

(19)



(11)

**EP 2 648 594 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:

**08.08.2018 Bulletin 2018/32**

(51) Int Cl.:

**A47L 15/24<sup>(2006.01)</sup>**

(86) International application number:

**PCT/US2011/062343**

(21) Application number: **11791727.8**

(22) Date of filing: **29.11.2011**

(87) International publication number:

**WO 2012/078400 (14.06.2012 Gazette 2012/24)**

**(54) LOADING APPARATUS FOR A CONVEYOR DISHWASHER**

**LADEVORRICHTUNG FÜR BANDSPÜLMASCHINE**

**APPAREIL DE CHARGEMENT POUR UN LAVE-VAISSELLE À CONVOYEUR**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO  
PL PT RO RS SE SI SK SM TR**

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(30) Priority: **06.12.2010 DE 102010062457**

(43) Date of publication of application:

**16.10.2013 Bulletin 2013/42**

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## Description

**[0001]** The invention relates to a loading apparatus for a conveyor dishwasher, in particular commercial flight-type dishwasher. The invention also relates to a combination of a conveyor dishwasher with a loading apparatus and to a method of loading a conveyor dishwasher with the aid of a loading apparatus.

**[0002]** Conveyor dishwashers (warewashers) are used commercially. In contrast to domestic dishwashers, in which the washware which is to be cleaned remains stationary in the machine as it is cleaned, the washware in conveyor dishwashers is transported through various treatment zones of the machine. In the case of conveyor dishwashers, the washware, for example crockery, pots, glasses, cutlery and other articles which are to be cleaned, is conveyed through a number of treatment zones, for example pre-wash zone(s), main-wash zone(s), post-wash or pre-rinse zone(s), final-rinse zone(s) and drying zone(s).

**[0003]** For transporting washware in a transporting direction through the conveyor dishwasher, use is made of a transporting apparatus which usually has compartments for receiving washware. In a flight-type dishwasher, the compartments may be formed by supporting fingers on a transporting belt of the transporting apparatus. All the articles and items of washware which are to be cleaned in the dishwasher are conveyed through the respective zones of the dishwasher by means of this transporting belt.

**[0004]** It is usually the case that the items of washware, prior to being introduced into the transporting belt, are pre-sorted and stacked according to type. For loading into the transporting belt, the stack of plates, bowls or trays is destacked again from time to time and manually introduced according to type into transporting-belt compartments. This sorting by type has advantages for the operator both in the loading region and in the unloading region of the conveyor dishwasher.

**[0005]** The advantages in the loading region are attained in particular as a result of an ergonomic procedure, and of a reduction in twisting of the body and movements of the body owing to the same movements being repeated a number of times. The advantages in the unloading region, in contrast, reside in the fact that more than one item of washware can be removed in a single movement, this making it possible to have an ergonomic procedure, and to reduce twisting of the body and movements of the body owing to the same movements being repeated a number of times. Further, an apparatus for supplying tableware to a conveyor dishwasher comprising a separating arrangement by means of which the items of washware received in a stacking magazine are discharged one by one is described in the prior art, for instance in document JP H07 111964 A with some details of the separating arrangement also disclosed in JP H03 16825 Y2.

**[0006]** The object of the invention is to allow as far as

possible automatic destacking of the items of washware into the flight-type dishwasher, it nevertheless being possible to maintain the advantages of manual stack formation. The intention is also to provide a corresponding method of loading such a conveyor dishwasher.

**[0007]** In respect of the apparatus, this object is achieved by a loading apparatus for a flight-type dishwasher according to Patent Claim 1.

**[0008]** Accordingly, the invention proposes a loading apparatus for a flight-type dishwasher wherein the loading apparatus has at least one stacking magazine by means of which washware which is to be cleaned, in particular plates, bowls or trays or similar stackable items of washware, is received in a stackwise manner. The at least one stacking magazine has a separating arrangement by means of which the items of washware received in the stacking magazine are discharged one by one. A conveying arrangement, to which the items of washware are discharged one by one by the separating arrangement, is provided here and, by means of the conveying arrangement, the items of washware discharged one by one by the separating arrangement are fed to a transporting belt of the flight-type dishwasher.

**[0009]** The separating arrangement has at least one thread which can be rotated relative to the washware received in the stacking magazine. Peripheral regions of individual items of washware can be received between the thread turns of the at least one thread such that, upon rotation of the thread relative to the washware received in the stacking magazine, the items of washware are moved in the vertical direction, wherein a respectively lowermost item of washware is discharged out of the stacking magazine.

**[0010]** Provision of the separating arrangement means that individual items of washware can be automatically destacked from the stack of washware received in the stacking magazine and discharged to the conveying arrangement, which, in turn, is designed to feed the destacked (separated) items of washware to the transporting belt of the conveyor dishwasher, so that they can be introduced there, likewise automatically, into transporting-belt compartments.

**[0011]** The advantages which can be achieved by the solution according to the invention are obvious: the stacking magazine of the loading apparatus according to the invention makes it possible for the washware which is to be cleaned to continue to be pre-sorted manually (or else also, optionally, in an automated manner) and to be stacked according to type. On the other hand, the separating arrangement then performs the task of destacking the items of washware, and this cuts back on a first manual operating step. Finally, the conveying arrangement serves for the automated introduction of the previously destacked and separated items of washware into a transporting belt of the conveyor dishwasher, for example into compartments of the transporting belt of the dishwasher. This does away with two elementary operating steps which were previously carried out manually, and conse-

quently the loading apparatus according to the invention cuts back on operating time or operating staff.

**[0012]** In the case of the solution according to the invention, stacking is realized as follows. Either, as has been the case until now, stacks of washware, i.e. items of washware stacked according to type, are formed on preliminary clearing or preparation benches of the conveyor dishwasher and are then carried to the loading apparatus and introduced into the at least one stacking magazine provided for this purpose. As an alternative to this, however, it is also possible for a stacking to take place directly at the loading apparatus in the at least one stacking magazine provided for this purpose. It is possible here for plates, bowls, trays or other stackable crockery to be introduced into the stacking magazine. It is conceivable here for a plurality of stacking magazines to be provided one beside the other in the loading apparatus. The first alternative of the loading apparatus according to the invention provides that the at least one thread of the separating arrangement is configured as an internal thread of a drum which can be rotated relative to the washware received in the stacking magazine and in which the washware can be stacked. In the case of this embodiment, it should preferably be possible for the entire peripheral region of the items of washware to be received by the thread turns of the internal thread. Since the items of washware rest on helices of the internal thread over their peripheral region, it is also possible for the items of washware to be stacked particularly straightforwardly and in the correct manner. In addition, uniform and skew-free guidance of the washware is ensured. The drum here constitutes a particularly straightforward design solution for destacking individual items of washware. The second alternative of the loading apparatus according to the invention provides that the at least one thread of the separating arrangement is configured as the external thread of at least two, and preferably three, parallel conveying belts which can be rotated relative to the washware received in the stacking magazine and between which the washware which is to be cleaned can be stacked. It should be possible here for preferably individual peripheral regions of the items of washware to be received by regions of the thread turns of the respective conveying belts. The separating arrangement thus no longer needs a corresponding drum with internal thread, which simplifies the construction of the magazine and reduces the weight thereof. This construction nevertheless allows similarly automated destacking of the items of washware. The provision of a plurality of conveying belts, in addition, has the advantage that the separating arrangement can be set in a relatively flexible manner to the size, and in particular the diameter, of the items of washware which are stacked in the stacking magazine and are to be separated from the stack of washware with the aid of the conveying belts, to be precise by the conveying belts being arranged correspondingly closer together or further apart from one another. Preferred developments of the loading apparatus ac-

cording to the invention are indicated in patent claims 2 to 6.

**[0013]** It is advantageous, in principle, if a drive arrangement is also provided for driving the at least one thread of the separating arrangement, as well as a control arrangement for activating the drive arrangement. In order to allow fully automated destacking of the individual items of washware and fully automated introduction of the destacked items of washware into a transporting belt of a flight-type dishwasher, it is advantageous in this context, in particular, if the control arrangement is designed to activate the drive arrangement in dependence on the transporting speed of the transporting belt of the flight-type dishwasher and to set the rotary speed of the at least one thread of the separating arrangement in dependence on the transporting speed of the transporting belt.

**[0014]** In a particularly preferred realization of the last-mentioned embodiment of the loading apparatus according to the invention, it is provided that the control arrangement is designed to set the rotary speed of the at least one thread of the separating arrangement such that the number of items of washware discharged out of the stacking magazine per unit of time is identical to the number of items of washware which are fed to the transporting belt of the flight-type dishwasher, and can be received by the transporting belt, per unit of time and this can effectively prevent the situations where, on the one hand, the transporting belt of the flight-type dishwasher is fed too many items of washware per unit of time, which would result in a build-up or overloading on the transporting belt in the loading zone of the conveyor dishwasher, and, on the other hand, the transporting belt of the flight-type dishwasher is fed too few items of washware per unit of time, which would result in insufficient loading of the transporting belt in the loading zone of the conveyor dishwasher. The speed here at which the items of washware discharged by the separating arrangement are fed to the transporting belt of the conveyor dishwasher with the aid of the conveying arrangement should preferably be considered to be constant.

**[0015]** According to a particular aspect of the last-mentioned embodiment of the solution according to the invention, the rotary speed of the at least one thread of the separating arrangement can be set not just in dependence on the transporting speed of the transporting belt, but also in dependence on the type of washware. This takes account of the fact that comparatively large items of washware, for example plates or trays, usually take up more space on the transporting belt of the conveyor dishwasher than smaller items of washware, for example saucers or bowls.

**[0016]** It is possible, in principle, for the washware to be stacked in the at least one stacking magazine with the user side upwards or downwards, without there being any risk of the magazine being blocked. While the degree of automation is high, it is thus nevertheless possible for the magazine to be handled in a flexible manner.

**[0017]** In respect of the conveying arrangement, it is conceivable for the latter to have, for example, a chute or a conveying belt by means of which the items of washware discharged one by one by the separating arrangement are fed to a transporting belt of the flight-type dishwasher. A chute here constitutes a particularly straightforward, advantageous and also efficient and, as it were, maintenance-free option by means of which the separated items of washware discharged from the stacking magazine are fed to a commercial conveyor dishwasher. A conveying belt, in contrast, makes it possible to bridge somewhat greater distances, as a result of which the stacking magazine of the loading apparatus may also be arranged further away from a loading zone or the entrance of the conveyor dishwasher.

**[0018]** For the purpose of moving the loading apparatus in three dimensions, the apparatus is preferably equipped with a chassis, which has, for example, steerable wheels or rollers. This makes it possible for the items of washware which are to be cleaned to be stacked manually, or optionally in an automated manner, in the at least one stacking magazine of the loading apparatus at any desired location of the kitchen, wherein the loading apparatus is then displaced to the entrance tunnel of the conveyor dishwasher and coupled there to the corresponding loading zone. Despite a high degree of automation, the advantages of manual stacking are thus maintained.

**[0019]** The object cited in the introduction is also achieved by a combination of a flight-type dishwasher and a loading apparatus of the type described above. As is indicated in patent claim 7, the flight-type dishwasher here, preferably at the dishwasher entrance, has a loading zone in which the at least one loading apparatus of the type mentioned above can be coupled to the flight-type dishwasher. Coupling of the at least one loading apparatus to the flight-type dishwasher takes place such that, with the aid of the conveying arrangement, the items of washware discharged one by one by the separating arrangement can be fed to a transporting belt of the flight-type dishwasher.

**[0020]** The destacking rate of the stacking magazine - and the supply rate for a conveying belt used, if appropriate, as a conveying arrangement - are set, preferably in dependence on the transporting-belt speed of the dishwasher, such that the transporting belt is charged continuously with separated items of washware. As already indicated, it is possible, depending on the three-dimensional sorting and loading sequence, for the loading apparatus to be fixed to the dishwasher or to be mobile and able to be coupled to the conveyor dishwasher in a loading region of the same. Despite a high degree of automation, the advantages of manual stacking are thus maintained.

**[0021]** Preferred developments of the combination according to the invention are indicated in patent claims 8 to 11. Accordingly, an advantageous embodiment provides that the transporting belt of the conveyor dishwasher

is of endless configuration and is provided with fingers, wherein the at least one loading apparatus is designed such that the operations of feeding the separated items of washware to the transporting belt and of introducing the separated items of washware into the transporting belt take place in a region of a transporting-belt deflection. In the case of this solution, the separated items of washware can slide in continuously between the fingers of the transporting belt, in the region of the transporting-belt deflection, without any further mechanical transfer aid or manual intervention being necessary.

**[0022]** As an alternative to the last-mentioned embodiment, the at least one loading apparatus is designed such that the operations of feeding the separated items of washware to the transporting belt and of loading the transporting belt take place in a region above a transporting-belt deflection. This realization is recommended, in particular, when the transporting belt of the conveyor dishwasher is of endless configuration, but is not equipped with any fingers. In the case of such embodiments of the transporting belt, the act of loading the transporting belt in a region above a transporting-belt deflection likewise makes it possible for the items of washware to be deposited straightforwardly and continuously on the transporting belt without an additional mechanical transfer aid or manual intervention.

**[0023]** If the flight-type dishwasher can be coupled simultaneously to a plurality of loading apparatuses arranged one beside the other, the dishwasher can be fed more washware overall, and this increases the efficiency of the dishwasher.

**[0024]** If individual stacking magazines can be assigned to individual tracks of the transporting belt, the respectively different types of washware stacked therein can be subjected to respectively suitable, track-bound cleaning processes. It is thus possible for different types of washware, for example plates, bowls, etc., to be fed simultaneously in an automated manner to the flight-type dishwasher and treated in a single, common cleaning cycle.

**[0025]** In respect of the method, the object which was mentioned in the introduction, and on which the invention is based, is achieved by the subject matter of independent patent claim 12. This claim proposes a method of loading a commercial flight-type dishwasher, wherein the method has the following method steps:

- providing a loading apparatus of the type discussed above;
- stacking washware in the at least one stacking magazine of the loading apparatus;
- coupling the loading apparatus to a loading zone of the flight-type dishwasher such that the conveying arrangement of the loading apparatus communicates with a transporting belt of the flight-type dishwasher; and
- rotating the at least one thread of the stacking magazine in dependence on a transporting-belt speed of

the flight-type dishwasher such that separated items of washware discharged out of the stacking magazine are continuously supplied to the transporting belt and received by the same.

**[0026]** In a preferred development of the method according to the invention, it is provided, prior to the loading apparatus being coupled to the loading zone of the flight-type dishwasher, the loading apparatus is displaced to a loading zone of the flight-type dishwasher.

**[0027]** The invention will be described hereinbelow with reference to the drawings, using various embodiments as examples. Identical, or functionally identical, parts are given identical designations here.

**[0028]** In the drawings:

Figure 1 shows a schematic longitudinal view of a conveyor dishwasher which can be coupled to a loading apparatus according to the invention in order for the conveyor dishwasher to be loaded in an automated manner with washware which is to be cleaned;

Figure 2 shows a sectional lateral view of a loading apparatus according to a first embodiment of the invention, the apparatus being coupled to a flight-type dishwasher;

Figure 3 shows a perspective view, as seen obliquely from above, of a further embodiment of a loading apparatus according to the invention; and

Figure 4 shows a plan view of two loading apparatuses of the first embodiment of the invention, these apparatuses being arranged one beside the other on a flight-type dishwasher.

**[0029]** Figure 1 shows a conveyor dishwasher 1 with a transporting apparatus 2 for transporting washware (not illustrated in Figure 1) in a transporting direction T through the conveyor dishwasher 1. The conveyor dishwasher 1 has at least one wash zone, for example as illustrated in Figure 1, a pre-wash zone 10 and two main-wash zones 11.1, 11.2, which are arranged downstream of the pre-wash zone 10, as seen in the transporting direction T.

**[0030]** As seen in the transporting direction T, a post-wash zone 12 is arranged downstream of the at least one wash zone 10, 11.1, 11.2, and at least one final-rinse zone, for example, as illustrated, just a single final-rinse zone 13, is arranged downstream of the post-wash zone 12. In the case of the conveyor dishwasher 1 illustrated in Figure 1, the final-rinse zone 13 is followed, in the transporting direction T of the washware, by a drying zone 14.

**[0031]** The respective zones 10, 11.1, 11.2, 12, 13, 14 of the conveyor dishwasher 1 may be separated from

one another via petitions 5. In the case of the embodiment illustrated in Figure 1, it is also the case that the entrance tunnel 3 of the conveyor dishwasher 1 itself is separated from the entrance 4 via a petition 5. The provision of the petitions 5 prevents wash liquid and final-rinse liquid from splashing and water vapour from escaping from the conveyor dishwasher 1.

**[0032]** The aforementioned treatment zones 10, 11.1, 11.2, 12, 13 of the conveyor dishwasher 1 are assigned spray nozzles 30a, 30b, 31.1a, 31.1b, 31.2a, 31.2b, 32a, 32b, 33a, 33b, 33c. These spray nozzles 30a, 30b, 31.1a, 31.1b, 31.2a, 31.2b, 32a, 32b, 33a, 33b, 33c serve for spraying liquid onto the washware which is to be treated as this washware is being transported through the respective treatment zones 10, 11.1, 11.2, 12, 13 by the transporting apparatus 2. The individual spray systems of the treatment zones 10, 11.1, 11.2, 12, 13 ensure that the washware which is to be treated is sprayed both from the upper side and from the underside.

**[0033]** In the case of the conveyor dishwasher 1 illustrated schematically in Figure 1, however, the final-rinse zone 13, in addition to having downwardly directed upper final-rinse nozzles 33a and upwardly directed lower final-rinse nozzles 33b, also has transversely directed lateral final-rinse nozzles 33c on each side of the transporting apparatus 2. The use of lateral final-rinse nozzles 33c makes it possible for the washware surfaces (crookery surfaces) to be sprayed specifically with final-rinse liquid even in occluded zones. It is precisely when the transporting system is fully loaded, for example with the crookery rack loaded with plates located one against the other, that the use of lateral final-rinse nozzles 33c in the final-rinse zone 13 has a clear advantage as far as the final-rinse effect is concerned (effective rinsing off of residues of detergents on crookery surfaces even in occluded zones) over systems in which only upper and lower final-rinse zones 33a, 33b, and no transversely directed lateral final-rinse nozzles 33c, are provided in the final-rinse zone 13.

**[0034]** The post-wash or pre-rinse zone 12, main-wash zones 11.1, 11.2 and pre-wash zone 10 are also assigned tanks (post-wash tank 22, main-wash tanks 21.1, 21.2, pre-wash tank 20) for receiving sprayed liquid and/or for providing liquid for the spray nozzles 30a, 30b, 31.1a, 31.1b, 31.2a, 31.2b, 32a, 32b, of the relevant treatment zones 10, 11.1, 11.2, 12.

**[0035]** As already indicated, in the case of the conveyor dishwasher 1 illustrated in Figure 1, final-rinse liquid, which is made of fresh water with rinse aid metered in, is sprayed onto the washware (not illustrated) via the final-rinse nozzles arranged laterally and above and beneath the transporting apparatus 2. Some of the sprayed final-rinse liquid is transported from treatment zone to treatment zone via a cascade system, counter to the transporting direction T of the washware. The rest of the final-rinse liquid sprayed in the final-rinse zone 13 is passed directly, via a valve V1 and a bypass line 6, into the pre-wash tank 20, which is assigned to the pre-wash

zone 10.

**[0036]** In the case of the cascade system, the final-rinse liquid sprayed by the final-rinse nozzles 33a, 33b, 33c flows under gravitational force from the final-rinse zone 13 into the post-wash tank 22, which is assigned to the post-wash zone 12. The final-rinse liquid which is sprayed in the final-rinse zone 13 and intercepted by the post-wash tank 22 is then delivered, with the aid of a post-wash pump 36, to the spray nozzles of the post-wash zone 12 (upper and lower post-wash nozzles 32a, 32b).

**[0037]** In a post-wash zone 12, wash liquid is rinsed off from the washware. The liquid (post-wash liquid) which accumulates here flows under gravitational force into the main-wash tank 21.1, which is assigned to the first main-wash zone 11.1. A drainage element 7, for example a drainage floor or a directing plate, is preferably provided for this purpose, the post-wash liquid sprayed by the post-wash nozzles 32a, 32b being directed thereby into the main-wash tank 21.1. According to another embodiment of the conveyor dishwasher 1, this embodiment not being illustrated, it is possible to dispense with the drainage element 7 when the main-wash tank 21.1 extends beneath the post-wash nozzles 32a, 32b of the post-wash zone 12.

**[0038]** The liquid received by the main-wash tank 21.1 of the first main-wash zone 11.1 is usually provided with a detergent and sprayed onto the washware, with the aid of a first main-wash pump 35.1, via the spray nozzles of the first main-wash zone 11.1 (upper and lower main-wash nozzles 31.1a, 31.1b). The wash liquid sprayed by the main-wash nozzles 31.1a, 31.1b then flows back under gravitational force into the main-wash tank 21.1.

**[0039]** The main-wash tank 21.1 is in fluid connection, via an overflow line 9.1, with the main-wash tank 21.2, which is assigned to the second main-wash zone 11.2. Via this overflow line 9.1, the wash liquid sprayed in the first main-wash zone 11.1 passes into the main-wash tank 21.2 of the second main-wash zone 11.2 if a sufficient quantity of wash liquid has been received in the main-wash tank 21.1 of the first main-wash zone 11.1.

**[0040]** The liquid received by the main-wash tank 21.2 of the second main-wash zone 11.2 is sprayed onto the washware, with the aid of a second main-wash pump 35.2, via the spray nozzles of the second main-wash zone 11.2 (upper and lower main-wash nozzles 31.2a, 31.2b). The wash liquid sprayed by the main-wash nozzle 31.2a, 31.2b then flows back under gravitational force into the main-wash tank 21.2 of the second main-wash zone 11.2.

**[0041]** The main-wash tank 21.2 of the second main-wash zone 11.2 is in fluid connection, via an overflow line 9.2, with the pre-wash tank 20, which is assigned to the pre-wash zone 10. Via this overflow line 9.2, the wash liquid sprayed in the second main-wash zone 11.2 passes into the pre-wash tank 20 if a sufficient quantity of wash liquid has been received in the main-wash tank 21.2 of the second main-wash zone 11.2.

**[0042]** The liquid received in the pre-wash tank 20 of the pre-wash zone 10 is then sprayed onto the washware, with the aid of a pre-wash pump 34, via the spray nozzles of the pre-wash zone 10 (upper and lower pre-wash nozzles 30a, 30b), in order for coarse soiling to be removed from the washware. The wash liquid sprayed by the pre-wash nozzles 30a, 30b then flows back under gravitational force into the pre-wash tank 20.

**[0043]** The pre-wash tank 20 is provided with an overflow line 8 which, in the event of a certain liquid level in the pre-wash tank 20 being exceeded, serves to feed the excess quantity of liquid to a waste-water system.

**[0044]** As already indicated, the liquid sprayed in the main-wash zones 11.1, 11.2 and in the pre-wash zone 10 preferably contains detergent which is metered, with the aid of a detergent-metering means (not shown in the drawings) for example into the liquid received in the main-wash tank 21.1 of the first main-wash zone 11.1.

**[0045]** As already mentioned, the final-rinse zone 13 is followed, in the transporting direction T, by the drying zone 14. In the drying zone 14, the washware is dried using dry and heated air in order for the moisture located on the washware to be blown or dried off. In order for the moisture content in the air to be kept in a range which is advantageous for drying purposes, it is conceivable for example to feed ambient air to the drying zone 14 from the outside via an opening, for example through the exit opening for washware.

**[0046]** The warm and moist air in the drying zone 14 is then drawn out of the drying zone 14 via a further opening for example with the aid of a fan 15. It is advantageous if the exhaust-air stream from the drying zone 14 passes a heat-recovery arrangement 16, in which for example a condenser may be provided. The heat-recovery arrangement 16 serves to recover at least some of the heat energy contained in the exhaust air. This recovered heat energy can be used, for example, for heating the liquid which is to be sprayed in the final-rinse zone 13.

**[0047]** If, prior to the conveyor dishwasher 1 starting up for the first time, the tanks assigned to the treatment zones 10, 11.1, 11.2, 12 (pre-wash tank 20, main-wash tanks 21.1, 21.2, post-wash tank 22) are empty or filled only to an insufficient extent, they have to be filled in the first instance via a fresh-water line 18 and/or by virtue of final-rinse liquid being sprayed in the final-rinse zone 13. The fresh-water line 18 can be connected to a fresh-water supply network via an activatable valve V3. The quantity of wash liquid available in the main-wash zones 11.1, 11.2 and in the pre-wash zone 10 can be monitored in each case with the aid of a level sensor provided in the main-wash tank 21.1, 21.2 of the first and/or second main-wash zone 11.1, 11.2, and/or with the aid of a level sensor provided in the pre-wash tank 20, and communicated to a control means 40.

**[0048]** It is possible for the final-rinse zone 13 - as illustrated in Figure 1 - to be assigned to a fresh-water tank 23 for the interim storage of at least some of the fresh water provided for final rinsing. On the one hand,

the fresh-water tank 23 is provided with a fresh-water connection, which can be connected to a fresh-water supply network via an activatable fresh-water feed valve V2. On the other hand, the fresh-water tank 23 is connected to the suction side of a final-rinse pump 37.

**[0049]** The pressure side of the final-rinse pump 37 is connected to the upstream end region 47 of a main-line system 44 via which, upon actuation of the final-rinse pump 37, fresh water is delivered out of the fresh-water tank 23 to the final-rinse nozzles 33a, 33b, 33c. In specific terms, the main-line system 44 connects the pressure side of the final-rinse pump 37 to a boiler 17. The main-line system 44 is configured here such that the liquid fed to the final-rinse nozzles 33a, 33b, 33c by the final-rinse pump 37 passes the heat-recovery arrangement 16 in the first instance, prior to reaching the boiler 17. This makes it possible for at least some of the thermal energy of the exhaust air channelled away from the drying zone 14 to be utilized for heating the liquid fed to the spray nozzles 33a, 33b, 33c via the main-line system 44.

**[0050]** Figure 2 shows a sectional lateral view of a loading apparatus 50 according to a first embodiment of the invention. The loading apparatus 50 serves the automated destacking of washware 100 which is to be cleaned and for feeding the destacked and separated items of washware 101 to a loading zone 61 of a conveyor dishwasher 1. The loading zone 61 is that region of the conveyor dishwasher 1 in which the items of washware 101 which are to be cleaned are transferred to the transporting apparatus 2 of the conveyor dishwasher 1. This region is usually located at the entrance 4 or upstream of the entrance 4.

**[0051]** In the case of the exemplary embodiment which is illustrated in Figure 2, use is made of a conveyor dishwasher 1 which, for transporting individual items of washware 101' through the respective treatment zones of the conveyor dishwasher 1, have a transporting apparatus 2 which has compartments for receiving the individual items of washware 101'. In specific terms, in the case of the embodiments illustrated in Figure 2, the compartments are formed by supporting fingers 63 on a transporting belt 62 of the transporting apparatus 2. All the articles and items of washware 101' which are to be cleaned in the dishwasher are conveyed through the respective treatment zones of the conveyor dishwasher 1 by means of this transporting belt 62.

**[0052]** As illustrated in Figure 2, the loading apparatus 50 has a stacking magazine 51 which receives the washware 100 which is to be cleaned, in this case plates, in a stacked manner. In order that the items of washware 101 received in the stacking magazine 51 can be destacked automatically in the downward direction, the stacking magazine 51 is provided with a separating arrangement by means of which the items of washware 101 received in the stacking magazine 51 are discharged separately, i.e. one by one. In specific terms, the separating arrangement has a thread which can be rotated relative to the washware 100 received in the stacking

magazine 51 and between the thread turns of which peripheral regions of individual items of washware 101 can be received such that, upon rotation of the thread, the items of washware 101 are moved in the vertical direction and a respectively lowermost item of washware 101' is discharged out of the stacking magazine 51.

**[0053]** In the case of that embodiment of the loading apparatus 50 which is illustrated in Figure 2, the thread of the separating arrangement is configured as an internal thread 52 of a drum 53 which can be rotated relative to the washware 100 received in the stacking magazine 51. The washware 100 which is to be cleaned is stacked in this drum 53, wherein - as shown in Figure 2 - the entire peripheral region of the items of washware 101 is received by the thread turns of the internal thread 52.

**[0054]** By virtue of the rotary movement of the drum 53, the stack of plates (washware 100) is conveyed downwards and individual items of washware 101 are destacked therefrom. The items of washware 101' which arrive at the bottom, and are destacked, are set down on a conveying arrangement 55. The conveying arrangement 55 is designed as a chute in the case of the embodiment illustrated in Figure 2. From the conveying arrangement 55, designed as a chute, the items of washware 101' are fed to the transporting belt 62 of the conveyor dishwasher 1 and are introduced there into the corresponding compartments of the transporting belt 62, these compartments being formed by the fingers 63. Designing the conveying arrangement 55 as a chute constitutes a particularly straightforward and cost-effective variant for feeding separated items of washware 101' to the transporting belt 62. In the case of the exemplary embodiment illustrated in Figure 2, the loading apparatus 50 is fixed to the conveyor dishwasher 1 in the loading zone 61. Depending on the three-dimensional sorting and loading sequence, it is also possible, however, for the loading apparatus 50 to be mobile, this allowing greater flexibility.

**[0055]** Figure 3 shows a perspective view, as seen obliquely from above, of a further embodiment of the loading apparatus 50' according to the invention. It is also the case with this embodiment of the loading apparatus 50' that the washware 100 stacked according to type, in this case likewise a stack of plates, is destacked automatically in a downward direction. Like the loading apparatus 50 according to Figure 2 as well, the loading apparatus 50' according to Figure 3 has a stacking magazine 51', which receives the washware 100 which is to be cleaned (in this case: plates) in a stacked manner. The separating arrangement is also provided in order that the items of washware 101' received in the stacking magazine 51' can be destacked automatically in the downward direction.

**[0056]** In the case of the embodiment according to Figure 3, the separating arrangement has three parallel conveying belts 52', 52'', 52''' which can be rotated relative to the washware 100 received in the stacking magazine 51'. The washware 100 is stacked between these con-

veying belts 52', 52", 52'''', wherein individual peripheral regions of the items of washware 101, i.e. portions of the peripheral regions of the items of washware 101, are received by regions of the thread turns of the respective conveying belts 52', 52", 52'''.

**[0057]** The loading apparatus 50' illustrated in Figure 3 functions as follows: in the first instance, the items of washware 101' which are to be cleaned (in this case: plates) are introduced into the centre of the three rotatable conveying belts 52', 52", 52''''. A uniform, coordinated rotary movement of the conveying belt 52', 52", 52''' transports each item of washware 101 in the downward direction. The respectively separated items of washware 101' are then introduced via a conveying arrangement 55, in this case a conveying belt, into the compartments of the transporting belt 62 of the conveying dishwasher 1, these compartments being formed by fingers 63.

**[0058]** In comparison with the loading apparatus 50 according to the embodiment illustrated in Figure 2 (drum solution), the loading apparatus 50' according to the embodiment illustrated in Figure 3 is distinguished by being lower in weight, and provision of the conveying arrangement 55, configured as a conveying belt, also allows it to serve a conveyor dishwasher 1 which is at a greater distance away.

**[0059]** Figure 4 illustrates a plan view of two loading apparatuses 50 of the first embodiment of the invention, wherein the two loading apparatuses are arranged one beside the other in a loading zone 62 of a flight-type dishwasher 1. Both loading apparatuses 50 may be of mobile configuration, and they can therefore be stacked with washware at a remote location and be displaced into the loading zone 61 for the first time for destacking purposes.

**[0060]** The washware 100 of each loading apparatus 50 may comprise respectively different types of washware, e.g. plates and bowls. In the case shown in Figure 4, however, two stacks of plates are destacked in parallel and fed to the transporting belt 62 of a flight-type dishwasher 1. Two transporting-belt tracks located one beside the other are charged here, and this considerably increases the loading speed of the conveyor dishwasher 1.

**[0061]** The individual transporting-belt tracks may be subject to different cleaning parameters, and it is therefore also possible for items of washware of different types to be loaded on each track in one loading operation.

**[0062]** The items of washware 101, rather than necessarily having to be introduced into a transporting belt 62 with fingers 63, may also be positioned on a transporting belt 62 without fingers 63 in a region above the transporting-belt deflection.

**[0063]** Although not illustrated explicitly in the drawings, it is conceivable for the respective loading apparatus 50, 50' to be assigned a drive arrangement for driving the rotatable drum 53 or the rotatable conveying belt 52', 52", 52''''. This drive arrangement can preferably be activated via the control arrangement 40 indicated in Figure 1. The control arrangement 40 here is preferably de-

signed to activate the drive arrangement in dependence on the transporting speed of the transporting belt 62 of the conveyor dishwasher 1 and to set the rotary speed of the rotatable drum 53, or of the rotatable conveying belt 52', 52", 52'''', in dependence on the transporting speed of the transporting belt 62.

**[0064]** It is conceivable here for the control arrangement 40 to be designed to set the rotary speed of the rotatable drum 53, or of the rotatable conveying belt 52', 52", 52'''', such that the number of items of washware 101' discharged out of the stacking magazine 51, or 51', per unit of time is identical to the number of items of washware which are fed to the transporting belt 62 of the conveyor dishwasher 1, and can be received by the transporting belt 62, per unit of time.

**[0065]** Furthermore, it is conceivable for the control arrangement 40 to be designed to set the rotary speed of the rotatable drum 53, or of the rotatable conveying belt 52', 52", 52'''', in dependence on the type of washware and, in particular, the size of the washware 100 received in the stacking magazine 51 or 51'.

**[0066]** It should be noted that, rather than being restricted to the exemplary embodiments illustrated above with reference to the drawings, the invention is made up of a combination of all the individual features disclosed herein.

**[0067]** It should also be noted that the loading apparatus 50, 50' according to the invention is preferably designed such that the washware 100 which is to be cleaned can be stacked in the corresponding stacking magazine 51, 51' with the user side upwards or with the user side downwards.

## Claims

1. Loading apparatus (50; 50') for a conveyor dishwasher (1), in particular flight-type dishwasher, wherein the loading apparatus (50; 50') has the following:

- at least one stacking magazine (51; 51') by means of which washware (100) which is to be cleaned, in particular plates, bowls or trays, is received in a stackwise manner, wherein the at least one stacking magazine (51; 51') has a separating arrangement by means of which the items of washware (101) received in the stacking magazine (51; 51') are discharged one by one; and

- a conveying arrangement (55; 55') by means of which the items of washware (101') discharged one by one by the separating arrangement are fed to a transporting belt (62) of the conveyor dishwasher (1), wherein the separating arrangement moves the items of washware (101) in the vertical direction and in each case one item of washware (101) is discharged out



of the stacking magazine (11, 11'), **characterised in that** the separating arrangement has at least one thread which is rotatable relative to the washware (100) received in the stacking magazine (51; 51') and between the thread turns of which peripheral regions of individual items of washware (101) are receivable such that, upon rotation of the thread, a respectively lowermost item of washware (101) is discharged out of the stacking magazine (11, 11'); and

wherein the at least one thread is configured as an internal thread (52) of a drum (53) which can be rotated relative to the washware (100) received in the stacking magazine (51) and in which the items of washware (101) can be stacked, wherein the peripheral region of the items of washware (101) can be received by the thread turns of the internal thread (52); or wherein the at least one thread is designed as the external thread of at least two, and preferably three, parallel conveying belts (52', 52'', 52''') which can be rotated relative to the washware (100) received in the stacking magazine (51') and between which the washware (100) can be stacked, wherein individual peripheral regions of the items of washware (101) can be received by regions of the thread turns of the respective conveying belts (52', 52'', 52''').

2. Loading apparatus (50; 50') according to claim 1, wherein a drive arrangement is also provided for driving the at least one thread of the separating arrangement, as is a control arrangement (40) for activating the drive arrangement, wherein the control arrangement (40) is designed to activate the drive arrangement in dependence on the transporting speeds of the transporting belt (62) of the conveyor dishwasher (1) and to set the rotary speed of the at least one thread of the separating arrangement in dependence on the transporting speed of the transporting belt (62).
3. Loading apparatus (50; 50') according to claim 2, wherein the control arrangement (40) is designed to set the rotary speed of the at least one thread of the separating arrangement such that the number of items of washware (101) discharged out of the stacking magazine (51, 51') per unit of time is identical to the number of items of washware (101') which are fed to the transporting belt (62) of the conveyor dishwasher (1), and can be received by the transporting belt (62) per unit of time; and/or wherein the control arrangement (40) is designed to set the rotary speed of the at least one thread of the separating arrangement in dependence on the type of washware and, in particular, on the size of washware (100) received in the at least one stacking magazine (51; 51').

4. Loading apparatus (50; 50') according to one of claims 1 to 3, wherein the loading apparatus (50; 50') is designed such that the items of washware (101) which are to be cleaned can be stacked in the at least one stacking magazine (51; 51') with the user side upwards or with the user side downwards.
5. Loading apparatus (50) according to one of claims 1 to 4, wherein the conveying arrangement (55; 55') has a chute or a conveying belt by means of which the items of washware (101') discharged one by one by the separating arrangement are fed to the transporting belt (62) of the conveyor dishwasher (1).
6. Loading apparatus (50; 50') according to one of claims 1 to 5, wherein the loading apparatus (50; 50') has a chassis for moving in three dimensions.
7. Combination of an in particular commercial conveyor dishwasher (1) and at least one loading apparatus (50; 50') according to one of claims 1 to 6, wherein the conveyor dishwasher (1), preferably at the dishwasher entrance, has a loading zone (61) in which the at least one loading apparatus (50; 50') is coupable to the conveyor dishwasher (1) such that, with the aid of the conveying arrangement (55, 55') of the at least one loading apparatus (50; 50'), the items of washware (101') discharged one by one by the separating arrangement can be fed to a transporting belt (62) of the conveyor dishwasher (1).
8. Combination according to claim 7, wherein the transporting belt (62) is of endless configuration and is provided with fingers (63), and wherein the at least one loading apparatus (50; 50') is designed such that the operations of feeding the separated items of washware (101') to the transporting belt (62) and of introducing the separated items of washware (101') into the transporting belt (62) take place in a region of a transporting-belt deflection.
9. Combination according to claim 8, wherein the transporting belt (62) is of endless configuration, and wherein the at least one loading apparatus (50; 50') is designed such that the operations of feeding the separated items of washware (101') to the transporting belt (62) and of loading the transporting belt (62) take place in a region above a transporting-belt deflection.
10. Combination according to one of claims 7 to 9, wherein the conveyor dishwasher (1) can be coupled simultaneously to a plurality of loading apparatuses (50; 50') arranged one beside the other.

11. Combination according to claim 10, wherein individual stacking magazines (51; 51') can be assigned to individual tracks of the transporting belt (62).

12. Method of loading a commercial conveyor dishwasher (1) with washware (100), wherein the method has the following method steps:

- providing a loading apparatus (50; 50') according to one of Claims 1 to 6;
- stacking washware (100) in the at least one stacking magazine (51; 51') of the loading apparatus (50; 50');
- coupling the loading apparatus (50; 50') to a loading zone (61) of the conveyor dishwasher (1) such that the conveying arrangement (55; 55') of the loading apparatus (50; 50') communicates with a transporting belt (62) of the conveyor dishwasher (1); and
- rotating the at least one thread of the stacking magazine (51; 51') in dependence on a transporting speed of the conveyor dishwasher (1) such that separated items of washware (101') discharged out of the stacking magazine (51; 51') are continuously supplied to the transporting belt (62) of the conveyor dishwasher (1) and received by the same.

13. Method according to claim 12, wherein, prior to the loading apparatus (50; 50') being coupled to the loading zone (61) of the conveyor dishwasher (1), the loading apparatus (50; 50') is displaced to the loading zone (61) of the conveyor dishwasher (1).

## Patentansprüche

1. Beladevorrichtung (50; 50') für eine Transportspülmaschine (1), insbesondere Bandtransportspülmaschine, wobei die Beladevorrichtung (50; 50') Folgendes aufweist:

- mindestens ein Stapelmagazin (51; 51') zum stapelweisen Aufnehmen von zu reinigendem Spülgut (100), insbesondere Tellern, Schalen oder Tabletts, wobei das mindestens eine Stapelmagazin (51; 51') eine Vereinzelungseinrichtung aufweist zum stückweisen Abgeben der in dem Stapelmagazin (51; 51') aufgenommenen Spülgutteile (101); und
- eine Fördereinrichtung (55; 55') zum Zuführen der von der Vereinzelungseinrichtung stückweise abgegebenen Spülgutteile (101') zu einem Transportband (62) der Transportspülmaschine (1), wobei die Vereinzelungseinrichtung die Spülgutteile (101) in vertikaler Richtung bewegt

und jeweils ein Spülgutteil (101) aus dem Stapelmagazin (11, 11') abgegeben wird,

**dadurch gekennzeichnet, dass** die Vereinzelungseinrichtung mindestens ein relativ zu dem in dem Stapelmagazin (51; 51') aufgenommenen Spülgut (100) drehbares Gewinde aufweist, zwischen dessen Gewindegängen Randbereiche einzelner Spülgutteile (101) derart aufnehmbar sind, dass beim Drehen des Gewindes ein jeweils unterstes Spülgutteil (101) aus dem Stapelmagazin (11, 11') abgegeben wird; und  
wobei das mindestens eine Gewinde als ein Innengewinde (52) einer relativ zu dem in dem Stapelmagazin (51) aufgenommenen Spülgut (100) drehbaren Trommel (53) ausgeführt ist, in welche die Spülgutteile (101) stapelbar sind, wobei der Randbereich der Spülgutteile (101) von den Gewindegängen des Innengewindes (52) aufnehmbar ist; oder  
wobei das mindestens eine Gewinde als das Außengewinde von mindestens zwei und vorzugsweise drei parallel zueinander verlaufenden und relativ zu dem in dem Stapelmagazin (51') aufgenommenen Spülgut (100) drehbaren Förderbändern (52', 52'', 52''') ausgebildet ist, zwischen denen das Spülgut (100) stapelbar ist, wobei einzelne Randbereiche der Spülgutteile (101) von Bereichen der Gewindegänge der jeweiligen Förderschnecken (52', 52'', 52''') aufnehmbar sind.

2. Beladevorrichtung (50; 50') nach Anspruch 1, wobei ferner eine Antriebseinrichtung zum Antreiben des mindestens einen Gewindes der Vereinzelungseinrichtung und eine Steuereinrichtung (40) zum Aktivieren der Antriebseinrichtung vorgesehen sind, wobei die Steuereinrichtung (40) ausgelegt ist, in Abhängigkeit von der Transportgeschwindigkeit des Transportbandes (62) der Transportspülmaschine (1) die Antriebseinrichtung zu aktivieren und die Rotationsgeschwindigkeit des mindestens einen Gewindes der Vereinzelungseinrichtung in Abhängigkeit von der Transportgeschwindigkeit des Transportbandes (62) einzustellen.

3. Beladevorrichtung (50; 50') nach Anspruch 2, wobei die Steuereinrichtung (40) ausgelegt ist, die Rotationsgeschwindigkeit des mindestens einen Gewindes der Vereinzelungseinrichtung derart einzustellen, dass die Anzahl der pro Zeiteinheit aus dem Stapelmagazin (51, 51') abgegebenen Spülgutteile (101) identisch ist mit der Anzahl der pro Zeiteinheit dem Transportband (62) der Transportspülmaschine (1) zugeführten und von dem Transportband (62) aufnehmbaren Spülgutteile (101'), und/oder  
wobei die Steuereinrichtung (40) ausgelegt ist, die Rotationsgeschwindigkeit des mindestens einen Gewindes der Vereinzelungseinrichtung in Abhängigkeit von der Spülgutart und insbesondere der

Größe des in dem mindestens einen Stapelmagazin (51; 51') aufgenommenen Spülguts (100) einzustellen.

4. Beladevorrichtung (50; 50') nach einem der Ansprüche 1 bis 3, wobei die Beladevorrichtung (50; 50') derart ausgebildet ist, dass die zu reinigenden Spülgutteile (101) mit der Benutzerseite nach oben oder mit der Benutzerseite nach unten in das mindestens eine Stapelmagazin (51; 51') ein stapelbar sind. 10
5. Beladevorrichtung (50) nach einem der Ansprüche 1 bis 4, wobei die Fördereinrichtung (55; 55') eine Rutsche oder ein Förderband aufweist zum Zuführen der von der Vereinzelungseinrichtung stückweise abgegebenen Spülgutteile (101') zu dem Transportband (62) der Transportspülmaschine (1). 15
6. Beladevorrichtung (50; 50') nach einem der Ansprüche 1 bis 5, wobei die Beladevorrichtung (50; 50') ein Fahrwerk zur räumlichen Bewegung aufweist. 20
7. Kombination aus einer insbesondere gewerblichen Transportspülmaschine (1) und mindestens einer Beladevorrichtung (50; 50') nach einem der Ansprüche 1 bis 6, wobei die Transportspülmaschine (1) vorzugsweise beim Maschineneinlauf eine Beladezone (61) aufweist, in welcher die mindestens eine Beladevorrichtung (50; 50') mit der Transportspülmaschine (1) koppelbar ist derart, dass mit Hilfe der Fördereinrichtung (55; 55') der mindestens einen Beladevorrichtung (50; 50') die von der Vereinzelungseinrichtung stückweise abgegebenen Spülgutteile (101') einem Transportband (62) der Transportspülmaschine (1) zuführbar sind. 25  
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8. Kombination nach Anspruch 7, wobei das Transportband (62) endlos ausgeführt und mit Fingern (63) versehen ist, und wobei die mindestens eine Beladevorrichtung (50; 50') derart ausgebildet ist, dass ein Zuführen der vereinzelter Spülgutteile (101') zu dem Transportband (62) und ein Einsetzen der vereinzelter Spülgutteile (101') in das Transportband (62) in einem Bereich einer Transportbandumlenkung erfolgt. 40  
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9. Kombination nach Anspruch 8, wobei das Transportband (62) endlos ausgeführt ist, und wobei die mindestens eine Beladevorrichtung (50; 50') derart ausgebildet ist, dass ein Zuführen der vereinzelter Spülgutteile (101') zu dem Transportband (62) und das Bestücken des Transportbandes (62) in einem Bereich oberhalb einer Transportbandumlenkung erfolgt. 50
10. Kombination nach einem der Ansprüche 7 bis 9, wobei die Transportspülmaschine (1) gleichzeitig mit mehreren, nebeneinander angeordneten Beladevorrich-

tungen (50; 50') koppelbar ist.

11. Kombination nach Anspruch 10, wobei einzelne Stapelmagazine (51; 51') individuellen Spuren des Transportbandes (62) zuordenbar sind.
12. Verfahren zum Beladen einer gewerblichen Transportspülmaschine (1) mit Spülgut (100), wobei das Verfahren die folgenden Verfahrensschritte aufweist:
  - Bereitstellen einer Beladevorrichtung (50; 50') nach einem der Ansprüche 1 bis 6;
  - Einstapeln von Spülgut (100) in das mindestens eine Stapelmagazin (51; 51') der Beladevorrichtung (50; 50');
  - Koppeln der Beladevorrichtung (50; 50') mit einer Beladezone (61) der Transportspülmaschine (1) derart, dass die Fördereinrichtung (55; 55') der Beladevorrichtung (50; 50') mit einem Transportband (62) der Transportspülmaschine (1) kommuniziert; und
  - Drehen des mindestens einen Gewindes des Stapelmagazins (51; 51') abhängig von einer Transportgeschwindigkeit der Transportspülmaschine (1) derart, dass dem Transportband (62) der Transportspülmaschine (1) kontinuierlich aus dem Stapelmagazin (51; 51') abgegebene, vereinzelter Spülgutteile (101') zugestellt und von diesem aufgenommen werden.
13. Verfahren nach Anspruch 12, wobei vor dem Koppeln der Beladevorrichtung (50; 50') mit der Beladezone (61) der Transportspülmaschine (1) die Beladevorrichtung (50; 50') an die Beladezone (61) der Transportspülmaschine (1) verfahren wird.

## Revendications

1. Appareil de chargement (50 ; 50') pour un lave-vaisselle à convoyeur (1), en particulier un lave-vaisselle à bande transporteuse sans panier, l'appareil de chargement (50 ; 50') comprenant :
  - au moins un magasin d'empilage (51 ; 51') au moyen duquel la vaisselle (100) qui doit être lavée, en particulier les assiettes, les bols ou les plateaux, est reçue de manière empilée, l'au moins un magasin d'empilage (51 ; 51') ayant un dispositif de séparation au moyen duquel les éléments de vaisselle (101) reçus dans le magasin d'empilage (51 ; 51') sont déchargés un par un ; et
  - un dispositif de convoyage (55 ; 55') au moyen duquel les éléments de vaisselle (101') déchargés un par un par le dispositif de séparation sont apportés jusqu'à une bande transporteuse (62)

du lave-vaisselle à convoyeur (1),  
le dispositif de séparation déplaçant les éléments de vaisselle (101) dans la direction verticale et, dans chaque cas, un élément de vaisselle (101) est déchargé du magasin d'empilage (11, 11'),  
l'appareil de chargement étant **caractérisé en ce que** :

le dispositif de séparation comporte au moins un filet rotatif par rapport à la vaisselle (100) reçue dans le magasin d'empilage (51 ; 51'), et entre les tours de filet duquel des régions périphériques d'élément individuel de vaisselle (101) peuvent être reçus de sorte que, lors de la rotation du filet, un élément de vaisselle (101) respectivement le plus bas soit déchargé du magasin d'empilage (11, 11') ; et

l'au moins un filet étant conçu comme un filet interne (52) d'un tambour (53) qui peut être mis en rotation par rapport à la vaisselle (100) reçue dans le magasin d'empilage (51) et dans lequel les éléments de vaisselle (101) peuvent être empilés, la région périphérique des éléments de vaisselle (100) pouvant être reçue par les tours de filet du filet interne (52) ; ou l'au moins un filet étant conçu comme le filet externe d'au moins deux, et de préférence trois, bandes convoyeuses parallèles (52', 52'', 52''') qui peuvent être mises en rotation par rapport à la vaisselle (100) reçue dans le magasin d'empilage (51') et entre lesquelles la vaisselle (100) peut être empilée, des régions périphériques individuelles des éléments de vaisselle (101) pouvant être reçus par des régions des tours de filet des bandes convoyeuses (52', 52'', 52''') respectives.

2. Appareil de chargement (50 ; 50') selon la revendication 1, dans lequel un dispositif d'entraînement est également fourni pour entraîner l'au moins un filet du dispositif de séparation, tout comme un dispositif de contrôle (40) pour activer le dispositif d'entraînement, le dispositif de contrôle (40) étant conçu pour activer le dispositif d'entraînement en fonction des vitesses de transport de la bande transporteuse (62) du lave-vaisselle à convoyeur (1), et pour régler la vitesse de rotation de l'au moins un filet du dispositif de séparation en fonction de la vitesse de transport de la bande transporteuse (62).
3. Appareil de chargement (50 ; 50') selon la revendication 2, dans lequel le dispositif de contrôle (40) est conçu pour régler la vitesse de rotation de l'au moins un

filet du dispositif de séparation, de sorte que le nombre d'éléments de vaisselle (101) déchargés du magasin d'empilage (51, 51') par unité de temps soit identique au nombre d'éléments de vaisselle (101) apportés jusqu'à la bande transporteuse (62) du lave-vaisselle à convoyeur (1), et puisse être reçu par la bande transporteuse (62) par unité de temps ; et/ou

dans lequel le dispositif de contrôle (40) est conçu pour régler la vitesse de rotation de l'au moins un filet du dispositif de séparation en fonction du type de vaisselle et, en particulier, de la taille de la vaisselle (100) reçue dans l'au moins un magasin d'empilage (51 ; 51').

4. Appareil de chargement (50 ; 50') selon l'une des revendications 1 à 3, dans lequel l'appareil de chargement (50 ; 50') est conçu de sorte que les éléments de vaisselle (101) qui doivent être lavés puissent être empilés dans l'au moins un magasin d'empilage (51 ; 51') avec le côté utilisateur vers le haut ou le côté utilisateur vers le bas.
5. Appareil de chargement (50) selon l'une des revendications 1 à 4, dans lequel le dispositif de convoyage (55 ; 55') comporte une goulotte ou une bande convoyeuse au moyen de laquelle les éléments de vaisselle (101) déchargés un par un par le dispositif de séparation sont apportés jusqu'à la bande transporteuse (62) du lave-vaisselle à convoyeur (1).
6. Appareil de chargement (50 ; 50') selon l'une des revendications 1 à 5, dans lequel l'appareil de chargement (50 ; 50') comporte un châssis de déplacement en trois dimensions.
7. Combinaison d'un lave-vaisselle à convoyeur commercial particulier (1) et d'au moins un appareil de chargement (50 ; 50') selon l'une des revendications 1 à 6, dans laquelle le lave-vaisselle à convoyeur (1), de préférence au niveau de l'entrée de lave-vaisselle, comporte une zone de chargement (61) où l'au moins un appareil de chargement (50 ; 50') peut être accouplé au lave-vaisselle à convoyeur (1) de sorte que, avec l'aide du dispositif de convoyage (55, 55') de l'au moins un appareil de chargement (50 ; 50'), les éléments de vaisselle (101) déchargés un par un par le dispositif de séparation puissent être apportés jusqu'à une bande transporteuse (62) du lave-vaisselle à convoyeur (1).
8. Combinaison selon la revendication 7, dans laquelle la bande transporteuse (62) est de configuration sans fin et est munie de doigts (63), et dans laquelle l'au moins un appareil de chargement

(50 ; 50') est conçu de sorte que les opérations d'apport des éléments de vaisselle (101') séparés sur la bande transporteuse (62) et d'introduction des éléments de vaisselle (101') séparés sur la bande transporteuse (62) se déroulent dans une région d'une déviation de bande transporteuse. 5

9. Combinaison selon la revendication 8, dans laquelle la bande transporteuse (62) est de configuration sans fin, et dans laquelle l'au moins un appareil de chargement (50 ; 50') est conçu de sorte que les opérations d'apport des éléments de vaisselle (101') séparés sur la bande transporteuse (62) et de chargement de la bande transporteuse (62) se déroulent dans une région au-dessus d'une déviation de bande transporteuse. 10 15

10. Combinaison selon l'une des revendications 7 à 9, dans laquelle le lave-vaisselle à convoyeur (1) peut être accouplé simultanément à une pluralité d'appareils de chargement (50 ; 50') disposés les uns sous les autres. 20

11. Combinaison selon la revendication 10, dans laquelle des magasins d'empilage individuels (51 ; 51') peuvent être affectés à des chenilles individuelles de la bande transporteuse (62). 25

12. Procédé de chargement d'un lave-vaisselle à convoyeur commercial (1) avec de la vaisselle (100), le procédé comprenant les étapes de procédé suivantes consistant à : 30

fournir un appareil de chargement (50 ; 50') selon l'une des revendications 1 à 6 ; 35  
empiler de la vaisselle (100) dans l'au moins un magasin d'empilage (51 ; 51') de l'appareil de chargement (50 ; 50') ;  
accoupler l'appareil de chargement (50 ; 50') à une zone de chargement (61) du lave-vaisselle à convoyeur (1), de sorte que le dispositif de convoyage (55 ; 55') de l'appareil de chargement (50 ; 50') communique avec une bande transporteuse (62) du lave-vaisselle à convoyeur (1) ; et 40 45  
faire tourner l'au moins un filet du magasin d'empilage (51 ; 51') en fonction d'une vitesse de transport du lave-vaisselle à convoyeur (1) de sorte que des éléments de vaisselle (101') séparés déchargés du magasin d'empilage (51 ; 51') soient fournis en continu à la bande transporteuse (62) du lave-vaisselle à convoyeur (1) et reçus par celle-ci. 50

13. Procédé selon la revendication 12, dans lequel, avant que l'appareil de chargement (50 ; 50') ne soit accouplé à la zone de chargement (61) du lave-vaisselle à convoyeur (1), l'appareil de 55

chargement (50 ; 50') est déplacé vers la zone de chargement (61) du lave-vaisselle à convoyeur (1).

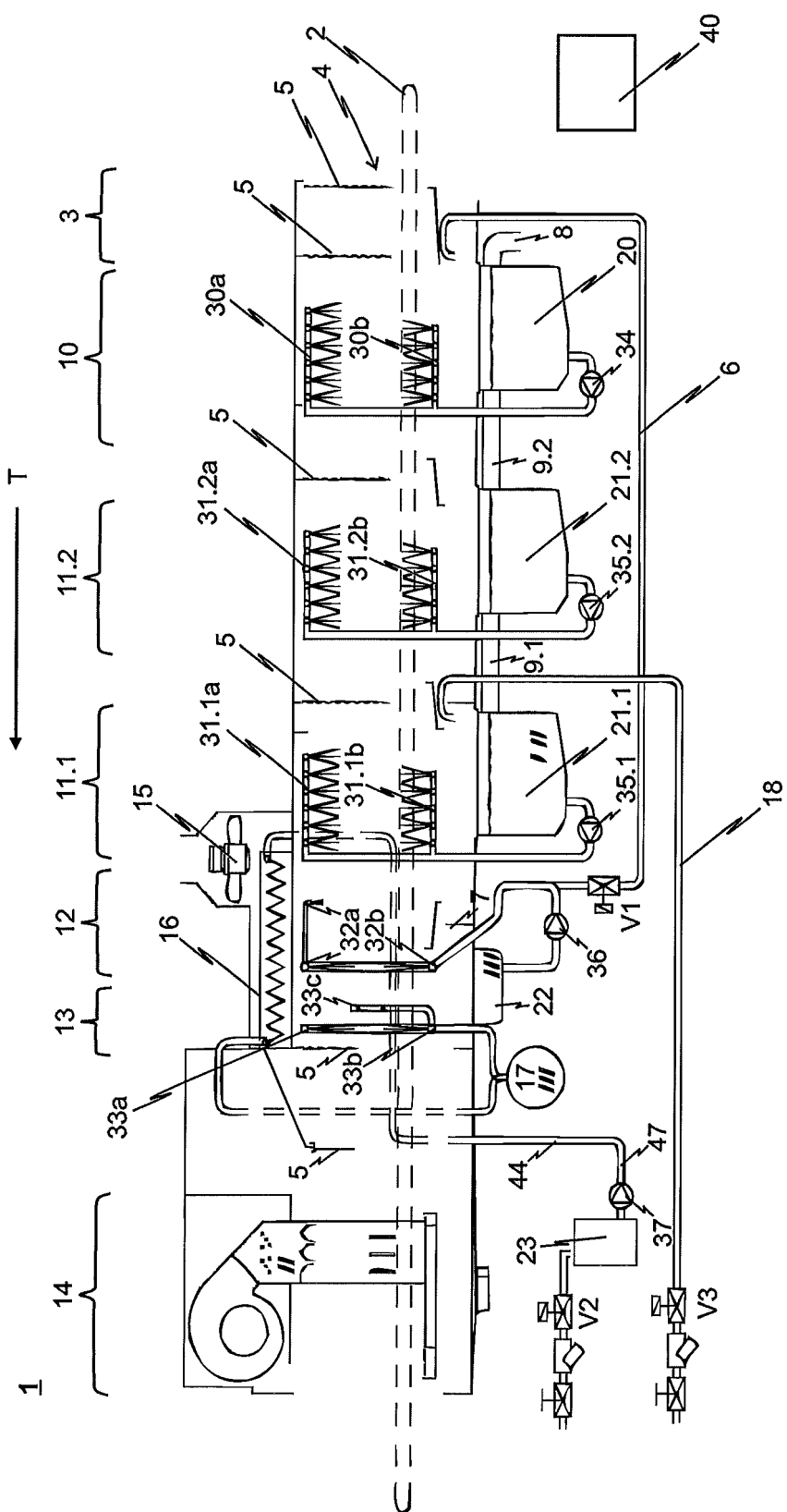
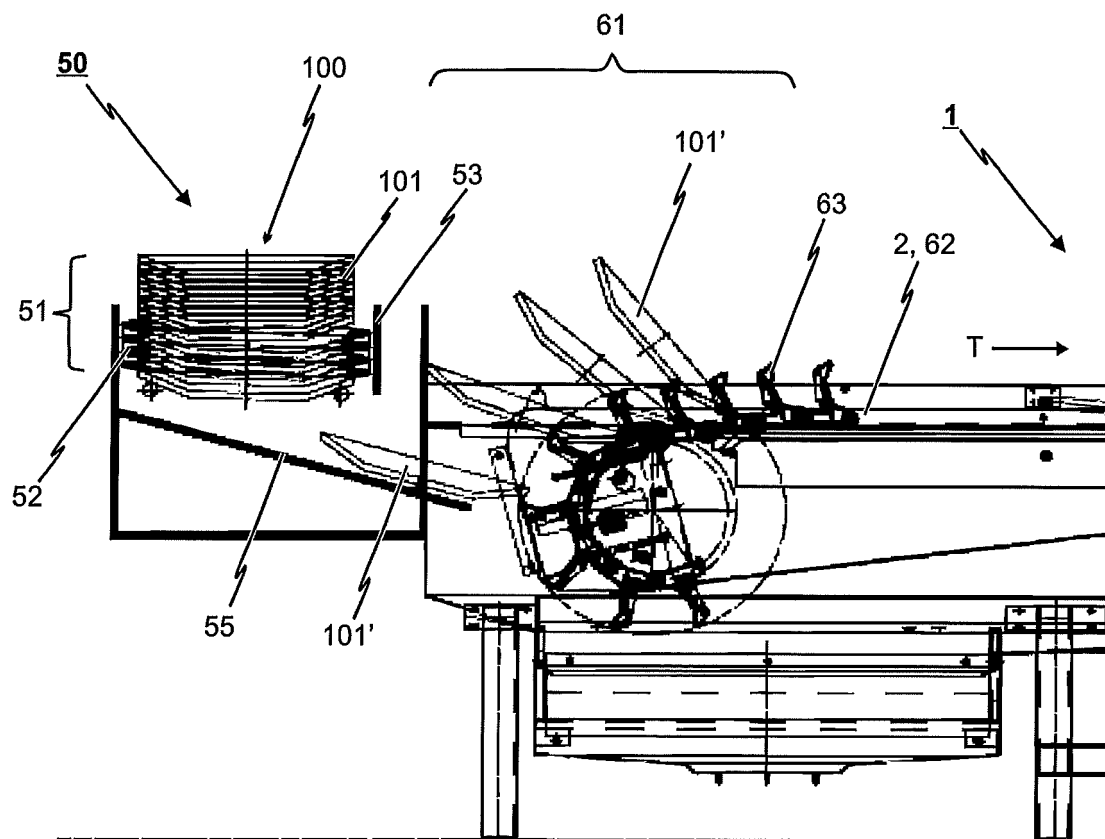
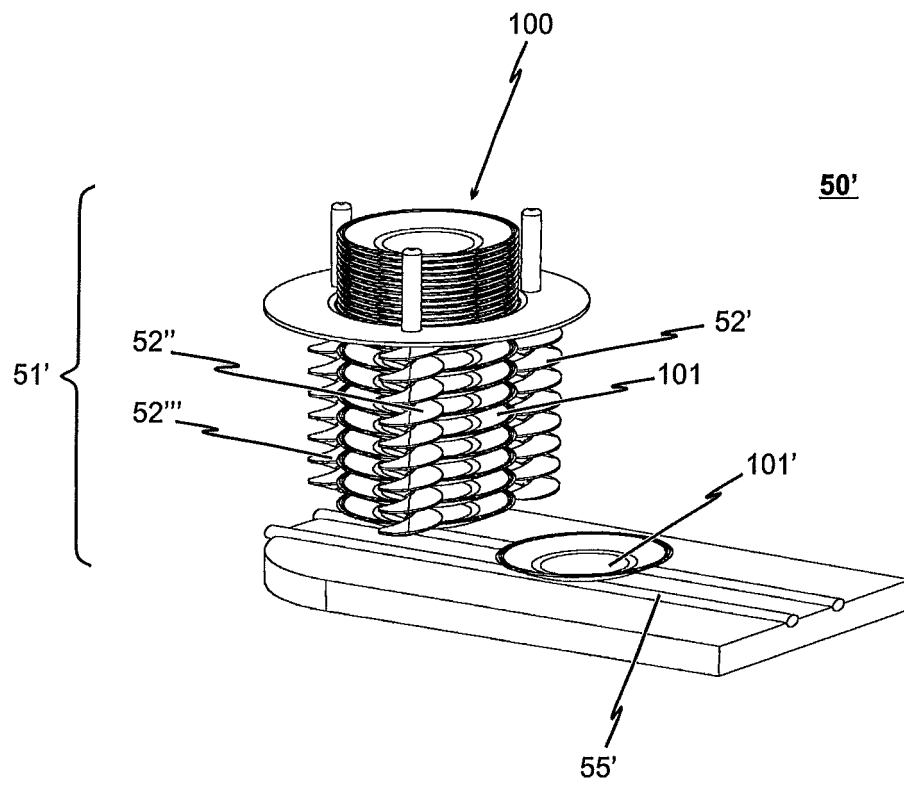


Fig. 1

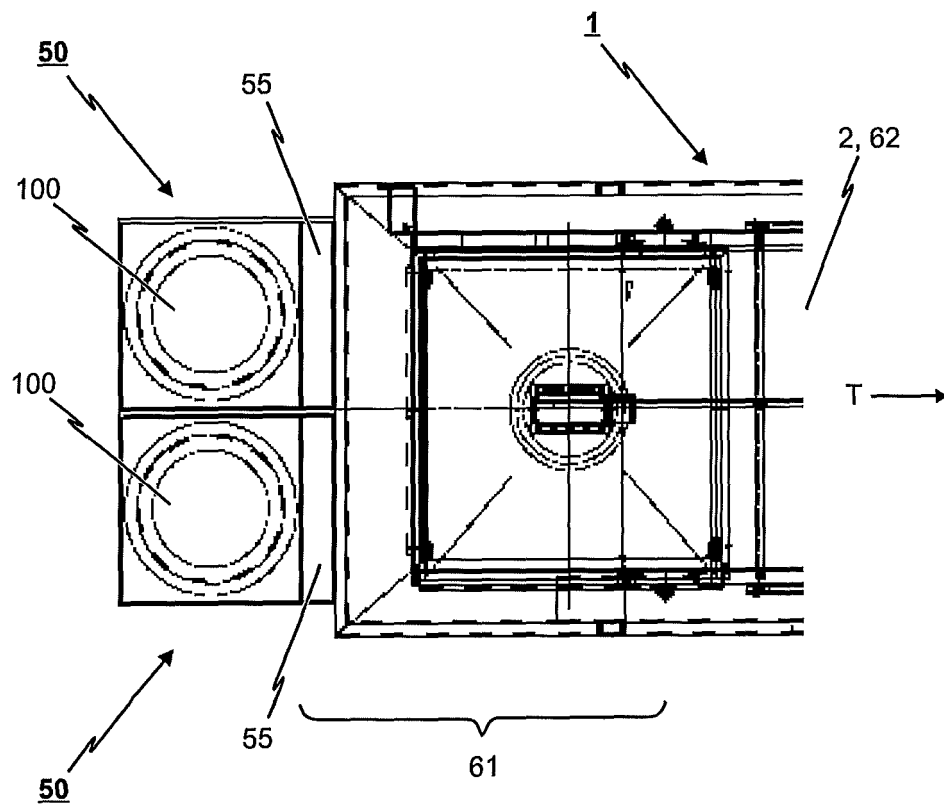


*Fig. 2*



*Fig. 3*





*Fig. 4*

**REFERENCES CITED IN THE DESCRIPTION**

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