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(54) **A DISHWASHER WITH IMPROVED DRYING PERFORMANCE**

(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; at least one lower rack (4) and at least one upper rack (5) which are disposed in the washing tub (3) and whereon the kitchen items are placed; at least one spraying member (6) which sprays water onto the racks (4) to provide the performance of the washing process;

ess; a fan (7) which enables the moist air in the washing tub (3) to be sucked and discharged of the washing tub (3) during the drying process; a drying duct (8) which is disposed between the washing tub (3) and the body (2), which enables the moist air sucked from the washing tub (3) to condense, and one end of which opens into the washing tub (3); and an opening (9) which enables the air duct (8) to draw air from inside the washing tub (3).

Description

[0001] The present invention relates to a dishwasher with improved drying performance.

[0002] In the dishwasher, after the washing and rinsing steps are performed, the dishes are dried with the drying step. The drying step is very important in order to ensure that the dishes leave the dishwasher in a brighter and cleaner manner. In the drying step, the water drops on the dishes are evaporated and removed from the dishes. The evaporated water drops hit cold surfaces and moist air and condense thereon to be removed from the washing tub. In order to ensure the efficiency of the drying step after the completion thereof, water vapor should be removed from the washing tub in a short time or condensed and then removed from the washing tub. However, the vapor removed from the washing tub is quite dense and the temperature thereof is high. Therefore, discharging all the vapor from the washing tub at once may cause condensation and puddles in the external environment and may damage the external environment.

[0003] In the state of the art International Patent Application No. WO2014180648, a dishwasher comprising a drying duct is disclosed.

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

[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 and wherein the dishes to be washed are loaded; at least one lower rack and at least one upper rack which are disposed in the washing tub; at least one spraying member which sprays water onto the racks; a fan which enables the vapor in the washing tub to be sucked and discharged during the drying step; and a drying duct which receives the dense vapor sucked from the washing tub. By means of the fan, the dense vapor created due to the hot water used in the washing process is removed from the washed items. The drying duct opens into the washing tub through an opening. The process of removing dense vapor from the washing tub should be done in a short time, before the vapor hits the surface of the kitchen items. Thus, the washed kitchen items are dried in a short time.

[0006] The dishwasher of the present invention comprises an air guiding member which is connected to the drying duct through an opening from inside the washing tub and which enables the hot air coming from the drying duct to be guided. By means of the air guiding member, the hot air drawn from the drying duct is guided to the bottom of the washing tub.

[0007] In an embodiment of the present invention, the dishwasher comprises a control unit which ensures that cold water is drawn from the mains to be accumulated on the bottom of the washing tub just before the drying step, and the air guiding member which provides that the hot air coming from the drying duct is delivered onto the cold water surface. By means of the air guiding member,

the hot air containing dense humidity evaporates by hitting the cold water surface. Thus, the temperature of the vapor in the washing tub is decreased.

[0008] In an embodiment of the present invention, the dishwasher comprises a tank which is disposed on the body, and the control unit which ensures that the water in the washing tub is delivered to the tank to be used in the new cycle after the drying step. Thus, the drying performance is increased without changing the water consumption.

[0009] In an embodiment of the present invention, the dishwasher comprises the air guiding member having a first shell with a mouth portion connected to the opening and a second shell ensuring the formation of an air duct when joined with the first shell. When the first shell and the second shell are joined, a duct is formed, thus providing the guiding of the air.

[0010] In an embodiment of the present invention, the dishwasher comprises a sealing member which is disposed on the mouth portion. Thus, the air flow between the drying duct and the air guiding member is prevented from being uncontrollably delivered into the washing tub. Moreover, the pressurized water sprayed by the spraying members is prevented from entering the drying duct.

[0011] In an embodiment of the present invention, the dishwasher comprises the air guiding member having at least one slot and at least one claw disposed opposite to each other on the first shell and/or the second shell. Thus, the first shell and the second shell are joined to form the air duct.

[0012] In an embodiment of the present invention, the dishwasher comprises the air guiding member having an end portion inclined towards the bottom of the washing tub. Thus, the hot air coming from the drying duct is delivered directly onto the surface of the cold water accumulated on the bottom of the washing tub without being dispersed in the washing tub.

[0013] In an embodiment of the present invention, the dishwasher comprises the air guiding member which is detachably attached onto the lower rack. The air guiding member can be attached onto the lower rack. By means of the detachable structure thereof, the air guiding member can be easily removed and cleaned by the user.

[0014] In an embodiment of the present invention, the dishwasher comprises the air guiding member which can be attached and detached by sliding on the lower rack in a vertical plane by means of a guide provided on the side edges thereof. Thus, the placement thereof is facilitated.

[0015] In an embodiment of the present invention, the dishwasher comprises the air guiding member having a stepped section arranged on the second shell. By means of the stepped section, the air guiding member can be used without preventing the upper rack from being brought to various positions.

[0016] By means of the present invention, a dishwasher is realized, comprising an air guiding member which enables the hot air coming from the drying duct to be delivered onto the cold surface formed in the washing tub.

[0017] 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 schematic view of the air duct.
 Figure 3 - is the exploded view of the air guiding member.
 Figure 4 - is the perspective view of the dishwasher and the air duct.

[0018] The elements illustrated in the figures are numbered as follows.

- 1- Dishwasher
- 2- Body
- 3- Washing tub
- 4- Lower rack
- 5- Upper rack
- 6- Spraying member
- 7- Fan
- 8- Drying duct
- 9- Opening
- 10- Air guiding member
- 11- Control unit
- 12- Tank
- 13- Mouth portion
- 14- First shell
- 15- Air duct
- 16- Second shell
- 17- Sealing member
- 18- Claw
- 19- Housing
- 20- End portion
- 21- Guide
- 22- Stepped section

[0019] 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; at least one lower rack (4) and at least one upper rack (5) which are disposed in the washing tub (3) and whereon the kitchen items are placed; at least one spraying member (6) which sprays water onto the racks (4) to provide the performance of the washing process; a fan (7) which enables the moist air in the washing tub (3) to be sucked and discharged of the washing tub (3) during the drying process; a drying duct (8) which is disposed between the washing tub (3) and the body (2), which enables the moist air sucked from the washing tub (3) to condense, and one end of which opens into the washing tub (3); and an opening (9) which enables the air duct (8) to draw air from inside the washing tub (3). The kitchen items are placed onto the racks (4). The washing process is performed by spraying water by means of the spraying member (6). After the washing process, the drying step is started to quickly remove water droplets from the kitchen items. Therefore, the vapor density in the washing tub (3) is

enabled to reduced. By means of the fan (7), the moist air is discharged from the washing tub (3), and the hot and humid air is guided through the drying duct (8). The drying duct (8) opens into the washing tub (3) through the opening (9).

[0020] The dishwasher (1) of the present invention comprises an air guiding member (10) which is disposed in the washing tub (3), one end of which is connected to the drying duct (8) through the opening (9) and the other end extending towards the bottom of the washing tub (3). The air guiding member (10) is disposed in the washing tub (3). The hot air drawn from the washing tub (3) by means of the drying duct (8) is sent back into the washing tub (3) and delivered by means of the air guiding member (10). Thus, the air is cooled and controlled.

[0021] In an embodiment of the present invention, the dishwasher (1) comprises a control unit (11) which ensures that the cold water taken from the mains is accumulated on the bottom of the washing tub (3) just before the drying step, and the air guiding member (10) which enables the hot air drawn from the washing tub (3) by means of the drying duct (8) to be delivered onto the cold water surface in the washing tub (3). After the washing step is completed, cold water is drawn from the mains into the washing tub (3) before the drying step begins. Thus, a cold surface is formed on the bottom of the washing tub (3). When the hot air drawn from the washing tub (3) is sent back into the washing tub (3), the hot air is enabled to hit the cold surface to be condensed. Thus, the temperature in the washing tub (3) is decreased and the drying process is performed in a shorter time.

[0022] In an embodiment of the present invention, the dishwasher (1) comprises a tank (12) which is provided on the body (7), and the control unit (11) which enables the cold water in the washing tub (3) to be delivered into the tank (12) after the drying step is completed. Waste water is kept in the tank (12) disposed between the body (2) and the washing tub (3). The cold water taken into the washing tub (3) before the drying step heats up after being exposed to the hot air coming from the drying duct (8). When the drying step is completed, the heated clean water is delivered to the tank (12) to be used in the next cycle. Thus, less energy is consumed for heating the water in the next cycle. Consequently, the drying performance is improved and energy is saved.

[0023] In an embodiment of the present invention, the dishwasher (1) comprises the air guiding member (10) having a first shell (14) with a mouth portion through which the air enters via the opening (9) and a second shell (16) which is joined with the first shell (14) to form an air duct (15) through which the air flows. The air guiding member (10) is formed by joining the first shell (14) and the second shell (16). Thus, the air guiding member (10) can be easily separated and cleaned by the user. When the first shell (14) and the second shell (16) are joined, the air duct (15) through which the hot air passes is formed therebetween. The mouth portion (13) arranged on the first shell (14) is seated onto the opening

(9). Thus, the hot air is delivered from the air duct (15) to the air guiding member (10).

[0024] In an embodiment of the present invention, the dishwasher (1) comprises the air guiding member (10) having a sealing member (17) which is provided on the mouth portion (13). Thus, the air flow between the drying duct (8) and the air guiding member (10) is prevented from being uncontrollably delivered into the washing tub (3). Moreover, the pressurized water sprayed by the spraying members is prevented from entering the drying duct (8).

[0025] In an embodiment of the present invention, the dishwasher (1) comprises at least one claw (18) provided on the first shell (14) or the second shell (16) and at least one housing (19) provided on the first shell (14) or the second shell (16), and the first shell (14) and the second shell (16) which are joined by the engagement of the housings (19) and the claws (18). A claw (18) and a housing (19) is oppositely provided on the first shell (14) and the second shell (16). Thus, the first shell (14) and the second shell (16) are joined to form the air duct (15).

[0026] In an embodiment of the present invention, the dishwasher (1) comprises the air guiding member (10) having an end portion (20) inclined towards the bottom of the washing tub (3) when mounted onto the washing tub (3). By means of the end portion (20) provided on the area of the air guiding member (10) close to the washing tub (3), the hot air is directly delivered onto the surface of the cold water accumulated on the bottom of the washing tub (3). Thus, the hot vapor suddenly hits the cold surface and condensation occurs very quickly. Consequently, the temperature of the air in the washing tub (3) is decreased.

[0027] In an embodiment of the present invention, the dishwasher (1) comprises the air guiding member (10) which is detachably attached onto the lower rack (4). The air guiding member (10) can be attached onto the lower rack (4). Thus, the air guiding member (10) can be easily removed and cleaned by the user. When the lower rack (4) is pulled forward, the air guiding member (10) is separated from the opening (9), and while the lower rack (4) is in the washing tub (3), the air guiding member (10) aligns with the opening (9). The air guiding member (10) is positioned almost in the middle of the plate wires on the lower rack (4). Thus, the air guiding member (10) does not prevent the placement of kitchen items. Moreover, the air guiding member (10) can create a support surface for non-standard loads.

[0028] In an embodiment of the present invention, the dishwasher (1) comprises the air guiding member (10) which can be attached to and detached from the lower rack (4) by sliding in the vertical plane by means of a guide (21) provided almost along its side edges. The air guiding member (10) can be attached to and detached from the lower rack (4) by sliding by means of the slides (21) provided on its side edges. Thus, the air guiding member (10) can be centered so as to be aligned with the opening (9).

[0029] In an embodiment of the present invention, the dishwasher (1) comprises the air guiding member (1) having a stepped section (22) arranged on the second shell (16). By means of the stepped section (22) arranged on the second shell (16), the upper rack (5) can move more freely. Thus, the air guiding member (10) does not create an obstacle against load placement in the washing tub (3).

[0030] By means of the present invention, a dishwasher (1) is realized, comprising an air guiding member (10), one end of which is connected to the drying duct (8) and the other end opening into the washing tub (3). Before the drying step begins, a cold surface is formed on the bottom of the washing tub (3) by means of the cold water drawn from the mains, and the hot air coming from the drying duct (8) is delivered onto the cold surface by means of the air guiding member (10) such that condensation is achieved. Thus, the temperature in the washing tub (3) is decreased and the drying performance is increased.

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; at least one lower rack (4) and at least one upper rack (5) which are disposed in the washing tub (3) and whereon the kitchen items are placed; at least one spraying member (6) which sprays water onto the racks (4) to provide the performance of the washing process; a fan (7) which enables the moist air in the washing tub (3) to be sucked and discharged of the washing tub (3) during the drying process; a drying duct (8) which is disposed between the washing tub (3) and the body (2), which enables the moist air sucked from the washing tub (3) to condense, and one end of which opens into the washing tub (3); and an opening (9) which enables the air duct (8) to draw air from inside the washing tub (3), **characterized by** an air guiding member (10) which is disposed in the washing tub (3), one end of which is connected to the drying duct (8) through the opening (9) and the other end extending towards the bottom of the washing tub (3).
2. A dishwasher (1) as in Claim 1, **characterized by** a control unit (11) which ensures that the cold water taken from the mains is accumulated on the bottom of the washing tub (3) just before the drying step, and by the air guiding member (10) which enables the hot air drawn from the washing tub (3) by means of the drying duct (8) to be delivered onto the cold water surface in the washing tub (3).
3. A dishwasher (1) as in Claim 2, **characterized by** comprises a tank (12) which is provided on the body

(7), and by the control unit (11) which enables the cold water in the washing tub (3) to be delivered into the tank (12) after the drying step is completed.

4. A dishwasher (1) as in any one of the above claims, **characterized by** the air guiding member (10) having a first shell (14) with a mouth portion through which the air enters via the opening (9) and a second shell (16) which is joined with the first shell (14) to form an air duct (15) through which the air flows. 5
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5. A dishwasher (1) as in Claim 4, **characterized by** the air guiding member (10) having a sealing member (17) which is provided on the mouth portion (13). 15
6. A dishwasher (1) as in Claim 4, **characterized by** at least one claw (18) provided on the first shell (14) or the second shell (16) and at least one housing (19) provided on the first shell (14) or the second shell (16), and the first shell (14) and the second shell (16) which are joined by the engagement of the housings (19) and the claws (18). 20
7. A dishwasher (1) as in any one of the above claims, **characterized by** the air guiding member (10) having an end portion (20) inclined towards the bottom of the washing tub (3) when mounted onto the washing tub (3). 25
8. A dishwasher (1) as in any one of the above claims, **characterized by** the air guiding member (10) which is detachably attached onto the lower rack (4). 30
9. A dishwasher (1) as in Claim 8, **characterized by** the air guiding member (10) which can be attached to and detached from the lower rack (4) by sliding in the vertical plane by means of a guide (21) provided almost along its side edges. 35
10. A dishwasher (1) as in any one of Claims 4 to 9, **characterized by** the air guiding member (1) having a stepped section (22) arranged on the second shell (16). 40

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Figure 1

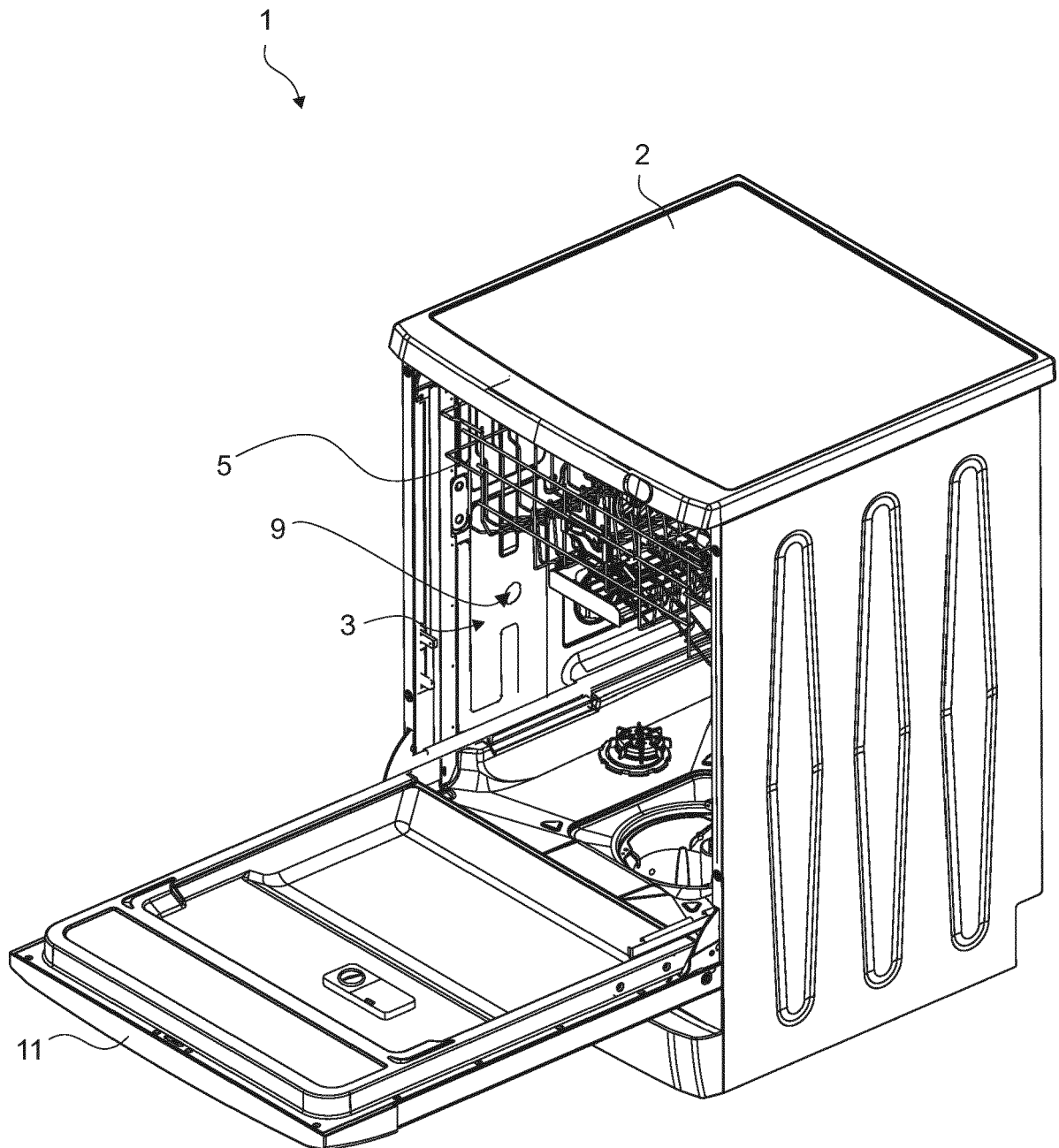


Figure 2

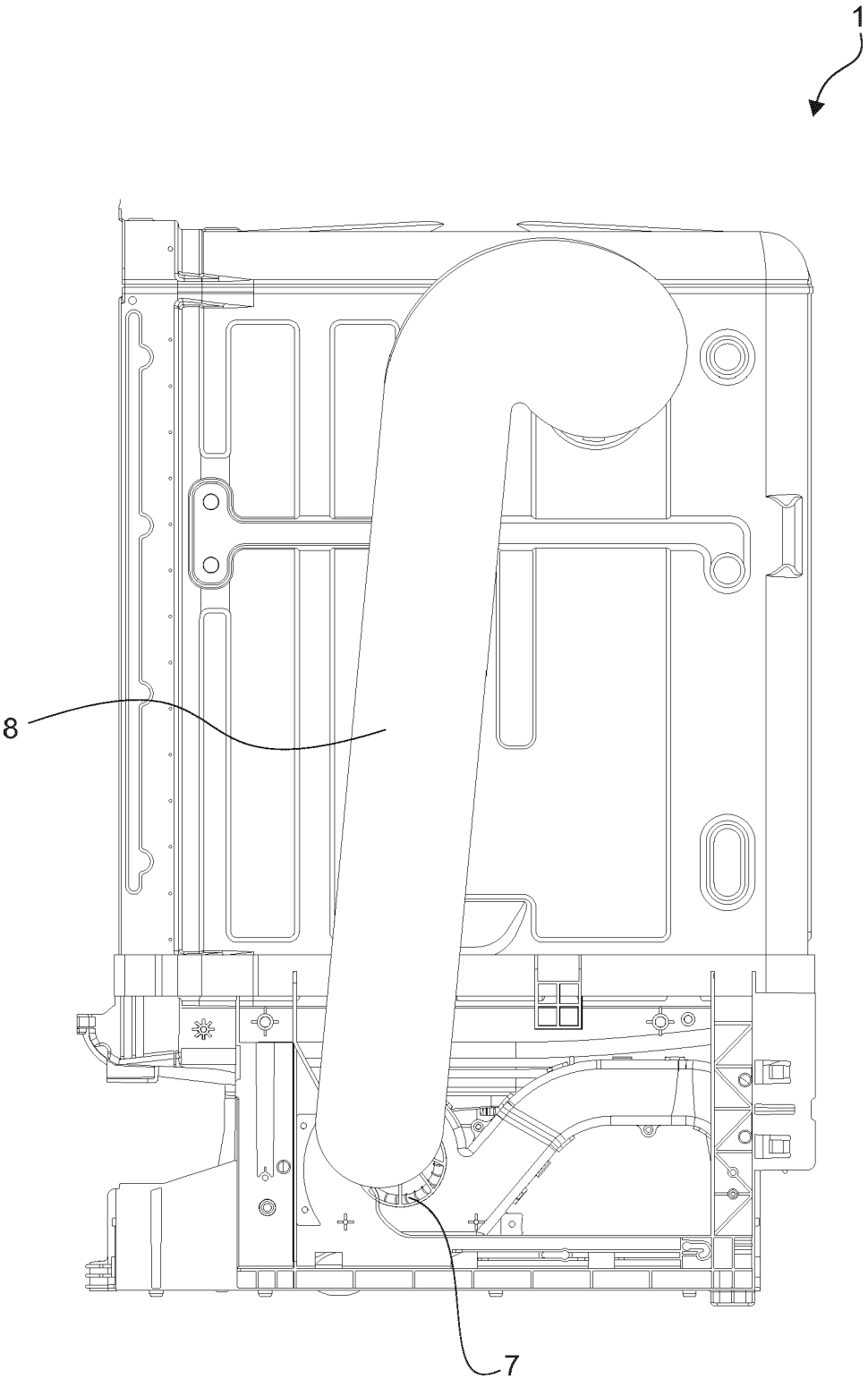


Figure 3

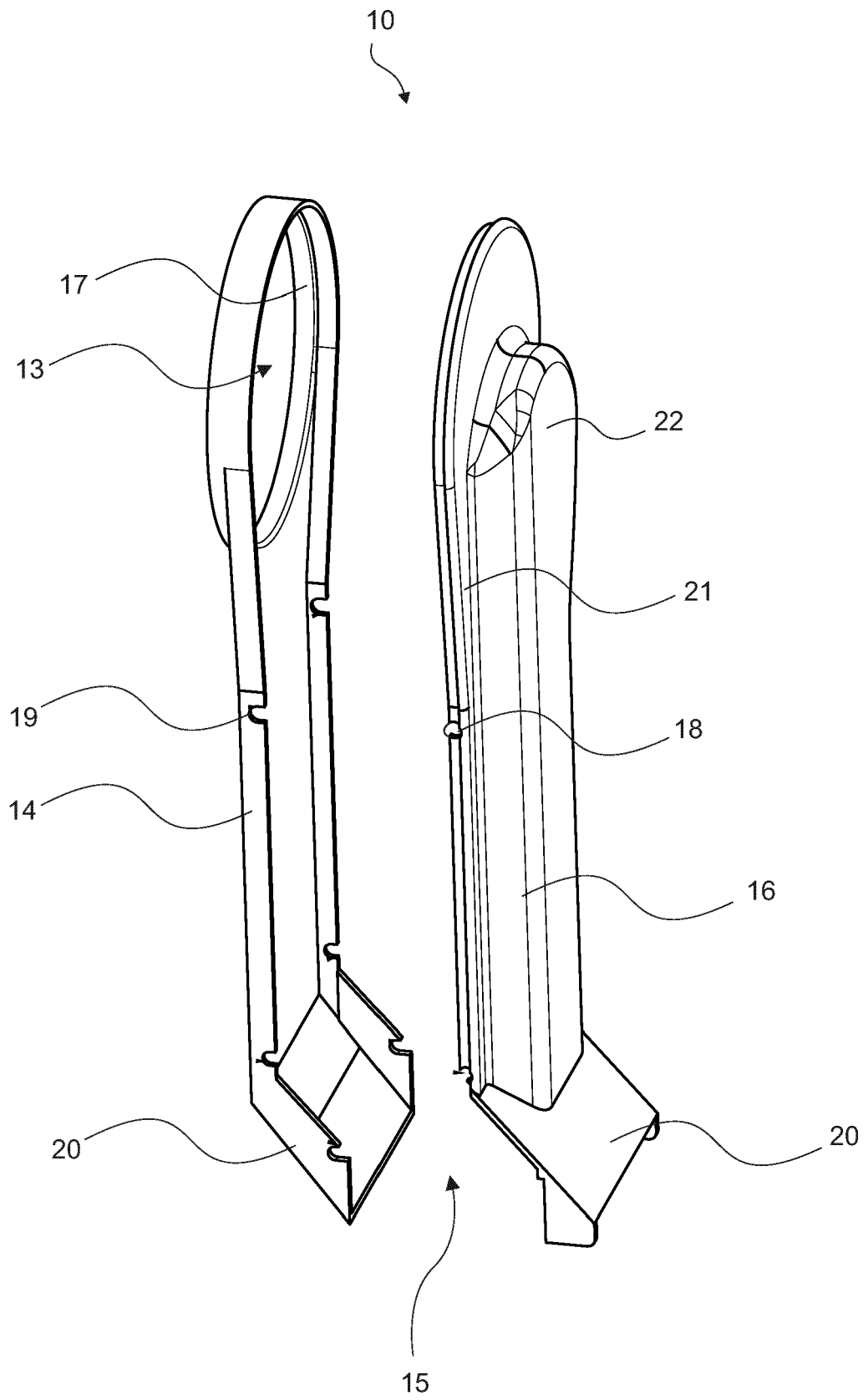
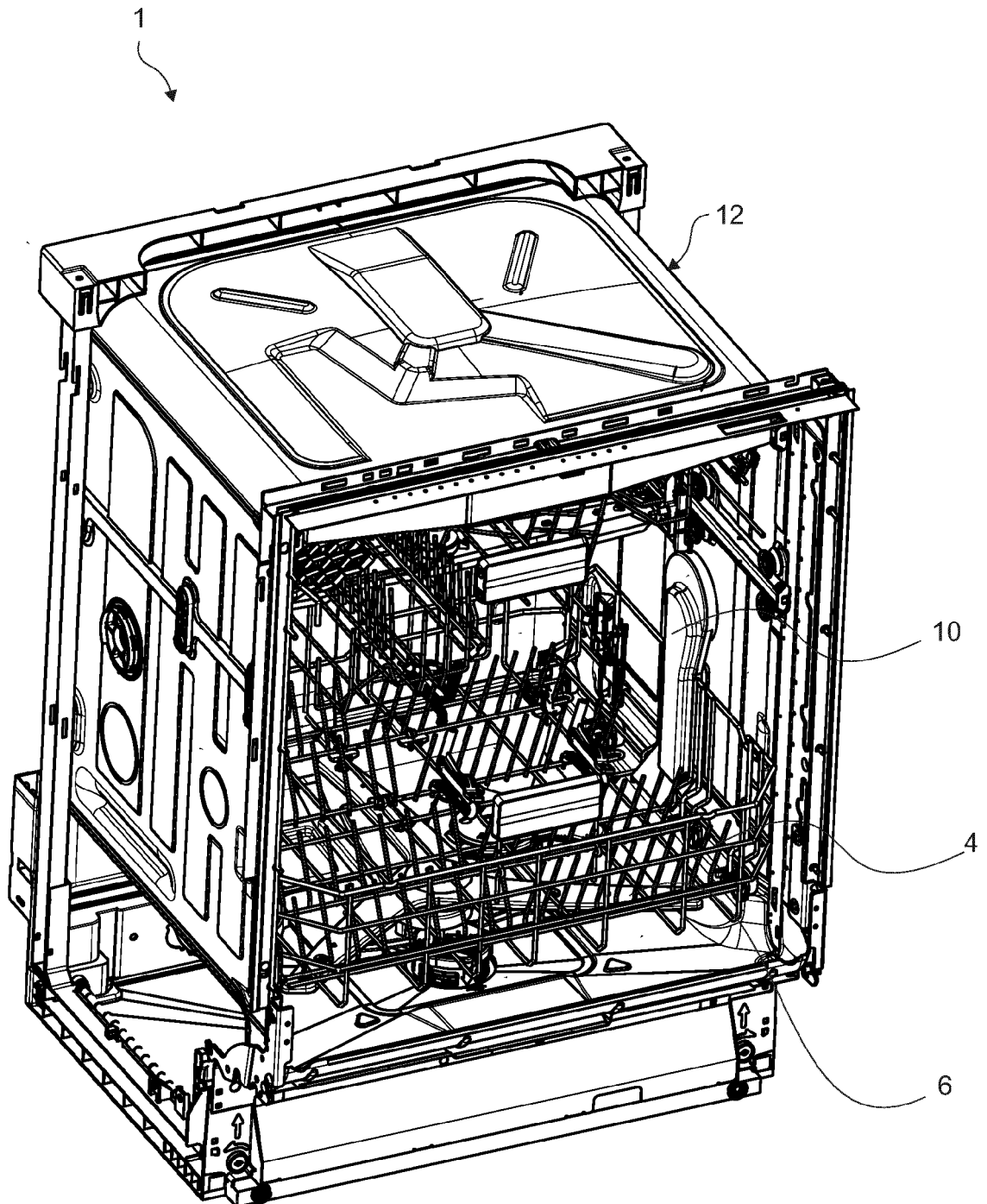


Figure 4





EUROPEAN SEARCH REPORT

Application Number

EP 24 16 0460

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EPO FORM 1503 03.82 (P04C01)

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	US 2022/125276 A1 (KIM SEUNGYOUN [KR] ET AL) 28 April 2022 (2022-04-28)	1, 4 - 7, 10	INV. A47L15/48
Y	* paragraphs [0012] - [0014] * * paragraphs [0060] - [0069] * * paragraphs [0075] - [0078] * * paragraphs [0100] - [0109] * * paragraphs [0202] - [0220] * * paragraphs [0236] - [0253] * * claim 1; figures 1-19 *	2	
A	DE 199 46 563 A1 (AEG HAUSGERAETE GMBH [DE]) 12 April 2001 (2001-04-12) * column 1, line 30 - column 2, line 25 * * column 2, line 64 - column 3, line 2 * * column 4, line 8 - column 4, line 60 * * claim 1; figures 1-3 *	1-10	
Y	DE 24 40 422 A1 (EURO HAUSGERAETE GMBH) 4 March 1976 (1976-03-04) * page 3, line 8 - page 4, line 24 * * claims 1-8 *	2	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 August 2024	Examiner Weinberg, Ekkehard
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	

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 24 16 0460

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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05-08-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2022125276 A1	28-04-2022	EP 3988002 A1	27-04-2022
		KR 20220053423 A	29-04-2022
		US 2022125276 A1	28-04-2022
DE 19946563 A1	12-04-2001	DE 19946563 A1	12-04-2001
		EP 1090580 A2	11-04-2001
DE 2440422 A1	04-03-1976	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2014180648 A [0003]