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

(57) An automatic system (100) for processing reusable containers comprising: a loading and batching module (102) for loading and collecting the reusable containers to be processed; a washing and rinsing module (104) for washing and rinsing the reusable containers from the loading and batching module; a drying module (106) for drying the reusable containers from the washing and rinsing module; a stacking module (108) for stacking the reusable containers from the drying module; and at least one transferring module (110) for enabling the transferring of the reusable containers between the loading and batching module, the washing and rinsing module, the drying module and the stacking module.

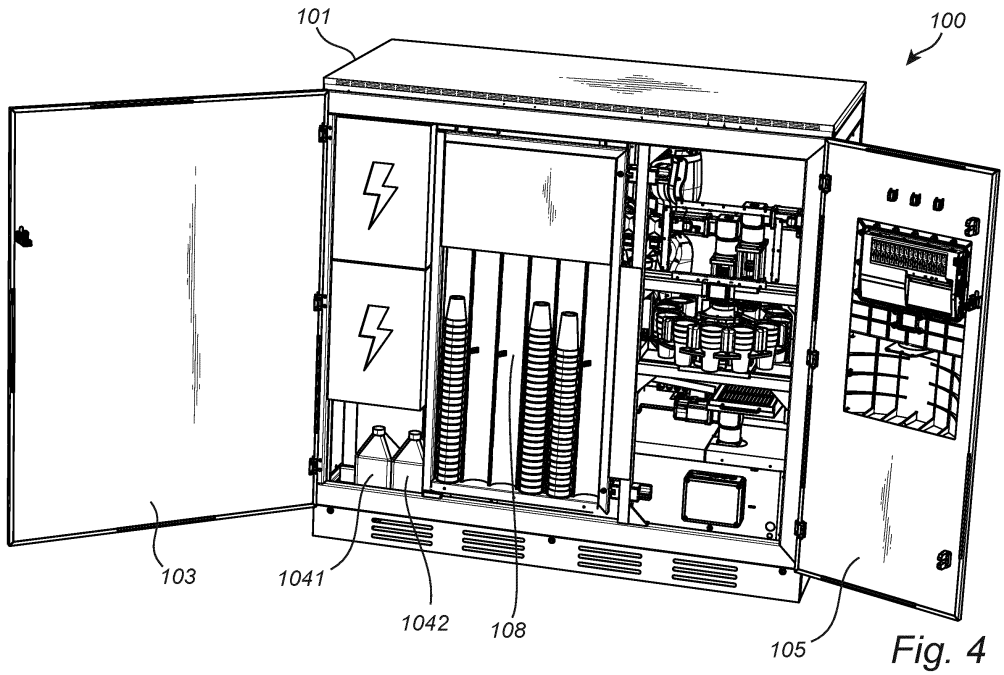

Fig. 4

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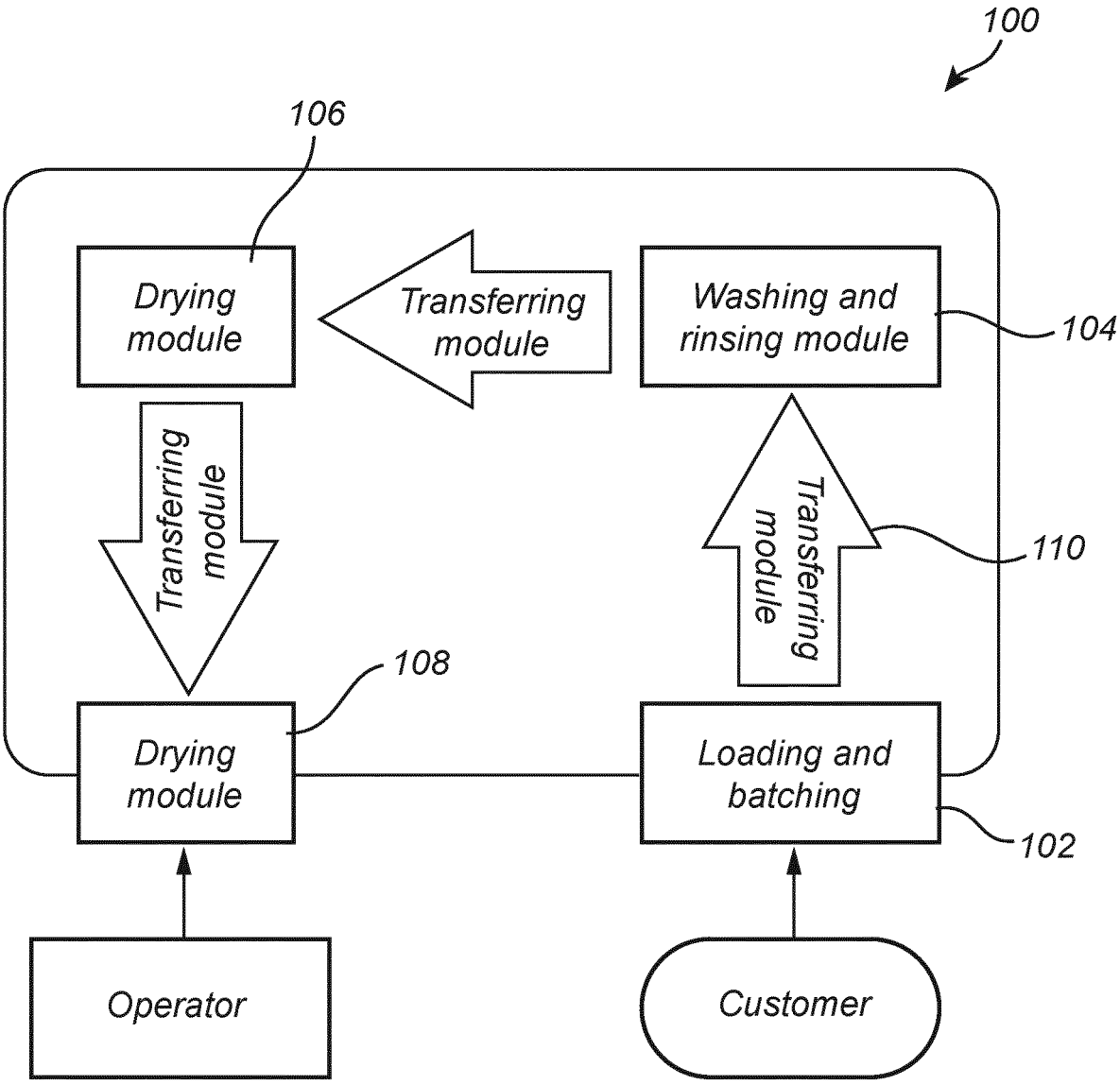
100
106
Drying module
Transferring module
Washing and rinsing module
104
Transferring module
Transferring module
110
108
Drying module
Loading and batching
102
Operator
Customer

Fig. 6

Description

FIELD OF THE INVENTION

[0001] The present invention generally relates to container processing, and, more particularly, to method and system for automatically processing reusable containers.

BACKGROUND OF THE INVENTION

[0002] Disposable containers have been widely used due to convenience, however, more and more 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 in some cases it is even mandatory in bars and quick service restaurants. The processing of reusable containers is usually operated by an operator, i.e. the operator manually collects dirty containers, puts them into a dishwasher and then takes them to the beverage distribution area after they are washed in the dishwasher. This is inefficient and needs high labor cost.

SUMMARY OF THE INVENTION

[0003] In the light of the above, it is of interest to provide alternative solutions in order to improve the efficiency of processing the reusable containers. These and other objects are achieved by providing an automatic 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 an automatic system for processing reusable containers. The automatic system comprises a loading and batching module for loading and collecting the reusable containers to be processed, a washing and rinsing module for washing and rinsing the reusable containers from the loading and batching module, a drying module for drying the reusable containers from the washing and rinsing module, a stacking module for stacking the reusable containers from the drying module, and at least one transferring module for enabling the transferring of the reusable containers between the loading and batching module, the washing and rinsing module, the drying module and the stacking module.

[0005] Thus, the present invention is based on an idea of providing a system which can automatically collect, wash, sanitize, dry, sort and stack reusable containers without manual handling from the operator.

[0006] According to an embodiment of the present invention, the loading and batching module comprises a loading area and a batching area. The loading area comprises a scanning system, an user interface display and a door, wherein the scanning system comprises a reader for reading identification information registered on a used container; the user interface display is configured to display information of the automatic system; and the door is configured to open automatically after the used container is recognized as a reusable container by the scanning system. The batching area comprises a rotating platform for collecting all recognized reusable containers. Due to the arrangement of the scanning system and the door, the used containers which are recognized as reusable containers can be collected automatically in the loading area.

[0007] According to an embodiment of the present invention, the washing and rinsing module comprises a cavity for washing and rinsing the reusable containers, and a washing rack or a movable belt equipped with vertical supports for the reusable containers.

[0008] According to an embodiment of the present invention, the drying module comprises a carousel belt equipped with vertical supports for the reusable containers, the carousel belt being configured to move the reusable containers along a ventilated tunnel with hot air.

[0009] According to an embodiment of the present invention, the stacking module is equipped with sensors for notifying an operator when the reusable containers in the stacking module exceed a threshold.

[0010] According to an embodiment of the present invention, the at least one transferring module comprises an operating arm equipped with suction cups or grippers.

[0011] According to an embodiment of the present invention, the identification information is registered in at least one of a bar code, QR code and a RFID tag.

[0012] According to a second aspect of the present invention, there is provided a method for automatically processing reusable containers. The method comprises the steps of scanning identification information registered on a used container in a scanner, recognizing whether the used container is a reusable container, loading and batching the used container in a loading and batching module when the used container is recognized as a reusable container, automatically transferring the reusable containers from the loading and batching module to a washing and rinsing module, washing and rinsing the reusable container in the washing and rinsing module, automatically transferring the reusable containers from the washing and rinsing module to a drying module, drying the reusable container in the drying module, automatically transferring the reusable containers from the drying module to a stacking module, and stacking the reusable container in the stacking module.

[0013] According to an embodiment, the identification information comprises information about at least a type and a size of the reusable container.

[0014] According to an embodiment, the loading and batching the used container comprises automatically opening a door after the container code is recognized as a reusable container and loading the reusable container in a loading area and then collecting the reusable container in a batching area with a rotating platform.

[0015] According to an embodiment, the method further comprises a pre-rinse step.

[0016] According to an embodiment, the method further comprises notifying an operator when the reusable containers in the stacking module exceed a threshold.

[0017] According to an embodiment, the method further comprises stopping working when the stacking module is full.

[0018] According to an embodiment, the drying the reusable container comprises driving a carousel belt with vertical supports for the reusable containers to move the reusable containers along a tunnel ventilated with hot air.

[0019] According to an embodiment, the method further comprises indicating an error message on a display when the used container is not recognized as a reusable container.

[0020] The present invention has the advantages of reducing labor cost and improving efficiency of processing reusable containers, thus there are fewer fatiguing operations by operators and the system is easy to use, which on another hand helps to make the use of reusable containers more popular thus the waste of materials is significantly reduced and is more environment friendly.

[0021] Further objectives of, features of, and advantages with, the present invention will become apparent when studying the following detailed disclosure, the drawings and the appended claims. Those skilled in the art will realize that different features of the present invention can be combined to create embodiments other than those described in the following.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] This and other aspects of the present invention will now be described in more detail, with reference to the appended drawings showing embodiment(s) of the invention.

Fig. 1 schematically shows a front overview of the system according to an exemplifying embodiment of the present invention,

Fig. 2 schematically shows a front view of the system with a left outer door being open according to an exemplifying embodiment of the present invention,

Fig. 3 schematically shows a front view of the system with the left outer door and a left inner door being open according to exemplifying embodiments of the present invention,

Fig. 4 schematically shows a front view of the system with the left outer door and a right door being open according to an exemplifying embodiment of the present invention,

Fig. 5 schematically shows a rear view of the system without panels according to an exemplifying embodiment of the present invention,

Fig. 6 schematically shows modules included in the system according to an exemplifying embodiment of the present invention,

Fig. 7 schematically shows an overview of the transferring module according to an exemplifying embodiment of the present invention,

Figs. 8A-8E schematically show the arrangement of the loading area in different statuses according to exemplifying embodiments of the present invention,

Figs. 9A schematically shows the arrangement of the modules in the system according to exemplifying embodiments of the present invention,

Fig. 9B schematically shows the transfer of containers from the batching area to the pre-rinsing area according to an exemplifying embodiment of the present invention,

Figs. 10A-10B schematically show a structure of the washing and rinsing module according to an exemplifying embodiment of the present invention,

Figs. 11A-11B schematically show a structure of the drying module according to an exemplifying embodiment of the present invention,

Fig. 12A schematically shows a structure of the stacking module according to an exemplifying embodiment of the present invention.

Fig. 12B schematically shows a filling percentage of the containers in the stacking module indicated with LED lights according to an exemplifying embodiment of the present invention.

Fig. 13 schematically show a workflow of processing the reusable containers according to an exemplifying embodiment of the present invention.

DETAILED DESCRIPTION

[0023] Fig. 1 schematically shows a front overview of the system 100, Fig. 2 schematically shows a front view of the system 100 with a left outer door being open, Fig. 3 schematically shows a front view of the system 100 with the left outer door and a left inner door being open and Fig. 4 schematically shows a front view of the system 100 with the left outer door and a right door being open according to exemplifying embodiments of the present invention. According to some embodiments, the system 100 comprises a housing 101 and is provided with three doors: the left outer door 103, the right door 105 and the left inner door 107. As shown in Figs. 2 to 4, the left outer door 103 is arranged at the left front side of the system 100, when the left outer door 103 is open, an operator may access a stacking module 108, a detergent tank 1041 and a rinse aid tank 1042. As shown in Fig. 3, the left inner door 107 is arranged inside the system 100 and is behind the stacking module 108, when the left inner door 107 is open, the operator may access all modules in the system 100. Further as shown in Fig. 4, the right door 105 is arranged at the right front side of the system 100, when the right door 105 is open, the operator may access all modules in the system 100.

[0024] Fig. 5 schematically shows a rear view of the system 100 without panels according to an exemplifying embodiment of the present invention. Fig. 6 schematically shows the modules included in the system according to an exemplifying embodiment of the present inven-

tion. The arrangement of all the modules of the system will be described according to Figs. 5 and 6 in combination with Figs. 2 to 4. According to some embodiments as shown in Fig. 6, the system 100 comprises at least one transferring module 110, a loading and batching module 102, a washing and rinsing module 104, a drying module 106 and a stacking module 108. According to some embodiments as shown in Fig.5, the washing and rinsing module 104 and the drying module 106 are arranged at the bottom of the system 100 inside the housing 101, the loading and batching module 102 is arranged above the drying module 106, the stacking module 108 is arranged on the left inner door 107. The function of the each module will be described in details below.

[0025] The system 100 comprises at least one transferring module 110 for automatically transferring the reusable containers. Fig. 7 schematically shows an overview of the transferring module 110 according to an exemplifying embodiment of the present invention. According to some embodiments, the transferring module 110 may comprise an operating arm equipped with suction cups such that the reusable containers may be sucked up by the suction cups 1101 and transferred from one module to another module of the system. According to some other embodiments, the transferring module 110 may comprise a robot with grippers such that the reusable containers may be gripped by the grippers and transferred from one module to another module of the system 100.

[0026] The system 100 further comprises a loading and batching module 102 for loading and collecting reusable containers to be processed. According to some embodiments, the loading and batching module 102 comprises a loading area 1021 and a batching area 1022. Fig. 8A-8E schematically show the arrangement of the loading area 1021, Fig. 9A schematically shows the arrangement of the batching area 1022 in the system 100. The loading area 1021 is The loading area 1021 comprises a scanning system 1023, a user interface display 1024 and a door 1025. The scanning system 1023, the user interface display 1024 and the door 1025 are arranged on the right door 105 as shown in Figs 2-4. According to some embodiments, when a user approaches the system 100 with a used container, he may follow instructions on the user interface display 1024 or choose an operation from a menu shown on the user interface display 1024, and then scan information of the used container using the scanning system 1023. According to some embodiments, the used container may be any suitable type of containers such as a container for liquid, a container for food etc.. According to some embodiments, the information of the used container is identification information and the scanning system 1023 comprises a reader, the user scans the identification information printed on the used container using the reader. According to some embodiments, the identification information may be registered in any suitable form such as a bar code, a QR code or a RFID tag. Further according to some embodiments, the identification information may include at least one of a unique ID of the container, the type of the container, a size of the container, loading time to the system 100 and removing time from the system 100 etc.. According to some embodiments, the loading and batching module 102 may recognize whether the scanned container is a reusable container according to the information scanned in the scanning system 1023, if the used container is recognized as a reusable container, the door 1025 may open automatically, and the recognized reusable container may be loaded in the loading area 1021 when the user drops down the container, and then the container loaded in the loading area 1021 is collected in the batching area 1022 which is below the loading area 1021 inside the housing 101 as shown in Fig. 4. According to some embodiments, the door 1025 may be any suitable type of door such as a sliding door, a hinged door etc.. According to some embodiments, the batching area 1022 may comprise a rotating platform 1026 with vertical supports for the reusable containers, after one container is collected on the rotating platform 1026, the rotating platform 1026 rotates a certain distance such that the next container in the loading area 1021 can be collected on the next support on the rotating platform 1026. According to some other embodiments, the used container may not be recognized as a reusable container, an error message may be shown on the user interface display 1024 in such case. The information shown on the user interface display 1024 is not limited to the above mentioned, it may further include information such as visual and/or audio instruction for the operator on how to operate the system 100, visual and/or audio feedback for scanned information, visual and/or audio notification of opening the door 1025, visual and/or audio notification of closing the door 1025; a total count number of containers loaded in the system 100, visual and/or audio indication and alarm when the containers in the stacking module 108 is full, troubleshooting information on how to process the reusable containers in a right way or solve impediments due to wrong operations, and status of the system 100 such as turning off, tuning on, processing phase of the reusable containers etc..

[0027] Figs. 9A and 9B schematically show a pre-rinsing phase according to an exemplifying embodiment of the present invention. According to some embodiments, there is provided a pre-rinsing phase for the containers in the batching area 1022. The transferring module 110 may grasp at least one container each time from the batching area 1022, turns it upside down and places it over a water jet 114 for the pre-rinsing phase as shown in Figs. 9A and 9B. According to some embodiments, the system 101 is further provided with a waste basket 112 which is placed under the batching and pre-rinse zones to collect residuals and pre-rinse water.

[0028] According to some embodiments, after the pre-rinsing phase, the reusable containers are transferred by the transferring module 110 to a washing and rinsing module 104 which will be described in details below.

[0029] The system 100 further comprises the washing and rinsing module 104 for washing and rinsing the reusable containers from the loading and batching module 102. Figs. 10A and 10B schematically shows a structure of the washing and rinsing module according to an exemplifying embodiment of the present invention. According to some embodiments, the washing and rinsing module 104 may comprise a cavity 1041 for washing and rinsing the reusable containers, rinsing and washing arms 1042, a washing rack or a carousel belt 1043 equipped with vertical supports for the reusable containers, a drawer door 1044, a tech compartment 1046 and a steam evacuation chimney 1047. According to some embodiments, when the carousel belt 1043 is provided in the washing and rinsing module, it may be driven by a motor.

[0030] According to some embodiments, after the prerinsing phase, each container is positioned on one of the vertical supports of the washing rack 1043 by the transferring module 110. When the rack is full, the washing and rinsing module 104 will be pushed into the cavity 1041 by the transferring module 110 and the washing phase starts. Once the washing phase is finished, the drawer 1044 opens automatically, and the containers are transferred by the transferring module 110 to a drying module 106 which will be described in details below.

[0031] The system 100 further comprises the drying module 106. Figs. 11A and 11B schematically show a structure of the drying module 106 according to an exemplifying embodiment of the present invention. According to some embodiments, a carousel belt 1061 which runs inside a tunnel ventilated with hot air flow is provided in the drying module 106, the carousel belt 1061 is provided with vertical supports 1067 for the containers such that when the carousel belt 1061 moves along the ventilated tunnel with hot air, the containers are dried by the hot air flow. According to some embodiments, the carousel belt 1061 may move more than one turn inside the tunnel to ensure good drying of the containers. According to some embodiments, there is provided an opening 1062 on the top of the drying module 106 such that the containers are allowed to be put into or taken out of the drying module 106. According to some embodiments, the drying module 106 is equipped with fans 1063 for air ventilation, electrical heating elements 1064, working temperature control sensors 1065, safety temperature sensors 1066, electrical brushless motor 1067 for driving the carousel belt 1061, electrical box 1068 for control and power supply. According to some embodiments, the fans 1063 are axial fans, the hot air ventilation is thus produced by the axial fans and the electrical heating elements 1064. According to some embodiments, the carousel belt 1061 may be the same carousel belt arranged in the washing and rinsing module 104 or it may be a separately arranged carousel belt.

[0032] The system 100 further comprises the stacking module 108. Fig. 12A schematically shows a structure of the stacking module 108 according to an exemplifying embodiment of the present invention. According to some embodiments, the stacking module 108 may be arranged to allow the transferring module 110 to stack the dried containers according to their sizes. According to some embodiments, their size information is obtained from the scanned identification information. According to some other embodiments, sensors may be provided to detect the size of the containers. The system 100 may be arranged to notify the operator when the containers in the stacking module is about to be full. According to some embodiments, a container counter may be arranged in the stacking module to notify the operator. According to some other embodiments, the notification may be indicated when the number of the containers exceeds a preset threshold. According to some other embodiments, the notification may be indicated when the sensor detects that the storage of the container exceeds a preset threshold. According to some embodiments, the notification is indicated on the user interface display in the form of audio and/or video. According to some other embodiments, the notification is indicated by LED lights 116 arranged on the right door 105. According to some other embodiments, the filling percentage of the containers in the stacking module may be shown to the operator on the user interface display or by the LED lights 116 as shown in Fig. 12B.

[0033] Now some workflow of processing the reusable containers according to some embodiments of the present invention will be described in details according to Fig. 13. According to some embodiments, the processing comprises the steps of: scanning 1301 identification information registered on the used container in the scanning system; determining 1303 whether the used container is a reusable container; loading and batching 1305 the used container in the loading and batching module when the used container is recognized as a reusable container; automatically transferring 1307 the reusable containers from the loading and batching module to the washing and rinsing module; washing and rinsing 1309 the reusable container in the washing and rinsing module; automatically transferring 1311 the reusable containers from the washing and rinsing module to the drying module; drying 1313 the reusable container in the drying module; automatically transferring 1315 the reusable containers from the drying module to the stacking module; and stacking 1317 the reusable container in the stacking module.

[0034] According to some embodiments, when the used container is not recognized as a reusable container in the determining step 1303, the method further comprises indicating 1319 an error message on the user interface display in any suitable form such as audio and/or video.

[0035] According to some embodiments, the loading and batching 1305 the used container in the loading and batching module when the used container is recognized as a reusable container may comprising automatically opening 1321 the door after the used container is recog-

nized as a reusable container and the container is loaded into the loading area when the operator drops down the container and then collecting the reusable container in the batching area with the rotating platform. According to some embodiments, each of the containers is collected on a vertical support arranged on the rotating platform.

[0036] According to some embodiments, the drying the reusable container may further comprise driving a carousel belt with vertical supports for the reusable containers to move the reusable containers along a tunnel ventilated with hot air. According to some further embodiments, the carousel belt begins moving as soon as the transferring module 110 places the first container on the carousel belt and the following containers are placed on empty vertical supporters while the carousel belt moves.

[0037] According to some embodiments, the method may further notify the operator when the reusable containers in the stacking module exceed a threshold or may stop working when the stacking module is full.

[0038] According to some embodiments, the method may further comprise a pre-rinsing step. The used containers are transferred 1323 from the batching area to a pre-rinsing area. According to some embodiments, the transferring module 110 may grasp at least one container each time from the batching area 1022, turns it upside down and places it over a water jet 114 for the pre-rinsing phase.

[0039] According to some embodiments, the method further comprises determining 1325 whether the reusable containers in the stacking module exceeds a threshold, if yes, notifying 1327 the operator when the reusable containers in the stacking module exceeds a threshold. The method further comprises determining 1329 whether the stacking module is full, if it is full, the system will stop work 1331 until the stack module is emptied 1333 by the operator. According to some embodiments, the notification of the stack module is about to be full is displayed on the user interface display or shown with LED lights. According to some other embodiments, the fill percentage of the stack module is shown with LED lights on the right door.

[0040] The person skilled in the art realizes that the present invention by no means is limited to the preferred embodiments described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

Claims

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

   a loading and batching module (102) for loading and collecting the reusable containers to be processed;
   a washing and rinsing module (104) for washing and rinsing the reusable containers from the loading and batching module;
   a drying module (106) for drying the reusable containers from the washing and rinsing module;
   a stacking module (108) for stacking the reusable containers from the drying module; and
   at least one transferring module (110) for enabling the transferring of the reusable containers between the loading and batching module, the washing and rinsing module, the drying module and the stacking module.

2. The automatic system for processing reusable containers according to claim 1, wherein the loading and batching module comprises a loading area (1021) and a batching area (1022), wherein the loading area comprises:

   a scanning system (1023) comprising a reader for reading identification information registered on a used container;
   an user interface display (1024) for displaying information of the automatic system; and
   a door (1025) configured to open automatically after the used container is recognized as a reusable container by the scanning system; and

   the batching area comprises a rotating platform for collecting all recognized reusable containers.

3. The automatic system for processing reusable containers according to claim 1 or 2, wherein the washing and rinsing module comprises a cavity (1041) for washing and rinsing the reusable containers, and a washing rack (1043) or a movable belt equipped with vertical supports for the reusable containers.

4. The automatic system for processing reusable containers according to any one of the preceding claims, wherein the drying module comprises a carousel belt (1061) equipped with vertical supports (1067) for the reusable containers, the carousel belt being configured to move the reusable containers along a ventilated tunnel with hot air.

5. The automatic system for processing reusable containers according to any one of the preceding claims, wherein the stacking module is equipped with at least one of sensors and container counters for notifying an operator when the reusable containers in the stacking module exceed a threshold.

6. The automatic system for processing reusable containers according to any one of the preceding claims, wherein the at least one transferring module comprises an operating arm equipped with suction cups (1101) or grippers.

7. The automatic system for processing reusable containers according to claim 2, wherein the identification information is registered in at least one of a bar code, a QR code and a RFID tag.

8. A method for automatically processing reusable containers, comprising the steps of:

Scanning (1301) identification information registered on a used container in a scanning system;
determining (1303) whether the used container is a reusable container;
loading and batching (1305) the used container in a loading and batching module when the used container is recognized as a reusable container;
automatically transferring (1307) the reusable containers from the loading and batching module to a washing and rinsing module;
washing and rinsing (1309) the reusable container in the washing and rinsing module;
automatically transferring (1311) the reusable containers from the washing and rinsing module to a drying module;
drying (1313) the reusable container in the drying module;
automatically transferring (1315) the reusable containers from the drying module to a stacking module; and
stacking (1317) the reusable container in the stacking module.

9. The method for automatically processing reusable containers according to claim 8, wherein the identification information comprises information about at least a type of the reusable container.

10. The method for automatically processing reusable containers according to claim 8 or 9, wherein the loading and batching the used container comprises:
automatically opening (1321) a door after the container is recognized as a reusable container and loading the reusable container in a loading area and then collecting the reusable container in a batching area with a rotating platform.

11. The method for automatically processing reusable containers according to any one of claims 8-10, further comprising a pre-rinsing step.

12. The method for automatically processing reusable containers according to any one of claims 8-11, further comprising notifying (1327) an operator when the reusable containers in the stacking module exceed a threshold.

13. The method for automatically processing reusable containers according to any one of claims 8-12, further comprising stopping working (1331) when the stacking module is full.

14. The method for automatically processing reusable containers according to any one of claims 8-13, wherein the drying the reusable container comprises:
driving a carousel belt with vertical supports for the reusable containers to move the reusable containers along a tunnel ventilated with hot air.

15. The method for automatically processing reusable containers according to any one of claims 6-14, further comprising:
indicating (1319) an error message on a display when the used container is not recognized as a reusable container.

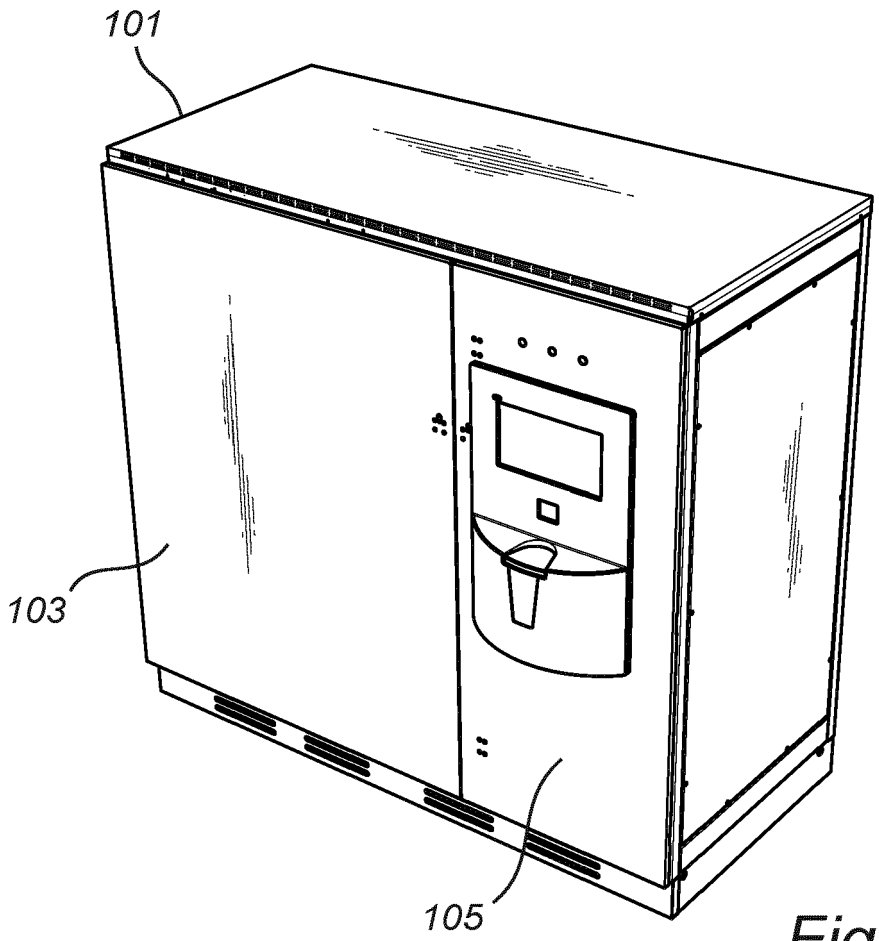

Fig. 1

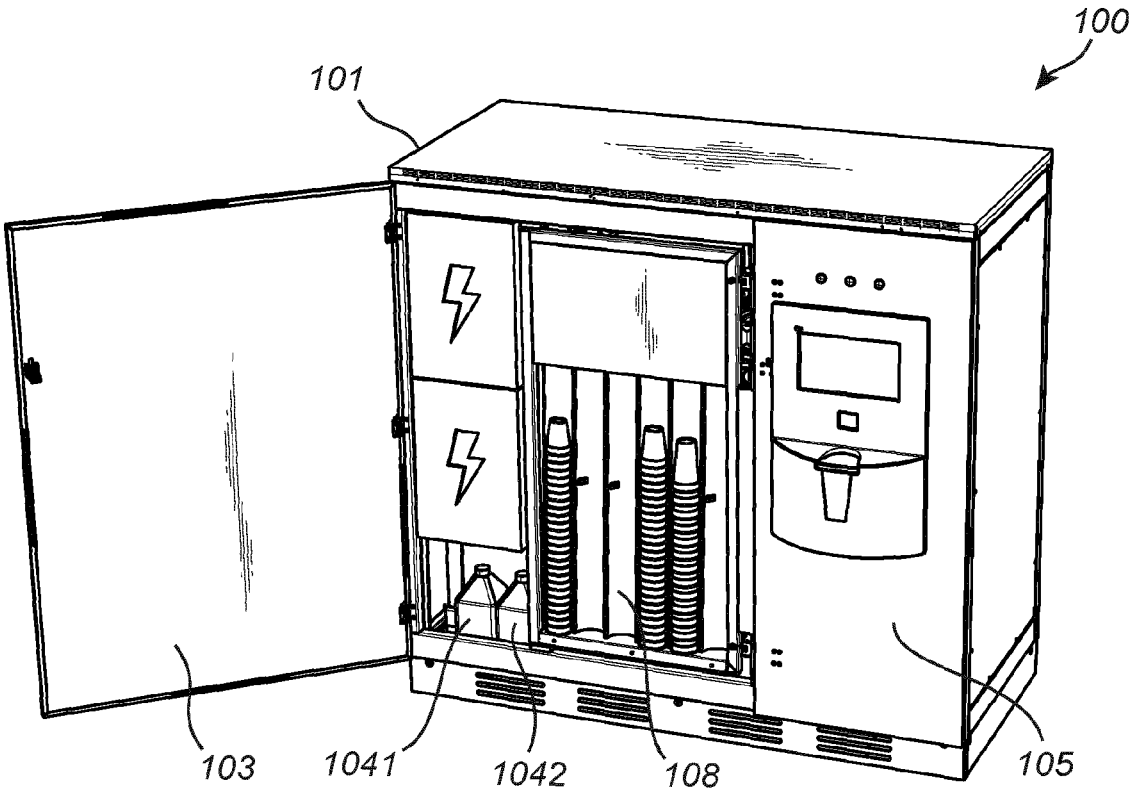

Fig. 2

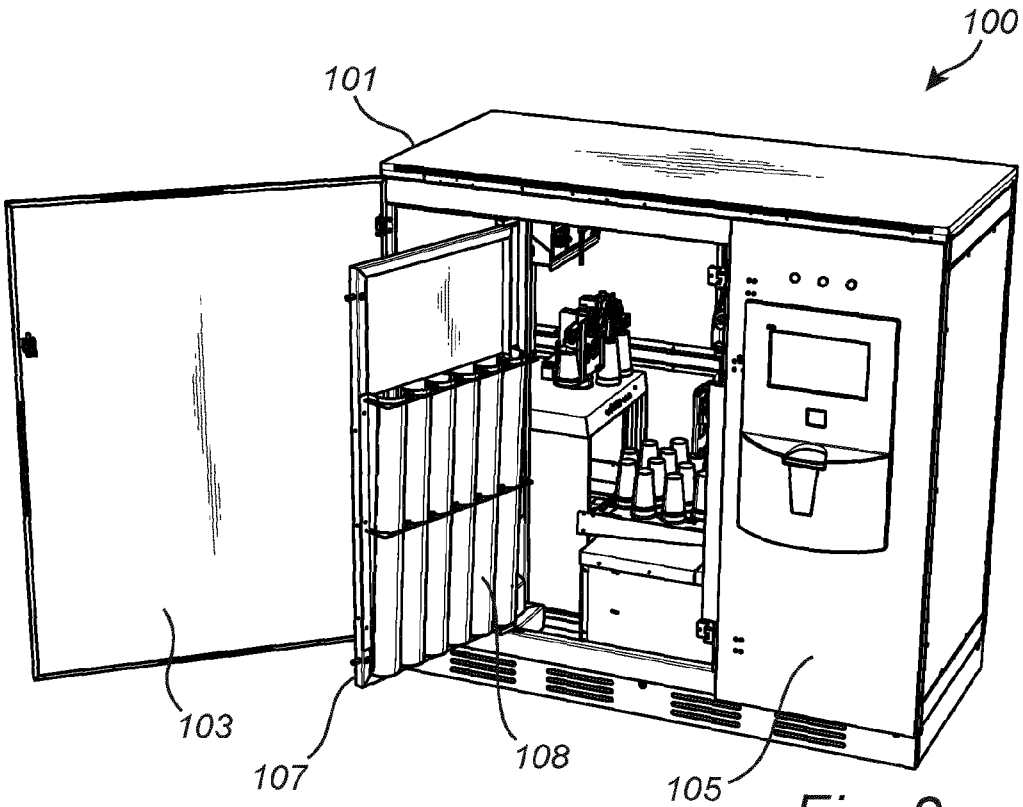

Fig. 3

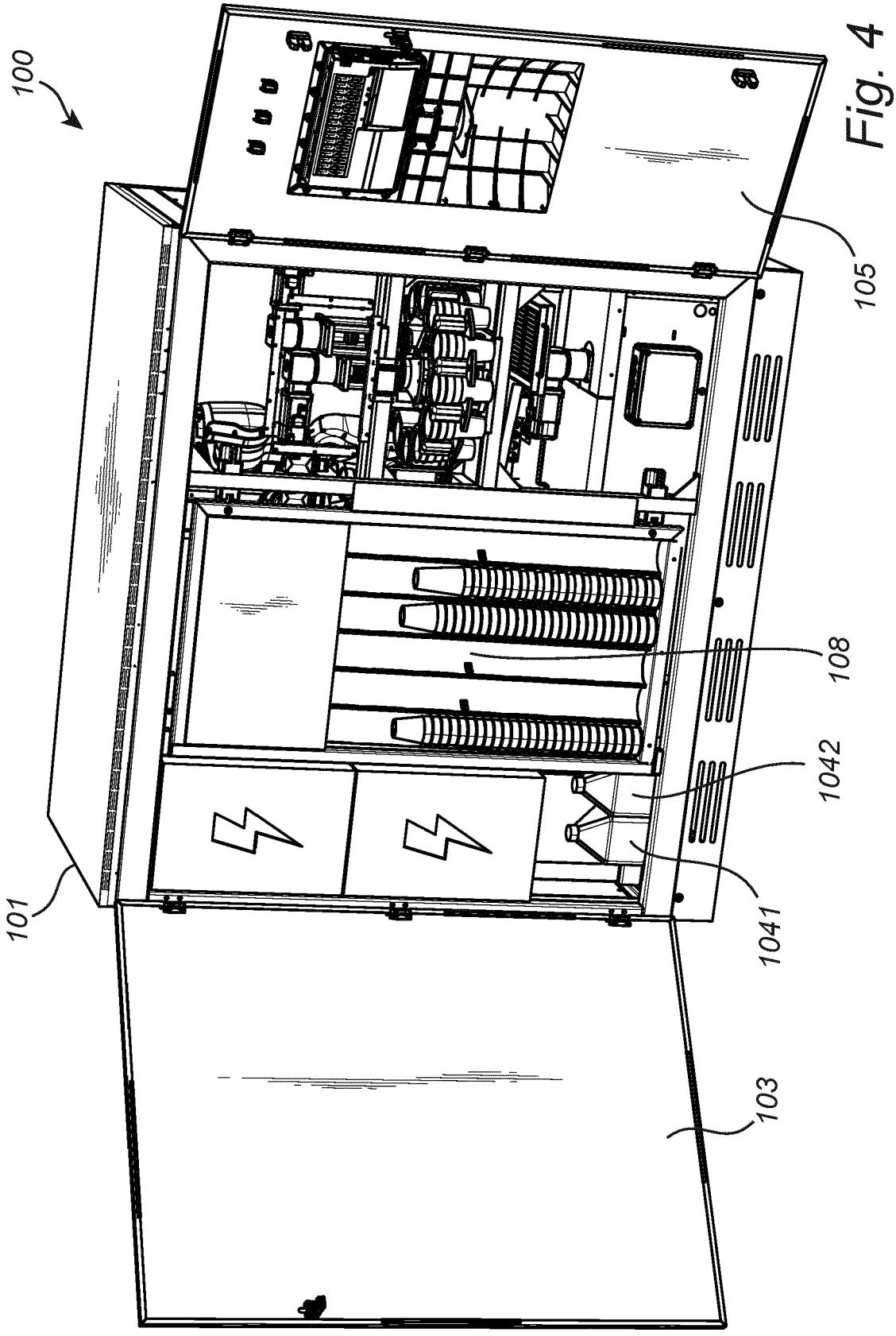

Fig. 4

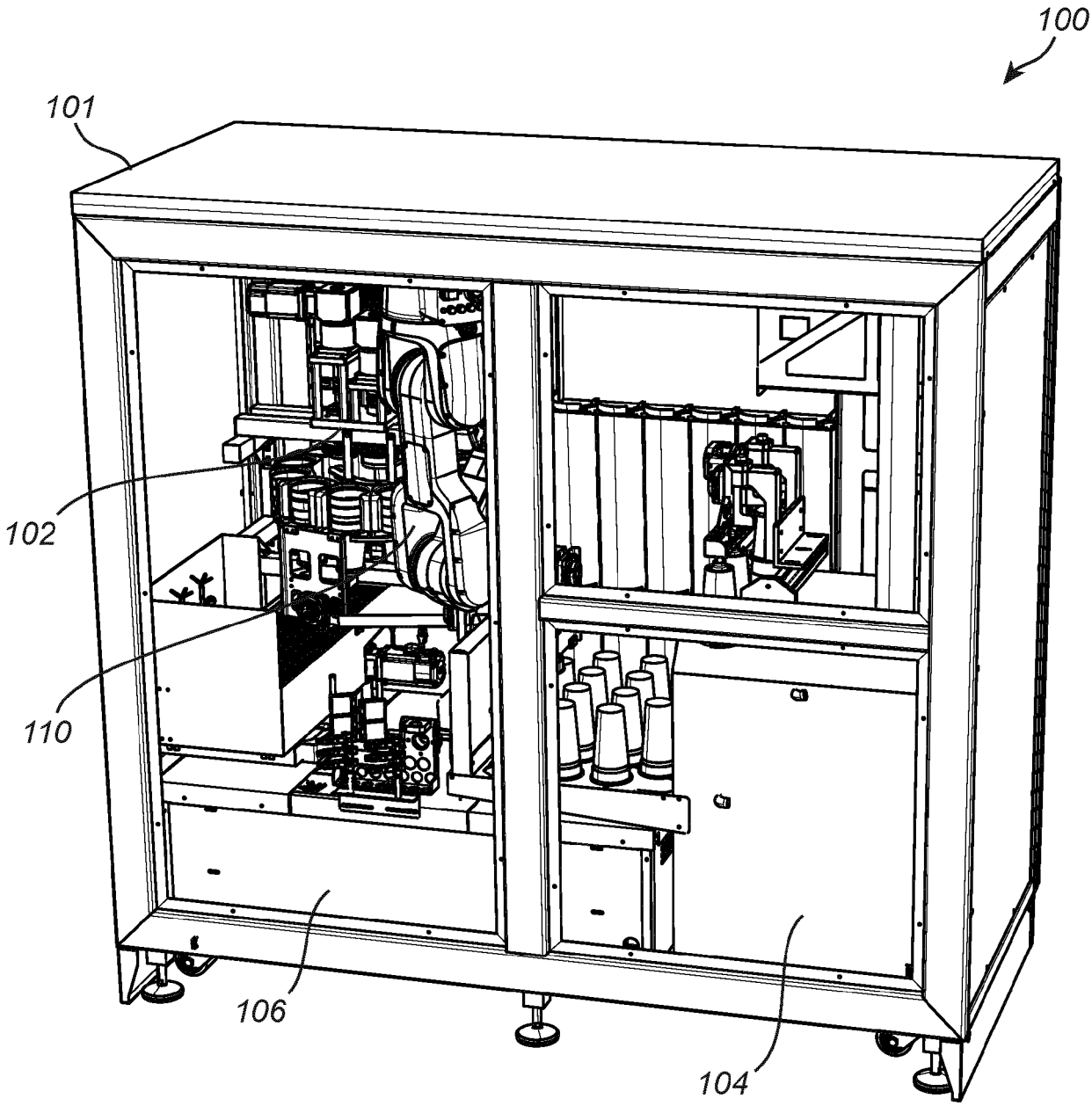

Fig. 5

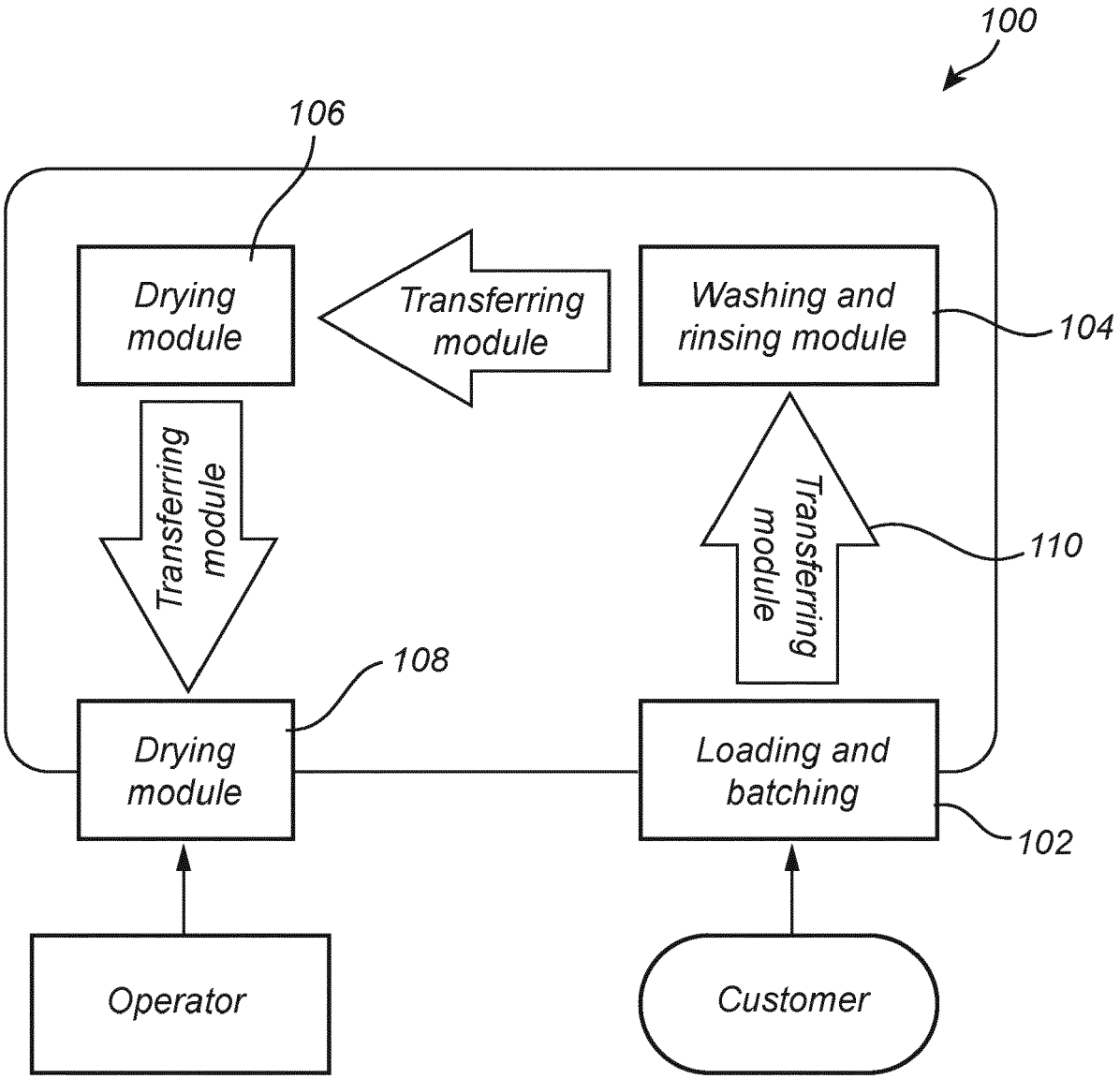
100
106
Drying module
Transferring module
Washing and rinsing module
104
Transferring module
Transferring module
110
108
Drying module
Loading and batching
102
Operator
Customer

Fig. 6

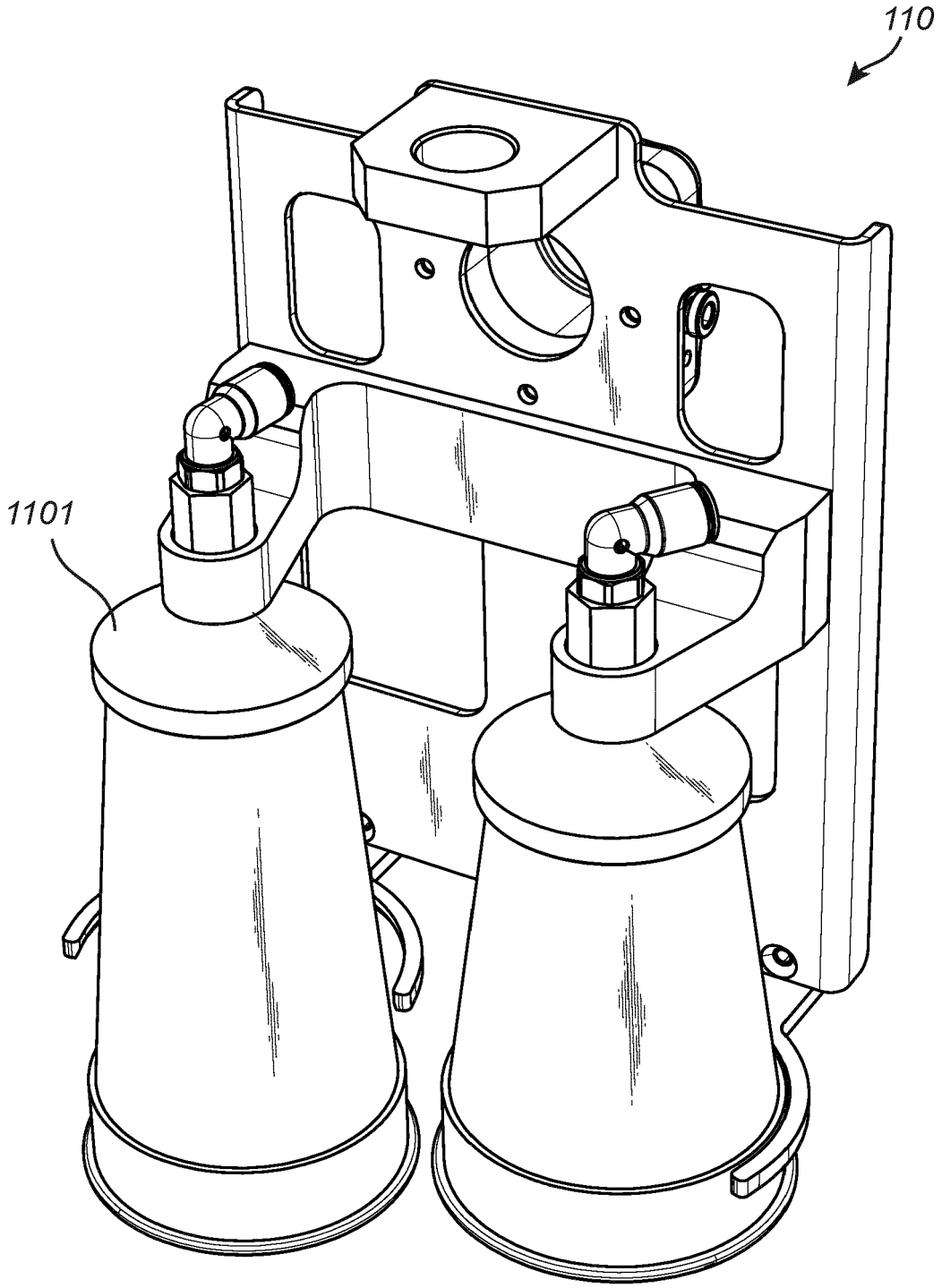

Fig. 7

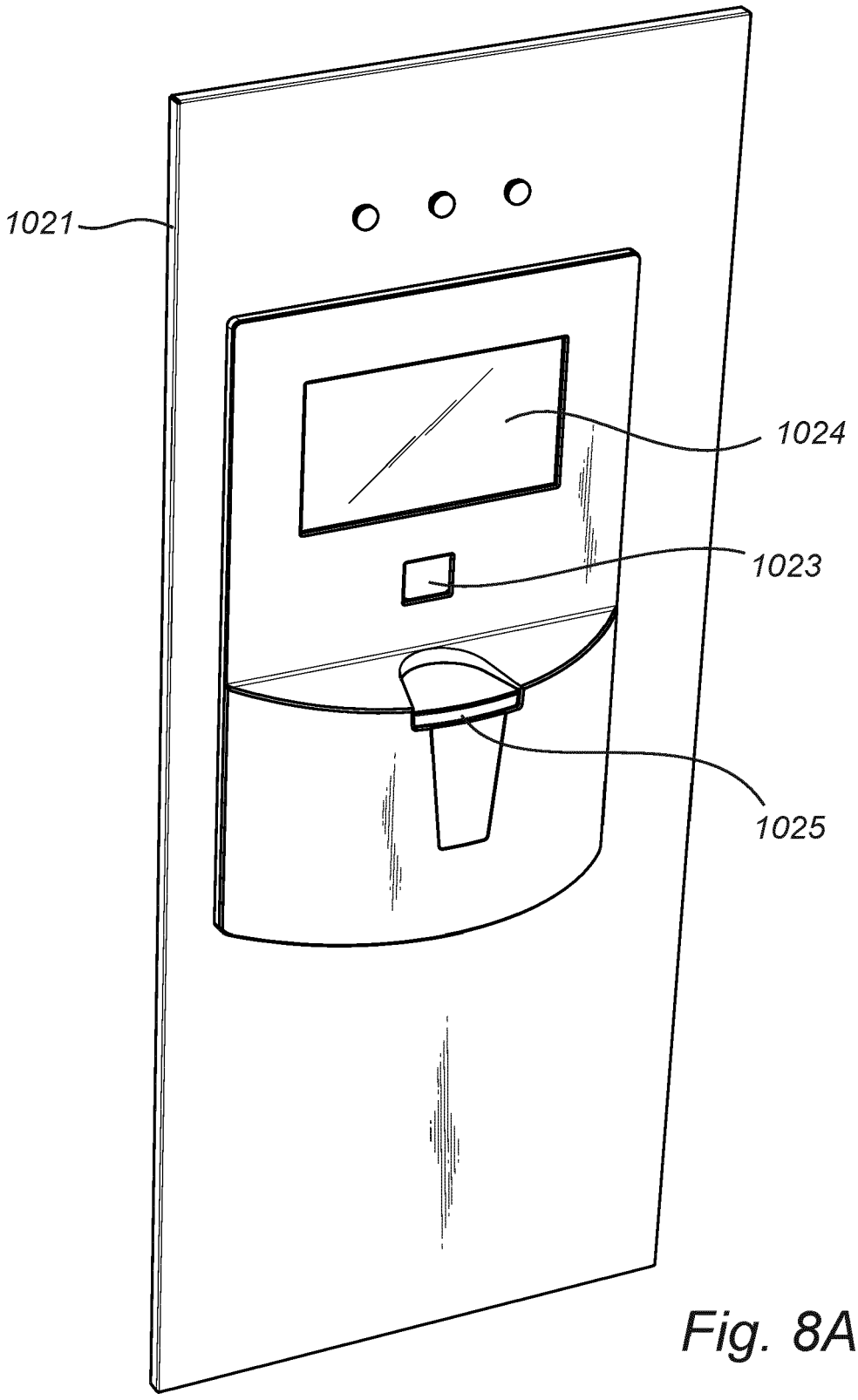

Fig. 8A

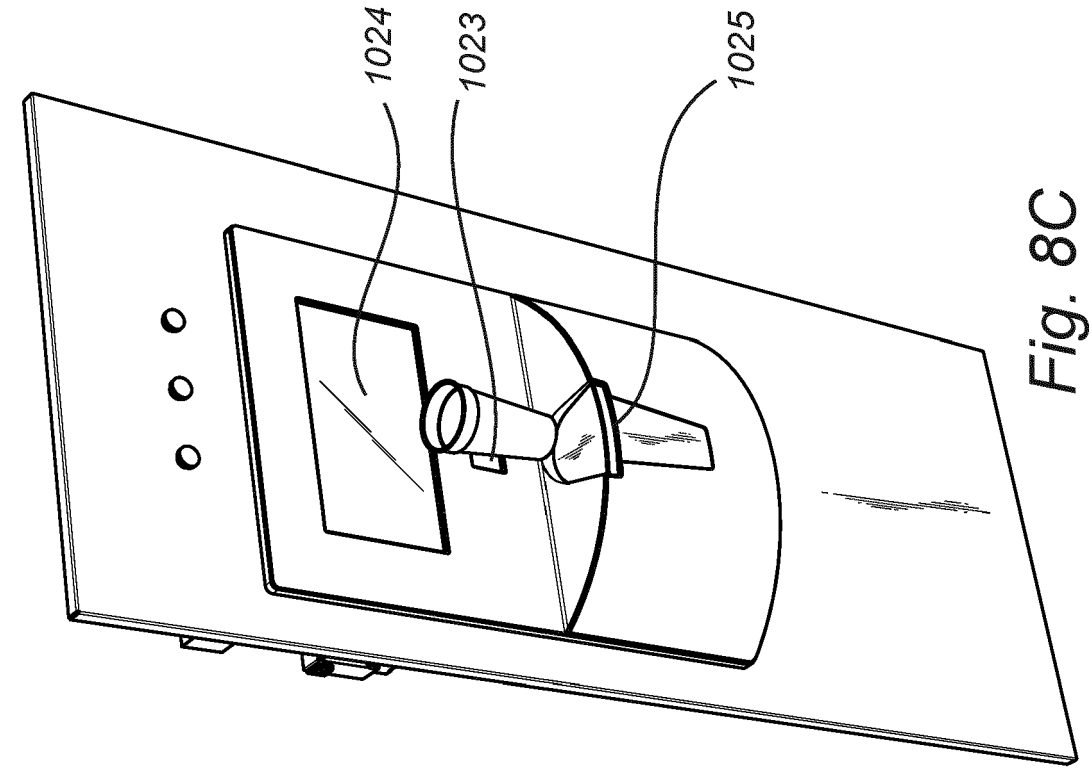

Fig. 8C

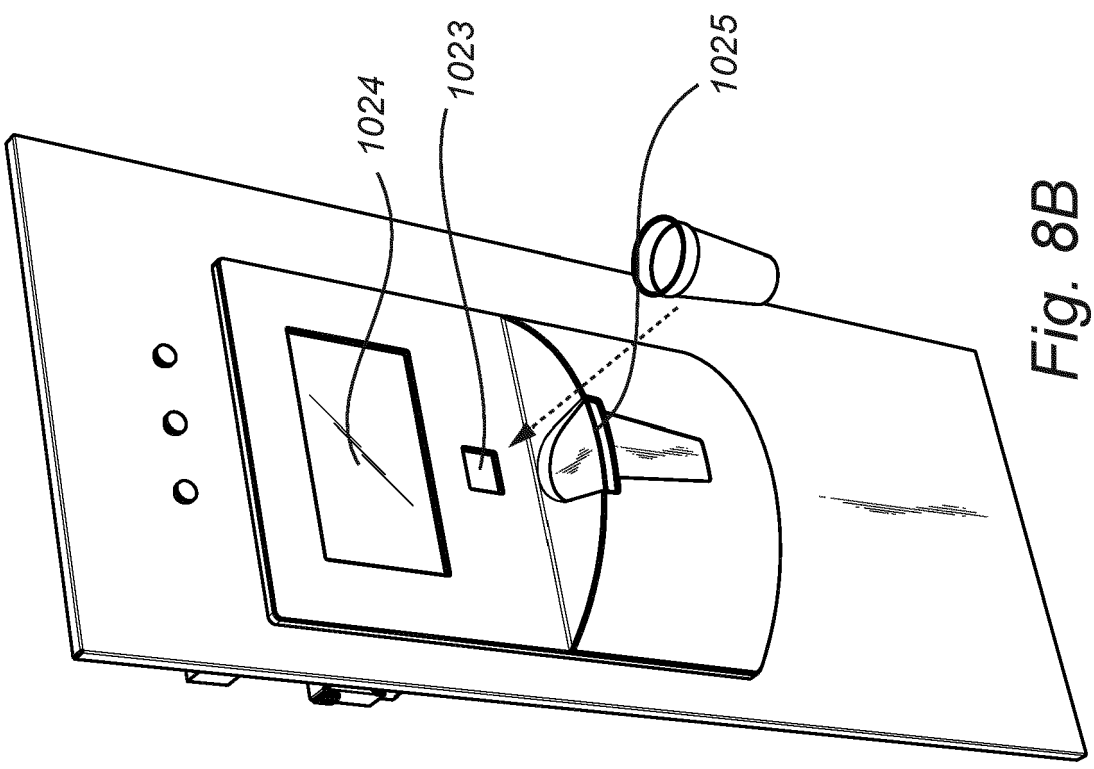

Fig. 8B

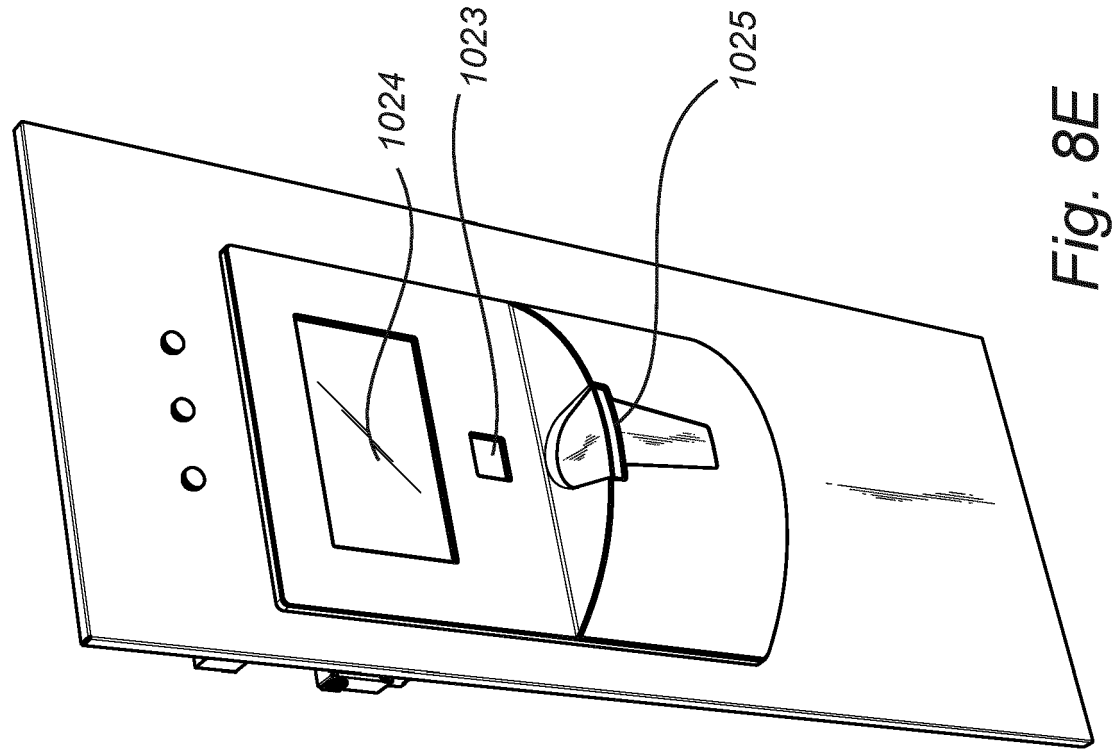

Fig. 8E

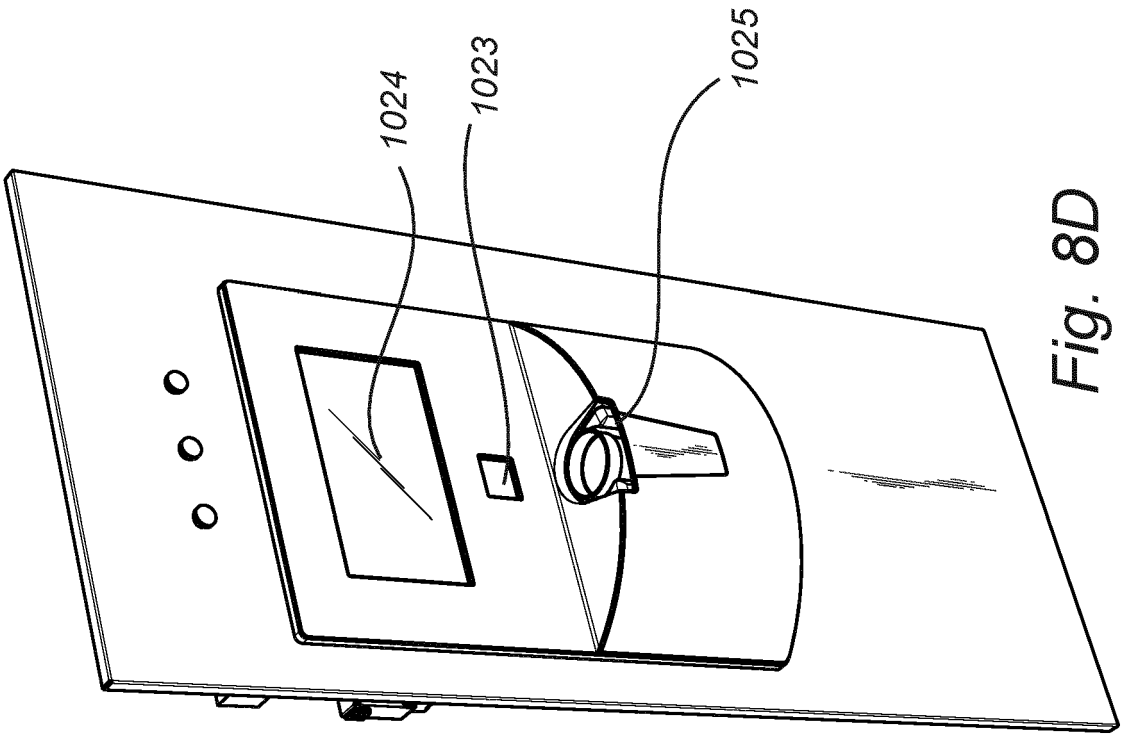

Fig. 8D

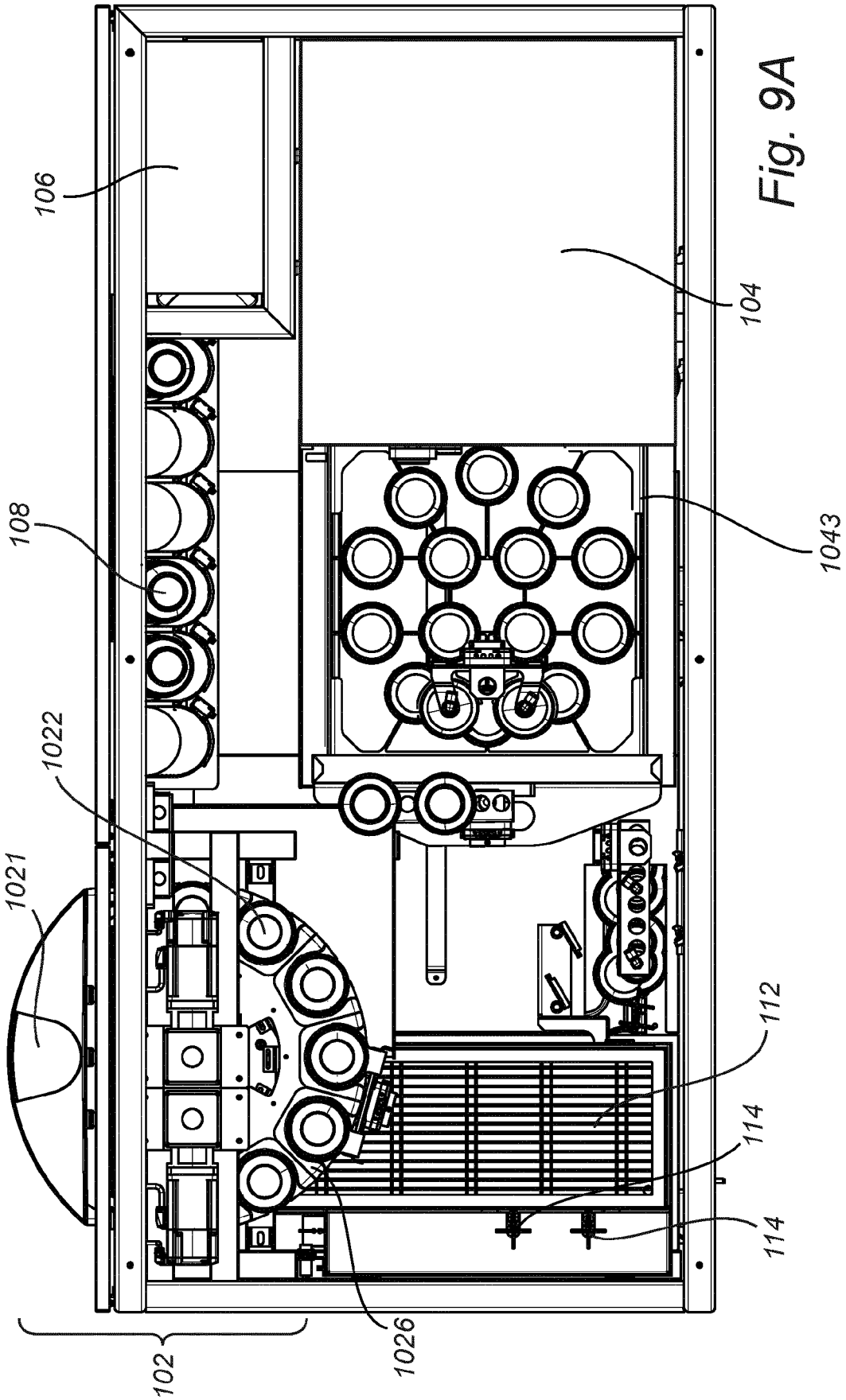

Fig. 9A

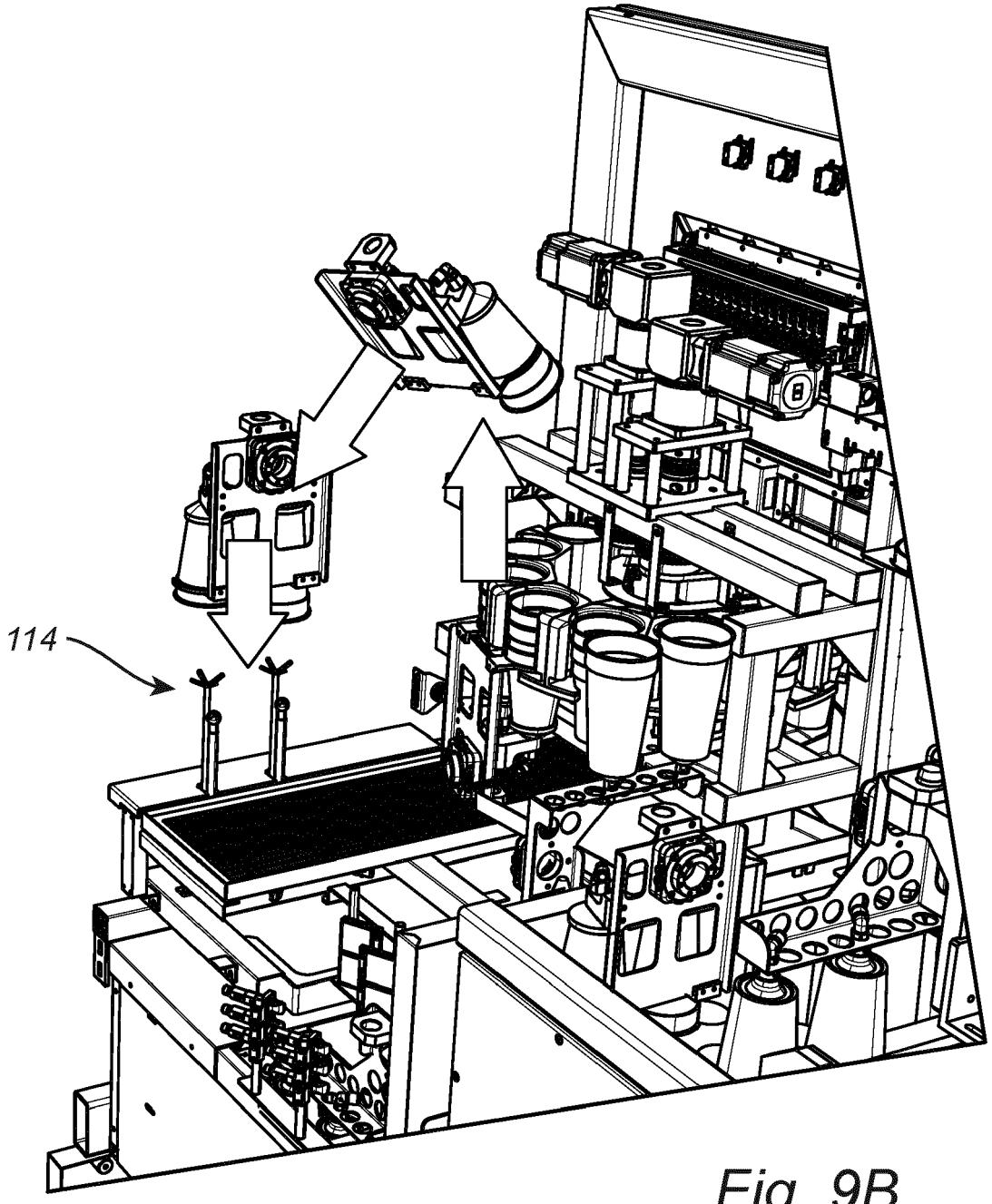

Fig. 9B

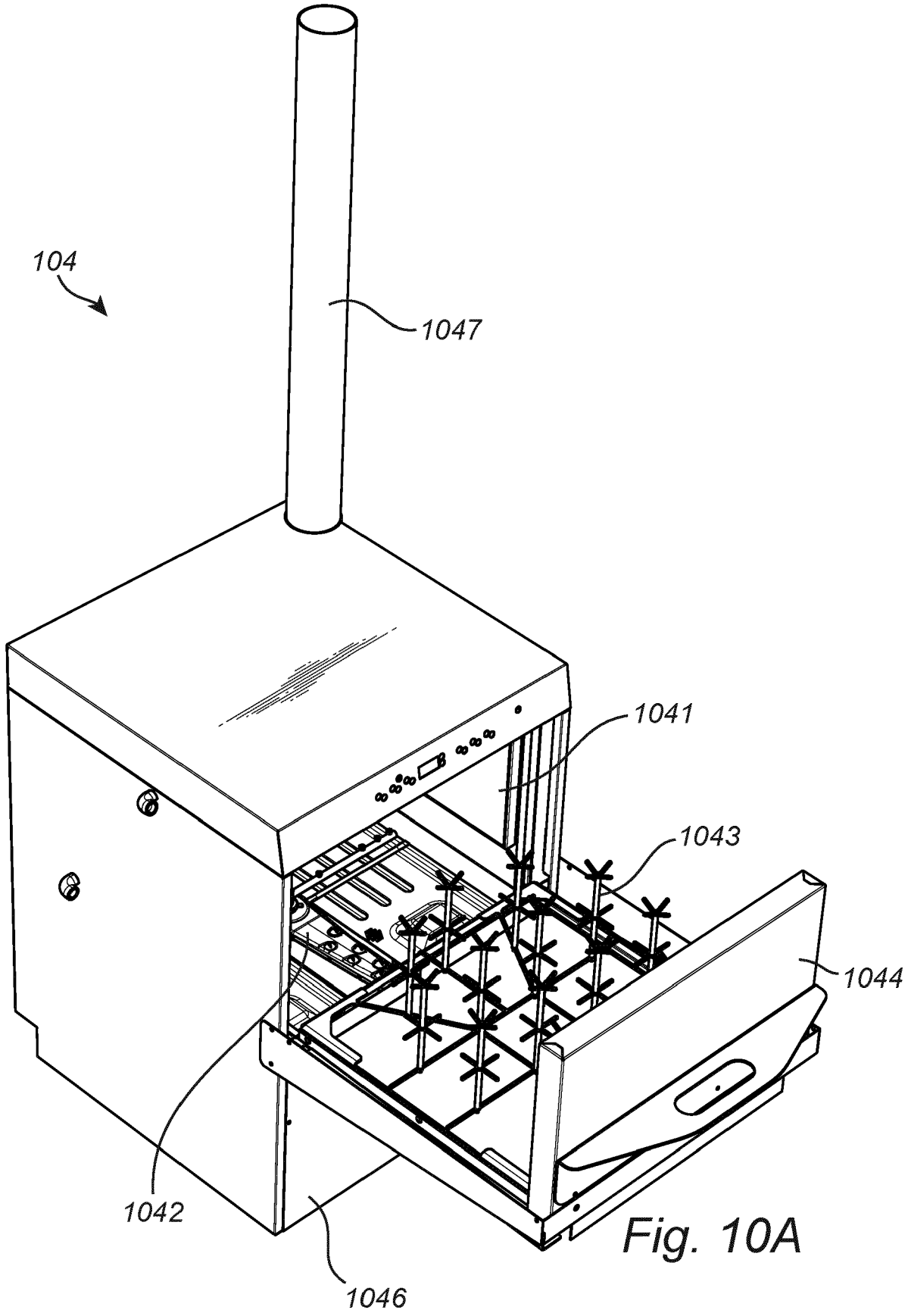

Fig. 10A

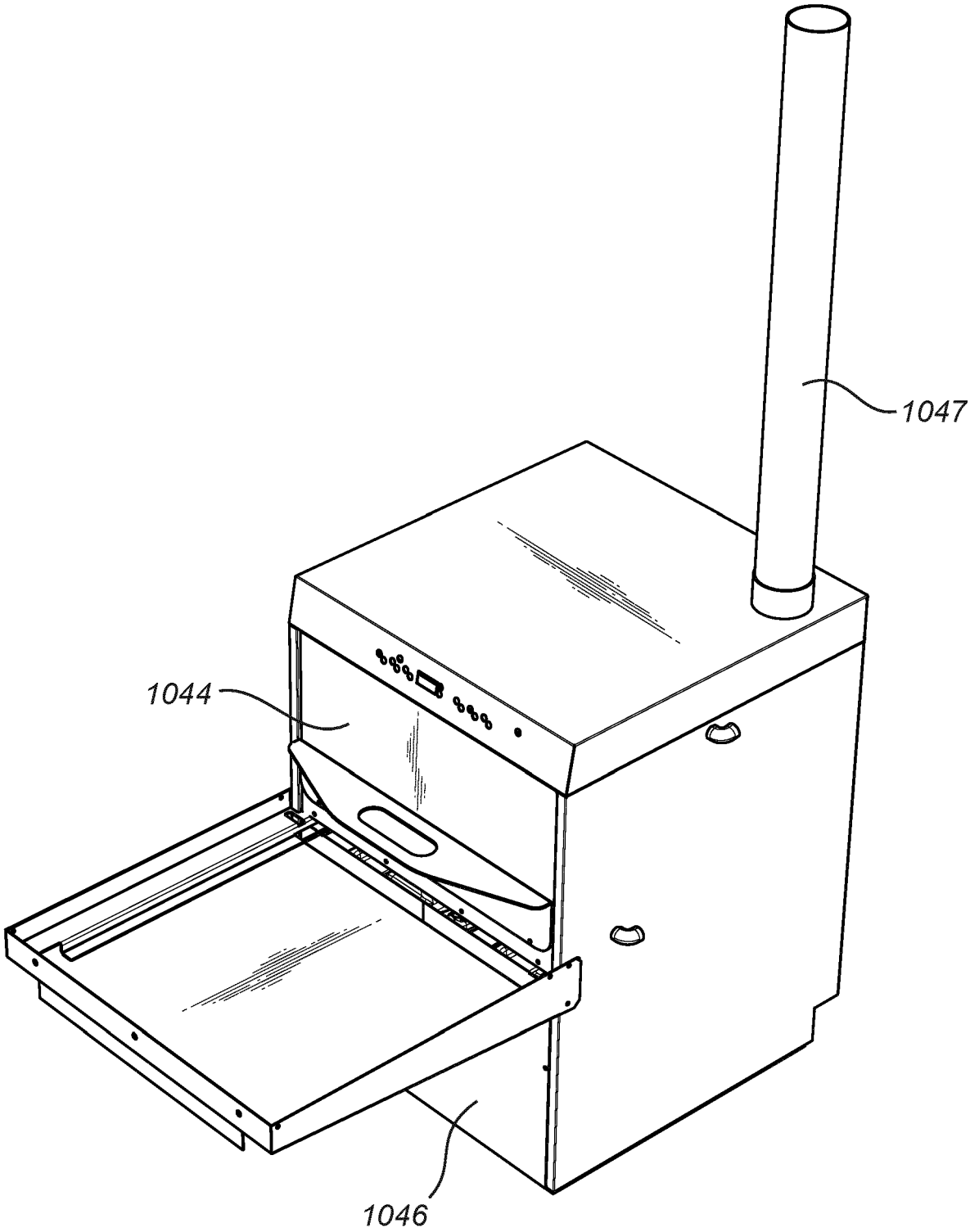

Fig. 10B

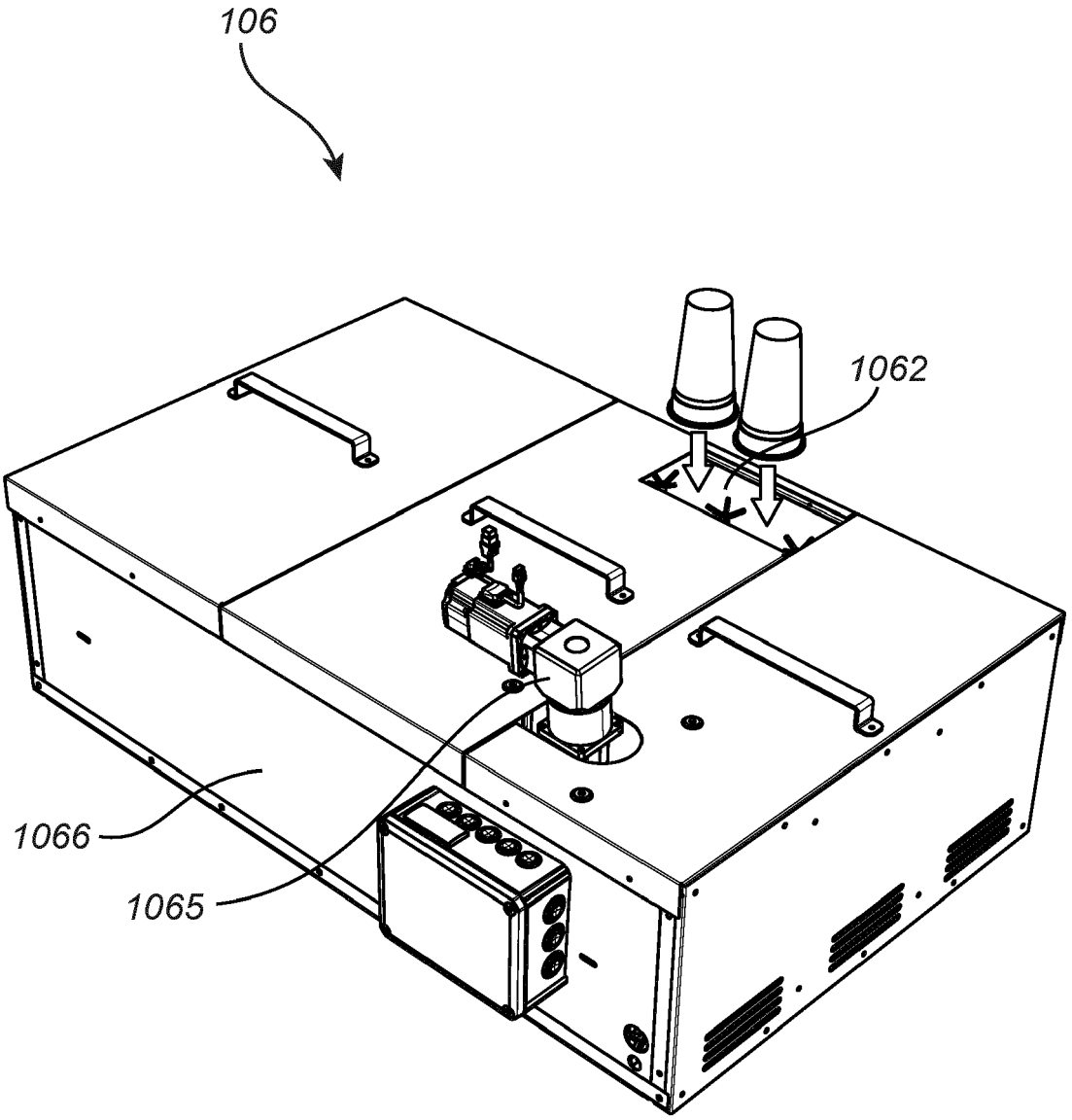

Fig. 11A

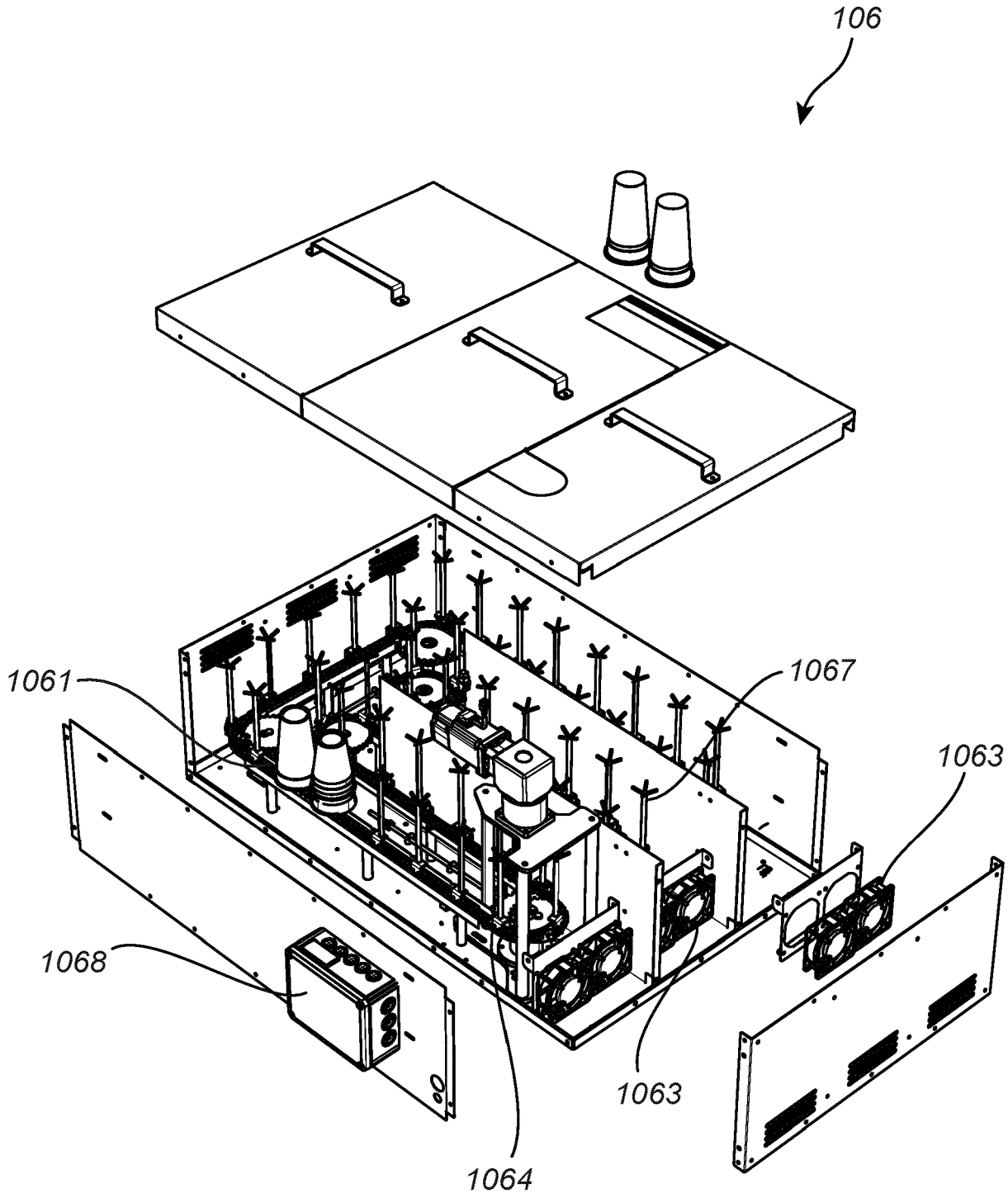

Fig. 11B

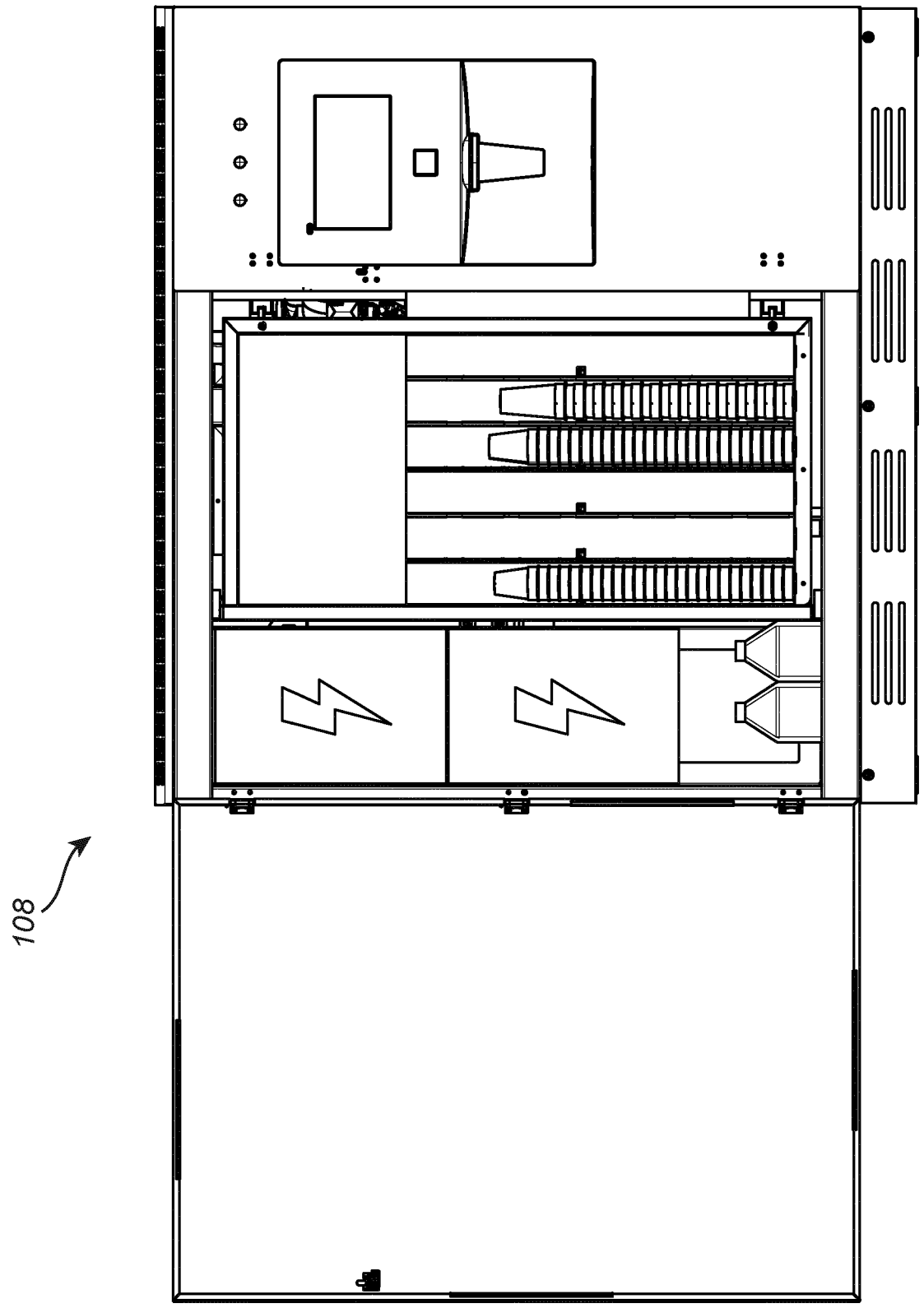

Fig. 12A

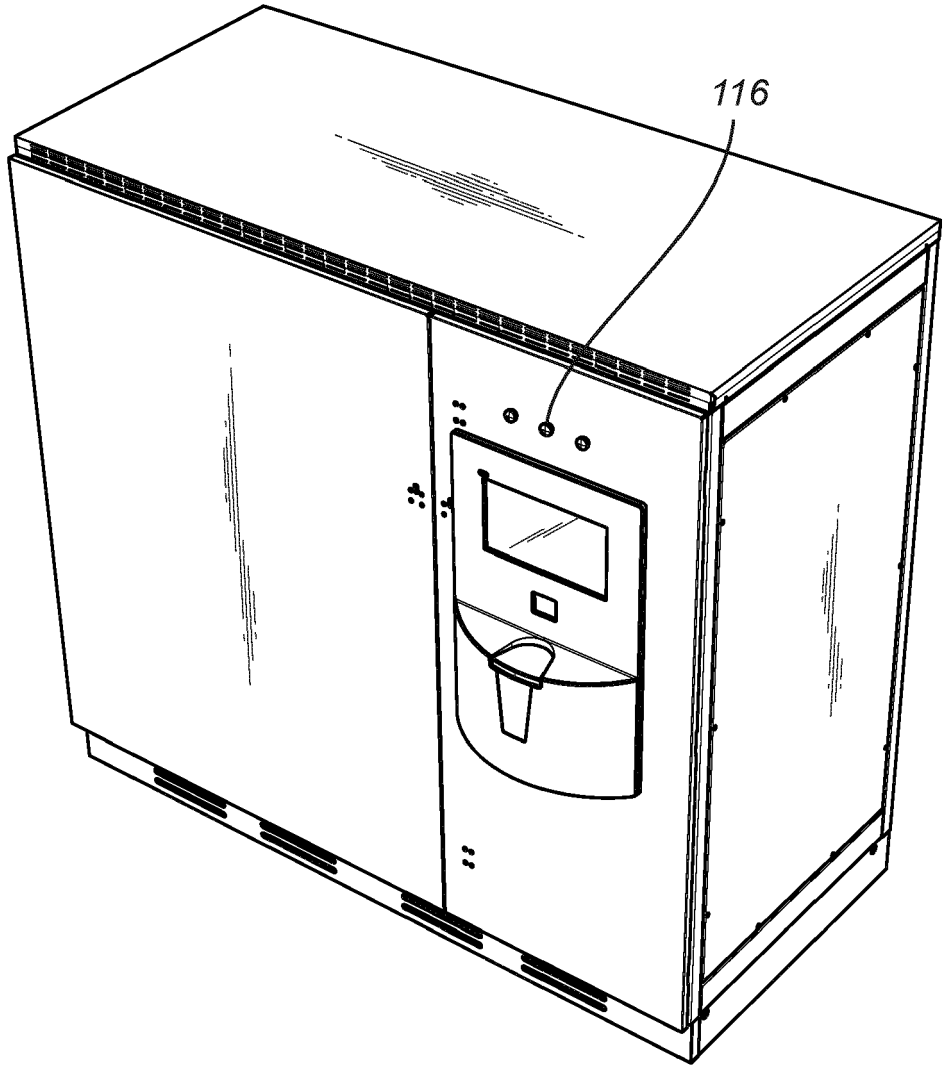

Fig. 12B

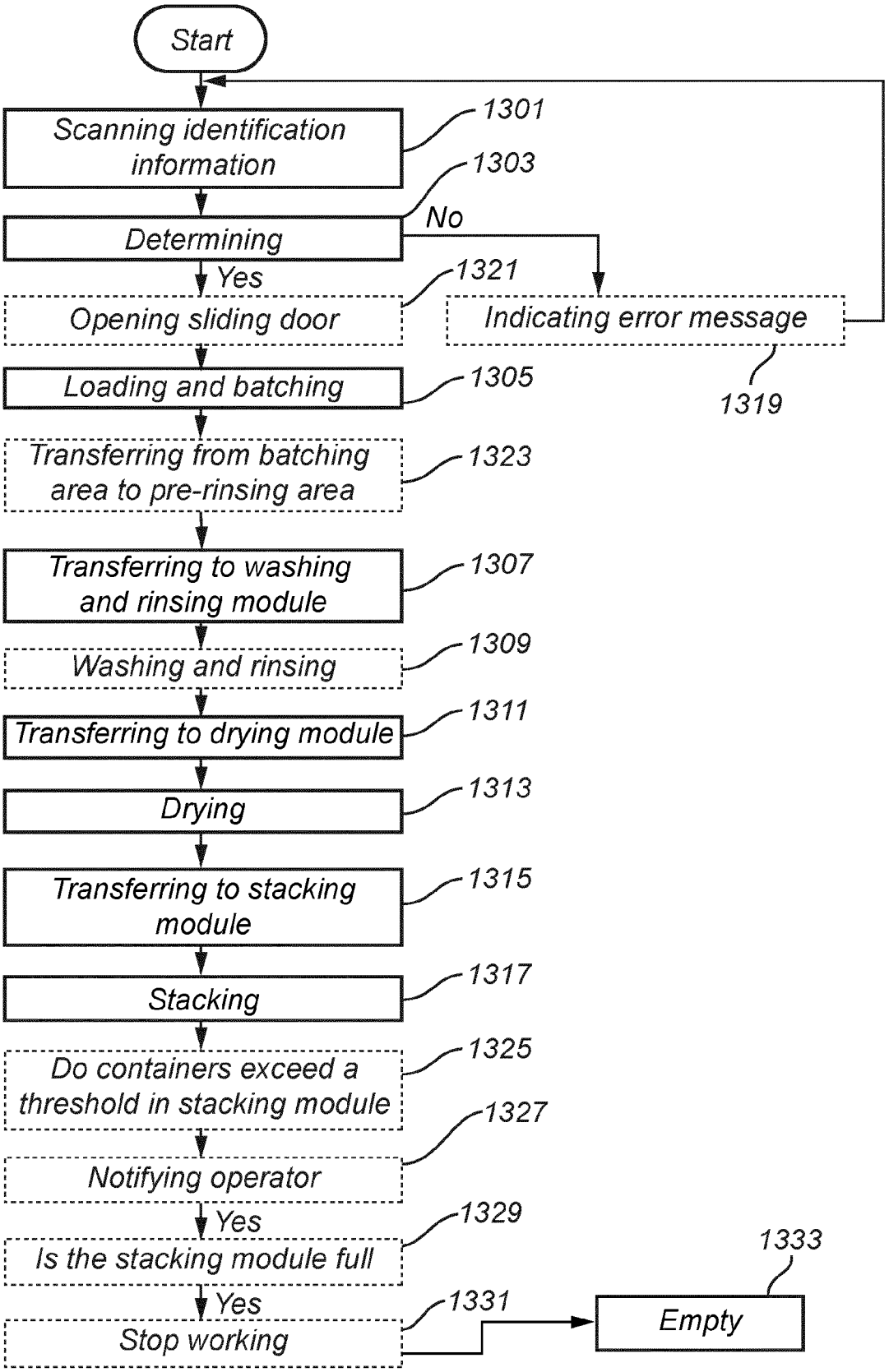
Start
Scanning identification information
1301
Determining
1303
No
Yes
Opening sliding door
1321
Indicating error message
1319
Loading and batching
1305
Transferring from batching area to pre-rinsing area
1323
Transferring to washing and rinsing module
1307
Washing and rinsing
1309
Transferring to drying module
1311
Drying
1313
Transferring to stacking module
1315
Stacking
1317
Do containers exceed a threshold in stacking module
1325
Notifying operator
1327
Yes
Is the stacking module full
1329
Yes
Stop working
1331
Empty
1333

Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 22 20 2776

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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B08B A47L A47F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 March 2023	Béguin-Adriaenssens

CATEGORY OF CITED DOCUMENTS

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29-03-2023

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