

[DESCRIPTION]

[Invention Title]

DEVICE AND METHOD FOR AUTOMATICALLY TRANSPORTING
CHEMICAL CONTAINER

5 [Technical Field]

The present invention relates to a device and method for automatically transferring a chemical container, and more particularly, to a device and method for automatically transferring a chemical container that are capable of determining whether chemical information of the chemical container coincides with chemical
10 information required by a chemical supply device by confirming the chemical information of the chemical container and then automatically transferring the chemical container.

[Background Art]

Generally, in all companies which use hazardous chemicals, such as
15 companies for manufacturing semiconductors, semiconductor devices, liquid crystal displays (LCD), and organic light emitting devices (OLED), pharmaceutical companies, paint companies, and the like, a variety of types of chemicals are used. Also, a variety of methods of safely supplying such chemicals have been provided.

Although a large quantity of such chemicals is supplied by a tank lorry
20 vehicle depending on medicines, usage, and process properties, a small quantity of chemicals in a variety of containers is sometimes supplied.

The chemical containers are generally shipped from a chemical manufacturing plant while being packed with a bundle as a unit on a pallet movable by a forklift, a hand lift, or the like. When the chemical containers are unloaded by

a forklift at an entrance of a plant using chemicals, a worker carries the chemical containers using a hand lift into a building.

Subsequently, the worker wears chemical-protective clothes and safety protective gear such as a gas mask and moves and loads a number of such chemical
5 containers mountable on a cart mountable on a chemical supply device.

Subsequently, a door of the chemical supply device is opened, and the cart itself is mounted thereon. In this case, rollers are installed on a top of the cart and a bottom of an interior of the chemical supply device such that only the chemical containers may be mounted. On the other hand, the chemical containers may be
10 mounted outside the chemical supply device not on an interior thereof.

Subsequently, a coupler with nozzles is connected to a chemical inlet/outlet of the chemical container in the chemical supply device. When the coupler is completely connected, chemicals in the chemical container are transferred to a usage location by driving a chemical transfer pump. In this case, nitrogen gas is injected
15 into the chemical container so that chemicals may be transferred to the usage place at a set pressure. Through these processes, empty chemical containers of which all chemicals are used are carried out in reverse order.

In such a conventional chemical container transfer method, since the worker manually transfers the chemical container which accommodates chemicals to the
20 chemical supply device one by one using a hand lift, a cart, or the like, there has been a problem of safety of the worker being threatened.

Such a conventional art is disclosed in Korean Patent Publication No. 10-2017-0017958.

[Disclosure]

25 [Technical Problem]

The present invention is directed to providing a device and method configured to automatically transfer a chemical container that are capable of automatically supplying a chemical container with chemical information confirmed to be required by a chemical supply device to the chemical supply device.

5 The present invention is also directed to providing a device and method configured to automatically transfer a chemical container in which chemical containers released from a chemical manufacturing plant may be transferred in a bundle to a chemical supply device while being not disassembled from a pallet so as to prevent damage to the chemical container and an external leakage of chemicals
10 which may occur in a process of disassembling and separating a package of the chemical container.

The present invention is also directed to providing a device and method configured to automatically transfer a chemical container in which, when chemical information of a chemical container is checked and an abnormality is detected, the
15 chemical container may be discharged so as to quickly perform a process.

The present invention is also directed to providing a device and method configured to automatically transfer a chemical container in which an area occupied by the device and a size of the device may be reduced.

The present invention is also directed to providing a device and method
20 configured to automatically transfer a chemical container in which a plurality of chemical containers are made to wait temporarily so as to immediately supply a large amount of chemicals to a chemical supply device so that supply of chemicals may be smoothly performed.

[Technical Solution]

One aspect of the present invention provides an automatic chemical container transfer device including at least one transfer line configured to transfer a chemical container (2) loaded on an inlet portion (110) to a chemical supply device (5) and a control portion configured to receive chemical information of the chemical container (2) transferred through the transfer line and to control the chemical container (2) to be supplied to the chemical supply device (5) when the received chemical information coincides with information of chemicals required in the chemical supply device (5).

A first inspection portion (130) configured to inspect chemical information of the chemical container (2) transferred through the transfer line may be provided, and the control portion may receive the chemical information from the first inspection portion (130).

A pallet (3) on which the chemical container (2) is loaded may be mounted on a transfer member (111) provided in the inlet portion (110), and at least one holding bracket (115) may be provided on an entrance side of the inlet portion (110) so that the pallet (3) mounted on the transfer member (111) is held when the pallet (3) is transferred toward the entrance of the inlet portion (110).

A pallet (3) on which the chemical container (2) is loaded may be mounted on a transfer member (111) provided in the inlet portion (110). Also, tilted surfaces are formed on inner surfaces formed on both sides of the inlet portion (110) to have a certain length along a transfer direction of the chemical container (2) and to face each other such that a pair of tilt guides (116-1, 116-2) configured to guide the pallet (3) to be mounted in the inlet portion (110) may be provided.

A first alignment portion (120) configured to align a pallet (3), on which the chemical container (2) is loaded, on a central part of the transfer line may be provided between the inlet portion (110) and the first inspection portion (130).

The first alignment portion (120) may include a plurality of transfer members (121) configured to transfer the chemical container (2) and the pallet (3), which are transferred from the inlet portion (110), along the transfer line, a pair of alignment members (124-1), (124-2) configured to push and align both sides of the pallet (3) to be parallel to the transfer line, and a pair of alignment driving portions (123-1), (123-2) configured to allow the alignment members (124-1), (124-2) to reciprocate in directions opposite each other.

A lifting member (128) configured to lift the pallet (3) upward while the pallet (3) is mounted on the transfer members (121) and a lift driving portion (127) configured to lift the lifting member (128) in a vertical direction may be provided. Also, the control portion may drive the lift driving portion (127) to allow the lifting member (128) to lift the pallet (3) from the transfer members (121) and may drive the alignment driving portions (123-1), (123-2) to allow the alignment members (124-1), (124-2) to push both sides of the pallet (3) to align the pallet (3).

A first inspection portion (130) may include a chemical container scanner configured to scan chemical information on a surface of the chemical container (2). Also, the control portion may determine whether the chemical container (2) corresponds to a chemical container needed by the chemical supply device (5) from the chemical information received from the chemical container scanner.

The first inspection portion (130) may include at least one pallet scanner (133), (134) configured to scan chemical information on a surface of the pallet (3) on which the chemical container (2) is loaded. Also, the control portion may

determine whether the chemical information of the pallet (3) corresponds to chemicals needed by the chemical supply device (5) from the chemical information received from the pallet scanners (133), (134).

5 A first inspection portion (130) may further include a plurality of frames (135c) disposed on a lateral perimeter of the chemical container (2) with a length in a vertical direction and may further include at least one protrusion sensor (136), (137) configured to detect whether the chemical container (2) or a packing material of the chemical container (2) protrudes further than the frames (135c) on each of the plurality of frames (135c).

10 An outlet portion (210) configured to discharge the chemical container, of which all chemicals are used, in the chemical supply device (5) may be provided on a side of the inlet portion (110). Also, the at least one transfer line may include a first transfer line (100) connected to the inlet portion (110) and includes a second transfer line (200) disposed to be parallel and adjacent to the first transfer line (100) and
15 connected to the outlet portion (210).

First connection portions (140), (240) which are configured to connect the first transfer line (100) and the second transfer line (200) to each other may be provided so as for the first inspection portion (130) to switch a transfer direction of the chemical container (2) to transfer the chemical container (2) to the second
20 transfer line (200) when a first inspection portion (130) determines that the chemical container (2) transferred from the inlet portion (110) is incorrectly loaded. Also, the chemical container (2) transferred by the first inspection portion (130) to the second transfer line (200) through the first connection portions (140), (240) may be discharged outside through the outlet portion (210).

The first connection portions (140), (240) may include a first transfer line connection portion (140) provided on the first transfer line (100) and including a first direction switching member (143) configured to transfer the chemical container (2) toward the second transfer line (200) and a second transfer line connection portion (240) provided on the second transfer line (200) and including a second direction switching member having a structure symmetrical to that of the first direction switching member (143) to transfer and mount the chemical container (2) transferred by the first direction switching member (143) to and on the second transfer line (200).

A second inspection portion (230) configured to inspect chemical information of the chemical container (2) loaded through the outlet portion (210) may be provided at a position on the second transfer line (200) which corresponds to the first inspection portion (130).

When the chemical container (2) is loaded on the second transfer line (200) through the outlet portion (210), the chemical container (2) may be inspected by the second inspection portion (230), may pass through the first transfer line (100), and may be transferred to the chemical supply device (5).

At least one buffer portion (301), (302), (303), (304) on which the chemical container (2) which has passed through the first inspection portion (130) stands by temporarily before being supplied to the chemical supply device (5) may be provided on the transfer line.

The at least one transfer line may include a first transfer line (100) including the inlet portion (110) and the first inspection portion (130), a second transfer line (200) disposed to be parallel and adjacent to the first transfer line (100) and connected to the outlet portion (210), a third transfer line (300) connected to the first transfer line (100) vertically and including a chemical container inlet port (331)

configured to load the chemical container (2) on the chemical supply device (5), and a fourth transfer line (400) disposed to be parallel and adjacent to the third transfer line (300) and connected to an end of the first transfer line (100).

The buffer portions (301), (302), (303), (304) may be provided on the third
5 transfer line (300) and the fourth transfer line (400).

At least two connection portions (320), (420); (330), (430); (340), (440) which are configured to transfer the chemical container (2) from the third transfer line (300) to the fourth transfer line (400) or to transfer the chemical containers (2) from the fourth transfer line (400) to the third transfer line (300) may be provided
10 between the third transfer line (300) and the fourth transfer line (400).

Second connection portions (150), (250) and third connection portions (160), (260) which are configured to connect the first transfer line (100) to the second transfer line (200) and to switch the transfer direction of the chemical container (2) may be provided. Also, the second connection portions (150), (250) may be
15 connected to the third transfer line (300), and the third connection portions (160), (260) may be connected to the fourth transfer line (400).

The automatic chemical container transfer device may further include a transfer vehicle (600) configured to reciprocate along transfer vehicle rails (500) provided between the transfer line and the chemical supply device (5) and including
20 a transfer member configured to transfer the chemical container (2) to deliver the chemical container (2) from the transfer line to the chemical supply device (5).

Another aspect of the present invention provides a method of automatically transferring a chemical container. The method includes loading a chemical container (2) on an inlet portion (110), transferring the chemical container (2)
25 through at least one transfer line, and receiving chemical information of the

transferred chemical container (2) and supplying the chemical container (2) to a chemical supply device (5) when the received chemical information coincides with information needed by the chemical supply device (5).

[Advantageous Effects]

5 According to the present invention, a chemical container with chemical information confirmed to be required by a chemical supply device may be automatically supplied to the chemical supply device so as to reduce the number of operations for supplying chemicals and to supply chemicals smoothly.

 Also, chemical containers released from a chemical manufacturing plant may
10 not be disassembled from a pallet and may be transferred to the chemical supply device in a bundle so as to prevent damage to the chemical container and an external leakage of chemicals which may occur in a process of disassembling and separating a package of the chemical container.

 Also, a tilted guide and alignment portion are provided on a transfer line on
15 which the chemical containers are transferred so that the chemical containers may be transferred while being aligned on the transfer line.

 Also, when the chemical information of the chemical container is checked and an abnormality is detected, the chemical container may be discharged so as to prevent incorrect chemicals from being supplied and to quickly perform a process.

20 Also, the transfer line of the chemical containers may be formed to be rectangular to change a transfer direction so as to reduce an area occupied by the automatic chemical container transfer device and to reduce a size of the automatic chemical container transfer device.

 Also, a buffer portion is provided on the transfer line so as to make a plurality
25 of such chemical containers wait temporarily so as to immediately supply a large

quantity of chemicals to the chemical supply device and the chemical containers are made to wait on the transfer line temporarily so as to continuously perform transportation without a necessity to provide an additional standby location.

Also, a plurality of such buffer portions may be provided to make a large
5 number of such chemical containers wait temporarily so as to correspond to a demand for chemicals needed in the chemical supply device.

[Description of Drawings]

FIG. 1 is a perspective view of an automatic chemical container transfer device according to the present invention.

10 FIG. 2 is a plan view of the automatic chemical container transfer device shown in FIG. 1.

FIG. 3 is a perspective view illustrating a state in which chemical containers and a pallet are inserted into an inlet portion of the automatic chemical container transfer device shown in FIG. 1.

15 FIG. 4 is a perspective view illustrating the inlet portion of the automatic chemical container transfer device shown in FIG. 1.

FIG. 5 is a front view illustrating a state in which the pallet is guided by a tilt guide on the inlet portion of the automatic chemical container transfer device shown in FIG. 1.

20 FIG. 6 is a perspective view illustrating an alignment portion of the automatic chemical container transfer device shown in FIG. 1.

FIG. 7 is a perspective view illustrating a state in which the chemical containers and the pallet are mounted obliquely on the alignment portion of the automatic chemical container transfer device shown in FIG. 1.

FIG. 8 is a front view illustrating a state in which the chemical containers and the pallet are mounted on the alignment portion of the automatic chemical container transfer device shown in FIG. 1.

FIG. 9 is a perspective view illustrating a first inspection portion and a first
5 connection portion of the automatic chemical container transfer device shown in FIG. 1.

FIG. 10 is a perspective view illustrating the first connection portion provided on a first transfer line of the automatic chemical container transfer device shown in FIG. 1.

10 FIG. 11 is a plan view illustrating a state in which the chemical containers are located on the first connection portion on the first transfer line in the automatic chemical container transfer device shown in FIG. 1.

FIG. 12 is a plan view illustrating a state in which the chemical containers are located on the first connection portion on a second transfer line in the automatic
15 chemical container transfer device shown in FIG. 1.

FIG. 13 is a cross-sectional view taken along line A-A of FIG. 12 and illustrates a state in which the pallet is mounted on a top end of a transfer member.

FIG. 14 is a cross-sectional view illustrating a state in which the pallet and the chemical containers have been lifted by a first lift portion in the state of FIG. 13.

20 FIG. 15 is a plan view illustrating a path on which the chemical containers and the pallet are inserted through the inlet portion and transferred to a chemical supply device in the automatic chemical container transfer device shown in FIG. 1.

FIG. 16 is a plan view illustrating a path on which an empty chemical container of which all chemicals are used is discharged from the chemical supply

device and transferred to a discharge portion in the automatic chemical container transfer device shown in FIG. 1.

FIG. 17 is a plan view illustrating a path on which the chemical containers and the pallet are inserted through an outlet portion and transferred to the chemical supply device in the automatic chemical container transfer device shown in FIG. 1.

**** Description of Reference Numerals ****

	1: automatic chemical container transfer device	
	2: chemical container	
	3: pallet	4: forklift
10	5: chemical supply device	6: pump unit
	110: inlet portion	111, 121, 141, 241: transfer members
	112-1, 112-2: lateral frames	
	113-1, 113-2, 113-3, 113-4: support frames	
	114: inlet frame	115: holding bracket
15	116-1, 116-2: tilt guides	116-1a, 116-2a: tilted surfaces
	120: first alignment portion	122-1, 122-2: lateral frames
	123-1, 123-2: alignment driving portions	124-1, 124-2: alignment members
	125-1, 125-2: driving shafts	126-1, 126-2: support frames
	127: lift driving portion	128: lifting member
20	130: first inspection portion	131: first scanner driving portion
	132: second scanner driving portion	133, 134: pallet scanners
	135: inspection portion frame	135a, 135b: upper frames
	135c: vertical frame	136, 137: protrusion detection sensors
	140: first connection portion (first transfer line connection portion)	
25	142-1, 142-2: lateral frames	143: first direction switching member

144: first direction switching driving portion 145: pulley

146: first lifting portion

240: first connection portion (second transfer line connection portion)

242-1, 242-2: lateral frames 243: second direction switching member

5 244: second direction switching driving portion

150, 250: second connection portions

160, 260: third connection portions 210: outlet portion

220: second alignment portion 230: second inspection portion

310: air shower portion 320, 420: fourth connection portions

10 330, 430: fifth connection portions 340, 440: sixth connection portions

331: chemical container inlet port 341: chemical container outlet port

500: transfer vehicle rails 600: transfer vehicle

601: transfer member 602: safety bar

[Modes of the Invention]

15 Hereinafter, an automatic chemical container transfer device according to the present invention will be described in detail with reference to the attached drawings.

The automatic chemical container transfer device according to the present invention will be described with reference to FIGS. 1 and 2.

20 An automatic chemical container transfer device 1 according to the present invention includes one or more transfer lines 100, 200, 300, and 400 configured to transfer chemical containers 2 inserted into an inlet portion 110 to a chemical supply device 5 and a control portion (not shown) configured to receive chemical information of the chemical containers 2 transferred through the transfer lines 100, 200, 300, and 400 and to control the chemical containers 2 to be supplied to the

chemical supply device 5 when the received chemical information coincides with information needed in the chemical supply device 5.

The chemical containers 2 are mounted in the chemical supply device 5 while being loaded on a top of a pallet 3. When the chemical containers 2 and the pallet 3 are mounted in the chemical supply device 5, the chemical supply device 5 is configured to automatically open a lid of the chemical container 2 and to connect a coupler to the chemical container 2 so as to supply chemicals accommodated in the chemical container 2 to a chemical usage place. In this case, the chemicals accommodated in the chemical container 2 may be transferred to the chemical usage place using a transfer pump or through pressurization of nitrogen gas. A pump unit including the transfer pump may be installed on one side of the chemical supply device 5.

A first inspection portion 130 configured to inspect the chemical information of the chemical container 2 supplied from the inlet portion 110 is provided on the transfer lines 100, 200, 300, and 400, and the controller may be configured to receive the chemical information from the first inspection portion 130.

The one or more transfer lines 100, 200, 300, and 400 include a first transfer line 100 connected to the inlet portion 110 and having a linear shape.

The first transfer line 100 is configured to define a path for transferring the pallet 3 on which the chemical containers 2 are loaded. Here, a transfer member may be provided from a beginning to an end of the first transfer line 100 to transfer the chemical containers 2 and the pallet 3.

The transfer member may include, for example, a plurality of rollers provided along a longitudinal direction of the first transfer line 100 and a roller driving portion configured to rotate the rollers. The pallet 3 on which the chemical containers 2 are

loaded is mounted above the plurality of rollers, and the chemical containers 2 and the pallet 3 are transferred along the first transfer line 100 by rotation of the rollers.

Also, as the transfer member, a conveyer belt is available instead of the rollers. A chain block in which a hoist with wheels attached to both sides of a
5 monorail installed on a ceiling is moved by a motor is available.

The transfer member may be configured to be driven forward and backward to transfer the chemical container 2 and the pallet 3 bidirectionally. Here, the transfer member may be configured to perform bidirectional transfer on all of the transfer lines 100, 200, 300, and 400 which will be described below.

10 Also, objects to be transferred, which are transferred along the transfer lines 100, 200, 300, and 400, are the vertically loaded chemical containers 2 and the pallet 3. Hereinafter, for convenience of description, the target to be transferred will be referred to as the chemical containers 2 and referred to as the chemical containers 2 and the pallet 3 together when a description of the pallet 3 is needed.

15 The inlet portion 110, a first alignment portion 120, and the first inspection portion 130 may be sequentially provided on the first transfer line 100. A plurality of such transfer members are provided on the inlet portion 110, the first alignment portion 120, and the first inspection portion 130 along a transfer direction so as to transfer the chemical containers 2.

20 The inlet portion 110 is a position at which the first transfer line 100 begins and is a place at which a forklift 4 loads the chemical containers 2 on the first transfer line 100.

A loading guide 170 is provided in the rear of the inlet portion 110. Here, the rear means a direction opposite a transfer direction, in which the chemical
25 containers 2 are transferred, on the basis of the first transfer line 100, and the front

means the transfer direction in which the chemical containers 2 are transferred on the basis of the first transfer line 100.

When a shutter (not shown) provided in a building is opened, the forklift 4 loads the chemical containers 2 on the inlet portion 110 through an open portion of the loading guide 170.

When the chemical containers 2 are transferred while deviating from the first transfer line 100 obliquely, the first alignment portion 120 is provided to align the deviation. In this case, the first alignment portion 120 may be configured to align the chemical containers 2 to be at a central part of the first transfer line 100.

The first inspection portion 130 may inspect chemical information using a unique identifier such as a barcode label or a radio frequency identification (RFID) and the like which is attached to the chemical container 2. The unique identifier attached to the chemical container 2 includes a chemical name as well as a variety of pieces of necessary information. Also, the first inspection portion 130 may inspect a unique identifier such as a barcode label or an RFID and the like which is attached to the pallet 3. The unique identifier attached to the pallet 3 also includes a chemical name as well as a variety of pieces of necessary production information. The first inspection portion 130 may check the unique identifiers, and the control portion may check whether chemicals correspond to what is needed in the chemical supply device 5 using the checked information of chemicals in the chemical container 2 and the pallet 3.

Also, the one or more transfer lines 100, 200, 300, and 400 may further include a second transfer line 200 disposed to be parallel and adjacent to the first transfer line 100.

An outlet portion 210, a second alignment portion 220, and a second inspection portion 230 are sequentially provided on the second transfer line 200. A plurality of such transfer members are provided on the outlet portion 210, the second alignment portion 220, and the second inspection portion 230 along a transfer direction so as to transfer the chemical containers 2. In this case, the transfer members may be rotationally driven so as to transfer the chemical containers 2 bidirectionally along the second transfer line 200.

A discharge guide 270 with an open central part may be provided in the rear of the outlet portion 210, and the discharge guide 270 may include the same configuration as that of the loading guide 170.

The outlet portion 210 is configured to transmit and externally discharge the chemical container 2 of which all chemicals are used in the chemical supply device 5 through the second transfer line 200. The outlet portion 210 may be provided to be adjacent to a lateral part of the inlet portion 110.

When the chemical container 2 is transferred to the outlet portion 210, the forklift 4 lifts and externally discharges the pallet 3 on which the chemical containers 2 are loaded through the discharge guide 270 provided in the rear of the outlet portion 210.

Meanwhile, when a problem such as a failure and the like occurs in the inlet portion 110 or the first transfer line 100, it is impossible to load the chemical containers 2 through the inlet portion 110. In this case, the chemical containers 2 may be loaded through the outlet portion 210 so as to use the outlet portion 210 as an inlet portion. On the other hand, when a problem such as a failure and the like occurs in the outlet portion 210 or the second transfer line 200, the chemical containers 2 may be discharged through the inlet portion 110.

The second alignment portion 220 performs the same function as that of the first alignment portion 120. Accordingly, when the chemical container 2 loaded through the outlet portion 210 is transferred while deviating obliquely, the second alignment portion 220 may be configured to align the chemical containers 2 on a central part of the second transfer line 200 to align the deviation. Also, when the chemical containers 2 of which all chemicals are used are discharged through the outlet portion 210, the chemical containers 2 may be aligned by the second alignment portion 220 and then discharged. The second alignment portion 220 may be provided to be adjacent to the first alignment portion 120 side by side.

When the chemical containers 2 are loaded through the outlet portion 210, the second inspection portion 230 inspects chemical information of the chemical containers 2 and may have the same configuration as that of the first inspection portion 130.

A first shutter portion 180 and a second shutter portion 280 may be provided between the first alignment portion 120 and the first inspection portion 130 and between the second alignment portion 220 and the second inspection portion 230, respectively, to block air outside the building from being transferred indoors and to prevent outside contaminants from moving inside. The first and second shutter portions 180 and 280 may be configured as wind-shielding shutters and configured to be automatically opened before the chemical containers 2 pass and to be automatically closed after the chemical containers 2 pass.

Also, the first and second shutter portions 180 and 280 may include speed doors. The speed doors may be configured to sense the chemical containers 2 using sensors when the chemical containers 2 are located in middle parts of the shutter portions 180 and 280, may be formed using materials not influenced by a collision

between the chemical container 2 and the door to prevent damage even when the doors are closed while the chemical containers 2 are below the shutter portions 180 and 280, and may be configured to be automatically opened when a collision occurs.

Also, the speed doors may have an automatic restoration function in which
5 both ends of the door split like a zipper when the chemical container 2 collides with the speed door on the move while the speed door is closed and are automatically attached to each other when the door is opened again so as to prevent the doors and the chemical containers 2 from being damaged.

A plurality of connection portions 140, 150, and 160 may be provided on the
10 first transfer line 100 and the second transfer line 200 to connect the first transfer line 100 to the second transfer line 200.

The plurality of connection portions 140, 150, and 160 may include a first connection portion 140 or 240 configured to connect the first inspection portion 130 to the second inspection portion 230, a second connection portion 150 or 250
15 provided at a position corresponding to a third transfer line 300 which will be described below, and a third connection portion 160 or 260 provided at an end of the first transfer line 100 or the second transfer line 200 as a position corresponding to a fourth transfer line 400 which will be described below.

The first connection portions 140 and 240, the second connection portions
20 150 and 250, and the third connection portions 160 and 260 may include the first connection portion 140, the second connection portion 150, and the third connection portion 160, which are provided on the first transfer line 100, and the first connection portion 240, the second connection portion 250, and the third connection portion 260 which are provided on the second transfer line 200.

A plurality of transfer members such as rollers may be provided on the first connection 140 (a first transfer line connection portion) of the first transfer line 100 and the first connection portion 240 (a second transfer line connection portion) of the second transfer line 200 along a direction perpendicular to transfer directions of the first transfer line 100 and the second transfer line 200. Accordingly, when the transfer members are driven, the chemical containers 2 mounted on the transfer members of the first transfer line connection portion 140 may be transferred toward the second transfer line 200 and mounted on the second transfer line connection portion 240.

As an example, when chemical information of the chemical container 2 transferred from the inlet portion 110 is checked by the first inspection portion 130 and it is determined that the chemical container 2 is loaded incorrectly and not needed in the chemical supply device 5, the chemical container 2 on the first transfer line connection portion 140 may be transferred to the second transfer line connection portion 240 by switching a transfer direction of the chemical container 2 and then be discharged through the outlet portion 210. Also, a transfer may be performed in reverse direction.

The second connection portions 150 and 250 and the third connection portions 160 and 260 may have the same configuration as that of the first connection portions 140 and 240 and may transfer the chemical containers 2 from the first transfer line 100 to the second transfer line 200 or transfer the chemical containers 2 from the second transfer line 200 to the first transfer line 100.

When the chemical container 2 is loaded on the second transfer line 200 through the outlet portion 210, the chemical container 2 is inspected by the second inspection portion 230, passes through the first transfer line 100 laterally through the

second connection portions 150 and 250, and then is transferred to the third transfer line 300.

The third transfer line 300 is connected to the first transfer line 100 perpendicularly and is connected to the second connection portions 150 and 250.

5 The fourth transfer line 400 is disposed at an end part of the first transfer line 100 to be adjacent and parallel to the third transfer line 300 while being connected to the first transfer line perpendicularly and connected to the third connection portions 160 and 260.

10 Transfer members may be provided from a beginning to an end of each of the third transfer line 300 and the fourth transfer line 400 to transfer the chemical containers 2 and the pallet 3.

15 There are foreign substances on exteriors of the chemical container 2 and the pallet 3. Here, foreign substances may become an obstacle when the lid of the chemical container is removed or mounted again along the transfer line and thus cause a malfunction thereof or influence purity of chemicals. Accordingly, an air shower portion 310 may be provided on the third transfer line 300 to remove the foreign substances on the chemical containers 2 and the pallet 3.

20 When the chemical container 2 enters the air shower portion 310 through the second connection portion 150 of the first transfer line 100, the foreign substances on the chemical containers 2 and the pallet 3 may be removed by spraying air during a time set in the air shower portion 310.

A gate of the air shower portion 310 may be formed to be a slidable type with a general transparent window and may be a speed door like the shutter portion 180 to move fast and prevent damage caused by a collision with the pallet 3.

One or more buffer portions 301, 302, 303, and 304 are provided on the transfer lines 100, 200, 300, and 400 so that the chemical container 2 which has passed through the first inspection portion 130 may stand by temporarily before being supplied to the chemical supply device 5.

5 In the embodiment, as an example, the buffer portions 301, 302, 303, and 304 are provided on the third transfer line 300 and the fourth transfer line 400.

 The buffer portions 301, 302, 303, and 304 include a first buffer portion 301 and a second buffer portion 302, which are provided on the third transfer line 300, and a third buffer portion 303 and a fourth buffer portion 304 which are provided on
10 the fourth transfer line 400.

 The first buffer portion 301 and the fourth buffer portion 304 are provided at positions facing each other to be adjacent to each other, and the second buffer portion 302 and the third buffer portion 303 are provided at positions facing each other to be adjacent to each other.

15 A chemical container inlet port 331 is provided between the first buffer portion 301 and the second buffer portion 302 to load the chemical container 2 on the chemical supply device 5. The chemical container inlet port 331 means a position at which the chemical container 2 is loaded, and a fifth connection portion 330, which will be described below, may perform a function of the chemical container
20 inlet port 331.

 Also, a chemical container outlet port 341 configured to discharge the chemical container 2 discharged from the chemical supply device 5 into the third transfer line 300 may be provided. The chemical container outlet port 341 means a position at which the chemical container 2 is discharged, and a sixth connection

portion 340, which will be described below, may perform a function of the chemical container outlet port 341.

Two or more connection portions 320, 420; 330, 430; and 340, 440 configured to transfer the chemical containers 2 from the third transfer line 300 to the fourth transfer line 400 or to transfer the chemical containers 2 from the fourth transfer line 400 to the third transfer line 300 are provided between the third transfer line 300 and the fourth transfer line 400.

The two or more connection portions 320, 420; 330, 430; and 340, 440 include fourth connection portions 320 and 420 configured to connect sides of the third transfer line 300 and the fourth transfer line 400 which are close to the first connection line 100 and include sixth connection portions 340 and 440 configured to connect end parts of the third transfer line 300 and the fourth transfer line 400 which are far from the first connection line 100.

In this case, the chemical container 2 used by the chemical supply device 5 is withdrawn from the chemical supply device 5 and then transferred to the sixth connection portion 340 of the third transfer line 300 using a transfer vehicle 600 which will be described below. The chemical container 2 of the sixth connection portion 340 is transferred to the sixth connection portion 440 of the fourth transfer line 400. Accordingly, the sixth connection portions 340 and 440 are used to move the chemical container 2 in a direction from the third transfer line 300 to the fourth transfer line 400.

Meanwhile, the fourth connection portions 320 and 420 are used to supply the chemical containers 2, which stand by temporarily on the buffer portion 303 and 304 provided on the fourth transfer line 400, to the chemical supply device 5 through the third transfer line 300. That is, the chemical containers 2 of the third buffer portion

303 or the fourth buffer portion 400 are transferred from the fourth transfer line 400 to the third transfer line 300 through the fourth connection portions 320 and 420, are transferred to a position of the chemical container inlet port 331 along the third transfer line 300, and then are inserted into the chemical supply device 5.

5 The sixth connection portions 340 and 440 are used for moving the chemical container 2 of which all chemicals are used in the chemical supply device 5 in the direction from the third transfer line 300 to the fourth transfer line 400. That is, the chemical container 2 inside the chemical supply device 5 is transferred to the sixth connection portion 340 of the third transfer line 300 and then transferred to the sixth
10 connection portion 440 of the fourth transfer line 400. The chemical container 2, which has been transferred to the sixth connection portion 440, is sequentially transferred along the fourth transfer line 400, the third connection portions 160 and 260, and the second transfer line 200 and then is discharged through the outlet portion 210.

15 Fifth connection portions 330 and 430 may be provided between the fourth connection portions 320 and 420 and the sixth connection portions 340 and 440. When it is impossible to transfer the chemical container 2 of the chemical supply device 5 using the sixth connection portions 340 and 440 due to failures or the like of the sixth connection portions 340 and 440, the chemical container 2 of which all
20 chemicals are used in the chemical supply device 5 may be transferred to the fourth transfer line 400 through the fifth connection portions 330 and 430.

 The fifth connection portion 330 provided on the third transfer line 300 may function as the chemical container inlet portion 331 for loading the chemical container 2 on the chemical supply device 5.

Meanwhile, the first to third connection portions 140, 240; 150, 250; and 160, 260, which have been described above, include transfer members such as rollers to transfer the chemical containers 2 in both of a direction from the first transfer line 100 to the second transfer line 200 and a direction opposite thereto. Also, the fourth
5 to sixth connection portions 320, 420; 330, 430; and 340, 440 include transfer members such as rollers to transfer the chemical containers 2 in both of a direction from the third transfer line 300 to the fourth transfer line 400 and a direction opposite thereto.

As described above, when the third transfer line 300 and the fourth transfer
10 line 400 include a plurality of such buffer portions 301, 302, 303, and 304, it is possible to secure a large number of the chemical containers 2 to be loaded on the chemical supply device 5 so as to immediately meet the demand for chemicals needed in the chemical supply device 5.

Also, since the plurality of connection portions 320, 420; 330, 430; and 304,
15 440 are provided between the third transfer line 300 and the fourth transfer line 400, an operation of loading the chemical containers 2 on the chemical supply device 5 and an operation of discharging the chemical container 2 from the chemical supply device 5 may be performed at the same time so as to reduce an operation performance time.

20 Also, the chemical containers 2 stand by temporarily on the transfer lines 300 and 400 so as to be continuously transferred without needing to provide an additional standby place.

Also, the transfer lines 100, 200, 300, and 400 of the chemical containers 2 may be formed to be rectangular to change a transfer direction so as to reduce an area

occupied by the automatic chemical container transfer device 1 and to reduce a size of the automatic chemical container transfer device.

Meanwhile, when the chemical containers 2 are transferred along the first to fourth transfer lines 100, 200, 300, and 400, real-time positions of the chemical containers 2 may be checked by sensors (not shown) provided on the transfer lines. In other words, when the first inspection portion 130 checks chemical information of one chemical container 2, a real-time position of the chemical container 2 with the chemical information being checked is sensed by the sensors provided on the transfer lines so that it is possible to check chemical information of the chemical containers 2 which stand by temporarily on the buffer portions 301, 302, 303, or 304. Accordingly, to transfer the chemical containers 2 which are needed by the chemical supply device 5, the chemical information of the chemical containers 2 standing by temporarily on the buffer portion 301, 302, 303, or 304 may be checked and the checked chemical containers 2 may be loaded on the chemical supply device 5.

The chemical containers 2 may be loaded on the chemical supply device 5 using the transfer vehicle 600 driven being unmanned, or empty chemical containers 2 of which all chemicals are used may be discharged from the chemical supply device 5.

To this end, transfer vehicle rails 500 may be provided between the chemical supply device 5 and the third transfer line 300 to allow the transfer vehicle 600 to reciprocate therebetween.

In the embodiment, as an example, the transfer vehicle rails 500 are provided. However, the transfer vehicle 600 may be configured to travel along a line drawn on the ground or to travel along set coordinates.

The transfer vehicle 600 may include a transfer member 601 such as rollers to load the chemical containers 2 mounted thereon on the chemical supply device 5 or to discharge the chemical containers 2 from the inside to the outside of the chemical supply device 5.

5 Two or more of such transfer vehicles 600 may be provided on the transfer vehicle rails 500 to deal with a case in which the transfer vehicle 600 is broken. When two or more transfer vehicles 600 are provided as described above and one of them is broken, a space for housing and repairing the one broken transfer vehicle may be provided. When the broken transfer vehicle 600 is housed in the space, a
10 safety bar 602 which may collide with the transfer vehicle 600 and includes a safety sensor may be installed at an entrance, through which the transfer vehicle 600 enters, so as to prevent another transfer vehicle 600 from entering when the safety bar 602 is held. Also, two or more safety bars 602 may be installed in a vertical direction to increase safety. When a worker drops the safety bar 602 unintentionally, the
15 transfer vehicle 600 which is traveling may stop.

Components of the inlet portion 110 and the first shutter portion 170 will be described with reference to FIGS. 3 to 5.

The loading guide 170 provided in the rear of the inlet portion 110 includes a guide frame 171 formed to have a quadrangular shape with an open central part to
20 allow the chemical containers 2 to be loaded and includes a lower shielding plate 172 provided below the guide frame 171 and which is formed to block foreign substances outside the building from entering the building.

Also, the loading guide 170 may further include an inlet portion sensor (light curtain) 173 configured to stop transfer through the transfer lines 100, 200, 300, and
25 400 when a worker is sensed other than loading and discharge times of the chemical

containers 2 using the forklift so as to increase safety of the worker, traffic lights 174 provided on one side of the guide frame 171 and configured to emit light to allow a driver of the forklift to check whether loading/discharging of the pallet 3 is possible, and a speaker 175 configured to generate an alarm to notify the worker of a danger
5 situation when the forklift enters to load/discharge the pallet 3.

The inlet portion sensor 173 may include a light emitting portion and a light receiving portion provided on one side and the other side of the guide frame 171, respectively.

A discharge guide 180 provided in the rear of the outlet portion 210 may
10 include the same components as the guide frame, the lower shielding plate, the inlet portion sensor, the traffic lights, and the speaker included in the loading guide 170.

The inlet portion 110 includes a transfer member 111 on which the pallet 3, above which the chemical containers 2 are loaded, is mounted. The transfer member 111 includes a roller. A plurality of such rollers are provided along the
15 first transfer line 100.

A fork insertion portion 3a having a through shape is formed in the pallet 3 along a transfer direction. A fork protruding forward from the forklift 4 may be inserted into the fork insertion portion 3a and be lifted so as to transfer the pallet 3 and the chemical containers 2.

20 The inlet portion 110 includes the transfer member 111 including the plurality of rollers rotated by a driving portion (not shown), a pair of lateral frames 112-1 and 112-2 configured to support both sides of the transfer member 111, support frames 113-1, 113-2, 113-3, and 113-4 configured to support lateral parts or bottoms of the transfer member 111 and the lateral frames 112-1 and 112-2, and an entrance frame
25 114 provided at an entrance of the inlet portion 110.

A pair of holding brackets 115 may be coupled to both left and right sides of the entrance frame 114. The fork of the forklift 4 is inserted into the fork insertion portion 3a of the pallet 3 so that the chemical containers 2 and the pallet 3 are held and enter the inlet portion 110. When the pallet 3 is mounted on a top end of the transfer member 111 and then the forklift 4 moves backward, the pallet 3 may be pulled backward. In this case, a rear end of the pallet 3 is held by the holding brackets 115 so that the pallet 3 may be prevented from deviating toward the entrance of the inlet portion 110. As an example, the pair of holding brackets 115 is provided. However, a different number of such holding brackets 115 may be provided.

A pair of tilt guides 116-1 and 116-2 may be provided above the pair of lateral frames 112-1 and 112-2. Tilted surfaces 116-1a and 116-2a are formed on the tilt guides 116-1 and 116-2 at corner parts formed inside the inlet portion 110. The tilted surfaces 116-1a and 116-2a are formed such that tilted surfaces face upward, and the tilted surface 116-1a on one side and the tilted surface 116-2a face each other.

As shown in FIG. 5, when the pallet 3 is loaded through the inlet portion 110 while being tilted to the side, a corner part of a bottom end of the pallet 3 comes into contact with the tilted surface 116-2a and is guided toward an inside of the inlet portion 110 along the tilted surface 116-2a so that the pallet 3 is mounted on the transfer member 111.

Meanwhile, like the inlet portion 110, the outlet portion 210 may include a transfer member, holding brackets, and tilt guides. When the inlet portion 110 fails, the chemical containers 2 may be loaded through the outlet portion 210.

The first alignment portion 120 will be described with reference to FIGS. 6 to 8.

The first alignment portion 120 is provided to align the chemical containers 2 and the pallet 3 to be parallel to the first transfer line 100 when the chemical
5 containers 2 and the pallet 3, which are transferred from the inlet portion 110, are transferred while deviating from the first transfer line 100 as shown in FIG. 7.

The first alignment portion 120 includes a plurality of transfer members 121 configured to transfer the chemical containers 2 and the pallet 3, which are transferred from the inlet portion 110, along the first transfer line 100, a pair of
10 alignment members 124-1 and 124-2 configured to push and align both sides of the pallet 3 to be parallel to the first transfer line 100, and a pair of alignment driving portions 123-1 and 123-2 configured to allow the alignment members 124-1 and 124-2 to reciprocate in directions opposite each other.

Both ends of the transfer member 121 are supported by a pair of lateral
15 frames 122-1 and 122-2 extending lengthwise toward the first transfer line 100.

The pair of alignment members 124-1 and 124-2 include a first alignment member 124-1 provided on one side of the first transfer line 100 and a second alignment member 124-2 provided on the other side thereof and have a plate shape extending lengthwise toward the first transfer line 100 and extend lengthwise
20 corresponding to a length of the pallet 3. Also, the alignment members 124-1 and 124-2 may be configured to partially come into surface contact with lateral surfaces of the pallet 3 so as to increase an aligning property of the pallet 3.

The pair of alignment driving portions 123-1 and 123-2 include a first alignment driving portion 123-1 configured to provide a driving force for
25 reciprocation of the first alignment member 124-1 and a second alignment driving

portion 123-2 configured to provide a driving force for reciprocation of the second alignment member 124-2.

The first alignment driving portion 123-1 is supported by a first alignment driving portion support frame 126-1, and the second alignment driving portion 123-2 is supported by a second alignment driving portion support frame 126-2.

A first driving shaft 125-1 is provided between the first alignment member 124-1 and the first alignment driving portion 123-1 and transfers a driving force of the first alignment driving portion 123-1 to the first alignment member 124-1. A second driving shaft 125-2 is provided between the second alignment member 124-2 and the second alignment driving portion 123-2 and transfers a driving force of the second alignment driving portion 123-2 to the second alignment member 124-2.

When the transfer members 121 include rollers, the pallet 3 is transferred along the transfer lines while surfaces of the rollers come into contact with a bottom surface of the pallet 3. Here, since a frictional force is needed to generate this transfer force, the surfaces of the rollers may include synthetic resins and particularly include polyethylene (PE) material among the synthetic resins. However, since the bottom surface of the pallet 3 comes into contact with top surfaces of the transfer members 121, when the alignment members 124-1 and 124-2 push both sides of the pallet 3 to align the pallet 3, there is a problem in that the pallet 3 is not pushed or the surfaces of the rollers are scratched due to the frictional force of the surfaces of the rollers.

To prevent the problem, when the chemical containers 2 and the pallet 3 are lifted upward so that the pallet 3 is pushed by the alignment members 124-1 and 124-2 while the bottom surface of the pallet 3 is spaced upward apart from the surfaces of

the rollers, alignment may be performed without scratches on the surfaces of the rollers.

To this end, a lifting member 128 and a lift driving portion 127 which are configured to lift the pallet 3 may be provided.

5 The lifting member 128 is configured to lift the pallet 3 upward while the pallet 3 is mounted on the transfer members 121, and a plurality of such lifting members 128 may be provided along a transfer direction of the pallet 3. In this case, the lifting member 128 is provided between the transfer members 121 adjacent to each other and to perform a lift without interference with the transfer members 121.

10 Meanwhile, a top surface of the lifting member 128, which comes into contact with the bottom surface of the pallet 3, has a rectangular shape having a short width in the transfer direction of the pallet 3 and a long length in a direction perpendicular to the transfer direction of the pallet 3. Due to the above shape, the frictional force with the bottom surface of the pallet 3 is reduced so as to smoothly
15 align the pallet 3.

The lift driving portion 127 is configured to lift the lifting members 128 in a vertical direction and may lift the plurality of lifting members 128 integrally.

As above, as an example, the pallet 3 is aligned while being lifted by the lifting members 128 and the lift driving portion 127. When friction between the
20 transfer members 121 and the pallet 3 is not great, the lifting members 128 and the lift driving portion 127 may not be provided and the pallet 3 may be aligned without an operation of lifting the pallet 3.

As shown in FIG. 8, when the control portion drives the lift driving portion 127 and the pallet 3 is lifted by the lifting members 128, the bottom surface of the
25 pallet 3 is spaced apart from the transfer members 121. In this situation, the

alignment driving portions 123-1 and 123-2 are driven such that the alignment members 124-1 and 124-2 push both sides of the pallet 3 to align the pallet 3.

In this case, since the lifting member 128, which comes into contact with the bottom surface of the pallet 3 due to lift driving of the lift driving portion 127, includes a metal material, the top surface of the lifting member 128, which comes into contact with the pallet 3, is smooth. Accordingly, even when the pallet 3 is pushed by the alignment members 124-1 and 124-2, surfaces of the rollers are not scratched.

The first inspection portion 130 will be described with reference to FIG. 9. The second inspection portion 230 may include some or all of the components of the first inspection portion 130 which will be described below.

A unique identifier such as a barcode label or an RFID and the like is attached to each of the chemical containers 2 and the pallet 3, and the first inspection portion 130 may check chemical information of each of the chemical containers 2 and the pallet 3 using the unique identifier. The unique identifier may be attached to each of left and right sides of the pallet 3 and be attached to a top surface of the chemical container 2.

The first inspection portion 130 includes a chemical container scanner configured to check chemical information by scanning the unique identifier attached to the surface of the chemical container 2. The chemical container scanner may be configured to scan all of a plurality of such chemical containers 2 at once or be configured to scan each of the plurality of chemical containers 2 while shifting a location of the chemical container scanner.

When the location of the chemical container scanner is shifted, the first inspection portion 130 may include scanner driving portions 131 and 132. When all

of the plurality of chemical containers 2 are scanned at once, the scanner driving portions may not be included.

The scanner driving portions 131 and 132 may include a first scanner driving portion 131 and a second scanner driving portion 132 which are configured to move
5 in a plane defined by two axes perpendicularly intersecting each other so as to scan the top surface among surfaces of the chemical container 2.

The chemical container scanner may reciprocate in a longitudinal direction of one of the two axes perpendicularly intersecting each other due to driving of the first scanner driving portion 131. The chemical container scanner and the first scanner
10 driving portion 131 may reciprocate integrally in a longitudinal direction of the other of the two axes perpendicularly intersecting each other due to driving of the second scanner driving portion 132.

As described above, the chemical container scanner may scan the chemical containers 2 while moving in the plane due to the first scanner driving portion 131
15 and the second scanner driving portion 132. Accordingly, when the plurality of chemical containers 2 are provided, chemical information thereof may be checked while the chemical container scanner moves above the top surfaces of the plurality of chemical containers 2.

The chemical container scanner and the first and second scanner driving
20 portions 131 and 132 may be installed in an inspection portion frame 135 configured to couple components of the first inspection portion 130.

The inspection portion frame 135 may include an upper frame 135a and 135b on top which has a quadrangular shape and may include a plurality of vertical frames 135c coupled to the upper frames 135a and 135b lengthwise in a vertical direction
25 and disposed around a lateral part of the chemical container 2.

The chemical container scanner and the first and second scanner driving portions 131 and 132 are coupled to the upper frame 135a and 135b. One side 135a of the upper frame 135a and 135b is parallel to one of the two axes perpendicularly intersecting each other, and the other side 135b is parallel to the other of the two axes
5 perpendicularly intersecting each other.

The control portion determines whether the chemical container 2 corresponds to the chemical container 2 needed by the chemical supply device 5 from chemical information received from the chemical container scanner.

Also, the first inspection portion 130 may include one or more pallet scanners
10 133 and 134 configured to scan chemical information on the surface of the pallet 3. The pallet scanners 133 and 134 may be installed at a height corresponding to the side of the pallet 3 and scan a unique identifier attached to the side of the pallet 3 so as to check the chemical information of the pallet 3.

The control portion determines whether the chemical information of the pallet
15 3 corresponds to chemicals needed by the chemical supply device 5 from the chemical information received from the pallet scanners 133 and 134.

The plurality of chemical containers 2 may be transferred while being packed with a packing material with the pallet 3. Here, when the chemical containers 2 are transferred while the packing material is damaged, a problem may occur during
20 transfer. Also, when the chemical containers 2 and the pallet 3 are transferred while being biased, a problem such as a collision with another structure or overturning may occur during transfer.

To prevent this problem, the vertical frame 135c may include one or more protrusion sensors 136 and 137 configured to detect whether the chemical container

2 or the packing material of the chemical container 2 protrudes further than the vertical frame 135c.

The protrusion sensors 136 and 137 may include a first light emitting portion 136a and a first light receiving portion 136b disposed to face each other in a diagonal
5 direction to detect whether the chemical container 2 or the packing material of the chemical container 2 protrudes above a vertical plane on one side of the chemical container 2 and may include a second light emitting portion 137a and a second light receiving portion 137b disposed to generate a second light beam intersecting a first light beam from the first light emitting portion 136a toward the first light receiving
10 portion 136b.

An arrangement shape which allows the first light beam and the second light beam to intersect each other may be formed such that the first light beam and the second light beam intersect each other in a letter X shape or cross shape. In the embodiment shown in FIG. 9, as a case of intersecting in the letter X shape, the first
15 light emitting portion 136a, the first light receiving portion 136b, the second light emitting portion 137a, and the second light receiving portion 137b are arranged at four corners, respectively.

The first transfer line connection portion 140 and the second transfer line connection portion 240 which are included in the first connection portions 140 and
20 240 will be described with reference to FIGS. 10 to 14.

The first transfer line connection portion 140 includes a plurality of transfer members 141 configured to transfer the chemical containers 2 along the first transfer line 100, a pair of lateral frames 142-1 and 142-2 configured to support both ends of the plurality of transfer members 141, a first direction switching member 143 located
25 between a pair of neighboring transfer members 141 among the plurality of transfer

members 141, a first direction switching driving portion 144 configured to rotationally drive the first direction switching member 143, and a first lifting portion 146 configured to lift the first direction switching member 143 vertically through a space between the pair of transfer members 141.

5 The first direction switching member 143 may include a pair of belts extending lengthwise in a direction perpendicular to the first transfer line 100, a pulley 145 is connected to the belts, and the first direction switching driving portion 144 configured to provide a driving force for rotating the belts is provided between the pair of belts.

10 When the chemical container 2 is transferred along the first transfer line 100, a height of a top end of the first direction switching member 143 is formed to be lower than a height of a top end of the transfer member 141 so that the bottom surface of the pallet 3 comes into contact with the top end of the transfer member 141 as shown in FIG. 13.

15 In this state, when the chemical containers 2 are switched in the transfer direction by 90 degrees and transferred toward the second transfer line connection portion 240, as shown in FIG. 14, the first lifting portion 146 is driven so that the height of the top end of the first direction switching member 143 is higher than the height of the top end of the transfer member 141.

20 When an abnormality occurs as a result of inspection by the first inspection portion 130 and the first lifting portion 146 is driven upward to transfer the chemical containers 2 and the pallet 3 to the second transfer line connection portion 240, the first direction switching member 143 moves upward and lifts the bottom surface of the pallet 3 upward so as to lift and space the bottom surface of the pallet 3 apart
25 from the top end of the transfer member 141.

The second transfer line connection portion 240 may be provided on the second transfer line 200 and may include the same components as those of the first transfer line connection portion 240 in a symmetrical structure thereto so as to transfer and mount the chemical container 2 transferred by the first direction
5 switching member 143 to and on the second transfer line 200.

That is, the second transfer line connection portion 240 includes a plurality of transfer members 241 configured to transfer the chemical containers 2 along the second transfer line 200, a pair of lateral frames 242-1 and 242-2 configured to support both ends of the plurality of transfer members 241, a second direction
10 switching member 243 located between a pair of neighboring transfer members 241 among the plurality of transfer members 241, a second direction switching driving portion 244 configured to rotationally drive the second direction switching member 243, and a second lifting portion (not shown) configured to lift the second direction
15 switching member 243 vertically through a space between the pair of transfer members 241.

When the first direction switching driving portion 144 is driven while the chemical containers 2 and the pallet 3 are mounted above the first direction switching member 143 as shown in FIG. 11, the first direction switching member 143 rotates and transfers the chemical containers 2 and the pallet 3 to the second transfer line
20 connection portion 240.

As shown in FIG. 12, the chemical containers 2 transferred from the first transfer line connection portion 140 are driven by the second direction switching member 243 on the second transfer line connection portion 240 to be located above the transfer members 241. In this case, a height of a top end of the second direction
25 switching member 243 is higher than that of a top end of the transfer member 241 so

that the bottom surface of the pallet 3 is spaced apart from the top end of the transfer member 241.

In this state, when the second direction switching member 243 is moved downward by driving the second lifting portion, the bottom surface of the pallet 3 is mounted to come into contact with the top end of the transfer member 241. Subsequently, when the transfer members 241 are rotationally driven, the chemical containers 2 are transferred along the second transfer line 200.

As shown in FIGS. 11 and 12, the first direction switching member 143 further protrudes outward from the lateral frame 142-1 provided between the lateral frames 242-1 and 242-2 on the second transfer line 200 and the second direction switching member 243 further protrudes outward from the lateral frame 242-1 provided between the lateral frames 242-1 and 242-2 on the first transfer line 100 so that the first direction switching member 143 and the second direction switching member 243 are provided to be adjacent to each other. Accordingly, the first direction switching member 143 and the second direction switching member 243 may continuously transfer the chemical containers 2.

The components of the first connection portions 140 and 240 which have been described above may be equally applied to the second connection portions 150 and 250, the third connection portions 160 and 260, the fourth connection portions 320 and 420, the fifth connection portions 330 and 430, and the sixth connection portions 340 and 440.

Also, the second connection portion 150 and the third connection portion 160 which are provided on the first transfer line 100 may transfer the chemical containers 2 toward the second transfer line 200, the third transfer line 300, or the fourth transfer line 400.

A path on which the chemical containers 2 and the pallet 3 are transferred while being loaded through the inlet portion 110 will be described with reference to FIG. 15.

When the forklift 4 loads the chemical containers 2 on the inlet portion 110,
5 the chemical containers 2 are transferred along the first transfer line 100 by driving the transfer members.

The chemical containers 2 are aligned on the first alignment portion 120. Subsequently, inspections on chemical information, an abnormality in position, and the like are performed by the first inspection portion 130. When there is no
10 abnormality as a result of inspection, the chemical containers 2 and the pallet 3 are transferred along the first transfer line 100. When an abnormality is detected, an alarm is generated so as to allow a worker to directly check again. As a result of checking, when it is determined to recover the chemical containers 2 and the pallet 3,
15 the chemical containers 2 and the pallet 3 are transferred from the first transfer line connection portion 140 to the second transfer line connection portion 240, transferred to the outlet portion 210 along the second transfer line 200, and recovered by the forklift 4.

When a part with an abnormality detected by the first inspection portion 130 is checked and dealt with by the worker, the chemical containers 2 and the pallet 3
20 are reinspected by the first inspection portion 130. When there is no abnormality, the chemical containers 2 and the pallet 3 are transferred along the first transfer line 100.

The chemical container 2, which is checked by the first inspection portion 130 to have no abnormality, is switched at the second connection portion 150 in the
25 transfer direction by 90 degrees and transferred to the air shower portion 310. The

air shower portion 310 sprays air for as long as a set time and removes foreign substances on the exteriors of the chemical container 2 and the pallet 3.

The chemical container 2 which has passed through the air shower portion 310 is transferred to any one of the first to fourth buffer portions 301, 302, 303, and 5 304 and stands by temporarily.

When all chemicals in the chemical container 2 loaded on the chemical supply device 5 are used, the control portion drives the transfer members of the third transfer line 300 and the fourth transfer line 400 to load the chemical containers 2, which stand by on the buffer portions 301, 302, 303, and 304, on the chemical supply 10 device 5.

In this case, since chemicals of the chemical containers 2, which stand by on the first to fourth buffer portions 301, 302, 303, and 304, may harden when a long time has elapsed, the chemical container 2 transferred, first among the plurality of chemical containers 2 which stand by, to the buffer portions 301, 302, 303, and 304 15 may be loaded on the chemical supply device 5.

To this end, the chemical containers 2 transferred passing through the air shower portion 310 are sequentially transferred in an order of the first buffer portion 301, the second buffer portion 302, the third buffer portion 303, and the fourth buffer portion 304 and stand by.

20 Subsequently, to load the chemical container 2 on the fourth buffer portion 304 first when it is necessary to load the chemical container 2 on the chemical supply device 5, the chemical container 2 on the fourth buffer portion 304 sequentially passes through the fourth connection portions 320 and 420 and the first buffer portion 301 and then is transferred to the fifth connection portion 330.

The fifth connection portion 330 corresponds to the chemical container inlet port 331. When the transfer vehicle 600 is located to be adjacent to the chemical container inlet port 331, the chemical container 2 on the fifth connection portion 330 is loaded on the chemical supply device 5 using the transfer vehicle 600.

5 In this case, it is possible to check chemical information of the chemical containers 2 and the pallet 3 in the transfer vehicle 600.

When the chemical containers 2 are mounted in the chemical supply device 5, the chemical supply device 5 is configured to open a lid of the chemical container 2 and to connect a coupler to the chemical container 2 so as to supply chemicals
10 accommodated in the chemical container 2 to a chemical usage place.

A transfer path of a case in which an empty chemical container 2 of which all chemicals are used in the chemical supply device is discharged to the outlet portion 210 will be described with reference to FIG. 16.

When the empty chemical container 2 of which all chemicals have been used
15 in the chemical supply device 5 is transferred, the transfer vehicle 600 is located in front of the chemical supply device 5 and the empty chemical container 2 is loaded on the transfer member 601 of the transfer vehicle 600.

The transfer vehicle 600, on which the chemical container 2 is loaded, moves to positions of the sixth connection portions 340 and 440 and the chemical container
20 2 is transferred from the transfer vehicle 600 to the sixth connection portion 340 of the third transfer line 300 and the sixth connection portion 440 of the fourth transfer line 400.

The chemical container 2 is switched in the transfer direction on the sixth connection portion 440 to be transferred along the fourth transfer line 400 and is
25 located on the second transfer line 200 through the third connection portions 160 and

260. Also, the chemical container 2 is switched in the transfer direction on the third connection portion 260 to be transferred along the second transfer line 200 and is loaded on the forklift 4 through the outlet portion 210.

A path on which the chemical containers 2 and the pallet 3 are transferred while being loaded through the outlet portion 210 will be described with reference to FIG. 17.

When it is not possible to transfer the chemical container 2 through the inlet portion 110 or the first transfer line 100, the chemical container 2 is loaded through the outlet portion 210.

The chemical containers 2 of the outlet portion 210 are aligned on the second alignment portion 220, inspected for chemical information, an abnormality in position, and the like by the second inspection portion 230, and then transferred along the second transfer line 200 when there is no abnormality as a result of inspection. The second inspection portion 230 may be provided for emergency when an abnormality occurs in the inlet portion 110.

The chemical container 2, which is checked by first inspection portion 230 as having no abnormality, is switched at the second connection portion 250 in the transfer direction by 90 degrees, passes through the second connection portion 150 of the first transfer line 100, and is transferred to the air shower portion 310. The air shower portion 310 sprays air for as long as a set time and removes foreign substances on the exteriors of the chemical container 2 and the pallet 3.

A process of loading the chemical containers 2, which have passed through the air shower portion 310, on the chemical supply device 5 is equal to that described above with reference to FIG. 15 and thus will be omitted.

Although a case in which one chemical supply device 5 is provided has been described above, a plurality of such chemical supply devices 5 may be provided. When the plurality of chemical supply devices 5 are provided, the control portion may control such that the chemical containers 2 having chemical information which
5 coincides with that needed by each of the plurality of chemical supply devices 5 are supplied to the plurality of chemical supply devices 5.

According to the present invention, the chemical container 2 having chemical information checked to be needed by the chemical supply device 5 may be automatically supplied to the chemical supply device 5 so as to reduce the number of
10 operations for supplying chemicals and to supply chemicals smoothly. Also, the chemical containers 2 released from a chemical manufacturing plant may not be disassembled from the pallet 3 and may be transferred to the chemical supply device 5 in a bundle so as to prevent damage to the chemical container and an external leakage of chemicals which may occur in a process of disassembling and separating a
15 package of the chemical container.

Although the exemplary embodiment of the present invention has been described above, the present invention is not limited to the above-described embodiment and may be modified into a variety of forms within the range of the claims, the detailed description, and the attached drawings of the present invention,
20 which are included in the present invention.

[CLAIMS]

[Claim 1]

An automatic chemical container transfer device comprising:

at least one transfer line configured to transfer a chemical container (2)
5 loaded on an inlet portion (110) to a chemical supply device (5); and

a control portion configured to receive chemical information of the chemical
container (2) transferred through the transfer line and to control the chemical
container (2) to be supplied to the chemical supply device (5) when the received
chemical information coincides with information required in the chemical supply
10 device (5);

wherein an outlet portion (210) configured to discharge the chemical
container, of which all chemicals are used, in the chemical supply device (5) is
provided on a side of the inlet portion (110), and

wherein the at least one transfer line comprises a first transfer line (100)
15 connected to the inlet portion (110) and comprises a second transfer line (200)
disposed to be parallel and adjacent to the first transfer line (100) and connected to
the outlet portion (210).

[Claim 2]

The automatic chemical container transfer device of claim 1, wherein a first
20 inspection portion (130) configured to inspect chemical information of the chemical
container (2) transferred through the first transfer line (100) is provided, and the
control portion receives the chemical information from the first inspection portion
(130).

[Claim 3]

The automatic chemical container transfer device of claim 1, wherein a pallet (3) on which the chemical container (2) is loaded is mounted on a transfer member (111) provided in the inlet portion (110), and

wherein at least one holding bracket (115) is provided on an entrance side of the inlet portion (110) so that the pallet (3) mounted on the transfer member (111) is held when the pallet (3) is transferred toward the entrance of the inlet portion (110).

[Claim 4]

The automatic chemical container transfer device of claim 1, wherein a pallet (3) on which the chemical container (2) is loaded is mounted on a transfer member (111) provided in the inlet portion (110), and

wherein since tilted surfaces are formed on inner surfaces formed on both sides of the inlet portion (110) to have a certain length along a transfer direction of the chemical container (2) and to face each other, a pair of tilt guides (116-1, 116-2) configured to guide the pallet (3) to be mounted in the inlet portion (110) are provided.

[Claim 5]

The automatic chemical container transfer device of claim 2, wherein a first alignment portion (120) configured to align a pallet (3), on which the chemical container (2) is loaded, on a central part of the first transfer line (100) is provided between the inlet portion (110) and the first inspection portion (130).

[Claim 6]

The automatic chemical container transfer device of claim 5, wherein the first alignment portion (120) comprises:

a plurality of transfer members (121) configured to transfer the chemical container (2) and the pallet (3), which are transferred from the inlet portion (110), along the first transfer line (100);

a pair of alignment members (124-1), (124-2) configured to push and align
5 both sides of the pallet (3) to be parallel to the first transfer line (100); and

a pair of alignment driving portions (123-1), (123-2) configured to allow the alignment members (124-1), (124-2) to reciprocate in directions opposite each other.

[Claim 7]

The automatic chemical container transfer device of claim 6, wherein the
10 alignment members (124-1), (124-2) extend lengthwise toward the transfer line and at least partially come into surface contact with sides of the pallet (3).

[Claim 8]

The automatic chemical container transfer device of claim 6, wherein a lifting member (128) configured to lift the pallet (3) upward while the pallet (3) is mounted
15 on the transfer members (121) and a lift driving portion (127) configured to lift the lifting member (128) in a vertical direction are provided, and

wherein the control portion drives the lift driving portion (127) to allow the lifting member (128) to lift the pallet (3) from the transfer members (121) and drives the alignment driving portions (123-1), (123-2) to allow the alignment members
20 (124-1), (124-2) to push both sides of the pallet (3) to align the pallet (3).

[Claim 9]

The automatic chemical container transfer device of claim 8, wherein surfaces of the transfer members (121) include a synthetic resin material, and

wherein the lifting member (128) configured to come into contact with a bottom surface of the pallet (3) due to lift driving of the lift driving portion (127) includes a metal material.

[Claim 10]

5 The automatic chemical container transfer device of claim 2, wherein a first inspection portion (130) comprises a chemical container scanner configured to scan chemical information on a surface of the chemical container (2), and

 wherein the control portion determines whether the chemical container (2) corresponds to a chemical container needed by the chemical supply device (5) from
10 the chemical information received from the chemical container scanner.

[Claim 11]

 The automatic chemical container transfer device of claim 10, wherein the first inspection portion (130) further comprises scanner driving portions (131), (132) configured to shift a position of the chemical container scanner, and

15 wherein the scanner driving portions (131), (132) comprise a first scanner driving portion (131) and a second scanner driving portion (132) which are movable in a plane defined by two axes perpendicularly intersecting each other to scan the surface of the chemical container (2).

[Claim 12]

20 The automatic chemical container transfer device of claim 1, wherein a first inspection portion (130) comprises at least one pallet scanner (133), (134) configured to scan chemical information on a surface of a pallet (3) on which the chemical container (2) is loaded, and

wherein the control portion determines whether the chemical information of the pallet (3) corresponds to chemicals needed by the chemical supply device (5) from the chemical information received from the pallet scanners (133), (134).

[Claim 13]

5 The automatic chemical container transfer device of claim 2, wherein a first inspection portion (130) further comprises a plurality of frames (135c) disposed on a lateral perimeter of the chemical container (2) with a length in a vertical direction and further comprise at least one protrusion sensor (136), (137) configured to detect whether the chemical container (2) or a packing material of the chemical container
10 (2) protrudes further than the frames (135c) on each of the plurality of frames (135c).

[Claim 14]

 The automatic chemical container transfer device of claim 13, wherein the protrusion sensors (136), (137) comprise a first light emitting portion (136a) and a first light receiving portion (136b) which are disposed to face each other to detect
15 whether the chemical container (2) or the packing material of the chemical container (2) protrudes above a vertical plane on one side of the chemical container (2) and comprise a second light emitting portion (137a) and a second light receiving portion (137b) which are disposed to generate a light beam intersecting a light beam from the first light emitting portion (136a) toward the first light receiving portion (136b).

20 [Claim 15]

 The automatic chemical container transfer device of claim 1, wherein when the chemical container (2) cannot be loaded in through the inlet portion (110) or the first transfer line (100), the chemical container (2) is loaded in through the outlet portion (210) and transferred through the second transfer line (200).

25 [Claim 16]

The automatic chemical container transfer device of claim 2, wherein first connection portions (140), (240) which are configured to connect the first transfer line (100) and the second transfer line (200) to each other are provided so as for the first inspection portion (130) to switch a transfer direction of the chemical container (2) to transfer the chemical container (2) to the second transfer line (200) when a first inspection portion (130) determines that the chemical container (2) transferred from the inlet portion (110) is incorrectly loaded, and

wherein the chemical container (2) transferred from the first inspection portion (130) to the second transfer line (200) through the first connection portions (140), (240) is discharged through the outlet portion (210).

[Claim 17]

The automatic chemical container transfer device of claim 16, wherein the first connection portions (140), (240) comprise:

a first transfer line connection portion (140) provided on the first transfer line (100) and comprising a first direction switching member (143) configured to transfer the chemical container (2) toward the second transfer line (200); and

a second transfer line connection portion (240) provided on the second transfer line (200) and comprising a second direction switching member having a structure symmetrical to that of the first direction switching member (143) to transfer and mount the chemical container (2) transferred by the first direction switching member (143) to and on the second transfer line (200).

[Claim 18]

The automatic chemical container transfer device of claim 17, wherein the first transfer line connection portion (140) further comprises a plurality of transfer members (141) configured to transfer the chemical container (2) along the first

transfer line (100) and further comprises a first lifting portion (146) configured to lift the first direction switching member (143),

wherein the first direction switching member (143) is configured to be lifted between a pair of neighboring transfer members (141) among the plurality of transfer members (141), and

wherein when the first direction switching member (143) is lifted by the first lifting portion (146) and lifts the chemical container (2), the first direction switching member (143) is driven by a first direction switching driving portion (144) to transfer the chemical container (2) to the second direction switching member.

10 [Claim 19]

The automatic chemical container transfer device of claim 17, wherein the second transfer line connection portion (240) further comprises a plurality of transfer members configured to transfer the chemical container (2) along the second transfer line (200) and further comprises a second lifting portion configured to lift the second direction switching member,

wherein the second direction switching member is configured to be lifted between a pair of neighboring transfer members among the plurality of transfer members, and

wherein the second direction switching member locates the chemical container (2) transferred from the first direction switching member (143) on the second transfer line (200) and then drives the second lifting portion to mount the chemical container (2) on the transfer member of the second transfer line (200).

[Claim 20]

The automatic chemical container transfer device of claim 17, wherein the first transfer line connection portion (140) comprises a pair of lateral frames (142-1),

(142-2) configured to support ends of both sides of the plurality of transfer members (141) configured to transfer the chemical container (2) toward the first transfer line (100),

wherein the first direction switching member (143) further protrudes outward
5 from the lateral frame (142-1) provided on the second transfer line (200) between the lateral frames (142-1), (142-2),

wherein the second transfer line connection portion (240) comprises a pair of lateral frames configured to support ends of both sides of the plurality of transfer members configured to transfer the chemical container (2) toward the second transfer
10 line; and

wherein the second direction switching member protrudes further outward from the lateral frame provided on the first transfer line between the lateral frames of the second transfer line connection portion (240) so that the first direction switching member (143) and the second direction switching member continuously transfer the
15 chemical container (2).

[Claim 21]

The automatic chemical container transfer device of claim 2, wherein a second inspection portion (230) configured to inspect chemical information of the chemical container (2) loaded through the outlet portion (210) is provided at a
20 position on the second transfer line (200) which corresponds to the first inspection portion (130).

[Claim 22]

The automatic chemical container transfer device of claim 21, wherein when the chemical container (2) is loaded on the second transfer line (200) through the
25 outlet portion (210), the chemical container (2) is inspected by the second inspection

portion (230), passes through the first transfer line (100), and is transferred to the chemical supply device (5).

[Claim 23]

An automatic chemical container transfer device comprising:

5 at least one transfer line configured to transfer a chemical container (2) loaded on an inlet portion (110) to a chemical supply device (5);

 a first inspection portion (130) configured to inspect chemical information of the chemical container (2) transferred through the transfer line;

 a control portion configured to receive chemical information of the chemical
10 container (2) transferred through the transfer line from the first inspection portion (130) and to control the chemical container (2) to be supplied to the chemical supply device (5) when the received chemical information coincides with information required in the chemical supply device (5); and

 an air shower portion (310) configured to spray air to remove foreign
15 substances on an exterior of the chemical container (2) which has passed through the first inspection portion (130).

[Claim 24]

 The automatic chemical container transfer device of claim 2, wherein at least one buffer portion (301), (302), (303), (304), on which the chemical container (2)
20 which has passed through the first inspection portion (130) stands by temporarily before being supplied to the chemical supply device (5), is provided on the transfer line.

[Claim 25]

 The automatic chemical container transfer device of claim 24, wherein the at
25 least one transfer line further comprises:

a third transfer line (300) connected to the first transfer line (100) vertically and comprising a chemical container inlet port (331) configured to load the chemical container (2) on the chemical supply device (5); and

a fourth transfer line (400) disposed to be parallel and adjacent to the third
5 transfer line (300) and connected to an end of the first transfer line (100).

[Claim 26]

The automatic chemical container transfer device of claim 25, wherein the buffer portions (301), (302), (303), (304) are provided on the third transfer line (300) and the fourth transfer line (400).

10 [Claim 27]

The automatic chemical container transfer device of claim 25, wherein the buffer portions (301), (302), (303), (304) comprise:

a first buffer portion (301) and a second buffer portion (302) provided on one side and the other side of the chemical container inlet port (331) on the third transfer
15 line (300), respectively; and

a fourth buffer portion (304) provided at a position corresponding to the first buffer portion (301) and a third buffer portion (303) provided at a position corresponding to the second buffer portion (302), and the positions being on the fourth transfer line (400).

20 [Claim 28]

The automatic chemical container transfer device of claim 25, wherein at least two connection portions (320), (420); (330), (430); (340), (440) which are configured to transfer the chemical container (2) from the third transfer line (300) to the fourth transfer line (400) or to transfer the chemical containers (2) from the

fourth transfer line (400) to the third transfer line (300) are provided between the third transfer line (300) and the fourth transfer line (400).

[Claim 29]

The automatic chemical container transfer device of claim 28, wherein the at
5 least two connection portions (320), (420); (330), (430); (340), (440) comprise fourth connection portions (320), (420) configured to connect sides of the third transfer line (300) and the fourth transfer line (400), which are close to the first transfer line (100) and comprise sixth connection portions (340), (440) configured to connect ends of the third transfer line (300) and the fourth transfer line (400), which are far from the
10 first transfer line (100),

wherein the sixth connection portions (340), (440) are used for transferring the chemical container (2) of which all chemicals are used in the chemical supply device (5) in a direction from the third transfer line (300) to the fourth transfer line (400), and

15 wherein the fourth connection portions (320), (420) are used for supplying the chemical container (2), which stands by temporarily on the buffer portion provided on the fourth transfer line (400), to the chemical supply device (5) through the third transfer line (300).

[Claim 30]

20 The automatic chemical container transfer device of claim 25, wherein the third transfer line (300) and the fourth transfer line (400) perpendicularly intersect the first transfer line (100).

[Claim 31]

The automatic chemical container transfer device of claim 25, wherein third connection portions (160), (260) configured to connect ends of the first transfer line (100) and the second transfer line (200) to each other are provided, and

wherein the chemical container (2) of which all chemicals are used in the
5 chemical supply device (5) passes through the third connection portions (160), (260) through the fourth transfer line (400) and is discharged outward through the second transfer line (200).

[Claim 32]

The automatic chemical container transfer device of claim 25, wherein
10 second connection portions (150), (250) and third connection portions (160), (260) which are configured to connect the first transfer line (100) to the second transfer line (200) and to switch the transfer direction of the chemical container (2) are provided, and

wherein the second connection portions (150), (250) are connected to the
15 third transfer line (300), and the third connection portions (160), (260) are connected to the fourth transfer line (400).

[Claim 33]

The automatic chemical container transfer device of claim 1, further comprising a transfer vehicle (600) configured to reciprocate along transfer vehicle
20 rails (500) provided between the transfer line and the chemical supply device (5) and comprising a transfer member configured to transfer the chemical container (2) to deliver the chemical container (2) from the transfer line to the chemical supply device (5).

[Claim 34]

The automatic chemical container transfer device of claim 33, wherein a plurality of such transfer vehicles (600) are provided on the transfer vehicle rails (500).

[Claim 35]

5 The automatic chemical container transfer device of claim 34, wherein the plurality of transfer vehicles (600) are provided, the chemical container (2) is loaded on the chemical supply device (5) using one transfer vehicle (600), and an empty chemical container (2), of which all chemicals have been used in the chemical supply device (5), is transferred to the transfer line using another transfer vehicle (600).

10 [Claim 36]

The automatic chemical container transfer device of claim 1, wherein when a plurality of such chemical supply devices (5) are provided, the control portion controls such that the chemical containers (2) having chemical information which coincides with that needed by each of the plurality of chemical supply devices (5) are
15 supplied to the plurality of chemical supply devices (5).

[Claim 37]

The automatic chemical container transfer device of claim 1, wherein when the chemical container (2) cannot be discharged through the outlet portion (210) or the second transfer line (200), the chemical container (2) is discharged through the
20 inlet portion (110).

[Claim 38]

A method of automatically transferring a chemical container, the method comprising:

loading a chemical container (2) on an inlet portion (110);
25 transferring the chemical container (2) through at least one transfer line; and

receiving chemical information of the transferred chemical container (2) and supplying the chemical container (2) to a chemical supply device (5) when the received chemical information coincides with information needed by the chemical supply device (5);

5 wherein the at least one transfer line comprises a first transfer line (100) connected to the inlet portion (110) and comprises a second transfer line (200) disposed to be parallel and adjacent to the first transfer line (100) and provided on the side of the inlet portion (110) and connected to the outlet portion (210) for discharging the chemical container that has been used in the chemical supply device
10 (5); and determines whether the chemical information of the chemical container (2) transferred through the first transfer line (100) matches the information required by the chemical supply device (5).

[Claim 39]

 The method of claim 38, wherein the chemical information is inspected by a
15 first inspection portion (130) provided on the first transfer line (100).

[Claim 40]

 The method of claim 39, wherein when an abnormality in the chemical information is detected as a result of inspection using the first inspection portion (130), the chemical container (2) is discharged through the outlet portion (210).

20 [Claim 41]

 The method of claim 40, wherein when an abnormality in the chemical information is detected as a result of inspection using the first inspection portion (130), the chemical container (2) is switched in a transfer direction and then is discharged through the outlet portion (210).

25 [Claim 42]

The method of claim 38, wherein the chemical container (2) transferred through the first transfer line (100) or the second transfer line (200) is aligned by an alignment portion.

[Claim 43]

5 The method of claim 38, wherein at least one buffer portion (301), (302), (303), (304) on which a plurality of chemical containers (2) stand by temporarily on the at least one transfer line and when all chemicals in the chemical container (2) which has been loaded on the chemical supply device (5) are used, the standing-by chemical containers (2) on the buffer portion (301), (302), (303), (304) are loaded on
10 the chemical supply device (5).