



## DISHWASHER AND METHOD OF OPERATING DISHWASHER

## TECHNICAL FIELD

The present invention relates to a dishwasher and a method of operating a dishwasher.

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## BACKGROUND

A dishwasher comprises a washing chamber in which for instance, dishes to be cleaned are placed. Washing liquid is sprayed into the washing chamber by means of a circulation pump for cleaning and/or rinsing the dishes. Washing liquid may be circulated  
10 in the dishwasher in different washing cycles. Thus, a dishwashing operation may comprise for instance, a prewashing cycle during which the dishes are cleaned with water only, a main washing cycle during which the dishes are cleaned with water and detergent, and a rinsing cycle during which the dishes are rinsed with water and a rinsing agent. Water admitted into the dishwasher may be softened, e.g. by means of an ion  
15 exchange resin.

WO 2009/027320 discloses a domestic dishwasher comprising a treatment chamber, in which items to be washed are supplied with washing liquid, and a reservoir that functions as a heat exchanger. The reservoir is in thermal contact with an outer wall of the  
20 dishwasher and in thermal contact with the treatment chamber. The reservoir is filled with fresh water by means of supply means. The water in the reservoir is pre-heated *inter alia* by means of heated washing liquid in the treatment chamber. The contents of the reservoir can be introduced via outlet lines into the treatment chamber. The dishwasher is equipped with recycling means that deliver washing liquid from the  
25 treatment chamber to the reservoir.

## SUMMARY

An object of the present invention is to provide an alternative dishwasher, wherein control of dishwasher temperature is provided while water saving is achieved.

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According to an aspect of the invention, the object is achieved by a dishwasher comprising a washing chamber with a sump and a circulation circuit. The circulation

circuit comprises the sump, a circulation pump and a spraying device for spraying washing liquid into the washing chamber. The dishwasher further comprises a reservoir adapted to be connected to water mains. A liquid connection is adapted to transfer liquid from the reservoir to the washing chamber. A return system is adapted to transfer liquid  
5 from the washing chamber to the reservoir. The reservoir is thermally insulated from the washing chamber.

Since the reservoir is thermally insulated from the washing chamber, a temperature of washing liquid in the washing chamber is not affected by a temperature of water in the  
10 reservoir. In other words, no heat exchange takes place between the washing chamber and the reservoir. Thus, a precise temperature control of the washing liquid may be achieved also if cold water is held in the reservoir. As a result, the above mentioned object is achieved.

15 In the washing chamber dishes to be cleaned may be placed. The dishes are cleaned and/or rinsed by washing liquid circulating in the circulation circuit. The spraying device may comprise one or more rotating arms. The washing liquid may be water, water with added detergent, or water with added rinsing agent. A dishwashing operation may comprise a number of different washing cycles. The different types of washing liquids  
20 may be used in different washing cycles. For instance, a first washing cycle may be performed using water only for rinsing the dishes and soaking dry residue on the dishes, and a second washing cycle may be performed with washing liquid in the form of water with added detergent. Washing liquid in the washing chamber may be drained completely from washing liquid between two washing cycles. Alternatively, the washing  
25 chamber is not drained between two washing cycles and the same washing liquid is used in a second washing cycle of the two washing cycles. In this case further liquid, e.g. in the form of freshwater, may be added to the washing liquid in the second washing cycle. A further alternative may be a partial drain of washing liquid from the washing chamber between two washing cycles. In this case further liquid, e.g. in the form of  
30 freshwater, may be added to the washing liquid in a second washing cycle of the two washing cycles. Freshwater admitted into the dishwasher from water mains may be softened, e.g. by flowing through a device comprising ion exchange resin. The term dishwashing operation herein is to be interpreted as washing one batch of dishes in the

dishwasher. The term freshwater used herein refers to both water stemming directly from the water mains as well as water which has passed a water softening arrangement.

5 The reservoir may be in thermal communication with an ambient environment of the dishwasher. Thus, freshwater held in the reservoir may be warmed up by the ambient environment of the dishwasher.

10 According to embodiments, the reservoir may be arranged adjacent to a wall portion of the washing chamber and a thermal insulation material may be arranged between the reservoir and the wall portion. In this manner thermal insulation of the reservoir from the washing chamber may be achieved.

15 According to embodiments, the dishwasher may comprise a heating element arranged in thermal communication with the circulation circuit. In this manner the temperature of circulating washing liquid may be raised to a desired or required level.

20 According to embodiments, the dishwasher may comprise a controller for controlling washing parameters of the dishwasher. The controller may be connected to the heating element and a temperature sensor for controlling a temperature of a washing liquid in the washing chamber. In this manner the temperature of circulating washing liquid may be controlled.

25 The controller may for instance control settings of one or more valves in the dishwasher. The controller may control the circulation pump and possible further pumps in the dishwasher. The controller may control the length of the different washing cycles of the dishwasher. The controller may dose detergent and/or rinsing solution into water.

30 According to embodiments, the reservoir may comprise two or more tanks arranged adjacent to one or more wall portions of the washing chamber. In this manner a sufficient reservoir volume may be achieved under circumstances where availability of space in the dishwasher does not permit installation of one tank comprising a sufficient volume. The two or more tanks may be interconnected.

According to embodiments, the return system may comprise the circulation pump. In this manner the circulation pump may be utilized for transferring washing liquid from the washing chamber to the reservoir.

- 5 According to embodiments, the return system may comprise a first conduit extending between the sump and the reservoir. In this manner the first conduit may be utilized for transferring washing liquid from the washing chamber to the reservoir. The circulation pump and/or one or more valves may be arranged in the first conduit.
- 10 According to embodiments, the dishwasher may be adapted to store washing liquid in the reservoir. In this manner washing liquid stored from a first dishwashing operation may be used in a first washing cycle of a following dishwashing operation.

According to embodiments, the dishwasher may be:

- 15 adapted to transfer washing liquid stored in the reservoir to the washing chamber, adapted to utilize transferred washing liquid in a first washing cycle in the dishwasher, adapted to tap freshwater from water mains into the reservoir, adapted to transfer at least part of the freshwater from the reservoir to the washing chamber, and
- 20 adapted to utilize the said at least part of the freshwater in a following washing cycle following the first washing cycle. In this manner the reservoir may be rinsed through by freshwater. Residue of washing liquid may thus be removed from the reservoir between two dishwashing operations. A following washing cycle may be a washing cycle immediately following the first washing cycle, or it may be a later washing cycle, i.e. one
- 25 or more washing cycles may be performed between the first washing cycle and the following washing cycle.

According to embodiments, the dishwasher may be:

- 30 adapted to repeat tapping freshwater from water mains into the reservoir and transferring the freshwater from the reservoir to the washing chamber, one or more times, and adapted to utilize at least part of the the freshwater in one or more further washing cycles. In this manner the reservoir may be thoroughly rinsed through by freshwater between two dishwashing operations.

According to a further aspect of the invention there is provided a method of operating a dishwasher. The dishwasher comprises a washing chamber with a sump and a circulation circuit. The circulation circuit comprises the sump, a circulation pump, and a spraying device for spraying washing liquid into the washing chamber. A heating element is arranged in thermal communication with the circulation circuit. The dishwasher further comprises a reservoir adapted to be connected to water mains. The reservoir is thermally insulated from the washing chamber. A liquid connection is adapted to transfer liquid from the reservoir to the washing chamber. A return system is adapted to transfer liquid from the washing chamber to the reservoir. The method comprises:

circulating washing liquid in the circulation circuit,  
tapping freshwater from water mains into the reservoir, and  
heating the washing liquid circulating in the circulation circuit without a washing liquid temperature being affected by a water temperature of the freshwater in the reservoir.

Further features of, and advantages with, the present invention will become apparent when studying the appended claims and the following detailed description. Those skilled in the art will realize that different features of the present invention may be combined to create embodiments other than those described in the following, without departing from the scope of the present invention, as defined by the appended claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The various aspects of the invention, including its particular features and advantages, will be readily understood from the following detailed description and the accompanying drawings, in which:

Figs. 1 and 2 illustrate schematically dishwashers according to embodiments, and Fig. 3 illustrates a method of operating a dishwasher.

#### DETAILED DESCRIPTION

The present invention will now be described more fully with reference to the accompanying drawings, in which example embodiments are shown. However, this invention should not be construed as limited to the embodiments set forth herein.

Disclosed features of example embodiments may be combined as readily understood by one of ordinary skill in the art to which this invention belongs. Like numbers refer to like elements throughout. Well-known functions or constructions will not necessarily be described in detail for brevity and/or clarity.

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**Fig. 1** illustrates schematically a dishwasher **2** according to embodiments. The dishwasher comprises a housing **4** having wall portions **6**, **6'**. The housing **4** comprises a washing chamber **8**, the wall portions **6**, **6'** at least partially defining the washing chamber **8**. The dishwasher **2** is provided with a door (not shown) for closing the washing chamber **8** and racks **10** for supporting dishes **12** in the washing chamber **8**. At a bottom portion of the washing chamber **8** there is arranged a sump **14**. The dishwasher **2** comprises a circulation circuit **16** for circulating washing liquid in the washing chamber **8**. The circulation circuit **16** comprises the sump **14**, a circulation pump **18**, two spraying devices **20** for spraying the washing liquid into the washing chamber **8**, and conduits interconnecting the sump **14**, the circulation pump **18**, and the spraying devices **20**. During dishwashing, washing liquid is circulated in the circulation circuit **16** by means of the circulation pump **18** and sprayed into the washing chamber **8** in directions towards the dishes **12** to clean the dishes **12**. The washing liquid flows downwards in the washing chamber **8** into the sump **14** from which it is continuously pumped to one or both of the spraying devices **20**. It may be held that also the washing chamber **8** forms part of the circulation circuit **16**. A flow control device **22** may control the washing liquid directed to one or both of the two spraying devices **20**. Purely as an example, it may be mentioned that about 2 – 5 liters of washing liquid may circulate in the circulation circuit **16**.

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The dishwasher **2** comprises a reservoir **24**. The reservoir **24** is arranged adjacent to one of the wall portions **6** forming part of a side wall of the washing chamber **8**. A thermal insulation material **26** is arranged between the reservoir **24** and the wall portion **6**. Thus, the reservoir **24** is thermally insulated from the washing chamber **8**. The thermal insulation material may for instance comprise mineral wool and/or solid foam material. The reservoir **24** is connected to water mains via an inlet valve **28** of the dishwasher **2**. Freshwater may thus be tapped into the reservoir **24** from water mains. Freshwater may pass via a water softening device **29** to the reservoir **24**. Either a direct conduit from the inlet valve **28** to the reservoir **24** or a conduit via the water softening device **29** may be

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provided in the dishwasher 2. Alternatively, both options may controllably be provided in the dishwasher 2. A liquid connection **30** is adapted to transfer liquid from the reservoir 24 to the washing chamber 8.

5 A return system **32** is adapted to transfer liquid from the washing chamber 8 to the reservoir 24. The return system 32 comprises the circulation pump 18. Thus, the circulation pump 18 may be arranged to transfer washing liquid from the washing chamber 8 and its sump 14 to the reservoir 24. The return system 32 comprises a first conduit **34** extending between the sump 14 and the reservoir 24.

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A first control valve **36** is provided in the liquid connection 30, the first conduit 34, and the return system 32. The first control valve 36 is closed when freshwater is tapped into the reservoir 24. The first control valve 36 is opened to transfer water from the reservoir 24 to the washing chamber 8 and the circulation circuit 16. The first control valve 36 is opened to transfer washing liquid from the washing chamber 8 to the reservoir 24. The first control valve 36 is closed to hold washing liquid in the reservoir 24. The first control valve 36 is opened to transfer washing liquid from the reservoir 24 to the washing chamber 8 and the circulation circuit 16. Liquid is disposed of from the washing chamber 8 via a drain comprising a drain pump **38** connected to the sump 14.

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Accordingly, the dishwasher 2 is adapted to store washing liquid in the reservoir 24. For instance washing liquid from a final washing cycle of a dishwashing operation, i.e. rinsing liquid, may be stored in the reservoir 24. This washing liquid is then used in a first washing cycle of a following dishwashing operation.

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A heating element **40** is arranged in thermal communication with the circulation circuit 16. The dishwasher 2 comprises a controller **42** for controlling washing parameters of the dishwasher 2. The controller 42 is connected to the heating element 40 and a temperature sensor **44** for controlling a temperature of a washing liquid circulating in the circulation circuit 16 and/or in the washing chamber 8. The controller 42 further may be connected to one or more of the inlet valve 28, the first control valve 36, the flow control device 22, the circulation pump 18, and the drain pump 38. Thus, the controller 42 may control a dishwashing operation of the dishwasher 2. A control panel (not shown) may further be connected to the controller 42 for a user of the dishwasher 2 to select e.g. a

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particular type of dishwashing operation or a particular temperature range for a dishwashing operation.

**Fig. 2** illustrates schematically a dishwasher 2 according to embodiments. The dishwasher 2 of these embodiments has several features in common with the embodiments illustrated in connection with Fig. 1. With reference to Fig. 2 the main differences to the Fig. 1 embodiments are discussed in the following.

During dishwashing, washing liquid is circulated in a circulation circuit 16 of the dishwasher 2 by means of a circulation pump 18. The washing liquid may be heated by means of a heating element 40 under the control of a controller 42.

The dishwasher 2 comprises a reservoir 24. The reservoir 24 comprises two tanks 46, 46'. The tanks 46, 46' are arranged adjacent to one of the wall portions 6' forming part of a bottom wall of the washing chamber 8. A thermal insulation material 26 is arranged between the tanks 46, 46' and the wall portion 6'. The tanks 46, 46' and accordingly, the reservoir 24, are thermally insulated from the washing chamber 8. At least one conduit interconnects the tanks 46, 46'. Thus, the tanks 46, 46' are communicating vessels. One of the tanks 46 is connected to water mains via an inlet valve 28 and a water softening device 29. Accordingly, freshwater may be tapped into the tanks 46, 46' from water mains.

A liquid connection 30 is adapted to transfer liquid from the reservoir 24 to the washing chamber 8. A return system 32 is adapted to transfer liquid from the washing chamber 8 to at least one of the tanks 46, 46' of the reservoir 24. The return system 32 comprises a first conduit 34 extending between the sump 14 and the reservoir 24. Thus, the first conduit 34 may be arranged to transfer washing liquid from the washing chamber 8 and its sump 14 to the reservoir 24.

A first control valve 36 is provided in the liquid connection 30. A second control valve 48 is provided in the first conduit 34. A third control valve 50 is provided in the circulation circuit 16. Again, valves and pumps are controlled by the controller 42.

The first and second control valves 36, 48 are closed when freshwater is tapped into the reservoir 24. The first control valve 36 is opened to transfer water from the reservoir 24 to the circulation circuit 16. The second control valve 48 is opened to transfer washing liquid from the washing chamber 8 to the reservoir 24. The first control valve 36 is closed to hold washing liquid in the reservoir 24. The first control valve 36 is opened to transfer washing liquid from the reservoir 24 to the circulation circuit 16. During circulation of the washing liquid in the circulation circuit 16, the third control valve 50 is open and the second control valve 48 is closed. Again, liquid is disposed of from the washing chamber 8 via a drain comprising a drain pump 38 connected to the sump 14.

Accordingly, the dishwasher 2 is adapted to store washing liquid in the reservoir 24. For instance washing liquid from a final washing cycle of a dishwashing operation, i.e. rinsing liquid, may be stored in the reservoir 24. This washing liquid is then used in a first washing cycle of a following dishwashing operation.

**Fig. 3** illustrates a method of operating a dishwasher. The dishwasher may be a dishwasher 2 according to embodiments discussed in connection with Figs. 1 and 2. In particular, the dishwasher comprises a reservoir for freshwater and washing liquid, which reservoir is thermally insulated from a washing chamber of the dishwasher.

The method comprises:  
circulating **60** washing liquid in a circulation circuit of the dishwasher,  
tapping **62** freshwater from water mains into the reservoir, and  
heating **64** a washing liquid circulating in the circulation circuit without a washing liquid temperature being affected by a water temperature of the freshwater in the reservoir.

The method may further comprise:  
transferring **66** washing liquid from the washing chamber to the reservoir, and  
storing **68** the washing liquid in the reservoir. These steps may suitably be performed as last steps of a dishwashing operation, i.e. the washing liquid used during a last rinsing of dishes in the dishwasher is stored in the reservoir. The stored washing liquid may be used as a washing liquid in a first washing cycle of a following dishwashing operation. In this manner water may be save.

The method may further comprise:

transferring **70** washing liquid stored in the reservoir to the washing chamber,  
utilizing **72** transferred washing liquid in a first washing cycle in the dishwasher,  
tapping **74** freshwater from water mains into the reservoir,

5 transferring **76** at least part of the freshwater from the reservoir to the washing chamber,  
and

utilizing **78** the said at least part of the freshwater in a following washing cycle following  
the first washing cycle. A following washing cycle may be a washing cycle immediately  
following the first washing cycle, or it may be a later washing cycle, i.e. one or more  
10 washing cycles may be performed between the first washing cycle and the following  
washing cycle.

The method may further comprise:

repeating **80** tapping freshwater from water mains into the reservoir and transferring the  
15 freshwater from the reservoir to the washing chamber, one or more times, and  
utilizing **82** at least part of the freshwater in one or more further washing cycles.

In this manner the reservoir is rinsed by freshwater between each storing **68** of washing  
liquid in the reservoir. Thus, the reservoir is thoroughly cleaned between each storing **68**  
20 of washing liquid and bacterial growth in the reservoir is prevented or at least reduced. If  
in the alternative, freshwater would not pass the reservoir on its way to the washing  
chamber separate measures might be required for cleaning the reservoir, at least from  
time to time.

25 The different washing cycles performed during a dishwashing operation may be the  
following: The first washing cycle - a pre-rinse of dishes, the second washing cycle - a  
main wash of the dishes, the third washing cycle – a cold rinse of the dishes, and the  
fourth washing cycle – a hot rinse of the dishes. Washing liquid used in two upon each  
other following washing cycles may be the same, or freshwater may be added to in a  
30 second washing cycle of the two washing cycles, or at least part of the washing liquid  
may be exchanged for freshwater in a second washing cycle of the two washing cycles.

Accordingly, a dishwasher 2 according to embodiments discussed in connection with  
Figs. 1 and 2, is:

adapted to transfer washing liquid stored in the reservoir to the washing chamber,  
adapted to utilize transferred washing liquid in a first washing cycle in the dishwasher,  
adapted to tap freshwater from water mains into the reservoir,  
adapted to transfer at least part of the freshwater from the reservoir to the washing  
5 chamber, and  
adapted to utilize the said at least part of the freshwater in a following washing cycle  
following the first washing cycle.

Furthermore, such a dishwasher 2 may be:

10 adapted to repeat tapping freshwater from water mains into the reservoir and transferring  
the freshwater from the reservoir to the washing chamber, one or more times, and  
adapted to utilize at least part of the freshwater in one or more further washing cycles.

Example embodiments described above may be combined as understood by a person  
15 skilled in the art. Although the invention has been described with reference to example  
embodiments, many different alterations, modifications and the like will become apparent  
for those skilled in the art. For instance, in case the reservoir 24 comprises several tanks  
46, 46', these tanks may be arranged adjacent to different wall portions 6, 6' of the  
washing chamber 8, e.g. one tank adjacent to a side wall portion and one tank adjacent  
20 to a bottom wall portion. If required for a particular washing cycle, stored washing liquid  
or stored freshwater transferred from the reservoir 24 to the washing chamber 8 and the  
circulation circuit 16 may be topped of with fresh water from water mains. The controller  
42 may comprise one or more microcontrollers and a memory. The controller 42 may  
comprise one or more controllers adapted to control different parts or processes in the  
25 dishwasher 2.

Alternatively, the method discussed in connection with Fig. 3 may be performed in a  
dishwasher 2 discussed herein, in which dishwasher no particular measures have been  
taken to thermally insulate the reservoir 24 from the washing chamber 8. The reservoir  
30 24 may even be in thermal communication with the washing chamber 8. In the latter  
case the step: heating 64 a washing liquid circulating in the circulation circuit without a  
washing liquid temperature being affected by a water temperature of the freshwater in  
the reservoir, of the method is instead reduced to a corresponding step, namely only:  
heating 64 a washing liquid circulating in the circulation circuit.

Therefore, it is to be understood that the foregoing is illustrative of various example embodiments and the invention is not to be limited to the specific embodiments disclosed and that modifications to the disclosed embodiments, combinations of features  
5 of disclosed embodiments as well as other embodiments are intended to be included within the scope of the appended claims.

As used herein, the term "comprising" or "comprises" is open-ended, and includes one or more stated features, elements, steps, components or functions but does not preclude  
10 the presence or addition of one or more other features, elements, steps, components, functions or groups thereof.

## CLAIMS

1. A dishwasher (2) comprising a washing chamber (8) with a sump (14) and a circulation circuit (16), the circulation circuit (16) comprising the sump (14), a circulation pump (18) and a spraying device (20) for spraying washing liquid into the washing chamber (8), the dishwasher (2) further comprising a reservoir (24) adapted to be connected to water mains, wherein a liquid connection (30) is adapted to transfer liquid from the reservoir (24) to the washing chamber (8), and wherein a return system (32) is adapted to transfer liquid from the washing chamber (8) to the reservoir (24),  
5  
10 **characterized in that** the reservoir (24) is thermally insulated from the washing chamber (8).
2. The dishwasher (2) according to claim 1, wherein the reservoir (24) is arranged adjacent to a wall portion (6, 6') of the washing chamber (8) and a thermal insulation material (26) is arranged between the reservoir (24) and the wall portion (6, 6').  
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3. The dishwasher (2) according to claim 1 or 2, comprising a heating element (40) arranged in thermal communication with the circulation circuit (16).
- 20 4. The dishwasher (2) according to claim 3, comprising a controller (42) for controlling washing parameters of the dishwasher (2), wherein the controller (42) is connected to the heating element (40) and a temperature sensor (44) for controlling a temperature of a washing liquid in the washing chamber (8).
- 25 5. The dishwasher (2) according to any one of the preceding claims, wherein the reservoir (24) comprises two or more tanks (46, 46') arranged adjacent to one or more wall portions (6, 6') of the washing chamber (8).
6. The dishwasher (2) according to any one of the preceding claims, wherein the return system (32) comprises the circulation pump (18).  
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7. The dishwasher (2) according to any one of the preceding claims, wherein the return system (32) comprises a first conduit (34) extending between the sump (14) and the reservoir (24).

8. The dishwasher (2) according to any one of the preceding claims, wherein the dishwasher (2) is adapted to store washing liquid in the reservoir (24).
9. The dishwasher (2) according to claim 8, wherein the dishwasher (2) is: adapted to transfer washing liquid stored in the reservoir (24) to the washing chamber (8), adapted to utilize transferred washing liquid in a first washing cycle in the dishwasher (2), adapted to tap freshwater from water mains into the reservoir (24), adapted to transfer at least part of the freshwater from the reservoir (24) to the washing chamber (8), and adapted to utilize said at least part of the freshwater in a following washing cycle following the first washing cycle.
10. The dishwasher (2) according to claim 9, wherein the dishwasher (2) is: adapted to repeat tapping freshwater from water mains into the reservoir (24) and transferring the freshwater from the reservoir (24) to the washing chamber (8), one or more times, and adapted to utilize the freshwater in one or more further washing cycles.
11. A method of operating a dishwasher, the dishwasher comprising a washing chamber with a sump, and a circulation circuit comprising the sump, a circulation pump, and a spraying device for spraying washing liquid into the washing chamber, a heating element being arranged in thermal communication with the circulation circuit, the dishwasher further comprising a reservoir adapted to be connected to water mains, the reservoir being thermally insulated from the washing chamber, wherein a liquid connection is adapted to transfer liquid from the reservoir to the washing chamber, and wherein a return system is adapted to transfer liquid from the washing chamber to the reservoir, the method comprising:  
circulating (60) washing liquid in the circulation circuit,  
tapping (62) freshwater from water mains into the reservoir, and  
heating (64) the washing liquid circulating in the circulation circuit without a washing liquid temperature being affected by a water temperature of the freshwater in the reservoir.
12. The method according to claim 11, comprising:  
transferring (66) washing liquid from the washing chamber to the reservoir, and  
storing (68) the washing liquid in the reservoir.

13. The method according to claim 12, comprising:

transferring (70) washing liquid stored in the reservoir to the washing chamber,  
utilizing (72) transferred washing liquid in a first washing cycle in the dishwasher,  
tapping (74) freshwater from water mains into the reservoir,

5 transferring (76) at least part of the freshwater from the reservoir to the washing  
chamber, and  
utilizing (78) said at least part of the freshwater in a following washing cycle following  
the first washing cycle.

10 14. The method according to claim 13, comprising:

repeating (80) tapping freshwater from water mains into the reservoir and  
transferring the freshwater from the reservoir to the washing chamber, one or more  
times, and  
utilizing (82) at least part of the freshwater in one or more further washing cycles.

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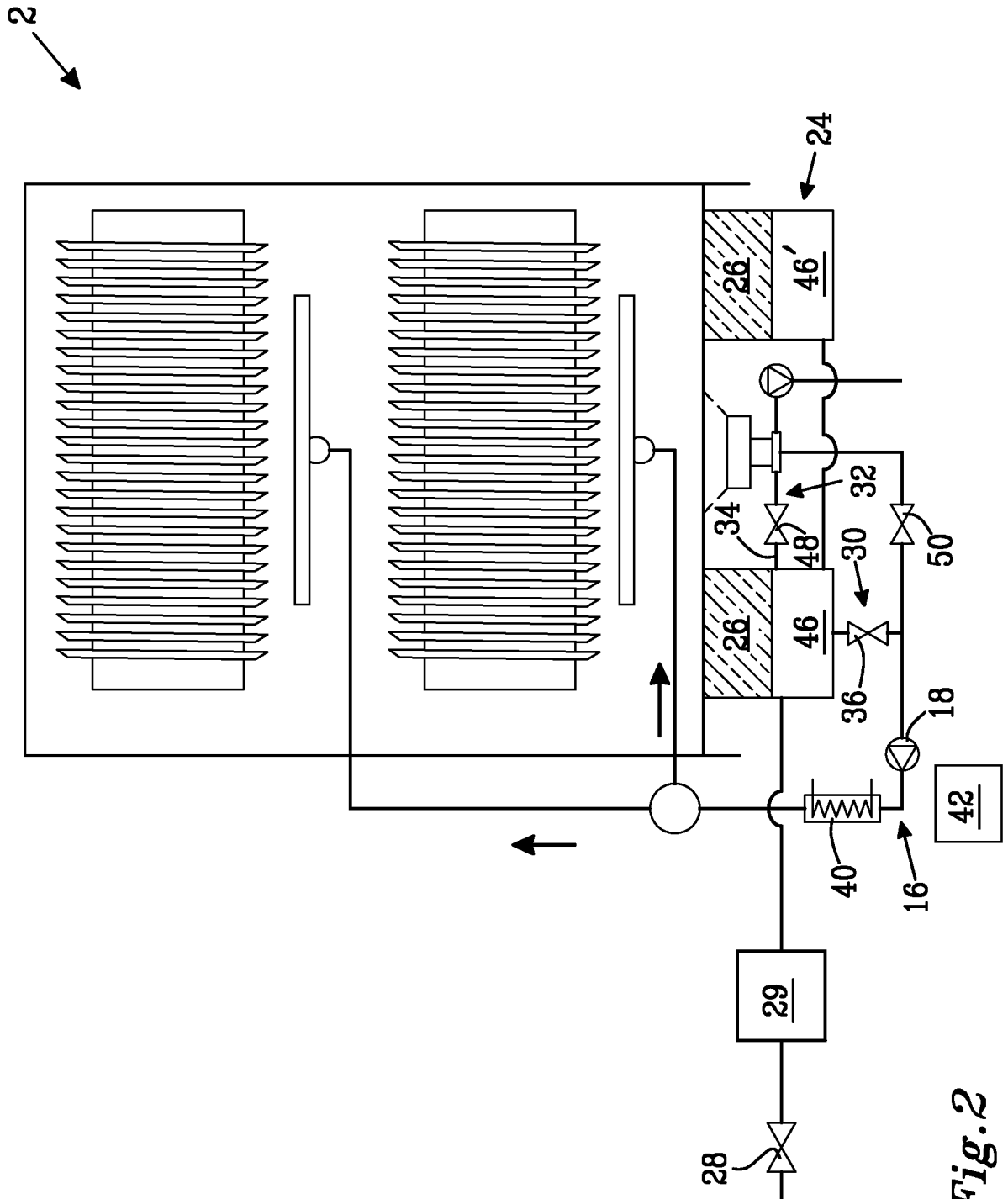
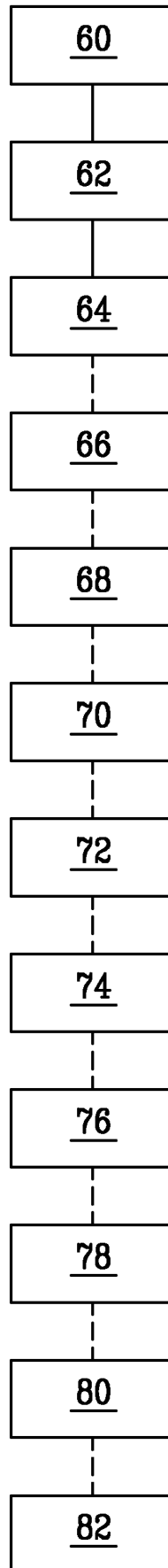


Fig.2



*Fig.3*

INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2012/055885

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A47L15/42 A47L15/00  
ADD.  
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED  
Minimum documentation searched (classification system followed by classification symbols)  
A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2011/155179 A1 (DELLE DANIEL [ES] ET AL) 30 June 2011 (2011-06-30) cited in the application the whole document	1-14
Y	US 2010/229900 A1 (ROSENBAUER MICHAEL [DE]) 16 September 2010 (2010-09-16) the whole document	1-14
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Further documents are listed in the continuation of Box C.

See patent family annex.

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Date of the actual completion of the international search  27 June 2012	Date of mailing of the international search report  04/07/2012
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Jeziarski, Krzysztof
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2012/055885

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2 327 349 A1 (FAGORBRANDT SAS [FR]) 1 June 2011 (2011-06-01) paragraph [0130] - paragraph [0133] -----	1-14

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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