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(54) **SYSTEM AND METHOD FOR PROCESSING REUSABLE CONTAINERS**

(57) Disclosed herein is a system (100) for processing reusable containers comprising a scanning module (110) comprising a reader (111) configured to read identification (201) information registered on a used container (200), a loading module (120) configured to determine a state of a container interior, based on information from at least one sensor (121), and to load or discard the container (200), a washing module (130) configured to wash the container (200) from the loading module (120), a rinsing module (140) configured to rinse the container (200) from the washing module (130), a drying module (150) configured to dry the container (200) from the rinsing module (140), an unloading area (160) configured to deliver the processed container (200) to a user, and a conveying module (170) configured to convey the container (200) from the loading module (120) to the unloading area (160).

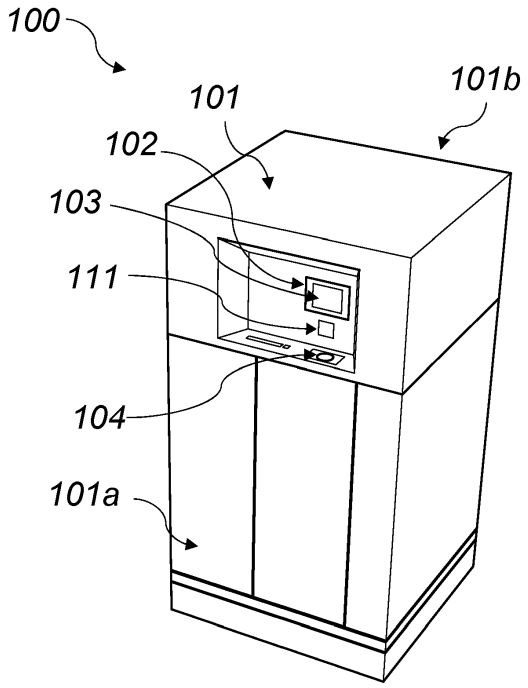

Fig. 1

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Description

Technical Field

[0001] The invention generally relates to container processing, and, more specifically, to a system and a method for processing reusable containers.

Background

[0002] Disposable containers are widely used in everyday life in a wide range of applications such as restaurants, coffee shops, grocery stores, hospitals, etc, due to their convenience. However, the widespread use of disposable containers has incurred both huge waste of materials and serious pollution to the environment. Therefore, the use of reusable containers is becoming more and more preferred and sometimes even mandatory for example in fast food restaurants, coffee shops and bars. The processing of reusable containers is usually operated by an operator, i.e. the operator manually collects dirty containers, puts them into a dishwasher or similar, and transfers them to a beverage distribution area after they have been washed and dried. Further, if the reusable container for some reason cannot be reused, due to it being damaged or soiled in a way that cannot be efficiently cleaned, the operator has to manually inspect and sort out the defect reusable container(s). This is inefficient and incurs high labor costs.

Summary

[0003] In the light of the above, it is desired to provide alternate solutions for processing reusable containers, in order to improve the efficiency and reduce labor costs. These and other objects are achieved by providing a system and method for processing reusable containers having the features in the independent claims. Preferred embodiments are defined in the dependent claims.

[0004] Hence, according to a first aspect of the present invention, there is provided a system for processing reusable containers comprising a scanning module comprising a reader configured to read identification information registered on a used container, a loading module configured to determine a state of a container interior, based on information from at least one sensor, and to load or discard the container, a washing module configured to wash the container from the loading module, a rinsing module configured to rinse the container from the washing module, a drying module configured to dry the container from the rinsing module, an unloading area configured to deliver the processed container to a user, and a conveying module configured to convey the container from the loading module, through the washing module, the rinsing module and the drying module, to the unloading area.

[0005] There are a number of advantages associated with the system according to the present invention. For example, the system allows for reusable containers to be automatically processed. The system identifies, washes, rinses, dries and delivers the reusable container. Further, the system allows for determining a state of the reusable container, such that reusable containers that cannot be washed properly are scrapped before entering the washing cavity. This is advantageous since the system identifies this automatically, and further it is scrapped before it is processed, saving resources in the system. Moreover, since the system processes the reusable container automatically, there is no need for an operator to manually perform the processing tasks. Thus, the present invention enables the release of an operators time that can be spent on other tasks, as well as saving labor costs. Since the system is automatic, it can be placed to be exposed to the user, such as a customer in a fast food restaurant. The system does not need to be placed in an area where only workers have access to it. This is beneficial since the user is the end customer, and therefore we can skip the use of middle hands.

[0006] According to a second aspect of the present invention, there is provided a method for processing reusable containers, comprising the steps of scanning identification information registered on a used container in the scanning module. The method further comprises the step of determining whether the used container is a reusable container. The method further comprises the step of loading the container in a loading module when the container is recognized as a reusable container. The method further comprises the step of determining the interior state of the container into one of a load value and a discard value. The method further comprises the step of loading the reusable container to a conveying module when the interior state equals the load value. The method further comprises the step of transferring, via the conveying module, the reusable container from the loading module to a washing module, washing the reusable container in the washing module, transferring, via the conveying module, the reusable container from the washing module to a rinsing module, rinsing the reusable container in the rinsing module, transferring, via the conveying module, the reusable container from the rinsing module to a drying module, drying the reusable container in the drying module, transferring, via a transferring means, the reusable container from the drying module to an unloading area.

[0007] There are a number of advantages associated with the method according to the present invention. For example, the method allows for reusable containers to be automatically processed. The method identifies, washes, rinses, dries and delivers the reusable container. Further, the method allows for determining a state of the reusable container, such that reusable containers that cannot be washed properly are scrapped before entering the washing cavity. This is advantageous since the method identifies this automatically, and further it is scrapped before it is processed, saving resources in the system. Moreover, since the method processes the reusable container auto-

matically, there is no need for an operator to manually perform the processing tasks. Thus, the present invention enables the release of an operators time that can be spent on other tasks, as well as labor costs. Since the method of processing reusable containers is automatic, it can be placed to be exposed to the user, such as a customer in a fast food restaurant.

[0008] By "reusable container" is herein meant a type of consumer container such as reusable bottles, cups, boxes, cans, or other containers typically used for food or liquid storage. The reusable containers are designed for reuse without impairment of its protective function, and can be reused multiple times. The reusable containers are typically made from a durable material, for example a type of plastic, metal, wood, etc.

[0009] By "operator" is herein meant a person working at a facility where the system is installed, and interacting with the system for the purposes of collecting the reconditioned containers, performing service tasks, etc.

[0010] By "user" is herein meant a person interacting with the system for the purpose of submitting a container for reconditioning.

[0011] The scanning module comprises a reader configured to read identification information registered on a used container. The scanning module may be exposed to a user, such that the user may place the used container to be identified. The scanning module may thus comprise a holder for the used container, where the used container may be kept still during identification. The scanning module may be used as a way to ensure that the identified container may be processed by the system. This is beneficial since it prevents malfunction of the system by feeding it a container that it may not process, due to limits in size, shape or other. Further, it may be used as a way for the provider of the system to ensure that the intended reusable containers are provided to the system. For example, a fast food restaurant may wish to only process reusable containers from their own brand. This is advantageous in that the system may be made to accustom different providers, depending on their individual needs. Even further, the scanning module may be used to identify the type of container by its characteristics. The characteristics may be size, material, and type of container such as cup, bottle, can, etc. The identification information may then be used to determine the processing cycle, such as an amount of detergent in the washing phase, or a temperature of the washing liquid, or a time duration of the rinsing and/or drying phase. This is beneficial since it allows a plurality of containers to be processed by the system. Further, it enables a way to save resources such as water and detergent.

[0012] The scanning module may further comprise a user interface. The user interface may be configured to inform the user that the container has been identified by the scanning module. The user interface may further comprise indication means informing the user about the identified container. For example, if the container cannot be identified, or is identified but cannot be processed for some reason, the indication means may visually or by sound inform the user that the container needs to be removed from the scanning module. The indication means may for example include a lamp, such as an LED light. The indication means may also include a speaker. If the container is identified and possible to process by the system, the indication means may inform the user visually or by generating a sound. For example, the indication means may shine with a red light if the container cannot be identified or processed, and green if it can be identified and/or processed.

[0013] According to an exemplifying embodiment of the present disclosure, the identification information is registered in at least one of a bar code, a QR code and a RFID tag, or determined by image recognition. Thus, the reader may be a reader suitable for reading identification information of the types stated above. This is beneficial since the system may meet the needs of different providers having different reusable containers. Thus, the system may be advantageously adapted to different types of identification information by adapting the reader of the scanning module. For example, a fast food restaurant and a bar may use the same type of reusable containers but with different identification registrations. The system may then have different readers for the system in the fast food restaurant and in the bar. Alternatively, the system may be designed to include a reader that may read all the different types of identification information registrations. The identification information may include at least one of a unique ID of the container, a type of the container, a size of the container, a material of the container, etc.

[0014] The scanning module may further comprise an entrance for the used container. The entrance may allow the used container to enter the system after it has been identified. The entrance may for example be a type of door, such as a sliding door, a hatch, etc. When the used container has been identified and deemed processable, the entrance may open to allow access for the used container to enter the system. The used container may thus automatically access a space beneath the sliding door, for example, to thereby enter the loading module of the system where it will be further processed.

[0015] The loading module is configured to determine a state of the container interior, based on information from at least one sensor. The loading module is further configured to load or discard the container. The loading module may thus receive the container from the scanning module. The at least one sensor may be arranged to sense a state of the interior of the container. For example, if the container is a cup or a mug, the at least one sensor may be arranged to determine a state of the inside of the cup.

[0016] According to an exemplifying embodiment of the present disclosure, the at least one sensor is an optical sensor. The at least one sensor may thus be a camera, or an IR sensor, for example. The at least one sensor may further be an ultrasonic sensor. The optical sensor may thus sense an interior state of the container,

which is advantageous since it facilitates the determination regarding if the container should be loaded into the system or discarded.

[0017] According to an exemplifying embodiment of the present disclosure, the information from the at least one sensor comprises information regarding an emptiness of the container. For example, the container may be partly filled with an object that is not possible to wash with conventional methods for washing a reusable container. For example, the container may contain waste such as plastic wrapper, napkins, plastic utensils, etc. A washing system may not be designed to handle objects like these in the washing process. Further, additional waste may get stuck in the different modules, for example the washing module or drying module, which may impair the results of the processing. Thus, a requirement to be able to process the container may be that it needs to fulfill a certain degree of emptiness. An acceptable degree of emptiness may for example be that the container contains residues from a drink or food that has been stored therein. An unacceptable degree of emptiness may for example be that the container contains a foreign object, such as a napkin, plastic wrapper, a straw, etc.

[0018] According to an exemplifying embodiment of the present disclosure, the interior state of the container is binary and comprises a load value, wherein the container interior is empty and the container is loaded by the loading module, and a discard value, wherein the container interior is not empty and the container is discarded by the loading module. Thus, the acceptable degree of emptiness may correspond to the load value, and the unacceptable degree of emptiness may correspond to the discard value.

[0019] The loading module may thus determine, based on information from the at least one sensor, if the container may be processed or not. If it is determined that the container may be processed, it may be loaded into the washing module in the system. If it is determined that the container cannot be processed, the loading module may discard the container. The container may be discarded to a separate space where discarded container may be collected and/or emptied. This is advantageous in that determining an emptiness of the container may facilitate the decision whether the container may be processed or not. Further, the information may be utilized to advantageously control the loading module such that it only allows containers it has the ability to process, decreasing the risk of damaging the system.

[0020] According to an exemplifying embodiment of the present disclosure, the loading module further comprises a holder configured to receive a container from the scanning module, wherein the container is releasably arranged in the holder. The loading module further comprises a nozzle configured to pre-rinse the container in the holder, and a waste holder configured to receive a discarded container, wherein the holder is configured to rotate to a first position enabling the nozzle to pre-rinse the container. The holder is further configured to rotate to a second position enabling the at least one sensor to access the container interior. The holder is further configured to rotate to a third position enabling a release of the container into the waste holder, wherein the holder is further configured to rotate to a fourth position enabling loading of the container on the conveying module. Thus, the container may be transferred from the scanning module to the holder of the loading module. The container may be releasably arranged in the holder, such that the container may be released from the holder to be either loaded into the washing module of the system, or discarded into the waste holder. The holder may thus receive the container from the scanning module, in a position hereinafter referred to as the initial position. After receiving the container from the scanning module, the holder, with the container arranged therein, may rotate to a first position, where a nozzle may pre-rinse the container. The pre-rinsing may be performed by the nozzle spraying a jet of water into the container. The jet of water from the nozzle may further contain a type of detergent. If the container contains any residual waste or foreign objects, these may be rinsed from the container during the pre-rinsing. The first position may be a position where the container is oriented with its opening facing downwards, such that waste may fall out from the container by the force of gravity and/or the force from the waterjet. This orientation of the container in the first position is beneficial since it facilitates the pre-rinsing of the container by enabling waste/objects inside the container to fall out from the container, as well as preventing water from the jet of water from the nozzle to stay in the cup and fill the cup during pre-rinsing. Further, if the container is partly filled or filled when a user enters it into the system, the contents of the container may be emptied when the holder is rotated to the first position.

[0021] The holder may rotate to the second position subsequent to the pre-rinsing. In the second position, the at least one sensor may have access to the container interior. It is advantageous to sense the container interior after the container has been pre-rinsed, since the pre-rinsing may permit waste to be emptied from the container. This is beneficial since a container that is not empty when being entered into the system by the user may still be processed. The more containers that may be processed by the system, the less wasted containers, which is advantageous from an environmental perspective. The at least one sensor may detect a degree of emptiness in the second position. The information from the at least one sensor may be fed to a control unit of the loading module and/or system. The control unit may determine based on the information from the at least one sensor if the container should be loaded or discarded. From the second position, the holder may be rotated to a third or a fourth position. The third position may correspond to discarding the container, thus enabling a release of the container into the waste holder. Further, the fourth position may correspond to loading the container, thus loading the container on the conveying module. Thus, the holder

may only rotate to either the third or fourth position for each container being loaded into the loading module. For example, if a container is determined to be loaded by the loading module, the holder may rotate from the second position directly to the fourth position. In the same way, if a container is determined to be discarded by the loading module, the holder may rotate from the second position directly to the third position, where the container is discarded. The holder may then return to its initial position where a new container may be loaded into the holder from the scanning module.

[0022] According to an exemplifying embodiment of the present disclosure, the holder rotates to the first position in a first direction, and to the second position in a second direction, and to the third and fourth position in the first direction, wherein the first direction and second direction are different from each other. For example, the holder may rotate to the first position in a counter-clockwise direction. When rotating to the second position, the holder may rotate in a clockwise direction. Further, when rotating to the third or fourth position, the holder may continue to rotate in the counter-clockwise direction. When returning to the initial position from the third or fourth position, the holder may rotate in a clockwise direction again. In another example, the holder may rotate to the first, third and fourth positions in a clockwise direction, and to the second position in a counter-clockwise direction.

[0023] The waste holder may be a bin, a trash can, or any other type of holder suitable for receiving waste. The waste holder may be configured to hold a plurality of containers, to avoid having to empty the waste holder each time a container is discarded. For example, the waste holder may be emptied by an operator of the system in the end of each day, week or month, depending on how many containers that have been discarded. The contents of the waste holder may be limited to the discarded containers, enabling the discarded containers therein to be sent to recycling, for example. Thus, the waste being emptied from the containers during pre-rinsing may be emptied into a separate bin, such that the waste is not mixed together.

[0024] If the holder is rotated to the fourth position, the container in the holder may be released and loaded on the conveying module. According to an exemplifying embodiment of the present disclosure, the conveying module is a carousel belt extending through the washing module, the rinsing module, and the drying module. Thus, the conveying module may transfer the container from the loading module, through the washing module, the rinsing module and the drying module, and to the unloading area. This is advantageous since a common conveying mechanism can be used for different modules in the system. This enables a continuous feeding of the containers through the system. It further enables a more compact system, being more space efficient. Further, fewer components are needed when assembling the system. The carousel belt may not have a start or an end, but be configured in a continuous loop through the different modules. This means that when a container has been loaded onto the carousel belt, it will maintain on the carousel belt until it is unloaded to the unloading area. Thus, the carousel may run continuously through the modules, such that one container thereon may be inside the washing module at the same time as another container may be inside the drying module. This is advantageous since it allows the system to handle containers continuously, instead of in batches. If the containers are handled in batch, it may be difficult to predict when the batch is filled and ready to process, why some containers may be sitting in the system for a long time before being processed. Also, a continuous handling of the containers allows for a compact system being more space efficient, since no space is needed to be made to hold a batch of containers. Instead, the containers may be handled one by one in a continuous stream, as they are entered into the system by a user. The conveying module may comprise a motor for driving the carousel belt through the modules. The motor may for example be a brushless electrical motor with gears and supports. This is advantageous in that a brushless electrical motor may be controlled to drive the carousel with different velocities. It further enables the carousel to run though the modules in a smooth pace.

[0025] According to an exemplifying embodiment of the present disclosure, the carousel belt comprises a plurality of vertical supports each configured to hold a container. The vertical supports may for example be pins, spikes, teeth, etc. the vertical supports may be evenly distributed along the carousel belt with equal distance therebetween. The containers may be placed with their opening facing downwards on the vertical supports. For example, if the vertical supports are a type of pin, and the container is a cup, the cup may be placed with its opening facing downwards, such that the bottom of the cup is resting on the pin. The vertical supports may thus hold the container in place on the carousel belt. Further, the vertical supports prevents the containers from falling of the carousel belt or tipping over. Further, they ensure that the containers are spaced apart during processing, and that they are all oriented in the same way, which may be important in the washing, drying or rinsing modules. Further, the conveying module may comprise a sensor for determining if the vertical supports are loaded with a container or not. For example, the sensor may be an optical sensor. The sensor information may be used by a control unit in the system, to determine if the conveying module is full. If each vertical support has a container arranged on it, the conveying module cannot accept additional containers until at least one container has been unloaded to the unloading area. The control unit may use this information to prevent double-stacking of containers on a single vertical support. For example, the loading module may be paused, and not accept containers from the scanning module. Further, the user interface in the scanning module may inform a user that the system

is full, and ask them to wait for a certain time interval before scanning the container again.

[0026] According to an exemplifying embodiment of the present disclosure, the washing module comprises a washing cavity for washing the containers. The carousel belt equipped with the vertical supports may act as the washing rack inside the washing cavity, for washing the containers. This is advantageous in that the carousel belt with vertical supports enable a more compact and space-efficient system. There is no need for an additional washing rack in the washing cavity, which decreases the number of components needed in the system. Further, the number of loading/unloading steps of the container in the system decreases, which further decreases the number of points of failures in the system. For example, if the container had to be transferred between different holders/racks in each module, the number of places where a container may be misplaced, damaged or lost increases. By having one common conveying module running through the washing module, the drying module and the rinsing module, this number of places decreases, leading to a more reliable system. Further, the washing module may be equipped with a sensor for determining if there are any containers inside the washing cavity. The sensor may be an optical sensor, such as a camera. For example, if the carousel belt runs through the washing cavity without any containers on the vertical supports, the sensor may detect this. The sensor may be connected to a control unit in the system. The control unit may thus, based on the information from the sensor, control the washing module to only activate the washing cycle if there is a container inside the washing cavity.

[0027] According to an exemplifying embodiment of the present disclosure, the rinsing module comprises a rinsing cavity for rinsing the containers. Similarly as for the washing module, the carousel belt equipped with the vertical supports may act as the rinsing rack inside the rinsing cavity, for rinsing the containers. This is advantageous in that the carousel belt with vertical supports enable a more compact and space-efficient system. There is no need for an additional rinsing rack in the rinsing cavity, which decreases the number of components needed in the system. Further, the rinsing module may be equipped with a sensor for determining if there are any containers inside the rinsing cavity. The sensor may be an optical sensor, such as a camera. For example, if the carousel belt runs through the rinsing cavity without any containers on the vertical supports, the sensor may detect this. The sensor may be connected to a control unit in the system. The control unit may thus, based on the information from the sensor, control the rinsing module to only activate the rinsing cycle if there is a container inside the rinsing cavity.

[0028] Even further, according to a further exemplifying embodiment of the present disclosure, the drying module comprises a drying cavity for drying the containers. Similarly as for the washing module and the rinsing module, the carousel belt equipped with the vertical supports may act as the drying rack inside the drying cavity, for drying the containers. This is advantageous in that the carousel belt with vertical supports enable a more compact and space-efficient system. There is no need for an additional drying rack in the drying cavity, which decreases the number of components needed in the system. Further, the drying module may be equipped with a sensor for determining if there are any containers inside the drying cavity. The sensor may be an optical sensor, such as a camera. For example, if the carousel belt runs through the drying cavity without any containers on the vertical supports, the sensor may detect this. The sensor may be connected to a control unit in the system. The control unit may thus, based on the information from the sensor, control the drying module to only activate the drying cycle if there is a container inside the drying cavity.

[0029] According to a further example, the information from the sensor arranged in the washing cavity may be used to determine if the rinsing module and drying module should perform their respective cycles. If there are containers on the vertical supports running through the washing cavity, the same containers will end up in the rinsing and drying modules as well, since they are travelling along the carousel belt running through these modules. Therefore, the sensor information from the washing cavity may be reused by the rinsing module and the drying module as well.

[0030] According to an exemplifying embodiment of the present disclosure, the unloading area comprises a stacking module configured to stack the containers from the drying module and a transferring means for transferring the containers from the drying module to the stacking module. The stacking module may comprise vertical supports for the containers to be stacked on. The vertical supports may for example be tubes or vertical lanes configured to receive a container.

[0031] Further, according to one exemplifying embodiment, the stacking module further comprises at least one sensor for identifying a size of the container, and wherein the stacking module is further configured to, according to the size of the container, sort the containers into different stacks. Thus, the containers may be sorted according to size on the vertical supports. This is advantageous since it facilitates the handling of the processed containers. An operator emptying the stacking module does not have to manually sort the containers into their respective size or type, since this is already performed by the system. Further, sorting the containers according to type and size enables a more space-efficient system, since stacking similar containers onto each other is more space-efficient than stacking different containers on top of each other.

[0032] According to an exemplifying embodiment of the present disclosure, the transferring means is an operating arm equipped with suction cups or grippers. Thus, the transferring means may transfer the container from the carousel belt to the stacking module, one by one. An operating arm is advantageous since it may perform both the task of transferring the container from the con-

veying module, and further to stack it in the proper stack of containers. The operating arm may be configured to move in a vertical direction and in a horizontal direction. For example, the operating arm may lift the container from the carousel belt, in a vertical direction. Further, when transferring the container to the stacking module, the operating arm may move in a horizontal direction. When the correct stack has been identified for the certain container, the operating arm may place the container in the stack by lowering it in the vertical direction. The operating arm may be controlled by a control unit in the system, to grip or release the container, and to move the operating arm in the different directions. This is advantageous in that it increases the controllability of the system. Further, an operating arm that can move in both a horizontal and vertical direction is beneficial since it may perform the tasks of two operating arms by only using one.

Brief description of the drawings

[0033] Exemplifying embodiments will now be described more in detail, with reference to the following appended drawings, in which:

Figure 1 illustrates a perspective view of a system according to an exemplifying embodiment of the present disclosure;
Figures 2a-d illustrates a scanning module of a system according to an exemplifying embodiment of the present disclosure;
Figure 3 illustrates a loading module according to an exemplifying embodiment of the present disclosure;
Figure 4 schematically illustrates different positions of a holder of a loading module according to an exemplifying embodiment of the present disclosure;
Figure 5 illustrates a perspective view of a loading module, a washing module, a rinsing module, a drying module, a conveying module and an unloading area of a system according to an exemplifying embodiment of the present disclosure;
Figure 6 illustrates a perspective view of a conveying module according to an exemplifying embodiment of the present disclosure;
Figure 7 illustrates a perspective view of a washing module and a conveying module according to an exemplifying embodiment of the present disclosure;
Figure 8 illustrates a perspective view of a drying module according to an exemplifying embodiment of the present disclosure;
Figure 9 illustrates a transferring means in an unloading module according to an exemplifying embodiment of the present disclosure;
Figure 10 illustrates a stacking module according to an exemplifying embodiment of the present disclosure;
Figure 11 schematically illustrates a method for processing reusable containers according to an exemplifying embodiment of the present disclosure.

Detailed description

[0034] As illustrated in the figures, the size of the elements and regions may be exaggerated for illustrative purposes and, thus, are provided to illustrate the general structures of the embodiments. Like reference numerals refer to like elements throughout.

[0035] Exemplifying embodiments will now be described more fully hereinafter with reference to the accompanying figures, in which currently preferred embodiments are shown. The invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided for thoroughness and completeness, and fully convey the scope of the invention to the skilled person.

[0036] With reference to figure 1, a perspective view of the system 100 according to an exemplifying embodiment of the present disclosure is shown. The system 100 is enclosed by a housing 101. The housing 101 provides protection for the system 100 housed therein, while presenting the system 100 as one unit to a user (not shown). Further, the housing 101 has a front side 101a and a rear side 101b. The front side 101a of the housing 101 may be in direct contact with a user (not shown) of the system 100. Further, the rear side 101b may be in direct contact with an operator of the system 100. The user may be a person interacting with the system 100 for the purpose of submitting a container for reconditioning. The operator may be a person working at a facility where the system 100 is installed, and interacting with the system 100 for the purposes of collecting the reconditioned containers, performing service tasks, etc. A scanning module 110 is arranged in the front side 101a of the housing 101. The scanning module 110 is configured to identify a container by reading, via the reader 111, an identification information arranged on the container. The scanning module 110 includes a user interface 102. The user interface 102 shown in the present figure includes a display 103. The user interface 102 is configured to inform the user (not shown) via the display 103, different information related to the system 100. The scanning module 110 further includes a reader 111, arranged below the display 103. The reader 111 is configured to read an identification means (not shown) on a container. The reader 111 may for example be a barcode scanner, a camera, or another type of optical sensor. Further, there is a shelf 104 arranged in the housing 101, for placing a container on while presenting the container to the reader 111. The shelf 104 is connected to a holder (not shown) of a loading module (not shown) as will be discussed more in detail below.

[0037] With reference to figs. 2a-2d, a scanning module 110 of a system 100 according to an exemplifying embodiment of the present disclosure is shown. The figures 2a-2d show different stages of a container 200

being submitted to the system 100. Identification information 201 are arranged on an outer surface of the container 200. The identification information 201 may be identified by the reader 111. In the example shown in figs. 2a-2d, the identification information 201 is a barcode. The reader 111 is thus a barcode reader 111, or any other type of reader 111 suitable for reading barcodes. Further, the scanning module 110 comprises a user interface 102, including a display 103. Moreover, there is a shelf 104 arranged in the scanning module 110. The shelf 104 includes a slot 104' for placing a container 300. More specifically, the slot 104' is a sliding door, which in it's open state leads to the holder 122 of the loading module 120 . When the sliding door 104' is closed, a container 200 may be placed on top of the sliding door 104', which may be used as a support for the container 200 during identification of the container 200.

[0038] Turning now to fig. 2a, a scanning module 110 is seen, where a container 100 is being submitted to the scanning module 100. The container 200 is brought towards the reader 111 (indicated by an arrow in the figure) reading the identification information 201 on the container 200. A user (not shown) submitting the container 200 to the scanning module 110 may place the container on the closed sliding door 104' after the identification information 201 has been read by the reader 111. A user may also place the container 200 on the closed sliding door 104' during reading of the identification information 201 by the reader 111. As is seen in fig. 2a, the sliding door 104' is placed below the reader 111. The display 103 is placed above the reader 111. The display 103 may show identification information 201 about the identified container 200, after the identification information 201 has been read by the reader 111. The identification information 201 may entail information regarding a type of container, size, material, and whether it is recognized by the system 100 or not. A container 200 not being recognized by the system 100 may be classified as not being able to be processed by the system 100. Thus, the scanning module 110 may be used as a way to ensure that the identified container 200 may be processed by the system 100.

[0039] Turning now to fig. 2b, the scanning module 110 is seen in a stage subsequent to the stage where the container 200 is identified by the identification information 201 being read by the reader 111. The display 103 may notify the user regarding the state of the container 200 in the identification stage. For example, the display 103 may show the identification information identified on the container 200. The display 103 may further show information regarding if the container 200 is processable by the system 100 or not. In the case when the container 200 is able to be processed by the system 100, the sliding door 104' will slide to open, such that the container 200 may fall into the holder 122 of the loading module 120 connected to the sliding door 104'. In fig. 2b, the sliding door 104' is shown half-open, revealing a space underneath the sliding door 104'. The space underneath the sliding door 104' may be the holder 122 or a pipe or tunnel in direct connection with the holder 122, such that a container 200 entering the space ends up in the holder 122.

[0040] With reference to fig. 2c, the scanning module 110 is seen in a stage subsequent to the stage shown in fig. 2b, where the sliding door 104' is partly open. The sliding door 104' has now been fully opened, and the container 200 is inserted into the space below the sliding door 104'. The display 103 may indicate that a processing of the container 200 is starting.

[0041] With reference to fig. 2d, the scanning module 110 is shown in a stage subsequent to the stage where the container 200 has been inserted into the space beneath the sliding door 104'. The sliding door 104' has now been fully closed. The display 103 may continue to indicate that a processing of the container 200 is starting.

[0042] With reference to fig. 3, a loading module 120 according to an exemplifying embodiment of the present disclosure is shown. The loading module 120 comprises a holder 122, for receiving a container 200 from the scanning module 110. The holder 122 has a shape corresponding to the shape of the container 200, why one container 200 at a time fits into the holder 122. The container 200 is releasably arranged in the holder 122. The holder 122 is rotatably arranged on a rotating wheel 125 arranged in the loading module 120. The holder 122 is attached to the rotating wheel 125, which may rotate the holder 122 in a clockwise and a counter-clockwise direction, which will be discussed more in relation to fig. 4. In fig. 3, the holder 122 is shown in the different positions around the rotating wheel 125.

[0043] Further, the loading module 120 comprises a sensor 121 configured to determine a state of an interior of the container 200. The sensor 121 is an optical sensor arranged in a position in the loading module 120 where it may reach an interior of the container 200. For example, as seen in fig. 3, the sensor 121 is arranged in the top left corner of the loading module 120, corresponding to a position of the holder 122 where an open end of the container 200 in the holder 122 is partly facing upwards. Further, the loading module 120 comprises a nozzle 123. The nozzle 123 is configured to spray water or another type of liquid into the container 200, thereby pre-rinsing the container 200. The nozzle 123 is arranged in a position in the loading module 120 where it may reach an interior of the container 200. For example, as shown in fig. 3, the nozzle is placed in the bottom left corner, corresponding to a position of the holder 122 where an open end of the container 200 in the holder 122 is partly facing downwards. Further, the loading module 120 comprises a waste holder 124. The waste holder 124 is configured to receive a container 200 that has been pre-rinsed by the nozzle 123 but haven't successfully been emptied by the pre-rinsing. The waste holder 124 is tube leading to a waste bin (not shown), or similar. The waste holder 124 is connected to the holder 122, such that a container 200 in

the holder 122 may be released into the waste holder 124, and thereby discarded.

[0044] With reference to fig. 4, different positions of a holder 122 of a loading module 120 according to an exemplifying embodiment of the present disclosure is shown. The holder 122 is shown in an initial position P0, a first position P1, a second position P2, a third position P3, and a fourth position P4. In the initial position P0, the holder 122 is arranged in a vertical position around the rotating wheel 125. In this position, the holder 122 receives the container 200 from the scanning module 110. The container 200 is inserted into the holder 122 with the opening end 200' of the container 200 facing upwards, such that the opening end 200' of the container 200 is exposed in the holder 122. This means that the interior of the container 200 is exposed to an outside of the holder 122. The bottom of the container 200, opposite to the open end 200', is arranged in the bottom of the holder 122. After receiving the container 200 in the holder 122 from the scanning module 110, the holder 122 may be rotated in a counter-clockwise direction by the rotating wheel 125, to a position P1. In position P1, the holder 122 is rotated to a position where the nozzle 123 may reach the interior of the container 200. The container 200 is oriented with its opening 200' partly facing downwards in a vertical direction in the first position P1. The nozzle (not shown) sprays a liquid into the interior of the container 200, and thereby pre-rinses it. The pre-rinse enables any foreign object inside the container 200 to be emptied from the container 200 and follow the jet of liquid from the nozzle 123 out from the container 200. The loading module 120 comprises a scrap collector (not shown) aligned with the position P1 of the holder 122. The scrap collector may be a type of sink or bin, configured to receive scrap and liquid. Thus, waste or foreign objects may fall out from the container 200 by the force of gravity combined with the force from the liquid sprayed into the container 200 from the nozzle 123. The orientation of the container 200 in the first position P1 is beneficial since it facilitates the pre-rinsing of the container 200 by enabling waste/objects inside the container 200 to fall out from the container 200. For example, if the container 200 is partly filled or filled when a user enters it into the system 100, the contents of the container 200 may be emptied by the pre-rinsing when the holder 122 is rotated to the first position P1.

[0045] Subsequent to the pre-rinsing in position P1, the holder 122 is rotated in a clockwise direction to a position P2. In position P2, the holder 122 is rotated to a position where the sensor 121 may reach the interior of the container 200. The container 200 is oriented with it's opening 200' partly facing upwards in a vertical direction in the second position P2. The sensor (not shown) detects an interior of the container 200, i.e. if the container 200 is empty or contains any foreign objects. Based on the information from the sensor 121, an interior state of the container 200 is determined. The interior state of the container 200 is binary and comprises a load value, which is the determined value when the interior of the container 200 is empty. The interior state further comprises a discard value, which is the determined value when the container 200 interior is not empty, i.e. contains foreign objects. Depending on the determined interior state, the holder 122 may either rotate to a position P3, or to a position P4.

[0046] If the determined interior state, based on information from the sensor 121, equals the discard value, the holder 122 is rotated from the second position P2, to a third position P3, in a counter-clockwise direction. In the third position P3, the opening end 200' of the container 200 is partly facing downwards in a vertical direction. The container 200 is released from the holder 122 in the third position P3, into the waste holder (not shown). Thereby the container 200 is discarded in the third position P3.

[0047] If the determined interior state, based on information from the sensor 121, equals the load value, the holder 122 is rotated from the second position P2, to a fourth position P4, in a counter-clockwise direction. In the fourth position P4, the opening end 200' of the container 200 is facing downwards in a vertical direction. The container 200 is released from the holder 122 in the fourth position P4, onto the conveying module (not shown). Thereby, the container 200 is loaded in the fourth position P4.

[0048] With reference to fig. 5, a perspective view of a loading module 120, a washing module 130, a rinsing module 140, a drying module 150, a conveying module 170 and an unloading area 160 of a system 100 according to an exemplifying embodiment of the present disclosure is shown. A plurality of containers 200 are arranged on the conveying module 170. The conveying module 170 extends from the loading module 120, through the washing module 130, the rinsing module 140, and the drying module 150, to the unloading area 160. From the loading module 120, a container 200 is loaded onto the conveying module 170, by dropping the container 200 from the holder 122 in the fourth position P4, onto a vertical support 171 arranged on the conveying module 170. As seen in fig. 5, the conveying module 170 comprises a plurality of vertical supports 171, more specifically vertical pins 171, onto which a container 200 is arranged with the open end 200' facing downwards in a vertical direction. Moreover, the vertical supports 171 are arranged on a common belt 172, moving in one direction from the loading module 120, through the washing module 130, the rinsing module 140, the drying module 150 and then back to the loading module 120. Thus, the conveying module 170 forms a continuous, closed path, common for the washing module 130, the rinsing module 140 and the drying module 150. A container 200 loaded on a vertical support 171 in the conveying module 170, enters an entering portion 132 of the washing module 130, is led through the washing module 130 to be washed, and then exits through an exit portion 133 of the washing module 130, and enters into the rinsing module 140. The entrance in the rinsing module 140 is

connected to the exit of the washing module 130. Thus, the container 200 exiting the washing module 130 simultaneously enters the rinsing module 140. The rinsing module 140 comprises an entering portion 141 and an exit portion 142. Thus, the container 200 enters the rinsing module 140 through the entering portion 141, is led through the rinsing module 140 by the conveying module 170, exits the rinsing module 140 through the exit portion 142 and simultaneously enters the drying module 150. The drying module 150 comprises an entering portion 152 and an exit portion 153. The container 200 enters the drying module 150 through the entering portion 152, and exits the drying module through the exit portion 153. The container 200 is unloaded from the conveying module 170 by a transferring means 162. The transferring means 162 seen in fig. 5 is an operating arm 162 movable in a horizontal direction and a vertical direction. The transferring means 162 is lowered in a vertical direction to retrieve a container 200 from the conveying module 170. The transferring means 162 then rises in a vertical direction with the container 200 to lift the container 200 from the vertical pin 171. Thereafter, the transferring means 162 moves in a horizontal direction to move the container 200 towards a stacking module 161, where the transferring means 162 then lowers the container 200 in a vertical direction, to place the container 200 in one of the stacks 165 in the stacking module 161. More details regarding the unloading area 160 and the stacking module 161 will be discussed with reference to figures 9 and 10 below.

[0049] With reference to fig. 6, a perspective view of a conveying module 170 according to an exemplifying embodiment of the present disclosure is shown. The conveying module 170 is shown in relation to the washing module 130, the other modules are hidden in this figure. Arrows indicate the direction of the movement of the conveying module 170 in the system 100. Further, in the present figure, each vertical supports 171 has a container 200 arranged thereon. The belt 172 common for all vertical supports 171 is seen extending in a continuous path. From the present figure, it is clearly seen that the conveying module 170 is a conveying belt 172 with a plurality of vertical supports 171 arranged in a continuous path. Thus, there is no start nor end to the conveying module 170, instead it moves continuously in laps around its path, which extends through the washing module 130, the rinsing module 140 and the drying module 150.

[0050] With reference to fig. 7, a perspective view of a washing module 130 and a conveying module 170 according to an exemplifying embodiment of the present disclosure is shown. The washing module 130 is the only module that is seen in fig. 7, the remaining modules are hidden, to show the continuous path of the conveying module 170. The washing module 130 has an entering portion 132 on a side thereof, which is an opening in a wall of the washing module 130. The conveying module 170 enters the washing module 130 through the entering portion 132. The washing module 130 comprises a washing cavity 131 where the conveying module 170 enters when entering the washing module 130 through the entering portion 132. The washing cavity 131 is a cavity for receiving containers 200 for washing. Further, the washing cavity 131 comprises nozzles (not shown) and a compartment holding detergent (not shown) arranged in the washing cavity 131, to enable providing detergent and/or liquid on the container 200 or containers 200 therein. The entering portion 132 may be covered with curtains (not shown), for insulating the washing cavity 131 and to prevent detergent, liquid and/or dirt from the containers 200 to escape from the washing cavity 131. The curtains may be made from a flexible material, such as a type of polymer. The exit portion 133 of the washing module 130 and the entering portion 132 are comprised by the same opening in the washing module 130. The exit portion 133 of the washing module 130 is connected to the entering portion 141 of the rinsing module 140.

[0051] Moreover, fig. 7 shows vertical supports 171 arranged on the conveying module 170. A vertical support 171 may be emptied from a container 200 by the transferring means (not shown) in the unloading module 160. The vertical support 171 thereafter continues its path towards the loading module 120, where a new container 200 may be loaded on the vertical support 171. The conveying module 170 shown in fig. 7 is driven by a motor (not shown) and a system of cogs 173, on which the belt (not shown) is arranged.

[0052] With reference to fig. 8, a perspective view of a drying module 150 according to an exemplifying embodiment of the present disclosure is shown. The drying module comprises a housing 151 enclosing the drying module 150. The drying module 150 further comprises an entering portion 152 connected to the exit portion 142 of the rinsing module 140, and an exit portion 153 leading to the unloading area 160. The drying module 150 further comprises a fan arrangement 154 arranged above the conveying module 170 in the drying module 150. The fan arrangement 154 is configured to produce hot air which is led through the housing 151 to the conveying module 170 and the containers 200 arranged thereon. The fan arrangement 154 dries the containers 200 when they are being led through the drying module 150 by the conveying module 170. The dried containers 200 leaves the drying module 150 through the exit portion 153, which is an opening in the housing 151. When the containers 200 leave the drying module 150, they are no longer covered by the housing 151, and are therefore exposed to the transferring means 162 of the unloading area 160.

[0053] With reference to fig. 9, a transferring means 162 in an unloading module 160 according to an exemplifying embodiment of the present disclosure is shown. The transferring means 162 is an operating arm, which is movable in a horizontal direction and a vertical direction. Moreover, the transferring means 162 comprises a vertical rail 166 and a horizontal rail 167. The vertical rail 166 is attached to the horizontal rail 167 in a way that allows

for the vertical rail 166 to slide along the horizontal rail in a horizontal direction, and to be lowered and lifted in a vertical direction. The transferring means 162 comprises a pair of grippers 163 configured to engage with a container 200 arranged on a vertical support 171. The grippers 163 have an open state and a closed state. In the open state, as shown in fig. 9, the grippers 163 may be positioned around a container 200, to prepare the transferring means 162 for engaging with the container 200. In the closed state, the grippers 163 may lock around the container 200, thereby enabling the transferring means 162 to lift the container 200 from the vertical supports 171.

[0054] With reference to fig. 10, a stacking module 161 according to an exemplifying embodiment of the present disclosure is shown. The stacking module 161 comprises a plurality of stacks 165a, 165b, 165c, 165d, 165e. Each stack 165a, 165b, 165c, 165d, 165e may represent a type and/or size of a container 200. Further, the stacking module 161 comprises a sensor (not shown). The sensor may be arranged on the transferring means 162, for example. The sensor detects a size of the container 200 that has been lifted from the vertical support 171. Based on the detected size of the container 200, the container 200 is sorted into one of the plurality of stacks 165a, 165b, 165c, 165d, 165e in the stacking module 161. For example, the plurality of stacks 165a, 165b, 165c, 165d, 165e may be arranged in order of size, from smallest size in the utmost left stack 165a, to the largest size in the utmost right stack 165e. The stacks 165a, 165b, 165c, 165d, 165e are each arranged in a tube. Furthermore, the stacking module 161 comprises a second sensor (not shown) for detecting when each tube is full, i.e. when one of the stacks 165a, 165b, 165c, 165d, 165e fills one of the corresponding tubes and needs to be emptied. In case the stacks 165a, 165b, 165c, 165d, 165e are full, the system 100 will not allow any more containers 200 to be loaded by the loading module 120 until the stacks 165a, 165b, 165c, 165d, 165e are emptied. The information from the second sensor that one or more of the stacks 165a, 165b, 165c, 165d, 165e are full may be notified to the user via the user interface 102.

[0055] With reference to fig. 11, a method 300 for processing reusable containers 200 according to an exemplifying embodiment of the present disclosure is shown. The method 300 comprises the step S1 of scanning identification information 201 registered on a used container 200. The method further comprises the step S2 of determining whether the used container 200 is a reusable container 200. Thereafter, a step S3 is performed, comprising loading the container 200 in a loading module 120 when the container 200 is recognized as a reusable container 200. Subsequent to step S3, there is a step S3a comprising pre-rinsing the reusable container 200 in the loading module 120, and a step S4, comprising determining the interior state of the container 200 into one of a load value and a discard value. Depending on the interior state, either a step S5a is performed, or a step S5b. Step S5a comprises loading the reusable container 200 to a conveying module 170 when the interior state equals the load value. Step S5b comprises discarding the reusable container 200 to a waste holder 124 when the interior state equals the discard value. If step S5a is performed, there are subsequent steps. If step S5b is performed, there are no more subsequent steps. A step S6 subsequent to step S5a comprises transferring via the conveying module 170 the reusable container 200 from the loading module 120 to a washing module 130. Subsequent to the step S6 is a step S7 comprising washing the reusable container 200 in the washing module 130. Subsequent to step S7 is a step S8 comprising transferring via the conveying module 170 the reusable container 200 from the washing module 130 to a rinsing module 140. Subsequent to step S8 is a step S9 comprising rinsing the reusable container 200 in the rinsing module 140. Thereafter a step S10 is performed, comprising transferring via the conveying module 170 the reusable container 200 from the rinsing module 140 to a drying module 150. Thereafter a step S11 is performed, comprising drying the reusable container 200 in the drying module 150. Subsequent to step S11, is a step S12 comprising transferring via the transferring means 162 the reusable container 200 from the drying module 150 to an unloading area 160.

[0056] Although features and elements are described above in particular combinations, each feature or element can be used alone without the other features and elements or in various combinations with or without other features and elements.

[0057] Additionally, variations to the disclosed embodiments can be understood and effected by the skilled person in practicing the claimed invention, from a study of the figures, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements, and the indefinite article "a" or "an" does not exclude a plurality. The mere fact that certain features are recited in mutually different dependent claims does not indicate that a combination of these features cannot be used to advantage.

Claims

1. A system (100) for processing reusable containers comprising:

   a scanning module (110) comprising a reader (111) configured to read identification (201) information registered on a used container (200);
   a loading module (120) configured to determine a state of a container interior, based on information from at least one sensor (121), and to load or discard the container (200);
   a washing module (130) configured to wash the container (200) from the loading module (120);
   a rinsing module (140) configured to rinse the

container (200) from the washing module (130);
a drying module (150) configured to dry the container (200) from the rinsing module (140);
an unloading area (160) configured to deliver the processed container (200) to a user; and
a conveying module (170) configured to convey the container (200) from the loading module (120), through the washing module (130), the rinsing module (140) and the drying module (150), to the unloading area (160).

2. System (100) according to claim 1, wherein the information from the at least one sensor (121) comprises information regarding an emptiness of the container (200).

3. System (100) according to any preceding claim, wherein the at least one sensor (121) is an optical sensor.

4. System (100) according to claim 2, wherein the interior state of the container (200) is binary and comprises

a load value, wherein the container interior is empty and the container (200) is loaded by the loading module (120);
a discard value, wherein the container interior is not empty and the container (200) is discarded by the loading module (120).

5. System (100) according to any preceding claim, wherein the loading module (120) further comprises a holder (122) configured to receive a container (200) from the scanning module (110), wherein the container (200) is releasably arranged in the holder (122); and

a nozzle (123) configured to pre-rinse the container (200) in the holder (122);
a waste holder (124) configured to receive a discarded container (200); wherein
the holder (122) is configured to rotate to a first position (P1) enabling the nozzle (123) to pre-rinse the container (200);
the holder (122) is further configured to rotate to a second position (P2) enabling the at least one sensor (121) to access the container interior; and
the holder (122) is further configured to rotate to a third position (P3) enabling a release of the container (200) into the waste holder (124), wherein
the holder (122) is further configured to rotate to a fourth position (P4) enabling loading of the container (200) on the conveying module (170).

6. System (100) according to claim 5, wherein the holder (122) rotates to the first position (P1) in a first direction, and to the second (P2) position in a second direction, and to the third (P3) and fourth position (P4) in the first direction, wherein the first direction and second direction are different from each other.

7. System (100) according to any preceding claim, wherein the conveying module (170) is a carousel belt extending through the washing module (130), the rinsing module (140), and the drying module (150).

8. System (100) according to claim 7, wherein the carousel belt (170) comprises a plurality of vertical supports (171) each configured to hold a container (200).

9. System (100) according to any preceding claim, wherein the identification information (201) is registered in at least one of a bar code, a QR code and a RFID tag, or determined by image recognition.

10. System (100) according to any preceding claim, wherein the unloading area (160) comprises
a stacking module (161) configured to stack the containers (200) from the drying module (150) and a transferring means (162) for transferring the containers (200) from the drying module (150) to the stacking module (161).

11. System (100) according to claim 10, wherein the transferring means (162) is an operating arm equipped with suction cups or grippers (163).

12. System (100) according to claim 10 or 11, wherein the stacking module (161) further comprises at least one sensor for identifying a size of the container (200), and wherein the stacking module (161) is further configured to, according to the size of the container, sort the containers into different stacks (165a, 165b, 165c, 165d, 165e).

13. A method (300) for processing reusable containers, comprising the steps of:

scanning (S1) identification information registered on a used container in the scanning module;
determining (S2) whether the used container is a reusable container;
loading (S3) the container in a loading module when the container is recognized as a reusable container;
determining (S4) the interior state of the container into one of a load value and a discard value;
loading (S5a) the reusable container to a conveying module when the interior state equals the load value;

transferring (S6), via the conveying module, the reusable container from the loading module to a washing module;
washing (S7) the reusable container in the washing module;
transferring (S8), via the conveying module, the reusable container from the washing module to a rinsing module;
rinsing (S9) the reusable container in the rinsing module;
transferring (S10), via the conveying module, the reusable container from the rinsing module to a drying module;
drying (S11) the reusable container in the drying module;
transferring (S12), via a transferring means, the reusable container from the drying module to an unloading area.

14. Method according to claim 13, wherein an alternative set of steps subsequent to the step of determining (S4) the interior state of the container into one of a load value and a discard value, is
discarding (S5b) the container when the interior state equals the discard value.

15. Method according to claim 13 or 14, further comprising the step of:
pre-rinsing (S3a) the reusable container in the loading module.

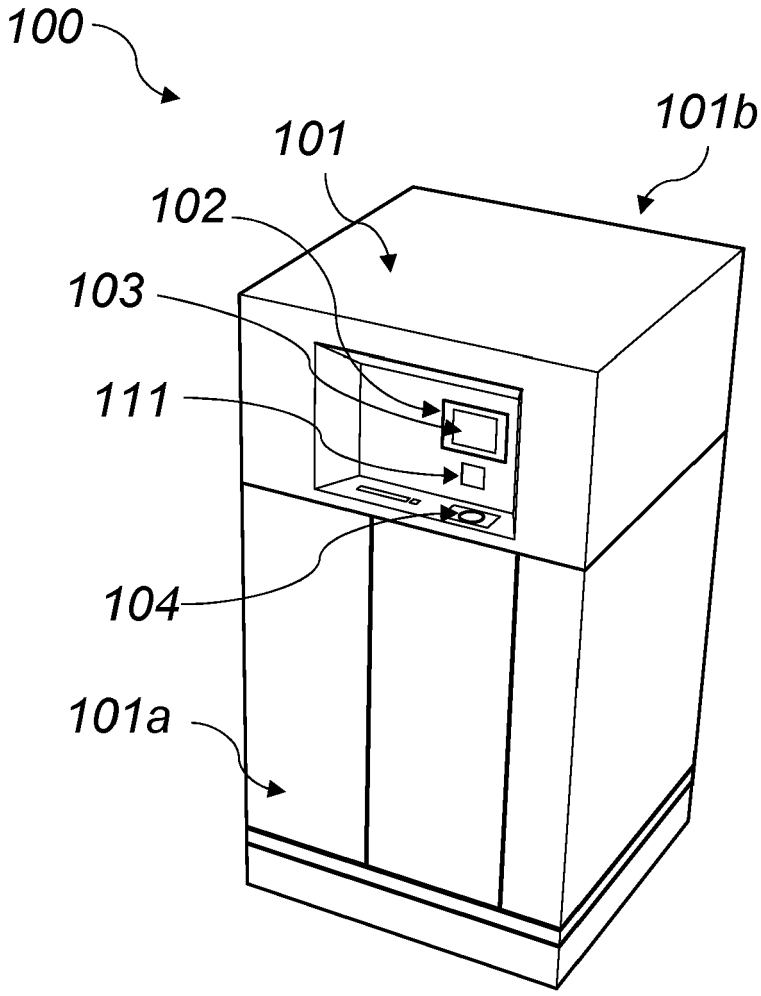

Fig. 1

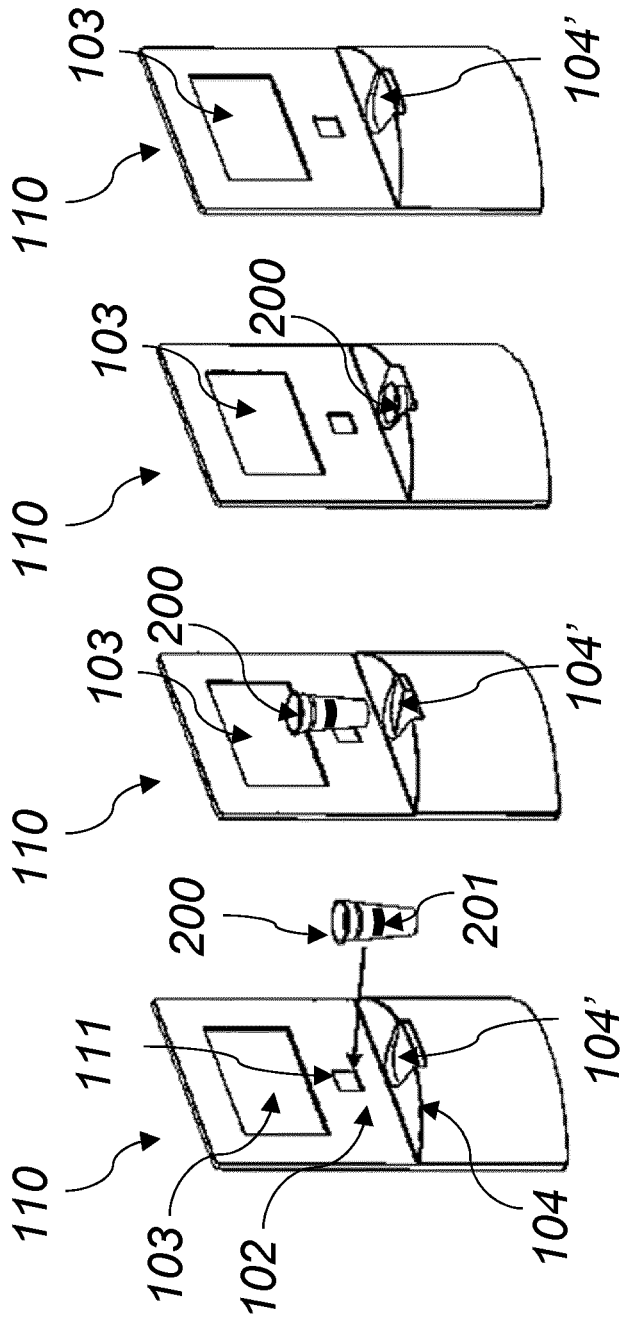

Fig. 2A Fig. 2B Fig. 2C Fig. 2D

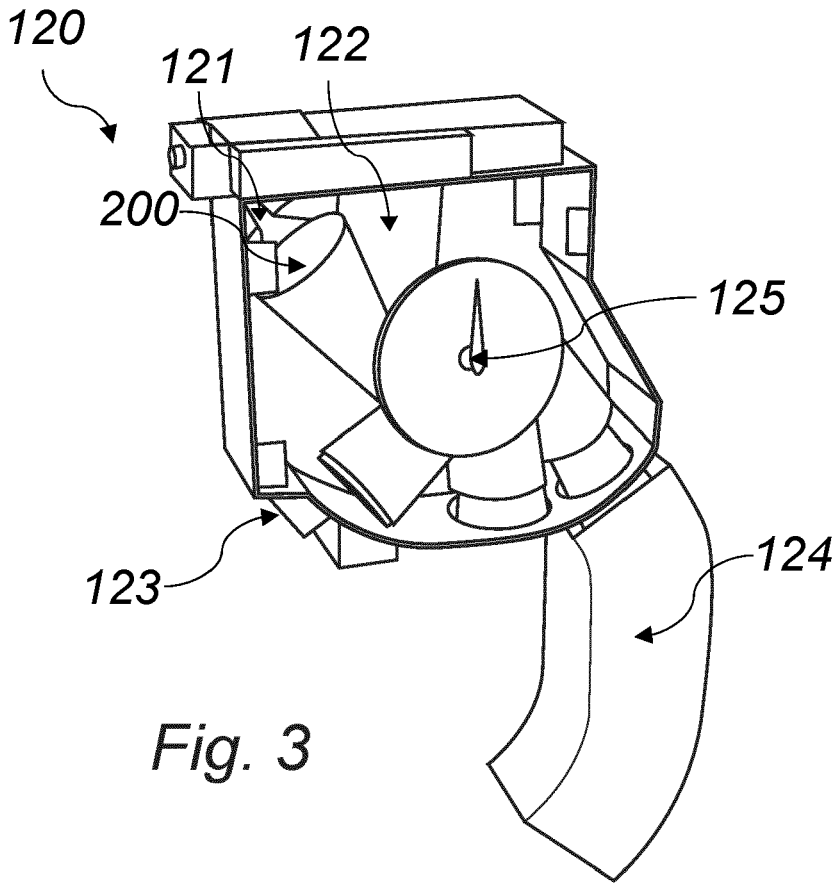
120
121
122
200
125
123
124

Fig. 3

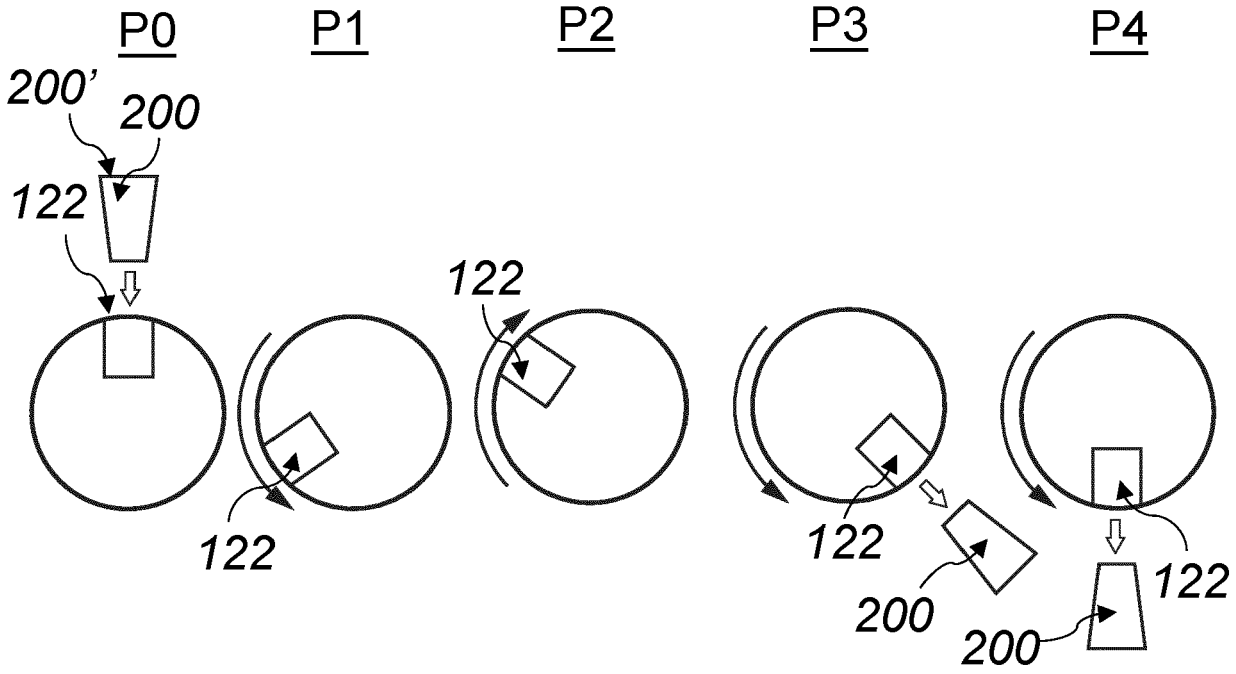
P0
P1
P2
P3
P4
200'
200
122
122
122
122
200
200
122

Fig. 4

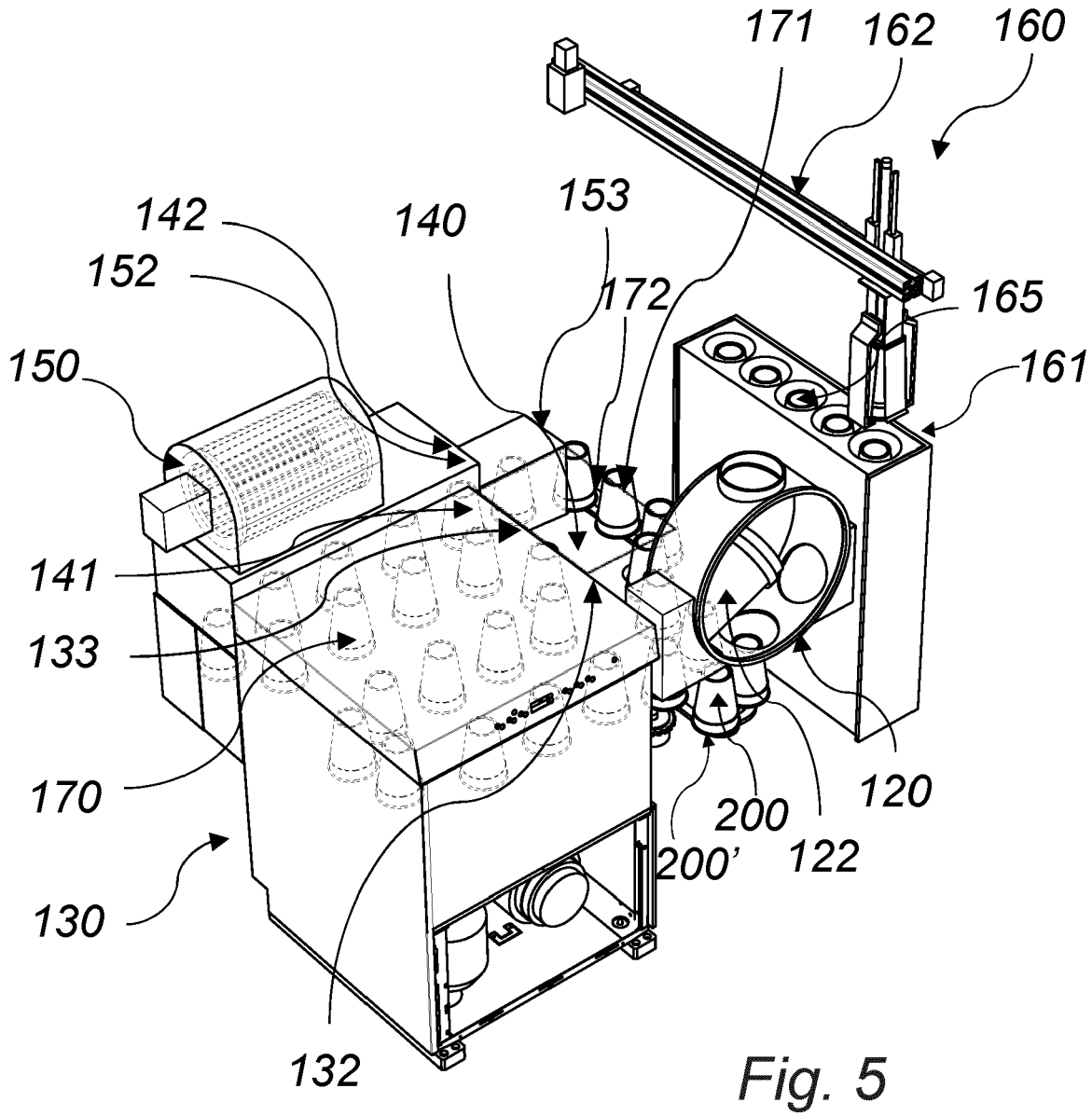
171
162
160
142
140
153
152
172
165
150
161
141
133
170
130
132
200
200'
122
120

Fig. 5

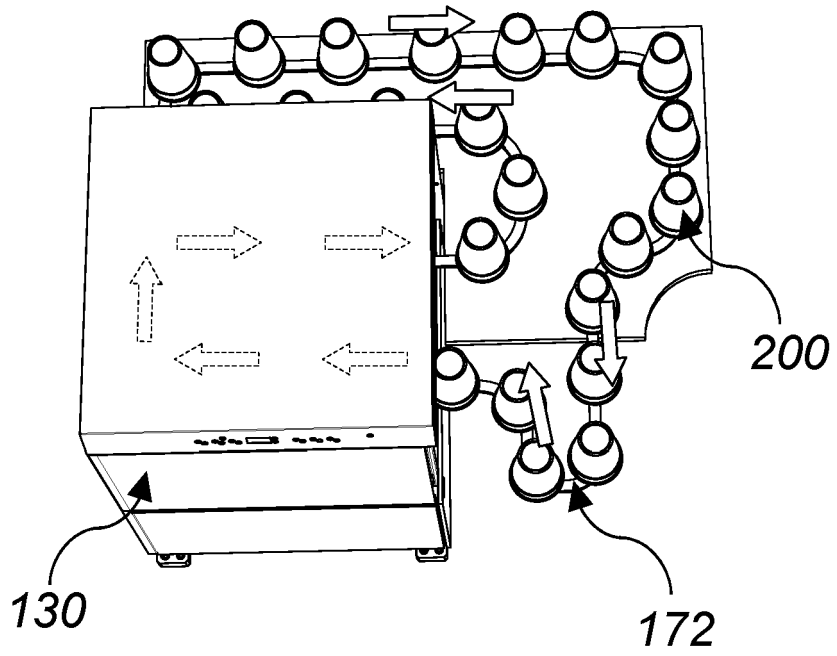

Fig. 6

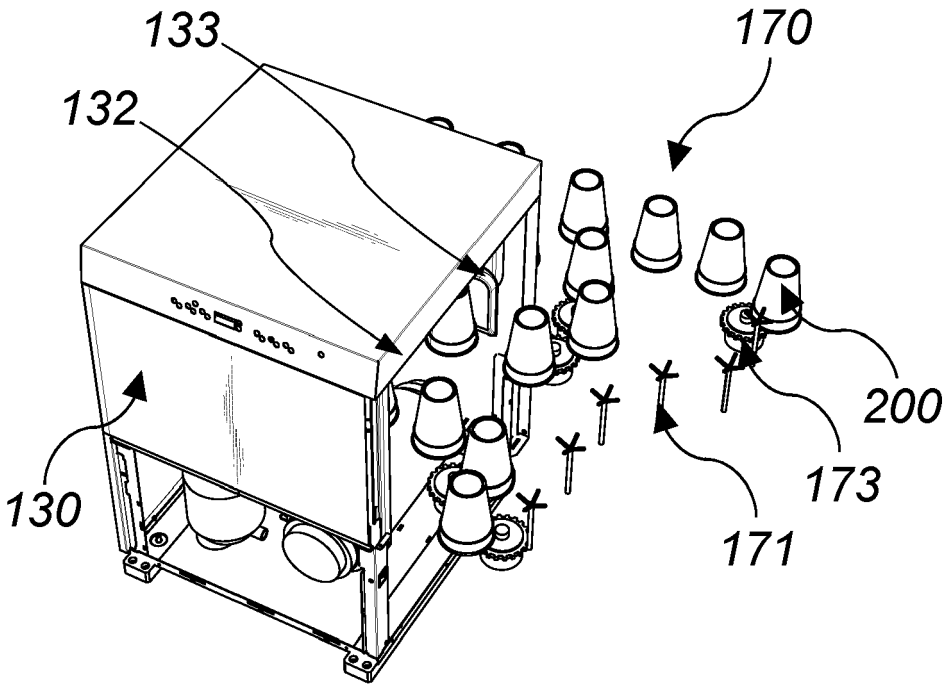

Fig. 7

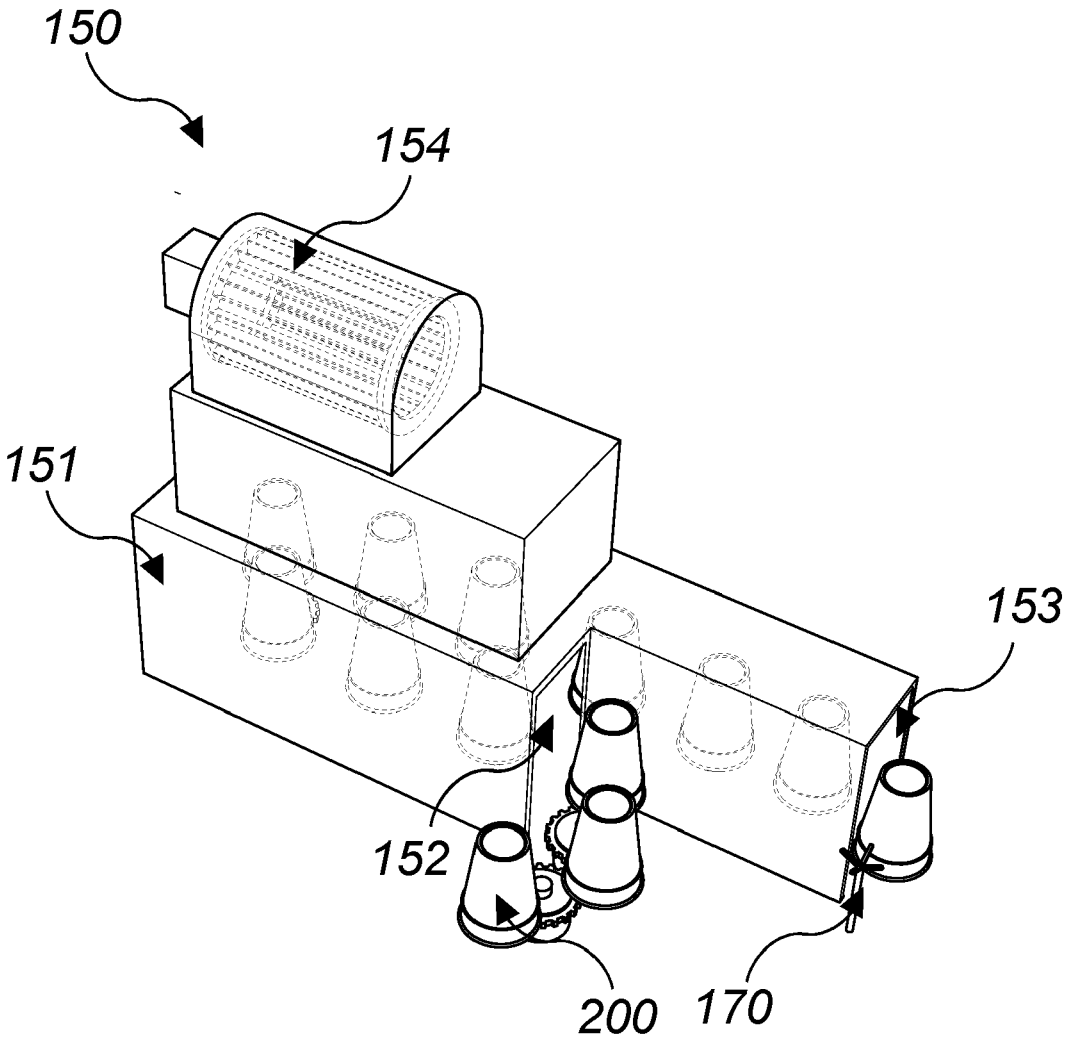

Fig. 8

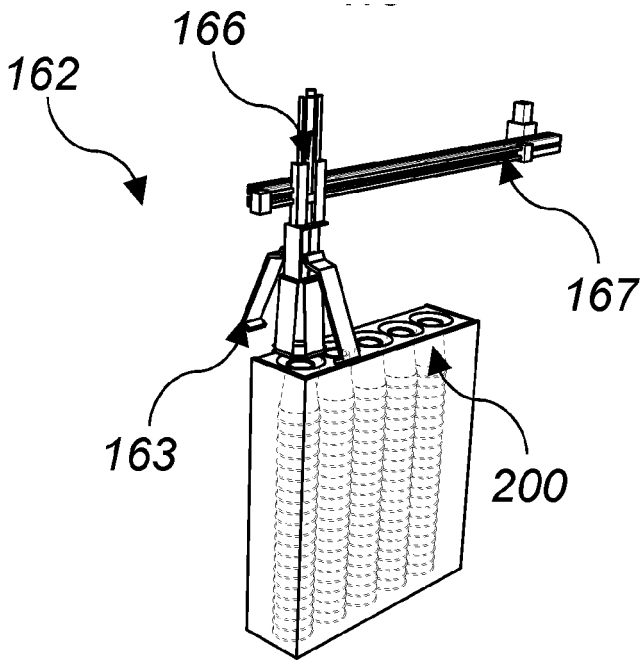

Fig. 9

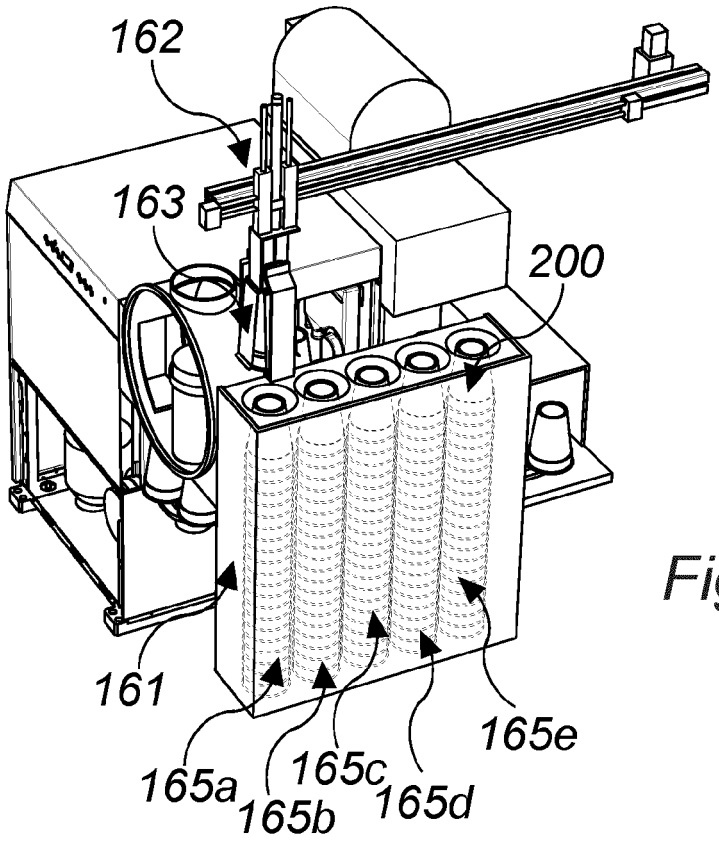

Fig. 10

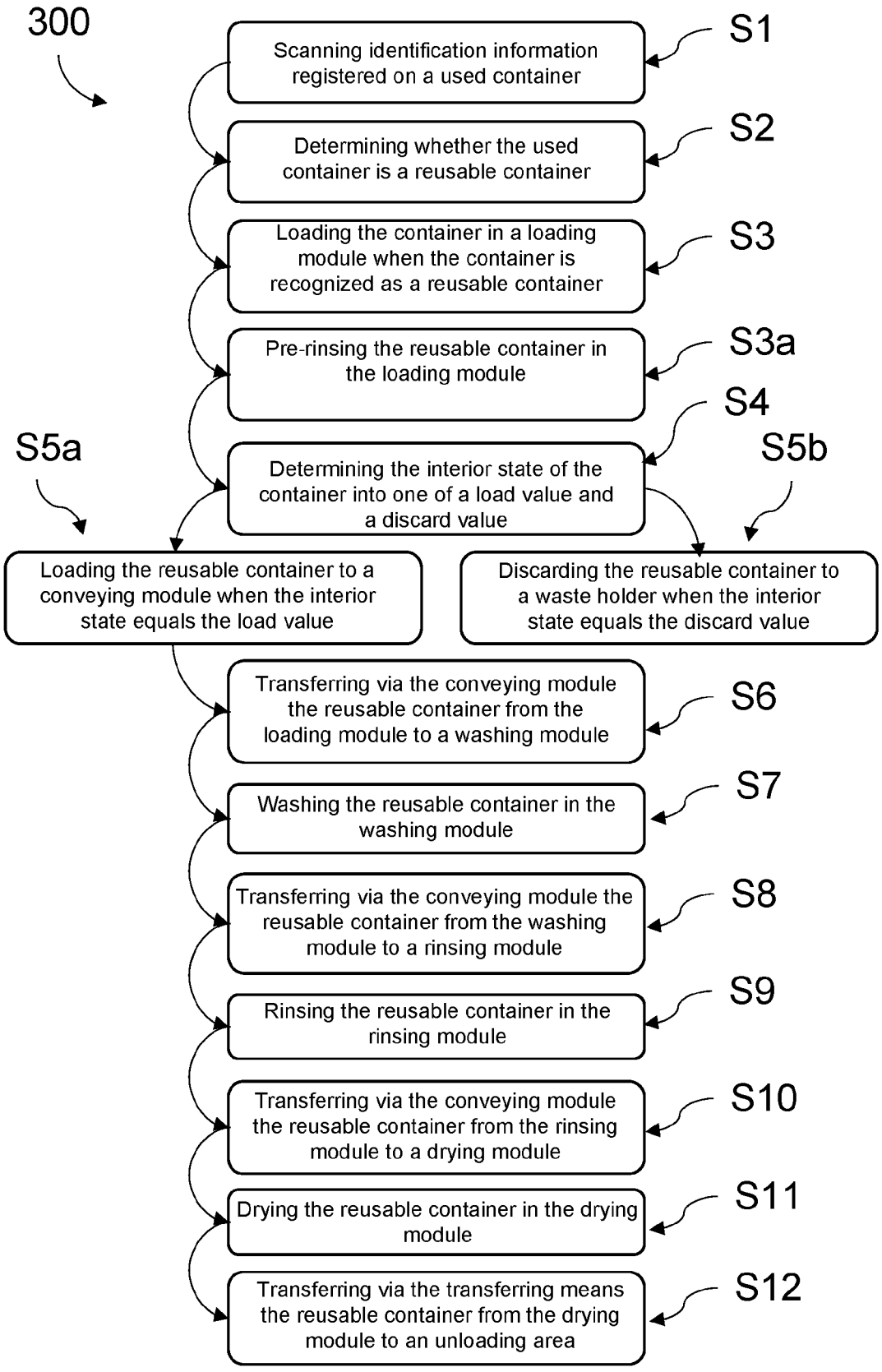
300
Scanning identification information registered on a used container
S1
Determining whether the used container is a reusable container
S2
Loading the container in a loading module when the container is recognized as a reusable container
S3
Pre-rinsing the reusable container in the loading module
S3a
Determining the interior state of the container into one of a load value and a discard value
S4
S5a
S5b
Loading the reusable container to a conveying module when the interior state equals the load value
Discarding the reusable container to a waste holder when the interior state equals the discard value
Transferring via the conveying module the reusable container from the loading module to a washing module
S6
Washing the reusable container in the washing module
S7
Transferring via the conveying module the reusable container from the washing module to a rinsing module
S8
Rinsing the reusable container in the rinsing module
S9
Transferring via the conveying module the reusable container from the rinsing module to a drying module
S10
Drying the reusable container in the drying module
S11
Transferring via the transferring means the reusable container from the drying module to an unloading area
S12

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 23 21 3059

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Place of search	Date of completion of the search	Examiner
Munich	22 May 2024	Lodato, Alessandra

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