) * figures 1, 2, 4 * * paragraphs [0001], [0035], [0036], [0054] *	1-11	
A	WO 2016/034240 A1 (ELECTROLUX APPLIANCES AB [SE]) 10 March 2016 (2016-03-10) * page 5, line 17 - page 5, line 22 *	1-11	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 July 2022	Jalal, Rashwan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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& : member of the same patent family, corresponding document

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EUROPEAN SEARCH REPORT

Application Number
EP 22 16 4821

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	EP 2 484 211 A1 (MIELE & CIE [DE]) 8 August 2012 (2012-08-08) * the whole document * -----	1-11	
Y	US 5 869 812 A (CREAMER KURT S [US] ET AL) 9 February 1999 (1999-02-09) * figure 2 * * column 2, line 55 - column 2, line 65 * * column 3, line 28 - column 3, line 35 * -----	9	
			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 July 2022	Jalal, Rashwan

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