

CLAIMS

1. A dispatching system for item picking of a three-dimensional warehouse, comprising: one or more control centers, one or more first handling devices, one or more second handling devices, at least one three-dimensional warehouse, and at least one lifting device, wherein the three-dimensional warehouse is provided with a plurality of floors, the plurality of floors of the three-dimensional warehouse are communicated by the at least one lifting device, and the one or more control centers each communicate with the one or more first handling devices and the one or more second handling devices, wherein:

a bottom floor of the three-dimensional warehouse is provided with at least one bottom-floor docking point, at least some bottom-floor storage spaces of the bottom floor are provided with at least one of a vehicle and a vehicle support, and the vehicle support in the bottom-floor storage space is configured for placing a vehicle transported by the second handling device;

higher floors of the three-dimensional warehouse other than the bottom floor are each provided with at least one higher-floor docking point and a rail for the first handling device to run thereon, and at least some higher-floor storage spaces of the higher floor are provided with a vehicle;

the control center is configured to determine, according to a handling task, a first handling device, a second handling device, and a lifting device for performing the handling task, and send a handling instruction for performing the handling task to the first handling device, the second handling device, and the lifting device separately;

the first handling device is configured to take a vehicle indicated in the handling instruction out of or put the vehicle indicated in the handling instruction into the higher-floor storage space according to the handling instruction sent by the control center, and transport the vehicle indicated in the handling instruction between the higher-floor storage space and the higher-floor docking point;

the second handling device is configured to take a vehicle indicated in the handling instruction out of or put the vehicle indicated in the handling instruction into the bottom-floor storage space according to the handling instruction sent by the control center, and transport the vehicle indicated in the handling instruction between the lifting device and the bottom-floor storage space, between the bottom-floor storage space and the bottom-floor docking point, or between the lifting device and the bottom-floor docking point; and

the lifting device is configured to ascend or descend to a specified floor according to the handling instruction sent by the control center, and transport at least one of the vehicle indicated

in the handling instruction, the first handling device, and the second handling device between the floors.

2. The system according to claim 1, wherein at least some higher-floor storage spaces in the higher floor are further provided with a vehicle support configured for placing the vehicle, and a distance between the vehicle support and the rail is greater than a height of the first handling device not carrying the vehicle; and

the first handling device is further configured to travel to below the higher-floor storage space, and transport the vehicle from below the higher-floor storage space in a piggyback manner and leave the higher-floor storage space; or

the first handling device is further configured to, at a rail position adjacent to the higher-floor storage space, take out the vehicle from a side of the higher-floor storage space to the first handling device, or place the vehicle from the first handling device into the higher-floor storage space from the side of the higher-floor storage space; or

the first handling device is further configured to take out the vehicle from above the higher-floor storage space to the first handling device, or put the vehicle from the first handling device into the higher-floor storage space from above the higher-floor storage space.

~~3. The system according to claim 1, wherein the first handling device is further configured to, at a rail position adjacent to the higher floor storage space, take out the vehicle from a side of the higher floor storage space to the first handling device, or place the vehicle from the first handling device into the higher floor storage space from the side of the higher floor storage space.~~

~~4. The system according to claim 1, wherein the first handling device is further configured to take out the vehicle from above the higher floor storage space to the first handling device, or put the vehicle from the first handling device into the higher floor storage space from above the higher floor storage space.~~

~~5. The system according to claim 1, wherein the three dimensional warehouse comprises a plurality of lifting devices, and at least an overlap exists between specified floors reachable by the plurality of lifting devices.~~

~~63.~~ The system according to claim 1 or 2, wherein a rail is arranged in the lifting device, and is configured to connect with the rail arranged in the higher floor, to enable the first handling device to travel into the lifting device.

~~74.~~ The system according to claim ~~63~~, wherein the control center is further configured to determine, at least in part according to a to-be-performed handling task of each of the higher floors, a quantity of first handling devices required by the each of the higher floors, determine,

according to the quantity of first handling devices required by the each of the higher floors and a current quantity of first handling devices of the each of the higher floors, first handling devices that need to be dispatched by the each of the higher floors, and send a dispatching instruction to the first handling devices that need to be dispatched; and

the first handling device is further configured to travel into the lifting device according to the received dispatching instruction, and reach a higher floor specified in the dispatching instruction through the lifting device.

85. The system according to claim 63 or 4, wherein the higher-floor docking point is arranged in the lifting device; and

the first handling device is further configured to travel to the higher-floor docking point in the lifting device, and place the vehicle at the higher-floor docking point, or take out the vehicle from the higher-floor docking point.

96. The system according to any one of claims 3 to 5-7, wherein the higher floors of the three-dimensional warehouse comprise a higher floor where not all areas are communicated by the rail;

for the higher floor where not all areas are communicated by the rail, in a case that the first handling device needs to be dispatched between different areas of the higher floor, the control center is configured to determine an area from which the first handling device is to be dispatched as a departure area, and determine an area into which the first handling device is to be dispatched as a destination area, and determine another higher floor which is closest to the higher floor and in which all areas are communicated by the rail as a transit floor; and send a dispatching instruction to the first handling device in the departure area, send a handling instruction to a lifting device communicating the transit floor and the departure area, and send a handling instruction to a lifting device communicating the transit floor and the destination area, so that the first handling device reaches the destination area from the departure area through the two lifting devices and the transit floor.

~~740~~. The system according to any one of ~~claims 3 to 6~~claim 7, comprising at least two three-dimensional warehouses, wherein bottom surfaces of the three-dimensional warehouses are in communication with each other;

in a case that the first handling device needs to be dispatched between different three-dimensional warehouses, the control center is configured to determine a three-dimensional warehouse from which the first handling device is to be dispatched as a departure warehouse, and determine a three-dimensional warehouse into which the first handling device is to be dispatched as a destination warehouse, send a dispatching instruction to the first handling

device in the departure warehouse, and send a handling instruction to a second handling device, a lifting device of the departure warehouse, and a lifting device of the destination warehouse, so that the first handling device is dispatched from the departure warehouse to the destination warehouse through the two lifting devices and the second handling device; and

the second handling device is configured to transport the first handling device from the bottom floor of the departure warehouse to the bottom floor of the destination warehouse according to the dispatching instruction.

~~118.~~ The system according to any one of claims 1 to 7, wherein an unpowered or powered carrier is arranged in the lifting device, and the higher-floor docking point is provided with at least the carrier located in the lifting device; and

the first handling device is further configured to travel to the carrier, and place the vehicle on the carrier, or take out the vehicle from the carrier;

further, an unpowered or powered carrier is arranged outside the lifting device, the higher-floor docking point is further provided with at least the carrier located outside the lifting device, and in a case that the lifting device is located at a higher floor, the carrier located outside the lifting device is docked with the carrier located in the lifting device, so that the vehicle is transported from the carrier located in the lifting device to the carrier located outside the lifting device, or the vehicle is transported from the carrier located outside the lifting device to the carrier located in the lifting device.

~~12. The system according to claim 11, wherein an unpowered or powered carrier is arranged outside the lifting device, the higher-floor docking point is further provided with at least the carrier located outside the lifting device, and in a case that the lifting device is located at a higher floor, the carrier located outside the lifting device is docked with the carrier located in the lifting device, so that the vehicle is transported from the carrier located in the lifting device to the carrier located outside the lifting device, or the vehicle is transported from the carrier located outside the lifting device to the carrier located in the lifting device.~~

~~13. The system according to claim 11 or 12, wherein the unpowered carrier at least comprises a vehicle support configured for placing the vehicle, and the powered carrier at least comprises a conveyor and/or a two-way telescopic fork.~~

~~149.~~ The system according to any one of claims 1 to 8, wherein a height of the vehicle support in the at least some bottom-floor storage spaces of the bottom floor of the three-dimensional warehouse is higher than a height of the second handling device not carrying the vehicle; and the second handling device is further configured to, when not carrying the vehicle, selectively travel below the at least some bottom-floor storage spaces, or transport the vehicle

from below the at least some bottom-floor storage spaces in a piggyback manner and leave the bottom-floor storage spaces; and/or

wherein an interval between uprights in at least some bottom-floor storage spaces of the bottom floor of the three-dimensional warehouse is greater than a width of the second handling device, and a height of a lowest point of a connector between two adjacent uprights of at least some bottom-floor storage spaces of the bottom floor of the three-dimensional warehouse is higher than the height of the second handling device not carrying the vehicle; and the second handling device is further configured to, when not carrying the vehicle, selectively travel between the two adjacent uprights of the at least some bottom-floor storage spaces of the bottom floor.

~~15. The system according to claim 14, wherein an interval between uprights in at least some bottom-floor storage spaces of the bottom floor of the three-dimensional warehouse is greater than a width of the second handling device, and a height of a lowest point of a connector between two adjacent uprights of at least some bottom-floor storage spaces of the bottom floor of the three-dimensional warehouse is higher than the height of the second handling device not carrying the vehicle; and the second handling device is further configured to, when not carrying the vehicle, selectively travel between the two adjacent uprights of the at least some bottom-floor storage spaces of the bottom floor.~~

~~16~~10. The system according to any one of claims 1 to 9, wherein the second handling device is configured to, at an aisle position adjacent to the bottom-floor storage space, take out the vehicle from a side of the bottom-floor storage space to the second handling device, or place the vehicle from the second handling device into the bottom-floor storage space from the side of the bottom-floor storage space, or

the second handling device is configured to, at an aisle position adjacent to the bottom-floor storage space, enter to below the bottom-floor storage space, and take out the vehicle from below the bottom-floor storage space to the second handling device, or place the vehicle indicated in the handling instruction from the second handling device into the bottom-floor storage space.

~~17. The system according to claim 1, wherein the second handling device is configured to, at an aisle position adjacent to the bottom-floor storage space, enter to below the bottom-floor storage space, and take out the vehicle from below the bottom-floor storage space to the second handling device, or place the vehicle indicated in the handling instruction from the second handling device into the bottom-floor storage space.~~

~~18. The system according to claim 1, wherein a specified area of the bottom floor of the~~

~~three-dimensional warehouse is provided with at least one bottom-floor docking point; and~~

~~the second handling device is configured to take the vehicle out of the bottom-floor storage space or the lifting device, transport the vehicle to the bottom-floor docking point, and place the vehicle in the specified area; or take out the vehicle from the bottom-floor docking point in the specified area, and transport the vehicle to the bottom-floor storage space or the lifting device.~~

~~1911. The system according to any one of claims 1 to 1048, wherein a specified area of the bottom floor of the three-dimensional warehouse is provided with at least one bottom-floor docking point, a powered carrier is arranged in the lifting device, the bottom floor of the three-dimensional warehouse is provided with a powered carrier, and in a case that the lifting device is located at the bottom floor, the carrier of the bottom floor is docked with the carrier located in the lifting device, so as to transport the vehicle from the carrier in the lifting device to the carrier of the bottom floor, or transport the vehicle from the carrier of the bottom floor to the carrier in the lifting device; and~~

~~the second handling device is further configured to take out the vehicle from the carrier of the bottom floor, transport the vehicle to the bottom-floor docking point, and place the vehicle in the specified area; or take out the vehicle from the bottom-floor docking point in the specified area, and transport the vehicle to the carrier of the bottom floor.~~

~~20. The system according to claim 1, further comprising one or more external temporary storage areas, wherein the external temporary storage area is in a form of at least one of three-dimensional storage or planar storage;~~

~~the external temporary storage area and the at least one three-dimensional warehouse share at least some of the second handling devices, or the second handling device transports and/or is docked with the vehicle between the external temporary storage area and the at least one three-dimensional warehouse; and~~

~~the control center is further configured to store inventory information of items in the external temporary storage area and the at least one three-dimensional warehouse.~~

~~2112. A dispatching method for item picking of at least one three-dimensional warehouse, wherein floors of the three-dimensional warehouse are communicated by at least one lifting device, a bottom floor of the three-dimensional warehouse is provided with at least one bottom-floor docking point, at least some bottom-floor storage spaces of the bottom floor are provided with a vehicle and a vehicle support, the vehicle support in the bottom-floor storage space is configured for placing a vehicle transported by a second handling device, higher floors other than the bottom floor of the three-dimensional warehouse are each provided with at least one~~

higher-floor docking point, the higher floors are each provided with a rail for a first handling device to run thereon, and at least some higher-floor storage spaces of the higher floors are provided with a vehicle, and the method comprises:

determining a to-be-performed handling task;

determining, according to the handling task, a first handling device, a second handling device and a lifting device for performing the handling task; and

sending a handling instruction to the determined first handling device, second handling device and lifting device separately, so that the first handling device, the second handling device and the lifting device cooperate to transport a vehicle from the higher-floor storage space or the bottom-floor storage space of the three-dimensional warehouse to the bottom-floor docking point, or transport a vehicle from the bottom-floor docking point to the higher-floor storage space or the bottom-floor storage space of the three-dimensional warehouse,

wherein a rail is arranged in the lifting device, and is configured to connect with the rail arranged in the higher floor, to enable the first handling device to travel into the lifting device.

~~22~~13. The method according to claim ~~24~~12, wherein the sending the handling instruction to the determined first handling device comprises:

determining, according to the handling task, a higher-floor storage space corresponding to the handling task; and

sending the handling instruction to the determined first handling device according to a position of the higher-floor storage space and an aisle position adjacent to the higher-floor storage space, so that the first handling device, at the aisle position, takes out a vehicle indicated in the handling instruction from a side of the higher-floor storage space to the first handling device, or places the vehicle indicated in the handling instruction from the first handling device into the higher-floor storage space from the side of the higher-floor storage space, according to the handling instruction; or

sending the handling instruction to the determined first handling device according to a position of the higher-floor storage space and a position of another storage space above the higher-floor storage space, so that the first handling device, according to the handling instruction, takes out a vehicle indicated in the handling instruction from the position of the another higher-floor storage space above the higher-floor storage space to the first handling device, or lowers the vehicle indicated in the handling instruction from the first handling device to the higher-floor storage space.

~~23. The method according to claim 21, wherein the sending the handling instruction to the determined first handling device comprises:~~

determining, according to the handling task, a higher floor storage space corresponding to the handling task; and

~~sending the handling instruction to the determined first handling device according to a position of the higher floor storage space and a position of another storage space above the higher floor storage space, so that the first handling device, according to the handling instruction, takes out a vehicle indicated in the handling instruction from the position of the another higher floor storage space above the higher floor storage space to the first handling device, or lowers the vehicle indicated in the handling instruction from the first handling device to the higher floor storage space.~~

~~24. The method according to claim 21, wherein a rail is arranged in the lifting device, and is configured to connect with the rail arranged in the higher floor, to enable the first handling device to travel into the lifting device.~~

~~25~~14. The method according to claim ~~24~~12 or 13, further comprising:

determining, at least in part according to a to-be-performed handling task of each of the higher floors, a quantity of first handling devices required by the each of the higher floors;

determining, according to the quantity of first handling devices required by the each of the higher floors and a current quantity of first handling devices of the each of the higher floors, first handling devices that need to be dispatched by the each of the higher floors; and

sending a dispatching instruction to the determined first handling devices that need to be dispatched, so that the first handling devices travel into the lifting device according to the received dispatching instruction, and reach a higher floor specified in the dispatching instruction through the lifting device.

~~26~~15. The method according to any one of claims 2412 to 14, wherein the higher-floor docking point is arranged in the lifting device; and

the sending the handling instruction to the determined first handling device comprises:

determining, according to the handling task, a higher-floor docking point in the lifting device corresponding to the handling task; and

sending the handling instruction to the determined first handling device according to a position of the higher-floor docking point in the lifting device, so that the first handling device travels to the higher-floor docking point in the lifting device, and places a vehicle at the higher-floor docking point, or takes out a vehicle from the position of the higher-floor docking point.

~~27~~16. The method according to claim ~~25~~14, wherein the higher floors of the three-dimensional warehouse comprise a higher floor where not all areas are connected by the rail, and the method further comprises:

for the higher floor where not all areas are communicated by the rail, determining to dispatch the first handling device between different areas of the higher floor;

determining an area from which the first handling device is to be dispatched as a departure area, and determining an area into which the first handling device is to be dispatched as a destination area, and determining another higher floor which is closest to the higher floor and in which all areas are communicated by the rail as a transit floor; and

sending a dispatching instruction to the first handling device in the departure area, sending a handling instruction to a lifting device communicating the transit floor and the departure area, and sending a handling instruction to a lifting device communicating the transit floor and the destination area, so that the first handling device reaches the destination area from the departure area through the two lifting devices and the transit floor.

~~28~~17. The method according to claim ~~25~~14, wherein there are at least two three-dimensional warehouses, bottom surfaces of the three-dimensional warehouses are in communication with each other, and the method further comprises:

determining to dispatch the first handling device between different three-dimensional warehouses;

determining a three-dimensional warehouse from which the first handling device is to be dispatched as a departure warehouse, and determining a three-dimensional warehouse into which the first handling device is to be dispatched as a destination warehouse; and

sending a dispatching instruction to the first handling device in the departure warehouse, and sending a handling instruction to a second handling device, a lifting device of the departure warehouse, and a lifting device of the destination warehouse, so that the first handling device is dispatched from the departure warehouse to the destination warehouse through the two lifting devices and the second handling device.

~~29~~18. The method according to any one claims ~~24~~12 to 17, wherein an unpowered or powered carrier is arranged in the lifting device, and the higher-floor docking point is provided with at least the carrier located in the lifting device; and

the sending the handling instruction to the determined first handling device comprises:

determining, according to the handling task, a higher-floor docking point in the lifting device corresponding to the handling task; and

sending the handling instruction to the determined first handling device according to a position of the higher-floor docking point in the lifting device, so that the first handling device travels to the carrier that is used as the higher-floor docking point in the lifting device, and places a vehicle on the carrier, or takes out a vehicle from the carrier that is used as the higher-

floor docking point₂

further, an unpowered or powered carrier is arranged outside the lifting device, and the higher-floor docking point is further provided with at least the carrier located outside the lifting device; and

the sending the handling instruction to the determined lifting device comprises:

determining, according to the handling task, a higher-floor docking point corresponding to the handling task; and

sending the handling instruction to the lifting device according to a floor at which the higher-floor docking point is located, so that the lifting device moves to the floor at which the higher-floor docking point is arranged, the carrier located in the lifting device is docked with the carrier located outside the lifting device, and the vehicle is transported from the carrier located in the lifting device to the carrier that is located outside the lifting device and used as the higher-floor docking point, or the vehicle on the carrier that is located outside the lifting device and used as the higher-floor docking point is transported to the carrier in the lifting device.

~~30. The method according to claim 29, wherein an unpowered or powered carrier is arranged outside the lifting device, and the higher-floor docking point is further provided with at least the carrier located outside the lifting device; and~~

~~the sending the handling instruction to the determined lifting device comprises:~~

~~determining, according to the handling task, a higher floor docking point corresponding to the handling task; and~~

~~sending the handling instruction to the lifting device according to a floor at which the higher-floor docking point is located, so that the lifting device moves to the floor at which the higher-floor docking point is arranged, the carrier located in the lifting device is docked with the carrier located outside the lifting device, and the vehicle is transported from the carrier located in the lifting device to the carrier that is located outside the lifting device and used as the higher-floor docking point, or the vehicle on the carrier that is located outside the lifting device and used as the higher floor docking point is transported to the carrier in the lifting device.~~

~~31~~19. The method according to any one of claims 24~~12~~ to 18, wherein the sending the handling instruction to the determined second handling device comprises:

determining, according to the handling task, a bottom-floor storage space corresponding to the handling task; and

sending the handling instruction to the second handling device according to a position of

the bottom-floor storage space and an aisle position adjacent to the bottom-floor storage space, so that the second handling device, at the aisle position adjacent to the bottom-floor storage space, takes out a vehicle indicated in the handling instruction from a side of the bottom-floor storage space to the second handling device, or places the vehicle indicated in the handling instruction from the second handling device into the bottom-floor storage space from the side of the bottom-floor storage space; or

sending the handling instruction to the second handling device according to a position of the bottom-floor storage space, so that the second handling device, at an aisle position adjacent to the bottom-floor storage space, enters to below the bottom-floor storage space, and takes out a vehicle indicated in the handling instruction from below the bottom-floor storage space to the second handling device, or places the vehicle indicated in the handling instruction from the second handling device into the bottom-floor storage space.

~~32. The method according to claim 21, wherein the sending the handling instruction to the determined second handling device comprises:~~

~~determining, according to the handling task, a bottom floor storage space corresponding to the handling task; and~~

~~sending the handling instruction to the second handling device according to a position of the bottom floor storage space, so that the second handling device, at an aisle position adjacent to the bottom floor storage space, enters to below the bottom floor storage space, and takes out a vehicle indicated in the handling instruction from below the bottom floor storage space to the second handling device, or places the vehicle indicated in the handling instruction from the second handling device into the bottom floor storage space.~~

~~33. The method according to claim 21, wherein a specified area of the bottom floor of the three-dimensional warehouse is provided with at least one bottom floor docking point; and~~

~~the sending the handling instruction to the determined second handling device comprises:
determining, according to the handling task, a bottom floor docking point arranged in the specified area corresponding to the handling task; and~~

~~sending the handling instruction to the second handling device according to the bottom-floor docking point arranged in the specified area, so that the second handling device takes a vehicle indicated in the handling instruction out of the bottom floor storage space or the lifting device, transports the vehicle to the bottom floor docking point, and places the vehicle in the specified area; or takes out the vehicle indicated in the handling instruction from the bottom-floor docking point in the specified area, and transports the vehicle to the bottom floor storage space or the lifting device.~~

3420. The method according to any one of claims 3312 to 19, wherein a specified area of the bottom floor of the three-dimensional warehouse is provided with at least one bottom-floor docking point, a powered carrier is arranged in the lifting device, and a bottom floor of the three-dimensional warehouse is provided with a powered carrier;

the sending the handling instruction to the determined lifting device comprises:

determining, according to the handling task, a bottom-floor docking point corresponding to the handling task; and

sending the handling instruction to the lifting device to instruct the lifting device to move to the bottom floor, so that the lifting device moves to the bottom floor, and the carrier on the bottom floor is docked with the carrier located in the lifting device, to transport the vehicle from the carrier in the lifting device to the carrier on the bottom floor, or transport the vehicle from the carrier on the bottom floor to the carrier in the lifting device,

wherein the sending the handling instruction to the determined second handling device comprises:

determining, according to the handling task, a bottom-floor docking point arranged in the specified area corresponding to the handling task; and

sending the handling instruction to the second handling device according to the bottom-floor docking point arranged in the specified area, so that the second handling device takes out the vehicle from the carrier on the bottom floor, transports the vehicle to the bottom-floor docking point, and places the vehicle in the specified area; or takes out the vehicle indicated in the handling instruction from the bottom-floor docking point in the specified area, and transports the vehicle to the carrier on the bottom floor.

~~35. The method according to claim 34, wherein the sending the handling instruction to the determined second handling device comprises:~~

~~determining, according to the handling task, a bottom-floor docking point arranged in the specified area corresponding to the handling task; and~~

~~sending the handling instruction to the second handling device according to the bottom-floor docking point arranged in the specified area, so that the second handling device takes out the vehicle from the carrier on the bottom floor, transports the vehicle to the bottom-floor docking point, and places the vehicle in the specified area; or takes out the vehicle indicated in the handling instruction from the bottom-floor docking point in the specified area, and transports the vehicle to the carrier on the bottom floor.~~

~~36. The method according to claim 21, further comprising: arranging one or more external temporary storage areas outside the three dimensional warehouse, wherein the external~~

temporary storage area is in a form of three-dimensional storage or planar storage; the external temporary storage area and the three-dimensional warehouse share at least some of the second handling devices, or the second handling device transport and/or is docked with the vehicle between the external temporary storage area and the at least one three-dimensional warehouse; and

the determining the to-be-performed handling task comprises:

determining the to-be-performed handling task according to stored inventory information of items in the external temporary storage area and the three-dimensional warehouse and order information.