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(54) **HEAT RECOVERY OVEN WITH DISHWASHER**

WÄRMERÜCKGEWINNUNGSOFEN MIT GESCHIRRSPÜLER

FOUR DE RÉCUPÉRATION DE CHALEUR DOTÉ D'UN LAVE-VAISSELLE

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Description

Technical Field of the Invention

[0001] The present invention relates to a heat recovery oven with dishwasher that combines both dishwashing and cooking functions in a single structure. The present invention allows for taking advantage of these two functions at the same time or at different times.

[0002] The present invention particularly relates to a household appliance that not only occupies less space as it is capable of performing both washing and cooking functions simultaneously but also saves energy by using the heat generated in the oven section during cooking for heating the water to be used in the dishwasher.

State of the Art (Prior Art)

[0003] Heating devices used for cooking, drying, melting, or exposing a substance to a heat process within an enclosed area and for controlling the temperature for various aims are called ovens.

[0004] Nowadays, ovens are used in many different fields. For instance, ovens are used for preparing and cooking food in household kitchens, in medium-sized industrial enterprises such as restaurants, diners, cafes, hotel kitchens, in the food industry, for producing porcelain or glass in the cement industry, iron and steel industry, and aluminum industry. The heat energy in the ovens can be generated by using fuels such as coal, fuel oil, or natural gas in solid, liquid, or gas form, or by using electricity or solar heat.

[0005] Ovens, based on their operating properties and equipment, may vary as gas ovens, electric turbo ovens, multifunctional and static ovens, or based on their purpose of use, they may be classified as household type ovens and industrial type ovens. There are household-type ovens that are used for cooking food at appropriate temperatures and under suitable conditions, contain one or more properties as thermostatic, static, turbo, etc., and provide heat with the help of conventional electric or natural gas.

[0006] Recently, household appliances have begun being manufactured such that they combine a plurality of functions. In the state of the art, there are household appliances that combine oven and dishwasher or stove, oven and dishwasher, thereby offering dual and triple functions together. There are studies that focus on the waste heat in line with increasing energy consumption.

[0007] In the state of the art, the patent numbered EP2196126A1 describes a system with a heat exchanger that is used for transferring heat between the kitchen appliances (such as oven and dishwasher, etc.). The invention disclosed in said application comprises at least two different household appliances, utilizes a heat exchanger for exchanging air to water, and water is heated with hot air.

[0008] In another patent application numbered

GB2381442A in the state of the art, a household appliance in which the oven function or dishwasher function is provided in a single structure. In this household appliance, after the food is cooked by means of the oven's cooking function, the basket of the dishwasher must be placed inside after the oven trays and apparatuses are removed.

[0009] The utility model application numbered CN2772495Y discloses a system in which the oven firebox is cooled with water. Here, the aim is to prevent the liquid and solid food spilled from the cooked foods to the base of the oven firebox from burning in extreme heat and emitting odor and smoke. Therefore, it is aimed to eliminate the burning smell in cooked food.

[0010] However, since two different household appliances comprise a plurality of functions in such combo systems, they create excessive energy consumption or a rather complex system of operation due to densely integrated systems. This complex operating system also causes excessive energy consumption. Unused waste heat released from the insulation system of the oven while the oven is working cannot cycle therein and the generated heat goes to waste. Moreover, in the ovens used in the state of the art, the waste heat generated as a consequence of the cooking process dissipates around where the oven is located and increases the ambient temperature.

[0011] This not only causes discomfort to the user but also results in overcooking of the food.

[0012] Disadvantages and the inadequacy of available solutions in this regard necessitated making an improvement in the relevant technical field. The present invention, eliminating the disadvantages in the state of the art, relates to a heat recovery household appliance that consists of two parts and that offers the functions of both a dishwasher and an oven.

Brief Description and Objects of the Invention

[0013] The present invention relates to an energy-saving multifunctional household appliance that comprises two separate sections in which the functions of an oven and a dishwasher are provided in a single construct. The present invention transfers the waste heat between different functions of a single household appliance.

[0014] Therefore, an object of the present invention is to develop a household appliance that comprises both oven and dishwasher within a single body. In the present invention, dishes may be washed in the dishwasher while food is cooked inside the oven simultaneously or at different times. Hence, the present invention allows for saving space.

[0015] Another object of the present invention is to save energy while using the dishwasher and the oven. In the inventive heat recovery oven with dishwasher, the waste heat within the oven's firebox is used for heating the water to be used in the dishwasher while the cooking function is being performed or from the moment the cook-

ing function is completed, thereby saving energy. Heat transfer is ensured by the flow of water over the firebox of the oven section.

[0016] Another object of the present invention is to prevent the ambient heat from increasing through the dissipation of heat of the oven section where cooking is carried out to the environment. In the present invention, after the oven's cooking operation is complete, the mains water let into the water tank which is in contact with the oven firebox is transferred to the boiler of the dishwasher as soon as the dishwasher begins operating, the heat in the oven firebox is absorbed and the oven firebox is cooled as there is a water flow from the periphery of the oven firebox. Thus, the oven is also cooled rapidly, and the ambient temperature is prevented from rising uncomfortably. After the cooking process is done, the rapid cooling of the oven prevents the food cooked in the oven from getting overcooked, thereby preserving the crispness of the food.

Description of the Figures

[0017]

FIGURE 1 illustrates the external view of the inventive heat recovery oven with dishwasher.

FIGURE 2 illustrates the internal view of the inventive heat recovery oven with dishwasher.

FIGURE 3 illustrates the mains water flow path in the inventive heat recovery oven with dishwasher.

FIGURE 4 illustrates the structural alternatives of the oven firebox and water tank peripheral to the oven; A) the state in which the oven firebox wall also functions as the inner wall of the water tank, B) the state where the water tank body comprises a separate body and is installed within the oven firebox.

Description of Elements/Sections/Parts that Constitute the Invention

[0018] To provide a better understanding of the inventive heat recovery oven with dishwasher, parts, and sections given in the figures are enumerated, and the numbers corresponding to each part and section are provided below;

1) Carrier Body

1.1) Control Panel

1.2) Upper Sheet

1.3) Side Sheet

1.4) Kickplate

1.5) Feet

1.6) Water Transfer Hose Between the Oven and Dishwasher

1.7) Mains Water Inlet Hose

1.8) Mains Water Inlet Solenoid Valve (Electric Valve)

1.9) Mains Water Inlet Port

2) Oven Section

2.1) Oven Handle

2.2) Oven Door

2.3) Oven Firebox

2.4) Water Tank

2.5) Oven Door Joint

2.6) Cooling Fan

2.7) Oven Door Hinge

2.8) Turbo Fan

2.9) Water Tank Temperature Sensor

2.10) Oven Upper Resistance

2.11) Oven Insulation Material

2.12) Water Level Sensor

2.13) Oven Lower Resistance

2.14) Water Tank Water Outlet Solenoid Valve

3) Dishwasher Section

3.1) Dishwasher Handle

3.2) Dishwasher Door

3.3) Dishwasher Boiler

3.4) Dishwasher Basket

3.5) Dishwasher Water Temperature Sensor

3.6) Dishwasher Door Hinge

3.7) Water Discharge Opening

Detailed Description of the Invention

[0019] The present invention relates to a heat recovery oven with dishwasher that is capable of performing the functions of dishwashing and cooking in two separate sections within a single structure. Heat recovery oven with dishwasher has two separate doors for these two functions (Figure 1) and these two functions can be operated at the same time or at different times. The cooking

function of the oven section (2) and the dishwashing function of the dishwasher section (3) can operate independently at different times, can also operate independently at the same time, or the dishwashing function can operate in the dishwasher section (3) immediately after the cooking function in the oven section (2) relevant with each other in the economic function.

[0020] In the present invention, while the cooking function continues or the cooking function is completed, the waste heat generated in the oven firebox (2.3) is used in the dishwasher section (3). The water received from the mains is used for the dishwashing function in the dishwasher section (3) when it is heated by the waste heat above the oven firebox (2.3) and is adjusted to the required temperature. The mains water let into the water chamber (2.4) absorbs the heat in the oven firebox (2.3) after the cooking function in the oven section (2), the oven is cooled rapidly and the ambient temperature is prevented from rising uncomfortably. Moreover, energy saving is also achieved since the water heated by the waste heat is used in the dishwasher section (3).

[0021] The carrier body (1) of said heat recovery oven with dishwasher comprises two main sections; these are the oven section (2) and the dishwasher section (3). Moreover, a central control panel (1.1) is provided within the carrier body (1), and the oven section (2) and the dishwasher section (3) are controlled from this panel. Carrier body (1) of the heat recovery oven with dishwasher comprises two separate doors as the oven door (2.2) and the dishwasher door (3.2) for the oven section (2) and the dishwasher section (3), external body sheets as the upper sheet (1.2) and the side sheet (1.3), and feet (1.5). The oven section (2) where the cooking function is carried out comprises the oven firebox (2.3), a cooling fan (2.6), a turbo fan (2.8), wire racks, trays, a lighting lamp, the safety thermostat, oven upper resistance (2.10), oven lower resistance (2.13), a water tank (2.4) located around the oven firebox (2.3), a water level sensor (2.12) that measures the amount of water let into the water tank, a temperature sensor (2.9), a solenoid valve (2.14) (electric valve) to direct the water to the dishwasher after the water is heated. A water transfer hose (1.6) is provided between the oven and dishwasher between two sections. The dishwasher section (3), where the dishwashing function is performed, comprises the dishwasher boiler (3.3), resistances, the dishwasher basket (3.4), water pump, water spray propeller, water drain filter, wastewater hose, detergent compartment, dishwasher water temperature sensor (3.5), water level meter, dishwasher boiler (3.3), water tank, mains water inlet, temperature sensor, solenoid valve (2.14), water level sensor (2.12), upper water spray propeller, lower water spray propeller.

[0022] In the inventive heat recovery oven with dishwasher, the oven and dishwasher sections can operate simultaneously. However, the dishwashing cycle is preferably carried out in the dishwasher section right after the cooking cycle in the oven section so as to achieve

the highest efficiency.

[0023] The operating method of the heat recovery oven with dishwasher in which the dishwashing cycle is commenced right after the cooking cycle so as to achieve high efficiency comprises the following process steps;

i. commencing the cooking cycle in the oven section by initializing said high-efficiency cycle from the control panel (1.1),

ii. starting to draw water from the mains water by opening mains water inlet solenoid valve (1.8) that controls the water coming from the mains water inlet (1.9) for the dishwasher washing function immediately after the cooking cycle in the oven section is completed,

iii. transferring the mains water to the water tank (2.4) located around the oven firebox (2.3),

iv. measuring the temperature of the water tank (2.4) with the temperature sensor (2.9) and transferring the temperature information to the control card,

v. heating the water in the water tank (2.4) by the oven firebox waste heat in the water tank (2.4) until it reaches the desired temperature for the dishwashing cycle in the dishwasher section,

vi.

a) transferring the water heated in the water tank (2.4) to the dishwasher boiler (3.3) by triggering the solenoid valve (2.14) by the card according to the data transmitted by the temperature sensor (2.9) and by opening the solenoid valve (2.14) in case the water heated with the waste heat of the oven firebox reaches the temperature required by the washing program selected by the user, or

b) transferring the water to the dishwasher boiler (3.3) after the solenoid valve (2.14) is opened by the card after the control card detects that the water temperature cannot rise more by means of the temperature sensor (2.9) and the card detects that the oven firebox (2.3) does not heat the water anymore in case the water heated with the waste heat of the oven firebox reaches the temperature required by the washing program selected by the user;

vii. heating the water by means of the resistance in case the water temperature in the dishwasher boiler (3.3) is measured by the temperature sensor (3.5) and used directly in the dishwashing process or in case the water does not meet the temperature required by the washing program selected by the user,

viii. starting the dishwashing cycle in the dishwasher section and washing the dishes by spraying the water with detergent for a certain time and temperature on the dishes,

ix. draining the wastewater in the dishwasher boiler (3.3) through the wastewater discharge opening (3.7) when washing is completed and turning off the device when the dishwashing cycle is completed.

[0024] The body of the inventive heat recovery oven with dishwasher comprises an insulation material (2.11) located around the oven firebox (2.3). The water tank (2.4) is positioned between the oven firebox (2.3) and the insulation material (2.11).

[0025] In an embodiment of the present invention, the water tank (2.4) and the oven firebox (2.3) consist of separate parts. The water tank (2.4) is in contact with the oven firebox (2.3) (Figure 4-B) and it features high thermal conductivity and a water-resistant structure that allows heat transfer. The water tank (2.4) is preferably made of stainless steel. The water tank (2.4) that is in contact with the oven firebox (2.3) is positioned between the oven firebox (2.3) and the insulation material (2.11). The insulation material (2.11) can be an insulation blanket made of rock wool or a similar material.

[0026] In another embodiment of the present invention, the water tank (2.3) and the oven firebox (2.4) consist of a single part (Figure 4-A). The mains water let into the water tank (2.4) passes directly through the body of the oven firebox (2.3). Since there is no separate wall between them, a much more efficient heat transfer is achieved. Water directly comes into contact with the body of the oven firebox (2.3) where there is waste heat of the oven firebox and receives the waste heat. During the cooking phase, the water tank (2.4) is always empty and the water tank (2.4) serves as an insulator by providing heat insulation by means of the air space within the same. In this configuration; after the cooking cycle in the oven is complete and the washing cycle in the dishwasher begins, the water to be used in the dishwasher is filled into the water tank (2.4). The water filling the water tank (2.4) is heated by being fed through the waste heat of the oven. At this stage, the water temperature in the water tank is measured by the temperature sensor (2.9) and transferred to the dishwasher. If the temperature of the water is lower than the desired value, it is heated by the resistance of the dishwasher, and the dishwashing cycle is started.

[0027] The dishwasher washing program is selected by the user at the beginning of the high-efficiency cycle via the control panel (1.1). Each program has different temperature settings. For example; in economic programs, dishes are washed at a temperature between 45-50 °C, and in the intensive programs, they are washed at a temperature between 60-75 °C.

Claims

1. A heat recovery oven with dishwasher comprising:

- a carrier body (1) that contains two separate doors, namely, the oven door (2.2) and the dishwasher door (3.2), external body sheets, namely, the upper sheet (1.2) and the side sheet (1.3), and feet (1.5),
- an oven section (2) in which the cooking function is performed and that contains oven firebox (2.3), cooling fan (2.6), turbo fan (2.8), wire racks, trays, lighting lamp, safety thermostat, oven upper resistance (2.10), oven lower resistance (2.13), a water tank (2.4) a water level sensor (2.12) that measures the amount of water taken into the water tank, a temperature sensor (2.9), an electric solenoid valve (2.14) to direct the water to the dishwasher after the water is heated,
- a dishwasher section (3) in which the dishwashing function is performed and that contains dishwasher boiler (3.3), resistances, water transfer hose between the oven and dishwasher (1.6), dishwasher basket (3.4), water pump, water spray propeller, water drain filter, wastewater hose, detergent compartment, dishwasher water temperature sensor (3.5), water level meter, water tank, mains water inlet, temperature sensor, solenoid valve (2.14), water level sensor (2.12), upper water spray propeller, lower water spray propeller; the heat recovery oven with dishwasher is **characterized in that** the water tank (2.4) is located around the oven firebox (2.3).

2. A heat recovery oven with dishwasher according to Claim 1, **characterized in that**; an insulation material (2.11) is positioned around the oven firebox (2.3).

3. A heat recovery oven with dishwasher according to Claim 2, **characterized in that**; the water tank (2.4) is located between the oven firebox (2.3) and the insulation material (2.11).

4. A heat recovery oven with dishwasher according to Claim 1, **characterized in that**; the water tank (2.4) and the oven firebox (2.3) consist of separate parts.

5. A heat recovery oven with dishwasher according to Claim 4, **characterized in that**; the water tank (2.4) is made of stainless steel.

6. A heat recovery oven with dishwasher according to Claim 1, **characterized in that**; the water tank (2.4) and the oven firebox (2.3) consist of a single part.

7. A heat recovery oven with dishwasher according to

Claim 6, **characterized in that**; the water tank (2.4) and the oven firebox (2.3) consisting of one piece are made of stainless steel.

8. A heat recovery oven with dishwasher according to any of the preceding claims, **characterized in that**; the cooking function in the oven section (2) and the dishwashing function in the dishwasher section (3) can be carried out at the same time or at different times independently of one another.
9. A method for operating the heat recovery oven with dishwasher according to any of the preceding claims, in which the dishwashing cycle is commenced right after the cooking cycle so as to achieve high efficiency, **characterized in that**, it comprises the process steps of:
 - i. commencing the cooking cycle in the oven section by initializing said high-efficiency cycle from the control panel (1.1),
 - ii. starting to draw water from the mains water by opening mains water inlet solenoid valve (1.8) that controls the water coming from the mains water inlet (1.9) for the dishwasher washing function immediately after the cooking cycle in the oven section is completed,
 - iii. transferring the mains water to the water tank (2.4) located around the oven firebox (2.3),
 - iv. measuring the temperature of the water tank (2.4) with the temperature sensor (2.9) and transferring the temperature information to the control card,
 - v. heating the water in the water tank (2.4) by the waste heat of the oven firebox in the water tank (2.4) until it reaches the desired temperature for the dishwashing cycle in the dishwasher section,
 - vi.
 - a) transferring the water heated in the water tank (2.4) to the dishwasher boiler (3.3) by triggering the solenoid valve (2.14) by the card according to the data transmitted by the temperature sensor (2.9) and by opening the solenoid valve (2.14) in case the water heated with the waste heat of the oven firebox reaches the temperature required by the washing program selected by the user,
 - or
 - b) transferring the water to the dishwasher boiler (3.3) after the solenoid valve (2.14) is opened by the card after the control card detects that the water temperature cannot rise more by means of the temperature sensor (2.9) and the card detects that the oven firebox (2.3) does not heat the water anymore in case the water heated with the

waste heat of the oven firebox reaches the temperature required by the washing program selected by the user;

- vii. heating the water with the resistance in case the water temperature in the dishwasher boiler (3.3) is measured by the water temperature sensor (3.5) and used directly in the dishwashing process or the water does not meet the temperature required by the washing program selected by the user,
- viii. commencing the dishwashing cycle in the dishwasher section and washing the dishes by spraying the water with detergent for a certain time and temperature on the dishes,
- ix. draining the wastewater in the dishwasher boiler (3.3) through the wastewater discharge opening (3.7) when the washing cycle is complete and turning off the device when the dishwashing cycle is complete.

Patentansprüche

1. Wärmerückgewinnungssofen mit Geschirrspülmaschine, umfassend:

- einen Trägerkörper (1), welcher zwei separate Türen, nämlich die Ofentür (2.2) und die Geschirrspülmaschinentür (3.2), äußere Körperplatten, nämlich die obere Platte (1.2) und die Seitenplatte (1.3), und Füße (1.5) enthält,
- einen Ofenteil (2), in dem die Kochfunktion ausgeführt wird und welcher einen Ofenfeuererraum (2.3), ein Kühlgebläse (2.6), ein Turbogebläse (2.8), die Drahtgestelle, die Backbleche, eine Beleuchtungslampe, einen Sicherheitsthermostat, einen oberen Ofenwiderstand (2.10), einen unteren Ofenwiderstand (2.13), einen Wassertank (2.4), einen Wasserstandssensor (2.12), die in den Wassertank aufgenommene Wassermenge misst, einen Temperatursensor (2.9), einen elektrischen Solenoidventil (2.14) zum Leiten des Wassers
- in die Geschirrspülmaschine nach dem Erhitzen des Wassers enthält,
- einen Geschirrspülmaschinenteil (3) in dem die Geschirrspülfunktion ausgeführt wird und welcher den Geschirrspülmaschinenboiler (3.3), die Widerstände und den Wasserübertragungsschlauch zwischen Ofen und Geschirrspülmaschine (1.6) Geschirrspülmaschinenkorb (3.4), die Wasserpumpe, den Wassersprühpropeller, den Wasserablauffilter, den Abwasserschlauch, das Spülmittelfach, den Wassertemperatursensor der Geschirrspülmaschine (3.5), den Wasserstandsmesser, den Wassertank, den Leitungswasserzulauf, den Temperatursensor,

- das Solenoidventil (2.14), den Wasserstands-
sensor (2.12), den oberen Wassersprühpropel-
ler, den unteren Wassersprühpropeller enthält;
der Wärmerückgewinnungssofen mit Geschirr-
spülmaschine ist **dadurch gekennzeichnet**, 5
dass der Wassertank (2.4) um den Ofenfeuer-
raum (2.3) platziert ist.
2. Wärmerückgewinnungssofen mit Geschirrspülma-
schine nach Anspruch 1, **dadurch gekennzeichnet**, 10
dass ein Isoliermaterial (2.11) um den Ofenfeuer-
raum (2.3) positioniert ist.
3. Wärmerückgewinnungssofen mit Geschirrspülma-
schine nach Anspruch 2, **dadurch gekennzeichnet**, 15
dass der Wassertank (2.4) zwischen dem Ofenfeu-
erraum (2.3) und dem Isoliermaterial (2.11) platziert
ist.
4. Wärmerückgewinnungssofen mit Geschirrspülma-
schine nach Anspruch 1, **dadurch gekennzeichnet**, 20
dass der Wassertank (2.4) und der Ofenfeuerraum
(2.3) aus separaten Stücken bestehen.
5. Wärmerückgewinnungssofen mit Geschirrspülma-
schine nach Anspruch 4, **dadurch gekennzeichnet**, 25
dass der Wassertank (2.4) aus Edelstahl hergestellt
ist.
6. Wärmerückgewinnungssofen mit Geschirrspülma-
schine nach Anspruch 1, **dadurch gekennzeichnet**, 30
dass der Wassertank (2.4) und die Ofenfeuerraum
(2.3) aus einem einzigen Stück bestehen.
7. Wärmerückgewinnungssofen mit Geschirrspülma-
schine nach Anspruch 6, **dadurch gekennzeichnet**, 35
dass der Wassertank (2.4) und der Ofenfeuerraum
(2.3), die aus einem einzigen Stück bestehen, aus
Edelstahl hergestellt sind. 40
8. Wärmerückgewinnungssofen mit Geschirrspülma-
schine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass die Kochfunktion
im Ofenteil (2) und die Geschirrspülfunktion im Ge-
schirrspülmaschinenteil (3) gleichzeitig oder zu ver- 45
schiedenen Zeiten unabhängig voneinander ausge-
führt werden können.
9. Verfahren zum Betreiben des Wärmerückgewin-
nungssofens mit Geschirrspülmaschine nach einem 50
der vorhergehenden Ansprüche, wobei der Ge-
schirrspülvorgang kurz nach dem Kochvorgang be-
ginnt, um eine hohe Effizienz zu erreichen, **dadurch**
gekennzeichnet, dass es die folgenden Prozess-
schritte umfasst; 55
- i. Beginn des Kochvorgangs im Ofenteil durch
Initialisierung des genannten Hocheffizienzvor-

- gangs vom Bedienfeld aus (1.1),
ii. Start der Entnahme von Wasser aus dem Lei-
tungswasser durch Öffnen des Leitungswasser-
zulauf-Solenoidventils (1.8), welches die Was-
serzufuhr aus dem Leitungswasserzulauf (1.9)
für die Spülfunktion der Geschirrspülmaschine
kurz nach dem Ende des Kochvorgangs im
Ofenteil steuert,
iii. Übertragung des Leitungswassers in den
Wassertank (2.4), der sich um den Ofenfeuer-
raum (2.3) platziert,
iv. Messung der Temperatur des Wassertanks
(2.4) mittels des Temperatursensors (2.9) und
Übertragung der Temperaturinformation an die
Bedienungskarte,
v. Erhitzen des Wassers im Wassertank (2.4)
durch die Abwärme des Ofenfeuerraums im
Wassertank (2.4), bis es die gewünschte Tem-
peratur für den Geschirrspülvorgang im Ge-
schirrspülmaschinenteil erreicht hat,
vi.

- a) Übertragung des im Wassertank (2.4) er-
hitzten Wassers in den Geschirrspülma-
schinenboiler (3.3) durch Auslösen des So-
lenoidventils (2.14) durch die Karte entspre-
chend den vom Temperatursensor (2.9)
übermittelten Daten und durch Öffnen des
Solenoidventils (2.14), wenn das mit der
Abwärme des Ofenfeuerraums erhitze
Wasser die Temperatur erreicht, die für das
vom Benutzer ausgewählte Spülprogramm
erforderlich ist, oder
b) Übertragung des Wassers in den Ge-
schirrspülmaschinenboiler (3.3) nach dem
Öffnen des Solenoidventils (2.14) durch die
Karte, nachdem die Bedienungskarte mit-
tels des Temperatursensors (2.9) festge-
stellt hat, dass die Wassertemperatur nicht
weiter ansteigen kann, und die Karte fest-
gestellt hat, dass der Ofenfeuerraum (2.3)
das Wasser nicht mehr aufheizt, falls das
mit der Abwärme der Ofenfeuerkammer
aufgeheizte Wasser die Temperatur er-
reicht, die für das vom Benutzer ausgewähl-
te Spülprogramm erforderlich ist;

- vii. Erhitzung des Wassers mit dem Widerstand,
falls die Wassertemperatur im Geschirrspülma-
schinenboiler (3.3) mittels des Wassertempera-
tursensors (3.5) gemessen und direkt für den
Geschirrspülprozess verwendet wird oder das
Wasser nicht die Temperatur erfüllt, die für das
vom Benutzer ausgewählte Spülprogramm er-
forderlich ist,
viii. Beginn des Geschirrspülvorgangs im Ge-
schirrspülmaschinenteil und Spülen des Ge-
schirrs, in dem das Wasser mit Spülmittel für

eine bestimmte Zeit und Temperatur auf das Geschirr gesprüht wird,

ix. Ablauf des Abwassers im Geschirrspülmaschinenboiler (3.3) durch die Abwasserabflussöffnung (3.7), wenn der Spülvorgang beendet ist und Ausschalten des Gerätes, wenn der Geschirrspülvorgang beendet ist.

Revendications

1. Un four à récupération de chaleur avec lave-vaisselle comprenant :

- un corps support (1) qui contient deux portes séparées, à savoir la porte du four (2.2) et la porte du lave-vaisselle (3.2), des tôles de corps externes, à savoir la tôle supérieure (1.2) et la tôle de côté (1.3), et des pieds (1.5),

- une partie du four (2) dans laquelle la fonction de cuisson est exécutée et qui contient le foyer du four (2.3), le ventilateur de refroidissement (2.6), le ventilateur turbo (2.8), les grilles métalliques du four, les plaques du four, la lampe d'éclairage, le thermostat de sécurité, la résistance supérieure du four (2.10), la résistance inférieure du four (2.13), un réservoir d'eau (2.4), un capteur de niveau d'eau (2.12) qui mesure la quantité d'eau introduite dans le réservoir d'eau, un capteur de température (2.9), une soupape électromagnétique (2.14) pour diriger l'eau vers le lave-vaisselle après que l'eau est chauffée,

- une partie du lave-vaisselle (3) dans laquelle la fonction de lavage de la vaisselle est exécutée et qui contient la chaudière du lave-vaisselle (3.3), les résistances, le tuyau de transfert d'eau entre le four et le lave-vaisselle (1.6), le panier de lave-vaisselle (3.4), la pompe à eau, l'hélice de pulvérisation d'eau, le filtre de drainage d'eau, le tuyau d'évacuation des eaux usées, le récipient de produit vaisselle, le capteur de température d'eau du lave-vaisselle (3.5), l'indicateur de niveau d'eau, le réservoir d'eau, l'entrée d'eau du réseau, le capteur de température, la soupape électromagnétique (2.14), le capteur de niveau d'eau (2.12), l'hélice supérieur de pulvérisation d'eau, l'hélice inférieur de pulvérisation d'eau ;

le four à récupération de chaleur avec lave-vaisselle est **caractérisé en ce que** le réservoir d'eau (2.4) est situé autour du foyer du four (2.3).

2. Un four à récupération de chaleur avec lave-vaisselle selon la revendication 1, **caractérisé en ce qu'**un matériau isolant (2.11) est situé autour du foyer du four (2.3).

3. Un four à récupération de chaleur avec lave-vaisselle selon la revendication 2, **caractérisé en ce que** le réservoir d'eau (2.4) est situé entre le foyer du four (2.3) et le matériau isolant (2.11).

4. Un four à récupération de chaleur avec lave-vaisselle selon la revendication 1, **caractérisé en ce que** le réservoir d'eau (2.4) et le foyer du four (2.3) sont constitués de pièces séparées.

5. Un four à récupération de chaleur avec lave-vaisselle selon la revendication 4, **caractérisé en ce que** le réservoir d'eau (2.4) est fabriqué en acier inoxydable.

6. Un four à récupération de chaleur avec lave-vaisselle selon la revendication 1, **caractérisé en ce que** le réservoir d'eau (2.4) et le foyer du four (2.3) sont constitués d'une seule pièce.

7. Un four à récupération de chaleur avec lave-vaisselle selon la revendication 6, **caractérisé en ce que** le réservoir d'eau (2.4) et le foyer du four (2.3) constitués d'une seule pièce sont fabriqués en acier inoxydable.

8. Un four à récupération de chaleur avec lave-vaisselle selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ; la fonction de cuisson dans la partie du four (2) et la fonction de lavage de la vaisselle dans la partie du lave-vaisselle (3) peuvent être exécutés en même temps ou à des moments différents indépendamment l'un de l'autre.

9. Un procédé pour faire fonctionner le four à récupération de chaleur avec lave-vaisselle selon l'une quelconque des revendications précédentes, dans lequel le cycle de lavage de la vaisselle est commencé juste après le cycle de cuisson afin d'atteindre un haut rendement, **caractérisé en ce qu'**il comprend les étapes de processus suivantes ;

- i. commencer le cycle de cuisson dans la partie du four en initialisant ledit cycle à haut rendement sur le panneau de commande (1.1),

- ii. commencer à tirer de l'eau du réseau en ouvrant la soupape électromagnétique de l'entrée d'eau du réseau (1.8) qui contrôle l'eau provenant de l'entrée d'eau du réseau (1.9) pour la fonction de lavage du lave-vaisselle immédiatement après la fin du cycle de cuisson dans la partie du four,

- iii. transférer l'eau du réseau vers le réservoir d'eau (2.4) situé autour du foyer du four (2.3),

- iv. mesurer la température du réservoir d'eau (2.4) par le capteur de température (2.9) et transférer les informations de température à la carte de contrôle,

v. chauffer l'eau dans le réservoir d'eau (2.4) par la chaleur perdue du foyer du four dans le réservoir d'eau (2.4) jusqu'à ce qu'il atteigne la température désirée pour le cycle de lavage dans la partie du lave-vaisselle, 5

vi.

a) transférer l'eau chauffée dans le réservoir d'eau (2.4) vers la chaudière du lave-vaisselle (3.3) en déclenchant la soupape électromagnétique (2.14) par la carte selon les données transmises par le capteur de température (2.9) et en ouvrant la soupape électromagnétique (2.14) dans le cas où l'eau chauffée par la chaleur perdue du foyer du four atteint la température requise par le programme de lavage sélectionné par l'utilisateur, ou bien 10

b) transférer l'eau vers la chaudière du lave-vaisselle (3.3) après l'ouverture de la soupape électromagnétique (2.14) par la carte de contrôle après que la carte de contrôle détecte que la température de l'eau ne peut plus monter au moyen du capteur de température (2.9) et que la carte détecte que le foyer de four (2.3) ne chauffe plus l'eau dans le cas où l'eau chauffée par la chaleur perdue du foyer du four atteint la température requise par le programme de lavage sélectionné par l'utilisateur ; 15 20 25 30

vii. chauffer l'eau par la résistance dans le cas où la température de l'eau dans la chaudière du lave-vaisselle (3.3) est mesurée par le capteur de température d'eau (3.5) et utilisée directement dans le processus de lavage de la vaisselle ou le cas où l'eau n'atteint pas la température requise par le programme de lavage sélectionné par l'utilisateur ; 35

viii. commencer le cycle de lavage de la vaisselle dans la partie du lave-vaisselle et laver la vaisselle en pulvérisant l'eau avec du produit vaisselle sur la vaisselle pendant un certain temps et à une certaine température, 40

ix. drainer des eaux usées dans la chaudière du lave-vaisselle (3.3) à travers l'ouverture d'évacuation des eaux usées (3.7) lorsque le cycle de lavage est terminé et éteindre l'appareil lorsque le cycle de lavage de la vaisselle est terminé. 45 50

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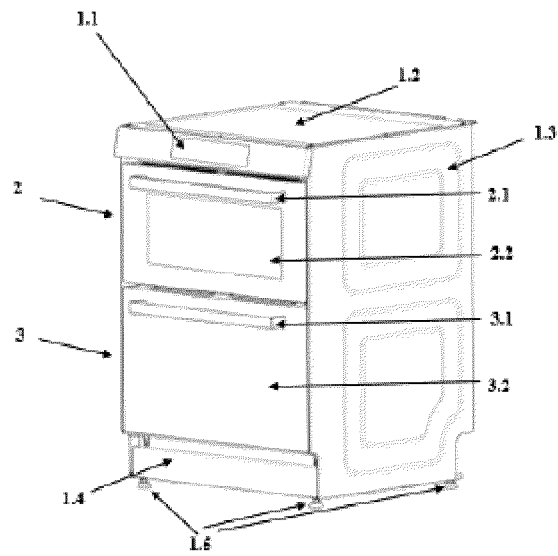


FIGURE 1

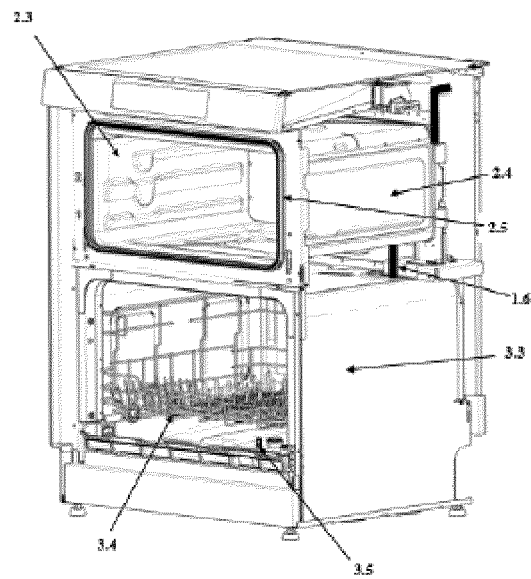


FIGURE 2

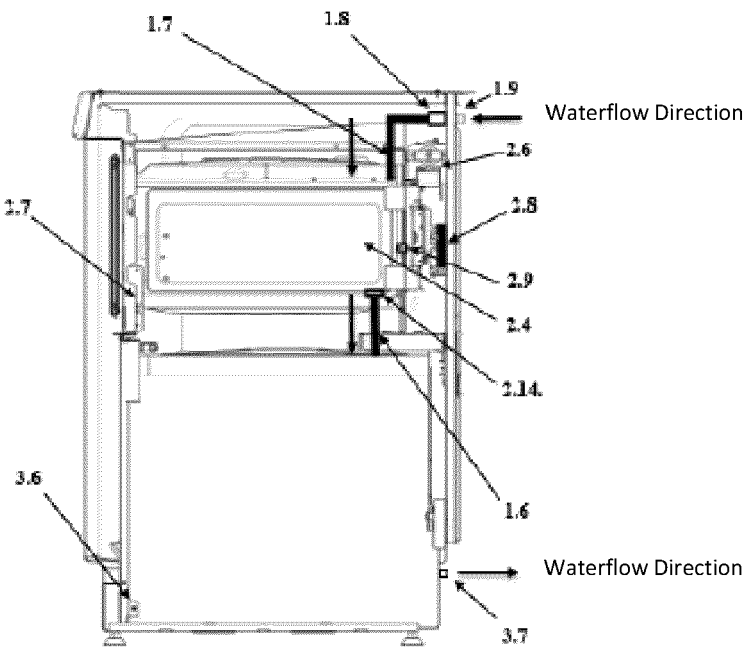


FIGURE 3

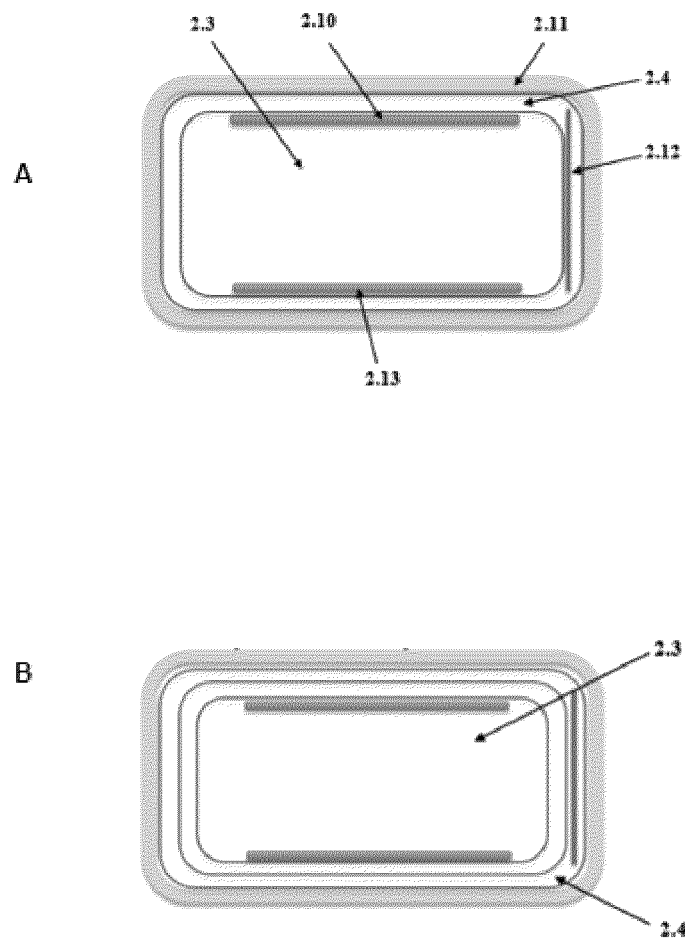


FIGURE 4

REFERENCES CITED IN THE DESCRIPTION

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