

CLAIMS

1. An inventory system, comprising:

a control system,

5 a plurality of storage and retrieval devices in communication with the control system, and

a plurality of handling devices in communication with the control system,

wherein the plurality of storage and retrieval devices operate in a storage area of the inventory system, a plurality of inventory racks are deployed in the storage area, each inventory rack of the plurality of inventory racks has a plurality of compartments, each compartment of the plurality of compartments comprises a plurality of storage spaces, and an inventory receptacle is placed on each
10 storage space of the plurality of storage spaces,

wherein the control system is configured to: determine a target inventory receptacle from inventory receptacles in the storage area; determine a target storage and retrieval device from the plurality of storage and retrieval devices and a target handling device from the plurality of handling
15 devices; and send a dispatching instruction to the target storage and retrieval device and to the target handling device;

wherein the target storage and retrieval device is configured to: drive, in response to the dispatching instruction, to a position specified in the dispatching instruction, take out the target inventory receptacle, and directly or indirectly provide the target inventory receptacle to the target
20 handling device; and

wherein the target handling device is configured to: drive, in response to the dispatching instruction, to a position specified in the dispatching instruction, obtain the target inventory receptacle, and transport the target inventory receptacle from the storage area to a workstation specified in the dispatching instruction for a service operation.

25 2. The inventory system according to claim 1, wherein

the target storage and retrieval device is further configured to place the target inventory receptacle at a preset transfer position; and

the target handling device is further configured to drive, in response to the dispatching instruction, to the preset transfer position to obtain the target inventory receptacle.

3. The inventory system according to claim 1, wherein

the target storage and retrieval device is further configured to take out the target inventory receptacle from a storage space of a first position of the plurality of inventory racks and place the target inventory receptacle in a storage space of a second position of the plurality of inventory racks, wherein
5 the first position is higher than the second position; and

the target handling device is further configured to drive, in response to the dispatching instruction, to a position corresponding to the storage space of the second position, and obtain the target inventory receptacle.

4. The inventory system according to claim 1, wherein

10 the target handling device is further configured to drive, in response to the dispatching instruction, to a preset position, wherein the preset position is adjacent to a position where the target storage and retrieval device takes out the target inventory receptacle; and

the target storage and retrieval device is further configured to place at least one taken-out target inventory receptacle on the target handling device.

15 5. The inventory system according to any one of claims 1-4, wherein each storage space of each inventory rack of the plurality of inventory racks has a storage space identification mark to allow the plurality of storage and retrieval devices to identify and to be aligned with a storage space where the target inventory receptacle is located; and/or

each inventory receptacle of the plurality of inventory receptacles has a receptacle identification
20 mark to allow the plurality of storage and retrieval devices to identify and to be aligned with the target inventory receptacle.

6. The inventory system according to any one of claims 1-5, wherein a bottommost compartment of each inventory rack of the plurality of inventory racks is a storage floor;

the target storage and retrieval device is further configured to place the target inventory receptacle
25 on a bottommost compartment of a given inventory rack serving as the storage floor; and

the target handling device is further configured to obtain the inventory receptacle from the bottommost compartment of the given inventory rack serving as the storage floor.

7. The inventory system according to any one of claims 1-6, wherein a storage rack is arranged below a bottommost compartment of each inventory rack of the plurality of inventory racks;

30 the target storage and retrieval device is further configured to place the target inventory receptacle

on a storage rack; and

the target handling device is further configured to obtain the inventory receptacle from the storage rack.

8. The inventory system according to any one of claims 1-7, wherein a temporary storage rack is
5 arranged on each storage and retrieval device of the plurality of storage and retrieval devices, each temporary storage rack has a plurality of compartments, and each compartment comprises at least one storage space;

wherein the target inventory receptacle is located in a rear row of a compartment in which the target inventory receptacle is located in a longitudinal direction; and

10 the target storage and retrieval device is further configured to directly take out the target inventory receptacle based on there being no other inventory receptacle located in a front row with respect to the target inventory receptacle of the compartment in which the target inventory receptacle is located; or sequentially take out, based on there being at least one inventory receptacle located in the front row with respect to the target inventory receptacle that blocks the target inventory receptacle, the at least
15 one inventory receptacle in the front row, sequentially place the at least one inventory receptacle in at least one storage space of temporary storage racks, take out the target inventory receptacle, place the target inventory receptacle in a storage space of the temporary storage racks, and return the at least one inventory receptacle to the compartment from which the at least one inventory receptacle was taken out.

20 9. The inventory system according to claim 1, further comprising:

one or more control systems,

one or more storage and retrieval devices in communication with the one or more control systems,

one or more handling devices in communication with the one or more control systems, and

one or more destinations,

25 wherein a warehouse is formed by at least one inventory rack with a plurality of floors,

wherein space between the at least one inventory rack forms a first aisle, each floor of the inventory rack is provided with at least two storage spaces in a longitudinal direction, a row of first bottom-floor storage spaces are arranged on a bottom floor of at least one side of the inventory rack adjacent to the first aisle, at least some of the first bottom-floor storage spaces on the bottom floor of
30 the inventory rack are provided with inventory receptacles, and at least some of higher-floor storage

spaces on higher floors other than the bottom floor of the inventory rack are provided with inventory receptacles;

wherein space where no first bottom-floor storage space is arranged on the bottom floor of the inventory rack forms a second aisle, and the second aisle runs through the bottom floor of the inventory rack;

wherein the control system is configured to determine, according to a handling task, a storage and retrieval device and/or a handling device that performs the handling task, and send a handling instruction for performing the handling task to the storage and retrieval device and to the handling device;

wherein the storage and retrieval device drives in the first aisle and is configured to:

take out, according to the handling instruction sent by the control system, a target inventory receptacle indicated by the handling instruction from a higher-floor storage space of the inventory rack and put the target inventory receptacle in an idle first bottom-floor storage space, or

take out the target inventory receptacle indicated by the handling instruction from the first bottom-floor storage space and put the target inventory receptacle in the higher-floor storage space; and

wherein the handling device drives in the first aisle and/or the second aisle, and is configured to:

take out, according to the handling instruction sent by the control system, the target inventory receptacle indicated by the handling instruction from the first bottom-floor storage space, or

put the target inventory receptacle indicated by the handling instruction in the first bottom-floor storage space, and transport the target inventory receptacle indicated by the handling instruction between the first bottom-floor storage space and the one or more destinations.

10. The inventory system according to claim 9, wherein bottom floors of the at least one inventory rack are all provided with the first bottom-floor storage spaces; and

the handling device drives in the first aisle.

11. The inventory system according to claim 9 or 10, wherein at least one row of second bottom-floor storage spaces are further arranged on a bottom floor of the inventory rack not adjacent to the first aisle, and at least some of the second bottom-floor storage spaces on the bottom floor of the inventory rack are provided with inventory receptacles; and

space where no first bottom-floor storage space or second bottom-floor storage space is arranged on the bottom floor of the inventory rack forms the second aisle.

12. The inventory system according to claim 11, wherein the handling device is further configured to:

take out, according to the handling instruction sent by the control system, the target inventory receptacle indicated by the handling instruction from a second bottom-floor storage space or put the target inventory receptacle indicated by the handling instruction in the second bottom-floor storage space, and

transport the target inventory receptacle indicated by the handling instruction between the second bottom-floor storage space and a given destination or between the first bottom-floor storage space and the second bottom-floor storage space.

13. The inventory system according to any one of claims 9-12, wherein

the control system is further configured to send a position change instruction to the storage and retrieval device; and

the storage and retrieval device is further configured to change a target inventory receptacle indicated in the position change instruction from a current storage space to at least one of the first bottom-floor storage space, the second bottom-floor storage space, or the higher-floor storage space above the second aisle according to the position change instruction, or from the first bottom-floor storage space to the higher-floor storage space above the second aisle.

14. The inventory system according to any one of claims 9-13, wherein heights of inventory receptacle racks of at least some of the first bottom-floor storage spaces and at least some of the second bottom-floor storage spaces on the bottom floor of the inventory rack are greater than a height of the handling device carrying no inventory receptacle; and

the handling device carrying no inventory receptacle is further configured to selectively drive below the at least some of the first bottom-floor storage spaces and the at least some of the second bottom-floor storage spaces, or transport the target inventory receptacle in a piggybacking manner and leave.

15. An inventory method, comprising:

determining, by a control system, a target inventory receptacle from an inventory receptacle in a storage area of an inventory system;

determining, by the control system, a target storage and retrieval device from a plurality of storage and retrieval devices and a target handling device from a plurality of handling devices;

5 sending, by the control system, a dispatching instruction to the target storage and retrieval device and to the target handling device, wherein the plurality of storage and retrieval devices and the plurality of handling devices are in communication with the control system, the plurality of storage and retrieval devices operate in the storage area, a plurality of inventory racks are deployed in the storage area, each inventory rack of the plurality of inventory racks has a plurality of compartments, each compartment of the plurality of compartments comprises a plurality of storage spaces, and an inventory receptacle is placed on each storage space of the plurality of storage spaces;

10 driving the target storage and retrieval device, in response to the dispatching instruction, to a position specified in the dispatching instruction, taking out, by the target storage and retrieval device, the target inventory receptacle, and directly or indirectly providing, by the target storage and retrieval device, the target inventory receptacle to the target handling device; and

15 driving the target handling device, in response to the dispatching instruction, to a position specified in the dispatching instruction, obtaining, by the target handling device, the target inventory receptacle, and transporting, by the target handling device, the target inventory receptacle from the storage area to a workstation specified in the dispatching instruction for a service operation.

16. The inventory method according to claim 15, wherein

the directly or indirectly providing, by the target storage and retrieval device, the target inventory receptacle to the target handling device comprises:

20 placing, by the target storage and retrieval device in response to the dispatching instruction, the target inventory receptacle at a preset transfer position; and

driving the target handling device in response to the dispatching instruction to the preset transfer position to obtain the target inventory receptacle.

17. The inventory method according to claim 15, wherein

25 the directly or indirectly providing, by the target storage and retrieval device, the target inventory receptacle to the target handling device comprises:

taking out, by the target storage and retrieval device in response to the dispatching instruction, the target inventory receptacle from a storage space of a first position of the plurality of inventory racks and placing the target inventory receptacle in a storage space of a second position of the plurality of inventory racks, wherein the first position is higher than the second position; and

30 driving the target handling device in response to the dispatching instruction to a position

corresponding to the storage space of the second position, and obtaining the target inventory receptacle.

18. The inventory method according to any one of claims 15-17, wherein each storage space of each inventory rack of the plurality of inventory racks has a storage space identification mark to allow the storage and retrieval devices to identify and to be aligned with a storage space where the target
5 inventory receptacle is located; and/or

each of the inventory receptacles has a receptacle identification mark to allow the storage and retrieval devices to identify and to be aligned with the target inventory receptacle.

19. The inventory method according to any one of claims 15-18, wherein a temporary storage rack is arranged on each of the plurality of storage and retrieval devices, each temporary storage rack
10 has a plurality of compartments, and each compartment comprises at least one storage space;

wherein the target inventory receptacle is located in a rear row of a compartment in which the target inventory receptacle is located in a longitudinal direction; and driving the target storage and retrieval device to a position specified in the dispatching instruction, and taking out the target inventory receptacle comprises:

15 directly taking out, by the target storage and retrieval device, the target inventory receptacle based on there being no other inventory receptacle in a front row with respect to the target inventory receptacle of the compartment in which the target inventory receptacle is located; or

sequentially taking out, by the target storage and retrieval device, based on there being at least one inventory receptacle in the front row with respect to the target inventory receptacle that blocks the
20 target inventory receptacle, the at least one inventory receptacle in the front row, sequentially placing the at least one inventory receptacle in at least one storage space of the temporary storage racks, taking out the target inventory receptacle, placing the target inventory receptacle in a storage space of the temporary storage racks, and returning the at least one inventory receptacle to the compartment from which the at least one inventory receptacle was taken out.

20. The inventory method according to claim 15, wherein the warehouse comprises one or more storage and retrieval devices, one or more handling devices, and one or more destinations, the warehouse is formed by at least one inventory rack, the inventory rack is provided with a plurality of floors, space between the at least one inventory rack forms a first aisle, each floor of the inventory rack is provided with at least two storage spaces in a longitudinal direction, a row of first bottom-floor
30 storage spaces are arranged on a bottom floor of at least one side of the inventory rack adjacent to the

first aisle, at least some of the first bottom-floor storage spaces on the bottom floor of the inventory rack are provided with inventory receptacles, at least some of higher-floor storage spaces on higher floors other than the bottom floor of the inventory rack are provided with inventory receptacles, space where no first bottom-floor storage space is arranged on the bottom floor of the inventory rack forms
5 a second aisle, the second aisle runs through the bottom floor of the inventory rack, and the method comprises:
determining a to-be-performed handling task;
determining a storage and retrieval device and/or a handling device that performs the handling task according to the handling task; and
10 sending a handling instruction for performing the handling task to the storage and retrieval device and to the handling device, wherein the storage and retrieval device drives in the first aisle, the handling device drives in the first aisle and/or the second aisle, and the storage and retrieval device and the handling device cooperate to transport a target inventory receptacle indicated by the handling instruction from a higher-floor storage space or a first bottom-floor storage space of the warehouse to
15 a destination, or transport the target inventory receptacle indicated by the handling instruction from the destination to the higher-floor storage space or the first bottom-floor storage space of the warehouse.