



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.01.2022 Bulletin 2022/01

(51) Int Cl.:
A47L 15/00 (2006.01)

(21) Application number: **21182234.1**

(22) Date of filing: **29.06.2021**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **30.06.2020 TR 202010339**

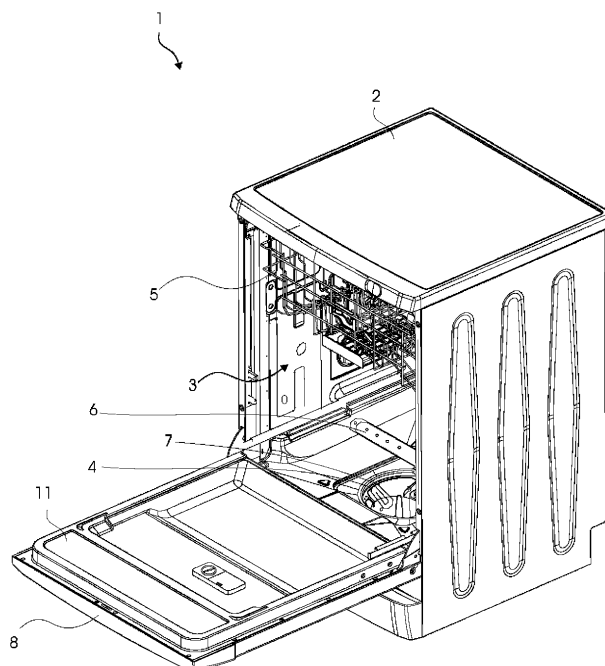
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(54) **A DISHWASHER COMPRISING A HEATER**

(57) The present invention relates to a dishwasher (1) comprising a body (2); a washing tub (3) which is disposed in the body (2) and wherein the washing process is performed; a sump (4) which is disposed at the base of the washing tub (3) and wherein the water is

collected; at least one rack (5) which is disposed in the washing tub (3) and wherein the kitchen items are loaded; and at least one spraying member (6) which sprays water onto the rack (5).

Figure 1



Description

[0001] The present invention relates to a dishwasher comprising a heater.

[0002] In dishwashers, the washing process is composed of certain steps. By means of the prewashing step, the dirt on the dishes is removed. After the prewashing step, the temperature of the water is increased, and the main washing step is performed wherein the cleaning is realized with hot water and detergent. In the main washing step, the oil residues and dirt on the dishes are removed. In the rinsing steps after the main washing step, the detergent residues and dirt residues are removed from the surfaces of the dishes. After the rinsing step, the drying step is performed. By means of the drying step, the water droplets on the dishes are dried. Thus, the formation of stains on the dishes is prevented and the dishes are unloaded from the machine in a dry state. In order to ensure an efficient drying step, the dishes are heated before the drying step. The heating process is realized by heating the water. Thus, the temperature of the water is increased to high levels and the washing performance is increased. Moreover, an additional heater is not used to heat the air therein. However, keeping the washing water circulating through the washing tub to heat the dishes at high temperatures increases the amount of energy consumed. In embodiments wherein the temperature of the water is not high enough, the drying performance decreases.

[0003] In the state of the art European Patent Application No. EP1738677, a dishwasher is disclosed, comprising a method wherein steam is generated by means of the water heater.

[0004] The aim of the present invention is the realization of a dishwasher with improved drying performance.

[0005] The dishwasher realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a body; a washing tub which is disposed in the body; a door which is provided on the body; a sump wherein the water leaving the washing tub is collected; at least one rack which is disposed in the washing tub and wherein the kitchen items are loaded; and at least one spraying member which sprays water onto the rack. The water sprayed onto the rack by means of the spraying member leaves the washing tub to be collected in the sump. The water is cleansed of dirt in the sump.

[0006] The dishwasher of the present invention comprises a heater which heats the water collected in the sump and a control unit which provides the delivery of the water heated in the sump onto the rack for a certain time. The water collected in the sump is heated by means of the heater and reused in the washing tub. The water in the sump reaching a temperature value predetermined by the producer is delivered onto the kitchen items for a time predetermined by the producer. Thus, the kitchen items are heated.

[0007] In an embodiment of the present invention, the

dishwasher comprises the control unit which keeps the door open for a time predetermined by the producer after the dishes are heated by means of the water heated in the sump. By opening the door, a circulation between the air in the washing tub and the ambient air is generated, and thus the drying performance is increased.

[0008] In an embodiment of the present invention, the dishwasher comprises the heater which heats the water collected in the sump to a temperature between 45°C and 100°C. The control unit controls the heater to ensure that the heating is performed within a certain range. By spraying the water at a temperature between 45°C and 100°C onto the dishes for a certain time, the surface temperature of the dishes is increased.

[0009] In an embodiment of the present invention, the dishwasher comprises the spraying member which sprays the water heated in the sump onto the rack for a time between 1 second and 5 minutes, and the control unit which controls the spraying member. By delivering the heated water onto the dishes for a short time predetermined by the producer, the surface temperature of the dishes is increased.

[0010] In an embodiment of the present invention, the dishwasher comprises at least one valve which controls the delivery of the water into the washing tub, and the control unit which controls the valve. By means of the control unit, while the water is being collected in the sump, the valves are closed so as to prevent the delivery of the water into the washing tub. Thus, the temperature of the water is increased while the same is static.

[0011] In an embodiment of the present invention, the dishwasher comprises a pump which controls the pressure of the water delivered through the spraying member, and the control unit which controls the rotational speed of the pump. By means of the control unit, while the water is being collected in the sump, the rotational speed of the pump is decreased.

[0012] By means of the present invention, a dishwasher is realized, comprising a heater which heats the water in the sump while it is static, and a control unit which controls the delivery of the heated water onto the rack.

[0013] A dishwasher realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the perspective view of the dishwasher.

Figure 2 - is the perspective view of the spraying member, the valve and the pump.

[0014] The elements illustrated in the figures are numbered as follows:

1. Dishwasher
2. Body
3. Washing tub
4. Sump
5. Rack
6. Spraying member

- 7. Heater
- 8. Control unit
- 9. Valve
- 10. Pump
- 11. Door

[0015] The dishwasher (1) comprises a body (2); a washing tub (3) which is disposed in the body (2) and wherein the washing process is performed; a door (11) which interrupts the contact between the washing tub (3) and the outer environment; a sump (4) which is disposed at the base of the washing tub (3) and wherein the water is collected; at least one rack (5) which is disposed in the washing tub (3) and wherein the kitchen items are loaded; and at least one spraying member (6) which sprays water onto the rack (5). The washing process is performed with the spraying members (6) in the washing tub (3) spraying water onto the kitchen items. The water leaving the washing tub (3) is collected in the sump (4).

[0016] The dishwasher (1) of the present invention comprises a heater (7) which is provided on the sump (4), and a control unit (8) which enables the water collected in the sump (4) before the drying step to be heated by the heater (7) to a value predetermined by the producer and to be delivered onto the dishes for a time predetermined by the producer. By means of the heater (7) provided on the sump (4), the water collected in the sump (4) is heated. By means of the control unit (8), the heated water is delivered onto the kitchen items loaded into the rack (5) for a time predetermined by the producer before the drying step. Thus, the surfaces of the kitchen items are heated, and the drying performance is increased.

[0017] In an embodiment of the present invention, the dishwasher (1) comprises the control unit (8) which enables the door (11) to be kept open for a time predetermined by the producer after the drying step starts. After the dishes are heated by means of the water heated by the heater, the drying step starts, and the door (11) is enabled to be kept open for a predetermined time during the drying step. By opening the door (11), the air in the washing tub (3) and the ambient air mix with each other. Thereby, the drying performance is increased. In the preferred embodiment of the present invention, the door (11) is kept open for a time between 1 seconds and 10 minutes, preferably for 1 minute.

[0018] In an embodiment of the present invention, the dishwasher (1) comprises the heater (7) which heats the water collected in the sump (4) to a temperature between 45°C and 100°C, and the control unit (8) which controls the heater (7). By heating water to a temperature between 45°C and 100°C, the surface of the kitchen items is heated to at least 30°C. In the preferred embodiment of the present invention, the temperature of the dishes is 38°C, and the temperature of the water is 52°C. Thus, the water remaining on the dishes is easily evaporated during the drying step, and the drying performance is increased.

[0019] In an embodiment of the present invention, the dishwasher (1) comprises the spraying member (6) which

sprays the water heated in the sump (4) onto the rack (5) for a time between 1 second and 5 minutes, and the control unit (8) which controls the time. By spraying the water onto the kitchen items for a short time between 1 second and 5 minutes, the temperature of only the surface of, not the entire, kitchen items is increased. Thus, the drying performance is increased while saving energy. In the preferred embodiment of the present invention, the water is delivered onto the kitchen items for 90 seconds.

[0020] In an embodiment of the present invention, the dishwasher (1) comprises at least one valve (9) which controls the delivery of the water from the spraying member (6) into the washing tub (3), and the control unit (8) which keeps the valves (9) closed while the water is being collected in the sump (4). By closing the valves (9) while the water is being collected in the sump (4), the water is prevented from being delivered by the spraying member (6). Thus, the static water collected in the sump (4) is enabled to reach the desired temperature. By heating the water collected in the sump (4) and not heating the entire dishes, energy saving is provided.

[0021] In an embodiment of the present invention, the dishwasher (1) comprises at least one pump (10) which controls the pressure of the water delivered from the spraying member (6) into the washing tub (3), and the control unit (8) which decreases the rotational speed of the pump (10) while the water is being collected in the sump (4). By decreasing the rotational speed of the pump (10) while the water is being collected in the sump (4), the water is prevented from being delivered by the spraying member (6). Thus, the water is heated in the sump (4) while it is static, providing energy saving.

[0022] By means of the present invention, a dishwasher (1) is realized, comprising a heater (7) which heats the water used in the washing step after it is collected in the sump (4), and a control unit (8) which provides the delivery of the heated water onto the dishes on the rack (5).

Claims

1. A dishwasher (1) comprising a body (2); a washing tub (3) which is disposed in the body (2) and wherein the washing process is performed; a door (11) which interrupts the contact between the washing tub (3) and the outer environment; a sump (4) which is disposed at the base of the washing tub (3) and wherein the water is collected; at least one rack (5) which is disposed in the washing tub (3) and wherein the kitchen items are loaded; and at least one spraying member (6) which sprays water onto the rack (5), **characterized by** a heater (7) which is provided on the sump (4), and a control unit (8) which enables the water collected in the sump (4) before the drying step to be heated by the heater (7) to a value predetermined by the producer and to be delivered onto the dishes for a time predetermined by the producer.

2. A dishwasher (1) as in Claim 1, **characterized by** the control unit (8) which enables the door (11) to be kept open for a time predetermined by the producer after the drying step starts. 5
3. A dishwasher (1) as in Claim 1 or Claim 2, **characterized by** the heater (7) which heats the water collected in the sump (4) to a temperature between 45°C and 100°C, and the control unit (8) which controls the heater (7). 10
4. A dishwasher (1) as in any one of the above claims, **characterized by** the spraying member (6) which sprays the water heated in the sump (4) onto the rack (5) for a time between 1 second and 5 minutes, and the control unit (8) which controls the time. 15
5. A dishwasher (1) as in any one of the above claims, **characterized by** at least one valve (9) which controls the delivery of the water from the spraying member (6) into the washing tub (3), and the control unit (8) which keeps the valves (9) closed while the water is being collected in the sump (4). 20
6. A dishwasher (1) as in any one of the above claims, **characterized by** at least one pump (10) which controls the pressure of the water delivered from the spraying member (6) into the washing tub (3), and the control unit (8) which decreases the rotational speed of the pump (10) while the water is being collected in the sump (4). 25 30

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Figure 1

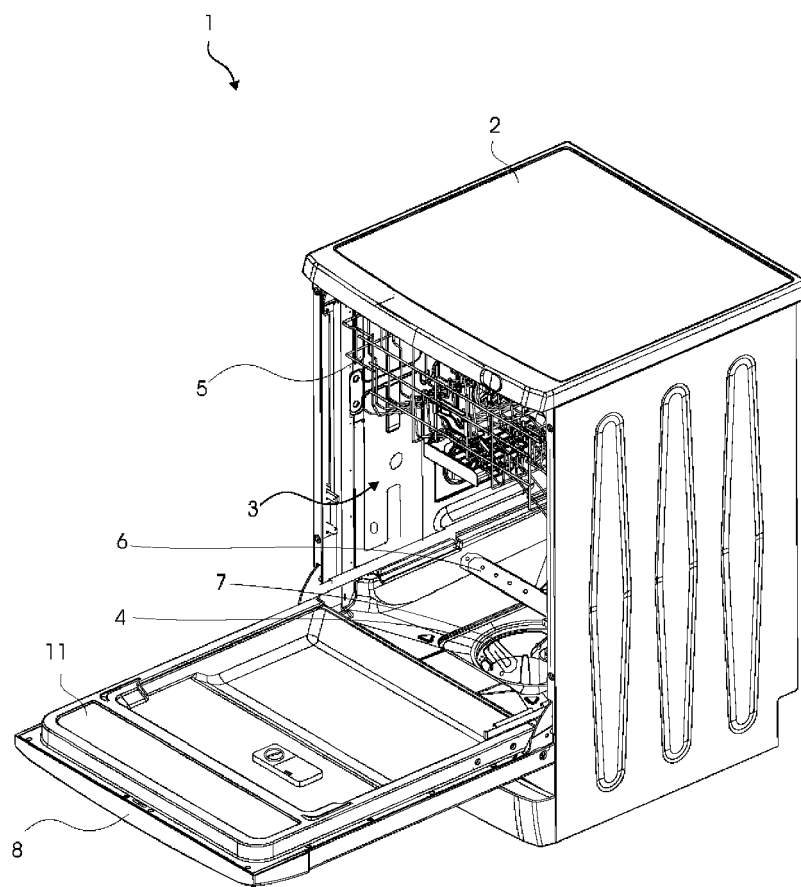
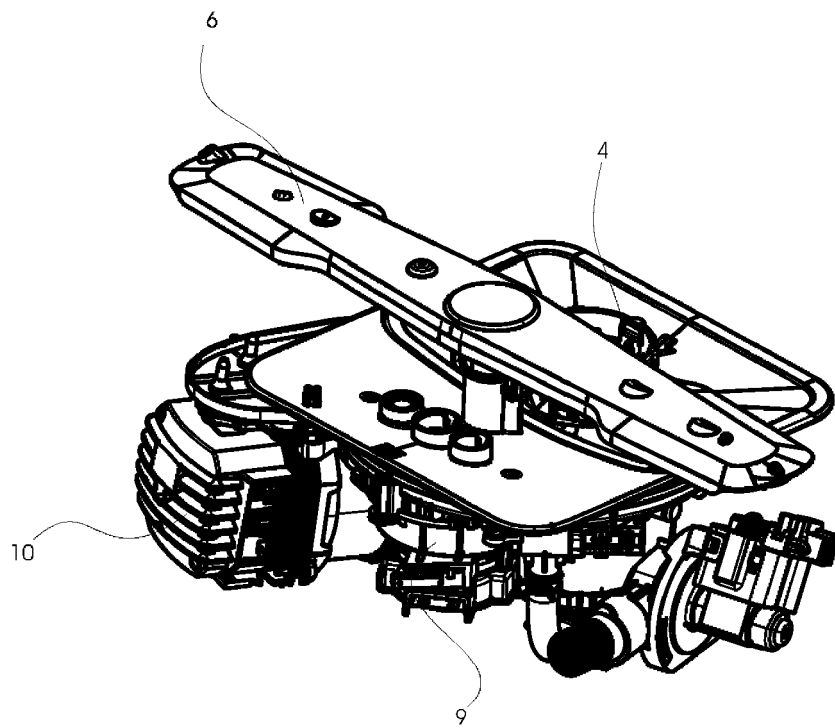


Figure 2





EUROPEAN SEARCH REPORT

Application Number
EP 21 18 2234

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* paragraphs [0016] - [0021] * * claims; figures *	4-6	
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A	* paragraphs [0036], [0054], [0057], [0081] * * claims; figures *	2,4-6	
X	DE 10 2004 054313 A1 (ELECTROLUX HOME PROD CORP [BE]) 11 May 2006 (2006-05-11)	1,3,5,6	
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Place of search Munich		Date of completion of the search 17 November 2021	Examiner Popara, Velimir
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 21 18 2234

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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