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(54) **CLEANING APPARATUS FOR A DISHWASHER**

(57) There is disclosed a cleaning apparatus (260) for a dishwasher. The cleaning apparatus (260) comprises at least one element (264) projecting from a body portion (262) of the cleaning apparatus. The at least one

element (264) is constructed and arranged to spray liquid (268) on to an item to be washed (216). The at least one element (264) is also constructed and arranged to impact an item to be washed (216) during a washing cycle.

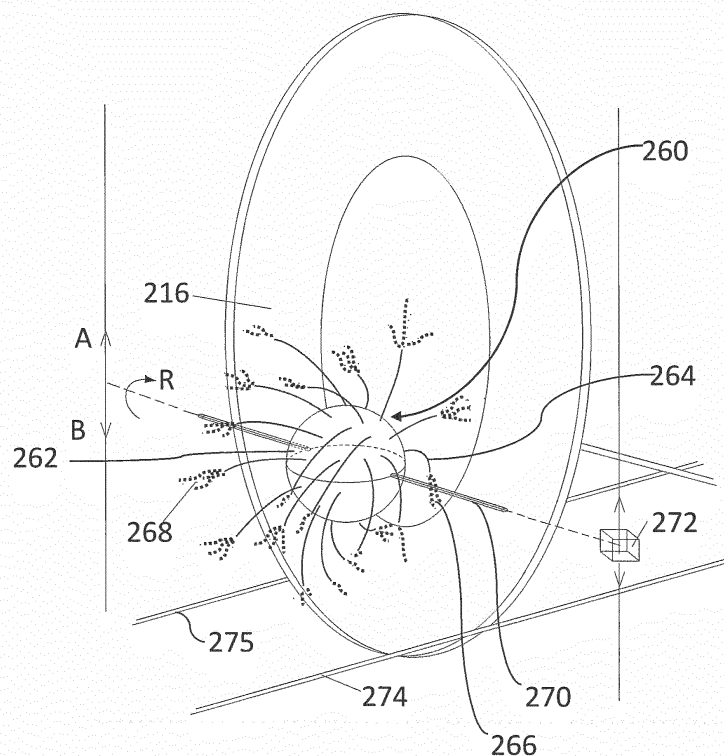


Fig. 2

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Description

Technical Field

[0001] The present disclosure relates to a cleaning apparatus for a dishwasher, and a dishwasher comprising one or more such cleaning apparatus..

Background

[0002] Dishwashers (also referred to as dishwashing machines) are used for washing items such as crockery and cutlery. A known dishwashing machine comprises a washing compartment for holding one or more items to be washed, and a washing mechanism for washing those items. Such a washing mechanism typically comprises one or more spray arms. Typically a user can select from a plurality of pre-defined washing cycles via a user interface on a front face of the dishwashing machine.

Summary

[0003] According to a first aspect there is provided a cleaning apparatus for a dishwasher, the cleaning apparatus comprising at least one element projecting from a body portion of the cleaning apparatus, the at least one element constructed and arranged to spray liquid on to an item to be washed and the at least one element constructed and arranged to impact an item to be washed during a washing cycle.

[0004] According to an example, the at least one element comprises a flexible material.

[0005] According to an example, the at least one element comprises an elastic polymer material.

[0006] According to an example, the at least one element comprises a plurality of projections.

[0007] According to an example, the plurality of projections form a serrated outer profile of the at least one element.

[0008] According to an example, at least some of the projections having a liquid outlet.

[0009] According to an example, the at least one element has a first end attached to the body portion and a second end spaced from the body portion, the second end having a smaller diameter than the first end.

[0010] According to an example, the first end comprises a liquid inlet to the at least one element and the second end comprises a liquid outlet from the at least one element.

[0011] According to an example, the cleaning apparatus is constructed and arranged to move during the washing cycle, the movement comprising one or more of: vertical movement of the body portion; rotational movement of the body portion..

[0012] According to an example the cleaning apparatus comprises a heating element for heating liquid in the apparatus.

[0013] According to an example the cleaning appara-

tus comprises an inflatable and deflatable balloon within the body portion for selectively increasing and decreasing liquid pressure in the cleaning apparatus.

[0014] According to an example the body portion is spherical.

[0015] According to an example the at least one element comprises a plurality of elements distributed about the body portion.

[0016] According to a second aspect there is provided a dishwasher comprising one or more cleaning apparatus according to the first aspect.

[0017] According to an example the one or more cleaning apparatus is comprised in a rack of the dishwasher, the rack comprising one or more hollow pipes for transferring liquid to the cleaning apparatus.

Brief Description of the Drawings

[0018] To assist understanding of the present disclosure and to show how embodiments may be put into effect, reference is made by way of example to the accompanying drawings in which:

Figure 1 shows schematically a dishwashing machine according to an example.

Figure 2 shows schematically a cleaning apparatus according to an example.

Figures 3 shows schematically a cleaning apparatus according to an example.

Figure 4 shows an element of a cleaning apparatus according to an example.

Figure 5 shows schematically a process according to an example.

Detailed Description

[0019] The present disclosure has applicability to a cleaning apparatus or device for dishwashing machines or dishwashers, as well as to dishwashers comprising such cleaning apparatus. Dishwashers are used to automate the washing of items of crockery such as plates, bowls, cups, mugs etc. Dishwashers may also be used to wash cutlery such as knives, forks, spoons, or indeed any other cooking or eating utensil. Other items that may be washed include glassware, food containers etc.

[0020] Figure 1 schematically shows an example of a dishwasher100. The dishwasher100 comprises a main body 102, within which there is a washing compartment or chamber 104. In this example the washing compartment 104 comprises a lower portion 106 and an upper portion 108. The lower portion 106 comprises a tray or rack or shelf 110 for holding items to be washed, and the upper portion 108 comprises a tray or rack or shelf 112 for holding items to be washed. The racks 110 and 112 can be moved in and out of the washing compartment 104 on roller assemblies.

[0021] Items to be washed are schematically shown at 114. In this case the items to be washed are schemati-

cally represented by plates 116 and 118 on rack 112, and plates 120 and 122 on rack 120. Of course there may alternatively be any other type of item to be washed or combination of items to be washed. In the example of Figure 1 a washing mechanism 123 comprises spray arm 124 in lower portion 106, and spray arm 126 in upper portion 108. In other examples the upper spray arm 126 is omitted. Each spray arm comprises a series of holes or nozzles which can spray water upwardly towards the items to be washed 114, while the spray arms 124 and 126 rotate. These are commonly referred to as spray holes. They may also be referred to as water outlets. Rotation of the spray arms 124 and 126, whilst ejecting water therefrom, helps to clean the items in a washing load.

[0022] In the example of Figure 1 the spray arm 124 is connected to shaft 125. The shaft 125 enables rotation of spray arm 124 about a central axis of the shaft 125. The shaft 125 and spray arm 124 may be considered to be comprised in a spray arm assembly 121. In the example of Figure 1 the spray arm 126 is connected to shaft 127. The shaft 127 enables rotation of spray arm 126 about a central axis of the shaft 127.

[0023] The dishwashing machine 100 further comprises water inlet schematically shown at 128 and water outlet schematically shown at 130, for enabling water to be fed to and taken away from the dishwashing machine respectively. In some examples a heater element (not shown) is provided for heating water as necessary. In other examples hot and cold water is drawn from a building's supply as required. A power connection is schematically shown at 132, which enables the dishwashing machine to be connected to mains electrical power for powering the dishwashing machine.

[0024] A water pump is schematically shown at 150. The water pump 150 is constructed and arranged to distribute water around the dishwashing machine 100. For example, the water pump 150 can pump water to spray arms 124 and 126. Water that has been sprayed falls back down to a base or sump 152 of the dishwashing machine 100, from where that water can be recycled (after filtering, in some examples) by the pump 150.

[0025] In some examples rotation of the spray arms 124 and 126 is effected by the force of water being ejected from spray holes of the spray arms. In such examples the spray holes may be arranged and/or oriented so as to facilitate such rotation. Additionally or alternatively one or more motors, shown schematically at 148, may be provided for powering rotation of the spray arms 124 and 126.

[0026] A controller is schematically shown at 134 for controlling operations of the dishwasher. The controller may comprise at least one memory and at least one processor. The controller 134 can, for example, cause the dishwashing machine to operate according to one or more pre-determined washing cycles selected via a user interface 136. The available washing cycles may differ from each other by temperature and/or duration, for ex-

ample. Via the user interface 136 a user may also be able to select whether the washing cycle is for a full or half load. A display 138 is also provided which can display information to the user. This may include information such as confirming a user's washing cycle selection, as well as information such as time remaining of a washing cycle that is in progress. The display 138 may also display one or more alarm states to a user, for example by use of a flashing light. A speaker may also be provided in some examples, so that an audible alarm can be provided to a user (for example a buzzer). An alarm state may, for example, indicate an end of a wash.

[0027] A door of the dishwashing machine 100 is schematically shown at 140. The door 140 is connected to main body 120 via hinges 142 and 144. In Figure 1 the door is in an open position enabling access to washing compartment 104. The door 140 may be moved to a closed position so that the washing compartment 104 is then substantially enclosed. The door 140 may also include a receptacle for holding dishwashing detergent (e.g. a detergent cube) which can be released in to the dishwashing machine during a wash. The receptacle for holding washing detergent may of course also be positioned elsewhere within the dishwashing machine. The dishwashing machine may also include one or more further receptacles for containing dishwashing machine salt and/or rinse aid, for example.

[0028] A washing cycle generally comprises three main stages: (i) wetting; (ii) injection of detergent, (iii) rinsing. In some examples one or more of these steps may be omitted. For example a rinse wash may include just a rinsing cycle. Whichever steps are included or not included, the washing of the washing load may be generally termed a washing cycle.

[0029] A problem which has been recognised by the present inventors is that the spray arm assemblies 121 and 127 may not adequately wash items in the dishwasher 100. This may be particularly so where the items have dry or sticky soiling or staining.

[0030] Therefore, according to examples one or more cleaning apparatus 160 is provided. The cleaning apparatus 160 may be provided in addition to the one or more spray arm assemblies 121 and 127. In other examples the cleaning apparatus 160 may be provided instead of the one or more spray arm assemblies 121 and 127. As will be explained in more detail below, the cleaning apparatus 160 is constructed and arranged to spray liquid (e.g. water and/or detergent) on to items to be washed, and also to physically impact or touch items during a washing cycle so as to help remove dirt. In some examples the cleaning apparatus is comprised in a rack (e.g. rack 112) of the dishwasher 100, so as to be proximate to the items to be washed. In some examples liquid is supplied to the cleaning apparatus 160 by the water network of the dishwasher 100 e.g. via one or more pipes from pump 150. In some examples the rack holding the cleaning apparatus 160 is formed of one or more hollow pipes for delivering liquid to the cleaning apparatus 160.

In such examples the rack provides a dual function of holding items to be washed as well as being part of the water network for delivering liquid to cleaning apparatus 160.

[0031] Although in Figure 1 only one such cleaning apparatus 160 is shown, it will be understood that in some examples two or more such cleaning apparatus 160 may be provided in dishwasher 100.

[0032] A cleaning apparatus 260 according to an example is now described in more detail with reference to Figure 2. The cleaning apparatus 260 comprises a body portion 262 and at least one element 264 projecting from the body portion 262. In the example of Figure 2 there are a plurality of such elements 264 distributed about the body portion 262.

[0033] In the example of Figure 2 the body portion 262 is spherical or substantially spherical. In other examples the body portion 262 may be a different shape; for example the body portion 262 may be oval in cross-section. The body portion 262 may comprise a plastic material.

[0034] The at least one element 264 is constructed and arranged to eject or spray liquid on an item to be washed (e.g. plate 216). Sprayed liquid is schematically shown at 266 and 268 for example.

[0035] According to examples the cleaning apparatus 260 may be constructed and arranged to move during a washing cycle. For example the body portion 262 may be caused to rotate and/or move up and down during a washing cycle. In the example of Figure 2, mounting 270 is provided on which the body portion 262 is mounted. The mounting 270 may be caused to move up and down (e.g. in the directions of arrows A and B). The body portion 262 is also constructed and arranged to rotate around mounting 270, for example as shown by arrow R. The body portion 262 may also be constructed and arranged to move laterally across the width of the washing compartment (i.e. parallel to longitudinal axis of member 270). The body portion 262 may also be constructed and arranged to move in a direction in and out of the depth of the washing compartment (i.e. parallel to the longitudinal axis of rack portion 275).

[0036] A motor schematically shown at 272 may enable such movement of the cleaning apparatus 260.

[0037] The at least one element 264 is furthermore constructed and arranged to impact (i.e. physically touch) an item to be washed (e.g. plate 216) during a washing cycle. For example as the cleaning apparatus 260 is moved during a washing cycle the element 264 will have a brushing effect on the item 216, which in particular helps to remove dry or sticky stains.

[0038] A portion of the dishwasher rack is schematically shown at 274. As explained above the dishwasher rack 274 may itself form part of the water network for delivering liquid to the cleaning apparatus 260. For example the rack 274 may comprise one or more hollow tubes for delivering liquid to the cleaning apparatus 260.

[0039] Figure 3 shows some aspects of the cleaning apparatus 260 in more detail. More particularly Figure 3

shows some internal aspects of body portion 262. For clarity the plurality of elements 264 is not shown in Figure 3.

[0040] A heating element is schematically shown at 276, within body portion 262. The heating element may comprise, for example, a heating resistor. The heating element is constructed and arranged to heat liquid that is to be sprayed by the cleaning apparatus 260.

[0041] A pipe for delivering liquid to the cleaning apparatus 260 is shown at 278. According to some examples the pipe 278 may also comprise the mounting 270 (see Figure 2). An electrical conductor for supplying current to heating element 276 is schematically shown at 280. The conductor 280 is arranged to pass through the mounting 278. The conductor 280 comprises an electrically insulating coating.

[0042] A liquid holding portion of the body portion 262 is schematically shown at 263. Thus liquid may be fed through pipe 278 to liquid holding portion 263 of body portion 262, before passing in to the one or more elements 264.

[0043] A flexible balloon is schematically shown at 282, within body portion 262. The flexible balloon 282 comprises a gas 284, such as carbon dioxide (CO₂). Gas 284 is selectively pumped in to or expelled from balloon 282 in order to selectively inflate and deflate balloon 282. This causes selective increasing and decreasing of liquid pressure in the body portion 262, and consequently can control a pressure of liquid ejected out of the one or more elements 264. In some examples a pipe network (not shown) is provided for providing to/removing gas from the balloon 282. A gas supply tank (not shown) may also be provided, or gas may be drawn from the atmosphere.

[0044] Figure 4 shows an element 264 in more detail according to an example. In some examples the element 264 comprises a flexible material. In some examples the element 264 comprises an elastic polymer material.

[0045] The element 264 comprises a plurality of projections. The projections 286 may be in the form of serrations or spikes. The projections 286 have a brushing effect as they impact or touch an item to be washed. According to some examples at least some of the projections 286 comprise liquid outlets at their end, shown schematically at 288. These liquid outlets 288 may be considered "micro-holes". The projections 286 may also comprise an elastic polymer material.

[0046] The element 264 comprises a first end 290 and a second end 292. The first end 290 is arranged to connect to body portion 262. The first end 290 may be considered a liquid inlet in to the element 264, from liquid holding portion 263 of body portion 262. Liquid is schematically shown at 294. The second end 292 may comprise a hole for spraying liquid that has been forced through a hollow interior of element 264. Ejected liquid is schematically shown at 296.

[0047] According to some examples the second end 292 has a smaller diameter than the first end 290. According to some examples the element 264 may be con-

sidered to be in the form of a nozzle.

[0048] According to some examples at least two of a plurality of elements 264 may differ in some way. For example one element 264 may be longer than another element 264. One element 264 may have a wider internal diameter than another element 264. Thus in some examples different elements 264 may be arranged to eject liquid at different pressures.

[0049] Figure 5 is a flow chart of a process according to an example.

[0050] At S1, a user sets a washing program, for example via user interface 136.

[0051] As shown at S2, a washing cycle begins.

[0052] At S3, the heating element 276 in the cleaning apparatus 260 is activated.

[0053] During the washing cycle, the cleaning apparatus 260 ejects liquid on to one or more items to be washed, as shown at S4.

[0054] Also during the washing cycle the cleaning apparatus 260 is caused to be moved, as shown at S5.

[0055] At S6 the washing cycle is completed.

[0056] It will be understood that the order of the process of Figure 5 may differ across examples. For examples the order of S3 and S4 may be interchangeable, and S3 and S4 may also occur simultaneously.

[0057] It will be understood that the cleaning apparatus as described may more quickly and efficiently remove stains from items to be washed such as crockery and cutlery. This may enable shorter washing cycles and less water, electricity and detergent to be consumed.

[0058] The examples described herein are to be understood as illustrative examples of embodiments of the invention. Further embodiments and examples are envisaged. Any feature described in relation to any one example or embodiment may be used alone or in combination with other features. In addition, any feature described in relation to any one example or embodiment may also be used in combination with one or more features of any other of the examples or embodiments, or any combination of any other of the examples or embodiments. Furthermore, equivalents and modifications not described herein may also be employed within the scope of the invention, which is defined in the claims.

Claims

1. A cleaning apparatus for a dishwasher, the cleaning apparatus comprising at least one element projecting from a body portion of the cleaning apparatus, the at least one element constructed and arranged to spray liquid on to an item to be washed and the at least one element constructed and arranged to impact an item to be washed during a washing cycle.
2. A cleaning apparatus according to claim 1, the at least one element comprising a flexible material.

3. A cleaning apparatus according to claim 1 or claim 2, the at least one element comprising an elastic polymer material.
4. A cleaning apparatus according to any of claims 1 to 3, the at least one element comprising a plurality of projections.
5. A cleaning apparatus according to claim 4, the plurality of projections forming a serrated outer profile of the at least one element.
6. A cleaning apparatus according to claim 4 or claim 5, at least some of the projections having a liquid outlet.
7. A cleaning apparatus according to any of claims 1 to 6, the at least one element having a first end attached to the body portion and a second end spaced from the body portion, the second end having a smaller diameter than the first end.
8. A cleaning apparatus according to claim 7, the first end comprising a liquid inlet to the at least one element and the second end comprising a liquid outlet from the at least one element.
9. A cleaning apparatus according to any of claims 1 to 8, the cleaning apparatus constructed and arranged to move during the washing cycle, the movement comprising one or more of: vertical movement of the body portion; rotational movement of the body portion..
10. A cleaning apparatus according to any of claims 1 to 9, comprising a heating element for heating liquid in the apparatus.
11. A cleaning apparatus according to any of claims 1 to 10, comprising an inflatable and deflatable balloon within the body portion for selectively increasing and decreasing liquid pressure in the cleaning apparatus.
12. A cleaning apparatus according to any of claims 1 to 11, the body portion being spherical.
13. A cleaning apparatus according to any of claims 1 to 12, the at least one element comprising a plurality of elements distributed about the body portion.
14. A dishwasher comprising one or more cleaning apparatus according to any of claims 1 to 13.
15. A dishwasher according to claim 14, the one or more cleaning apparatus comprised in a rack of the dishwasher, the rack comprising one or more hollow pipes for transferring liquid to the cleaning apparatus.

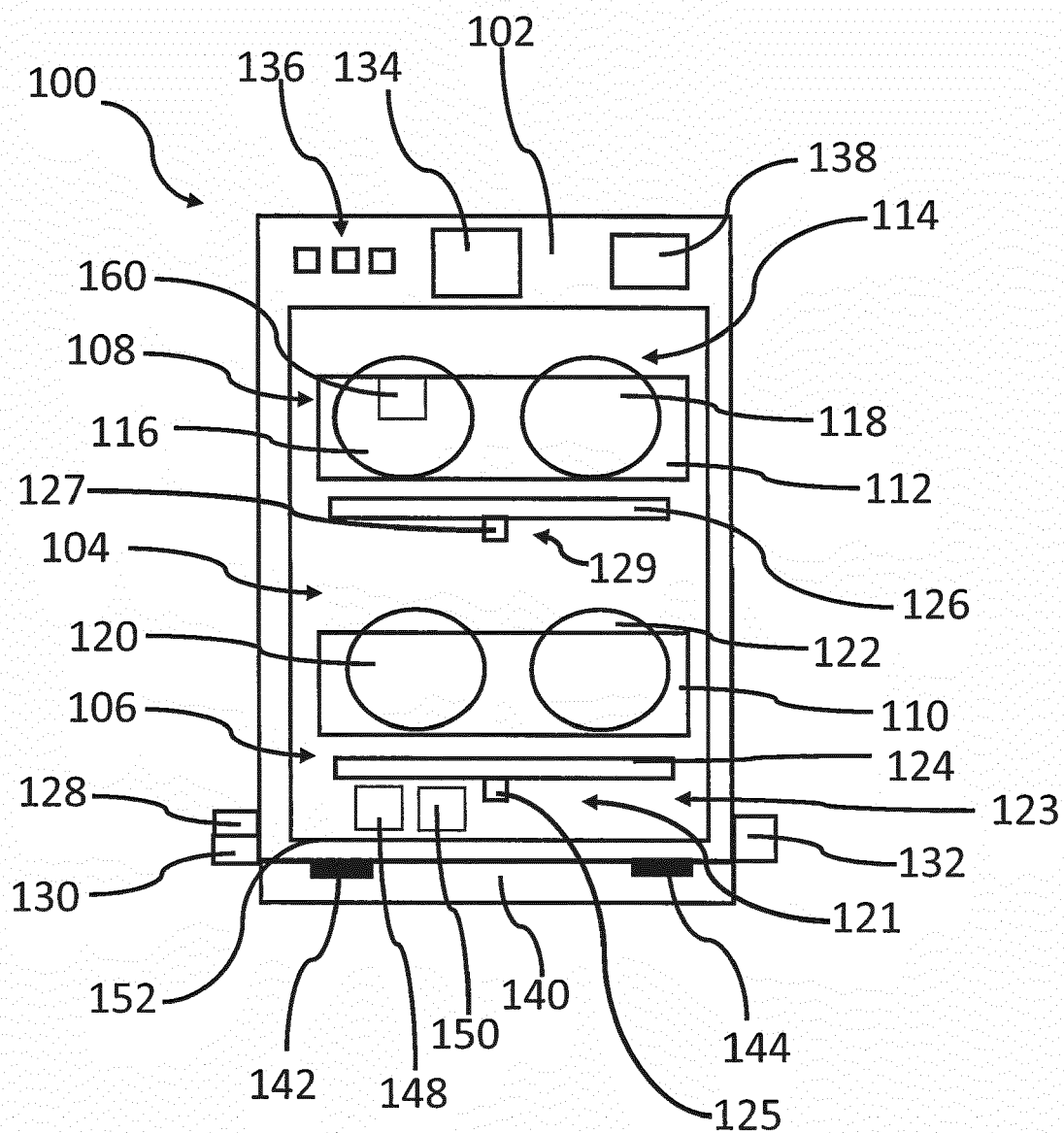


Fig. 1

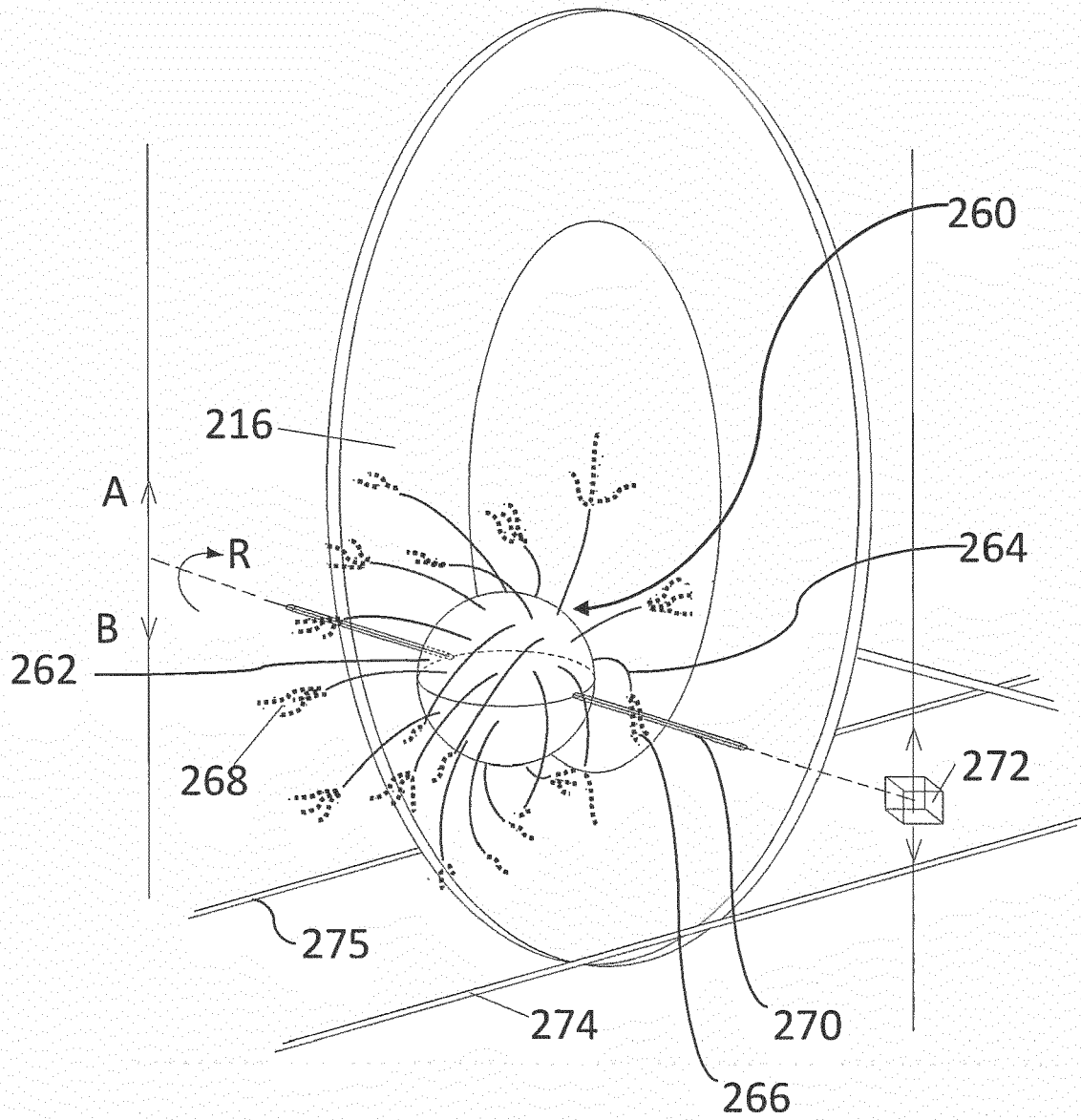


Fig. 2

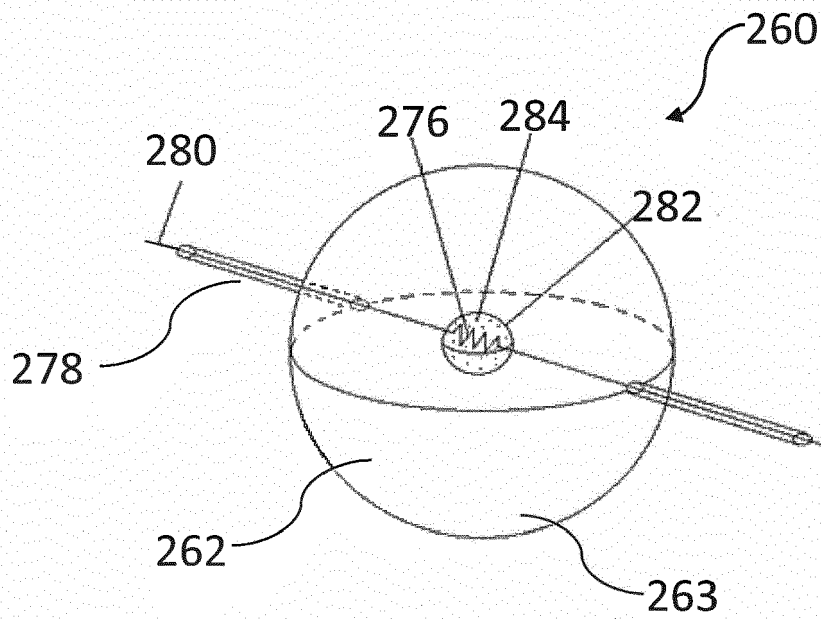
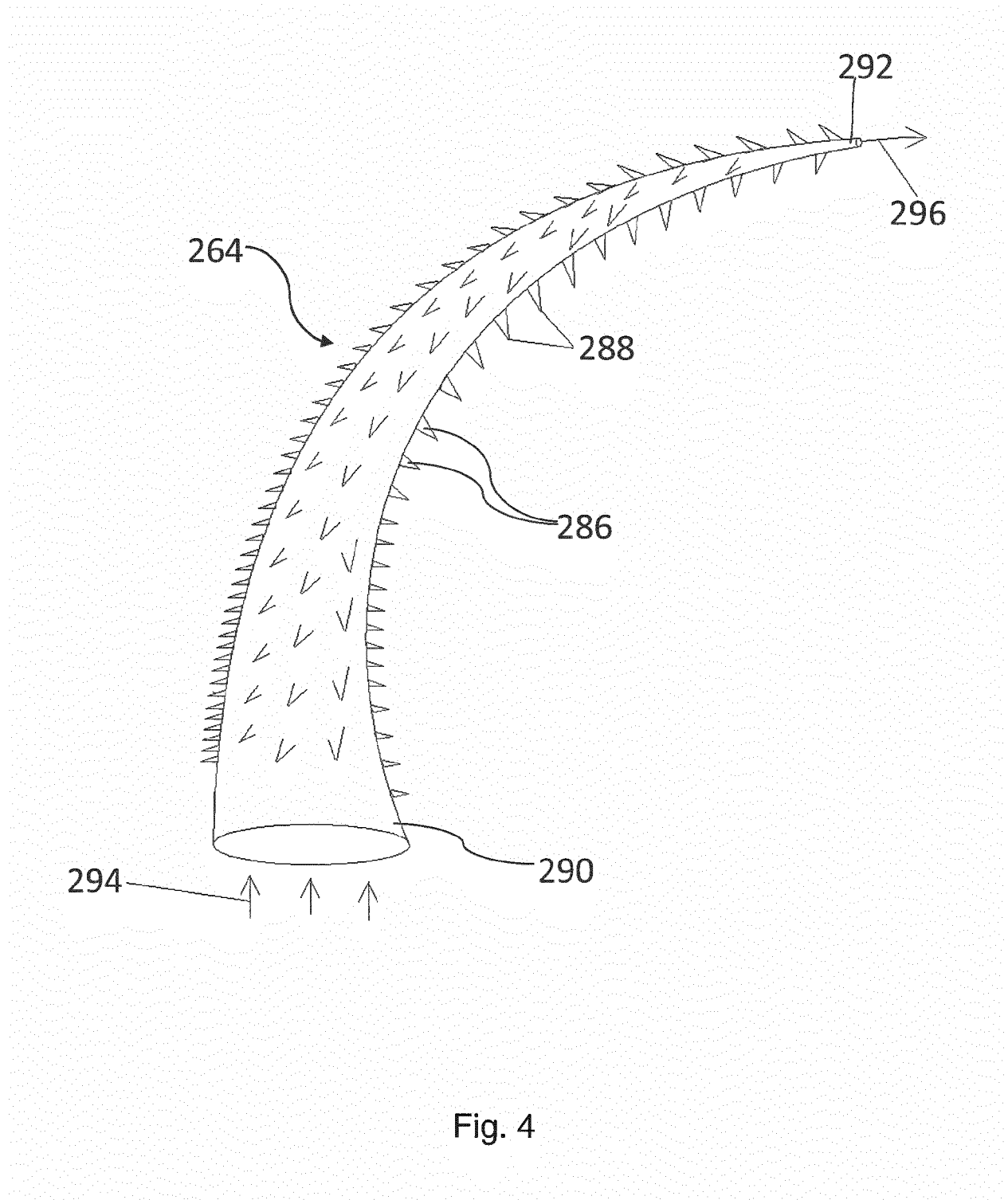


Fig. 3



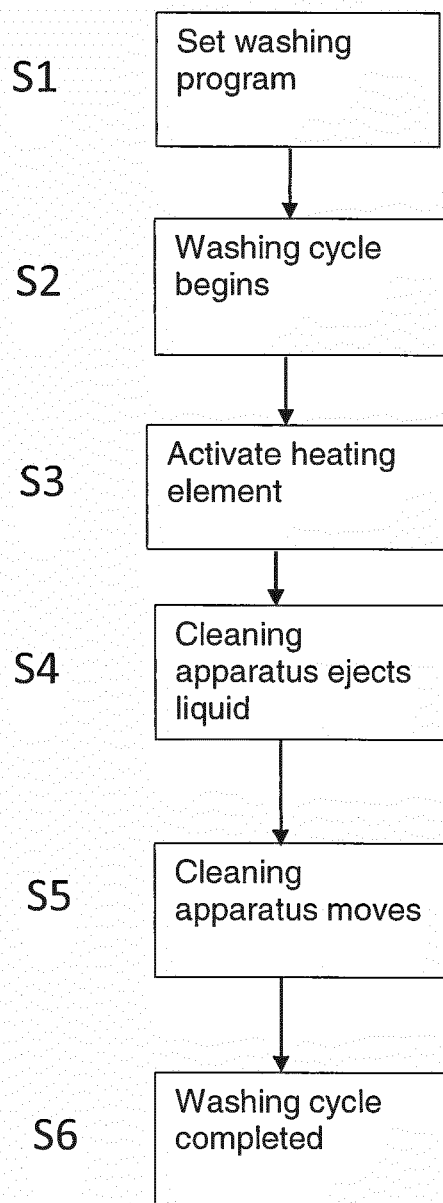


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 18 21 3675

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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	GB 1 060 642 A (TELEFOX ELETTRDOMESTICI S P A) 8 March 1967 (1967-03-08)	1-10, 13-15	INV.
A	* page 2, lines 33-117; figures 1-3,6-8 * -----	11,12	A47L15/42 A47L15/50 A47L15/39
X	DE 198 47 151 A1 (AEG HAUSGERAETE GMBH [DE]) 20 April 2000 (2000-04-20)	1-10, 13-15	
A	* column 2, line 63 - column 3, line 45; figure 3 * -----	11,12	
X	WO 2016/122029 A1 (JASOOM CO LTD [KR]; CHA CHUN-GEUN [KR]) 4 August 2016 (2016-08-04)	1-10,13, 14	
A	* figures 2-4 * -----	11,12,15	
X	CN 108 095 654 A (CHONGQING ZHENJING TECH DEVELOPMENT CO LTD)	1,4, 7-10,13, 14	
A	1 June 2018 (2018-06-01) * figures 1,5 * -----	11,12	
X	CN 108 371 530 A (GUO CHANGLEI)	1-10,13, 14	
A	7 August 2018 (2018-08-07) * the whole document * -----	11,12	TECHNICAL FIELDS SEARCHED (IPC)
A	WO 2006/025066 A1 (GATHE RAJESH VITTHALRAO [IN]; GATHE SUJATA RAJESH [IN]) 9 March 2006 (2006-03-09) * the whole document * -----	1-15	A47L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 June 2019	Examiner Lodato, Alessandra
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
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 21 3675

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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18-06-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1060642 A	08-03-1967	BE 636830 A	16-12-1963
		CH 416977 A	15-07-1966
		DE 1300649 B	07-08-1969
		FR 1366694 A	10-07-1964
		GB 1060642 A	08-03-1967
		NL 297295 A	25-05-1965

DE 19847151 A1	20-04-2000	DE 19847151 A1	20-04-2000
		EP 0997100 A1	03-05-2000

WO 2016122029 A1	04-08-2016	NONE	

CN 108095654 A	01-06-2018	NONE	

CN 108371530 A	07-08-2018	NONE	

WO 2006025066 A1	09-03-2006	NONE	
