

INTEGRATED COUPLING MODULE AND COUPLING SYSTEM INCLUDING THE SAME

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The embodiments relate to an integrated coupling module capable of opening and closing a cap of a container and discharging a liquid and a coupling system including the same.

Description of the Related Art

[0002] Various types of chemicals used in semiconductor factories or chemical plants are supplied in a state of being stored in containers such as drums. Therefore, supplying the semiconductor factories and the like with the delivered chemicals requires opening drum caps, coupling couplers thereto, and storing the chemicals in storage tanks in the factories. Or conversely, couplers may be coupled to empty drums to fill the same with chemicals.

[0003] However, an opening/closing module opening and closing a cap of a drum and a coupler fixing module are separately provided in a coupling module in the related art, which poses problems of larger size and cumbersome

operation of the coupling module.

[0004] In addition, the coupling module in the related art is composed of a first step in which an opening/closing module moves to the top of the drum, opens a cap, and then, withdraws from the top of the drum, a second step in which a coupler fixing module moves to the top of the drum and inserts the coupler into the drum, a third step in which a chemical is filled into or discharged from the drum through the coupler of the coupler fixing module, a fourth step in which the coupler fixing module withdraws from the top of the drum, and a fifth step in which the opening/closing module moves to the top the drum and couples the cap. However, the opening/closing module and the coupler fixing module need to alternately move to the operation position, which poses a problem of a relatively slow operation speed.

[0005] In addition, the inability of the coupling module in the related art to adjust the tilt angle poses another problem of difficulties in accurately gripping the cap or accurately inserting the coupler into an outlet of the drum when the cap or the outlet is tilted.

SUMMARY OF THE INVENTION

[0006] Therefore, the present invention has been made in view of the above problems, and it is an object of the

present invention to provide an integrated coupling module in which an opening/closing module and a coupler fixing module are integrated.

[0007] In addition, an integrated coupling module capable of adjusting the angle of the opening/closing module and the coupler fixing module is provided.

[0008] The object that the embodiments aim to achieve is not limited thereto and includes the purpose or effects to be understood from the means to solve the problem and the embodiments thereof.

[0009] To accomplish the above object, according to one aspect of the present invention, an integrated coupling module comprises: an opening/closing module including a cap gripping unit gripping a cap of a container; and a coupler fixing module fixing a coupler discharging a liquid in the container to the outside, wherein the coupler is disposed over the cap gripping unit.

[0010] The cap gripping unit may move from a first position at which the cap gripping unit overlaps the coupler to a second position at which the cap gripping unit does not overlap the coupler. When the cap gripping unit moves to the second position, the coupler may be lowered to be inserted into an outlet of the container.

[0011] A driving module connected to the coupler fixing

module to move the opening/closing module from the first position to the second position may be included.

[0012] The coupler fixing module may include a holder fixing the coupler and a first rotating unit rotating the coupler or a key code of the coupler, the opening/closing module may include a first support portion supporting the cap gripping unit and a second rotating unit rotating the cap gripping unit, and the driving module may rotate the first support portion.

[0013] The first rotating unit may be disposed higher than the second rotating unit.

[0014] An angle adjusting module adjusting the angle of the opening/closing module and the coupler fixing module may be included, wherein the angle adjusting module may include a first adjusting unit adjusting the tilt angle of the cap gripping unit and the coupler by axially rotating the holder with respect to a first direction; and a second adjusting unit adjusting the tilt angle of the cap gripping unit and the coupler by axially rotating the holder with respect to a second direction intersecting the first direction.

[0015] The cap gripping unit and the coupler may be adjusted to the same tilt angle by the first adjusting unit and the second adjusting unit.

[0016] A lifting/lowering module lifting and lowering the coupler fixing module may be further included, wherein the angle adjusting module may be disposed between the coupler fixing module and the lifting/lowering module.

[0017] The angle adjusting module may further include a third support portion connecting the lifting/lowering module and the coupler fixing module, wherein the second adjusting unit may be disposed between the lifting/lowering module and the third support portion, and the first adjusting unit may be disposed between the third support portion and the coupler fixing module.

[0018] The third support portion may include a one-end portion connected to the lifting/lowering module, a the-other-end portion connected to the coupler fixing module, and a bent portion formed between the one-end portion and the the-other-end portion.

[0019] A sensing module sensing the position and the tilt of the cap may be included, wherein the sensing module may include a fourth support portion connected to the coupler fixing module; a first sensing unit disposed on the fourth support portion to sense the position of the cap; and a second sensing unit disposed on the fourth support portion to sense the tilt of the cap.

[0020] The cap gripping unit may include a plurality of

slits into which protrusions of the cap are inserted and a latch unit to be coupled to the protrusions inserted into the slits.

[0021] According to the embodiment, the integration of the opening/closing module and the coupler fixing module may speed up the operation and reduce the installation area.

[0022] In addition, since the tilt angle of the opening/closing module and the coupler fixing module may be adjusted in accordance with the tilt of the cap and the outlet of the container, the cap may be accurately gripped and the coupler may be accurately inserted into the outlet.

[0023] Various beneficial advantages and effects of the present invention are not limited to the above description and will be more easily understood in the course of describing specific embodiments of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 is a conceptual view of a coupling system according to an embodiment of the present invention.

[0025] FIG. 2 is a conceptual view of an integrated coupling module according to an embodiment of the present invention.

[0026] FIG. 3 is a perspective view of the integrated coupling module in FIG.2 viewed from another direction.

[0027] FIGS. 4 and 5 are views showing a process of bringing a plurality of containers to at least one integrated coupling module.

[0028] FIG. 6 is a view showing a process of sensing a position of a cap coupled to a container.

[0029] FIG. 7 is a view showing a process of sensing the evenness of a cap coupled to a container.

[0030] FIG. 8 is a view showing a state of a cap gripping unit and a coupler rotating with respect to a first direction in accordance with a tilt of a cap.

[0031] FIG. 9 is a view showing a state of a cap gripping unit and a coupler rotating with respect to a second direction in accordance with a tilt of a cap.

[0032] FIG. 10 is a view showing a state of a cap gripping unit lowered to be coupled to a cap.

[0033] FIGS. 11A to 11C are views for describing an embodiment of a cap gripping unit gripping a cap by rotation.

[0034] FIGS. 12A to 12D are views for describing another embodiment of a cap gripping unit gripping a cap by rotation.

[0035] FIG. 13 is a view showing a state of a cap gripping unit separating a cap from a container.

[0036] FIG. 14 is a perspective view of a cap gripping unit.

[0037] FIG. 15 is a perspective view of a cap gripping unit viewed from another direction.

[0038] FIG. 16 is a view showing a state of cap gripping unit rotated to avoid overlapping with a coupler.

[0039] FIG. 17 is a view of the cap gripping unit in FIG. 16 viewed from another direction

[0040] FIG. 18A is a view showing a state of a key code of a coupler and a groove of an outlet aligned with each other.

[0041] FIG. 18B is a view showing a top surface of an outlet.

[0042] FIG. 19 is a view showing a state of a coupler inserted into an outlet.

[0043] FIG. 20 is a view showing a state of a cap gripping unit returned to an initial position.

[0044] FIG. 21 is a view showing a state of a cap gripping unit rotated to couple a cap to a container.

[0045] FIG. 22 is a view showing a state of a cap gripping unit lifted to complete an operation.

DETAILED DESCRIPTION OF THE INVENTION

[0046] Since the present invention may be modified in various ways and have various embodiments, specific embodiments will be illustrated in the drawings and described. However, this is not intended to limit the

present invention to the specific embodiments and should be construed as including all modifications, equivalents, and substitutes included in the spirit and technical scope of the present invention.

[0047] Terms such as first and/or second may be used to describe various components, but the components should not be limited by the terms. The terms only serve the purpose of distinguishing one component from other components. For example, the first component may be referred to as the second component, and similarly, the second component may also be referred to as the first component without deviating from the scope of the right according to the concept of the present invention. The term and/or includes a combination of a plurality of related items listed or an item among a plurality of related items listed.

[0048] When a component is referred to as "connected" or "coupled" to another component, it may be directly connected or coupled to the another component, but it should be understood that other components may exist in between. On the other hand, when a component is referred to as "directly connected" or "directly coupled" to another component, it should be understood that there is no other component in between.

[0049] The terms used in the present application are only

used to describe specific embodiments and are not intended to limit the present invention. Singular expressions include plural expressions unless the context explicitly indicates otherwise. In the present specification, terms such as "comprise" or "have" are intended to designate the presence of implemented features, numbers, steps, actions, components, parts, or combinations thereof and should not be understood to preclude the presence or additional possibilities of one or more of other features, numbers, steps, actions, components, parts or combinations thereof in advance.

[0050] Unless otherwise defined, all terms used herein, including technical or scientific terms, have the same meanings as are generally understood by those with common knowledge in the art to which the present invention pertains. The terms such as those defined in a generally used dictionary should be interpreted as having meanings consistent with the meanings in the context of the related technology and should not be interpreted as an idealistic or excessively formal meaning unless explicitly defined in the present specification.

[0051] Hereinafter, the embodiments will be described in detail with reference to the accompanying drawings. The same reference numerals are assigned to the same or

equivalent components regardless of the reference numerals and repetitive description thereof is omitted.

[0052] FIG. 1 is a conceptual view of a coupling system according to an embodiment of the present invention, FIG. 2 is a conceptual view of an integrated coupling module according to an embodiment of the present invention, and FIG. 3 is a perspective view of FIG. 2 viewed from another direction.

[0053] FIG. 1 shows that a coupling system according to an embodiment may include a pair of first transport members 210 disposed to face each other in a first direction (X-axis direction), a pair of second transport members 220 disposed to face each other in a second direction (Y-axis direction) perpendicular to the first direction, at least one integrated coupling module 100 disposed on the second transport member 220, and a control unit 300 controlling the first transport members, the second transport members, and the integrated coupling module.

[0054] The integrated coupling module 100 may be connected to the second transport member 220 to move in the first direction (X-axis direction) by a second transport module 221. In addition, the second transport member 220 may move by a first transport module 211 in the second direction (Y-axis direction).

[0055] Therefore, the integrated coupling module 100 may freely move in the first direction and the second direction by the first transport module 211 and the second transport module 221. The integrated coupling module 100 may be disposed on each of the pair of second transport members 220 but is not necessarily limited thereto.

[0056] A plurality of containers 10 may be disposed on a holder 20. The container 10 may store chemicals for a semiconductor display but is not necessarily limited thereto, and various liquids may be stored therein. The container 10 may have various sizes and shapes to accommodate various liquids.

[0057] A cap 11 may be coupled to an outlet in the container 10. Therefore, the control unit 300 may control the integrated coupling module 100 so as to open the cap 11 and insert the coupler into the outlet to discharge the liquid stored in the container 10 to the outside.

[0058] FIGS. 2 and 3 show that the opening/closing module 110 opening and closing the cap of the container and the coupler fixing module 130 supporting the coupler 120 may be coupled to each other to form one integrated coupling module 100.

[0059] The coupler fixing module 130 may include a holder 131 in which the coupler 120 is accommodated, a first

rotating unit 133 rotating the coupler 120, and a support structure 134. The holder 131 may be configured with an upper holder 131a and a lower holder 131b to accommodate the coupler 120. However, the holder structure is not necessarily limited thereto. There is no particular limit as long as the configuration may support the coupler 120.

[0060] The support structure 134 may include a first support plate 135 and a second support plate 136 fixing the coupler 120 and a plurality of connecting members 137 connecting the first support plate 135 and the second support plate 136. The connecting members 137 may have elasticity but are not necessarily limited thereto. The first support plate 135 and the second support plate 136 may have disk shapes but are not necessarily limited thereto and may be designed in various shapes.

[0061] The coupler 120 may include a nozzle 121 to be inserted into the outlet of the container 10, a transport tube 126 connected to the nozzle 121, and at least one key code 125. The key code 125 may be inserted into a groove formed on the outlet of the container 10.

[0062] The first rotating unit 133 may include a motor and a driving belt rotating the coupler 120. Therefore, the rotation of the key code 125 by the first rotating unit 133 allows alignment with the groove of the outlet.

[0063] The opening/closing module 110 may include a cap gripping unit 111 gripping the cap 11 of the container 10, a first support portion 113 supporting the cap gripping unit 111, a second rotating unit 114 rotating the cap gripping unit 111, and the driving belt 115 connected to the cap gripping unit 111 and the second rotating unit 114.

[0064] The cap gripping unit 111 may grip and rotate the cap 11 of the container 10 to open and close the cap 11 of the container 10. The cap gripping unit 111 may have various shapes capable of gripping the cap 11. For example, the cap gripping unit 111 may have a plurality of protrusions 112 protruding in a radial direction. An accommodating groove 111a in which the cap 11 is accommodated may be formed in the lower portion of the cap gripping unit 111 and a slit 112a may be formed in the protrusion 112 so that the protrusion of the cap may be inserted.

[0065] For example, the plurality of protrusions 112 may be manufactured to move in a radial direction by a cylinder or the like. This configuration allows the plurality of protrusions 112 to be coupled to the cap while the protrusions advance in the radial direction as much as possible to maximize the diameter of the accommodating groove 111a, and then, return to the original position so

that the cap may be effectively gripped.

[0066] The first support portion 113 may include a horizontal frame 113a supporting the gripping unit 111 and a vertical frame 113b connected to the coupler fixing module 130. The cap gripping unit 111 may be rotatably supported by the horizontal frame 113a.

[0067] The driving belt 115 may be disposed between the horizontal frame 113a and the cap gripping unit 111 to deliver the rotation power of the second rotating unit 114 to the cap gripping unit 111. Since the coupler 120 is disposed over the cap gripping unit 111, the first rotating unit 133 may be disposed higher than the second rotating unit 114.

[0068] A driving module 140 may rotatably connect the vertical frame 113b of the first support portion 113 to the coupler fixing module 130. The driving module 140 may include a second support portion 141 fixed to the coupler fixing module 130 and a third rotating unit 142 disposed on the second support portion 141 to axially rotate the vertical frame 113b. This configuration allows the vertical frame 113b of the opening/closing module 110 to be connected to the rotation shaft of the third rotating unit 142 to rotate.

[0069] The rotation of the vertical frame 113b rotates the

cap gripping unit 111. Therefore, the cap gripping unit 111 may move from a first position MA1 disposed under the coupler 120 to a second position where the rotation is terminated. However, the present invention is not necessarily limited thereto. The cap gripping unit 111 may move from the first position to the second position through horizontal movement rather than rotation. Alternatively, the coupler 120 may move down through the horizontal frame 113a and the cap gripping unit 111.

[0070] An angle adjusting module 150 may include a third support portion 153 connecting the lifting/lowering module 170 and the coupler fixing module 130, a first adjusting unit 151 axially rotating the holder 131 with respect to the first direction (X-axis direction), and a second adjusting unit 152 axially rotating the holder 131 with respect to the second direction (Y-axis direction)

[0071] The third support portion 153 may include a one-end portion (153a) connected to the lifting/lowering module 170, a the-other-end portion 153b connected to the coupler fixing module 130, and a bent portion between the one-end portion 153a and the the-other-end portion 153b. The one-end portion 153a and the the-other-end portion 153b may be disposed perpendicular to each other by the bend portion 153c disposed in between.

[0072] The second adjusting unit 152 may be disposed between the lifting/lowering module 170 and the one-end portion 153a of the third support portion 153 and the first adjusting unit 151 may be disposed between the the-other-end portion 153b of the third support portion 153 and the coupler fixing module 130. That is, the rotation axis of the first adjusting unit 151 and the rotation axis of the second adjusting unit 152 may be perpendicular to each other. Therefore, the tilt angle of the couple fixing module 130 may be adjusted by the respective rotations with respect to the X-axis and Y-axis by the first adjusting unit 151 and the second adjusting unit 152.

[0073] At this time, since the opening/closing module 110 is fixed to the coupler fixing module 130 by the driving module 140, the angle of the opening/closing module 110 may be also adjusted when the angle of the coupler fixing module 130 is adjusted. Therefore, according to the embodiment, the angle of the cap gripping unit 111 and the coupler 120 may be simultaneously adjusted to the same tilt angle by the angle adjusting module 150.

[0074] Since the opening/closing module and the coupler fixing module of the conventional structure are separately manufactured, the problem is that a configuration for adjusting the angle of the opening/closing module and a

configuration for adjusting the angle of the coupler fixing module are separately required.

[0075] However, since the opening/closing module 110 and the coupler fixing module 130 are integrally manufactured according to an embodiment, an advantage is that the angle of the cap gripping unit 111 and the coupler 120 may be adjusted with one angle adjusting module 150 at a time. Therefore, manufacturing costs may be cut and downsizing may be made possible.

[0076] A sensing module 160 may include a fourth support portion 163 connected to the coupler fixing module 130, a first sensing unit 161 disposed on the fourth support portion 163 to sense the position of the cap, and a second sensing unit 162 disposed on the fourth support portion 163 to sense the evenness of the cap.

[0077] The first sensing unit 161 may acquire an image of the top image of the container 10 to check the position of the cap. The control unit 300 may acquire the position coordinates of the cap through the image of the top image and output a drive signal to the first transport module 211 and the second transport module 221 to move the cap gripping unit 111 to over the cap 11. The first sensing unit 161 may be a camera capable of capturing images but is not necessarily limited thereto. Diverse equipment capable

of acquiring images may be selected.

[0078] The second sensing unit 162 may measure the evenness of the cap. For example, the second sensing unit 162 may be composed of a plurality of height sensors that respectively measure the height from the cap. The control unit may use a plurality of height signals from the sensing unit 162 to check how tilted the cap is. The number of height sensors is not particularly limited. For example, four height sensors may be disposed, but fewer or more height sensors may be disposed.

[0079] A lifting/lowering module 170 may include a fifth support portion 173 connected to the second transport member 220, a sliding unit 172 disposed on the fifth support portion 173 and connected to the coupling fixing module 130, and a lifting/lowering unit 171 lifting and lowering the sliding unit 172. The cap gripping unit 111 and the coupler 120 may be lifted and lowered by the lifting/lowering module 170.

[0080] FIGS. 4 and 5 are views showing a process of bringing a plurality of containers to at least one integrated coupling module.

[0081] FIGS. 4 and 5 show that a plurality of containers 10 may be brought to an operation position defined by a pair of first transport members 210 and a pair of second

transport members 220. The plurality of containers 10 may be brought to the operation position by transport members while being placed on the holder 20. Various transport means such as a conveyor, a roller, a conveyor belt, a forklift, a hand lift, an electric lift, a hand cart, a bogie, a rail, and the like that may move the container 10 may apply with no limitation.

[0082] Two containers 10 may be disposed in a first row and two containers 10 may be disposed in a second row. A first integrated coupling module 100A may perform a coupling operation on the two containers 10 disposed in the first row and a second integrated coupling module 100B may perform a coupling operation on the two containers 10 disposed in the second row. However, the present invention is not necessarily limited thereto, and the number of containers that can be operated on at a time may change in consideration of the amount of chemical to be used or an operation space. For example, three or less, or five or more containers may be disposed.

[0083] FIG. 6 is a view showing a process of sensing the position of the cap coupled to the container, and FIG. 7 is a view showing a process of sensing the evenness of the cap coupled to the container.

[0084] FIG. 6 shows that the first sensing unit 161 may

acquire an image of the top image of the container 10 to check the position of the cap 11. The control unit 300 may acquire the position coordinates of the cap 11 through the image of the top image and output a drive signal to the first transport member 210 and the second transport member 220 to move the cap gripping unit 111 over the cap 11. The first sensing unit 161 may be a camera capable of capturing images but is not necessarily limited thereto. The control unit 300 may use the image of the top image acquired by the first sensing unit 161 to obtain the position coordinates of the cap and check the protrusion position of the cap. This process may be performed by various image analysis methods.

[0085] FIG. 7 shows that the second sensing unit 162 may measure the evenness of the cap 11. For example, the second sensing unit 162 may be composed of a plurality of height sensors that respectively measure the height from the cap 11. The control 300 unit may use a plurality of height signals from the sensing unit 162 to check how tilted the cap 11 is. The number of height sensors is not particularly limited. For example, four height sensors may be disposed, but fewer or more height sensors may be disposed.

[0086] The control unit 300 may use the information

measured by the plurality of height sensors to calculate how tilted the cap 11 is with respect to the X-axis and Y-axis. When the tilt of cap 11 is calculated, the tilt angle of the integrated coupling module 100 may be adjusted accordingly. If the measurement result of the evenness reveals that the tilt of the cap 11 is out of a predetermined tilt range, an error message may be output without performing separation operation of the cap 11.

[0087] FIG. 8 is a view showing a state of the cap gripping unit and the coupler axially rotating with respect to the first direction in accordance with the tilt of the cap, FIG. 9 is a view showing a state of the cap gripping unit and the coupler axially rotated with respect to the second direction in accordance with the tilt of the cap, and FIG. 10 is a view showing a state of the cap gripping unit lowered to be coupled to the cap.

[0088] FIGS. 7 and 8 show that the cap 11 coupled to the container 10 may be disposed tilted for a variety of reasons. A container like a drum may require chemical resistance depending on the type of chemical so that resin materials (for example, PP, PE) with relatively weak strength may be used. Therefore, there is a possibility that a cap or an outlet is tilted when the container is made.

[0089] In addition, a mistake in adjusting the pressure of the gas injected after the container is filled with a chemical may cause a tilt and a failure to discharge gas from the container when the chemical is filled may cause a tilt. In addition, a failure to adjust the pressure when a small amount of pressurized gas is filled to maintain proper pressure while the chemical is discharged from the container may cause the container to shrink to generate a tilt in the cap or the outlet.

[0090] When the cap is disposed tilted for a variety of reasons as described, it may be difficult to accurately grip the tilted cap 11 if the cap gripping unit 111 is vertically lowered. Therefore, the integrated coupling module 100 according to the embodiment employs the angle adjusting module 150 to adjust the angle of the cap gripping unit 111..

[0091] The angle adjusting module 150 may include the third support portion 153 connecting the lifting/lowering module 170 and the coupler fixing module 130, the first adjusting unit 151 axially rotating the holder 131 with respect to the first direction (X-axis direction), and a second adjusting unit 152 axially rotating the holder 131 with respect to the second direction.

[0092] FIG. 8 shows that the coupler fixing module 130 may

axially rotate with respect to the first direction (X-axis direction) by the rotation of the first adjusting unit 151. At this time, since opening/closing module 110 may be also adjusted when the angle of the coupler fixing module 130 is adjusted. Therefore, the cap gripping unit 111 and the coupler 120 may be disposed tilted at a predetermined angle θ_1 with respect to the vertical direction X1.

[0093] FIG. 9 shows the coupler fixing module 130 may axially rotate with respect to the second direction (Y-axis direction) by the second adjusting unit 152. Since the second adjusting unit 152 axially rotates the third support portion 153 with respect to the second direction, the coupler fixing module 130 connected to the third support portion 153 and the opening/closing module 110 may axially rotate with respect to the second direction simultaneously. Therefore, the cap gripping unit 111 and the coupler 120 may be disposed tilted at a predetermined angle θ_2 with respect to the vertical direction X1.

[0094] This configuration allows rotations with respect to the X-axis and Y-axis so that adjustment to have the same angle as the tilt angle of the cap 11 is made possible.

[0095] FIG. 10 shows that, since the cap gripping unit 111 may axially rotate with respect to the X-axis and Y-axis by the first adjusting unit 151 and the second adjusting unit

152 to have the same angle as the tilt angle of the cap 11, the cap 11 may be accurately gripped even when the cap 11 is tilted.

[0096] At this time the plurality of protrusions 112 may be manufactured to move in the radial direction by a cylinder. This configuration allows the plurality of protrusions 112 to be coupled to the cap while the protrusions advance in the radial direction as much as possible to maximize the diameter of the accommodating groove, and then, return to the original position so that the cap may be effectively gripped.

[0097] The cap gripping unit 111 may rotate by the second rotating unit 114 while the cap 11 is gripped to separate the cap 11 from the container 10.

[0098] The opening/closing module and the coupler fixing module of the conventional structure are separately manufactured, which poses a problem that a configuration for adjusting the angle of the opening/closing module and a configuration for adjusting the angle of the coupler fixing module are required separately.

[0099] However, since the opening/closing module 110 and the coupler fixing module 130 may be integrally manufactured according to the embodiment, the angle of the cap gripping unit 111 and the coupler 120 may be adjusted

by one angle adjusting module 150 at a time.

[0100] FIGS. 11A to 11C are views for describing an embodiment of the cap gripping unit gripping the cap by rotation, and FIGS 12A to 12D are views for describing another embodiment of the cap gripping unit gripping the cap by rotation.

[0101] FIGS. 11A and 11B show that the cap gripping unit 111 may rotate by the angle adjusting module 150 to have the same angle as the tilt of the cap 11 and may be vertically lowered by the lifting/lowering module 170 to grip the cap as shown in FIG. 11C. In this case, the angle adjusting module 150 may be disposed between the holder 131 of the coupler fixing module and the lifting/lowering module 170.

[0102] This configuration allows the application of a structure in which the cap gripping unit 111 is vertically lowered or various structures for moving the cap gripping unit 111 obliquely.

[0103] For example, FIG. 12A shows that the angle adjusting module 150 may be disposed behind the lifting/lowering module 170. That is, the angle adjusting module 150 may be disposed between the lifting/lowering module 170 and a second transport member (220 in FIG. 10).

[0104] FIG. 12B shows that the lifting/lowering module 170

may be rotated together with the cap gripping unit 111 by the angle adjusting module 150. Thereafter, the cap gripping unit 111 may move horizontally in accordance with the center of the cap 11 with the center of the cap gripping unit 111 as shown in FIG. 12C. Thereafter, the cap gripping unit 111 may be lowered by the lifting/lowering module 170 to grip the cap 11 as shown in FIG. 12D. Since the cap gripping unit 111 and the lifting/lowering module 170 are rotated together by the angle adjusting module 150 as described above, the cap gripping unit 111 may be lowered obliquely to accurately grip the cap 11.

[0105] FIG. 13 is a view showing a state of the cap gripping unit separating the cap from the container, FIG. 14 is a perspective view of the cap gripping unit, FIG. 15 is a perspective view of the cap gripping unit viewed from another direction, FIG. 16 is a view showing a state of the cap gripping unit rotated, and FIG. 17 is a view showing FIG. 16 viewed from another direction.

[0106] FIG. 13 shows that, when the cap 11 is separated from the container 10 by the rotation of the cap gripping unit 111, the lifting/lowering module 170 may lift the cap gripping unit 111. Therefore, the cap gripping unit 111 may be lifted while gripping the cap 11.

[0107] FIGS. 14 and 15 show that the protrusions 11a of the cap 11 may be inserted into the slits 112a formed in the protrusions 112 of the cap gripping unit 111 and that the inserted protrusions 11a may be fixed by the latch unit 111b. The latch unit 111b may retract when the protrusions 11a of the cap 11 are being inserted into the grooves, and then, protrude again by an elastic member (not shown) when the protrusions 11a are inserted to fix the protrusions 11a of the cap 11 in the slits 112a.

[0108] FIGS. 16 and 17 show that the cap gripping unit 111 may withdraw from under (first position) the coupler 120 while gripping the cap 11. As described above, the driving module 140 may axially rotate the first support portion 113 of the opening/closing module 110

[0109] This configuration may prevent a failure by the cap gripping unit 111 to insert the nozzle 121 of the coupler 120 into the outlet 12 of the container 10 despite the coaxial disposition, and the consequent integral implementation, of the coupler 120 and the cap gripping unit 111.

[0110] However, the structure of withdrawing the cap gripping unit 111 from the first position is not limited thereto. The driving module 140 may horizontally move, and thus, switch from the first position to the second position,

the first support portion 113 to which the cap gripping unit 111 is connected. The second position may be a position at which the cap gripping unit 111 and the coupler 120 are not overlapped in the vertical direction.

[0111] FIG. 18A is a view showing a state of the key code of the coupler and the key code of the outlet aligned with each other, FIG. 18B is a view showing the top surface of the outlet, and FIG. 19 is a view showing a state of the coupler inserted into the outlet.

[0112] FIGS. 18A, 18B, and 19 show that the first sensing unit 161 may acquire an image of the outlet 12 image from which the cap 11 is removed and check whether the key code 125 is aligned with the groove 12b of the outlet 12. If it is determined that the key code 125 and the groove 12b are not aligned, the key code 125 may be rotated by the first rotating unit 133.

[0113] For example, the key code may be rotated clockwise or counterclockwise with respect to the reference point R1 disposed on the top surface of the outlet 12 in the image of the outlet 12 image so that the key code may be inserted into one or more open grooves among a plurality of grooves 12b. However, the present invention is not necessarily limited thereto. Various aligning methods using a vision may apply to the alignment of the key code.

[0114] When it is determined that the key code 125 is aligned, the coupler 120 may be lowered by the lifting/lowering module 170 to insert the nozzle 121 of the coupler 120 into the discharge groove 12a of the outlet 12 so that the liquid stored in the container 10 may be discharged to a storage tank. Various liquid transport methods may apply to the transport of the liquid of the container 10 to a storage tank.

[0115] FIG. 20 is a view showing a state of the cap gripping unit returned to an initial position, FIG. 21 is a view showing a state of the cap gripping unit rotated to couple the cap to the container, and FIG. 22 is a view showing of state of the cap gripping unit lifted to complete the operation.

[0116] FIG. 20 shows that, when the discharge of the liquid in the container 10 is completed, the coupler 120 may be lifted by the lifting/lowering module 170 and the cap gripping unit 111 may be returned to the original position under the coupler 120 by the driving module 140.

[0117] FIG. 21 shows that the cap gripping unit 111 gripping the cap 11 may be lowered by the lifting/lowering module 170 and the cap gripping unit 111 may couple the cap 11 to the outlet again while being rotated by the second rotating unit 114 to complete the operation.

[0118] FIG. 22 shows that the cap gripping unit 111 is lifted and the integrated coupling module 100 may move over to the top of the next container 10 to perform the same operation.

[0119] Thus far, description has focused on the embodiments, which only serve as an illustrative example and do not limit the present invention. Configurations of various embodiments described in the drawings may apply with no limitation.

[0120] Those with common knowledge in the related art to which the present invention pertains will understand that various modifications and applications not exemplified above are possible without departing from the fundamental characteristics of the present embodiments. For example, each component specific to the embodiments may be modified for implementation. And differences relating to such modifications and applications should be construed as included in the scope of the present invention defined in the accompanying claims.

DESCRIPTION OF REFERENCE NUMERALS

10: container

11: cap

100: integrated coupling module

110: opening/closing module
111: cap gripping unit
114: second rotating unit
120: coupler
125: key code
130: coupler fixing module
133: first rotating unit
140: driving module
150: angle adjusting module
151: first adjusting unit
152: second adjusting unit
170: lifting/lowering module

WHAT IS CLAIMED IS:

Claim 1. An integrated coupling module comprising:
an opening/closing module including a cap gripping unit gripping a cap of a container; and

a coupler fixing module fixing a coupler discharging a liquid in the container to an outside, wherein the coupler is disposed higher than the cap gripping unit,

wherein the cap gripping unit may move from a first position at which the cap gripping unit overlaps the coupler in the vertical direction to a second position at which the cap gripping unit does not overlap the coupler, and,

when the cap gripping unit moves to the second position, the coupler is lowered to be inserted into an outlet of the container.

Claim 2. The integrated coupling module according to claim 1 comprising a driving module connected to the coupler fixing module to move the opening/closing module from the first position to the second position.

Claim 3. The integrated coupling module according to claim 2, wherein the coupler fixing module includes a holder to which the coupler is fixed and a first rotating

unit rotating the coupler or a key code of the coupler,
the opening/closing module includes a first support portion supporting the cap gripping unit and a second rotating unit rotating the cap gripping unit, and
the driving module moves the first support portion to the second position.

Claim 4. The integrated coupling module according to claim 3, wherein the first rotating unit is disposed higher than the second rotating unit.

Claim 5. An integrated coupling module comprising:
an opening/closing module including a cap gripping unit gripping a cap of a container;

a coupler fixing module fixing a coupler discharging a liquid in the container to an outside, wherein the coupler is disposed higher than the cap gripping unit; and

an angle adjusting module adjusting a tilt angle of the opening/closing module and the coupler fixing module, wherein the angle adjusting module includes a first adjusting unit adjusting the tilt angle of the cap gripping unit and the coupler by axially rotating the couple fixing module with respect to a first direction; and a second adjusting unit adjusting the tilt angle of the cap gripping

unit and the coupler by axially rotating the coupler fixing module in a second direction intersecting the first direction.

Claim 6. The integrated coupling module according to claim 5, wherein the cap gripping unit and the coupler are adjusted to the same tilt angle by the first adjusting unit and the second adjusting unit.

Claim 7. The integrated coupling module according to claim 5 further comprising a lifting/lowering module lifting and lowering the coupler fixing module, wherein the angle adjusting module is disposed between the coupler fixing module and the lifting/lowering module.

Claim 8. The integrated coupling module according to claim 7, wherein the angle adjusting module further includes a third support portion connecting the lifting/lowering module and the coupler fixing module, wherein the second adjusting unit is disposed between the lifting/lowering module and the third support portion and

the first adjusting unit is disposed between the third support portion and the coupler fixing module.

Claim 9. The integrated coupling module according to claim 8, wherein the third support portion includes a one-end portion connected to the lifting/lowering module, a the-other-end portion connected to the coupler fixing module, and a bent portion formed between the one-end portion and the the-other-end portion.

Claim 10. The integrated coupling module according to claim 1 comprising a sensing module sensing a position and a tilt of the cap, wherein the sensing module includes a fourth support portion connected to the coupler fixing module, a first sensing unit disposed on the fourth support portion to sense the position of the cap, and a second sensing unit disposed on the fourth support portion to sense the tilt of the cap.

Claim 11. The integrated coupling module according to claim 1, wherein the cap gripping unit includes a plurality of slits into which protrusions of the cap are inserted and a latch unit to be coupled to the protrusions inserted into the slits.

Claim 12. A coupling method comprising:
separating a cap from a container by rotating a cap

gripping unit at a first position;

withdrawing the cap gripping unit from the first position and aligning a coupler disposed over the cap gripping unit with an outlet of the container;

discharging a liquid stored in the container by inserting the coupler into the outlet;

fastening the cap to the container by returning the cap gripping unit to the first position; and

wherein, in the step of separating the cap, the coupler is disposed over the cap gripping unit and the cap gripping unit and the coupler are disposed to be vertically overlapped.