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(54) COOKING OVEN WITH AN AUTOMATIC OR SEMIAUTOMATIC CLEANING SYSTEM

(57) The present invention is related to a cooking oven (1) comprising:
- a cooking chamber (2) wherein foodstuffs can be placed for being cooked, comprising an upper wall (23); - a heating device (8) for heating the internal of the cooking chamber (2); - a suction wall (18) separating the cooking chamber (2) from a heating chamber (19) containing, at least partially, the heating device (8); - a centrifugal fan (20), positioned in the heating chamber (19) and configured for circulating an airflow through the cooking chamber (2) and the heating chamber (19); wherein the suction wall comprises a suction mouth (18a) facing a central region of the centrifugal fan (20), wherein the cooking oven (1) comprises: - a cleaning system (70) comprising a washing/rinsing liquid introduction system (16) configured for taking washing/rinsing liquid within the cooking chamber (2) and provided with an outlet (16c) positioned in the upper wall (23) of the cooking chamber (2), wherein the cooking oven (1) comprises:
- a diverting element (24) configured for receiving a liquid (900) exiting the outlet (16c) of the washing/rinsing liquid introduction system (16) and for spreading it on the suction wall (18) so as to form a liquid film (910) on it, which is taken by gravity into the suction mouth (18a).

The invention also relates to a method for operating such an oven, comprising the following steps: - taking a washing/rinsing liquid within the cooking chamber (2) of the cooking oven (1) via the outlet (16c) of the washing/rinsing liquid introduction system (16) of the cleaning system (70) of the cooking oven (1); - receiving, by the diverting element (24), the washing/rinsing liquid exiting the outlet (16c); - spreading, by the diverting element (24), the received washing/rinsing liquid on the suction wall (18) so as to form a liquid film (910) on it, which is taken by gravity into the suction mouth (18a); - activating the centrifugal fan (20) so as to suck the washing/rinsing liquid in form of the liquid film (910), and to blow radially the washing/rinsing liquid in form of droplets together with the generated airflow (950).

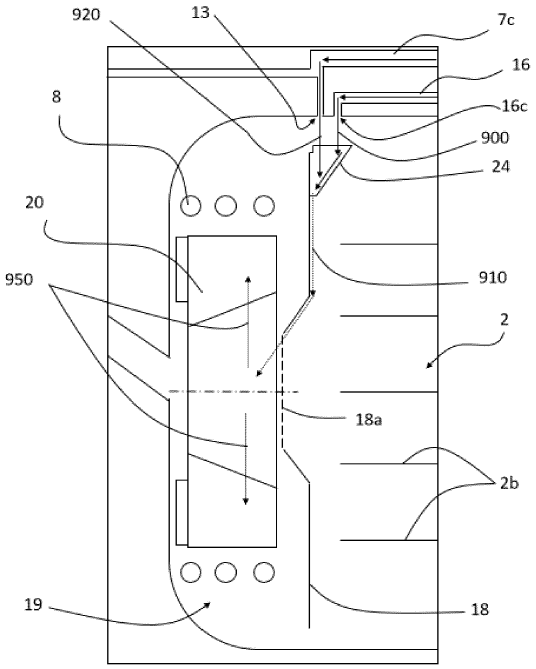

Fig. 11

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Description

[0001] The present invention relates to a cooking oven with an automatic or semiautomatic cleaning system, and in particular to a "professional" oven, i.e. and oven used mainly in professional activities, like restaurants, canteens, hotels, etc.

[0002] The invention also relates to a method for cleaning such an oven.

[0003] It is underlined that "semiautomatic" means comprising both automatic operations, i.e. operations performed automatically by the oven (e.g. controlled by the electronic board of the oven controlling also the cooking procedure), and manual operations, i.e. operations performed manually by a user, like for example loading additives, opening and closing valves, etc.

[0004] Typically, professional ovens for foodstuffs comprise a housing, typically made of steel, containing a cooking chamber wherein foodstuffs can be placed for being cooked.

[0005] The cooking chamber is frequently provided with removable trays or racks, where food and/or pots or backing trays containing foodstuff can be placed.

[0006] The cooking chamber is typically parallelepipedal, and it is provided with a bottom wall wherein the grease dripping from foodstuff during the cooking is collected, and periodically drained via a cooking chamber outlet fluidly connected, typically via a valve, to a grease container external to the oven.

[0007] The oven is also provided with a heating device, e.g. an electric heater, or a gas heater, configured for heating the internal of the cooking chamber.

[0008] Known ovens also comprise a suction wall separating the cooking chamber from a heating chamber containing, at least partially, the heating device, and, a centrifugal fan configured for circulating an airflow through the cooking chamber and the heating chamber.

[0009] Air is sucked from cooking chamber by the fan via a suction mouth provided in the central region of the suction wall, and then blown radially through the heating chamber, where it contacts the heating device; heated air is then blown into the cooking chamber mainly via gaps provided (preferably laterally) between the suction wall and the cooking chamber walls and/or via openings provided in the suction wall.

[0010] The cooking chamber needs to be periodically cleaned (e.g. washed, degreased, descaled) in order to ensure hygiene and to preserve its correct functioning.

[0011] A manual cleaning is burdensome and requires much time.

[0012] In order to automatically or semiautomatically cleaning the internal of the cooking chamber, some known ovens are provided with an automatic cleaning system adapted for taking a cleaning liquid (e.g. water mixed with an additive, for example a degreaser, or rinsing liquid) within the cooking chamber, so that this cleaning liquid contacts and cleans (e.g. degreases, rinses, etc.) the internal surfaces of the cooking chamber.

[0013] In some known solutions, the cleaning liquid is sprayed directly in a central region of the centrifugal fan via a pipe ending with a nozzle positioned within the cooking chamber and facing the central suction mouth of the suction wall. The cleaning liquid, sucked by the fan is then spread by the centrifugal fan all over the cooking chamber.

[0014] This solution has however the drawback that the nozzle and the pipe for taking the cleaning liquid to the fan, face the suction mouth, and therefore, during the cooking process, they disturb the air flux generated by the fan, negatively affecting the uniformity of the temperature in the cooking chamber, in particular in the central region of the cooking chamber (where the foodstuffs is typically positioned); it is underlined that temperature uniformity within the cooking chamber is particularly relevant in order not to negatively affect the cooking process.

[0015] In addition, the presence of the nozzle and its pipe in the central region of the cooking chamber reduces the internal volume available for the foodstuffs to be cooked.

[0016] In addition, the direct spraying of the cleaning liquid against the fan causes an annoying noise.

[0017] The aim of the invention is therefore to provide a cooking oven provided with an automatic or semiautomatic cleaning system which ensures an optimal cleaning of the cooking chamber without affecting, or only marginally affecting, the thermal uniformity within the cooking chamber during the cooking process.

[0018] Within this aim, another object of the invention is to provide a cooking oven having an automatic or semiautomatic cleaning system which doesn't reduce, or only marginally reduces, the volume of the cooking chamber available for the foodstuffs to be cooked. Another object of the invention is obtaining a solution for cleaning a cooking oven which is relatively silent.

[0019] Applicant has found that by providing a diverting element configured for receiving a liquid exiting the outlet, positioned in an upper wall of the cooking chamber, of a washing/rinsing liquid introduction system configured for taking a washing/rinsing liquid within the cooking chamber, the diverting element being also configured for spreading such a liquid on a suction wall separating the cooking chamber of the oven from a heating chamber containing at least partially an heating device, the spread liquid forming, on the suction wall, a liquid film which is taken by gravity to a suction mouth provided in the suction wall and facing the centrifugal fan, the washing/rinsing liquid can be effectively supplied to the central region of the fan without the need of positioning a nozzle and its pipe directly facing the suction mouth, and therefore without negatively affecting the airflow (and therefore the thermal uniformity) during the cooking process, and without reducing the volume within the central region of the cooking chamber available for the foodstuffs.

[0020] It is underlined, that in the present application *"by gravity"* means due only to the gravity force, so without the need of a dedicated fluid moving device, like for

example a pump, a fan, etc.

[0021] In addition, since the washing/rinsing liquid is sucked by the centrifugal fan in the form of a liquid film, without any jet of liquid hitting directly the fan, the noiselessness of the inventive solution is much higher than the prior art.

[0022] Thanks to the invention, washing/rinsing liquid can exit the outlet of the washing/rinsing liquid introduction system positioned in the upper wall of the cooking chamber in the form of a liquid vein, reducing the risk that such a liquid can be blown away by the centrifugal airflow produced by the fan, before reaching the central region of the latter; the liquid vein falling from the upper wall of the cooking chamber is in fact received by the diverting element, which then spreads it on the suction wall, so as to form a liquid film on it, which is sucked by the centrifugal fan through the suction mouth.

[0023] The liquid film falls into the suction mouth by gravity, and then, advantageously, it is sucked in droplets by the fan, the droplets being projected by the fan on the cavity walls.

[0024] The washing/rinsing liquid is spread on the cavity walls mainly in the same way as the grease during the cooking process, so that the cleaning effect is maximized.

[0025] Then, the liquid runs down by gravity to the cavity bottom, from which it can be drained. In particular, above aim and objects are solved by a cooking oven comprising:

- a cooking chamber wherein foodstuffs can be placed for being cooked, comprising an upper wall;
- a heating device for heating the internal of the cooking chamber;
- a suction wall separating the cooking chamber from a heating chamber containing, at least partially, the heating device;
- a centrifugal fan, positioned in the heating chamber and configured for circulating an airflow through the cooking chamber and the heating chamber;

wherein the suction wall comprises a suction mouth facing a central region of the centrifugal fan,
wherein the cooking oven comprises:

- a cleaning system comprising a washing/rinsing liquid introduction system configured for taking washing/rinsing liquid within the cooking chamber and provided with an outlet positioned in the upper wall of the cooking chamber,

wherein the cooking oven comprises:

- a diverting element configured for receiving a liquid exiting the outlet of the washing/rinsing liquid introduction system and for spreading it on the suction wall so as to form a liquid film on it, which is taken by gravity into the suction mouth.

[0026] It is underlined that a washing liquid can be for example water and/or water containing a detergent, while a rinsing liquid can be, for example water and/or water containing a descaling additive, or a brightener.

[0027] Preferably, the suction wall is oriented vertically, or substantially vertically, when the cooking oven is in its operative position.

[0028] It is underlined that in the present application *"operative position",* is defined as a position in which the oven is installed to be operated, and it lies in a horizontal, or substantial horizontal, plane such as the floor of a room, or the internal bottom wall of a piece of furniture in which the oven is built-in.

[0029] In a preferred embodiment, the diverting element is fixed to the suction wall.

[0030] Preferably, the suction wall is made of metal, more preferably of steel.

[0031] Preferably, the diverting element is made of metal, more preferably of steel.

[0032] In an advantageous embodiment, the diverting element is fixed to the suction wall by welding.

[0033] Preferably, the diverting element is positioned in proximity to an upper edge of the suction wall.

[0034] More preferably, the diverting element protrudes over an upper edge of the suction wall. Preferably, the diverting element is separated from the upper wall.

[0035] Advantageously, the diverting element comprises an inlet opening facing the outlet of the washing/rinsing liquid introduction system, and an outlet opening positioned in proximity to the suction wall.

[0036] More advantageously, the inlet opening and/or the outlet opening of the diverting element have a rectangular or substantially rectangular cross section.

[0037] Still more advantageously, the inlet opening and/or said outlet opening have a cross section having a long side parallel or substantially parallel to the suction wall, and a short side perpendicular or substantially perpendicular to the suction wall.

[0038] Preferably, the diverting element comprises a sloped wall configured for guiding liquid coming from the inlet opening to the outlet opening by gravity.

[0039] In an advantageous embodiment, the diverting element has a reversed U shaped cross section, comprising a base and two arms, fixed to the suction wall.

[0040] Preferably, the base of the reversed U-shaped cross section corresponds to the sloped wall of the diverting element.

[0041] Preferably, the arms of the U-shaped cross section are fixed to the suction wall by welding. in a preferred embodiment, the diverting element is funnel shaped.

[0042] In an advantageous embodiment, the cleaning system comprises a circulation system configured for pumping liquid out of the cooking chamber and for pumping such liquid, or a part thereof, again in the cooking chamber, the circulation system comprising a circulation pump, an aspiration conduit connecting the circulation pump to a cooking chamber outlet, and a delivery conduit connecting the circulation pump to a washing/rinsing liq-

uid circulation outlet provided in the upper wall of the cooking chamber and configured for allowing washing/rinsing liquid to enter the cooking chamber, wherein the diverting element is configured for receiving a liquid exiting the washing/rinsing liquid circulation outlet and for spreading it on the suction wall so as to form a liquid film on it, which is taken into the suction mouth by gravity.

[0043] Preferably, the inlet mouth is provided with a grating, allowing the passage of air and of liquid.

[0044] Preferably, the inlet mouth is funnel shaped, so as to favour the airflow towards the centrifugal fan.

[0045] Preferably, the suction wall is spaced from the lateral walls of the cooking chamber, so as to define two gaps therebetween, through which air radially blown by the centrifugal fan can pass from the heating chamber to the cooking chamber.

[0046] In a further advantageous embodiment, the suction wall can be provided with openings by which air radially blown by the centrifugal fan can pass from the heating chamber to the cooking chamber.

[0047] Preferably, the suction wall is spaced from the upper wall of the cooking chamber.

[0048] More preferably, the suction wall is spaced from the bottom wall of the cooking chamber.

[0049] Preferably, in the cooking oven according to the invention the cooking chamber has a bottom wall provided with a first cooking chamber outlet positioned in such a way to receive grease collected in the bottom wall,

[0050] Preferably, the cooking oven according to the invention is also provided with a grease conduit configured for draining grease from the cooking chamber.

[0051] Preferably, the first cooking chamber outlet is fluidly connected to the grease conduit. Preferably, the cooking oven according to the invention further comprises a vapour outlet duct configured for discharging vapour from the cooking chamber.

[0052] It is underlined that in the present application the word "vapour" has to be understood indiscriminately as pure steam, or as a mixture of steam and air and/or gasses.

[0053] Preferably in the cooking oven according to the invention the bottom wall of the cooking chamber is provided with a second cooking chamber outlet, distinct from the first cooking chamber outlet and fluidly connected to the vapour outlet duct.

[0054] It is underlined that, since both the cooking chamber outlet are positioned in the bottom of the cooking chamber, their impact on the thermal uniformity within the cooking chamber, and in particular in the region where foodstuff is placed, is very small.

[0055] Preferably, the first cooking chamber outlet, i.e. the one connected to the grease conduit, and the second cooking chamber outlet, i.e. the one connected to the vapour outlet duct, are reciprocally positioned and/or arranged, in such a way that the grease collected in the bottom wall of the cooking chamber enters firstly/more easily the first cooking chamber outlet than the second cooking chamber outlet, so that the possibilities that the grease enters the second cooking chamber outlet are highly reduced.

[0056] For example, in an advantageous embodiment, the inlet border of the second cooking chamber outlet can be placed at a raised position with respect to the inlet border of the first cooking chamber outlet; this preferred positioning of the inlet border of the second cooking chamber outlet guarantees that if the grease collects in the bottom wall of the cooking chamber, it enters firstly the first cooking chamber, and it is therefore drained to the grease conduit before reaching the level of the inlet border of the second cooking chamber outlet. In a further advantageous example, the bottom wall of the cooking chamber can be at least partially funnel-shaped, at least at or in proximity to the inlet border of the first cooking chamber outlet, so as to favour the drain of the grease collected in such a region to the first cooking chamber outlet.

[0057] Anyway other possible solutions can be used for forcing the grease collected in the bottom wall of the cooking chamber to enter firstly/more easily the first cooking chamber outlet than the second cooking chamber outlet; for example obstacles (e.g. protrusions) can be provided in the bottom wall of the cooking chamber, positioned in such a way to hinder the flow of the grease towards the second cooking chamber outlet and/or to and or to divert the flow towards the first cooking chamber outlet.

[0058] In a preferred embodiment, the bottom wall of the cooking chamber has a region, preferably centrally positioned, which is basin-shaped.

[0059] More preferably, the first cooking chamber outlet is positioned centrally with respect to this basin-shaped region.

[0060] Preferably, if the trays or racks are provided, the first cooking chamber outlet is positioned centrally with respect to overlying trays or racks, so as to effectively receiving grease dripping from the foodstuff positioned on these trays or racks.

[0061] In a preferred embodiment, the cooking oven comprises a shield element arranged for preventing grease, in particular grease falling from the overlying foodstuff being cooked, from entering the second cooking chamber outlet.

[0062] More preferably, the shield element is positioned over the second cooking chamber outlet, spaced apart from the inlet border of the latter.

[0063] Even more preferably, the shield element protrudes from a lateral wall of the cooking chamber.

[0064] Preferably, the shield element can be fixed to the lateral wall of the cooking chamber for example by welding and or screwing, and or bolts, etc.

[0065] In an advantageous embodiment, the shield element can have a convex shape, preferably a reversed V-shaped cross section, so as to deflect away from the underlying second cooking chamber outlet the grease droplets falling from the foodstuff being cooked. Advantageously, the vapour outlet duct comprises a vapour out-

let valve, for selectively opening/closing the vapour outlet duct, so as to regulate the discharge of the vapour in the external environment.

[0066] Advantageously, the cooking oven comprises an oven outlet, configured for draining liquid outside the cooking oven.

[0067] Preferably, the oven outlet is provided with an air trap.

[0068] In an advantageous embodiment, the grease conduit is selectively connected or connectable to a grease container.

[0069] Preferably, the grease conduit is selectively connected or connectable to the grease container via a first valve.

[0070] Preferably, the grease conduit is configured for draining grease exiting the first cooking chamber outlet by gravity.

[0071] In a preferred embodiment, the grease conduit is oriented vertically, or substantially vertically, when the cooking oven is in its operative position.

[0072] In an advantageous embodiment, the cooking oven comprises a vortex preventing device positioned at the first cooking chamber outlet and/or in the grease conduit, and configured for hindering the formation of vortexes in a stream of liquid exiting the cooking chamber via the first cooking chamber outlet.

[0073] The vortex preventing device hinders the formation of vortexes in the liquid flow exiting the cooking chamber through the first cooking chamber outlet.

[0074] Preferably, a vortex preventing device can be provided also at the second cooking chamber outlet.

[0075] Advantageously, the vortex preventing device is an insert having preferably a cross-shaped, or star-shaped cross section, in which a plurality of wings are advantageously defined. Advantageously, these wings partialize the opening of the first cooking chamber outlet, hindering the formation of vortexes in the liquid flow exiting the cooking chamber through the first cooking chamber outlet.

[0076] Advantageously, the vortex preventing device is form-fitted within the first cooking chamber outlet.

[0077] In a preferred embodiment, the first cooking chamber outlet is fluidly connected, in addition to the grease conduit, to the oven outlet.

[0078] In a further preferred embodiment, the first cooking chamber outlet is fluidly connected, in addition to the grease conduit, to the circulation system.

[0079] In a further preferred embodiment, the second cooking chamber outlet is fluidly connected, in addition to the vapour outlet duct, to the oven outlet.

[0080] In a further preferred embodiment, the second cooking chamber outlet is fluidly connected, in addition to the vapour outlet duct, to the grease conduit.

[0081] In a further preferred embodiment, the second cooking chamber outlet is fluidly connected to the grease conduit via a connection duct whose end portion protrudes within the grease conduit, substantially perpendicularly to the internal surface of the latter.

[0082] This advantageous positioning of the end portion hinders the entrance of grease flowing within the grease conduit by gravity into the end portion; in fact, such a grease flowing in the grease conduit, abuts perpendicularly the external lateral wall of the end portion of the connection duct, and it is very difficult that it can enter the end portion, which requires a longitudinal entrance.

[0083] In a preferred embodiment, the second cooking chamber outlet is fluidly connected, in addition to the vapour outlet duct, to the circulation system.

[0084] Preferably, the first cooking chamber outlet and the second cooking chamber outlet are selectively connected to the oven outlet via a second valve.

[0085] In a preferred embodiment, the washing/rinsing liquid introduction system comprises an introduction conduit fluidly connected to the cooking chamber and configured for selectively supplying into the latter washing and/or rinsing liquid.

[0086] In a further preferred embodiment, the washing/rinsing liquid introduction system comprises a third valve for controlling the supply of washing and/or rinsing liquid through the introduction conduit.

[0087] In an advantageous embodiment, the washing/rinsing liquid circulation outlet and/or the outlet of the introduction conduit are positioned in an upper wall of the cooking chamber. In an advantageous embodiment, the outlet of the introduction conduit is separated from the washing/rinsing liquid circulation outlet.

[0088] In a further advantageous embodiment, the outlet of the introduction conduit into the cooking chamber coincides with the washing/rinsing liquid circulation outlet.

[0089] In a further advantageous embodiment, the aspiration conduit is fluidly connected to the second cooking chamber outlet via a by-pass conduit fluidly connecting the aspiration conduit to the vapour outlet duct, to which the second cooking chamber outlet is fluidly connected.

[0090] In a further advantageous embodiment, the by-pass conduit is fluidly connected to the grease conduit.

[0091] Preferably, the by-pass conduit is fluidly connected to the grease conduit via the above-mentioned connection duct.

[0092] Preferably, the cooking oven comprises a drain conduit fluidly connecting the oven outlet to the first cooking chamber outlet and to the second cooking chamber outlet.

[0093] More preferably, the drain conduit is fluidly connected to the oven outlet via the second valve.

[0094] Still more preferably, the aspiration conduit is selectively fluidly connected to the oven outlet via the drain conduit.

[0095] Preferably, the by-pass conduit is selectively fluidly connected to the oven outlet via the drain conduit.

[0096] Preferably, the grease conduit is selectively fluidly connected to the oven outlet via the drain conduit.

[0097] In an advantageous embodiment, the cooking oven comprises a quenching system for cooling down

steam exiting from the cooking chamber.

[0098] Preferably, the quenching system comprises a quenching conduit for supplying cooling liquid within the vapour outlet duct.

[0099] In a preferred embodiment, the quenching conduit comprises an inlet positioned, in the operative position of the cooking oven, at a higher level with respect to the maximum level that washing/rinsing liquid can reach within the cooking chamber during the washing procedure of the cooking oven; this ensures that, even if washing/rinsing liquid should flow back through the quenching conduit, it wouldn't exit the latter with the risk of contaminating the water mains.

[0100] In a preferred embodiment, the vapour outlet duct comprises:

- a bottom region, positioned, in the operative position of the cooking oven, at least partially below the cooking chamber, and fluidly connected downstream of the second cooking chamber outlet,
- an end region protruding upwards from the bottom region, from which vapour is released in the environment.

[0101] Preferably, the quenching conduit comprises an outlet positioned within the bottom region of the vapour outlet duct; in this way quenching liquid is released in the vapour outlet duct quite far away from its end region. This arrangement of the outlet prevents that quenching liquid (e.g. water) exiting the quenching conduit is taken out of the vapour outlet duct due to the flow of vapour flowing therein.

[0102] Preferably, the bottom region of the vapour outlet duct is slightly inclined in such a way that liquid contained therein tends to flow, by gravity, in counter-current with respect to the vapour.

[0103] In a preferred embodiment, the by-pass conduit is connected to the vapour outlet duct at or in proximity to the initial region of the bottom region so that, due to the slope of the latter, condensed liquid present in such a bottom region flows by gravity into the by-pass conduit. In an advantageous embodiment, the outlet of the quenching conduit comprises a quenching nozzle arranged within the bottom region and configured for spraying a jet of water against the vapour exiting the second cooking chamber outlet.

[0104] Advantageously, the cooking oven comprises a fourth valve for controlling the supply of cooling water through the quenching conduit.

[0105] Advantageously, the cooking oven comprises a perforated suction wall separating the cooking chamber from a heating chamber containing at least partially the heating device and a fan, wherein the fan is configured for circulating heated air through the cooking chamber and the heating chamber.

[0106] In an advantageous embodiment, the cooking oven comprises a ventilation pipe fluidly connected to the cooking chamber and configured for selectively taking air from the external environment into the cooking chamber.

[0107] Preferably, the ventilation pipe comprises an outlet provided at the heating chamber. More preferably, the ventilation pipe is provided with a ventilation valve for selectively closing the ventilation pipe.

[0108] In an advantageous embodiment, the cooking oven comprises an overflow conduit directly fluidly connecting the vapour outlet duct to the oven outlet, and configured for directly discharging to the oven outlet the liquid present in the vapour outlet duct only if the level of the liquid in the vapour outlet duct exceeds a certain height.

[0109] In an advantageous embodiment, the circulation system is fluidly connected to the vapour outlet duct, and it is configured for taking washing/rinsing liquid from said cooking chamber into the vapour outlet duct, so as to wash the latter.

[0110] In a preferred embodiment, the cleaning system comprises a washing/rinsing additive supplying system configured for supplying washing and/or rinsing additives to the internal of the cooking chamber.

[0111] It is underlined that a washing additive can be, for example, a detergent, while a rinsing additive can be for example a descaling additive, a brightener, etc.

[0112] Preferably, the washing/rinsing additive supplying system comprises an additive drawer, loadable with a washing/rinsing additive and selectively fluidly connected or connectable to the circulation system in such a way to selectively supply a washing and/or rinsing additive to the latter.

[0113] More preferably, the additive drawer, is selectively fluidly connected or connectable to the aspiration conduit and/or delivery conduit.

[0114] Still more preferably, the cooking oven comprises a fifth valve for connecting the additive drawer to water supply mains.

[0115] In a further advantageous embodiment, the cooking oven comprises a sixth valve selectively connecting the additive drawer to the aspiration conduit and/or delivery conduit.

[0116] In a further advantageous embodiment, the cleaning system comprises a washing/rinsing additive multi-dosing system configured for supplying to the internal of the cooking chamber metered amounts of washing and/or rinsing additives.

[0117] Preferably, the washing/rinsing additive multi-dosing system comprises:

- one or more washing/rinsing additives containers filled or fillable with an amount of washing and/or rinsing additives sufficient for a plurality of washing/rinsing cycles;
- one or more washing/rinsing additives delivery conduits fluidly connecting such one or more washing/rinsing additives containers to the internal of the cooking chamber;
- one or more washing/rinsing additives pumps, con-

figured for pumping a washing/rinsing additive out of the one or more washing/rinsing additives containers and delivery the washing/rinsing additives to the cooking chamber via one or more washing/rinsing additives delivery conduits.

[0118] In an advantageous embodiment, at least one of the one or more washing/rinsing additives containers is fluidly connected to the additive drawer.

[0119] In a further preferred embodiment, at least one of the one or more washing/rinsing additives containers is fluidly connected to the washing/rinsing liquid introduction system.

[0120] More preferably all the one or more washing/rinsing additives containers are fluidly connected to the introduction conduit.

[0121] Advantageously, the cooking oven comprises a steam supply system configured for producing and supplying steam into the cooking chamber.

[0122] Preferably, the steam supply system comprises a boiler configured for producing steam and fluidly connected to the cooking chamber so as to release into the latter the steam.

[0123] More preferably, the boiler comprises a water reservoir fillable with water, and a water heater for heating water loaded within the water reservoir.

[0124] In an advantageous embodiment, the steam supply system comprises:

- a water inlet conduit fluidly connected to the water reservoir and connected or connectable to water mains,
- a water outlet conduit fluidly connecting the water reservoir to the oven outlet.

[0125] Still preferably, the steam supply system comprises:

- a sixth valve associated to the water inlet conduit for controlling the delivery of water to the water reservoir,
- a eighth valve associated to the water outlet conduit for controlling the drain of liquid from the reservoir to the oven outlet.

[0126] Preferably, the steam supply system comprises a steam duct fluidly connecting the reservoir to the cooking chamber.

[0127] In an advantageous embodiment, the cleaning system is configured for supplying a washing/rinsing liquid to the steam supply system.

[0128] Preferably, the cleaning system is configured for supplying a washing/rinsing liquid to the boiler.

[0129] Preferably, the cleaning system comprises a boiler cleaning conduit, fluidly connecting the washing/rinsing additive supplying system to the boiler.

[0130] More preferably, the boiler cleaning conduit fluidly connects the water reservoir to the additive drawer.

[0131] Still preferably, the boiler cleaning conduit fluidly connects the water reservoir to the washing/rinsing additive multi-dosing system.

[0132] More preferably, the boiler cleaning conduit fluidly connects the water reservoir to one or more of said the or more washing/rinsing additives container.

[0133] Preferably, the cooking oven comprises an electronic controller, for example a programmed/programmable electronic board, for controlling one or more (preferably all the) functions of the cooking oven (e.g. the cooking procedure, the washing procedure, the electronic controllable components, etc.).

[0134] In a further aspect thereof, the invention is related to a method for cleaning a cooking oven according to one or more of the above described embodiments, comprising the following steps:

- taking a washing/rinsing liquid within the cooking chamber of the cooking oven via the outlet of the washing/rinsing liquid introduction system of the cleaning system of the cooking oven;
- receiving, by the diverting element, the washing/rinsing liquid exiting the outlet;
- spreading, by the diverting element, the received washing/rinsing liquid on the suction wall so as to form a liquid film on it, which is taken by gravity into the suction mouth;
- activating the centrifugal fan so as to suck the washing/rinsing liquid in form of the liquid film, and to blow radially the washing/rinsing liquid in form of droplets together with the generated airflow.

[0135] In the advantageous embodiment in which the cooking oven comprises a circulation system configured for pumping liquid out of the cooking chamber and for pumping such liquid, or a part thereof, again in the cooking chamber, the circulation system comprising a circulation pump, an aspiration conduit connecting the circulation pump to a cooking chamber outlet, and a delivery conduit connecting the circulation pump to a washing/rinsing liquid circulation outlet provided in the upper wall of the cooking chamber and configured for allowing washing/rinsing liquid to enter the cooking chamber, and the diverting element is configured for receiving a liquid exiting the washing/rinsing liquid circulation outlet and spreading it on the suction wall so as to form a liquid film on it, which is taken by gravity into the suction mouth, the method advantageously comprises the following steps:

- taking a washing/rinsing liquid within the cooking chamber of the cooking oven via the washing/rinsing liquid circulation outlet of the circulation system of the cooking oven;
- receiving, by the diverting element, the washing/rinsing liquid exiting the washing/rinsing liquid circulation outlet
- spreading, by the diverting element, the received

washing/rinsing liquid on the suction wall so as to form a liquid film on it, which is taken by gravity into the suction mouth;
- activating the centrifugal fan so as to suck the washing/rinsing liquid in form of the liquid film, and to blow radially the washing/rinsing liquid in form of droplets together with the generated airflow.

[0136] These and other features and advantages of the invention will be better apparent from the following description of some exemplary and non-limitative embodiments, to be read with reference to the attached drawings, wherein:

- Fig. 1 is a schematic frontal view of an oven according to the invention;
- Fig. 2 is a schematic lateral view, with some parts removed for more clarity, of a first embodiment of a cooking oven according to the invention;
- Fig. 3 is a schematic lateral view, with some parts removed for more clarity, of a second embodiment of a cooking oven according to the invention;
- Fig. 4 is a schematic lateral view, with some parts removed for more clarity, of a third embodiment of a cooking oven according to the invention;
- Fig. 5 is a schematic lateral view, with some parts removed for more clarity, of a fourth embodiment of a cooking oven according to the invention;
- Fig. 6 is a schematic lateral view, with some parts removed for more clarity, of a fifth embodiment of a cooking oven according to the invention;
- Fig. 7 is a detail of an advantageous embodiment of the first cooking chamber outlet of a cooking oven according the invention, in which a vortex preventing device is visible;
- Fig. 8 is a detail of a schematic lateral view of the bottom region of the cooking chamber of an advantageous embodiment of a cooking oven according to the invention,
- Fig. 9 is a flow chart schematically showing the phases of a procedure for automatically or semiautomatically cleaning an oven according to an embodiment of the invention,
- Fig. 10 is a flow chart schematically showing the phases of a second embodiment of a procedure for automatically or semiautomatically cleaning an oven according to an embodiment of the invention,
- Fig. 11 is a detail of a schematic lateral view, with some parts removed for more clarity, of an advantageous embodiment of oven according to the invention;
- Fig. 12 is a detail of an advantageous embodiment of an upper wall, a suction wall and a diverting element according to the invention;
- Fig. 13 is a schematic view of the suction wall of a cooking oven according to the invention, seen from the internal of the cooking chamber;
- Fig. 14 is a schematic lateral view of an advantageous embodiment of a diverting element according to the invention;
- Fig. 15 is a schematic bottom view of an advantageous embodiment of a diverting element according to the invention.

[0137] With reference initially to Fig. 1, a cooking oven 1 according to the invention is schematically described.

[0138] It is underlined that all the functions of the oven can be advantageously controlled by a suitable electronic controller, for example a programmed/programmable electronic board, schematically illustrated in figure 2 by a dashed square 600.

[0139] The cooking oven comprises an external casing 200, containing a cooking chamber 2, wherein foodstuffs can be placed for being cooked; preferably, the cooking chamber is accessible via a door 2a.

[0140] In an advantageous embodiment, like in the examples of attached figures, the cooking chamber 2 contains a plurality of trays or racks 2b, wherein foodstuff, or pots or trays containing foodstuff, can be placed for being cooked.

[0141] The cooking chamber 2 has a bottom wall 3, preferably, but not necessarily, at least partially, basin-shaped, so as to better collect grease dripping from the foodstuffs being cooked. Advantageously, the bottom wall 3 is provided with a first cooking chamber outlet 4 positioned in such a way to receive grease or liquid dripped from the foodstuff being cooked and collected in the bottom wall 3.

[0142] In the advantageous examples illustrated in attached figures, the bottom wall 3 has a region 3a, preferably centrally positioned, which is basin shaped; in this advantageous example, the first cooking chamber outlet 4 is positioned centrally with respect to this basin-shaped region 3a. More preferably, the region 3a is at least partially funnel-shaped, at least at or in proximity to the inlet border 4a of first cooking chamber outlet 4, so as to favour the drain of the grease collected on such a region 3a to the first cooking chamber outlet 4. Preferably, if the trays or racks 2b are provided, the first cooking chamber outlet 4 is positioned centrally with respect to overlying trays or racks 2b, so as to effectively receive grease dripping from the foodstuff positioned on these trays or racks 2b.

[0143] The oven 1 also comprises a grease conduit 6 configured for draining grease from the cooking chamber 2; the first cooking chamber outlet 4 is fluidly connected to the grease conduit 6.

[0144] Advantageously, the grease conduit 6 is selectively connected or connectable to a grease container 60, positioned preferably outside the oven 1, and more preferably removable, in such a way that, when full, it can be removed for being emptied, and/or it can be replaced by an empty one.

[0145] In an advantageous embodiment, the grease conduit 6 is selectively connected or connectable to the grease container 60 via a first valve 11, that can be selectively opened and closed, automatically and/or man-

ually, in order to allow grease dripping from the foodstuff to be collected in the grease container 60.

[0146] In a preferred embodiment, the grease conduit 6 is configured for draining grease exiting the first cooking chamber outlet 4 by gravity.

[0147] It is underlined, that in the present application *"by gravity"* means due only to the gravity force, so without the need of a dedicated fluid moving device, like for example a pump.

[0148] For example, stating that *"the grease conduit is configured for draining grease exiting the first cooking chamber outlet by gravity"* means that grease exiting the cooking chamber outlet is taken from the inlet to the outlet of the grease conduit due only to the effect of the gravity force, for example since the inlet is positioned higher than the outlet.

[0149] This can be obtained, for example, by orienting the grease conduit 6 vertically, or substantially vertically, when the cooking oven 1 is in its operative position.

[0150] Advantageously, the cooking oven further comprises a heating device 8 configured for heating the internal of the cooking chamber 2; the heating device 8 can be an electrical heater, or (as in the examples illustrated in attached figures) hot tubes wherein the hot fumes exiting a gas burner flows, a heat exchanger, etc.

[0151] Advantageously, the cooking oven 1 comprises a suction wall 18 separating the cooking chamber 2 from a heating chamber 19 containing, at least partially, the heating device 8, and, a centrifugal fan 20 configured for circulating heated air through the cooking chamber 2 and the heating chamber 19.

[0152] Advantageously, the suction wall 18 is oriented vertically, or substantially vertically, when the cooking oven 1 is in its operative position.

[0153] Advantageously, the suction wall 18 comprises a suction mouth 18a, facing a central region of the centrifugal fan 20, from which air can enter the central region of the centrifugal fan 20.

[0154] Preferably, the inlet mouth 18a is funnel shaped, so as to favour the flow of air towards the centrifugal fan.

[0155] Preferably, the suction wall 18 is spaced from the lateral walls 210a, 210b of the cooking chamber 2, so as to define two gaps 211a, 211b therebetween, through which an airflow (schematically illustrated in figure 13 with arrows 950) generated the centrifugal fan 20, can pass from the heating chamber 19 to the cooking chamber 2.

[0156] In a further advantageous embodiment, not illustrated, the suction wall 18 can be provided with openings by which airflow 950 generated by the centrifugal fan 20 can pass from the heating chamber 19 to the cooking chamber 2.

[0157] Preferably, the suction wall 18 is also spaced from the upper wall 23 of the cooking chamber 2. More preferably, the suction wall is also spaced from the bottom wall 3 of the cooking chamber 2.

[0158] The cooking oven 1 comprises a vapour outlet duct 9 configured for discharging vapour from the cooking chamber 2; the vapour outlet duct 9 can advantageously discharge the vapour in the external environment around the cooking oven 1, or it can be advantageously connected to a vapour discharge system, preferably provided in the building where the cooking oven 1 is installed.

[0159] Advantageously, the vapour outlet duct 9 comprises a vapour outlet valve 45, for selectively opening/closing the vapour outlet duct 9, so as to regulate the discharge of the vapour in the external environment.

[0160] Advantageously, the bottom wall 3 of the cooking chamber 2 is provided with a second cooking chamber outlet 10, distinct from the first cooking chamber outlet 4 and fluidly connected to the vapour outlet duct 9.

[0161] Vapour present the cooking chamber 2, for example emitted from the foodstuff, and/or (like in the advantageously embodiments of figures 3 and 4) due to steam supplied in the cooking chamber 2 by a steam supply system 35, if the cooking oven is advantageously provided with such a steam supply system 35, is therefore discharged outside the cooking oven 1 passing through the second cooking chamber outlet 10 and the vapour outlet duct 9. Preferably, the first cooking chamber outlet 4 and the second cooking chamber outlet 10 are positioned on the bottom wall 3, and are reciprocally positioned and/or arranged, in such a way that the grease collected in the bottom wall 3 enters firstly/more easily the first cooking chamber outlet 4 than the second cooking outlet chamber 10, so that the possibilities that the grease enters the second cooking chamber outlet 10 are highly reduced.

[0162] This can be obtained for example, in advantageous embodiments, like in the examples illustrated in attached figures, if the inlet border 10a of the second cooking chamber outlet 10 is placed at a raised position with respect to the inlet border 4a of the first cooking chamber outlet 4; in this way the grease collected in the bottom 3 goes firstly into the first cooking chamber outlet 4, and therefore the possibilities that its level increases enough to enter the first cooking chamber outlet 10 are highly reduced.

[0163] In a further advantageous embodiment, like in the example of Figure 8, the cooking oven 1 can comprise a shield element 300 for preventing grease in particular grease falling from the overlying foodstuff being cooked, from entering the second cooking chamber outlet 10. Preferably, the shield element 300 is positioned over the second cooking chamber outlet 10, spaced apart from the inlet border 10a of the latter.

[0164] More preferably, the said shield element 300 protrudes from the lateral wall of the cooking chamber 2; advantageously the shield element 300 can be fixed to the lateral wall of the cooking chamber for example by welding and or screwing, and or bolts, etc.

[0165] In an advantageous embodiment, the shield element 300 can have a convex, preferably reversed V-shaped, cross section, so as to deflect away from the underlying second cooking chamber outlet 10 the grease

droplets falling from the foodstuff being cooked.

[0166] In the advantageous embodiments illustrated in attached figures, the cooking oven 1 comprises a cleaning system 70, advantageously comprising a circulation system 7 configured for pumping liquid out of the cooking chamber 2 and for pumping such liquid, or a part thereof, again in the cooking chamber 2.

[0167] In preferred embodiments, like for example the ones illustrated in attached figures, the circulation system 7 comprises a circulation pump 7a, an aspiration conduit 7b connecting the circulation pump 7a to the first cooking chamber outlet 4 and/or to the second cooking chamber outlet 10, and a delivery conduit 7c connecting the circulation pump 7a to a washing/rinsing liquid circulation outlet 13 provided in the cooking chamber 2 and configured for allowing washing/rinsing liquid to enter the cooking chamber 2.

[0168] It is underlined that a washing liquid can be for example water and/or water containing a detergent, while a rinsing liquid can be, for example water and/or water containing a descaling additive or a brightener.

[0169] In an advantageous embodiment, like in the examples illustrated in attached figures, the aspiration conduit 7b fluidly connects the circulation pump 7a both to the first cooking chamber outlet 4 and to the second cooking chamber outlet 10.

[0170] In an advantageous embodiment, like in the examples illustrated in attached figures, the cooking oven 1 comprises a vortex preventing device 100 positioned at the first cooking chamber outlet 4 and/or in the grease conduit 6, and configured for hindering the formation of vortexes in a stream of liquid exiting the cooking chamber 2 via the first cooking chamber outlet 4.

[0171] Advantageously, the vortex preventing device 100 can be an insert having preferably a cross-shaped, or star-shaped cross section, in which a plurality of wings 100a are advantageously defined, preferably form fitted within the first cooking chamber outlet 4; wings 100a partialize the opening of the first cooking chamber outlet 4, hindering the formation of vortexes in the liquid flow exiting the cooking chamber 2 through the first cooking chamber outlet 4.

[0172] Absence of vortexes is very important in the advantageous embodiments in which the oven is provided with above described circulation system 7, since vortexes could form bubbles that prevent the circulation pump 7a to prime properly.

[0173] In a further embodiment, not illustrated, a vortex preventing device 100 is positioned also at the second cooking chamber outlet 10.

[0174] Advantageously, the cooking oven 1 comprises an oven outlet 5, configured for draining liquid outside the cooking oven 1; advantageously the oven outlet 5 can be connected to the sewage pipes, not illustrated, of the building in which the cooking oven 1 is installed. Preferably, the first cooking chamber outlet 4 is fluidly connected, in addition to the grease conduit 6, also, preferably selectively, to the oven outlet 5.

[0175] Advantageously, the oven outlet 5 is provided with an air trap 5a, for preventing, when active (i.e. when filled with a liquid), gas to exit through said oven outlet 5.

[0176] In the advantageous embodiment in which the cooking oven 1 is provided with the circulation system 7, as in the examples of attached figures, the first cooking chamber outlet 4 can be fluidly connected to the circulation system 7.

[0177] In an advantageous embodiment, as in the examples of attached figures, the second cooking chamber outlet 10 is fluidly connected, in addition to the vapour outlet duct 9, to the oven outlet 5.

[0178] Preferably, the first cooking chamber outlet 4 and the second cooking chamber outlet 10 are selectively connected to the oven outlet 5 via a second valve 12, which can be manual or automatic.

[0179] Advantageously, the cooking oven 1 comprises a drain conduit 5b fluidly connecting the oven outlet 5 to the first cooking chamber outlet 4 and, preferably, to the second cooking chamber outlet 10.

[0180] Advantageously, the drain conduit 5b is fluidly connected to the oven outlet 5 via the second valve 12.

[0181] In a preferred embodiment, the second cooking chamber outlet 10 is fluidly connected, in addition to the vapour outlet duct 9, to the grease conduit 6.

[0182] In a preferred embodiment, the second cooking chamber outlet 10 is fluidly connected to the grease conduit 6 via a connection duct 50 whose end portion 50a protrudes within the grease conduit 6, substantially perpendicularly to the internal surface of the latter.

[0183] This positioning of the end portion 50a hinders the entrance of grease flowing within the grease conduit 6 by gravity into the end portion 50a; in fact, such a grease, flowing in the grease conduit 6, abuts perpendicularly against the external lateral wall of the end portion 50a of the connection duct 50, and it is very difficult that it can enter the end portion 50a which requires a longitudinal entrance.

[0184] Preferably, the aspiration conduit 7b of the circulation system 7 is fluidly connected to the second cooking chamber outlet 10 via a by-pass conduit 14 fluidly connecting the aspiration conduit 7b to the vapour outlet duct 9, to which the second cooking chamber outlet 10 is fluidly connected.

[0185] More preferably, the by-pass conduit 14 is fluidly connected to the grease conduit 6.

[0186] Even more preferably, the by-pass conduit 14 is fluidly connected to the grease conduit 6 via above described connection duct 50.

[0187] Advantageously, the aspiration conduit 7b of the circulation system 7 is selectively fluidly connected to the oven outlet 5 via the drain conduit 5b.

[0188] Advantageously, the by-pass conduit 14 is selectively fluidly connected to the oven outlet 5 via the drain conduit 5b.

[0189] Advantageously, the grease conduit 6 is selectively fluidly connected to the oven outlet 5 via the drain conduit 5b.

[0190] In an advantageous embodiment, the cleaning system 70 comprises a washing/rinsing liquid introduction system 16 configured for taking washing/rinsing liquid within the cooking chamber 2.

[0191] In an advantageous embodiment, the washing/rinsing liquid introduction system 16 comprises an introduction conduit 16a fluidly connected to the cooking chamber 2 and configured for selectively supplying into the latter washing and/or rinsing liquid.

[0192] In a preferred embodiment, the washing/rinsing liquid introduction system 16 comprises a third valve 16b for controlling the supply of washing and/or rinsing liquid through the introduction conduit 16a.

[0193] Advantageously, as in the examples illustrated in attached figures, the introduction conduit 16a can be connected, upstream the third valve, to water mains, not illustrated, provided in the building where the cooking oven 1 is installed.

[0194] Advantageously, the washing/rinsing liquid circulation outlet 13 and the outlet 16c of the introduction conduit 16a are positioned in an upper wall 23 of the cooking chamber 2. Preferably, the washing/rinsing liquid circulation outlet 13 and the outlet 16c of the introduction conduit 16a are positioned in an upper wall 23 of the cooking chamber 2, in proximity of the suction wall 18.

[0195] Preferably, the outlet 16c of the introduction conduit 16a is separated from the washing/rinsing liquid circulation outlet 3.

[0196] In a further advantageous embodiment, not illustrated, the outlet of the introduction conduit 16a into the cooking chamber 2 coincides with the washing/rinsing liquid circulation outlet 13.

[0197] According to the invention, the cooking oven 1 comprises a diverting element 24 configured for receiving a liquid exiting the outlet 16c of the introduction conduit 16a and spreading it on the suction wall 18 so as to form a liquid film 910 on it, which is taken by gravity into the suction mouth 18a, so that it can be sucked by the centrifugal fan 20.

[0198] Preferably the diverting element 24 is made of metal, more preferably of steel.

[0199] More preferably, the diverting element 24 is fixed to the suction wall 18, for example by welding.

[0200] Advantageously, the diverting element 24 is positioned in proximity to an upper edge 18b of the suction wall 18.

[0201] Preferably, the diverting element 24 protrudes over an upper edge 18b of the suction wall 18.

[0202] Advantageously, the diverting element 24 is separated from the upper wall 23.

[0203] The diverting element 24 preferably comprises an inlet opening 700 facing the outlet 16c of the introduction conduit 16a, and an outlet opening 800 positioned in proximity to the suction wall 18.

[0204] In a preferred embodiment, the inlet opening 700 and/or the outlet opening 800 have a rectangular or substantially rectangular cross section.

[0205] More preferably, the inlet opening 700 and/or the outlet opening 800 have a cross section having a long side parallel or substantially parallel to the suction wall 18, and a short side perpendicular or substantially perpendicular to the suction wall 18.

[0206] Advantageously, the diverting element 24 comprises a sloped wall 24a configured for guiding liquid coming from the inlet opening 700 to the outlet opening 800 by gravity. Advantageously, the diverting element 24 has a reversed U-shaped cross section, comprising a base 24a and two arms 24b, 24c, fixed to the suction wall 18, preferably by welding. Preferably, the diverting element is funnel shaped.

[0207] In the advantageous case in which the cooking oven 1 comprises above mentioned circulation system 7, the diverting element 24 can be configured for receiving a liquid exiting the washing/rinsing liquid circulation outlet 13 and spreading it on the suction wall 18 so as to form a liquid film 910 on it, which is taken into the suction mouth 18a by gravity. Advantageously, the cooking oven 1 comprises a quenching system 17 for cooling down steam exiting from the cooking chamber 2.

[0208] Preferably, the quenching system 17 comprises a quenching conduit 17a for supplying a cooling liquid within the vapour outlet duct 9.

[0209] The quenching liquid is preferably fresh water, coming from the water mains, not illustrated, of the building in which the cooking oven 1 is installed, to which the quenching conduit 17a can be fluidly connected.

[0210] Advantageously, the quenching conduit 17a comprises an inlet 170a positioned, in the operative position of the cooking oven 1, at a higher level with respect to the maximum level 500 that washing/rinsing liquid can reach within the cooking chamber 2 during the washing procedure of the cooking oven 1.

[0211] This ensures that, even if washing/rinsing liquid should flow back through the quenching conduit 17a, it wouldn't exit the latter with the risk of contaminating the water mains.

[0212] In a preferred embodiment, as in the examples illustrated in attached figures, the vapour outlet duct 9 comprises a bottom region 9a, positioned, in the operative position of the cooking oven 1, at least partially below the cooking chamber 2, and fluidly connected downstream of said second cooking chamber outlet 10.

[0213] More preferably, as in the examples of the attached figures, the bottom region 9a of the vapour outlet duct 9 is slightly inclined in such a way that liquid contained therein tends to flow, by gravity, in counter-current with respect to the vapour flowing through the bottom region 9a; in other words, the bottom region 9a is preferably inclined in such a way to define a backwards slope.

[0214] In a preferred embodiment, the by-pass conduit 14 is connected to the vapour outlet duct 9 at or in proximity to the initial region of the bottom region 9a so that, due to the slope of the latter, condensed liquid present in such a bottom region 9a flows by gravity into the by-pass conduit 14.

[0215] Preferably, the vapour outlet duct 9 comprises an end region 9b protruding upwards from the bottom region 9a, from which vapour is released in the environment.

[0216] Advantageously, the end region 9b is substantially vertical.

[0217] Preferably, the quenching conduit 17a comprises an outlet 1710b positioned within the bottom region 9a of the vapour outlet duct 9; since in this way quenching liquid is released in the vapour outlet duct quite far away from its end region 9a, this arrangement of the outlet 170b prevents that quenching liquid (e.g. water) exiting the quenching conduit 17a is taken out of the vapour outlet duct 9 by the flow of vapour, schematically illustrated with dotted arrows 400 in attached figures, flowing therein.

[0218] Preferably, the outlet 170b of the quenching conduit 17a comprises a quenching nozzle, not illustrated, arranged within the bottom region 9a and configured for spraying a jet of water against the vapour exiting the cooking chamber outlet 10.

[0219] In an advantageous embodiment, the quenching system 17 comprises a fourth valve 17c for controlling the supply of cooling water through the quenching conduit 17a.

[0220] Preferably, as in the examples illustrated in attached figures, the cooking oven 1 comprises a ventilation pipe 21 fluidly connected to the cooking chamber 2 and configured for selectively taking air from the external environment into the cooking chamber 2. Preferably, the ventilation pipe 21 comprises an outlet 21a provided at the heating chamber 19, more preferably in proximity to the fan 20.

[0221] Advantageously, the ventilation pipe 21 is provided with a controlled ventilation valve 22 for selectively closing the ventilation pipe 21.

[0222] Preferably, the cooking oven 1 comprises an overflow conduit 26 directly fluidly connecting the vapour outlet duct 9 to the oven outlet 5, and configured for directly discharging to the oven outlet 5 liquid present in the vapour outlet duct 9 only if the level of such a liquid exceeds a certain height. Advantageously, such height corresponds to the maximum level 500 allowed for the liquid within the cooking chamber 2.

[0223] Advantageously, like in the examples of attached figures, the circulation system 7 is fluidly connected to the vapour outlet duct 9, and it is configured for taking washing/rinsing liquid from the cooking chamber 2 into the vapour outlet duct 9, so as to wash the latter. Advantageously, the cleaning system 70 comprises a washing/rinsing additive supplying system 27 configured for supplying washing and/or rinsing additives to the internal of the cooking chamber 2.

[0224] In a preferred embodiment, the washing/rinsing additive supplying system 27 comprises an additive drawer 28, loadable with a washing/rinsing additive, and selectively fluidly connected or connectable to the circulation system 7, in such a way to selectively supply a washing and/or rinsing additive into the latter, and preferably to the aspiration conduit 7b and/or delivery conduit 7c.

[0225] Preferably, the washing/rinsing additive comprises a descaling additive.

[0226] Preferably, the cooking oven 1 comprises a fifth valve 29 for connecting the additive drawer 28 to water supply mains.

[0227] Preferably, the cooking oven 1 comprises a sixth valve 30 selectively connecting the additive drawer 28 to the aspiration conduit 7b and/or delivery conduit 7c.

[0228] In a further advantageous embodiment, like in the examples illustrated in figures 4 to 6, the cleaning system 70 comprises a washing/rinsing additive multidosing system 31 configured for supplying to the internal of the cooking chamber 2 metered amounts of washing and/or rinsing additives.

[0229] Preferably, the washing/rinsing additive multidosing system 31 comprises:

- one or more washing/rinsing additives containers 32a, 32b filled or fillable with an amount of washing and/or rinsing additives sufficient for a plurality of washing/rinsing cycles;
- one or more washing/rinsing additives delivery conduits 33a, 33b fluidly connecting such one or more washing/rinsing additives containers 32a, 32b to the internal of the cooking chamber 2;
- one or more washing/rinsing additives pumps 34a, 34b, configured for pumping a washing/rinsing additive out of the one or more washing/rinsing additives containers 32a, 32b and for delivering the washing/rinsing additives to the cooking chamber 2 via the one or more washing/rinsing additives delivery conduits 33a, 33b.

[0230] In advantageous embodiments, like the ones illustrated in the examples of figures 4 and 6, at least one of the one or more washing/rinsing additives containers 32a, 32bs (for example container 32a in figures 4 and 6) is fluidly connected to the additive drawer 28; in this way, the user can decide if using the cleaning system 70 as a *"single dose"* cleaning system, i.e. a system requiring to load the drawer 28 any time it has to be used (in this case the user uses the drawer 28 for loading the single dose of additive), or as a *"multi-dose"* system, i.e. a cleaning system in which the additive(s) have to be filled (or refilled), only sporadically, being enough for a plurality of washing/rinsing procedures.

[0231] Preferably, at least one of the one or more washing/rinsing additives containers 32a, 32b is fluidly connected to the washing/rinsing liquid introduction system 16, preferably to the introduction conduit 16a.

[0232] In an advantageous embodiment, like for example the one illustrated in figure 5, all the washing/rinsing additives containers 32a, 32b are fluidly connected to the introduction conduit 16a; in this case, the drawer 28 is preferably not provided, and the cleaning system 70 can

be used only as a "multi-dose" system.

[0233] In advantageous embodiments, like for example the ones illustrated in figures 3 and 4, the cooking oven 1 comprises a steam supply system 35 configured for producing and supplying steam into the cooking chamber 2.

[0234] Advantageously the steam supply system 35 can comprise a boiler 36 configured for producing steam and fluidly connected to the cooking chamber 2 so as to release into the latter the steam.

[0235] Preferably, the boiler 36 comprises a water reservoir 37 fillable with water, and a water heater 38 for heating water loaded within the water reservoir 37.

[0236] Advantageously, the steam supply system 35 comprises:

- a water inlet conduit 39 fluidly connected to the water reservoir 37 and connected or connectable to water mains,
- a water outlet conduit 40 fluidly connecting the water reservoir 37 to the oven outlet 5. More preferably, the steam supply system 35 comprises:
- a seventh valve 41 associated to the water inlet conduit 39 for controlling the delivery of water to the water reservoir 37,
- a eight valve 42 associated to the water outlet conduit 40 for controlling the drain of liquid from the reservoir 37 to the oven outlet 5.

[0237] Preferably, the steam supply system 35 comprises a steam duct 43 fluidly connecting the reservoir 37 to the cooking chamber 2, for supplying the steam from the reservoir 37 into the latter.

[0238] In advantageous embodiments, like in the examples of figures 3 and 4, the cleaning system 70 is configured for supplying a washing/rinsing liquid to the boiler 36.

[0239] In advantageous embodiments, like the ones illustrated in figures 3 and 4, the cleaning system 70 comprises a boiler cleaning conduit 44, fluidly connecting the washing/rinsing additive supplying system 27 to the boiler 36.

[0240] Preferably, like in the example of figures 3 and 4, the boiler cleaning conduit 44 fluidly connects the water reservoir 37 to the additive drawer 28.

[0241] In an advantageous embodiment, like in the example of figure 4, the boiler cleaning conduit 44 fluidly connects the water reservoir 37 to the washing/rinsing additive multi-dosing system 31. In this case, the boiler cleaning conduit 44 can preferably fluidly connect the water reservoir 37 to one or more of the one or more washing/rinsing additives container 32a, 32b.

[0242] The functioning of the oven according to the invention will be explained in relation to the different embodiments illustrated in attached figures; it is underlined that figure 1 is a schematic illustration of the external shape of a possible embodiment of a cooking oven 1 according to the invention, which fits all the internal layouts illustrated in the rest of the figures. It is also underlined that figure 11 is a schematic lateral cross section of a detail of the internal of a cooking oven according to the invention, which is also common to all the layouts illustrated in the rest of the figures.

[0243] With reference to the embodiment of figure 2, once the foodstuff has been loaded into the cooking chamber 2, and the door 2a has been closed, the cooking process can be started; the heating device 8 and the centrifugal fan 20 are operated, advantageously by the electronic controller 600 of the cooking oven 1, according to a specific cooking program selected and/or programmed by a user.

[0244] The centrifugal fan 20 generates an airflow 950 circulating between the heating chamber 19 and the cooking chamber 2; in particular, the centrifugal fan 20 sucks air from the cooking chamber 2 through the suction mouth 18a, blows it radially, so that the airflow 950 contacts the heating device 8 and is heated, and then blows it again into the cooking chamber 2, preferably via the gaps 211a, 211b, and/or via one or more openings, not illustrated, provided in the suction wall 18.

[0245] The diverting element 24, being positioned far away from the suction mouth 18a, and preferably in the upper edge 18b of the suction wall 18, does not disturb, or at most marginally disturbs, the airflow 950, and therefore it does not affect, or only marginally affects, the thermal uniformity within the cooking chamber 2.

[0246] Ventilation valve 22 is preferably controlled, advantageously by the electronic controller 600 of the cooking oven 1, for keeping fresh air from the external environment into the cooking chamber 2, advantageously according to the specific cooking program selected and/or programmed by the user.

[0247] During the cooking process, the vapour present in the cooking chamber 2, and the high internal temperature, increase the internal pressure, and, when the latter exceeds ambient pressure, vapour is expelled to external of the cooking chamber 2 via the second cooking chamber outlet 10 and the vapour outlet duct 9. Vapour outlet valve 45, if present, is controlled, preferably by the electronic controller 600, for selectively controlling the vapour discharge.

[0248] The quenching system 17, if provided, emits a jet of preferably fresh clean water, taken more preferably from external water mains, against the flow of vapour 400 flowing through the vapour outlet duct 9, cooling down and dehumidifying such a vapour; condensate resulting from this quenching process is received in the bottom region 9a of the vapour outlet duct 9, and, preferably due to its slope, it is taken by gravity to the by-pass conduit 14, from which it is taken, still by gravity, to the drain conduit 5b, and to the oven outlet 5, from where it can be drained to the sewage pipes, not illustrated, of the building in which the cooking oven 1 is installed.

[0249] Advantageously, before reaching the oven outlet 5, the condensate reaches the air trap 5a (if provided), activating the latter (if not already activated by liquid

present in the latter from previous usages of the cooking oven), so that vapour can't exit through it.

[0250] If condensate level within the vapour outlet duct 9 exceed the level of the overflow conduit 26, it is drained by the latter directly to the oven outlet 5 (passing through the air trap 5a, if present).

[0251] During the cooking process, grease can fall from the overlying foodstuff to the bottom 3 of the cooking chamber 2, and it is collected into the cooking chamber outlet 4 and taken to the grease conduit 6, from which it is collected into the grease container 60.

[0252] Having advantageously provided two separated cooking chamber outlets, one dedicated to collect grease, reduces the possibility that grease could obstruct the second cooking chamber outlet 10 taking to the vapour outlet duct 9.

[0253] In the advantageous embodiment in which the bottom wall 3 of the cooking chamber 2 has a region 3a at least partially funnel-shaped at least at or in proximity to the inlet border 4a of first cooking chamber outlet 4, grease collected on this region 3a is very effectively taken by gravity into the first cooking chamber outlet 4.

[0254] In the still more preferred embodiment in which the inlet border 10a of the second cooking chamber outlet 10 is placed at a raised position with respect to the inlet border 4a of the first cooking chamber outlet 4, if the grease collects in the bottom wall 3 of the cooking chamber, it enters firstly the first cooking chamber 4, and it is therefore drained to the grease conduit 6 before reaching the level of the inlet border of the second cooking chamber outlet 10.

[0255] In the advantageous embodiment, illustrated for example in figure 8, in which the cooking oven 1 comprises a shield element 300 for preventing grease from entering the second cooking chamber outlet 10, such a shield element 300 prevents also grease drops falling from the foodstuff being cooked to directly enter the second cooking chamber outlet 10.

[0256] After the end of cooking process, the oven can be cleaned by the cleaning system 70; an automatic or semi-automatic cleaning procedure can be advantageously activated by the electronic controller 600, which operates on the electrically/electronically operated components of the cleaning system 70.

[0257] A schematic flow chart of a possible automatic or semi-automatic cleaning procedure is illustrated in figure 9.

[0258] The automatic or semi-automatic cleaning procedure advantageously starts with a washing phase 1000, in which, in the embodiment of figure 2, preferably after having emptied the cooking chamber 2 and having positioned a detergent, for example in form of a tablet or of powder, in the bottom 3 of the cooking chamber, the door 2a can be closed, and, with the second valve 12 and the first valve 11 closed, third valve 16b can be opened (preferably automatically by the electronic controller 600).

[0259] Water flowing through the introduction conduit 16a enters the cooking chamber 2 via the outlet 16c; this water, therefore exits the outlet 16c in the form of a liquid vein 900, and it falls, by gravity, into the inlet opening 700 of the diverting element 24.

[0260] Sloped wall 24 guides this liquid vein 900 to the outlet opening 800 of the diverting element 24, which is advantageously positioned at the suction wall 18; water exiting the outlet opening 800 hits the suction wall 18, and it is spread (or distributed) on it so as to form a liquid film 910 which is taken by gravity to the suction mouth 18a.

[0261] Once the liquid level or the liquid amount within the cooking chamber 2 has reached a prefixed washing value, third valve 16b can be closed (advantageously automatically by the electronic controller 600).

[0262] The liquid level within the cooking chamber 2 can be preferably detected, for example by a suitable level sensor, not illustrated, present within the cooking chamber 2.

[0263] The amount of liquid within the cooking chamber 2 can be detected for example by a flowmeter, not illustrated measuring the amount of water entering through the third valve 16b, and communicating this amount to the electronic controller 600.

[0264] Advantageously, the flowmeter can be used also for detecting the liquid level within the cooking chamber 2, since the liquid level and the liquid amount within the cooking chamber are correlated; in this case, the data detected by the flowmeter can be advantageously transmitted to the electronic controller 600, which can be advantageously configured for calculating the liquid level from the amount of liquid entering through the third valve 16b. In a further advantageous embodiment, the amount or the level of liquid within the cooking chamber can be controlled, preferably by the electronic controller 600, by keeping the third valve 16b opened for a prefixed time

[0265] Then, the circulation pump 7a is operated, so as to circulate the washing liquid (i.e. water mixed with the detergent present in the cooking chamber 2) through the circulation system 7. In particular, the washing liquid is circulated through the first cooking chamber outlet 4, grease conduit 6, connection duct 50, drain conduit 5b, second cooking chamber outlet 10, bottom region 9a and at least part of the end region 9b of the vapour outlet duct 9, by-pass conduit 14, aspiration duct 7b, delivery duct 7c, circulation outlet 13, cooking chamber 2. Washing liquid flowing through the delivery duct 7c enters the cooking chamber 2 via the circulation outlet 13; this washing liquid, therefore exits the circulation outlet 13 in the form of a liquid vein 920, and it falls, by gravity, into the inlet opening 700 of the diverting element 24.

[0266] Sloped wall 24 guides this liquid vein 920 to the outlet opening 800 of the diverting element 24, which is advantageously positioned at the suction wall 18; washing liquid exiting the outlet opening 800 hits the suction wall 18, and it is spread (or distributed) on it so as to form a liquid film 910 which is taken by gravity to the suction mouth 18a.

[0267] Preferably, during the washing phase 1000, more preferably during activation of circulation pump 7a, the centrifugal fan 20 is operated, so as to distribute the washing liquid coming from the suction mouth 18a on all the surfaces internal to the cooking chamber 2.

[0268] In this case, the centrifugal fan 20 sucks the liquid film 910 entering the suction mouth 18a, and blows radially the droplets of washing liquid together with the airflow 950, so that they exit the heating chamber 19 and enter the cooking chamber 2 via the gaps 211a, 211b and/or openings, not illustrated, possibly provided in the suction wall 18.

[0269] The airflow 950 generated by the centrifugal fan 20 takes the droplets of washing liquid on the internal surfaces of the cooking chamber 2, so as to clean them.

[0270] Then, the washing liquid falls from the internal surfaces of the cooking chamber 2 to the bottom wall 3 of the latter, from which it can be circulated by the circulation system 7.

[0271] Preferably, during the washing phase 1000, more preferably after all the washing liquid is loaded into the cooking chamber, and before switching on the circulation pump 7a, the heating device 8 is operated, so as to improve the degreasing effect of the washing liquid. More preferably the heating device 8 is operated for keeping the temperature within the cooking chamber at a prefixed temperature (e.g. 140°C), or within a range of temperatures (e.g. 120-160°C), to which corresponds a temperature of the water comprised between 70-80°C.

[0272] Advantageously, the vortex preventing device 100 prevents the formation of air bubble that could prevent circulation pump 7a from properly priming.

[0273] At the end of the washing phase 1000 (e.g. after a certain time, counted for example by the electronic controller 600 has elapsed from the beginning of this phase), circulation pump 7a is stopped, and the second valve 12 is opened (preferably automatically by the electronic controller 600), so as to drain the washing liquid, advantageously by gravity, through the oven outlet 5.

[0274] Preferably, but not necessarily, during the washing phase 1000, after a certain time has lapsed from the switching on of the circulation pump 7a, a further amount of water can be loaded into the cooking chamber 2 by opening the third valve 16b, for example for a certain time, or until the quantity of water flown through the introduction conduit 16a, measured by a flowmeter (if provided), has reached a prefixed threshold, or until the liquid level within the cooking chamber 2 reaches a prefixed level. This further amount of water can be loaded while the circulation pump 7a is working, or the circulation pump 7a can be switched off during the further water loading.

[0275] Advantageously the washing liquid can be heated again during and/or after the loading of the further amount of water, by activating the heating device 8.

[0276] The automatic or semi-automatic cleaning procedure advantageously comprises one or more rinsing phases 2000, 2001 in which, after closing the second valve 12 (which can be done automatically by the electronic controller 600), third valve 16b is opened again (preferably automatically by the electronic controller 600), so as to take rinsing liquid (e.g. water or water mixed with a rinsing additive) within the cooking chamber 2.

[0277] Also in this case, rinsing liquid enters the cooking chamber via the introduction conduit 16a in the form of a vein 900, which falls into the diverting element 24, which receives it and spreads it on the suction wall 18, so as to form a liquid film 910 on it.

[0278] Once the rinsing liquid level or amount within the cooking chamber 2 has reached a prefixed rinsing value, third valve 16b can be closed (advantageously automatically by the electronic controller 600).

[0279] The liquid level within the cooking chamber 2 can be preferably detected, for example by a suitable level sensor, not illustrated, present within the cooking chamber 2.

[0280] The amount of liquid within the cooking chamber 2 can be detected for example by a flowmeter, not illustrated measuring the amount of water entering through the third valve 16b, and communicating this amount to the electronic controller 600.

[0281] Advantageously, the flowmeter can be used also for detecting the liquid level within the cooking chamber 2, since the liquid level and the liquid amount within the cooking chamber are correlated; in this case, the data detected by the flowmeter can be advantageously transmitted to the electronic controller 600, which can be advantageously configured for calculating the liquid level from the amount of liquid entering through the third valve 16b. In a further advantageous embodiment, the amount or the level of liquid within the cooking chamber can be controlled, preferably by the electronic controller 600, by keeping the third valve 16b opened for a prefixed time.

[0282] Then, preferably, circulation pump 7a is operated, so as to circulate the rinsing liquid through the circulation system 7, and to remove residuals of detergent possibly remained therein.

[0283] In particular, the rinsing liquid is circulated through the first cooking chamber outlet 4, grease conduit 6, connection duct 50, drain conduit 5b, second cooking chamber outlet 10, bottom region 9a and at least part of the end region 9b of the vapour outlet duct 9, by-pass conduit 14, aspiration duct 7b, delivery duct 7c, circulation outlet 13, cooking chamber 2. Rinsing liquid flowing through the delivery duct 7c enters the cooking chamber 2 via the circulation outlet 13; this rinsing liquid, therefore exits the circulation outlet 13 in the form of a liquid vein 920, and it falls, by gravity, into the inlet opening 700 of the diverting element 24.

[0284] Sloped wall 24 guides this liquid vein 920 to the outlet opening 800 of the diverting element 24, which is advantageously positioned at the suction wall 18; rinsing liquid exiting the outlet opening 800 hits the suction wall 18, and it is spread (or distributed) on it so as to form a liquid film 910 which is taken by gravity to the suction mouth 18a.

[0285] Preferably, during the rinsing phase 2000, more preferably during activation of circulation pump 7a, the centrifugal fan 20 is operated, so as to distribute the rinsing liquid on all the surfaces internal to the cooking chamber 2.

[0286] In this case, the centrifugal fan 20 sucks the liquid film 910 entering the suction mouth 18a, and blows radially the droplets of rinsing liquid together with the airflow 950, so that they exit the heating chamber 19 and enter the cooking chamber 2 via the gaps 211a, 211b and/or openings, not illustrated, possibly provided in the suction wall 18.

[0287] The airflow 950 generated by the centrifugal fan 20 takes the droplets of rinsing liquid on the internal surfaces of the cooking chamber 2, so as to clean them.

[0288] Then, the rinsing liquid falls from the internal surfaces of the cooking chamber 2 to the bottom wall 3 of the latter, from which it can be circulated by the circulation system 7.

[0289] Once a rinsing phase 2000, 2001 is completed (e.g. after a certain time, counted for example by the electronic controller 600 has elapsed from the beginning of this phase), circulation pump 7a is stopped, and the second valve 12 is opened (preferably automatically by the electronic controller 600), so as to drain the rinsing liquid, advantageously by gravity, through the oven outlet 5.

[0290] One or more further rinsing phases, equal or substantially equal to the one just described, can be performed.

[0291] Advantageously, before the last rinsing phase 2001, a descaling phase 3000 can be performed, which, in the embodiment of Figure 2, is advantageously almost equal to a rinsing phase 2000, 2001, with the difference that during the descaling phase 3000 a descaling additive, for example a descaling powder or tab, can be loaded (e.g. manually) into the cooking chamber 2, so as to generate a descaling liquid (i.e. water and descaling additive), which is circulated by the circulation system 7, so as to descale the surfaces that it contacts.

[0292] Preferably, the automatic or semi-automatic cleaning procedure can comprise, before the washing phase 1000, a soaking phase 4000; preferably, in the soaking phase 4000, with the second valve 12 and the first valve 11 closed, third valve 16b can be opened (preferably automatically by the electronic controller 600), preferably until a prefixed water level or amount is reached within the cooking chamber 2, and/or a prefixed time has lapsed until the third valve 16b has been opened. In the soaking phase 4000, heating device 8 is preferably switched on, so as to heat the water collected in the bottom 3 of the cooking chamber 2; then, after a certain time has lapsed, the second valve 12 is opened, and soaking water is drained via the oven drain 5. Then the washing phase 1000 can be performed.

[0293] With reference to the embodiment of figure 3, the functioning of the cooking oven according to the invention is the following.

[0294] Once the foodstuff has been loaded into the cooking chamber 2, and the door 2a closed, the cooking process can be started; the heating device 8 and the fan 20 are operated, advantageously by the electronic controller 600 of the cooking oven 1, according to a specific cooking program selected and/or programmed by a user.

[0295] The centrifugal fan 20 generates an airflow 950 circulating between the heating chamber 19 and the cooking chamber 2; in particular, the centrifugal fan 20 sucks air from the cooking chamber 2 through the suction mouth 18a, blows it radially, so that the airflow 950 contacts the heating device 8 and is heated, and then blows it again into the cooking chamber 2, preferably via the gaps 211a, 211b, and/or via one or more openings, not illustrated, provided in the suction wall 18.

[0296] The diverting element 24, being positioned far away from the suction mouth 18a, and preferably in the upper edge 18b of the suction wall 18, does not disturb, or at most marginally disturbs, the airflow 950, and therefore it does not affect, or only marginally affects, the thermal uniformity within the cooking chamber 2.

[0297] Ventilation valve 22 is preferably controlled, advantageously by the electronic controller 600 of the cooking oven 1, for keeping fresh air from the external environment into the cooking chamber 2, advantageously according to the specific cooking program selected and/or programmed by the user.

[0298] During the cooking process, the steam supply system 35 can be operated, preferably by the electronic controller 600, according to the specific cooking program selected and/or programmed by a user, in order to take a prefixed steam amount into the cooking chamber 2. In particular, after water is loaded into the water reservoir 37 via the seventh valve 41, water heater 38 can be operated in order to heat such water and generate steam, which is taken into the cooking chamber 2 via the steam duct 43.

[0299] During the cooking process, the vapour present in the cooking chamber 2, the steam supplied by the steam supply system 35 (if present) and the high internal temperature, increase the internal pressure, and, when the latter exceeds ambient pressure, vapour is expelled to external of the cooking chamber 2 via the second cooking chamber outlet 10 and the vapour outlet duct 9. Vapour outlet valve 45, if present, is controlled, preferably by the electronic controller 600, for selectively controlling the vapour discharge.

[0300] The quenching system 17, if provided, emits a jet of preferably fresh clean water, taken more preferably from external water mains, against the flow of vapour 400 flowing through the vapour outlet duct 9, cooling down and dehumidifying such a vapour ; condensate resulting from this quenching process is collected in the bottom region 9a of the vapour outlet duct 9, and, preferably due to its slope, it is taken by gravity to the by-pass conduit 14, from which it is taken, still by gravity, to the drain conduit 5b, and to the oven outlet 5, from where it can be drained to the sewage pipes, not illustrated, of the building in which the cooking oven 1 is installed.

[0301] It is underlined that in the present application the word "vapour" has to be understood indiscriminately as pure steam, or as a mixture of steam and air and/or gasses. Advantageously, before reaching the oven outlet 5, the condensate reaches the air trap 5a (if provided), activating the latter (if not already activated by liquid present from previous usages of the cooking oven), so that vapour can't exit through it.

[0302] If condensate level within the vapour outlet duct 9 exceeds the level of the overflow conduit 26, it is drained by the latter directly to the oven outlet 5 (passing through the air trap 5a, if present).

[0303] During the cooking process, grease can fall from the overlying foodstuff to the bottom 3 of the cooking chamber 2, and it is collected into the cooking chamber outlet 4 and taken to the grease conduit 6, from which it is collected into the grease container 60.

[0304] Having advantageously provided two separated cooking chamber outlets, one dedicated to collect grease, reduces the possibility that grease could obstruct the second cooking chamber outlet 10 taking to the vapour outlet duct 9.

[0305] In the advantageous embodiment in which the bottom wall 3 of the cooking chamber 2 has a region 3a at least partially funnel-shaped at least at or in proximity to the inlet border 4a of first cooking chamber outlet 4, grease collected on this region 3a is very effectively taken by gravity into the first cooking chamber outlet 4.

[0306] In the still more preferred embodiment in which the inlet border 10a of the second cooking chamber outlet 10 is placed at a raised position with respect to the inlet border 4a of the first cooking chamber outlet 4, if the grease collects in the bottom wall 3 of the cooking chamber, it enters firstly the first cooking chamber 4, and it is therefore drained to the grease conduit 6 before reaching the level of the second cooking chamber outlet 10.

[0307] In the advantageous embodiment, illustrated for example in figure 8, in which the cooking oven 1 comprises a shield element 300 for preventing grease from entering the second cooking chamber outlet 10, such a shield element 300 prevents also grease droplets falling from the foodstuff being cooked to directly enter the second cooking chamber outlet 10. After the cooking process, the oven can be cleaned by the cleaning system 70; an automatic or semi-automatic cleaning procedure can be advantageously activated by the electronic controller 600, which operates on the electrically/electronically operated components of the cleaning system 70.

[0308] Also in the embodiment of figure 3, after the end of cooking process, the cooking oven 1 can be cleaned by the cleaning system 70; an automatic or semi-automatic cleaning process can be advantageously activated by the electronic controller 600, which operates on the electrically/electronically operated components of the cleaning system 70.

[0309] A schematic flow chart of a possible automatic or semi-automatic cleaning process applicable to the advantageous embodiment of figure 3 is illustrated in figure 10.

[0310] The cleaning procedure advantageously comprises a steam supply system descaling phase 5000, in which the water reservoir 37 of the steam supply system 35 is preferably emptied by opening the eight valve 42, and a descaling additive is loaded in the additive drawer 28. Then, with seventh valve 41, eight valve 42, and sixth valve 30 closed, the fifth valve 29 is opened (preferably automatically by the electronic controller 600), so that clean water enters the additive drawer 28, dissolves , preferably only partially, the descaling additive contained therein, forming a descaling solution (i.e. water and descaling additive) which is taken, due to the pressure of the water in the water mains, into the water reservoir 37 through the boiler cleaning duct 44.

[0311] Preferably, the water reservoir is only partially filled with the descaling solution coming from the drawer 28, since a part of the descaling additive should preferably remain in the additive drawer for being used in a further step of the automatic or semi-automatic cleaning procedure.

[0312] Advantageously the amount of water loaded into the water reservoir is controlled by a flowmeter, not illustrated, provided at or in series with the fifth valve 29, and preferably controlled by the electronic controller 600 in such a way to close the valve after a prefixed amount of water has flown into the additive drawer 28.

[0313] The electronic controller 600 is also preferably configured in such a way that, in addition or in alternative to the flowmeter, a time-based control of the opening of the fifth valve 29 is performed; in other words, the valve is closed after a certain prefixed time has lapsed until its opening.

[0314] More preferably, some further water is loaded into the water reservoir 37 by opening (preferably automatically by the electronic controller 600) the seventh valve 41, until a prefixed level within the reservoir 37 is reached, and/or a prefixed time has lapsed until the opening of such seventh valve 41. In this way a prefixed concentration of descaling additive in the descaling solution contained in the water reservoir is obtained. Then the seventh valve 41 is closed.

[0315] Advantageously, the water heater 38 is switched on (preferably automatically by the electronic controller 600), so as to increase the descaling effect.

[0316] Preferably, the water heater 38 is controlled, preferably by the electronic controller 600, in order to keep a prefixed temperature within the reservoir 37, for example 80°C; preferably the temperature is measured by a temperature sensor, not illustrated, provided in the water reservoir 37.

[0317] Preferably, the descaling solution is kept into the water reservoir 37 for a prefixed time, more preferably one hour and a half. Preferably, this time can be regulated by the user, for example operating on a user interface of the cooking oven 1.

[0318] The cleaning process of the advantageous embodiment of figure 3, advantageously comprises also a

washing phase 1000 in which, preferably after having emptied the cooking chamber 2 a detergent, for example in form of a tablet or of powder, is placed in the bottom 3 of the cooking chamber, and the door 2a can be closed.

[0319] It is underlined that the steam supply system descaling phase 5000 and the washing phase 1000 can start contemporaneously, or one can start before the other.

[0320] Advantageously, in the washing phase 1000, preferably while the water reservoir 37 is being descaled, or before or after this phase, with the second valve 12 and the first valve 11 closed, third valve 16b can be opened (preferably automatically by the electronic controller 600).

[0321] Water flowing through the introduction conduit 16a enters the cooking chamber 2 via the outlet 16c; this water, therefore exits the outlet 16c in the form of a liquid vein 900, and it falls, by gravity, into the inlet opening 700 of the diverting element 24.

[0322] Sloped wall 24 guides this liquid vein 900 to the outlet opening 800 of the diverting element 24, which is advantageously positioned at the suction wall 18; water exiting the outlet opening 800 hits the suction wall 18, and it is spread (or distributed) on it so as to form a liquid film 910 which is taken by gravity to the suction mouth 18a.

[0323] The liquid level or amount within the cooking chamber 2 is preferably detected, for example by a suitable level sensor, not illustrated, present within the cooking chamber 2, and/or by a flowmeter, not illustrated measuring the amount of water entering through the third valve 16b, and communicating this amount to the electronic controller 600, which is configured for calculating the liquid level from the amount of liquid entering through the third valve 16b.

[0324] Once the liquid level or amount within the cooking chamber 2 has reached a prefixed value, and/or after a certain time has lapsed, third valve 16b is closed (advantageously automatically by the electronic controller 600).

[0325] The, circulation pump 7a is operated, so as to circulate the washing liquid (i.e. water mixed with the detergent present in the cooking chamber 2) through the circulation system 7.

[0326] In particular, the washing liquid is circulated through the first cooking chamber outlet 4, grease conduit 6, connection duct 50, drain conduit 5b, second cooking chamber outlet 10, bottom region 9a and at least part of the end region 9b of the vapour outlet duct 9, by-pass conduit 14, aspiration duct 7b, delivery duct 7c, circulation outlet 13, cooking chamber 2. Washing liquid flowing through the delivery duct 7c enters the cooking chamber 2 via the circulation outlet 13; this washing liquid, therefore, exits the circulation outlet 13 in the form of a liquid vein 920, and it falls, by gravity, into the inlet opening 700 of the diverting element 24.

[0327] Sloped wall 24 guides this liquid vein 920 to the outlet opening 800 of the diverting element 24, which is advantageously positioned at the suction wall 18; washing liquid exiting the outlet opening 800 hits the suction wall 18, and it is spread (or distributed) on it so as to form a liquid film 910 which is taken by gravity to the suction mouth 18a.

[0328] Preferably, during the washing phase 1000, more preferably during activation of circulation pump 7a, the centrifugal fan 20 is operated, so as to distribute the washing liquid on all the surfaces internal to the cooking chamber 2.

[0329] In this case, the centrifugal fan 20 sucks the liquid film 910 entering the suction mouth 18a, and blows radially the droplets of washing liquid together with the airflow 950, so that they exit the heating chamber 19 and enter the cooking chamber 2 via the gaps 211a, 211b and/or openings, not illustrated, possibly provided in the suction wall 18.

[0330] The airflow 950 generated by the centrifugal fan 20 takes the droplets of washing liquid on the internal surfaces of the cooking chamber 2, so as to clean them.

[0331] Then, the washing liquid falls from the internal surfaces of the cooking chamber 2 to the bottom wall 3 of the latter, from which it can be circulated by the circulation system 7.

[0332] Preferably, during the washing phase 1000, more preferably after all the washing liquid is loaded into the cooking chamber 2, and before switching on the circulation pump 7a, the heating device 8 is operated, so as to improve the degreasing effect of the washing liquid. More preferably the heating device 8 is operated for keeping the temperature within the cooking chamber at a prefixed temperature (e.g. 140°C), or within a range of temperatures (e.g. 120-160°C), to which corresponds a temperature of the water comprised between 70-80°C.

[0333] Advantageously, the vortex preventing device 100 prevents the formation of air bubble that could prevent circulation pump 7a from properly priming.

[0334] At the end of the washing phase 1000 (e.g. after a certain time, counted for example by the electronic controller 600 has elapsed from the beginning of this phase), circulation pump 7a is stopped, and the second valve 12 is opened (preferably automatically by the electronic controller 600), so as to drain the washing liquid, advantageously by gravity, through the oven outlet 5.

[0335] Preferably, but not necessarily, during the washing phase 1000, after a certain time has lapsed from the switching on of the circulation pump 7a, a further amount of water can be loaded into the cooking chamber 2 by opening the third valve 16b, for example for a certain time, or until the quantity of water flown through the introduction conduit 16a, measured by a flowmeter (if provided), or until the water level within the cooking chamber 2, has reached a prefixed value. This further amount of water can be loaded while the circulation pump 7a is working, or the circulation pump 7a can be switched off during the further water loading. Advantageously the washing liquid can be heated again during and/or after the loading of the further amount of water, by activating

the heating device 8.

[0336] The automatic or semi-automatic cleaning process can advantageously comprise a rinsing phase 2000 in which, after closing the second valve 12 (which can be done automatically by the electronic controller 600), third valve 16b is opened again (preferably automatically by the electronic controller 600), so as to take rinsing liquid within the cooking chamber 2. Also in this case, rinsing liquid enters the cooking chamber via the introduction conduit 16a in the form of a vein 900, which falls into the diverting element 24, which receives it and spreads it on the suction wall 18 so as to form a liquid film 910 on it.

[0337] Once the rinsing liquid level or amount within the cooking chamber 2 has reached a prefixed value, third valve 16b can be closed (advantageously automatically by the electronic controller 600).

[0338] The liquid level within the cooking chamber 2 can be preferably detected, for example by a suitable level sensor, not illustrated, present within the cooking chamber 2.

[0339] The amount of liquid within the cooking chamber 2 can be detected for example by a flowmeter, not illustrated measuring the amount of water entering through the third valve 16b, and communicating this amount to the electronic controller 600.

[0340] Advantageously, the flowmeter can be used also for detecting the liquid level within the cooking chamber 2, since the liquid level and the liquid amount within the cooking chamber are correlated; in this case, the data detected by the flowmeter can be advantageously transmitted to the electronic controller 600, which can be advantageously configured for calculating the liquid level from the amount of liquid entering through the third valve 16b. In a further advantageous embodiment, the amount or the level of liquid within the cooking chamber can be controlled, preferably by the electronic controller 600, by keeping the third valve 16b opened for a prefixed time.

[0341] Then, preferably, circulation pump 7a is operated, so as to circulate the rinsing liquid through the circulation system 7, and to remove residuals of detergent possibly remained therein.

[0342] In particular, the rinsing liquid is circulated through the first cooking chamber outlet 4, grease conduit 6, connection duct 50, drain conduit 5b, second cooking chamber outlet 10, bottom region 9a and at least part of the end region 9b of the vapour outlet duct 9, by-pass conduit 14, aspiration duct 7b, delivery duct 7c, circulation outlet 13, cooking chamber 2. Rinsing liquid flowing through the delivery duct 7c enters the cooking chamber 2 via the circulation outlet 13; this rinsing liquid, therefore exits the circulation outlet 13 in the form of a liquid vein 920, and it falls, by gravity, into the inlet opening 700 of the diverting element 24.

[0343] Sloped wall 24 guides this liquid vein 920 to the outlet opening 800 of the diverting element 24, which is advantageously positioned at the suction wall 18; rinsing liquid exiting the outlet opening 800 hits the suction wall 18, and it is spread (or distributed) on it so as to form a liquid film 910 which is taken by gravity to the suction mouth 18a.

[0344] Preferably, during the rinsing phase 2000, more preferably during activation of circulation pump 7a, the centrifugal fan 20 is operated, so as to distribute the rinsing liquid on all the surfaces internal to the cooking chamber 2.

[0345] In this case, the centrifugal fan 20 sucks the liquid film 910 entering the suction mouth 18a, and blows radially the droplets of rinsing liquid together with the airflow 950, so that they exit the heating chamber 19 and enter the cooking chamber 2 via the gaps 211a, 211b and/or openings, not illustrated, possibly provided in the suction wall 18.

[0346] The airflow 950 generated by the centrifugal fan 20 takes the droplets of rinsing liquid on the internal surfaces of the cooking chamber 2, so as to clean them.

[0347] Then, the rinsing liquid falls from the internal surfaces of the cooking chamber 2 to the bottom wall 3 of the latter, from which it can be circulated by the circulation system 7.

[0348] At the end of the rinsing phase 2000 (e.g. after a certain time, counted for example by the electronic controller 600 has elapsed from the beginning of this phase), circulation pump 7a is stopped, and the second valve 12 is opened (preferably automatically by the electronic controller 600), so as to drain the rinsing liquid, advantageously by gravity, through the oven outlet 5.

[0349] One or more further rinsing phases 2001, equal or substantially equal to the one just described, can be performed.

[0350] After one or more rinsing phases, a descaling phase 3000 is advantageously performed.

[0351] When the cleaning procedure is advantageously applied to the embodiment of the oven figure 3, preferably, in the descaling phase 3000, with first valve 11 and second valve 12 closed, and sixth valve 30 opened, fifth valve 29 is opened (preferably automatically by the electronic controller 600), so that clean water enters the additive drawer 28, dissolves , preferably completely, the descaling additive contained therein, forming a descaling liquid (i.e. water and descaling additive), and goes by gravity through sixth valve 30, to the aspiration conduit 7b.

[0352] Advantageously the amount of water loaded into the water reservoir is controlled by a flowmeter, not illustrated, provided at or in series with the fifth valve 29, and preferably controlled by the electronic controller 600 in such a way to close the valve after a prefixed amount of water has flown into the additive drawer 28.

[0353] The electronic controller 600 is also preferably configured in such a way that, in addition or in alternative to the flowmeter, a time-based control of the opening of the fifth valve 29 is performed; in other words, the valve is closed after a certain prefixed time has lapsed until its opening.

[0354] In the descaling phase 3000, circulation pump

7a is advantageously operated, so as to circulate the descaling liquid (i.e. water mixed with the descaling additive present in the additive drawer 28) through the circulation system 7.

[0355] In particular, the descaling liquid is circulated through the first cooking chamber outlet 4, grease conduit 6, connection duct 50, drain conduit 5b, second cooking chamber outlet 10, bottom region 9a and at least part of the end region 9b of the vapour outlet duct 9, by-pass conduit 14, aspiration duct 7b, delivery duct 7c, circulation outlet 13, cooking chamber 2. Preferably, during the descaling phase 3000, the heating device 8 is operated, so as to improve the descaling effect of the descaling liquid.

[0356] Descaling liquid flowing through the delivery duct 7c enters the cooking chamber 2 via the circulation outlet 13; this descaling liquid, therefore exits the circulation outlet 13 in the form of a liquid vein 920, and it falls, by gravity, into the inlet opening 700 of the diverting element 24.

[0357] Sloped wall 24 guides this liquid vein 920 to the outlet opening 800 of the diverting element 24, which is advantageously positioned at the suction wall 18; descaling liquid exiting the outlet opening 800 hits the suction wall 18, and it is spread (or distributed) on it so as to form a liquid film 910 which is taken by gravity to the suction mouth 18a.

[0358] Preferably, during the descaling phase 3000, more preferably during activation of circulation pump 7a, the centrifugal fan 20 is operated, so as to distribute the descaling liquid on all the surfaces internal to the cooking chamber 2.

[0359] In this case, the centrifugal fan 20 sucks the liquid film 910 entering the suction mouth 18a, and blows radially the droplets of descaling liquid together with the airflow 950, so that they exit the heating chamber 19 and enter the cooking chamber 2 via the gaps 211a, 211b and/or openings, not illustrated, possibly provided in the suction wall 18.

[0360] The airflow 950 generated by the centrifugal fan 20 takes the droplets of descaling liquid on the internal surfaces of the cooking chamber 2, so as to descale them.

[0361] Then, the descaling liquid falls from the internal surfaces of the cooking chamber 2 to the bottom wall 3 of the latter, from which it can be circulated by the circulation system 7.

[0362] At the end of the descaling phase 3000 (e.g. after a certain time, counted for example by the electronic controller 600 has elapsed from the beginning of this phase), circulation pump 7a is stopped, and the second valve 12 is opened (preferably automatically by the electronic controller 600), so as to drain the descaling liquid, advantageously by gravity, through the oven outlet 5.

[0363] Preferably, but not necessarily, at the same time with the completion of the descaling phase 3000, the steam supply system descaling phase 5000 can be completed; in this case, preferably automatically by the electronic controller 600, water heater 38 is switched off, eight valve 42 is opened, and the descaling solution present in the water reservoir 37 drained, advantageously by gravity, through the oven outlet 5.

[0364] Finally, a further rinsing phase 2001, equal to the ones described above, can be performed, so as to remove possible residuals of descaling solution from the internal of the oven.

[0365] In addition, the automatic or semi-automatic cleaning procedure preferably comprises a steam supply system rinsing phase 6000, comprising closing the eight valve 42 and opening the seventh valve 41 for a prefixed time, and/or until a prefixed water level is reached within the water reservoir, so as to load clean water within the water reservoir 37, and finally, after a prefixed time has lapsed , opening the eight valve 42, so as to drain, by gravity, rinsing liquid via the oven outlet 5.

[0366] Preferably, the automatic or semi-automatic cleaning procedure can comprise, before the washing phase 1000, a soaking phase 4000; preferably, in the soaking phase 4000, with the second valve 12 and the first valve 11 closed, third valve 16b can be opened (preferably automatically by the electronic controller 600), preferably until a prefixed water level or amount is reached within the cooking chamber 2, and/or a prefixed time has lapsed until the third valve 16b has been opened. In the soaking phase 4000, heating device 8 is switched on, so as to heat the water collected in the bottom 3 of the cooking chamber 2; then, after a certain time has lapsed, the second valve 12 is opened, and soaking water is drained via the oven drain 5. Then the washing phase 1000 can be performed.

[0367] In advantageous embodiment of figure 4, the cleaning procedure preferably differs from the cleaning procedure described with reference to the oven of figure 3 only because:

- during the washing phase 1000 the detergent is not placed in the bottom 3 of the cooking chamber by the user, but it is taken directly into the introduction system 16, preferably into the introduction conduit 16a, by operating additive pump 34b, in such a way to pump the washing additive out of the additive container 32b and pump the washing additive in the introduction system 16;
- during the steam supply system descaling phase 5000, and during the descaling phase 3000, preferably, the descaling additive is not manually loaded into the additive drawer 28, but it is loaded into the additive drawer by operating additive pump 34a, in such a way to pump the descaling additive out of the additive container 32a and to pump the descaling additive in the additive drawer 28.

[0368] In the advantageous embodiment of figure 4, the amount of descaling additive supplied to the additive drawer 28 can be advantageously controlled by operating the additive pump 34a for a prefixed time, and/or by

measuring the amount of liquid flowing through additive delivery conduit 33a, for example by a flowmeter, not illustrated.

[0369] In the advantageous embodiment of figure 4, the amount of washing agent supplied to the introduction system 16 is controlled by operating the additive pump 34b for a prefixed time, and/or by measuring the amount of liquid flowing through additive delivery conduit 33b, for example by a flowmeter, not illustrated.

[0370] It is underlined that in the advantageous embodiment of figure 4, an additive can be loaded also manually into the additive drawer 28 (for example if the additive container 32a is empty, and/or for adding a further kind of additive in addition to the one contained in additive container 32a).

[0371] In the advantageous embodiment of figure 5, the cleaning procedure preferably differs from the cleaning procedure described with reference to the oven of figure 1 only because:

- during the washing phase 1000 the detergent is not placed in the bottom 3 of the cooking chamber by the user, but it is taken directly into the introduction system 16, preferably into the introduction conduit 16a, by operating additive pump 34b, in such a way to pump the washing additive out of the additive container 32b and pump the washing additive in the introduction system 16, from which it is taken, together with the water entering the third valve 16b, into the cooking chamber 2;
- during the descaling phase 3000, the descaling additive is not manually loaded into the cooking chamber 2, but it is loaded into the introduction system by operating additive pump 34a, in such a way to pump the descaling additive out of the additive container 32a and to pump the washing additive in the introduction system 16, from which it is taken, together with the water entering the third valve 16b, into the cooking chamber 2.

[0372] In the advantageous embodiment of figure 5, during the automatic or semi-automatic cleaning method, the amount of descaling additive supplied to introduction system 16 can be advantageously controlled by operating the additive pump 34a for a prefixed time, and/or by measuring the amount of liquid flowing through additive delivery conduit 33a, for example by a flowmeter, not illustrated.

[0373] In the advantageous embodiment of figure 5, during the automatic or semi-automatic cleaning method, the amount of washing agent supplied to the introduction system 16 is controlled by operating the additive pump 34b for a prefixed time, and/or by measuring the amount of liquid flowing through additive delivery conduit 33b, for example by a flowmeter, not illustrated.

[0374] In the advantageous embodiment of figure 6, the cleaning procedure preferably differs from the cleaning procedure described with reference to the oven of figure 1 only because:

- during the washing phase 1000 the detergent is not placed in the bottom 3 of the cooking chamber by the user, but it is taken directly into the introduction system 16, preferably into the introduction conduit 16a, by operating additive pump 34b, in such a way to pump the washing additive out of the additive container 32b and pump the washing additive in the introduction system 16, from which it is taken, together with the water entering the third valve 16b, into the cooking chamber 2;
- during the descaling phase 3000, preferably, the descaling additive is not manually loaded into the cooking chamber 2, but is loaded into the additive drawer 28 by operating additive pump 34a, in such a way to pump the descaling additive out of the additive container 32a and to pump the descaling additive in the additive drawer 28.

[0375] In the advantageous embodiment of figure 6, during the automatic or semi-automatic cleaning method, the amount of descaling additive supplied to the additive drawer 28 can be advantageously controlled by operating the additive pump 34a for a prefixed time, and/or by measuring the amount of liquid flowing through additive delivery conduit 33a, for example by a flowmeter, not illustrated.

[0376] In the advantageous embodiment of figure 6, during the automatic or semi-automatic cleaning method, the amount of washing agent supplied to the introduction system 16 is controlled by operating the additive pump 34b for a prefixed time, and/or by measuring the amount of liquid flowing through additive delivery conduit 33b, for example by a flowmeter, not illustrated.

[0377] It is underlined that in the advantageous embodiment of figure 6 it is possible loading also manually an additive into the additive drawer 28 (for example if the additive container 32a is empty, and/or for adding a further kind of additive in addition to the one contained in additive container 32a).

[0378] It is seen therefore how the invention achieves the proposed aim and objects, there being provided a cooking oven provided with an automatic or semiautomatic cleaning system which ensures an optimal cleaning of the cooking chamber without affecting, or only marginally affecting, the thermal uniformity within the cooking chamber during the cooking process.

[0379] In addition, since the diverting element is not positioned in the central region of the cooking chamber, it doesn't reduce, or only marginally reduces, the volume of the cooking chamber available for the foodstuffs to be cooked.

[0380] In addition, the inventive solution is much silent, since there isn't any jet of liquid hitting directly the fan.

Claims

1. Cooking oven (1) comprising:

   - a cooking chamber (2) wherein foodstuffs can be placed for being cooked, comprising an upper wall (23);
   - a heating device (8) for heating the internal of said cooking chamber (2);
   - a suction wall (18) separating said cooking chamber (2) from a heating chamber (19) containing, at least partially, said heating device (8);
   - a centrifugal fan (20), positioned in said heating chamber (19) and configured for circulating an airflow (950) through said cooking chamber (2) and said heating chamber (19);

   wherein said suction wall comprises a suction mouth (18a) facing a central region of said centrifugal fan (20),
   wherein said cooking oven (1) comprises:

   - a cleaning system (70) comprising a washing/rinsing liquid introduction system (16) configured for taking washing/rinsing liquid within the cooking chamber (2) and provided with an outlet (16c) positioned in said upper wall (23) of said cooking chamber (2),

   characterized in that
   said cooking oven (1) comprises:

   - a diverting element (24) configured for receiving a liquid (900) exiting said outlet (16c) of said washing/rinsing liquid introduction system (16) and for spreading it on said suction wall (18) so as to form a liquid film (910) on it, which is taken by gravity into said suction mouth (18a).

2. Cooking oven, according to claim 1, wherein said suction wall (18) is oriented vertically, or substantially vertically, when the cooking oven (1) is in its operative position.

3. Cooking oven (1), according to one or more of the previous claims, wherein said diverting element (24) is fixed to said suction wall (18).

4. Cooking oven (1), according to one or more of the previous claims, wherein said diverting element (24) is positioned in proximity to an upper edge (18b) of said suction wall (18).

5. Cooking oven (1), according to one or more of the previous claims, wherein said diverting element (24) protrudes over an upper edge (18b) of said suction wall (18).

6. Cooking oven (1), according to one or more of the previous claims, wherein said diverting element (24) is separated from said upper wall (23).

7. Cooking oven (1), according to one or more of the previous claims, wherein said diverting element (24) comprises an inlet opening (700) facing said outlet (16c) of said washing/rinsing liquid introduction system (16), and an outlet opening (800) positioned in proximity to said suction wall (18).

8. Cooking oven (1), according to claim 7 wherein said inlet opening (700) and/or said outlet opening (800) have a rectangular or substantially rectangular cross section.

9. Cooking oven (1), according to claim 8 wherein said inlet opening (700) and/or said outlet opening (800) have a cross section having a long side parallel or substantially parallel to said suction wall (18), and a short side perpendicular or substantially perpendicular to said suction wall (18).

10. Cooking oven (1), according to claim 7 or 8 or 9, wherein said diverting element (24) comprises a sloped wall (24a) configured for guiding liquid (900, 920) coming from the inlet opening (700) to the outlet opening (800) by gravity.

11. Cooking oven, according to one or more of the previous claims, wherein said diverting element (24) has a reversed U-shaped cross section, comprising a base (24a) and two arms (24b, 24c), fixed to said suction wall (18).

12. Cooking oven (1), according to one or more of the previous claims, wherein said diverting element (24) is funnel shaped.

13. Cooking oven (1) according to one or more of the previous claims, wherein said cleaning system (70) comprises a circulation system (7) configured for pumping liquid out of said cooking chamber (2) and for pumping such liquid, or a part thereof, again in said cooking chamber (2), said circulation system (7) comprising a circulation pump (7a), an aspiration conduit (7b) connecting said circulation pump (7a) to a cooking chamber outlet (4, 10), and a delivery conduit (7c) connecting said circulation pump (7a) to a washing/rinsing liquid circulation outlet (13) provided in said upper wall (23) of said cooking chamber (2) and configured for allowing washing/rinsing liquid to enter said cooking chamber (2), wherein said diverting element (24) is configured for receiving a liquid (920) exiting said washing/rinsing liquid circulation outlet (13) and for spreading it on said suction wall (18) so as to form a liquid film (910) on it, which is taken into said suction mouth (18a) by gravity.

14. Method for cleaning a cooking oven (1) according to one or more of claim 1 to 13, comprising the following steps:

- taking a washing/rinsing liquid within the cooking chamber (2) of the cooking oven (1) via the outlet (16c) of the washing/rinsing liquid introduction system (16) of the cleaning system (70) of the cooking oven (1);
- receiving, by the diverting element (24), the washing/rinsing liquid exiting said outlet (16c) ;
- spreading, by the diverting element (24), the received washing/rinsing liquid on the suction wall (18) so as to form a liquid film (910) on it, which is taken by gravity into said suction mouth (18a);
- activating the centrifugal fan (20) so as to suck said washing/rinsing liquid in form of said liquid film (910), and to blow radially the washing/rinsing liquid in form of droplets together with the generated airflow (950).

15. Method according to claim 14, when applied to a cooking oven (1) according to claim 13, comprising the following steps:

- taking a washing/rinsing liquid within the cooking chamber (2) of the cooking oven (1) via the washing/rinsing liquid circulation outlet (13) of the circulation system (7) of the cooking oven (1);
- receiving, by the diverting element (24), the washing/rinsing liquid exiting said washing/rinsing liquid circulation outlet (13);
- spreading, by the diverting element (24), the received washing/rinsing liquid on the suction wall (18) so as to form a liquid film (910) on it, which is taken by gravity into said suction mouth (18a);
- activating the centrifugal fan (20) so as to suck said washing/rinsing liquid in form of said liquid film (910), and to blow radially the washing/rinsing liquid in form of droplets together with the generated airflow (950).

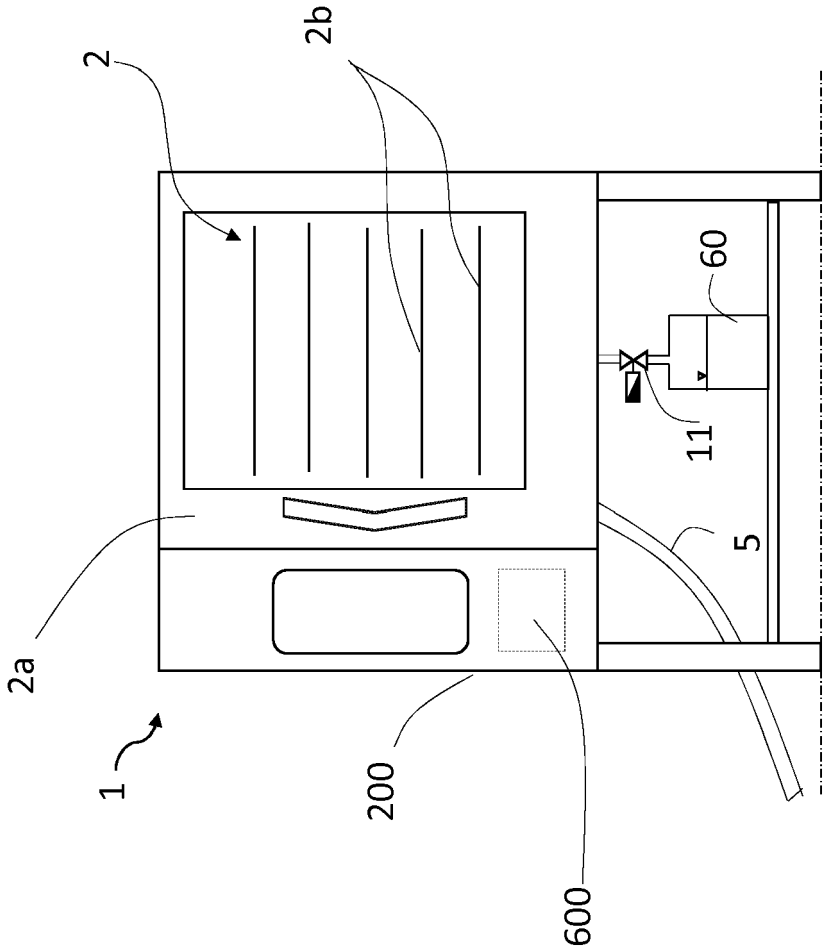
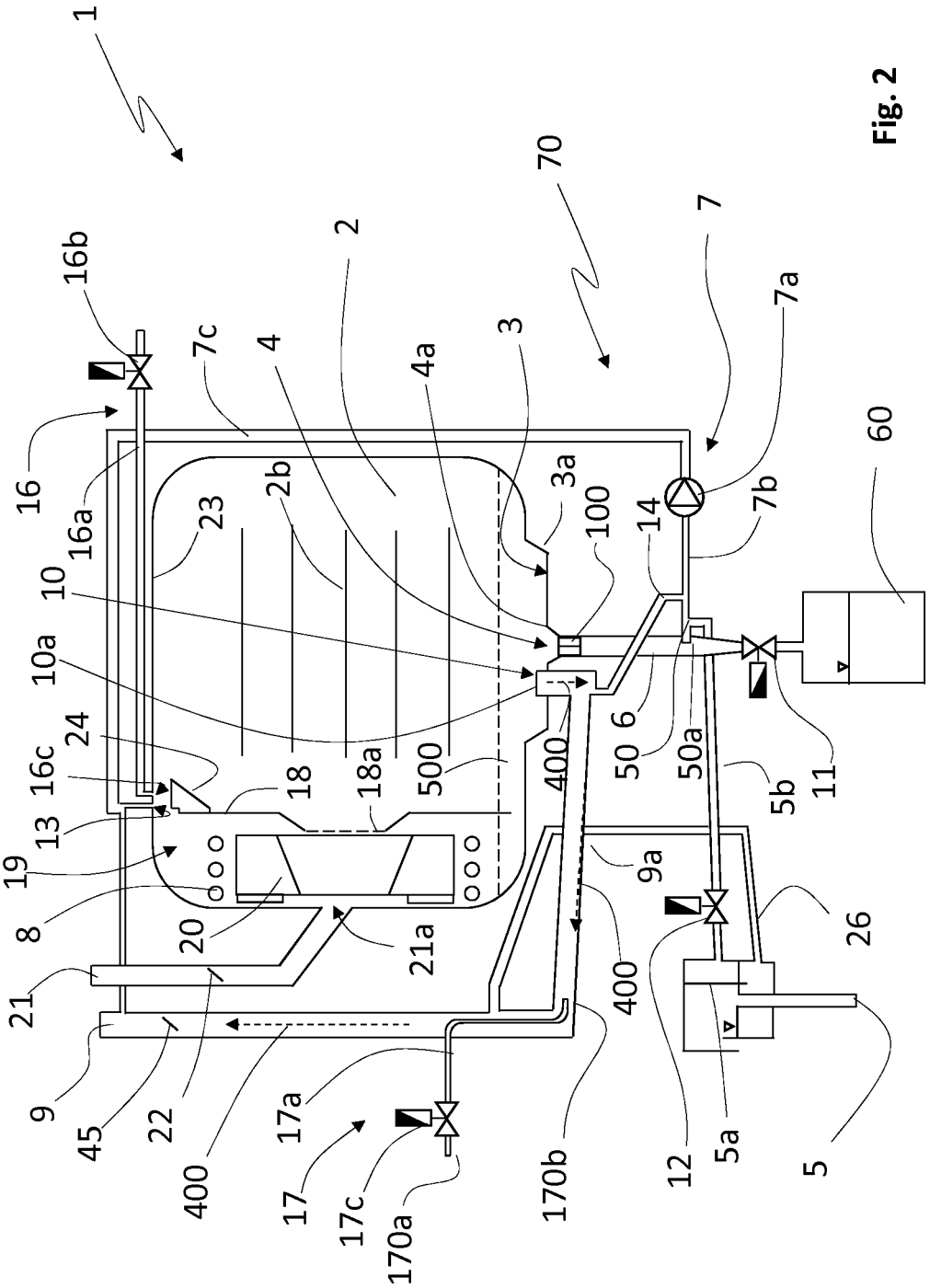


Fig. 1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7c
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10
10a
24
16c
13
19
8
18
18a
500
400
50
6
50a
5b
11
9a
26
20
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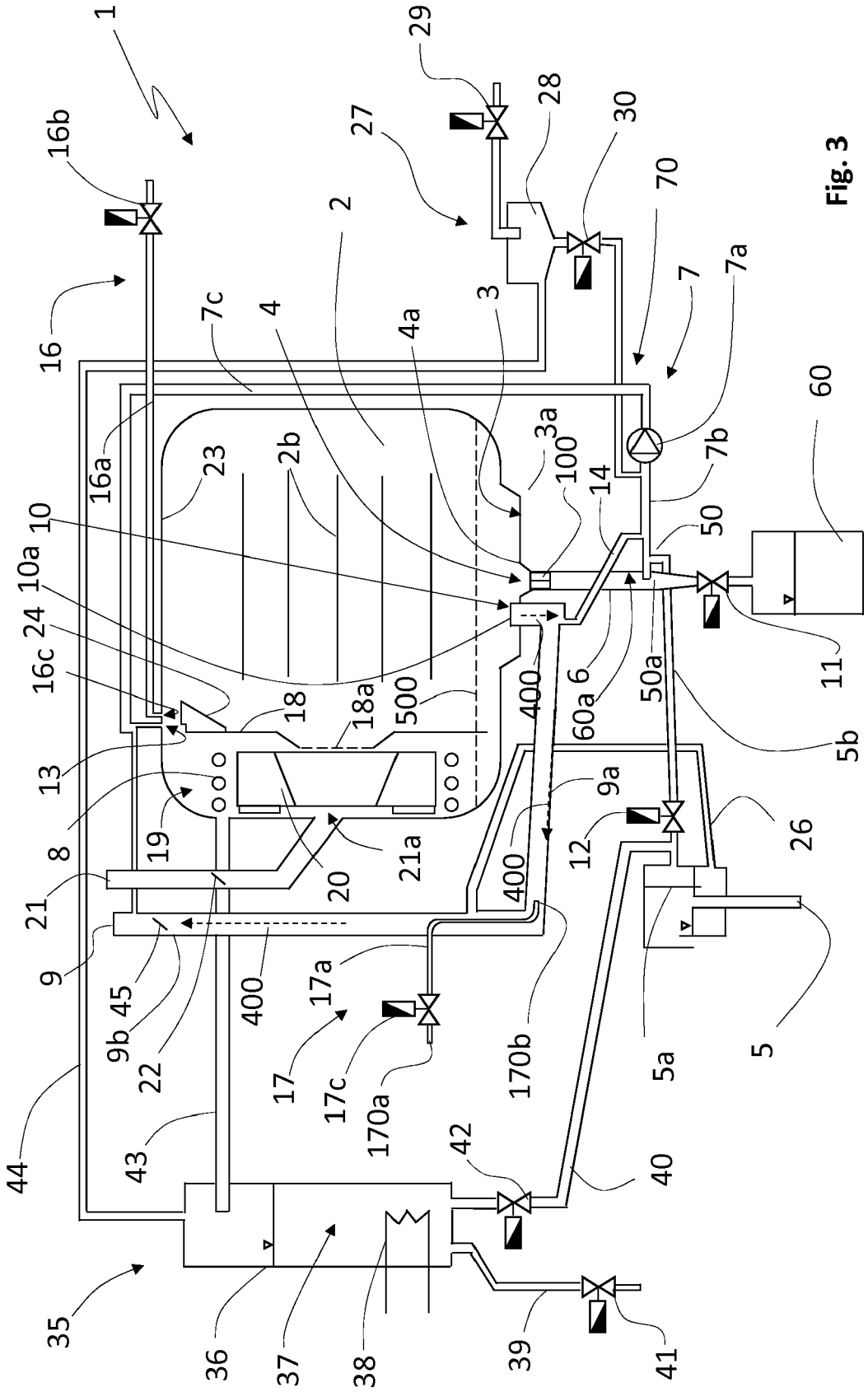
22
400
17a
17
17c
170a
170b
12
5a
5

Fig. 2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16c
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100
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50
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11
10
10a
24
23
2b
18
18a
500
400
6
60a
50a
5b
13
8
19
21a
20
21
9
9a
12
26
45
9b
22
400
17a
17
17c
170a
170b
5a
5
44
43
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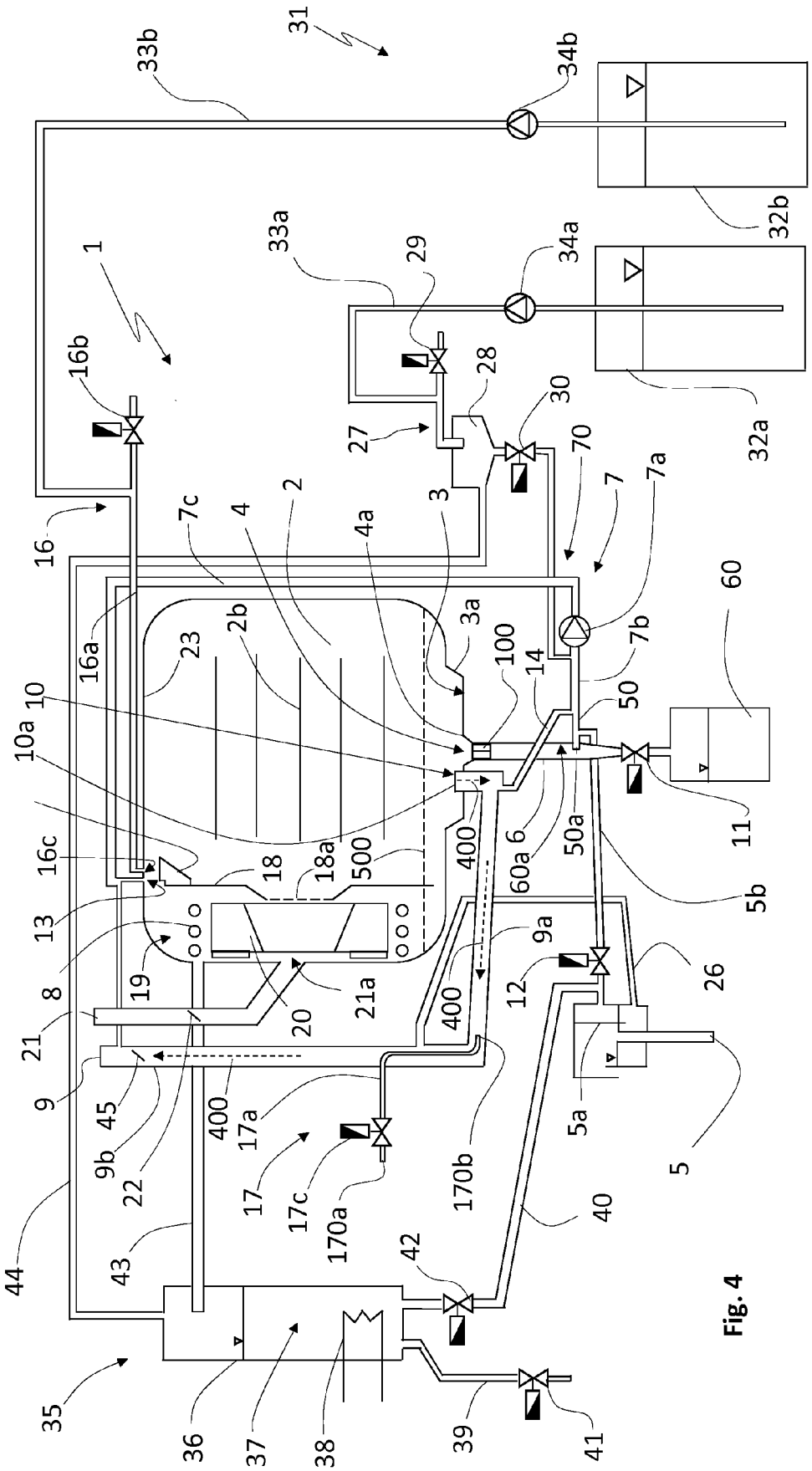
38
39
41

Fig. 3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32b
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34a
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16b
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7c
4
2
4a
3
60
16a
2b
3a
23
100
14
7b
10
50
10a
11
16c
18
18a
500
400
6
60a
50a
5b
13
9a
8
19
21a
12
26
21
20
400
9
45
400
17a
5a
9b
22
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17c
170a
170b
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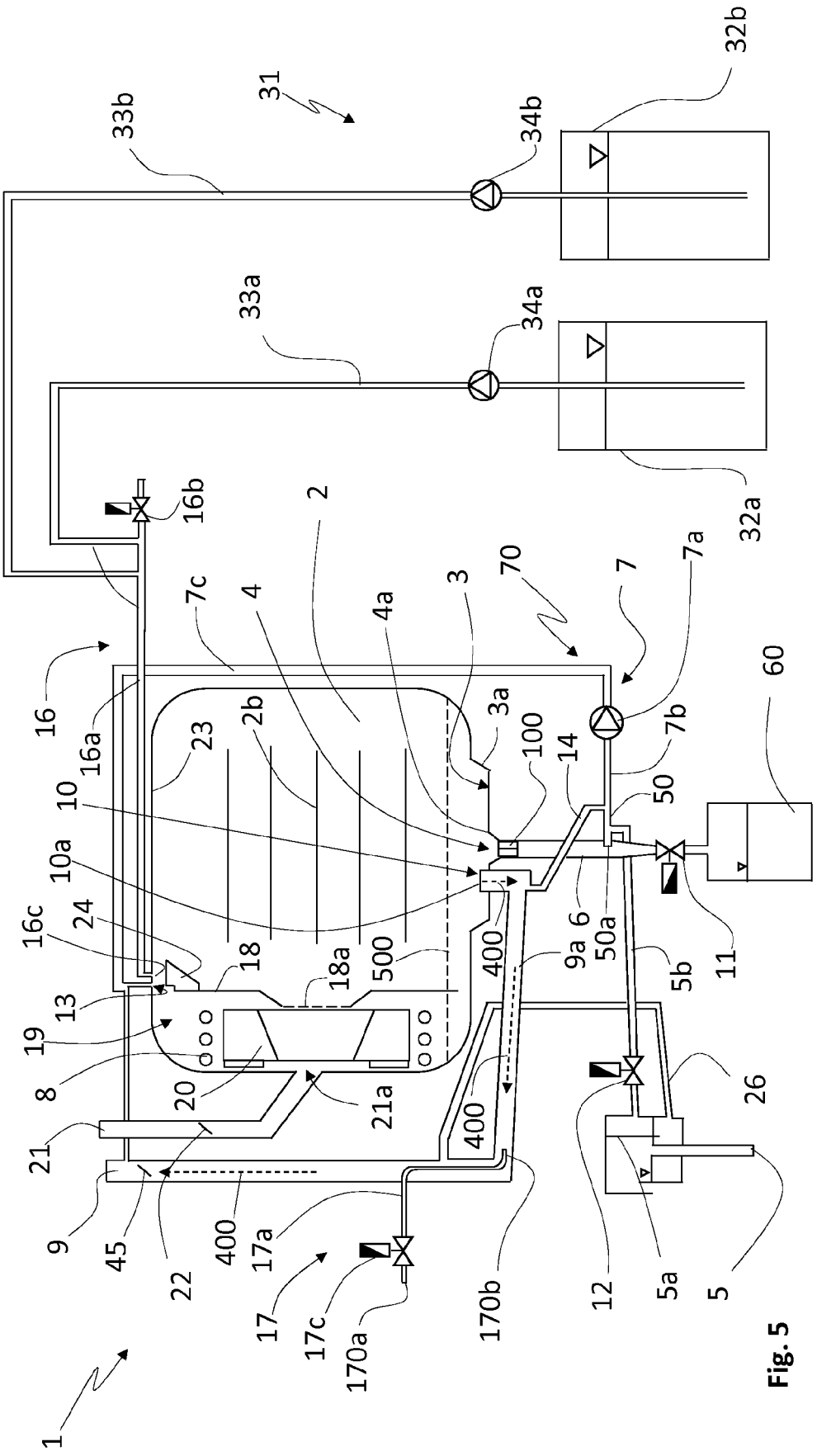
41

Fig. 4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5b
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7b
7c
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10
10a
11
12
13
14
16
16a
16b
16c
17
17a
17c
18
18a
19
20
21
21a
22
23
24
26
31
32a
32b
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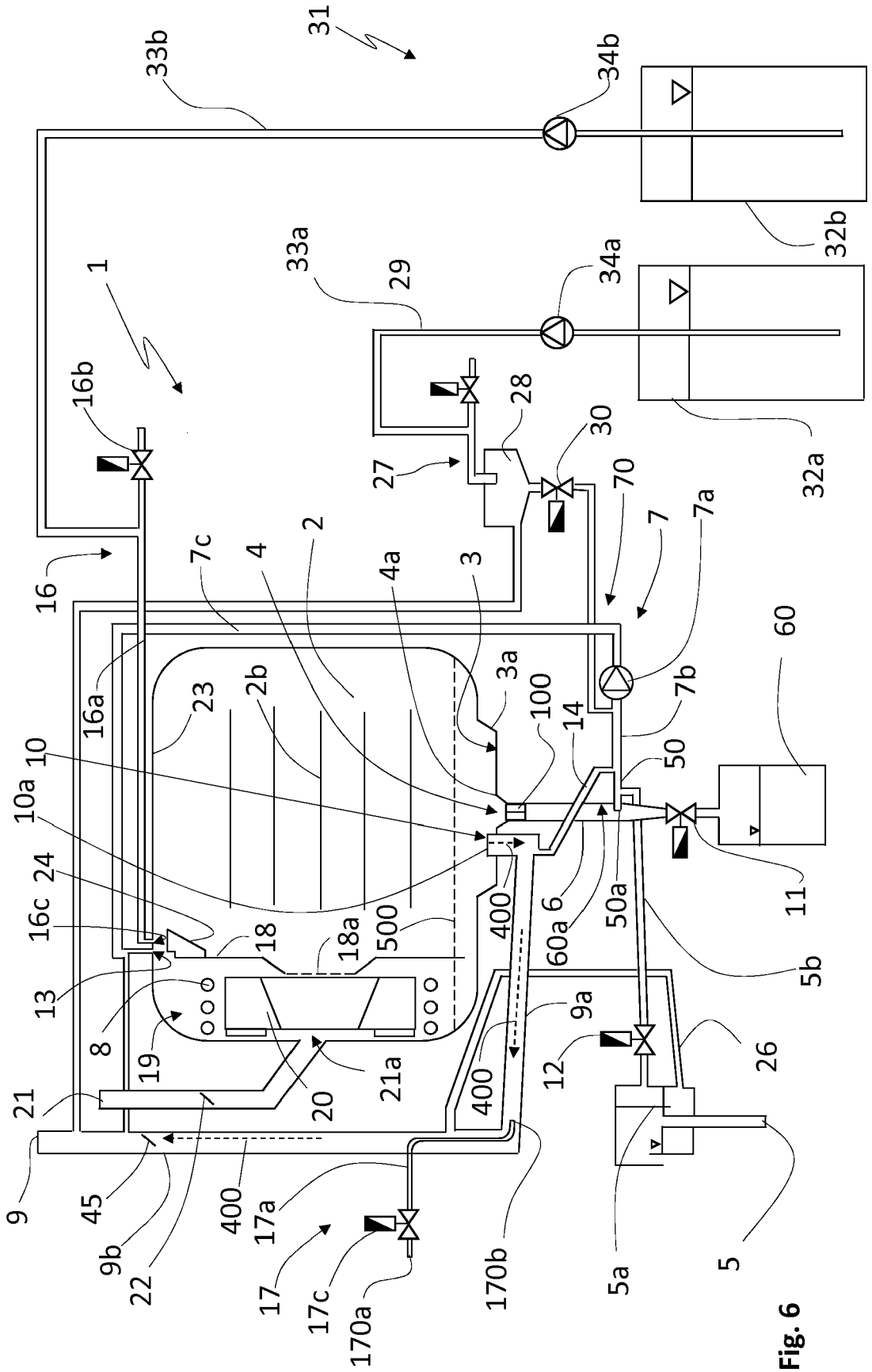
33b
34a
34b
45
50
50a
60
70
100
170a
170b
400
500

Fig. 5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7c
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4a
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16a
23
2b
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7b
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10a
24
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16c
18
18a
500
400
60a
6
50a
5b
13
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19
9a
12
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22
17
17c
170a
170b
5a
5

Fig. 6

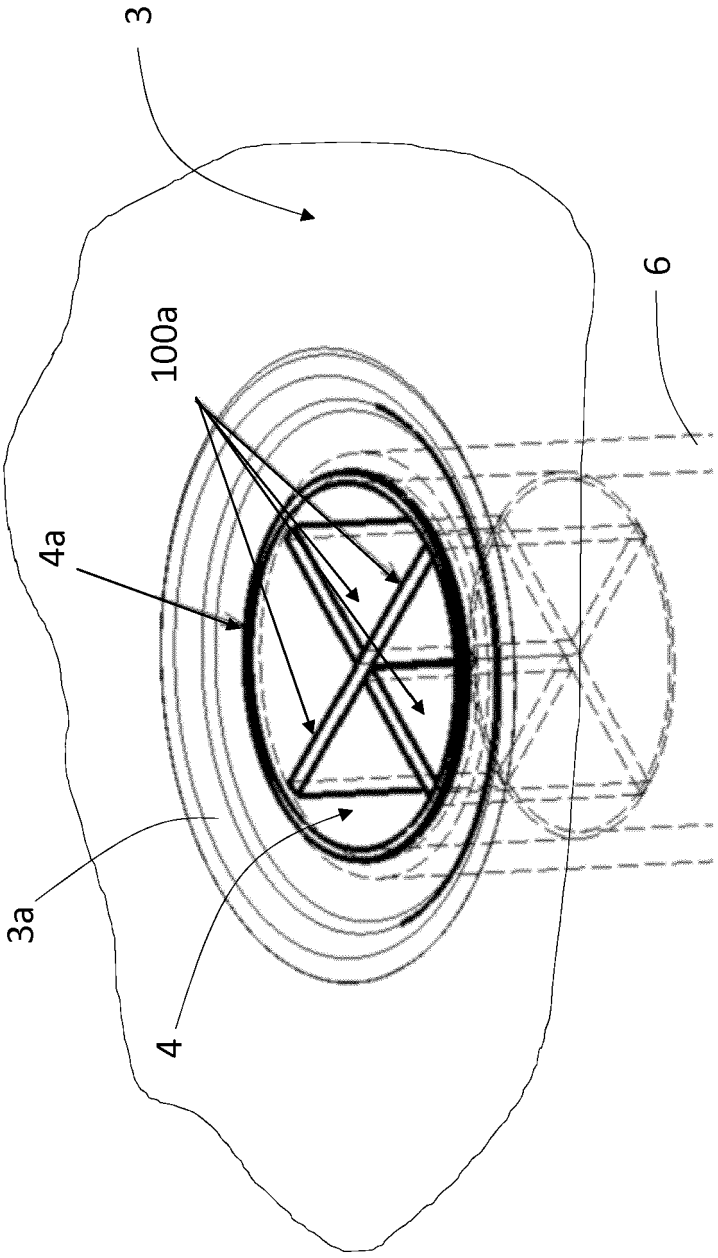


Fig. 7

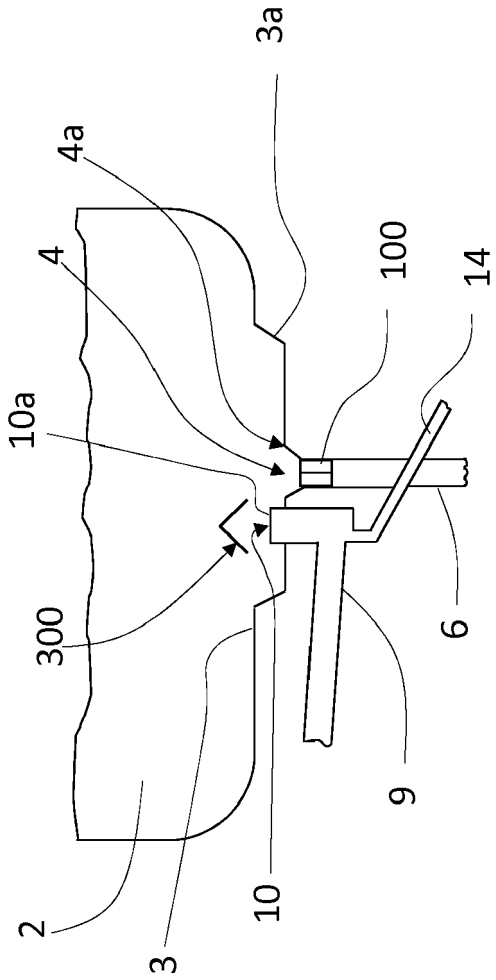
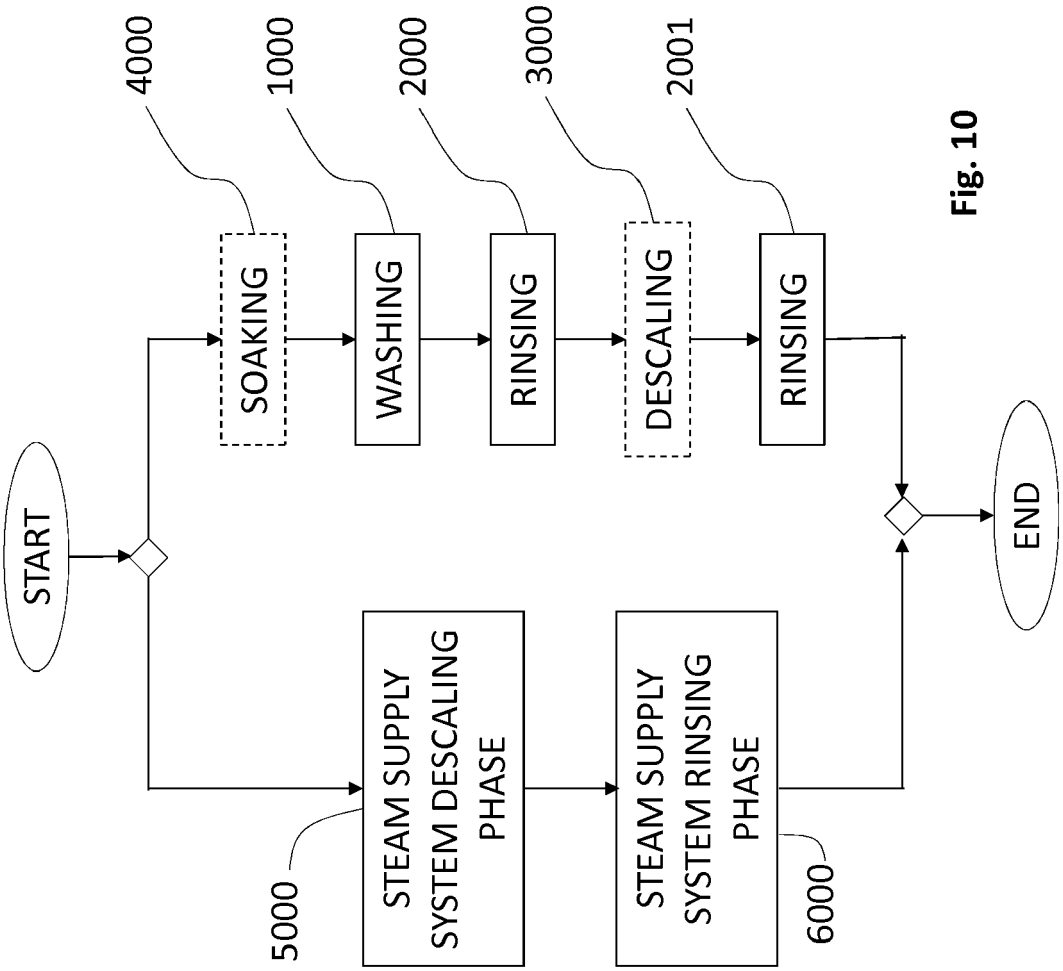


Fig. 8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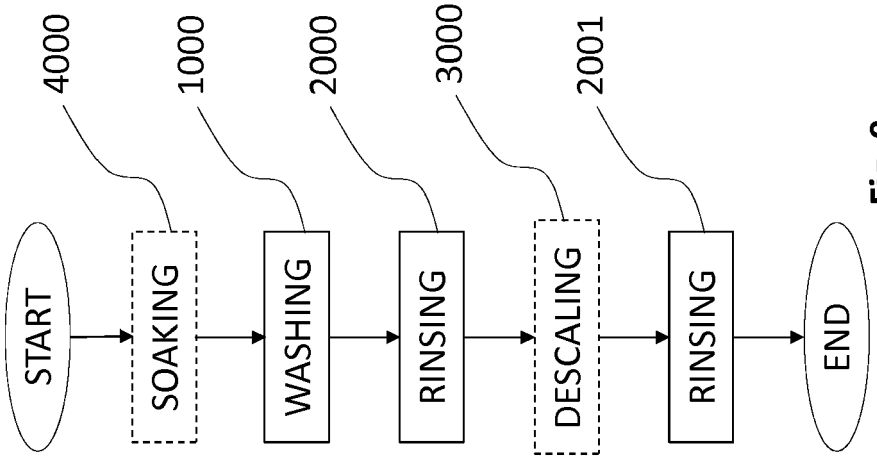
SOAKING
WASHING
RINSING
DESCALING
RINSING
END
STEAM SUPPLY SYSTEM DESCALING PHASE
STEAM SUPPLY SYSTEM RINSING PHASE
4000
1000
2000
3000
2001
5000
6000

Fig. 10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WASHING
RINSING
DESCALING
RINSING
END
4000
1000
2000
3000
2001

Fig. 9

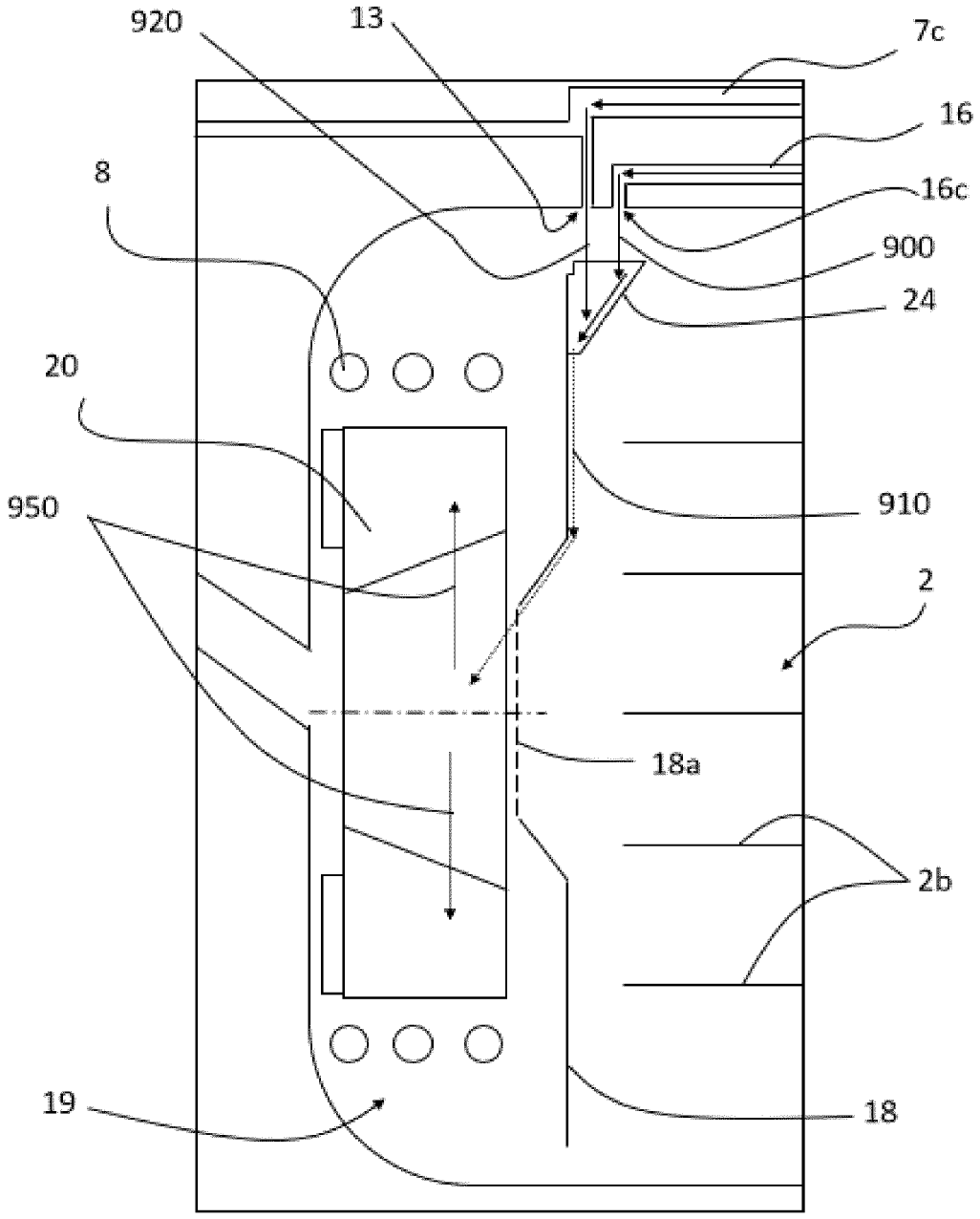
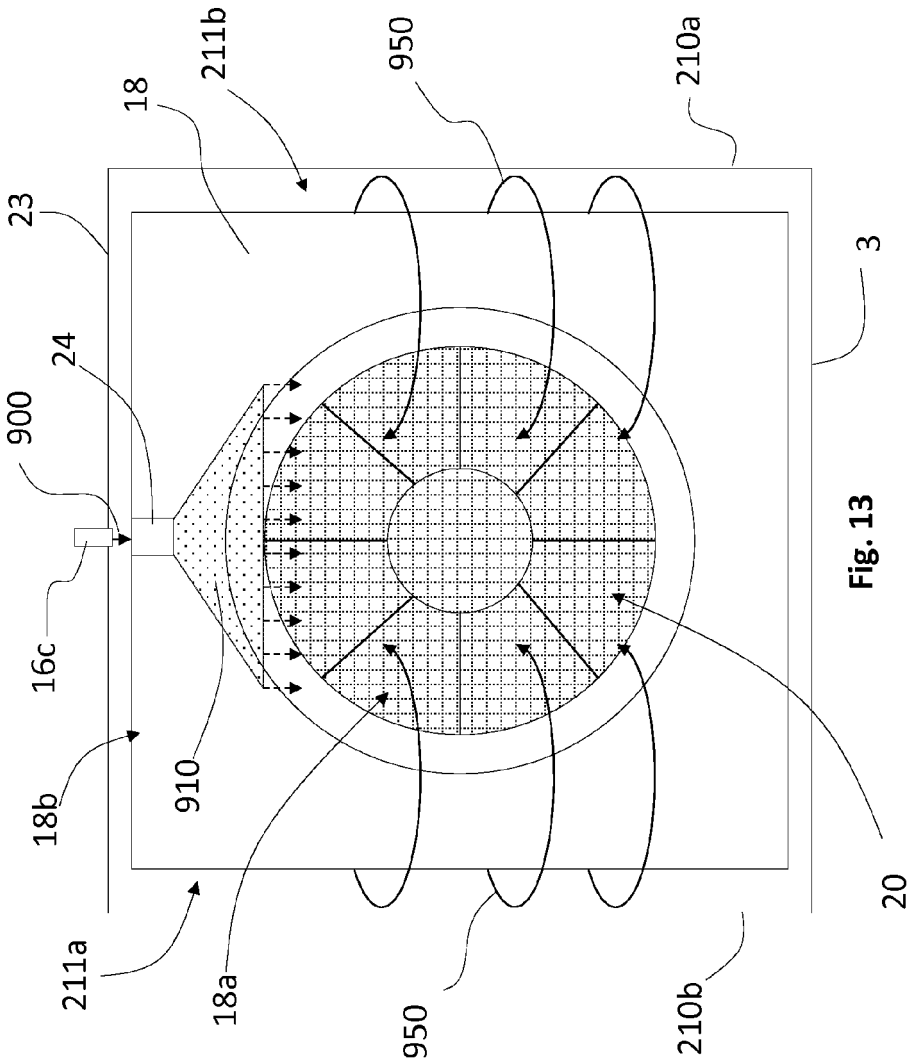


Fig. 11


211b
950
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24
900
16c
910
18b
211a
18a
950
210b
20

Fig. 13

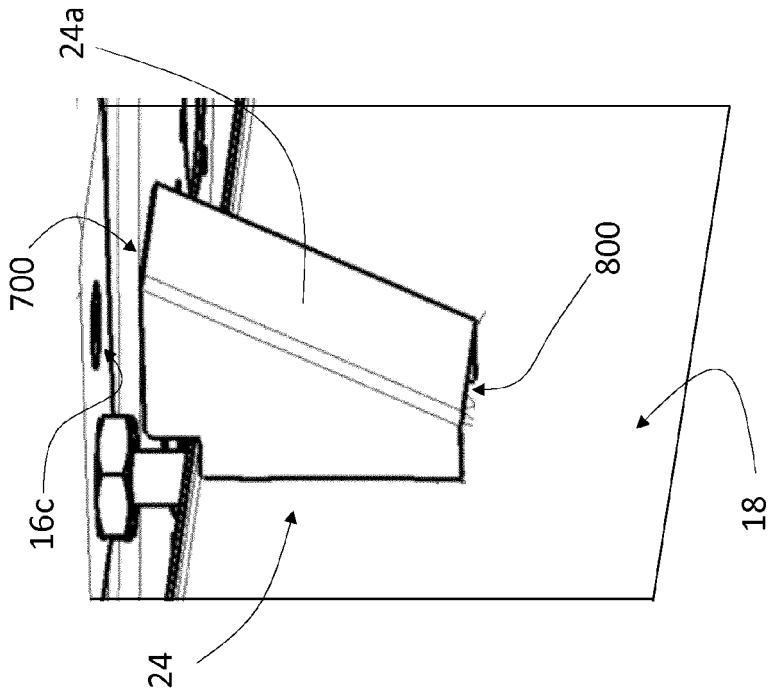
24a
700
800
16c
18
24

Fig. 12

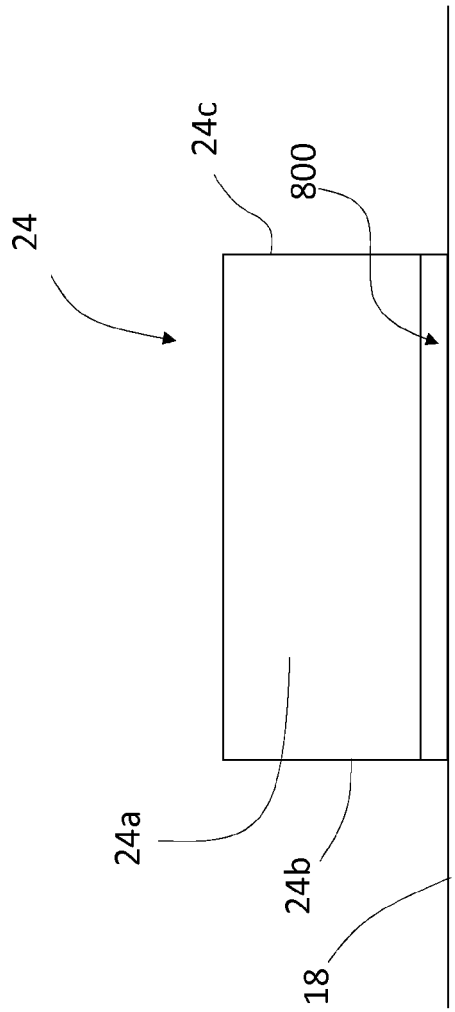

Fig. 15

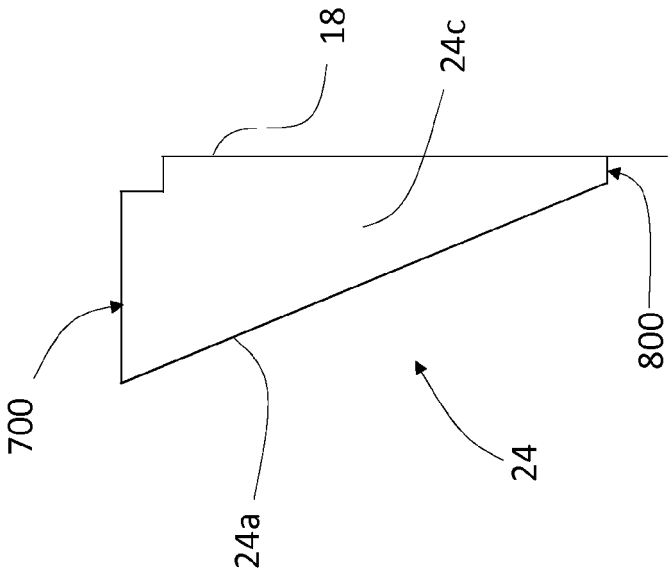

Fig. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 19 15 9487

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 1 978 309 A1 (ALTO SHAAM INC [US]) 8 October 2008 (2008-10-08) * paragraphs [0019] - [0021], [0023] - [0025], [0027], [0028], [0039], [0040]; figures 1-7 *	1-9,11, 14,15 10,12	INV. F24C14/00 F24C15/32
X	DE 42 23 451 A1 (ELOMA GMBH [DE]) 20 January 1994 (1994-01-20) * column 2, lines 11-46; claim 1; figures 1-3 *	1,2,4, 6-9,11, 14	
X	DE 20 2012 104832 U1 (KAERCHER FUTURETECH GMBH [DE]) 14 January 2013 (2013-01-14) * figures 1,2 *	1,2,4,6, 13-15	
X	DE 10 2007 005503 A1 (RATIONAL AG [DE]) 31 July 2008 (2008-07-31) * figure 1 *	1	

TECHNICAL FIELDS SEARCHED (IPC)
F24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 July 2019	Fest, Gilles

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11-07-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1978309 A1	08-10-2008	NONE	
DE 4223451 A1	20-01-1994	NONE	
DE 202012104832 U1	14-01-2013	NONE	
DE 102007005503 A1	31-07-2008	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82