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(54) **WASHING MACHINE WITH AUTOMATIC DIRT DISCHARGE**

WASCHMASCHINE MIT AUTOMATISCHER SCHMUTZENTLADUNG

LAVE-VAISSELLE POSSÉDANT UNE ÉVACUATION DE SALETÉ AUTOMATIQUE

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Description

[0001] The invention relates in particular to an industrial dish- or utensil-washing machine, which is designed as a programmable machine or as a transport washing machine, and an associated control device and/or method for discharging dirt particles from such a machine.

[0002] The invention is consequently directed at a washing machine which has at least one washing zone designed as a recirculation circuit. The washing zone designed as a recirculation circuit has a nozzle system with at least one washing nozzle for spraying washing liquid onto the batch of dishes and/or utensils to be cleaned, a washing tank for capturing at least part of the sprayed washing liquid and a washing pump for feeding washing liquid collected in the washing tank to the at least one washing nozzle. Furthermore, the washing machine has a dirt capture system assigned to the at least one washing zone and having at least one tank-covering screen, in order to separate dirt particles from the sprayed washing liquid flowing back into the washing tank as a result of gravity.

[0003] The document WO 2005/063108 A1 relates to a method for operating a dishwasher with a variable washing program, according to which the recirculation pump and the lye pump are at least temporarily operated in an alternating manner during a partial step of a program such that the dishwasher filter systems are automatically cleaned and the accumulated washing residues are conveyed away from the dishwasher at an early stage.

[0004] Programmable machines are manually loadable and unloadable dish-washing machines. The programmable machines (called "box-type ware washers" or else "batch dish washers") may be basket-type push-through washing machines, also called hood washing machines ("hood-type ware washers"), or front loaders ("front loader ware washers"). Front loaders may be built-under machines

[0005] ("under counter machines"), table top machines ("top counter machines") or freestanding washing machines with front loading ("free standing front loaders").

[0006] A washing machine designed as a programmable machine usually has a treatment chamber for the cleaning of a batch. As a rule, arranged beneath the treatment chamber is a washing tank, in which liquid can flow back out of the treatment chamber as a result of gravity. Located in the washing tank is washing liquid which is usually water, to which, if appropriate, detergent can be supplied.

[0007] Furthermore, a washing machine designed as a programmable machine has a washing system with a washing pump and with a line system connected to the washing pump and having a nozzle system which has at least one washing nozzle. The washing liquid located in the washing tank can be conveyed from the washing pump to the at least one washing nozzle via the line system and sprayed through this at least one washing nozzle in the treatment chamber onto the batch to be cleaned.

The sprayed washing liquid subsequently flows back into the washing tank as a result of gravity.

[0008] Transport washing machines ("conveyor ware washers") are, in particular, belt-type transport washing machines ("flight-type ware washers") or basket-type transport washing machines ("rack conveyor ware washers"). Transport washing machines are usually employed in the commercial sector. In contrast to programmable machines, in which the batch to be cleaned remains at a fixed location in the machine during cleaning, in transport washing machines a transport of the batch through various treatment zones of the transport washing machine takes place.

[0009] A transport washing machine usually has at least one pre-washing zone and at least one main-washing zone, which is arranged downstream of the pre-washing zone or pre-washing zones, as seen in the direction of transport of the batch. As a rule, at least one post-washing zone or pre-rinsing zone and at least one final-rinsing zone following the post-washing zone or post-washing zones are arranged downstream of the main-washing zone or main-washing zones, as seen in the direction of transport. As seen in the direction of transport, either the batch received directly on the conveyor belt or the batch held by baskets usually runs in the direction of transport through an entry tunnel, the following pre-washing zone or pre-washing zones, main-washing zone or main-washing zones, post-washing zone or post-washing zones, final-rinsing zone or final-rinsing zones and a drying zone into an exit section.

[0010] Said washing zones of the transport washing machine are assigned in each case a washing system which has a washing pump and a line system (washing line system) which is connected to the washing pump and via which washing liquid is supplied to the nozzle system or the at least one washing nozzle of the nozzle system. The washing liquid supplied to the at least one washing nozzle of the nozzle system is sprayed in the respective washing zones of the transport washing machine onto the batch which is being transported by a transport device of the transport washing machine through the respective washing zones. Each washing zone is assigned a tank in which the liquid sprayed by the washing nozzles is received and/or in which liquid for the nozzle systems of the respective treatment zones is provided.

[0011] In the transport washing machines conventionally known from the prior art, final-rinsing liquid in the form of fresh water, which may be pure or mixed with further additives, such as for example final-rinsing agent, is sprayed onto the batch via the spray nozzles of the final-rinsing zone. At least part of the sprayed final-rinsing liquid is transported from zone to zone, opposite to the direction of transport of the batch, via a cascade system.

[0012] The sprayed final-rinsing liquid is captured in a tank (post-washing tank) of the post-washing zone, from which tank it is conveyed via the washing pump of the washing system belonging to the post-washing zone to

the spray nozzles (post-washing nozzles) of the post-washing zone. Washing liquid is rinsed off from the batch in the post-washing zone. The liquid which in this case occurs flows into the washing tank of the at least one main-washing zone which precedes the post-washing zone, as seen in the direction of transport of the batch. Here, the liquid is usually provided with a detergent and sprayed onto the batch via the nozzles (washing nozzles) of the main-washing zone by means of a pump system (washing pump) belonging to the washing system of the main-washing zone. If no further main-washing zone is provided, the liquid subsequently flows from the washing tank of the main-washing zone into the pre-washing tank of the pre-washing zone. The liquid in the pre-washing tank is sprayed onto the batch via the pre-washing nozzles of the pre-washing zone by means of a pump system (pre-washing pump) belonging to the washing system of the pre-washing zone, in order to remove coarse impurities from the batch.

[0013] Conventionally, washing machines are equipped with rinsing pumps which supply the line system of the final-rinsing zone with the final-rinsing liquid to be sprayed. This ensures, in particular, a virtually constant volume flow of the final-rinsing liquid in the final-rinsing zone. It is also conceivable, however, to utilize the on-site line pressure, for example the pressure of the fresh water supply, in order to deliver the final-rinsing liquid to the line system of the final-rinsing zone. In this last-mentioned instance, an activatable valve may be provided between the line system and the spray nozzles of the final-rinsing zone, so that a temporary or complete interruption in the supply of final-rinsing liquid to the spray nozzles can be achieved.

[0014] Irrespective of whether the washing machine is designed as a programmable machine or as a transport washing machine, industrial dish-washing machines therefore usually comprise at least one washing system designed as a recirculation circuit, which has a nozzle system with at least one washing nozzle for spraying washing liquid onto the batch to be cleaned, a washing tank for capturing at least part of the sprayed liquid and at least one washing pump for feeding liquid collected in the washing tank to the at least one washing nozzle.

[0015] Since a washing zone designed as a recirculation circuit is used for cleaning the batch, at least part of the washing liquid already sprayed in the washing zone is circulated, and there is therefore the risk of the dirt particles removed from the batch being subjected to repeated comminution, on account of the permanent circulation of the washing liquid, and thus no longer being capable of being readily separated from the washing liquid by screening devices, etc. Therefore, in the case of a washing zone designed as a recirculation circuit, there is the risk of the contamination of the washing liquid in the washing zone increasing as the washing time increases, so that there is a greater risk of a batch being recontaminated and the washing result worsening overall.

[0016] This problem arises, in particular, in the case of the pre-washing or main-washing zones of a washing machine designed as a transport washing machine. Since, in the case of transport washing machines, the washing liquid used flows in cascade form counter to the transporting direction of the batch which is to be cleaned, the concentration of dirt in the washing liquid in the at least one pre-washing zone is greater than the concentration of dirt in the washing liquid in the rest of the treatment zones, since most dirt occurs in the pre-washing zone.

[0017] On the other hand, it is unavoidable that, during operation of a washing machine designed as a transport washing machine, part of the more contaminated washing liquid in the pre-washing zone is "entrained", by the transportation of the batch into the at least one main-washing zone which is arranged downstream of the pre-washing zone. This increases the contamination of the washing liquid in the main-washing zone and, accordingly, the washing result in the main-washing zone can likewise worsen.

[0018] In order for the dirt particles introduced into the washing machine to be separated from the washing liquid used for washing the batch, it is generally known to use screening devices in the form of dirt-screening baskets, in which the dirt particles introduced into the washing machine collect. In the case of washing machines designed as programmable machines, such a dirt-screening basket is usually arranged in the treatment chamber in the washing tank.

[0019] On the other hand, in respect of washing machines which are designed as transport washing machines, it is known for at least the pre-washing tank, which is assigned to the pre-washing zone, and preferably also the main-washing tank, which is assigned to the at least one main-washing zone, to be equipped with planar screens and dirt-screening baskets.

[0020] During operation of the washing machine, designed either as a programmable machine or as a transport washing machine, the dirt particles washed off the batch with the aid of the circulating washing water then fall onto the planar screens as a result of gravity. The dirt particles are separated there from the washing liquid flowing back into the corresponding washing tank. The separated dirt particles are then usually washed into a dirt-screening basket.

[0021] The solutions known so far from the prior art, in which planar screens or dirt-screening baskets are used for separating dirt particles from a circulating washing liquid, entail the risk that the dirt particles collecting on the planar screen or in the dirt-screening basket are comminuted by the permanent circulation of the washing liquid to such an extent as the washing time increases that the dirt particles have a grain size that is no longer held back by the mesh width of the planar screen or dirt-screening basket, and therefore increasing accumulations of dirt particles in the washing liquid as the washing time increases can no longer be prevented in spite of

providing a planar screen or dirt-screening basket.

[0022] This risk can in fact be countered by providing in a washing machine of the type mentioned at the beginning a dirt capture system, assigned to the at least one washing system and having at least one tank-covering screen, in order to separate dirt particles from the sprayed washing liquid flowing back into the washing tank of the washing system designed as a recirculation circuit as a result of gravity, the dirt capture system also having a dirt-collecting region, arranged in the washing system, for collecting the dirt particles separated from the washing liquid with the aid of the tank-covering screen. The dirt-collecting region is in this case open at the top, to allow dirt particles separated with the aid of the tank-covering screen to be fed in. However, the sides of the dirt-collecting region are of a completely closed form, so that even fine and ultrafine dirt is prevented from escaping from the dirt-collecting region. In the case of the solution according to the invention, it is also provided that the dirt capture system additionally has a dirt-discharging pipe system, connected to the dirt-collecting region, for discharging from the washing system the dirt particles collected in the dirt-collecting region.

[0023] On this basis, it is an object of the present invention to develop a washing machine of the type mentioned at the beginning to the extent that the risk of recontamination of the batch can be reduced still further and the overall washing result can be improved in a way that is effective but nevertheless easy to accomplish.

[0024] Various advantages that can be achieved with the solution according to the invention. Firstly, providing on the one hand the tank-covering screen, preferably designed as a planar screen, and on the other hand the dirt capture system ensures that the dirt particles washed off the batch in the washing system and the dirt particles introduced into the washing liquid in some other way can be effectively separated from the washing liquid and collected or concentrated in the dirt-collecting region. Since the dirt-collecting region is of a completely closed form (i.e. fluidtight) at its sides, the dirt particles collected in the dirt-collecting region are encapsulated in relation to the washing liquid in the washing tank, so that even relatively small dirt particles that could possibly be produced by the dirt particles collected in the dirt-collecting region breaking up cannot get back into the washing liquid received in the washing tank.

[0025] On the other hand, it is provided that the dirt-collecting region is connected to a dirt-discharging pipe system via which the dirt particles collected in the dirt-collecting region can be removed from the washing system. This makes it possible to reduce the residence time of the dirt particles in the dirt-collecting region, and thus in the washing system, so that it is no longer possible for dirt to break up as a result of the washing liquid circulating in the washing system.

[0026] However, the solution according to the invention goes further and envisages interrupting the operation of the washing pump for a first time. Within this first time,

or at the latest upon the expiry of this first time, operation of the dirty-water pump then takes place for a second period of time. This allows the rate at which dirt is introduced into the dirt-discharging system to be significantly improved, in particular in the case of machines and systems with a great washing pump circulating rate of 200 l/min to 1000 l/min. For this purpose, the washing pump circulation is interrupted for a short time immediately before the dirt pumping-away cycle, so that the dirt particles contained in the washing liquid can settle more easily in the dirt-collecting region.

[0027] Accordingly, the solution according to the invention achieves a constant washing result even as the washing time increases, recontamination of the batch by dirt particles in the washing liquid being effectively prevented.

[0028] On the other hand, the solution according to the invention provides an effective method of discharging dirt particles from the washing liquid, and it is therefore possible to realize a longer service life for the washing liquid in comparison with conventional solutions. It is thus possible to use the washing liquid for cleaning a greater quantity of dishes before it has to be changed. This cuts down, in particular, on the use of clean water, detergent and heating energy.

[0029] For discharging the dirt particles, the dirt capture system has at least one dirty-water pump arranged in the dirt-discharging pipe system. This pump serves for actively feeding the dirt particles collected in the dirty-water collecting region optionally either to a dirt-capturing container formed outside the washing system or to a waste-disposal system formed outside the washing machine. Preferably, the dirty-water pump is in this case designed to remove the dirt particles collected in the dirt-collecting region from the washing system continuously or at given times or when given events occur.

[0030] In addition, at least one activatable valve arranged in the dirt-discharging pipe system may also be provided, in order to connect the dirt-collecting region optionally to a dirt-capturing container formed outside the washing system or to a waste-disposal system formed outside the washing machine when required or at given times or when given events occur. By activating the valve arranged in the dirt-discharging pipe system, it is possible to connect the dirt-collecting region to the dirt-capturing container or the waste-disposal system, so that the dirt particles collected in the dirt-collecting region can be discharged, for example by gravity, from the dirt-collecting region, and consequently from the washing zone or the washing machine.

[0031] Accordingly, the solution according to the invention allows the dirt particles collected in the at least one washing system of the washing machine with the aid of the dirt capture system to be removed automatically from the washing machine. Such dirt discharge, carried out automatically and consequently much more thoroughly than before, relieves the personnel operating the washing machine. In addition, influencing or blocking of the

recirculation of the washing liquid in the washing zone due to overfilling of the dirt-collecting region can be effectively prevented.

[0032] Exemplary embodiments of the solution according to the invention, given by way of example, are described in more detail below with reference to the accompanying drawings.

[0033] In the drawings:

Figure 1 schematically shows a washing machine designed in the form of a transport washing machine, according to a first embodiment;

Figure 2 schematically shows a washing machine designed in the form of a transport washing machine, according to a second embodiment;

Figure 3 schematically shows a washing machine, designed in the form of a transport washing machine, according to a third embodiment,

Figure 4 schematically shows the washing tank of a washing system of a washing machine according to the invention, formed as a transport washing machine or as a programmable machine, with a dirt capture system and a control device coupled therewith, and

Figure 5 shows a schematically represented deactivation and activation sequence of a washing pump and a dirty-water pump over a number of washing cycles.

[0034] Figure 1 shows a schematic longitudinal sectional view of an example of a transport washing machine 50 designed according to the teachings of the present invention. The transport washing machine 50 according to the representation in Figure 1 has a pre-washing zone 51 and a main-washing zone 52, which is arranged downstream of the pre-washing zone 51, as seen in the direction of transport T of the batch (not represented in Figure 1). In the case of the transport washing machine 50 represented in Figure 1, a post-washing or pre-rinsing zone 53 and a final-rinsing zone 54 following the post-washing or pre-rinsing zone 53 are arranged downstream of the main-washing zone 52, as seen in the direction of transport T.

[0035] In the case of the transport washing machine 50 represented, at least the pre-washing zone 51 and the main-washing zone 52 are respectively formed as washing system 10-1 and washing system 10-2.

[0036] The batch, either received directly on a conveyor belt 58 or held by baskets, runs in the direction of transport T through an entry tunnel 55, the following pre-washing zone 51, the main-washing zone 52, the post-washing zone 53, the final-rinsing zone 54 and a drying zone 56 into an exit section 57.

[0037] Said treatment zones 51, 52, 53, 54 of the trans-

port washing machine 50 are respectively assigned spray nozzles 13-1, 13-2, 13-3, 13-4, via which liquid is sprayed onto the batch which is being transported by the conveyor belt 58 through the respective treatment zones 51, 52, 53, 54. At least the pre-washing zone 51, the main-washing zone 52 and the post-washing or pre-rinsing zone 53 are respectively assigned a tank (washing tank 14-1, 14-2, 14-3), in which sprayed washing liquid is received and/or in which washing liquid for the spray nozzles 13-1, 13-2, 13-3 of the respective zones 51, 52, 53 is provided.

[0038] The pre-washing zone 51, the main-washing zone 52 and the post-washing zone 53 of the transport washing machine 50 according to the first exemplary embodiment represented in Figure 1 have in each case a washing system 10-1, 10-2, 10-3. Each washing system 10-1, 10-2, 10-3 is composed of a washing pump 11-1, 11-2, 11-3, a line system 12-1, 12-2, 12-3 connected to the washing pump 11-1, 11-2, 11-3 and the spray nozzles 13-1, 13-2, 13-3 connected to the line system 12-1, 12-2, 12-3.

[0039] Furthermore, a control device 100 schematically represented in the figures is provided, serving (inter alia) for suitably activating the respective washing pumps 11-1, 11-2, 11-3 of the washing systems 10-1, 10-2, 10-3 during a washing process, in order at least intermittently to supply washing liquid via the associated line system 12-1, 12-2, 12-3 to the spray nozzles 13-1, 13-2, 13-3 of the nozzle system belonging to the respective washing system 10-1, 10-2, 10-3. At the same time, the control device 100 is designed (e.g., programmed or otherwise configured) to serve for the mutually coordinated activation according to the invention of the washing pump 11-1 and of the dirty-water pump 74-1, in order to improve the discharge of dirt, especially in the region of the machine 50 near the entrance.

[0040] In the case of the transport washing machine 50 represented in Figure 1, final-rinsing liquid in the form of fresh water, which may be mixed with further chemical additives, for example rinsing agent, is sprayed onto the batch (not represented in Figure 1) via the spray nozzles 13-4 of the final-rinsing zone 54, these nozzles being arranged above and beneath the conveyor belt 58. As represented in Figure 1, laterally arranged spray nozzles 13-5 may also be provided in the final-rinsing zone 54.

[0041] Part of the final-rinsing liquid sprayed in the final-rinsing zone 54 is transported from zone to zone via a cascade system counter to the transporting direction T of the batch. The rest is channeled directly into the pre-washing tank 14-1 of the pre-washing zone 51 via a valve 59 and a bypass line 60.

[0042] The final-rinsing liquid sprayed in the final-rinsing zone 54 is collected in the tank (post-washing or pre-rinsing tank 14-3) of the post-washing or pre-rinsing zone 53, from which it is delivered to the spray nozzles 13-3 (post-washing or pre-rinsing nozzles) of the post-washing or pre-rinsing zone 53 via the washing pump 11-3 belonging to the washing system 10-3 of the post-washing or pre-rinsing zone 53. Washing liquid is washed off

the batch in the post-washing or pre-rinsing zone 53.

[0043] The liquid which occurs here flows into the washing tank 14-2 of the main-washing zone 52, is usually provided with a detergent and is sprayed onto the batch via the spray nozzles 13-2 (washing nozzles) of the washing system 10-2 belonging to the main-washing zone 52 with the aid of a washing pump 11-2 belonging to the washing system 10-2 of the main-washing zone 52.

[0044] From the washing tank 14-2 of the main-washing zone 52, the washing liquid then flows into the pre-washing tank 14-1 of the pre-washing zone 51. The washing liquid collected in the pre-washing tank 14-1 is sprayed onto the batch in the pre-washing zone 51 via the spray nozzles 13-1 (pre-washing nozzles) of the washing system 10-1 belonging to the pre-washing zone 51, with the aid of a washing pump 11-1 belonging to the washing system 10-1 of the pre-washing zone 51, in order to remove coarse contaminants from the batch.

[0045] In the case of the transport washing machine 50 represented in Figure 1, the main-washing zone 52 has a tank-covering screen 20-2, which is arranged above the main-washing tank 14-2. During operation of the transport washing machine 50, washing liquid is sprayed onto the batch via the spray nozzles 13-2 (washing nozzles) of the washing system 10-2. The sprayed washing liquid flows back into the washing tank 14-2 of the main-washing zone 52 as a result of gravity, wherein the dirt particles washed off the batch in the main-washing zone 52 are retained by the tank-covering screen 20-2, provided that the dirt particles are larger than the mesh width of the tank-covering screen 20-2. The mesh width of the tank-covering screen 20-2 is preferably approximately 1 mm to 4 mm.

[0046] In the case of the transport washing machine 50 schematically represented in Figure 1, for the purpose of cleaning the tank-covering screen 20-2, the washing operation has to be interrupted in order to allow the tank-covering screen 20-2 to be cleaned manually.

[0047] Part of the washing liquid sprayed in the main-washing zone 52 passes into the washing tank (pre-washing tank 14-1) of the pre-washing zone 51 via an overflow system 61. Like the main-washing zone 52, the pre-washing zone 51 is equipped with a tank-covering screen 20-1 designed as a planar screen. This tank-covering screen 20-1 is arranged above the washing tank (pre-washing tank 14-1) of the pre-washing zone 51, in order to separate dirt particles from the washing liquid which has been sprayed in the pre-washing zone 51 and flows back into the pre-washing tank 14-1 as a result of gravity. The mesh width of the tank-covering screen 20-1 is preferably in a range between approximately 1 mm and 4 mm.

[0048] Since - as explained at the beginning - the concentration of dirt in the washing liquid is at its greatest in the pre-washing zone 51, since most dirt occurs here, the transport washing machine 50 represented in Figure 1 is equipped with a dirt capture system 70 which is assigned to the pre-washing zone 51 and has a dirt-collect-

ing region 71-1 arranged in the pre-washing zone 51, and in particular within the pre-washing tank 14-1. The construction and the functioning of the dirt capture system 70 used for the transport washing machine 50 represented in Figure 1 is described in more detail below with reference to the representation in Figure 4.

[0049] In the case of that embodiment of the transport washing machine 50 which is represented in Figure 1, the dirt-collecting region 71 serves for collecting the dirt particles separated from the washing liquid with the aid of the tank-covering screen 20-1. Specifically, and as described in more detail below with reference to the representation in Figure 4, the dirt-collecting region 71-1 is designed as a chamber which is arranged in the pre-washing tank 14-1 and is of a completely closed form on all its sides, but is open at the top, so that the dirt particles separated with the aid of the tank-covering screen 20-1 can pass into the chamber-like dirt-collecting region 71-1 via this opening. Since the dirt-collecting region 71 is of a completely closed form on all its sides, it is possible to effectively prevent the dirt particles collected in the dirt-collecting region 71-1 from being able to return into the pre-washing tank 14-1 and contaminate the washing liquid collected in the pre-washing tank 14-1.

[0050] Specifically, and as described in more detail below with reference to the representation in Figure 4, it is preferred if the tank-covering screen 20-1 is arranged above the dirt-collecting region 71-1 and has a runout slope in the form of a gradient directed toward a feed opening 22, the dirt-collecting region 71-1, which is open at the top, being arranged beneath the feed opening 22, so that the dirt particles separated with the aid of the tank-covering screen 20-1 can pass into the dirt-collecting region 71-1 via the feed opening 22.

[0051] It is conceivable here, in particular, for the tank-covering screen 20-1 to be designed, at least in certain regions, in a funnel-like manner, wherein the feed opening 22 is formed within the funnel-like region 21 of the tank-covering screen 20-1, and preferably in the center of the funnel-like region 21 of the tank-covering screen 20-1 (cf. in this respect also in particular the representation in Figure 4).

[0052] The dirt capture system 70 used for the embodiment represented in Figure 1 also has a dirt-discharging pipe system which is connected to the dirt-collecting region 71-1, comprises a vertical pipe 72-1 and a dirty-water line 73-1 and is intended for discharging from the pre-washing zone 51 the dirt particles collected in the dirt-collecting region 71-1. As illustrated, a dirty-water pump 74-1 is arranged in the dirt-discharging pipe system 72-1, 73-1. The inlet on the suction side of the dirty-water pump 74-1 is connected to the lower region of the dirt-collecting region 71-1 via the vertical pipe 72-1 belonging to the dirt-discharging pipe system 72-1, 73-1. The outlet on the pressure side of the dirty-water pump 74-1 opens out in the dirty-water line 73-1 belonging to the dirt-discharging pipe system.

[0053] In the case of the embodiment represented in

Figure 1, the dirty-water line 73-1 leads to an external dirt-capturing container 80, which is arranged outside the pre-washing zone 51, upstream of the entry tunnel 55 of the transport washing machine 50. This external dirt-capturing container 80 preferably has a screen and a connection 81 to a waste-water system.

[0054] Since, when washing liquid is sprayed in the pre-washing zone 51, it is not possible to prevent part of the sprayed washing liquid from getting into the dirt-collecting region 71, the dirty-water pump 74-1 delivers from the pre-washing zone 51 not only the dirt particles separated with the aid of the tank-covering screen 20-1 but also part of the washing liquid. The material removed from the dirt-collecting region 71-1 (dirt particles and washing liquid) is screened in the dirt-capturing container 80, wherein the liquid constituent parts (washing liquid) can be fed to a waste-water system via the outflow connection 81 and the solids remaining in the dirt-capturing container 80 (dirt particles) can then be disposed of.

[0055] As represented in Figure 2, it is also conceivable, as an alternative to the embodiment represented in Figure 1, for the dirt particles to be pumped out of the pre-washing zone 51 into a waste-disposal system 82 along with the waste water, wherein this system 82 can be placed in position either directly alongside the transport washing machine 50 or further away. Possible waste-disposal systems 82 which can be used are squeezing systems for separating solids and liquids and/or comminuting systems (grinding systems, chopping systems, etc.). The material removed from the dirt-collecting region 71-1 (dirt particles and washing liquid) is preferably likewise screened in the waste-disposal system 82, wherein the liquid constituent parts (washing liquid) can be fed to a waste-water system via an outflow connection 83 and the solids remaining in the waste-disposal system 82 (dirt particles) can then be disposed of. In the case of the embodiment in Figure 2, the control device 100 likewise serves for the mutually coordinated activation according to the invention of the washing pump 11-1 and of the dirty-water pump 74-1, in order to improve the discharge of dirt, especially in the region of the machine 50 near the entrance.

[0056] Figure 3 illustrates a further embodiment of the transport washing machine 50 designed according to the teachings of the present invention. This embodiment is essentially identical to the embodiment described above with reference to the representation in Figure 1 or Figure 2, with the exception that it is not just the pre-washing zone 51 but also the main-washing zone 52 that is equipped with a dirt capture system 70, the construction and functioning of which are described in more detail below with reference to the representation in Figure 4.

[0057] As a difference from the embodiment represented in Figure 1, in the case of the transport washing machine 50 shown in Figure 3 a tank-covering screen 20-2, which has a feed opening 22 (cf. Figure 4), is thus provided in or above the main-washing tank 14-2, wherein a dirt-collecting region 71-2 which is open at the top is

arranged beneath the feed opening 22. In this dirt-collecting region 71-2, the dirt particles separated with the aid of the tank-covering screen 20-2 are introduced into the dirt-collecting region 71-2 via the feed opening 22.

[0058] In the case of the embodiment of the solution according to the invention that is represented in Figure 3, a dirt-discharging pipe system comprising a dirty-water line 73-2 and a vertical pipe 72-2 is provided in the lower region of the dirt-collecting region 71-2. The material collected in the dirt-collecting region 71-2 (washing liquid and separated dirt particles) passes via a dirty-water pump 74-2 into a dirt-capturing container 80 formed outside the main-washing zone 52 or into a waste-disposal system 82 formed outside the transport washing machine 50. In the case of the embodiment in Figure 3, the control device 100 serves for the mutually coordinated activation according to the invention of the washing pumps 11-1, 11-2 and of the dirty-water pumps 74-1, 74-2, in order to improve the discharge of dirt over a batch transporting path of the machine 50 that is as great as possible.

[0059] The construction and functioning of the dirt capture system 70, and in particular the control device 100 according to the invention, are described in more detail below with reference to the representation in Figure 4.

[0060] The dirt capture system 70 is arranged within a washing tank 14 of a transport washing machine 50 or of a washing machine designed as a programmable machine. The dirt capture system 70 has a tank-covering screen 20, which is preferably arranged in the washing tank 14, above the level of the washing liquid received in the washing tank 14. The tank-covering screen 20 serves for separating dirt particles from the washing liquid which has been sprayed and flows back into the washing tank as a result of gravity. For this reason, a suitable mesh width has to be provided for the tank-covering screen 20.

[0061] The dirt capture system 70 also includes a dirt-collecting region 71, which is designed as a completely closed chamber and is open at the top. The dirt particles separated by the tank-covering screen 20 are fed to the dirt-collecting region 71 formed as a chamber via the opening of the latter. For this purpose, it is preferred if the tank-covering screen 20 has a runout slope in the form of a gradient directed toward a feed opening 22, the dirt-collecting region 71, which is open at the top, being arranged beneath the feed opening 22. As represented in Figure 4, it is conceivable, for example, for the tank-covering screen 20 to be designed, at least in certain regions, in a funnel-like manner, wherein the feed opening 22 is formed within the funnel-like region 21 of the tank-covering screen 20, and preferably in the tapered region of the funnel-like region 21 of the tank-covering screen 20.

[0062] Furthermore, it is preferred if the dirt-collecting region 71 is formed in a funnel-like manner at the upper end (cf. the funnel-like region 75 in Figure 4), in order to allow it to be inserted into, and received within, the feed opening 22 of the tank-covering screen 20.

[0063] Washing liquid is sprayed in the washing zone during operation of the washing machine (not shown in Figure 4), wherein part of the sprayed washing liquid flows back into the washing tank 14 via the tank-covering screen 20. The rest of the sprayed washing liquid flows directly, as a result of gravity, into the dirt-collecting region 71 via the feed opening 22 provided in the tank-covering screen 20. If the washing machine is designed as a transport washing machine (cf. Figures 1 to 3), then - as already indicated - during operation of the washing machine washing liquid is sprayed onto the batch via the spray nozzles 13-1 (pre-washing nozzles) and via the spray nozzles 13-2 (washing nozzles). If, on the other hand, the washing machine is designed as a programmable machine (cf. Figure 4), and therefore the batch to be treated remains in one place and the individual treatment steps take place successively one after the other, during operation of the washing machine in the washing zone the washing liquid is sprayed onto the batch via the washing nozzles referred to in Figure 4 by the reference numeral "13".

[0064] In the case of the transport washing machine 50 represented in Figure 1, the main washing zone 52 has a tank-covering screen 20-2, which is arranged above the main-washing tank 14-2. During operation of the transport washing machine 50, washing liquid is sprayed onto the batch via the spray nozzles 13-2 (washing nozzles) of the washing system 10-2.

[0065] The dirt particles washed off the batch during washing are prevented from getting into the washing liquid collected in the washing tank 14 by the tank-covering screen 20 - provided they are larger than the mesh width of the tank-covering screen 20. Rather, the dirt particles separated by the tank-covering screen 20 are moved by way of the runout slope to the feed opening 22 and thus pass into the dirt-collecting region 71. Since the side walls of the dirt-collecting region 71 are of a completely closed form, it is no longer possible for the dirt particles collected in the dirt-collecting region 71 to get into the washing liquid that is collected in the washing tank 14. Even if the dirt particles collected in the dirt-collecting region 71 are comminuted further by the action of washing liquid falling downward, this dirt still cannot get into the washing liquid collected in the washing tank 14 and thereby increase the contamination of the washing liquid.

[0066] In order for it to be possible for the dirt-collecting region 71 to be emptied automatically, the dirt capture system 70 also has a dirt-discharging pipe system. In the case of the embodiment of the dirt-discharging system 70 which is represented in Figure 4, this dirt-discharging pipe system comprises a vertical pipe 72, which is connected to the lower region of the dirt-collecting region 71. The vertical pipe 72 is connected to the inlet on the suction side of a dirty-water pump 74. The outlet on the pressure side of the dirty-water pump 74 opens out in a dirty-water line 73, so that, upon activation of the dirty-water pump 74, the content of the dirt-collecting region 71 can be removed from the washing zone.

[0067] The control device 100 is designed according to the invention for activating the washing pump 11 and the dirty-water pump 74 in a mutually coordinated manner, so that the recirculation circuit of the washing system 51, 52 can be interrupted for a first time span T1, and the discharge of dirt particles takes place within this first time span T1 or, at the latest upon the expiry of this first time span T1, within a second time span T2. For this purpose, the control device 100 is connected to the pumps 11, 74 via control lines 100-1, 100-2. If the circulation of the washing pump is interrupted for a short time, turbulences of the washing liquid can subside at the screen. As a result, the kinetic energy of the dirt particles contained in it decreases, so that they can be sucked more easily into the dirt-collecting region 71 with the aid of the dirty-water pump 74. The control device 100 may in this case be formed as part of a machine control or be integrated therewith.

[0068] The control device 100 preferably has a micro-processor with a program code capable of running on it, which initiates the timed activation of the pumps 11, 74. In this case, the control device 100 should preferably be designed for the cyclical repetition of the mutually coordinated activation of the washing pump 11 and of the dirty-water pump 74, in order to ensure a regular discharge of the dirt particles. Preferably, the washing pump 11 is in this case deactivated in a first time span T1 of 0.5 to 10 seconds, preferably of 1 to 3 seconds, and the dirty-water pump 74 is activated in a second time span T2 of 1 to 20 seconds, preferably of 2 to 10 seconds. In order to ensure a uniformly high washing quality, the control device 100 of transport washing machines is preferably designed to stop the batch transport device within the first time span T1.

[0069] In the case of programmable machines, it is of advantage if a predetermined washing time per batch is prolonged by the amount of the first time span T1, in order not to experience any losses in washing quality.

[0070] In the case of transport washing machines, a particularly high washing quality is achieved even under changing operating conditions if its control device 100 is designed to vary the first time span T1 and/or the second time span T2 as a function of the transport speed of a batch. As a result, a uniform discharge of dirt is ensured under differing transport speeds without impairing the washing quality. It is equally preferred also to vary the first time span T1 and/or the second time span T2 as a function of a final-rinsing-liquid quantity. This also applies to the repetition rate of the mutually coordinated activation of the washing pump 11 and of the dirty-water pump 74, which is dependent on the transport speed of a batch and/or dependent on a final-rinsing-liquid quantity.

[0071] The dirty-water pump 74 may also be designed for removing the dirt particles collected in the dirt-collecting region 71 together with the washing liquid likewise collected in the dirt-collecting region 71 continuously or at given times or when given events occur. In particular, it is conceivable here for the dirty-water pump 74 to be

activated via the already mentioned control device 100 as a function of the quantity of dirt particles collected in the dirt-collecting region 71.

[0072] It is nevertheless conceivable of course for dirt to be pumped out of the dirt-collecting region 71 as a function of, for example, the level in the dirt-collecting region 71, the level in the washing tank 14, or other factors.

[0073] If the dirt capture system 70 is used for a transport washing machine 50 (cf., for example, Figures 1 to 3), it is also conceivable for the dirty-water pump 74 to be activated, for example, as a function of the transport speed at which the batch is transported through the treatment zones of the transport washing machine 50 or, for example, as a function of the quantity of final-rinsing liquid which is sprayed per unit of time in the final-rinsing zone 54.

[0074] Figure 5 shows a schematic representation of a deactivation and activation sequence of the washing pump 11 and the dirty-water pump 74 over a number of washing cycles Z1, Z2 and Z3. In this example, the washing pump should be deactivated for a time span T1 at the beginning of each washing cycle Z1 to Z3, so that the recirculation circuit of the washing system 51, 52 is interrupted. Within this time span T1, or at the latest upon the expiry of this time span T1, that is to say after the turbulence of the dirt particles has subsided at the screen 20, the dirty-water pump 74 is activated for a time span T2. On account of their low kinetic energy, the dirt particles can be sucked away very effectively, since they are then only subjected to the influence of the suction of the dirty-water pump, which draws them into the feed opening 22 of the dirt-collecting region 71.

[0075] Of course, a dirt discharge may take place not only at the beginning of each washing cycle Z1 to Z3 but also at the end or in the middle of a cycle. What is important is that there is a cyclical repetition of the discharge, in order to achieve a uniformly high washing quality.

[0076] The invention is not restricted to the embodiments described in conjunction with the drawings.

[0077] It is thus conceivable, for example, for the tank-covering screen 20, 20-1, 20-2 of the dirt capture system 70 not to have an essentially central feed opening 22 via which the dirt particles separated with the aid of the tank-covering screen 20, 20-1, 20-2 pass into the dirt-collecting region 71, 71-1, 71-2. Rather, this feed opening 22 may also be designed in the form of a gap which is provided along a peripheral region of the tank-covering screen 20, 20-1, 20-2.

[0078] It is also conceivable, in principle, for the feed opening 22 to be covered by a coarse screen, wherein this coarse screen should preferably have a mesh width which is greater than the mesh width of the tank-covering screen 20, 20-1, 20-2. The provision of such a coarse screen can effectively prevent, for example, items of cutlery or other utensils, as opposed to dirty-water particles, from accidentally getting into the dirt-collecting region 71,

71-1, 71-2.

[0079] Although the solution according to the invention in Figures 1 to 3 has been described in conjunction with a transport washing machine 50, it is of course also conceivable for a washing machine designed in the form of a programmable machine to be equipped with a dirt capture system 70.

10 Claims

1. Washing machine having at least one washing system (51, 52) designed as a recirculation circuit, in particular industrial dish- or utensil-washing machine, which is designed as a programmable machine or as a transport washing machine (50), the at least one washing system (51, 52) having a nozzle system with at least one washing nozzle (13, 13-1, 13-2) for spraying washing liquid onto the batch to be cleaned, a washing tank (14; 14-1, 14-2) for capturing at least part of the sprayed washing liquid, and a washing pump (11; 11-1, 11-2) for feeding washing liquid collected in the washing tank (14; 14-1, 14-2) to the at least one washing nozzle (13, 13-1, 13-2), and, furthermore, a dirt capture system (70) assigned to the at least one washing system (51, 52) being provided in order to separate dirt particles from the sprayed washing liquid flowing back into the washing tank (14; 14-1, 14-2) as a result of gravity, and a dirty-water pump (74; 74-1, 74-2) connected to the dirt capture system (70) and intended for discharging the dirt particles from the dirt capture system (70), wherein a control device (100) is designed for the mutually coordinated activation of the washing pump (11; 11-1, 11-2) and of the dirty-water pump (74; 74-1, 74-2), so that the recirculation circuit of the washing system (51, 52) can be interrupted for a first time span (T1), **characterized in that** the control device (100) is designed for starting the activation of the dirty-water pump (74; 74-1, 74-2) within this first time span (T1) however not from the beginning of the first time span (T1) and for continuing for a second time span (T2), the control device (100) being designed for deactivating the washing pump (11; 11-1, 11-2) in the first time span (T1), the first time span (T1) being 0,5 to 10 seconds, and for activating the dirty-water pump (74; 74-1, 74-2) in the second time span (T2), the second time span (T2) being 1 to 20 seconds.
2. Washing machine according to Claim 1, the control device (100) being designed for the cyclical repetition of the mutually coordinated activation of the washing pump (11; 11-1, 11-2) and of the dirty-water pump (74; 74-1, 74-2).
3. Washing machine according to Claim 1 or 2, the control device (100) being designed for deactivating the

- washing pump (11; 11-1, 11-2) in a first time span (T1) of 1 to 3 seconds, and/or for activating the dirty-water pump (74; 74-1, 74-2) in a second time span (T2) of 2 to 10 seconds.
4. Washing machine according to one of the preceding claims, the control device (100) of transport washing machines being designed to stop the batch conveyor belt within the first time span (T1).
 5. Washing machine according to one of the preceding claims, the control device (100) of programmable machines being designed to prolong a predetermined washing time per batch by the amount of the first time span (T1).
 6. Washing machine according to one of the preceding claims, the control device (100) of transport washing machines being designed to vary the first time span (T1) and/or the second time span (T2) as a function of the transport speed of a batch, and/or as a function of a rinsing-liquid quantity.
 7. Washing machine according to one of the preceding claims, the control device (100) of transport washing machines being designed to vary a repetition rate of the mutually coordinated activation of the washing pump (11; 11-1, 11-2) and of the dirty-water pump (74; 74-1, 74-2) as a function of the transport speed of a batch, and/or as a function of a rinsing-liquid quantity.
 8. Method for discharging dirt particles from a washing machine according to one of the preceding claims, in which the recirculation circuit of the washing system (51, 52) is interrupted for a first time span (T1) as a result of the mutually coordinated activation of the washing pump (11; 11-1, 11-2) and of the dirty-water pump (74; 74-1, 74-2), characterized in that the washing pump (11; 11-1, 11-2) is deactivated in the first time span (T1), the first time span (T1) being 0,5 to 10 seconds, and that the dirty-water pump (74; 74-1, 74-2) is activated in the second time span (T2), within the first time span, however not from the beginning of the first time span (T1), the second time span (T2) being 1 to 20 seconds.
 9. Method according to Claim 8, the mutually coordinated activation of the washing pump (11; 11-1, 11-2) and of the dirty-water pump (74; 74-1, 74-2) for interrupting the recirculation circuit or for discharging the dirt particles is repeated cyclically.
 10. Method according to Claim 8 or 9, the first time span (T1) being 1 to 3 seconds, and/or the second time span (T2) being 2 to 10 seconds.
 11. Method according to one of Claims 8 to 10, in the case of transport washing machines the transport of a batch being stopped within the first time span (T1).
 12. Method according to one of Claims 8 to 11, in the case of a programmable machine a predetermined washing time for a batch being prolonged by the amount of the first time span (T1).
 13. Method according to one of Claims 8 to 12, in the case of transport washing machines the first time span (T1) and/or the second time span (T2) being varied as a function of the transport speed of a batch, and/or as a function of a rinsing-liquid quantity.
 14. Method according to one of Claims 8 to 13, in the case of transport washing machines a repetition rate of the mutually coordinated activation of the washing pump (11; 11-1, 11-2) and of the dirty-water pump (74; 74-1, 74-2) being varied as a function of the transport speed of a batch, and/or as a function of a rinsing-liquid quantity.
 15. Use of a control device (100) according to one of Claims 1 to 7 for carrying out the method according to one of Claims 8 to 14.

Patentansprüche

1. Spülmaschine mit mindestens einem Spülsystem (51, 52), das als ein Rezirkulationskreislauf ausgebildet ist, insbesondere industrielle Spülmaschine für Geschirr oder Besteck, die als eine programmierbare Maschine oder als eine Transportspülmaschine (50) ausgebildet ist, wobei das mindestens eine Spülsystem (51, 52) ein Düsensystem mit mindestens einer Spüldüse (13, 13-1, 13-2) zum Sprühen von Spülflüssigkeit auf die zu reinigende Charge, einen Spülbehälter (14; 14-1, 14-2) zum Auffangen zumindest eines Teils der versprühten Spülflüssigkeit und eine Spülpumpe (11; 11-1, 11-2) zum Zuführen von in dem Spülbehälter (14; 14-1, 14-2) aufgefangener Spülflüssigkeit zu der mindestens einen Spüldüse (13, 13-1, 13-2) aufweist, und wobei des Weiteren ein Schmutzauffangsystem (70), das dem mindestens einen Spülsystem (51, 52) zugeordnet ist, um Schmutzpartikel von der versprühten Spülflüssigkeit, die aufgrund der Schwerkraft zurück in den Spülbehälter (14; 14-1, 14-2) strömt, zu trennen, und eine Schmutzwasserpumpe (74; 74-1, 74-2), die mit dem Schmutzauffangsystem (70) verbunden ist und dazu bestimmt ist, die Schmutzpartikel aus dem Schmutzauffangsystem (70) abzuführen, vorgesehen sind, wobei eine Steuervorrichtung (100) für die gegenseitig koordinierte Aktivierung der Spülpumpe (11; 11-1, 11-2) und der Schmutzwasserpumpe (74; 74-1, 74-2) ausgelegt ist, sodass der Rezirkulations-

- kreislauf des Spülsystems (51, 52) für eine erste Zeitspanne (T1) unterbrochen werden kann, **dadurch gekennzeichnet, dass** die Steuervorrichtung (100) zum Starten der Aktivierung der Schmutzwasserpumpe (74; 74-1, 74-2) innerhalb dieser ersten Zeitspanne (T1), jedoch nicht ab Beginn der ersten Zeitspanne (T1), und zum Fortführen für eine zweite Zeitspanne (T2) ausgelegt ist, wobei die Steuervorrichtung (100) zum Deaktivieren der Spülpumpe (11; 11-1, 11-2) in der ersten Zeitspanne (T1), wobei die erste Zeitspanne (T1) 0,5 bis 10 Sekunden beträgt, und zum Aktivieren der Schmutzwasserpumpe (74; 74-1, 74-2) in der zweiten Zeitspanne (T2), wobei die zweite Zeitspanne (T2) 1 bis 20 Sekunden beträgt, ausgelegt ist.
2. Spülmaschine nach Anspruch 1, wobei die Steuervorrichtung (100) zur zyklischen Wiederholung der gegenseitig abgestimmten Ansteuerung der Spülpumpe (11; 11-1, 11-2) und der Schmutzwasserpumpe (74; 74-1, 74-2) ausgebildet ist.
 3. Spülmaschine nach Anspruch 1 oder 2, wobei die Steuervorrichtung (100) zum Deaktivieren der Spülpumpe (11; 11-1, 11-2) in einer ersten Zeitspanne (T1) von 1 bis 3 Sekunden und/oder zum Aktivieren der Schmutzwasserpumpe (74; 74-1, 74-2) in einer zweiten Zeitspanne (T2) von 2 bis 10 Sekunden ausgebildet ist.
 4. Spülmaschine nach einem der vorhergehenden Ansprüche, wobei die Steuervorrichtung (100) von Transportspülmaschinen zum Anhalten des Chargeförderbands innerhalb der ersten Zeitspanne (T1) ausgebildet ist.
 5. Spülmaschine nach einem der vorhergehenden Ansprüche, wobei die Steuervorrichtung (100) von programmierbaren Maschinen dazu ausgelegt ist, eine vorbestimmte Spülzeit pro Charge um den Betrag der ersten Zeitspanne (T1) zu verlängern.
 6. Spülmaschine nach einem der vorhergehenden Ansprüche, wobei die Steuervorrichtung (100) von Transportspülmaschinen dazu ausgelegt ist, die erste Zeitspanne (T1) und/oder die zweite Zeitspanne (T2) in Abhängigkeit von der Transportgeschwindigkeit einer Charge und/oder in Abhängigkeit von einer Spülflüssigkeitsmenge zu variieren.
 7. Spülmaschine nach einem der vorhergehenden Ansprüche, wobei die Steuervorrichtung (100) von Transportspülmaschinen dazu ausgelegt ist, eine Wiederholungsrate der gegenseitig abgestimmten Aktivierung der Spülpumpe (11; 11-1, 11-2) und der Schmutzwasserpumpe (74; 74-1, 74-2) in Abhängigkeit von der Transportgeschwindigkeit einer Charge und/oder in Abhängigkeit von einer Spülflüssigkeitsmenge zu variieren.
 8. Verfahren zum Abführen von Schmutzpartikeln aus einer Spülmaschine nach einem der vorhergehenden Ansprüche, wobei der Rezirkulationskreislauf des Spülsystems (51, 52) infolge der gegenseitig abgestimmten Aktivierung der Spülpumpe (11; 11-1, 11-2) und der Schmutzwasserpumpe (74; 74-1, 74-2) für eine erste Zeitspanne (T1) unterbrochen wird, **dadurch gekennzeichnet, dass** die Spülpumpe (11; 11-1, 11-2) in der ersten Zeitspanne (T1) deaktiviert wird, wobei die erste Zeitspanne (T1) 0,5 bis 10 Sekunden beträgt, und dass die Schmutzwasserpumpe (74; 74-1, 74-2) in der zweiten Zeitspanne (T2), innerhalb der ersten Zeitspanne, jedoch nicht ab Beginn der ersten Zeitspanne (T1), aktiviert wird, wobei die zweite Zeitspanne (T2) 1 bis 20 Sekunden beträgt.
 9. Verfahren nach Anspruch 8, wobei die gegenseitig abgestimmte Aktivierung der Spülpumpe (11; 11-1, 11-2) und der Schmutzwasserpumpe (74; 74-1, 74-2) zur Unterbrechung des Rezirkulationskreislaufs bzw. zur Abführung der Schmutzpartikel zyklisch wiederholt wird.
 10. Verfahren nach Anspruch 8 oder 9, wobei die erste Zeitspanne (T1) 1 bis 3 Sekunden beträgt, und/oder die zweite Zeitspanne (T2) 2 bis 10 Sekunden beträgt.
 11. Verfahren nach einem der Ansprüche 8 bis 10, wobei, im Fall von Transportspülmaschinen, der Transport einer Charge innerhalb der ersten Zeitspanne (T1) gestoppt wird.
 12. Verfahren nach einem der Ansprüche 8 bis 11, wobei, im Fall einer programmierbaren Maschine, eine vorbestimmte Spülzeit für eine Charge um den Betrag der ersten Zeitspanne (T1) verlängert wird.
 13. Verfahren nach einem der Ansprüche 8 bis 12, wobei, im Fall von Transportspülmaschinen, die erste Zeitspanne (T1) und/oder die zweite Zeitspanne (T2) in Abhängigkeit von der Transportgeschwindigkeit einer Charge und/oder in Abhängigkeit von einer Spülflüssigkeitsmenge variiert werden.
 14. Verfahren nach einem der Ansprüche 8 bis 13, wobei, im Fall einer Transportspülmaschine, eine Wiederholungsrate der gegenseitig abgestimmten Aktivierung der Spülpumpe (11; 11-1, 11-2) und der Schmutzwasserpumpe (74; 74-1, 74-2) in Abhängigkeit von der Transportgeschwindigkeit einer Charge und/oder in Abhängigkeit von einer Spülflüssigkeitsmenge variiert wird.

15. Verwendung einer Steuervorrichtung (100) nach einem der Ansprüche 1 bis 7 zur Durchführung des Verfahrens nach einem der Ansprüche 8 bis 14.

Revendications

1. Machine à laver avec au moins un système de lavage (51, 52) conçue comme un circuit de recirculation, notamment machine industrielle à laver la vaisselle ou les ustensiles, qui est conçue comme une machine programmable ou comme une machine à laver à bande transporteuse (50), l'au moins un système de lavage (51, 52) ayant un système de buses avec au moins une buse de lavage (13, 13-1, 13-2) pour pulvériser un liquide de lavage sur le lot à nettoyer, un réservoir de lavage (14 ; 14-1, 14-2) pour capturer au moins une partie du liquide de lavage pulvérisé, et une pompe de lavage (11 ; 11-1, 11-2) pour introduire le liquide de lavage recueilli dans le réservoir de lavage (14 ; 14-1, 14-2) à l'au moins une buse de lavage (13, 13-1, 13-2), et, en outre, un système de capture de saletés (70) attribué à l'au moins un système de lavage (51, 52) étant prévus pour séparer les particules de saleté du liquide de lavage pulvérisé refluant dans le réservoir de lavage (14 ; 14-1, 14-2) du fait de la gravité, et une pompe à eau sale (74 ; 74-1, 74-2) reliée au système de capture de saletés (70) et destinée à évacuer les particules de saletés du système de capture de saletés (70), dans lequel un dispositif de commande (100) est conçu pour l'activation mutuellement coordonnée de la pompe de lavage (11 ; 11-1, 11-2) et de la pompe à eau sale (74 ; 74-1, 74-2), afin que le circuit de recirculation du système de lavage (51, 52) puisse être interrompu pendant un premier laps de temps (T1), **caractérisé en ce que** le dispositif de commande (100) est conçu pour démarrer l'activation de la pompe à eau sale (74 ; 74-1, 74-2) au sein de ce premier laps de temps (T1) mais pas depuis le début du premier laps de temps (T1) et pour continuer pendant un deuxième laps de temps (T2), le dispositif de commande (100) étant conçu pour désactiver la pompe de lavage (11 ; 11-1, 11-2) dans le premier laps de temps (T1), le premier laps de temps (T1) étant de 0,5 à 10 secondes, et pour activer la pompe à eau sale (74 ; 74-1, 74-2) dans le deuxième laps de temps (T2), le deuxième laps de temps (T2) étant de 1 à 20 secondes.
2. Machine à laver selon la revendication 1, dans laquelle le dispositif de commande (100) est conçu pour la répétition cyclique de l'actionnement mutuellement coordonné de la pompe de lavage (11 ; 11-1, 11-2) et de la pompe à eau sale (74 ; 74-1, 74-2).
3. Machine à laver selon la revendication 1 ou 2, dans laquelle le dispositif de commande (100) est conçu

pour désactiver la pompe de lavage (11 ; 11-1, 11-2) dans un premier laps de temps (T1) de 1 à 3 secondes et/ou pour activer la pompe à eau sale (74 ; 74-1, 74-2) dans un deuxième laps de temps (T2) de 2 à 10 secondes.

4. Machine à laver selon l'une des revendications précédentes, dans laquelle le dispositif de commande (100) des machines à laver à bande transporteuse est conçu pour arrêter la courroie de convoyeur de lots au sein du premier laps de temps (T1).
5. Machine à laver selon l'une des revendications précédentes, dans laquelle le dispositif de commande (100) de machines programmables est conçu pour prolonger un temps de lavage prédéterminé par lot de la durée du premier laps de temps (T1) .
6. Machine à laver selon l'une des revendications précédentes, dans laquelle le dispositif de commande (100) des machines à laver à bande transporteuse est conçu pour modifier le premier laps de temps (T1) et/ou le deuxième laps de temps (T2) en fonction de la vitesse de transport d'un lot et/ou en fonction d'une quantité de liquide de rinçage.
7. Machine à laver selon l'une des revendications précédentes, dans laquelle le dispositif de commande (100) des machines à laver à bande transporteuse est conçu pour faire varier un taux de répétition de l'activation mutuellement coordonnée de la pompe de lavage (11 ; 11-1, 11-2) et de la pompe à eau sale (74 ; 74-1, 74-2) en fonction de la vitesse de transport d'un lot et/ou en fonction d'une quantité de liquide de rinçage.
8. Procédé pour évacuer des particules de saleté d'une machine à laver selon l'une des revendications précédentes, dans lequel le circuit de recirculation du système de lavage (51, 52) est interrompu pendant un premier laps de temps (T1) par suite de l'activation mutuellement coordonnée de la pompe de lavage (11 ; 11-1, 11-2) et de la pompe à eau sale (74 ; 74-1, 74-2), **caractérisé en ce que** la pompe de lavage (11 ; 11-1, 11-2) est désactivée dans le premier laps de temps (T1), le premier laps de temps (T1) étant de 0,5 à 10 secondes, et **en ce que** la pompe à eau sale (74 ; 74-1, 74-2) est activée dans le deuxième laps de temps (T2), au sein du premier laps de temps, mais pas depuis le début du premier laps de temps (T1), le deuxième laps de temps (T2) étant de 1 à 20 secondes.
9. Procédé selon la revendication 8, dans lequel l'activation mutuellement coordonnée de la pompe de lavage (11 ; 11-1, 11-2) et de la pompe à eau sale (74 ; 74-1, 74-2) pour interrompre le circuit de recircula-

tion ou pour évacuer les particules de saleté est répétée cycliquement.

10. Procédé selon la revendication 8 ou 9, dans lequel le premier laps de temps (T1) est de 1 à 3 secondes et/ou le deuxième laps de temps (T2) est de 2 à 10 secondes. 5
11. Procédé selon l'une des revendications 8 à 10, dans lequel, dans le cas de machines à laver à bande transporteuse, le transport d'un lot est arrêté au sein du premier laps de temps (T1). 10
12. Procédé selon l'une des revendications 8 à 11, dans lequel, dans le cas d'une machine programmable, un temps de lavage prédéterminé pour un lot est prolongé de la durée du premier laps de temps (T1). 15
13. Procédé selon l'une des revendications 8 à 12, dans lequel, dans le cas de machines à laver à bande transporteuse, le premier intervalle de temps (T1) et/ou le deuxième intervalle de temps (T2) est modifié en fonction de la vitesse de transport d'un lot et/ou en fonction d'une quantité de liquide de rinçage. 20 25
14. Procédé selon l'une des revendications 8 à 13, dans lequel, dans le cas de machines à laver à bande transporteuse, on fait varier un taux de répétition de l'activation mutuellement coordonnée de la pompe de lavage (11 ; 11-1, 11-2) et de la pompe à eau sale (74 ; 74-1, 74-2) en fonction de la vitesse de transport d'un lot et/ou en fonction d'une quantité de liquide de rinçage. 30 35
15. Utilisation d'un dispositif de commande (100) selon l'une des revendications 1 à 7 pour effectuer le procédé selon l'une des revendications 8 à 14. 40

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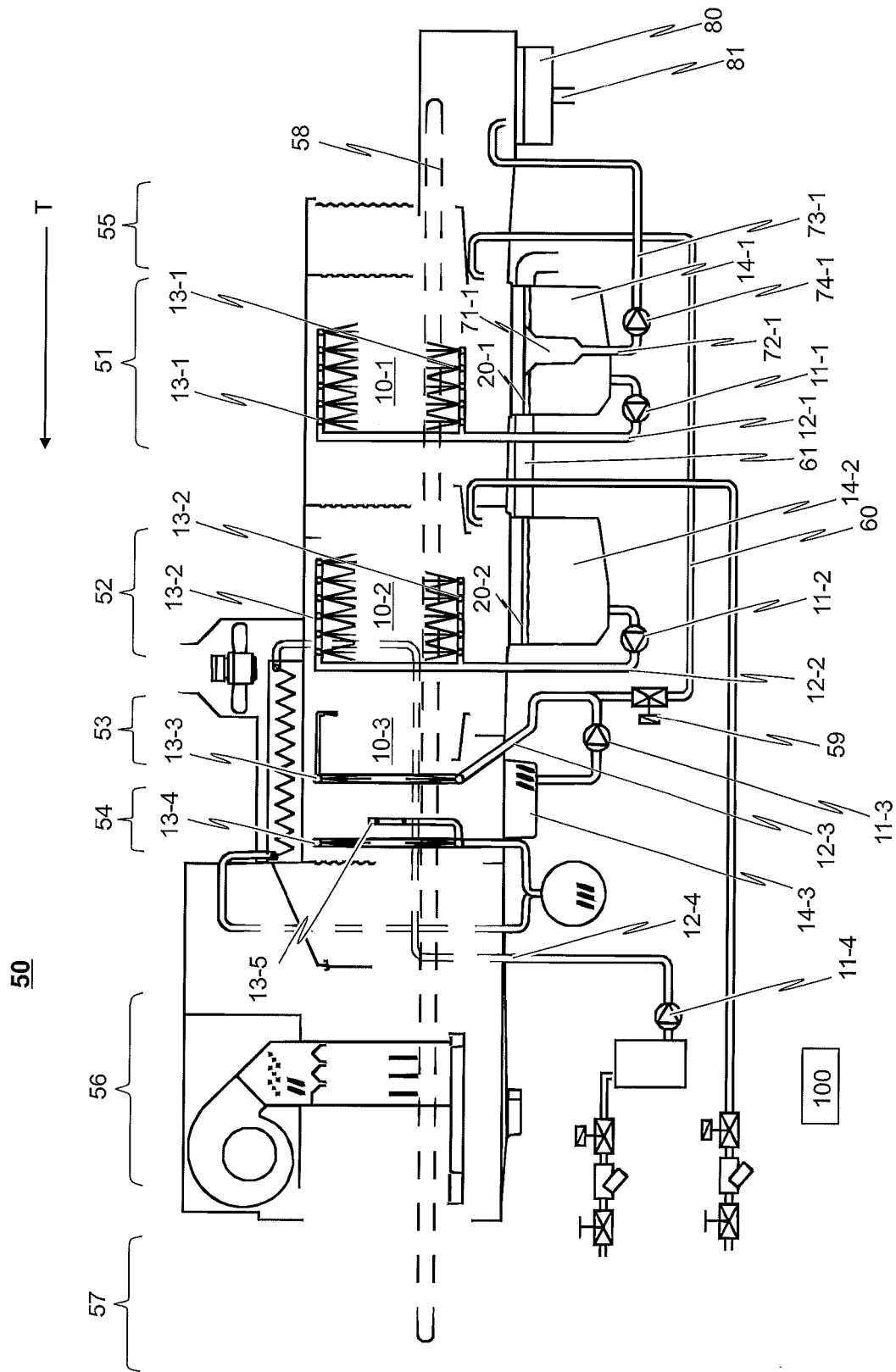
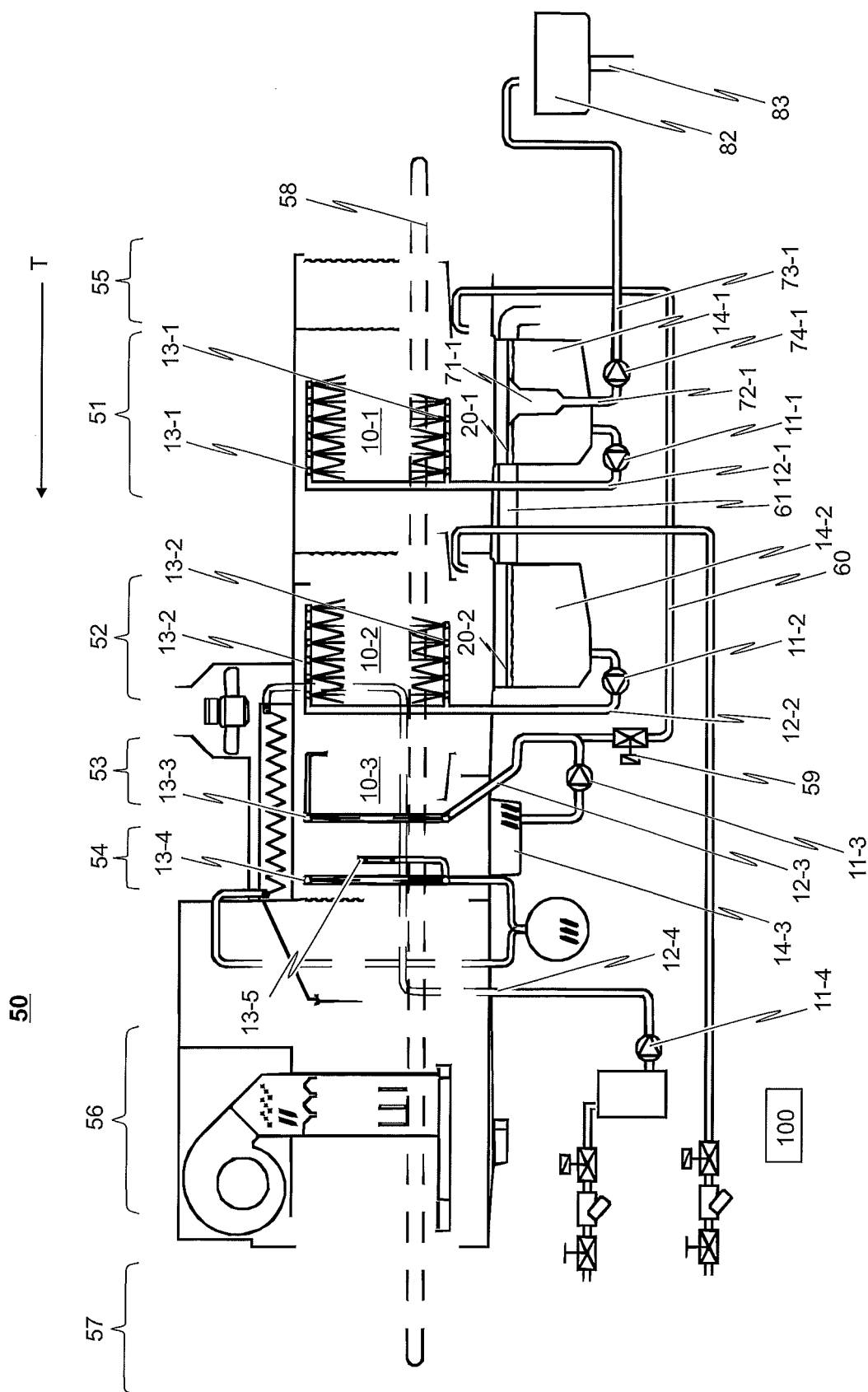


Fig. 1



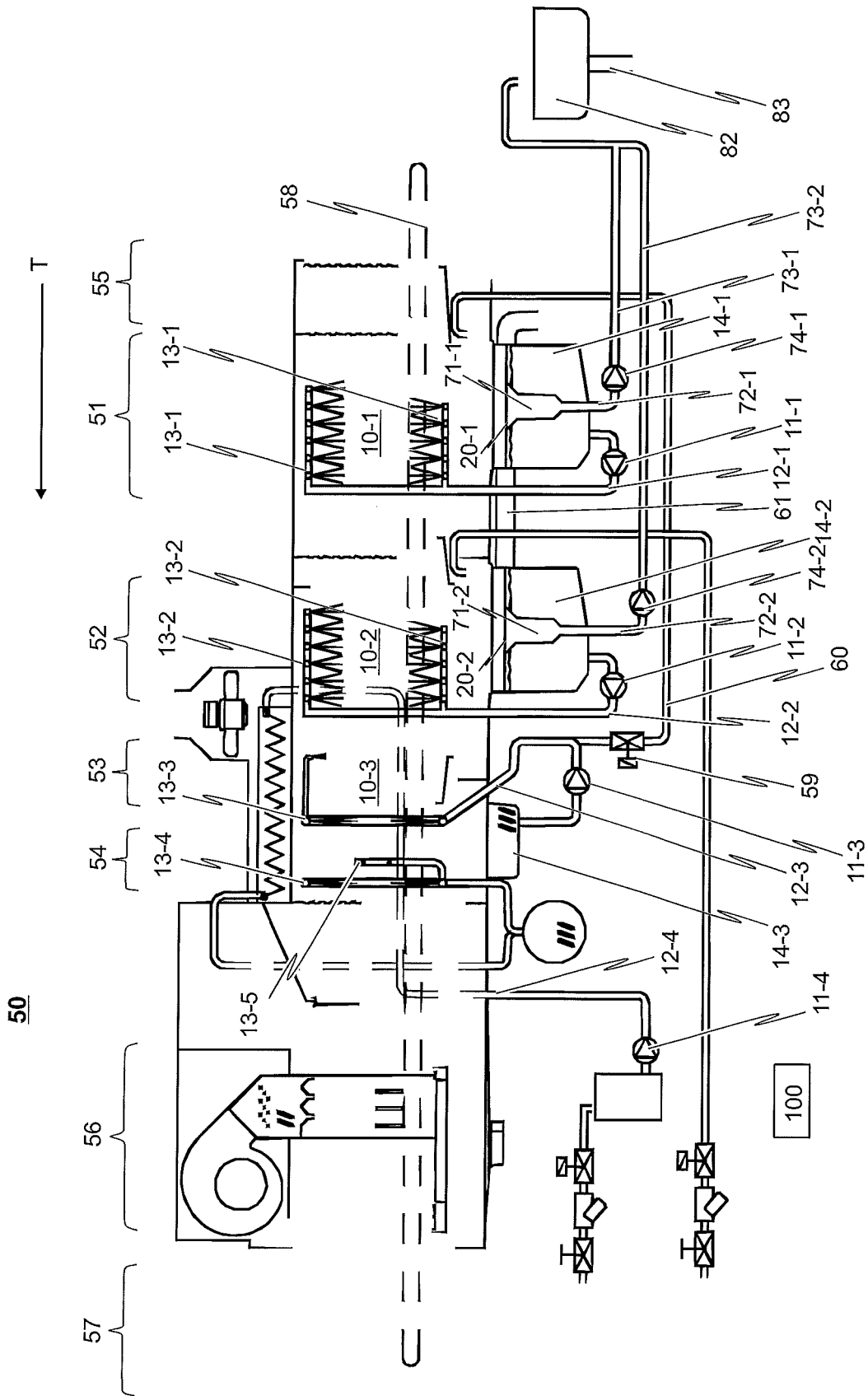


Fig. 3

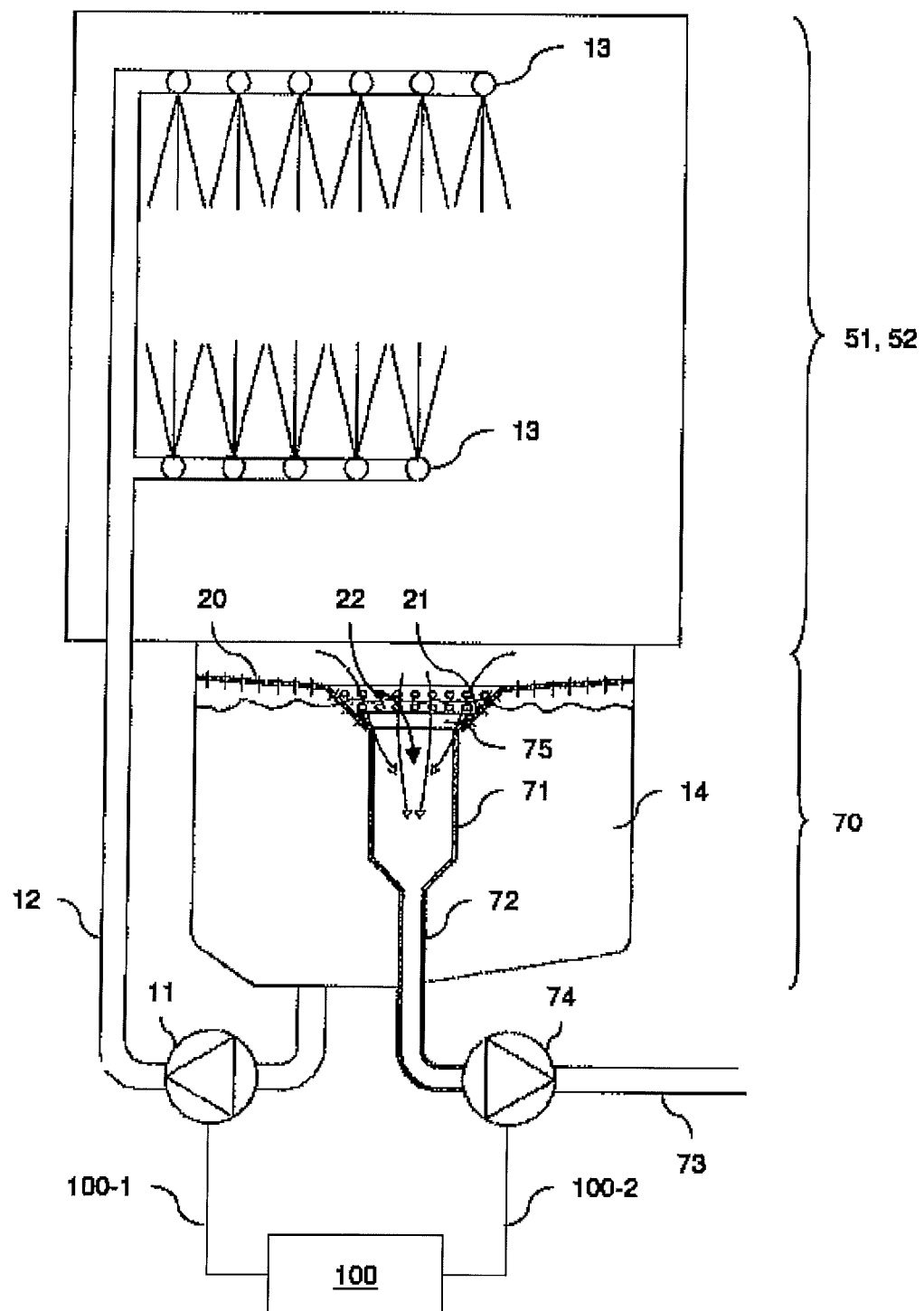


Fig. 4

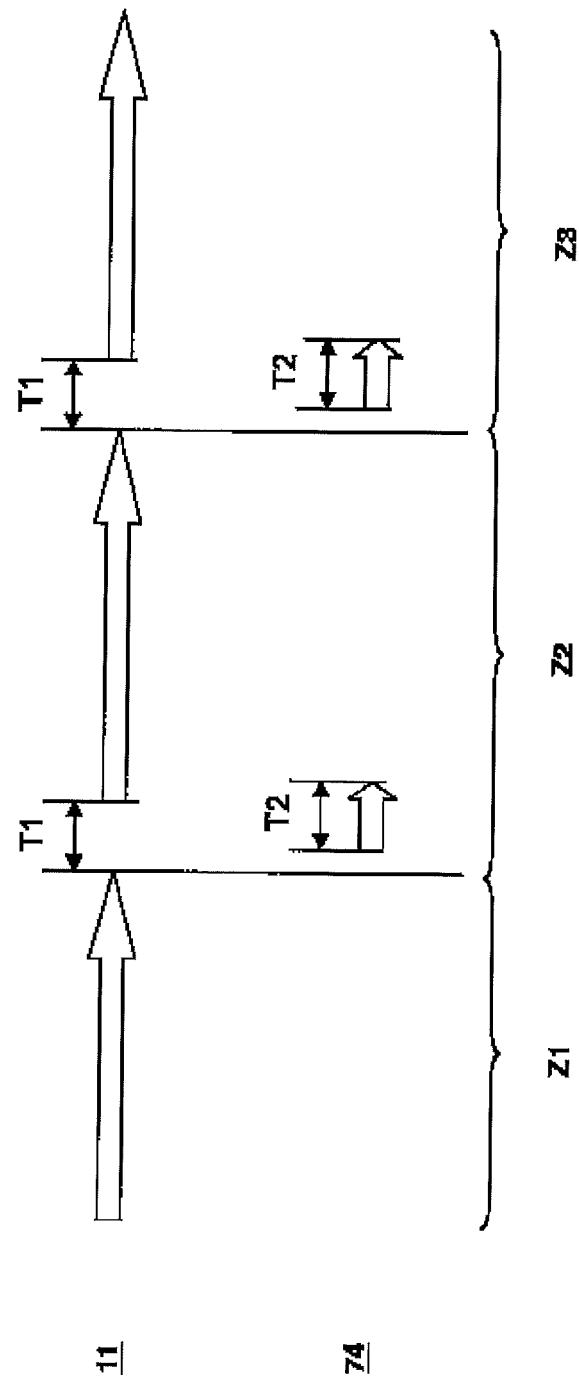


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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