



(51) International Patent Classification:

A47L 15/00 (2006.01) A47L 15/44 (2006.01)

(21) International Application Number:

PCT/US2019/047649

(22) International Filing Date:

22 August 2019 (22.08.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

10 2018 120 879.0

27 August 2018 (27.08.2018) DE

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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(54) Title: DISHWASHER

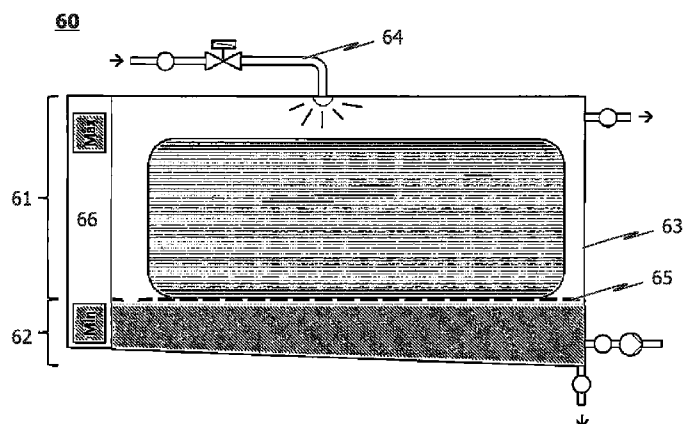


FIG. 3

(57) Abstract: A dishwasher (40, 50), has at least one treatment chamber (41) or at least one treatment zone (51, 52, 53, 54) in which wash liquid and/or final rinse liquid is sprayed as required onto the washware which is to be treated, wherein the wash liquid and/or final rinse liquid includes water containing a cleaning chemical, in particular detergent and/or rinse aid, which is added in a metered manner. The dishwasher (40, 50) further has a cleaning chemical conditioning device (60) for providing the cleaning chemical which is to be added in a metered manner, wherein the cleaning chemical conditioning device (60) is subdivided into a first region (61) for accommodating the cleaning chemical in concentrated form and into a second region (62), which is separated from the first region (61), for temporarily storing ready-to-use liquid cleaning chemical solution.



(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*

DISHWASHER

TECHNICAL FIELD

[0001] The present invention relates to a dishwasher, in particular a commercial dishwasher which is embodied as a box-type dishwasher or conveyor dishwasher, wherein the dishwasher has at least one treatment chamber or at least one treatment zone in which wash liquid and/or final rinse liquid is sprayed as required onto the washware which is to be treated. The wash liquid and/or final rinse liquid is water containing a cleaning chemical, in particular detergent and/or rinse aid, which is added in a metered manner.

[0002] The invention moreover relates to a method for operating such a dishwasher.

BACKGROUND

[0003] Box-type dishwashers within the sense of the present invention are single-tank machines which can be loaded and unloaded manually. Box-type dishwashers can be crockery-basket pass-through machines, also known as hood-type dishwashers, or front loaders. Front loaders can be front-loading under-counter machines, counter-top machines, or free-standing dishwashers.

[0004] A dishwasher embodied as a box-type dishwasher usually has a treatment chamber for cleaning washware. A wash tank, in which liquid can flow back from the treatment chamber due to the force of gravity, is generally arranged below the treatment chamber. Wash liquid, usually water, to which a cleaning chemical (detergent) is added in a metered manner, is situated in the wash tank.

[0005] A dishwasher embodied as a box-type dishwasher generally moreover has a wash system with a wash pump, a hose system connected to the wash pump, and spray nozzles (wash nozzles). The wash liquid situated in the wash tank can be conveyed to the wash nozzles via the hose system and sprayed onto the washware to be cleaned via the wash nozzles in the treatment chamber. The sprayed wash liquid then flows back into the wash tank.

[0006] A dishwasher embodied as a box-type dishwasher usually has a boiler in which liquid can be heated. Final rinse liquid, which is usually water to which a cleaning chemical (rinse aid) is added in a metered manner, is situated in the boiler.

[0007] A dishwasher embodied as a box-type dishwasher generally moreover has a final rinse system with a final rinse pump or a pressurized boiler, a hose system, connected to the final rinse pump or the pressurized boiler, with spray nozzles (final rinse nozzles). The final rinse liquid situated in the boiler can be conveyed to the spray nozzles from the final rinse pump or, by virtue of the hose pressure, via the hose system and sprayed onto the washware to be cleaned via the spray nozzles in the treatment chamber. The final rinse liquid sprayed then flows into the wash tank.

[0008] Conveyor dishwashers within the sense of the present invention are multi-tank machines, in particular belt conveyor dishwashers or basket conveyor dishwashers. Conveyor dishwashers usually find application in the commercial field. In contrast to box-type dishwashers, in which the washware to be cleaned remains stationary in the machine during cleaning, in conveyor dishwashers the washware is transported through different treatment zones of the conveyor dishwasher.

[0009] A conveyor dishwasher usually has at least one pre-wash zone and at least one main wash zone which is arranged, viewed in the direction of transport of the washware, downstream from the pre-wash zone or zones. At least one post-wash zone and at least one final rinse zone, arranged downstream from the post-wash zone or zones, are generally arranged downstream from the main wash zone or zones, viewed in the direction of transport. Viewed in the direction of transport, the washware which is either received directly on the conveyor belt or is held in baskets is usually fed, in the direction of transport, through a feed tunnel, the adjoining pre-wash zone or zones, main wash zone or zones, post-wash zone or zones, final rinse zone or zones, and at least one drying zone into an output section.

[0010] The said wash zones of the conveyor dishwasher are each associated with a wash system which has a wash pump and a hose system (wash hose system) which is connected to the wash pump and via which liquid (wash liquid) is conveyed to the spray nozzles (wash nozzles) of the wash zone. The wash liquid conveyed to the wash nozzles is sprayed

in the respective wash zone onto the washware which is transported by a transporting device of the conveyor dishwasher through the respective wash zones. Each wash tank is associated with a tank (wash tank) in which sprayed wash liquid is held and/or in which wash liquid for the wash nozzles is supplied to the relevant wash zone.

[0011] In the conveyor dishwashers under consideration here, liquid (final rinse liquid) in the form of fresh water in pure form or supplemented by further additives such as, for example, a cleaning chemical (rinse aid), is generally sprayed onto the washware via the spray nozzles (final rinse nozzles) of the final rinse zone. At least some of the sprayed final rinse liquid is transported from zone to zone via a cascade system counter to the direction of transport of the washware.

[0012] The sprayed final rinse liquid is collected in a tank (post-wash tank) of the post-wash zone from which it is conveyed to the spray nozzles (post-wash nozzles) of the post-wash zone via the wash pump of the wash system which is part of the post-wash zone. In the post-wash zone, wash liquid is rinsed from the washware. The liquid which is present hereby flows into the wash tank of the at least one main wash zone which is arranged upstream from the post-wash zone or zones, viewed in the direction of transport of the washware. The liquid is here usually provided with a cleaning chemical (detergent) and is sprayed onto the washware via the spray nozzles (wash nozzles) of the main wash zone by means of a pump system (wash pump) which is part of the wash system of the main wash zone. As long as there are no other main wash zones provided, the liquid then flows from the wash tank of the main wash zone into the pre-wash tank of the pre-wash zone. The liquid in the pre-wash tank is sprayed onto the washware via a pump system which is part of the wash system of the pre-wash zone via the spray nozzles (pre-wash nozzles) of the pre-wash zone in order to remove heavy soiling.

[0013] Irrespective of whether the dishwasher is embodied as a box-type dishwasher or conveyor dishwasher, commercial dishwashers thus usually comprise at least one wash system which has a wash pump which ensures a virtually constant circulation of water over the duration of a washing process in the treatment chamber (in the case of box-type dishwashers) or in the respective treatment zones (in the case of conveyor dishwashers). The respective wash pumps of the wash systems are switched on and off by a control device (machine control system) which is part of the dishwasher.

[0014] Commercial dishwashers of the type under consideration here, which are embodied as a box-type dishwasher, in particular in the form of an under-counter dishwasher, are often used in restaurants, bars, and cafes for rinsing glasses and/or crockery. Commercial under-counter machines are furthermore used in domestic kitchens of nursing homes and care facilities where utensils (pans, pots, cookware, bowls, etc) are often rinsed in addition to glasses and crockery.

[0015] Common to these different fields of use is that the commercial box-type dishwashers, in particular under-counter dishwashers, usually stand on the floor and are installed in a kitchen/bar or stand under a work surface. Moreover, all commercial dishwashers (box-type dishwashers or conveyor dishwashers) are usually supplied in one way or another with cleaning chemical (detergent and/or rinse aid) in order to obtain optimum cleaning and final rinsing results. The different options for supplying the dishwasher with cleaning chemical, and their advantages and disadvantages, are explained briefly below.

[0016] When supplying a dishwasher embodied as a box-type dishwasher, it is thus known, for example, to provide external canisters with liquid cleaning chemical. This is the most commonly encountered process in commercial dishwashers which are embodied as under-counter dishwashers. The external canisters are often provided as a 10-liter container (12 kg). With this approach, the canisters (usually two external canisters, namely a canister for detergent and a canister for rinse aid) must be placed close to the dishwasher, for example on the floor, in a cupboard, or in the kitchen/bar in which the dishwasher itself is integrated because connecting pipes appropriate for conveying the cleaning chemical must be laid from the dishwasher to the external cleaning chemical canister. Usually there is very restricted space in these regions for accommodating the external canisters.

[0017] When the cleaning chemical is used up, the empty canister is replaced with a new canister and the supply pipe is accordingly put into the new canister. In this procedure, it is necessary to wear suitable protective gloves and suitable protective goggles because the cleaning chemical is an alkaline or acid solution and there is a risk that, when they touch components (such as, for example, the supply pipe) which are wet with cleaning chemical, or when the cleaning chemical leaks or sprays out, users come into contact with the latter and are consequently harmed.

[0018] The above-described conventional approach, in which the cleaning chemical required to operate the dishwasher is supplied to the dishwasher via external canisters, in particular has the disadvantage that this approach requires additional space for the external canisters, which space is generally not present in a kitchen/bar, or only to a limited extent. Apart from this, this approach has certain disadvantages with respect to ergonomics, in connection with the handling of the generally very heavy canisters (12 kg).

[0019] Particular safety measures furthermore need to be provided when the external canisters need to be replaced because there is in principle a risk, in particular when changing the canister, that the user of the dishwasher or the person who replaces the external canisters comes into contact with the cleaning chemical. It is consequently unavoidable that a user will need to wear suitable protective gloves and suitable protective goggles at least when replacing the external cleaning chemical canisters.

[0020] As an alternative to the above-described solution in which external canisters are provided to supply the cleaning chemical required for the operation of the dishwasher, it is conceivable to provide integrated containers in the commercial dishwasher, in particular in the commercial under-counter dishwasher. These containers can be refilled, as required, with liquid cleaning chemical from a larger drum, usually a 10-liter canister.

[0021] This approach, in which the cleaning chemical is stored temporarily in the dishwasher in integrated cleaning chemical containers, also has disadvantages because the available space in a commercial under-counter machine is generally very limited such that the capacity of the integrated cleaning chemical containers is or can be necessarily usually just a few liters.

[0022] In this approach, it is consequently necessary for the cleaning chemical containers integrated in the dishwasher to be refilled regularly and relatively often. However, refilling the cleaning chemical containers integrated in the dishwasher is also generally not without problems because the corresponding refilling openings are often relatively small in design such that it is often unavoidable that a corresponding funnel or similar device is used as an aid to refill the cleaning chemical containers integrated in the dishwasher. Here too, i.e. during the refilling process, the operator of the dishwasher must take appropriate protective measures to prevent contact with the cleaning chemical causing damage to his/her health.

[0023] On the other hand, it would in principle be conceivable, as in the case of domestic dishwashers and a commercial dishwasher, in particular commercial under-counter dishwashers, to supply the cleaning chemical (detergent) in the form of detergent tabs or detergent powder before each program cycle of the dishwasher.

[0024] However, this approach which is generally used for household dishwashers cannot really be applied to commercial dishwashers. This is because domestic dishwashers are generally embodied as water-change dishwashers which are based on the principle that a wash cycle is performed usually, for example, once a day. For this, a certain quantity of the detergent (for example, in the form of detergent tabs) is put into the machine by hand before the program starts and is supplied to the washing process at a defined point in time. The detergent concentration is consequently the same for each wash program. In domestic machines, the rinse aid is often supplied separately to the washing process in liquid form via a supply container in the door.

[0025] Commercial dishwashers embodied in particular as under-counter dishwashers are usually not water-change dishwashers. Instead, the commercial dishwasher is filled once at the beginning with fresh water and approximately 30 to 50 rinse cycles are performed per day over the operating time of the dishwasher without all the water being replaced each time. The principle of domestic dishwashers where a certain quantity of detergent (for example, in the form of a detergent tab) is added per rinse program can therefore not really be applied to commercial dishwashers, in particular commercial under-counter dishwashers. On the one hand, it would take considerable effort to put detergent in a commercial dishwasher by hand many times a day, and on the other hand a consistent concentration of detergent could thus not be ensured as the quantity of water which is replaced per rinse program can differ in commercial dishwashers.

[0026] Nevertheless, the use of cleaning chemical tabs has some advantages in terms of safety, ergonomics, and space requirements. However, the capacity is very low and the process of a water-change dishwasher (domestic dishwasher) cannot really be transposed directly to a commercial dishwasher, in particular a commercial under-counter dishwasher, which works without a complete water change.

SUMMARY

[0027] Against the backdrop of these problems, the object of the invention is to develop a commercial dishwasher which is embodied as a box-type dishwasher or conveyor dishwasher such that the cleaning chemical required for the operation of the machine can be supplied to the machine in a particularly efficient but at the same time space-saving manner, wherein it is intended in particular for the ergonomics and the safety of the operator when handling the cleaning chemical to be optimized or improved.

[0028] A corresponding method for operating such a dishwasher is furthermore provided.

[0029] With respect to the dishwasher, the object on which this invention is based is achieved by the subject of independent claim 1, whilst with respect to the method, the object on which the invention is based is achieved by the subject of the subordinate claim 14, wherein advantageous developments of the dishwasher according to the invention and of the method according to the invention are each provided in the dependent claims.

[0030] Accordingly, the invention relates in particular to a dishwasher of the abovementioned type, i.e. in particular to a commercial dishwasher which is embodied as a box-type dishwasher or conveyor dishwasher, wherein the dishwasher has at least one treatment chamber or at least one treatment zone in which wash liquid and/or final rinse liquid is sprayed as required onto the washware which is to be treated. The wash liquid and/or final rinse liquid is water containing a cleaning chemical, in particular detergent and/or rinse aid, which is added in a metered manner.

[0031] To supply the corresponding cleaning chemical to the dishwasher, the dishwasher has a cleaning chemical conditioning device, integrated into the dishwasher, which is subdivided into a first region for accommodating the cleaning chemical in concentrated form and into a second region, which is separated from the first region, for temporarily storing ready-to-use liquid cleaning chemical solution.

[0032] In other words, the solution according to the invention provides a preferably fully-integrated cleaning chemical conditioning device which is designed such that the liquid cleaning chemical solution required for the operation of the dishwasher can be supplied over a long period of time, with the smallest possible space requirements, without there

being a regular need for the operator of the dishwasher to refill the cleaning chemical, whether in concentrated form or ready-to-use form.

[0033] For this purpose, a corresponding cleaning chemical conditioning device is integrated into the dishwasher. In the first region of the cleaning chemical conditioning device, the cleaning chemical is inserted by the operator of the dishwasher in concentrated form, for example in the form of a solid block of cleaning chemical. This is, figuratively speaking, in principle an oversized cleaning chemical tab which, in contrast to domestic dishwashers, serves to supply the cleaning chemical required for the operation of the dishwasher not just for one treatment cycle but for multiple treatment cycles.

[0034] The cleaning chemical conditioning device which is preferably fully integrated into the dishwasher moreover has a second region, which is separated from the first region, in which ready-to-use liquid cleaning chemical solution is temporarily stored. This ready-to-use liquid cleaning chemical solution is then added as required in a metered manner, according to a predetermined treatment program, by the dishwasher to the liquid (wash liquid or final rinse liquid) used during the operation of the dishwasher.

[0035] The advantage of the solution according to the invention, in which a cleaning chemical conditioning device is used to supply the cleaning chemical to be added in a metered manner during the operation of the dishwasher, which device is preferably fully integrated into the dishwasher, is in particular that, in order to supply the cleaning chemical solution, there is no additional space required, compared with the space required for the dishwasher itself.

[0036] The present invention furthermore affords considerable advantages in terms of ergonomics.

[0037] Apart from this, the present invention allows the supply and the addition in a metered manner of the cleaning chemical to be effected solely and exclusively via the control system of the dishwasher such that the optimum quantity of cleaning chemical solution can be determined and added in a metered manner at any point in time. This effectively prevents the washware to be treated in the dishwasher from being over- or under-treated. At the same time, the use of resources (in this case, cleaning chemical) can also be optimized.

[0038] The regions of the cleaning chemical conditioning device, i.e. the first and the second region of the cleaning chemical conditioning device, are placed inside the dishwasher, and moreover they are preferably placed in the lower region of the dishwasher. Alternatively, they can be placed in the door, in the upper or side region of the dishwasher, or another region thereof.

[0039] At least the first region of the cleaning chemical conditioning device can advantageously be accessed from outside for refilling, for example by opening a flap or by pulling it out.

[0040] The ready-to-use liquid cleaning chemical solution is preferably supplied in a completely automated or automatic manner in the second region of the cleaning chemical conditioning device.

[0041] According to advantageous embodiments of the solution according to the invention, it is provided that the second region of the cleaning chemical conditioning device is arranged below the first region and is designed as a supply container for the ready-to-use liquid cleaning chemical solution. A metering system comprising a metering pump is here advantageously associated with the cleaning chemical conditioning device, wherein the intake side of the metering pump is or can be flow-connected to the second region of the cleaning chemical conditioning device for the purpose of preferably automatically adding in a metered manner a quantity, which is defined and/or can be defined per unit time, of cleaning chemical solution, which is temporarily stored in the second region, to the wash liquid and/or final rinse liquid which is to be sprayed in the treatment chamber or the at least one treatment zone of the dishwasher.

[0042] In this connection, it is conceivable that a control device is associated with the dishwasher for activating the metering pump. In particular, this control device is part of an integrated logic in the control system of the dishwasher such that there is no need for an external control system and logic to be used in order to meter the cleaning chemical required during the operation of the dishwasher.

[0043] According to embodiments of the dishwasher according to the invention, the cleaning chemical conditioning device has a sprinkler system by means of which the cleaning chemical which is accommodated in the first region of the cleaning chemical

conditioning device in concentrated form can be wetted as required or continuously preferably automatically and in particular selectively automatically with a liquid solvent, in particular water, by spraying or in some other fashion in such a way that the solvent at least partially solubilizes the cleaning chemical which is accommodated in the first region of the cleaning chemical conditioning device and forms the ready-to-use liquid cleaning chemical solution which is to be temporarily stored in the second region of the cleaning chemical conditioning device.

[0044] In this connection, it is appropriate if a solvent metering system is associated with the sprinkler system for the purpose of adjusting and/or regulating a quantity of solvent which is to be sprayed by means of the sprinkler system per unit time.

[0045] For example, the solvent metering system is designed to preferably automatically adjust the quantity of solvent which is to be sprayed per unit time depending on a selected treatment program according to which washware in the dishwasher is to be treated, and/or depending on a cleaning chemical concentration in the cleaning chemical solution which is temporarily stored in the second region of the cleaning chemical conditioning device, and/or depending on a quantity of the cleaning chemical solution which is temporarily stored in the second region of the cleaning chemical conditioning device.

[0046] In this connection, it is particularly preferred that the second region of the cleaning chemical conditioning device is designed to be spatially, but not hermetically, separated from the first region of the cleaning chemical conditioning device, so that the solvent which is sprayed by means of the sprinkler system in the first region of the cleaning chemical conditioning device can be at least partially transferred to the second region of the cleaning chemical conditioning device preferably due to the force of gravity. This is hereby an arrangement and embodiment of the cleaning chemical conditioning device with the corresponding sprinkler system which can be produced particularly easily but is nonetheless very effective. However, other embodiments can of course also be considered in principle.

[0047] According to advantageous embodiments, an at least partially fluid-permeable separating means is provided in a region between the first and the second region of the cleaning chemical conditioning device, which separating means can preferably be removed

from the cleaning chemical conditioning device, in particular for servicing and/or cleaning purposes.

[0048] As already described, the dishwasher according to the invention has at least one treatment chamber or at least one treatment zone in which washware is treated or can be treated in accordance with an in particular selectable treatment program. In this connection, the dishwasher has a corresponding machine housing in which the at least one treatment chamber or treatment zone and at least the first and preferably also the second region of the cleaning chemical conditioning device are accommodated. The first and preferably also the second region of the cleaning chemical conditioning device are thus preferably accommodated in a lower region of the machine housing and in particular below the at least one treatment chamber or treatment zone of the dishwasher.

[0049] In this connection, it is, for example, conceivable if an in particular closable opening which is accessible from the outside - in respect of the housing - is associated with the first region of the cleaning chemical conditioning device, it being possible for the cleaning chemical in concentrated form, in particular as a drum, to be preferably manually supplied via said opening. The opening which is accessible from the outside and also the cleaning chemical conditioning device are themselves preferably embodied in such a way that an operator of the dishwasher is prevented from coming into contact with the cleaning chemical solution which is temporarily stored in the second region of the cleaning chemical conditioning device.

[0050] According to advantageous embodiments of the cleaning chemical conditioning device, the latter has a housing in which the first and the second region of the cleaning chemical conditioning device are accommodated, wherein a filling level monitoring system is moreover preferably associated with the cleaning chemical conditioning device for the purpose of monitoring a filling level of the cleaning chemical solution in the housing of the cleaning chemical conditioning device. By virtue of providing a corresponding housing in which the regions of the cleaning chemical conditioning device are accommodated, an enclosed design of the cleaning chemical conditioning device in particular is provided which enables a structure and in particular enables the cleaning chemical conditioning device to be integrated in the dishwasher as a modular component. It is consequently

particularly readily possible to replace or exchange the cleaning chemical conditioning device.

[0051] According to embodiments of the last mentioned embodiment, the filling level monitoring system preferably has a floating switch, wherein the solvent metering system which is associated with the sprinkler system is designed to adjust the quantity of solvent which is to be sprayed by means of the sprinkler system in the first region of the cleaning chemical conditioning device in particular per unit time depending on a filling level of the cleaning chemical solution in the housing of the cleaning chemical conditioning device, and in particular depending on a vertical position of the floating switch.

[0052] According to embodiments of the dishwasher according to the invention, a sensor system is associated with the first region of the cleaning chemical conditioning device for the purpose of directly or indirectly detecting a quantity of a cleaning chemical in concentrated form which is accommodated in the first region of the cleaning chemical conditioning device.

[0053] According to embodiments of the dishwasher according to the invention, a circulation device is associated with the cleaning chemical conditioning device for the purpose of circulating, continuously or as required, at least the cleaning chemical solution which is temporarily stored in the second region of the cleaning chemical conditioning device.

[0054] According to advantageous embodiments of the dishwasher according to the invention, the second region of the cleaning chemical conditioning device is designed as a tank, wherein at least one opening by means of which the tank can, as required, be fluidically connected to a drain of the dishwasher and/or to the intake side of a metering pump of a metering system of the dishwasher is provided preferably in a sump region of the second region of the cleaning chemical conditioning device, which second region is designed as a tank.

[0055] The present invention moreover relates to a method for operating a dishwasher, in particular a dishwasher of the abovedescribed type according to the invention, wherein the dishwasher has a storage container containing ready-to-use liquid cleaning chemical solution which is added in a metered manner, as required or continuously, to a liquid which

is to be sprayed as wash liquid and/or final rinse liquid during treatment of washware in the dishwasher, wherein the ready-to-use liquid cleaning chemical solution is preferably automatically prepared in the dishwasher, in particular when the quantity of cleaning chemical solution which is temporarily stored in the storage container has reached and/or fallen below a previously defined or definable minimum, wherein a solvent, in particular water, is brought into contact with a cleaning chemical which is present in concentrated form for the purpose of preparing the ready-to-use cleaning chemical solution.

BRIEF DESCRIPTION OF THE DRAWINGS

[0056] Exemplary embodiments of the present invention are described in detail below with reference to the attached drawings, in which:

[0057] Figure 1 shows, schematically, a dishwasher embodied as a box-type dishwasher, according to an embodiment of the present invention;

[0058] Figure 2 shows, schematically, a dishwasher embodied as a conveyor dishwasher, according to an embodiment of the present invention;

[0059] Figure 3 shows, schematically, an exemplary embodiment of a cleaning chemical conditioning device, as used for example in the dishwashers according to Figure 1 and Figure 2; and

[0060] Figures 4A to 4E show, schematically, an exemplary embodiment of a process sequence for supplying the cleaning chemical required in the operation of the dishwasher according to the invention.

DETAILED DESCRIPTION

[0061] A dishwasher 40 embodied as a box-type dishwasher is shown in Figure 1 in a schematic view in longitudinal section. The dishwasher 40 embodied as a box-type dishwasher has a treatment chamber 41 for the purpose of cleaning and rinsing washware (not shown in Figure 1). A tank 14-4, in which liquid can flow from the treatment chamber 41 due to the force of gravity, is arranged below the treatment chamber 41. The tank 14-4 can be covered at the transition to the treatment chamber 41 with the aid of a filter (not shown in Figure 1).

[0062] A liquid, which is usually water, is situated in the tank 14-4 and to which cleaning chemical (detergent and/or rinse aid) can be supplied automatically in a controlled manner from a cleaning chemical metering device (not shown in Figure 1). The liquid can be conveyed to spray nozzles (wash nozzles 13-7) from a wash pump 11-5 which is part of a wash system 10-4 of the dishwasher 40 via a hose system 12-5 and can be sprayed onto the washware which is to be cleaned through these wash nozzles 13-7 in the treatment chamber 41. The sprayed liquid then flows back into the tank 14-4. An outlet 42 with a drain pump 43 can be connected to the lower end of the tank 14-4 in order to empty the tank 14-4 as required.

[0063] The dishwasher 40 embodied as a box-type dishwasher moreover has a control device 20. This control device 20 serves (inter alia) to appropriately activate the wash pump 11-5 of the wash system 10-4 during the operation of the dishwasher in order to supply liquid at least periodically to the wash nozzles 13-7 via the hose system 12-5. The control device 20 moreover serves to activate the cleaning chemical metering device or devices.

[0064] The dishwasher according to Figure 1 embodied as a box-type dishwasher, and also the conveyor dishwasher shown schematically in Figure 2, has a corresponding cleaning chemical conditioning device 60 in order to supply the cleaning chemical which is to be added in a metered manner during the operation of the dishwasher 40, 50.

[0065] From a functional point of view, the cleaning chemical conditioning device 60 provided for the dishwasher 40 according to Figure 1 embodied as a box-type dishwasher has an identical design to the cleaning chemical conditioning device 60 which is used in the conveyor dishwasher 50 according to Figure 2. Consequently, in this regard reference is made to the view in Figure 3 in which an exemplary embodiment of the cleaning chemical conditioning device 60 according to the invention is shown schematically.

[0066] An example of a conveyor dishwasher 50 is shown in Figure 2 in a schematic view in longitudinal section. The conveyor dishwasher 50 according to the view in Figure 2 has a prewash zone 51 and a main wash zone 52 which is arranged downstream from the prewash zone 51, viewed in the direction T of transport of the washware (not shown in Figure 2). In the conveyor dishwasher 50 shown in Figure 2, a post-wash zone 53 and a

final rinse zone 54, connected downstream from the post-wash zone 53, are arranged downstream from the main wash zone 52, viewed in the direction T of transport. Viewed in the direction T of transport, the washware which is either accommodated directly on the conveyor belt 58 or held in baskets passes in the direction T of transport through an inlet tunnel 55, the adjoining pre-wash zone 51, the main wash zone 52, the post-wash zone 53, the final rinse zone 54, and through a drying zone 56 into an outlet section 57.

[0067] Spray nozzles 13-1, 13-2, 13-3, 13-4, by means of which liquid is sprayed onto the washware which is transported by the conveyor belt 58 through the respective treatment zones 51, 52, 53, 54, are in each case associated with the said treatment zones 51, 52, 53, 54 of the conveyor dishwasher 50. A tank (wash tank 14-1, 14-2, 14-3) in which sprayed liquid is accommodated and/or in which liquid is supplied for the spray nozzles 13-1, 13-2, 13-3 of the relevant zones 51, 52, 53 is associated with at least each wash zone (pre-wash zone 51, main wash zone 52, post-wash zone 53).

[0068] The pre-wash zone 51, main wash zone 52, and the post-wash zone 53 of the conveyor dishwasher 50 according to the embodiment shown in Figure 2 each have a wash system 10-1, 10-2, 10-3. Each wash system 10-1, 10-2, 10-3 consists of a wash pump 11-1, 11-2, 11-3, a hose system 12-1, 12-2, 12-3 connected to the wash pump and the spray nozzles 13-1, 13-2, 13-3 connected to the hose system 12-1, 12-2, 12-3.

[0069] A control device 20 is furthermore provided which (inter alia) serves to appropriately activate the respective wash pumps 11-1, 11-2, 11-3 of the wash systems 10-1, 10-2, 10-3 during a washing process in order to supply liquid at least periodically, via the associated hose system 12-1, 12-2, 12-3, to the spray nozzles 13-1, 13-2, 13-3 of the nozzle system associated with the respective wash system 10-1, 10-2, 10-3.

[0070] In detail, in the conveyor dishwasher 50 shown in Figure 2, final rinse liquid in the form of fresh water which can be supplemented by other additives such as, for example, cleaning chemical (rinse aid) is sprayed by means of the spray nozzles 13-4, arranged above and below the conveyor belt 58, of the final rinse zone 54 onto the washware shown in Figure 2. As shown in Figure 2, laterally arranged spray nozzles 13-5 are also provided in the final rinse zone 54.

[0071] A portion of the sprayed final rinse liquid is transported from zone to zone by means of a cascade system counter to the direction T of transport of the washware. The remainder is conducted via a valve 59 and a bypass hose 70 directly into the pre-wash tank 14-1.

[0072] The sprayed final rinse liquid is collected in the tank (post-wash tank 14-3) of the post-wash zone 53, from which it is conveyed by means of the wash pump 11-3 which is part of the wash system 10-3 of the post-wash zone 53 to the spray nozzles 13-3 (post-wash nozzles) of the post-wash zone 53. Wash liquid is rinsed from the washware in the post-wash zone 53. The liquid which is present hereby flows into the wash tank 14-2 of the main wash zone 52, is usually provided with cleaning chemical (detergent), and is sprayed onto the washware with the aid of a wash pump 11-2 which is part of the wash system 10-2 of the main wash zone 52 by means of the spray nozzles 13-2 (wash nozzles) of the wash system 10-2 which is part of the main wash zone 52.

[0073] The liquid then flows from the wash tank 14-2 of the main wash zone 52 into the pre-wash tank 14-1 of the pre-wash zone 51. The liquid in the pre-wash tank 14-1 is sprayed onto the washware by means of a wash pump 11-1 which is part of the wash system 10-1 of the pre-wash zone 51 by means of the spray nozzles 13-1 (pre-wash nozzles) of the wash system 10-1 which is part of the pre-wash zone 51 in order to remove heavy soiling from the washware.

[0074] The cleaning chemical conditioning device 60 is preferably accommodated in a lower region of the machine housing of the dishwasher 40, 50 and in particular below the at least one treatment chamber or treatment zone of the dishwasher 40, 50.

[0075] It is furthermore advantageous if an in particular closable opening, which can be accessed from outside, with respect to the machine housing of the dishwasher 40, 50, and via which the cleaning chemical can be supplied preferably manually in concentrated form in particular as a drum is associated with the cleaning chemical conditioning device 60. The opening which can be accessed from the outside in the machine housing, and the cleaning chemical conditioning device 60 itself, are preferably designed in such a way that contact by an operator of the dishwasher 40, 50 with the cleaning chemical solution which

is stored temporarily in the second region 62 of the cleaning chemical conditioning device 60 is prevented.

[0076] A corresponding metering appliance with an integrated logic can be used for the purpose of adding in a metered manner the chemical cleaning solution supplied from the cleaning chemical conditioning device 60 into the liquid which is to be sprayed in the treatment chamber and treatment zone of the dishwasher 40, 50. It is, however, advantageous if the control device 20 of the dishwasher 40, 50 itself is designed to activate appropriately a corresponding metering pump in order to add in a metered manner the quantity of cleaning chemical solution which is actually required to the liquid which is to be sprayed in the dishwasher 40, 50. In other words, it is in particular advantageous to relocate the logic which is usually integrated into the metering appliances in the control device 20 of the dishwasher 40, 50 such that conventional metering pumps can be used for the purpose of metering cleaning chemicals which have no control system and logic.

[0077] This not only affords a considerable cost advantage for the metering pumps but also further optimizes the addition in a metered manner of the cleaning chemical to the liquid which is to be sprayed in the dishwasher 40, 50. In detail, with this embodiment it is possible to effectively prevent that, in particular when the dishwasher 40, 50 starts up, a layer of liquid in the corresponding wash tank causes too much or too little cleaning chemical to be added in a metered manner. Instead, the cleaning chemical is added in a metered manner solely and exclusively by means of the control device 20 of the dishwasher 40, 50 so that the optimum quantity of cleaning chemical is determined at each point in time and the liquid which is to be sprayed in the dishwasher 40, 50 can be added in a metered manner. This effectively prevents the washware which is to be treated in the dishwasher 40, 50 from being over- or under-treated. The use of resources (in this case, in particular cleaning chemical) can at the same time also be optimized.

[0078] According to a development of the conveyor dishwasher 50 according to the invention, it is provided that a sensor system is moreover provided for the purpose of detecting a cleaning chemical concentration in the liquid which is to be sprayed in the at least one treatment zone of the conveyor dishwasher 50. The control device 20 associated with the conveyor dishwasher 50 is here in particular designed to activate accordingly a

metering pump of a cleaning chemical metering device of the conveyor dishwasher 50 depending on the detected cleaning chemical concentration.

[0079] In other words, in contrast to conventional solutions known from the prior art in which the conveyor dishwashers are not fitted with a metering pump and the metering pump in the form of a metering appliance with integrated logic is retrofitted, according to this development it is provided that the sensor system associated with the conveyor dishwasher 50 can detect the cleaning chemical concentration in particular in real time and in particular detects the quantity of cleaning chemical which is actually added in a metered manner per unit time to the liquid which is to be sprayed in the treatment zone of the conveyor dishwasher 50, and activates the metering pump accordingly.

[0080] In one conceivable embodiment of the abovementioned dishwasher 40, 50, it is in particular provided that the control device 20 associated with the dishwasher 40, 50 is designed to adjust at least some of the parameters which characterize the treatment of washware in the at least one treatment chamber and treatment zone of the dishwasher 40, 50. This at least one parameter which characterizes the treatment of washware in the at least one treatment chamber/treatment zone is, for example, a quantity of liquid which is to be sprayed per unit time in the treatment chamber/treatment zone, and/or is the temperature of the liquid which is to be sprayed there.

[0081] The cleaning chemical conditioning device 60 is in particular a cleaning chemical conditioning device 60 which is fully integrated into the dishwasher 40, 50 and is designed as a system which is enclosed overall. The cleaning chemical conditioning device 60 has a first region 61 and a second region 62, separated therefrom, wherein the two regions 61, 62 of the cleaning chemical conditioning device 60 are accommodated in a housing 63 of this cleaning chemical conditioning device 60. The housing 63 preferably has an enclosed design.

[0082] The first region 61 of the cleaning chemical conditioning device 60 serves to accommodate the cleaning chemical in concentrated form. The latter is hereby, for example, a water-soluble solid chemical block which is or can be inserted into the first region of the cleaning chemical conditioning device 60. It would, however, in theory also be con-

ceivable for a cartridge with a high dose of cleaning chemical liquid to be inserted into the first region of the cleaning chemical conditioning device 60.

[0083] The second region 62, which serves for the purpose of temporarily storing ready-to-use liquid cleaning chemical solution is provided below the first region 61 of the cleaning chemical conditioning device 60. The second region 62 of the cleaning chemical conditioning device 60 is designed in particular as a supply container for the ready-to-use liquid cleaning chemical solution.

[0084] A metering system with a metering pump is associated with the cleaning chemical conditioning device 60, wherein the intake side is or can be flow-connected to the second region 62 of the cleaning chemical conditioning device 60 in order to add in a metered manner, preferably automatically, a quantity, which is or can be fixed per unit time, of cleaning chemical solution stored temporarily in the second region 62 to the wash and/or final rinse liquid which is to be sprayed in the treatment chamber or in the at least one treatment zone of the dishwasher 40, 50. The metering pump of the metering system is here advantageously activated by means of the control unit 20 of the dishwasher 40, 50.

[0085] The cleaning chemical conditioning device 60 has a sprinkler system 64 by means of which the cleaning chemical accommodated in the first region 61 of the cleaning chemical conditioning device 60 can be wetted as required or continuously preferably automatically and in particular selectively automatically with a liquid solvent, in particular water, by spraying or in some other fashion in such a way that the solvent (water) at least partially solubilizes the cleaning chemical which is accommodated in the first region 61 of the cleaning chemical conditioning device 60 and forms the ready-to-use liquid cleaning chemical solution which is temporarily stored in the second region 62 of the cleaning chemical conditioning device 60.

[0086] A solvent metering system, which is preferably appropriately activated by means of the control device 20 of the dishwasher 40, 50, is associated with the sprinkler system 64 in order to adjust and/or regulate a quantity of solvent (water) which is to be sprayed by means of the sprinkler system 64 per unit time.

[0087] It is hereby advantageous if the solvent metering system is designed to preferably automatically adjust the quantity of solvent (water) which is to be sprayed per unit time

depending on a selected treatment program according to which washware in the dishwasher 40, 50 is to be treated, and/or depending on a cleaning chemical concentration in the cleaning chemical solution which is temporarily stored in the second region 62 of the cleaning chemical conditioning device 60, and/or depending on a quantity of the cleaning chemical solution which is temporarily stored in the second region 62 of the cleaning chemical conditioning device 60.

[0088] As is shown schematically in Figure 3, the second region 62 of the cleaning chemical conditioning device 60 is designed to be spatially, but not hermetically, separated from the first region 61 of the cleaning chemical conditioning device 60, so that the solvent (water) which is sprayed by means of the sprinkler system 64 in the first region 61 of the cleaning chemical conditioning device 60 can be at least partially transferred to the second region 62 of the cleaning chemical conditioning device 60 preferably due to the force of gravity.

[0089] In the embodiment of the cleaning chemical conditioning device 60 shown schematically in Figure 3, an at least partially fluid-permeable separating means 65 is provided between the first and the second region 61, 62 of the cleaning chemical conditioning device 60, which separating means can preferably be removed from the cleaning chemical conditioning device 60, in particular for servicing and/or cleaning purposes.

[0090] Although not shown explicitly in Figure 3, an in particular closable opening, which can be accessed from outside, with respect to the machine housing of the dishwasher 40, 50, and via which the cleaning chemical can be supplied preferably manually in concentrated form in particular as a drum is associated with the first region 61 of the cleaning chemical conditioning device 60. The opening which can be accessed from the outside, and the cleaning chemical conditioning device 60 itself, should here be designed in such a way that contact by an operator of the dishwasher 40, 50 with the cleaning chemical solution which is stored temporarily in the second region 62 of the cleaning chemical conditioning device 60 is prevented.

[0091] As already indicated, the cleaning chemical conditioning device 60 according to the embodiment shown schematically in Figure 3 has an enclosed design and has a housing 63 in which the first and second region 61, 62 of the cleaning chemical conditioning device

60 are accommodated. A filling level monitoring system 66 is moreover associated with the cleaning chemical conditioning device 60 for the purpose of monitoring a filling level of the cleaning chemical solution in the housing 63 of the cleaning chemical conditioning device 60.

[0092] As is shown schematically in Figure 3, it is conceivable in this connection if the filling level monitoring system 66 preferably has a floating switch, wherein the solvent metering system which is associated with the sprinkler system 64 is designed to adjust the quantity of solvent (water) which is to be sprayed by means of the sprinkler system 64 in the first region 61 of the cleaning chemical conditioning device 63 per unit time depending on a filling level of the cleaning chemical solution in the housing 63 of the cleaning chemical conditioning device 60, and in particular depending on a vertical position of the floating switch.

[0093] Although not shown explicitly in Figure 3, it is advantageous if a sensor system, for example a weighing sensor, is associated with the first region 61 of the cleaning chemical conditioning device 60 for the purpose of directly or indirectly detecting a quantity of a cleaning chemical in concentrated form which is accommodated in the first region 61 of the cleaning chemical conditioning device 60.

[0094] It is in principle advantageous if a circulation device is associated with the cleaning chemical conditioning device 60 for the purpose of circulating, continuously or as required, at least the cleaning chemical solution which is temporarily stored in the second region 62 of the cleaning chemical conditioning device 60.

[0095] The second region 62 of the cleaning chemical conditioning device 60 is designed in particular as a tank, wherein at least one opening by means of which the tank can, as required, be fluidically connected to a drain of the dishwasher 40, 50 and/or to the intake side of a metering pump of a metering system of the dishwasher 40, 50, is provided in a sump region of the second region 62 of the cleaning chemical conditioning device 60, which second region is designed as a tank.

[0096] The cleaning chemical conditioning device 60 designed as an enclosed container is placed (fully integrated) inside the dishwasher 40, 50. In particular, the cleaning chemical conditioning device 60 is preferably placed in the lower region of the dishwasher 40,

50, wherein it is, however, in principle also conceivable to provide the cleaning chemical conditioning device 60 at a different point/at a different region of the dishwasher 40, 50. In particular, the first region of the cleaning chemical conditioning device 60 is preferably accessible from a front side of the dishwasher 40, 50 for the purpose of refilling.

[0097] In this connection, it is conceivable for a corresponding door or other opening to be associated with the first region 61 of the cleaning chemical conditioning device 60.

[0098] As an alternative, it is, however, also conceivable if the first region can be pulled out, in the manner of a tray, from the cleaning chemical conditioning device 60 in order to fill the first region 61 with the cleaning chemical in concentrated form.

[0099] Apart from refilling the cleaning chemical in concentrated form in the first region 61 of the cleaning chemical conditioning device 60, all other process steps take place preferably completely automatically inside the dishwasher 40, 50. Included therein are, inter alia, possible necessary further processing of the cleaning chemical in concentrated form or of the cleaning chemical solution temporarily stored in the second region 62 of the cleaning chemical conditioning device 60, monitoring the filling level (including a prompt to refill the cleaning chemical in concentrated form in the first region 61 of the cleaning chemical conditioning device 60), metering solvent (water) via the sprinkler system 64, and metering ready-to-use cleaning chemical solution into the liquid (wash and/or final rinse liquid) which is to be sprayed in the dishwasher 40, 50.

[0100] As an alternative, solvent (water) can, for example, be added selectively manually by the operator of the dishwasher 40, 50 and the filling level in the cleaning chemical conditioning device 60 can be checked manually.

[0101] The cleaning chemical in concentrated form which is to be accommodated in the first region 61 is preferably in the form of a solid block. The latter can be produced, for example, by compression or molding. Alternatively, the cleaning chemical in concentrated form can also be a powder, gel, or liquid.

[0102] In order to completely protect the operator of the dishwasher 40, 50 from contact with the cleaning chemical, the cleaning chemical in concentrated form is preferably placed, including its packaging, in the first region 61 of the cleaning chemical conditioning

device 60. The use of a solid block of cleaning chemical which is packaged in a water-soluble film is preferred here. Alternatively, no packaging is, however, also possible if the cleaning chemical in concentrated form used allows it, without representing any risk for the operator of the dishwasher 40, 50.

[0103] The cleaning chemical in concentrated form is placed in the first region 61 of the cleaning chemical conditioning device 60 by the operator of the dishwasher 40, 50 such that the cleaning chemical in concentrated form is stored in the first region 61 of the cleaning chemical conditioning device 60. The ready-to-use liquid cleaning chemical solution is stored in the second region 62 of the cleaning chemical conditioning device 60.

[0104] A perforated or open separating means 65, which spatially separates the first and second region 62 from each other and retains larger (as yet undissolved) constituents of the cleaning chemical in concentrated form until they have dissolved further, is provided between the first region 61 and the second region 62 of the cleaning chemical conditioning device 60.

[0105] Whilst the dishwasher 40, 50 is being refilled by an operator, the filling level of the ready-to-use liquid cleaning chemical solution is below this separating means 65 in order to exclude the possibility of contact by the operator with liquid cleaning chemical solution. At other times, the ready-to-use liquid cleaning chemical solution can also be above the separating means 65. It is intended that it is even at certain times above the separating means in order to ensure that dissolving takes place by contact between the solvent or the liquid cleaning chemical solution and the cleaning chemical in concentrated form, in particular in the form of a solid block.

[0106] A solvent (in particular water) is automatically added by means of the sprinkler system 64 as a dissolving medium for the cleaning chemical block stored in the first region 61 of the cleaning chemical conditioning device 60. The solvent is preferably supplied via a corresponding activatable valve and the solvent is distributed via at least one nozzle. By virtue of the solvent being distributed widely via a nozzle, cleaning chemical is at the same time rinsed off the inner walls of the housing of the cleaning chemical conditioning device 60.

[0107] The sprinkler system 64 is appropriately activated by means of the filling level monitoring system 66 designed, for example, as a floating switch when an excessively low filling level of liquid cleaning chemical solution is detected.

[0108] The filling level monitoring system 66 furthermore serves as a protective device against the cleaning chemical conditioning device 60 designed as a container overflowing. If a maximum filling level is detected in the container of the cleaning chemical conditioning device 60, further supply of solvent via the sprinkler system 64 is preferably automatically prevented.

[0109] As indicated schematically in Figure 3, in the second region 62, designed as a tank, of the cleaning chemical conditioning device 60 a connection is provided via which the ready-to-use liquid cleaning chemical solution can be conveyed from the second region 62 of the cleaning chemical conditioning device 60 with the aid of a metering pump. The opening preferably has a corresponding filter in order to protect the metering pump from solid particles.

[0110] Furthermore, an overflow which serves as an additional safety device is provided in the first region 61 of the cleaning chemical conditioning device 60 to prevent overflowing of the cleaning chemical conditioning device 60 designed as an enclosed container in the event of a fault.

[0111] A drain which can be opened manually in order to empty as required the second region 62 and the cleaning chemical conditioning device 60, for example for the purpose of cleaning or rinsing the cleaning chemical conditioning device 60, is preferably provided at the lowest point of the second region, designed as a tank, of the cleaning chemical conditioning device 60.

[0112] Although not shown in Figure 3, it is advantageous if the opening or door associated with the first region 61 of the cleaning chemical conditioning device 60 is provided with a monitoring system in order to be able to establish whether the refilling opening for the cleaning chemical in concentrated form is closed in the first region 61 of the cleaning chemical conditioning device 60 because only then can solvent be sprayed via the sprinkler system 64. The monitoring system can, for example, have a reed switch or the like.

[0113] A preferred process sequence is described below with reference to the views in Figures 4A to 4E.

[0114] If the supply of ready-to-use cleaning chemical solution declines, a corresponding notification is preferably output automatically by means of the machine display of the dishwasher 40, 50, prompting the operator to refill the dishwasher 40, 50.

[0115] The first region of the cleaning chemical conditioning device 60 can be accessed by opening the refilling opening of the first region 61 of the cleaning chemical conditioning device 60 and the operator of dishwasher 40, 50 can insert a new block of cleaning chemical. The block is preferably packaged in water-soluble film so that there is no need to remove it from its packaging and likewise no need to wear protective gloves and protective goggles.

[0116] The filling level of the ready-to-use liquid cleaning chemical solution is moreover below the separating means 65 at this time so that there is no risk of coming into contact with the ready-to-use liquid cleaning chemical solution which is still situated in the second region 62 of the cleaning chemical conditioning device 60 as a buffer.

[0117] After the refilling opening has been closed in the first region 61 of the cleaning chemical conditioning device 60 and the refilling process has been confirmed on the machine display, and after it has been detected that the refilling opening has been closed correctly, the automatic process steps inside the dishwasher 40, 50 are started.

[0118] The initial state of the automatic process steps inside the dishwasher 40, 50 is shown in Figure 4A. In detail, in the state shown, the filling level of the ready-to-use cleaning chemical solution is relatively low and in particular below the separating means 65. Furthermore, a new solid block of cleaning chemical is present in the first region 61 of the cleaning chemical conditioning device 60.

[0119] In a first step according to Figure 4B, a defined quantity of solvent (water) is sprayed via the sprinkler system 64 onto the cleaning chemical in concentrated form accommodated in the first region 61 of the cleaning chemical conditioning device 60.

[0120] As shown in Figure 4C, the solid block of cleaning chemical is dissolved at least partially owing to the solvent added via the sprinkler system 64. It is in particular ensured

thereby that the ready-to-use cleaning chemical solution is present in preferably saturated form at least in the second region 62 of the cleaning chemical conditioning device 60.

[0121] As indicated in Figure 4D, so much ready-to-use liquid cleaning chemical solution has been delivered from the second region 62 of the cleaning chemical conditioning device 60 by means of the metering pump that the floating switch sends a corresponding signal to the control device 20 of the dishwasher 40, 50, in other words that the minimum filling level has been reached.

[0122] The process is then repeated from the first step (Figure 4B). This means that a defined quantity of solvent (water) is sprayed via the sprinkler system 64 onto the block of cleaning chemical in the first region 61 of the cleaning chemical conditioning device 60.

[0123] As indicated in Figure 4E, the second step is then repeated, according to which the block of cleaning chemical in the first region 61 of the cleaning chemical conditioning device 60 is dissolved.

[0124] The third step then takes place, or the first, second, and third step are repeated until the block of cleaning chemical in concentrated form which is originally accommodated in the first region 61 of the cleaning chemical conditioning device 60 has been used up.

[0125] If the ready-to-use cleaning chemical solution which is temporarily stored in the second region 62 of the cleaning chemical conditioning device 60 has reached a level which is below the separating means 65, a corresponding notification is shown on the machine display for the operator of the dishwasher 40, 50 that a new block of cleaning chemical needs to be inserted into the first region 61 of the cleaning chemical conditioning device 60.

[0126] The sequence then begins all over again.

[0127] The invention is not limited to the embodiment shown in the drawings and instead is a combination of all the features disclosed therein.

CLAIMS

1. Dishwasher (40, 50), in particular commercial dishwasher which is embodied as a box-type dishwasher or conveyor dishwasher, wherein the dishwasher (40, 50) has at least one treatment chamber (41) or at least one treatment zone (51, 52, 53, 54) in which wash liquid and/or final rinse liquid is sprayed as required onto the washware which is to be treated, wherein the wash liquid and/or final rinse liquid comprises water containing a cleaning chemical, in particular detergent and/or rinse aid, which is added in a metered manner, wherein the dishwasher (40, 50) has a cleaning chemical conditioning device (60) for providing the cleaning chemical which is to be added in a metered manner, wherein the cleaning chemical conditioning device (60) is subdivided into a first region (61) for accommodating the cleaning chemical in concentrated form and into a second region (62), which is separated from the first region (61), for temporarily storing ready-to-use liquid cleaning chemical solution.

2. Dishwasher (40, 50) according to Claim 1, wherein the second region (62) of the cleaning chemical conditioning device (60) is arranged below the first region (61) and is designed as a supply container for the ready-to-use liquid cleaning chemical solution, wherein a metering system comprising a metering pump is associated with the cleaning chemical conditioning device (60), wherein the intake side of the metering pump is or can be flow-connected to the second region (62) of the cleaning chemical conditioning device (60) for the purpose of preferably automatically adding in a metered manner a quantity, which is defined and/or can be defined per unit time in particular, of cleaning chemical solution, which is temporarily stored in the second region (62), to the wash liquid and/or final rinse liquid which is to be sprayed.

3. Dishwasher (40, 50) according to Claim 1 or 2, wherein the cleaning chemical conditioning device (60) has a sprinkler system (64) by means of which the cleaning chemical which is accommodated in the first region (61) of the cleaning chemical conditioning device (60) in concentrated form can be wetted as required or continuously preferably automatically and in particular selectively automatically with a liquid solvent, in particular water, by spraying or in some

other fashion in such a way that the solvent at least partially solubilizes the cleaning chemical which is accommodated in the first region (61) of the cleaning chemical conditioning device (60) and forms the usable liquid cleaning chemical solution which is to be temporarily stored in the second region (62) of the cleaning chemical conditioning device (60).

4. Dishwasher (40, 50) according to Claim 3, wherein a solvent metering system is associated with the sprinkler system (64) for the purpose of adjusting and/or regulating a quantity of solvent which is to be sprayed by means of the sprinkler system (64) per unit time.

5. Dishwasher (40, 50) according to Claim 4, wherein the solvent metering system is designed to preferably automatically adjust the quantity of solvent which is to be sprayed per unit time depending on a selected treatment program according to which washware in the dishwasher (40, 50) is to be treated, and/or depending on a cleaning chemical concentration in the cleaning chemical solution which is temporarily stored in the second region (62) of the cleaning chemical conditioning device (60), and/or depending on a quantity of the cleaning chemical solution which is temporarily stored in the second region (62) of the cleaning chemical conditioning device (60).

6. Dishwasher (40, 50) according to one of Claims 3 to 5, wherein the second region (62) of the cleaning chemical conditioning device (60) is designed to be spatially, but not hermetically, separated from the first region (61) of the cleaning chemical conditioning device (60), so that the solvent which is sprayed by means of the sprinkler system (64) in the first region (61) of the cleaning chemical conditioning device (60) can be at least partially transferred to the second region (62) of the cleaning chemical conditioning device (60) preferably due to the force of gravity.

7. Dishwasher (40, 50) according to one of Claims 1 to 6, wherein an at least partially fluid-permeable separating means (65) is provided in a region between the first and the second region (62) of the cleaning chemical conditioning device (60), which separating means can preferably be removed from the cleaning

chemical conditioning device (60), in particular for servicing and/or cleaning purposes.

8. Dishwasher (40, 50) according to one of Claims 1 to 7, wherein the dishwasher (40, 50) has at least one treatment chamber (41) or at least one treatment zone (51, 52, 53, 54) in which washware is treated or can be treated in accordance with an in particular selectable treatment program, and wherein the dishwasher (40, 50) has a machine housing in which the at least one treatment chamber (41) or treatment zone (51, 52, 53, 54) and at least the first and preferably also the second region (62) of the cleaning chemical conditioning device (60) are accommodated, wherein the first and preferably also the second region (61, 62) of the cleaning chemical conditioning device (60) are preferably accommodated in a lower region of the machine housing and in particular below the at least one treatment chamber (41) or treatment zone (51, 52, 53, 54) of the dishwasher (40, 50).

9. Dishwasher (40, 50) according to Claim 8, wherein an in particular closable opening which is accessible from the outside - in respect of the machine housing - is associated with the first region (61) of the cleaning chemical conditioning device (60), it being possible for the cleaning chemical in concentrated form, in particular as a bundle, to be preferably manually supplied via said opening, wherein the opening which is accessible from the outside and also the cleaning chemical conditioning device (60) are themselves preferably embodied in such a way that an operator of the dishwasher (40, 50) is prevented from coming into contact with the cleaning chemical solution which is temporarily stored in the second region (62) of the cleaning chemical conditioning device (60).

10. Dishwasher (40, 50) according to one of Claims 1 to 9, wherein the cleaning chemical conditioning device (60) has a housing (63) in which the first and the second region (62) of the cleaning chemical conditioning device (60) are accommodated, and wherein a filling level monitoring system (66) is associated with the cleaning chemical conditioning device (60) for the purpose of monitoring a filling level of the cleaning chemical solution in the housing (63) of the cleaning chemical conditioning device (60), wherein the filling level monitoring system

(66) preferably has a floating switch, and wherein the solvent metering system which is associated with the sprinkler system (64) is preferably designed to adjust the quantity of solvent which is to be sprayed by means of the sprinkler system (64) in the first region (61) of the cleaning chemical conditioning device (60) in particular per unit time depending on a filling level of the cleaning chemical solution in the housing (63) of the cleaning chemical conditioning device (60), and in particular depending on a vertical position of the floating switch.

11. Dishwasher (40, 50) according to one of Claims 1 to 10, wherein a sensor system is associated with the first region (61) of the cleaning chemical conditioning device (60) for the purpose of directly or indirectly detecting a quantity of a cleaning chemical in concentrated form which is accommodated in the first region (61) of the cleaning chemical conditioning device.

12. Dishwasher (40, 50) according to one of Claims 1 to 11, wherein a circulation device is preferably associated with the cleaning chemical conditioning device (60) for the purpose of circulating, continuously or as required, at least the cleaning chemical solution which is temporarily stored in the second region (62) of the cleaning chemical conditioning device.

13. Dishwasher (40, 50) according to one of Claims 1 to 12, wherein the second region (62) of the cleaning chemical conditioning device (60) is designed as a tank, wherein at least one opening by means of which the tank can, as required, be fluidically connected to a drain of the dishwasher (40, 50) and/or to the intake side of a metering pump of a metering system of the dishwasher is provided preferably in a sump region of the second region (62) of the cleaning chemical conditioning device (60), which second region is designed as a tank.

14. Method for operating a dishwasher (40, 50), in particular a dishwasher (40, 50) according to one of Claims 1 to 13, wherein the dishwasher (40, 50) has a storage container containing usable cleaning chemical solution which is added in a metered manner, as required or continuously, to a liquid which is to be sprayed as wash liquid and/or final rinse liquid during treatment of washware in the dishwasher (40, 50), wherein the usable cleaning chemical solution is preferably

automatically prepared in the dishwasher (40, 50), in particular when the quantity of cleaning chemical solution which is temporarily stored in the storage container has reached and/or fallen below a previously defined or definable minimum, wherein a solvent, in particular water, is brought into contact with a cleaning chemical which is present in concentrated form for the purpose of preparing the usable cleaning chemical solution.

15. Method according to Claim 14, wherein the usable cleaning chemical solution is a saturated aqueous solution; and/or wherein the cleaning chemical which is present in concentrated form is a solid cleaning chemical block, a cleaning chemical powder, a cleaning chemical gel and/or a cleaning chemical liquid.

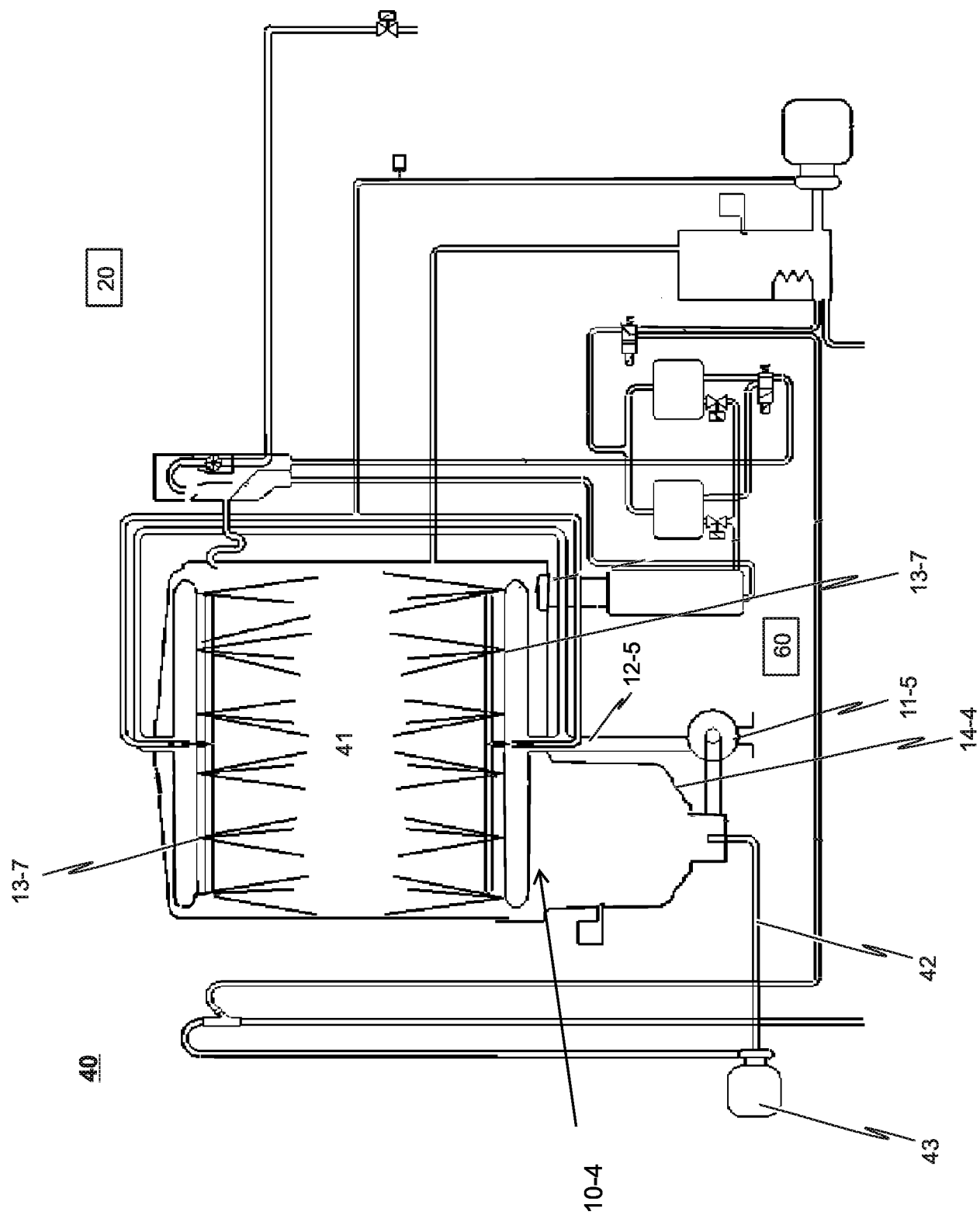


FIG. 1

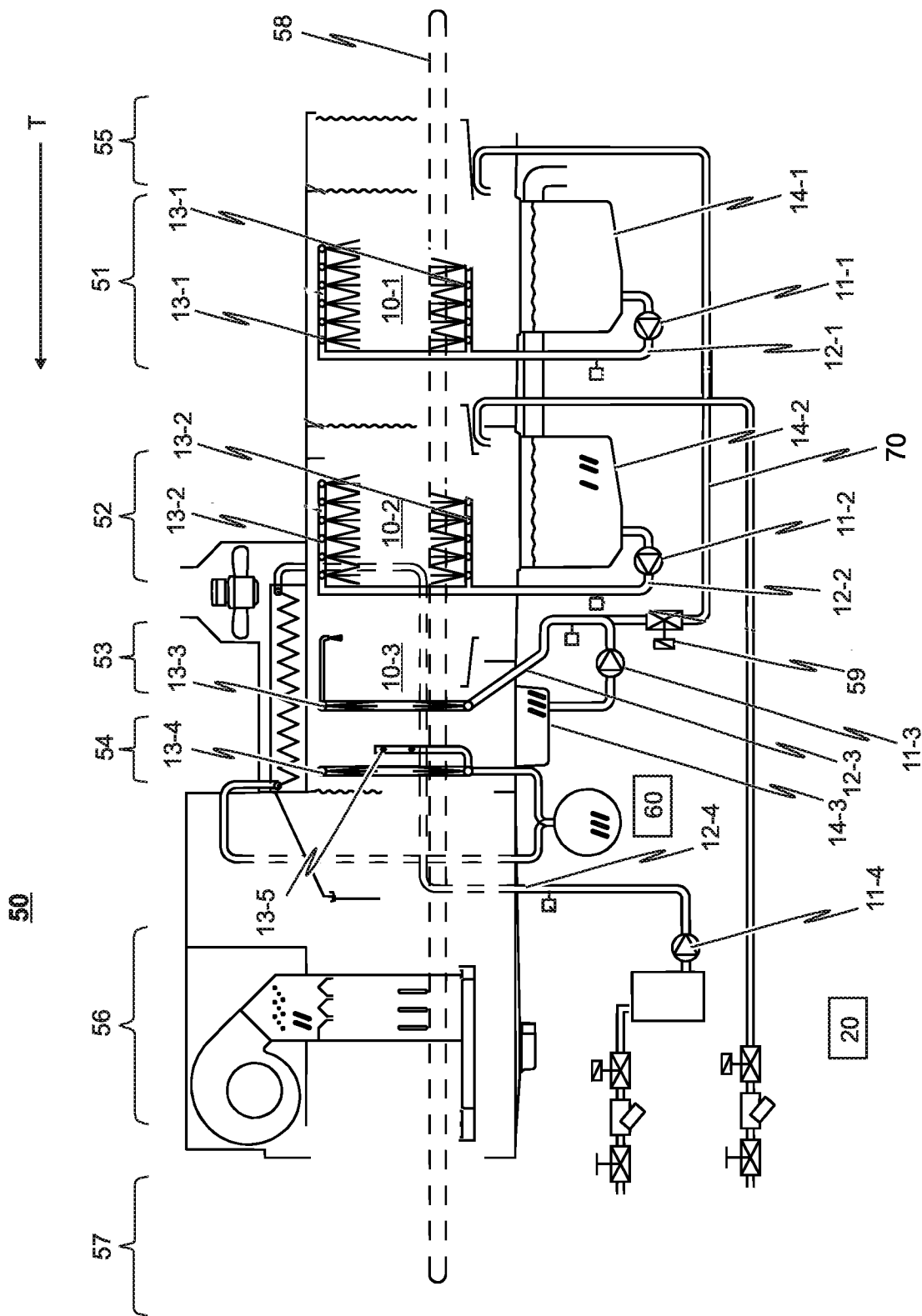


FIG. 2

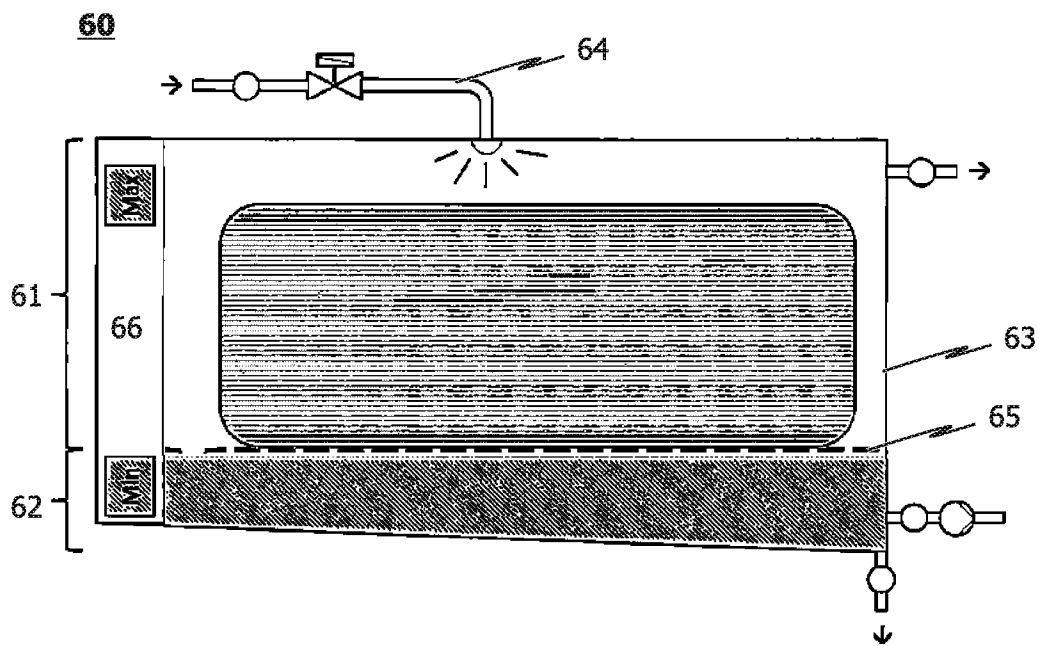
FIG. 3

FIG. 4A

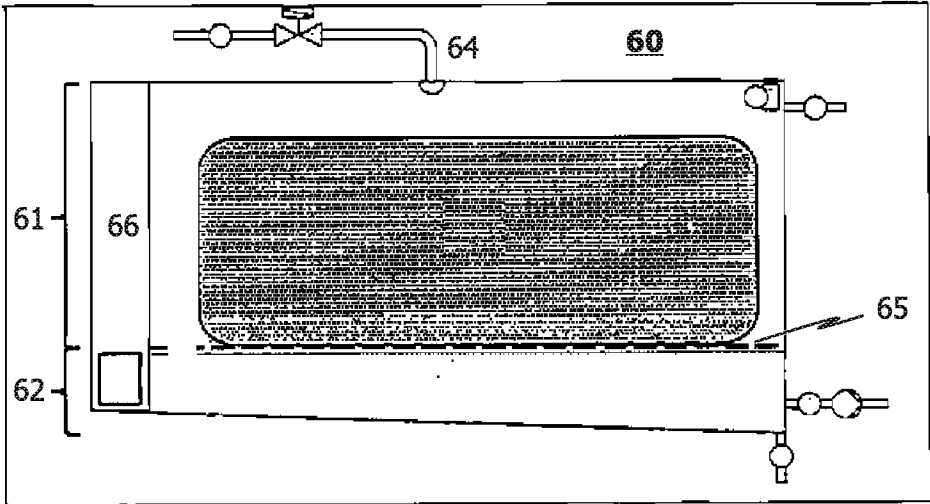


FIG. 4B

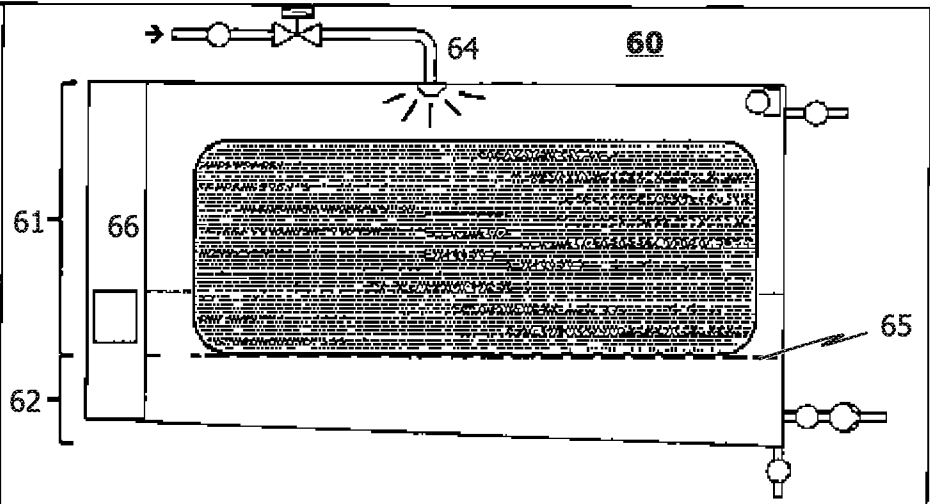


FIG. 4C

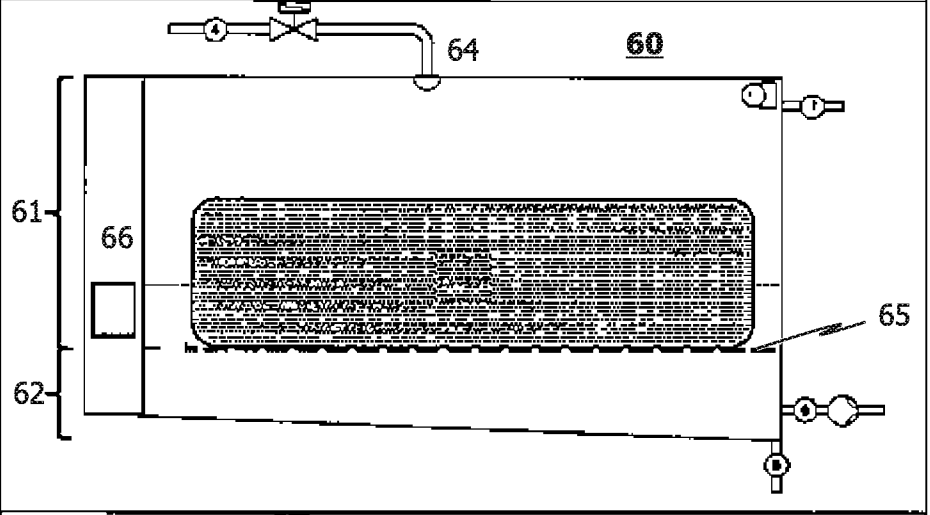


FIG. 4D

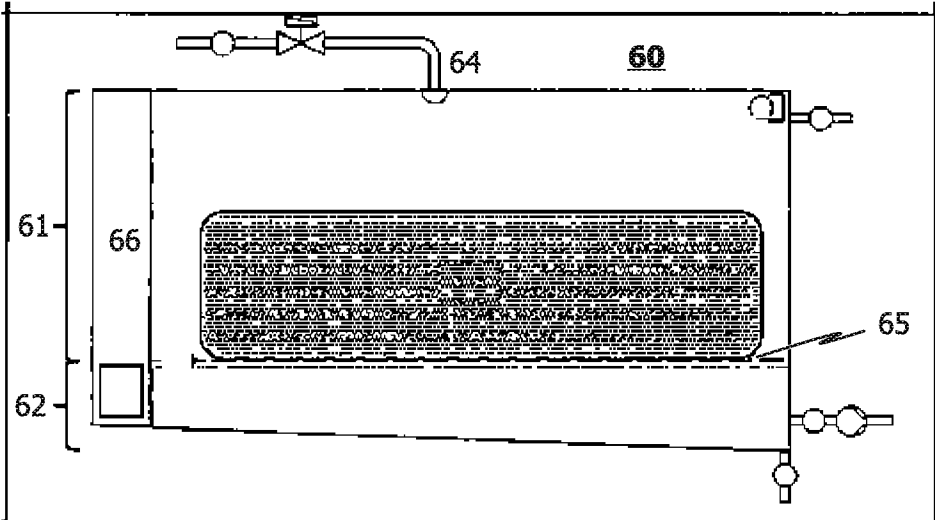
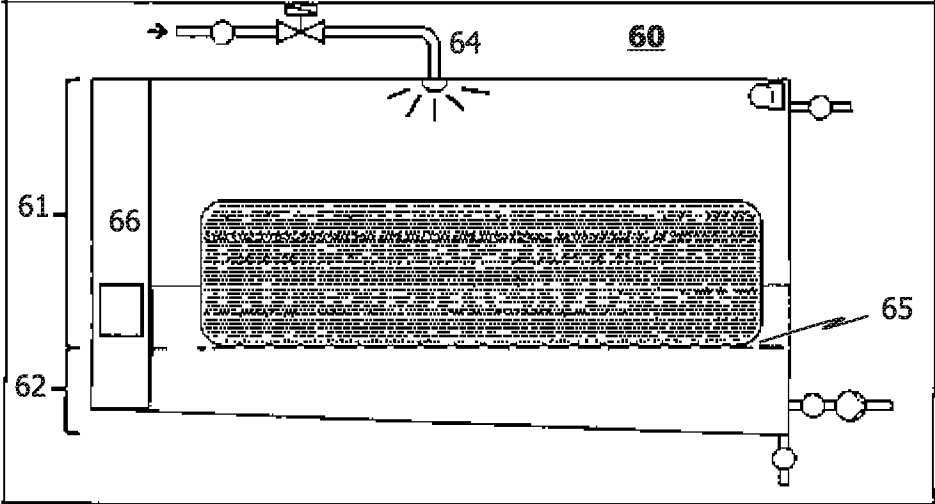


FIG. 4E



INTERNATIONAL SEARCH REPORT

International application No

PCT/US2019/047649

A. CLASSIFICATION OF SUBJECT MATTER

INV. A47L15/00 A47L15/44
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.
X	US 3 850 344 A (BURGE R ET AL) 26 November 1974 (1974-11-26) column 1, lines 43-49 column 2, line 64 - column 3, line 47 claim 5 figures 1, 2	1-7, 10-15
X	----- WO 2018/099671 A1 (ARCELIK AS [TR]) 7 June 2018 (2018-06-07) paragraphs [0018] - [0026] figures 1-9	1,8,9, 11,13-15
A	----- WO 2012/084005 A1 (ECOLAB INC [US]; CARLHOFF GEROLD [DE] ET AL.) 28 June 2012 (2012-06-28) page 23, line 24 - page 28, line 18 figure 1 -----	1-6,10, 13-15



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

24 October 2019

Date of mailing of the international search report

04/11/2019

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2019/047649

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