[CLAIMS]

[Claim 1]

An apparatus for automatically transferring an object to be transferred, the apparatus comprising:

a pair of first sensors configured to detect whether any portion protruding from both side surfaces of the object to be transferred, which is transferred along a transfer line, is present outside set positions while the object to be transferred is being transferred; and

a pair of second sensors configured to detect whether any portion protruding from front and rear surfaces of the object to be transferred is present outside set positions while the object to be transferred is stationary.

[Claim 2]

The apparatus of claim 1, wherein the object to be transferred includes a chemical container that is supplied to a chemical supply device and a pallet that supports a lower portion of the chemical container.

[Claim 3]

The apparatus of claim 2, wherein the pair of first sensors and the pair of second sensors are provided in an inspection unit provided on the transfer line in order to check information on a chemical of the chemical container.

[Claim 4]

The apparatus of claim 2, wherein:

an inspection unit provided on the transfer line and an input unit for placing the chemical container onto the transfer line are provided in order to check information on a chemical of the chemical container;

the pair of first sensors are provided in a state of being coupled to supports provided between the inspection unit and the input unit; and

the second sensors are each located on front and rear surfaces of the inspection unit.

[Claim 5]

The apparatus of claim 3, comprising:

a control unit configured to receive the information on the chemical of the chemical container transferred along the transfer line and, when the information on the chemical matches information required by the chemical supply device, supply the chemical container to the chemical supply device;

an input unit into which the chemical container is introduced; and

a discharge unit provided on a side of the input unit and configured to discharge the chemical container that is fully used in the chemical supply device,

wherein the transfer line includes a first transfer line connected to the input unit and a second transfer line disposed adjacent to the first transfer line to be parallel to the first transfer line and connected to the discharge unit.

[Claim 6]

The apparatus of claim 5, wherein:

in the inspection unit, when it is determined that the chemical container transferred from the input unit is incorrectly introduced, a connection unit that connects the first transfer line to the second transfer line in order to transfer the chemical container to the second transfer line by changing a transfer direction of the chemical container by the inspection unit is provided; and

in the inspection unit, the chemical container transferred to the second transfer line through the connection unit is discharged outward through the discharge unit.

[Claim 7]

The apparatus of claim 1, wherein the first sensors and the second sensors are provided so that the object to be transferred is first detected by the first sensors while the object to be transferred is being transferred, and the object to be transferred is detected second by the second sensors while the object to be transferred stops at a predetermined position after the object to be transferred is transferred.

[Claim 8]

The apparatus of claim 1, wherein the first sensors and the second sensors are provided so that the object to be transferred is first detected by the second sensors while the object to be transferred stops at a predetermined position after the object to be transferred is transferred, and the object to be transferred is detected second by the first sensors while the object to be transferred is being transferred.

[Claim 9]

The apparatus of claim 1, wherein the first sensor includes a light-emitting unit that emits light in an upward or downward direction and a light-receiving unit that receives the light generated by the light-emitting unit.

[Claim 10]

The apparatus of claim 9, wherein the light-emitting unit is formed as a light source unit that generates a laser beam and the light-receiving unit is formed as a reflecting plate that reflects the laser beam.

[Claim 11]

The apparatus of claim 2, wherein:

an inspection unit provided on the transfer line is provided in order to check information on a chemical of the chemical container; and

the second sensors are each formed using a light curtain to detect an entire region of a front surface of the inspection unit and an entire region of a rear surface of the inspection unit.

[Claim 12]

The apparatus of claim 1, further comprising a third sensor configured to detect whether a portion protruding upward from an upper surface of the object to be transferred is present outside a set position.

[Claim 13]

The apparatus of claim 12, wherein:

the object to be transferred includes a chemical container that is supplied to a chemical supply device and a pallet that supports a lower portion of the chemical container;

an inspection unit provided on the transfer line is provided in order to check information on the chemical of the chemical container; and

the third sensor is provided on an upper frame provided on an upper side of the inspection unit and detects whether a portion protruding upward from the upper surface of the object to be transferred is present while the object to be transferred is stationary.

[Claim 14]

The apparatus of claim 12, wherein the third sensor detects whether a portion protruding upward from the upper surface of the object to be transferred is present while the object to be transferred is being transferred.

[Claim 15]

An apparatus for automatically transferring an object to be transferred, the apparatus comprising:

a pair of first sensors configured to detect whether any portion protruding from both side surfaces of the object to be transferred is present outside set positions while the object to be transferred is stationary; and

a pair of second sensors configured to detect whether any portion protruding from front and rear surfaces of the object to be transferred is present outside set positions while the object to be transferred is stationary,

wherein the first sensors and the second sensors are each formed using a light curtain to detect both of the side surfaces and entire regions of the front and rear surfaces.

[Claim 16]

The apparatus of claim 15, wherein:

a transfer line is provided to transfer a chemical container, which is loaded on a pallet and introduced into an input unit, to a chemical supply device; and

the chemical container and the pallet, which are transferred along the transfer line, are aligned with a central portion of the transfer line, wherein the apparatus includes an alignment unit configured to align the chemical container and the pallet according to a size of the pallet.

[Claim 17]

The apparatus of claim 16, wherein:

an inspection unit is provided in order to check information on a chemical of the chemical container transferred along the transfer line; and

the alignment unit is provided between the input unit and the inspection unit.

[Claim 18]

The apparatus of claim 16, wherein the alignment unit includes:

a plurality of transfer members configured to transfer the chemical container and the pallet, which are transferred from the input unit, along the transfer line;

a pair of alignment members configured to align both side surfaces of the pallet with the transfer line to be parallel to the transfer line by pushing; and

an alignment driving unit configured to reciprocate the pair of alignment members in opposite directions.

[Claim 19]

The apparatus of claim 18, wherein the alignment member has a length in a direction toward the transfer line and at least a portion thereof is in surface contact with a side surface of the pallet.

[Claim 20]

The apparatus of claim 16, wherein:

the alignment unit includes a pallet information recognition unit for recognizing information on the pallet, and a pair of alignment members which are moved by the driving of the alignment driving unit to align both side surfaces of the pallet with the transfer line to be parallel to the transfer line by pushing both of the side surfaces of the pallet; and

the control unit controls the alignment driving unit so that the recognized information on the pallet corresponds to an amount of movement of the alignment member.

[Claim 21]

The apparatus of claim 20, wherein the information on the pallet received by the pallet information recognition unit includes information about the size of the

pallet, and the control unit controls the alignment driving unit to determine the amount of movement of the alignment member according to the size of the pallet.

[Claim 22]

The apparatus of claim 20, wherein the amount of movement of the alignment member corresponding to information on a plurality of pallets is preset in the control unit.

[Claim 23]

The apparatus of claim 20, wherein the pallet information recognition unit recognizes a unique identifier formed at a barcode label or a radio-frequency identification (RFID) attached to the pallet.

[Claim 24]

The apparatus of claim 16, wherein:

the alignment unit includes a pallet information recognition unit for recognizing information on the pallet, and a pair of alignment members which are moved by the driving of the alignment driving unit to align both side surfaces of the pallet with the transfer line to be parallel to the transfer line by pushing both of the side surfaces of the pallet; and

the pallet information recognition unit includes a pallet detection unit for detecting the size of the pallet, and an amount of movement of the alignment member is determined according to the size of the pallet detected by the pallet detection unit.

[Claim 25]

The apparatus of claim 16, wherein:

the alignment unit includes a pallet information recognition unit for recognizing information on the pallet, and a pair of alignment members which are moved by the driving of the alignment driving unit to align both side surfaces of the

pallet with the transfer line to be parallel to the transfer line by pushing both of the side surfaces of the pallet; and

the pallet information recognition unit includes a distance measuring sensor for measuring a distance from the pallet, and an amount of movement of the alignment member is determined according to the distance from the pallet measured by the distance measuring sensor.

[Claim 26]

The apparatus of claim 16, comprising an in-place detection sensor configured to detect whether the pallet is placed at a correct position to be aligned by the alignment unit.

[Claim 27]

The apparatus of claim 26, wherein the in-place detection sensor includes:

a first in-place detection sensor which is provided in a front of the alignment unit and detects whether a front of the pallet that has entered the alignment unit escapes from a set position; and

a second in-place detection sensor which is provided at a rear of the pallet and detects whether the rear of the pallet that has entered the alignment unit reaches a set position.

[Claim 28]

The apparatus of claim 16, wherein an escape prevention stopper for preventing the pallet that has entered the alignment unit from escaping forward or rearward is provided forward and rearward from the alignment unit.

[Claim 29]

The apparatus of claim 16, wherein:

the alignment unit includes a pallet information recognition unit for recognizing information on the pallet, and a pair of alignment members which are moved by the driving of the alignment driving unit to align both side surfaces of the pallet with the transfer line to be parallel to the transfer line by pushing both of the side surfaces of the pallet; and

the alignment driving unit is formed as a servomotor in order to control an amount of movement of the alignment member.

[Claim 30]

The apparatus of claim 16, comprising a control unit configured to receive the information on a chemical of the chemical container transferred along the transfer line and, when the information on the chemical matches information required by the chemical supply device, supply the chemical container to the chemical supply device.

[Claim 31]

A method of automatically transferring an object to be transferred, the method comprising:

operation a) of detecting, by first sensors, whether any portion protruding from both side surfaces of the object to be transferred, which is transferred along a transfer line, is present outside set positions while the object to be transferred is being transferred; and

operation b) of detecting, by second sensors, whether any portion protruding from front and rear surfaces of the object to be transferred is present outside a set position while the object to be transferred is stationary.

[Claim 32]

A method of automatically transferring an object to be transferred, the method comprising:

operation a) of detecting, by second sensors, whether any portion protruding from front and rear surfaces of the object to be transferred is present outside set positions while the object to be transferred, which is transferred along a transfer line, is stationary; and

operation b) of detecting, by first sensors, whether any portion protruding from both side surfaces of the object to be transferred is present outside set positions while the object to be transferred is being transferred.

[Claim 33]

The method of claim 31 or 32, wherein, when it is detected that the protruding portion is present by at least one of the first sensors and the second sensors, the object to be transferred is discharged outward through a discharge unit.

[Claim 34]

The method of claim 33, wherein the object to be transferred is discharged through the discharge unit provided on a second transfer line disposed adjacent to a first transfer line connected to an input unit, into which the object to be transferred is introduced, to be parallel to the first transfer line.

[Claim 35]

The method of claim 34, wherein:

the object to be transferred includes a chemical container that is supplied to a chemical supply device and a pallet that supports a lower portion of the chemical container; and

the first sensors and the second sensors are provided in an inspection unit provided on the transfer line in order to check information on a chemical of the chemical container, wherein, in the inspection unit, the object to be transferred is

transferred to the second transfer line so that the object to be transferred is discharged through the discharge unit.

[Claim 36]

The method of claim 31 or 32, wherein the object to be transferred including a chemical container that is supplied to a chemical supply device and a pallet that supports a lower portion of the chemical container is introduced into an input unit and then is transferred to the chemical supply device along the transfer line, and the control unit controls the chemical container and the pallet, which are transferred along the transfer line, to be aligned with a central portion of the transfer line according to a size of a pallet.

[Claim 37]

The method of claim 36, wherein the control unit receives information about the size of the pallet and controls an alignment driving unit for aligning the pallet according to the size of the pallet.

[Claim 38]

The method of claim 36, wherein the control unit receives information about positions of both side surfaces of the pallet and controls an alignment driving unit for aligning the pallet according to the positions of both of the side surfaces of the pallet.

[Claim 39]

The method of claim 36, wherein the control unit receives information on a chemical of the chemical container transferred along the transfer line, and when the information on the chemical matches information required by the chemical supply device, the control unit controls the chemical container to be supplied to the chemical supply device.

[Claim 40]

The method of claim 36, wherein, when it is detected that the pallet transferred along the transfer line is placed at a preset correct position, alignment of the pallet is performed.