

[DESCRIPTION]

[Invention Title]

TABLE MODULE AND APPARATUS FOR AUTOMATICALLY EXCHANGING CONVERSION KIT

[Technical Field]

The present application relates to a table module and an apparatus for automatically exchanging a conversion kit.

[Background Art]

A package manufacturing system may manufacture a semiconductor package by sequentially performing a cutting process of cutting a strip having a plurality of packages into individual packages, a cleaning process of cleaning the packages cut by the cutting process, a drying process of drying the packages cleaned by the cleaning process, a package inspection process of inspecting whether the completely dried package is defective, and a off-load process of sorting the packages that have passed the defect inspection and the packages that cannot pass the defect inspection based on the inspection result.

In general, the package manufacturing system includes a table module on which the strip or the package is seated. Upper plates of the table module need to be changed in accordance with the sizes of the individual packages that may vary depending on manufacturers or product properties. In the related art, when the size of the package is changed, the upper plate of the table module on which the package is seated needs to be changed manually by an operator. Because a replacement rate and a replacement time are more significant than necessary depending on the operator's skill, there is a problem in that an operational yield decreases, and a degree of completion of the replacement

operation is not reliable.

The background art of the present application is disclosed in Korean Patent No. 10-0920934.

[Disclosure]

[Technical Problem]

The present application has been made in an effort to solve the above-mentioned problems in the related art, and an object of the present application is to provide a system for automatically exchanging a conversion kit, a table module, and an apparatus for automatically exchanging a conversion kit, in which upper plates of the table module may be automatically changed.

However, technical problems to be solved by the exemplary embodiment of the present application are not limited to the aforementioned technical problem, and other technical problems may be present.

[Technical Solution]

As a technical solution for solving the above-mentioned technical problems, a system for automatically exchanging a conversion kit according to a first aspect of the present application may include: a package cutting device configured to cut a strip into packages; a drying device configured to dry the packages; a vision table on which the packages are seated; and a picker device configured to hold the package by suction and convey the package between the package cutting device, the drying device, and the vision table, in which the picker device may dispose or remove a conversion kit for holding the package by suction on/from the package cutting device, the drying device, the vision table, and the picker device.

In addition, in the system for automatically exchanging a conversion kit

according to the embodiment of the present application, the picker device may include: a first picker module configured to convey the strip to the package cutting device; a second picker module configured to convey the package from the package cutting device to the drying device; and a third picker module configured to convey the package from the drying device to the vision table, and each of the first to third picker modules may remove the conversion kit disposed previously on the package cutting device, the drying device, or the vision table or dispose a new conversion kit on the package cutting device, the drying device, or the vision table.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the second picker module may convey the conversion kit between the package cutting device and the drying device, and the third picker module may convey the conversion kit between the drying device and the vision table.

In addition, the system for automatically exchanging a conversion kit according to the embodiment of the present application further includes a loading/unloading device configured to prepare the conversion kit, the first picker module may be supplied with the conversion kit from the loading/unloading device and place the conversion kit on the package cutting device, the second picker module may pick up the conversion kit placed on the package cutting device and place the conversion kit on the drying device, and the third picker module may pick up the conversion kit placed on the drying device and place the conversion kit on the vision table.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the third picker module may place the conversion kit on the vision table and then additionally pick up the conversion

kit placed on the drying device, and the second picker module may place the conversion kit on the drying device and then additionally pick up the conversion kit placed on the package cutting device.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the first picker module may pick up the conversion kit placed on the package cutting device and convey the conversion kit to the loading/unloading device, the second picker module may pick up the conversion kit placed on the drying device and place the conversion kit on the package cutting device, and the third picker module may pick up the conversion kit placed on the vision table and place the conversion kit on the drying device.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the conversion kit of each of the vision table, the drying device, the third picker module, and the first picker module may be different in type from the conversion kit of the package cutting device.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, each of the package cutting device, the drying device, the vision table, and the picker device may include the conversion kit, and a negative pressure transfer plate structure configured to hold the conversion kit by suction and allow a negative pressure generator to communicate with a plurality of vacuum holes of the conversion kit.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the conversion kit is fixed to the negative pressure transfer plate when the negative pressure transfer plate holds the conversion kit by vacuum suction, and the conversion kit may be removed from the

negative pressure transfer plate when the vacuum suction of the negative pressure transfer plate to the conversion kit is released.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the negative pressure transfer plate structure may include: a product depressed portion made by depressing a portion of the negative pressure transfer plate structure facing a portion of the conversion kit having the plurality of the vacuum holes, the product depressed portion being configured to transmit an application of negative pressure and a release of negative pressure made by the negative pressure generator to the vacuum holes; and a kit depressed portion made by depressing a portion of the negative pressure transfer plate structure corresponding to at least a part of a rim portion of the conversion kit, the kit depressed portion being configured such that the vacuum suction is generated therein to the conversion kit.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the kit depressed portion may have a cross section having a long hole shape extending in a longitudinal direction of the table plate structure.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the negative pressure transfer plate structure may include a protruding protrusion, and the conversion kit may have a hole into which the protrusion is at least partially inserted.

A table module according to a second aspect of the present application may include: a conversion kit having a plurality of vacuum holes formed in a Z-axis direction; and a table negative pressure transfer plate structure having the other surface in the Z-axis direction on which the conversion kit is disposed, the table negative pressure transfer

plate structure being configured to allow a negative pressure generator to communicate with the vacuum holes, in which the table negative pressure transfer plate structure is configured to hold the conversion kit by vacuum suction, in which the conversion kit is fixed to the table negative pressure transfer plate structure when the table negative pressure transfer plate structure holds the conversion kit by vacuum suction, and in which the conversion kit is removable from the table negative pressure transfer plate structure when the table negative pressure transfer plate structure releases the vacuum suction to the conversion kit.

In addition, in the table module according to the embodiment of the present application, the table negative pressure transfer plate structure may include: a table product depressed portion made by depressing, toward one side in the Z-axis direction, a portion of the table negative pressure transfer plate structure facing a portion of the conversion kit having a plurality of the vacuum holes, the table product depressed portion being configured to transmit an application of negative pressure and a release of negative pressure made by the negative pressure generator to the vacuum holes; and a table kit depressed portion made by depressing, toward one side in the Z-axis direction, a portion of the table negative pressure transfer plate structure corresponding to at least a part of a rim portion of the conversion kit, the table kit depressed portion being configured such that the vacuum suction is generated therein to the conversion kit.

In addition, in the table module according to the embodiment of the present application, the kit depressed portion may have a cross section having a long hole shape extending in the longitudinal direction of the conversion kit.

In addition, in the table module according to the embodiment of the present application, the table negative pressure transfer plate structure may include a protrusion

protruding toward the other side in the Z-axis direction, and the conversion kit may have a hole into which the protrusion is at least partially inserted.

An apparatus for automatically exchanging a conversion kit according to a third aspect of the present application includes: a table module according to the first aspect of the present application; and a picker module configured to separate a conversion kit disposed on the table negative pressure transfer plate structure from the table negative pressure transfer plate structure or place a new conversion kit on the table negative pressure transfer plate structure.

In addition, in the apparatus for automatically exchanging a conversion kit according to the embodiment of the present application, the picker module may include a picker negative pressure transfer plate structure having one side in the Z-axis direction on which the conversion kit is mounted, and the picker negative pressure transfer plate structure may be configured to hold the conversion kit by vacuum suction.

In addition, in the apparatus for automatically exchanging a conversion kit according to the embodiment of the present application, the picker negative pressure transfer plate structure may include: a picker product depressed portion made by depressing, toward the other side in the Z-axis direction, a portion of the picker negative pressure transfer plate structure facing a portion of the conversion kit having the plurality of the vacuum holes, the picker negative pressure transfer plate structure being configured to transmit an application of negative pressure and a release of negative pressure made by the negative pressure generator to the vacuum holes; and a picker kit depressed portion made by depressing, toward the other side in the Z-axis direction, a portion of the picker negative pressure transfer plate structure facing a rim portion of the conversion kit, the picker kit depressed portion being configured to hold the conversion kit by suction.

In addition, in the apparatus for automatically exchanging a conversion kit according to the embodiment of the present application, the picker kit depressed portion may have a cross section having a long hole shape extending in the longitudinal direction of the conversion kit.

In addition, in the apparatus for automatically exchanging a conversion kit according to the embodiment of the present application, the picker negative pressure transfer plate structure may include a protrusion protruding toward one side in the Z-axis direction, and the table negative pressure transfer plate structure may have a hole into which the protrusion is at least partially inserted.

In addition, in the apparatus for automatically exchanging a conversion kit according to the embodiment of the present application, the conversion kit may further include a pair of protruding portions protruding outward from two opposite lateral surfaces of the conversion kit and extending in a longitudinal direction of the conversion kit, and the picker negative pressure transfer plate structure may further include a pair of fastening portions protruding toward one side in the Z-axis direction from the two opposite lateral surfaces of the picker negative pressure transfer plate structure and configured to be fitted with the pair of protruding portions.

In addition, in the apparatus for automatically exchanging a conversion kit according to the embodiment of the present application, the picker module may further include a conversion kit, and in a state in which the conversion kit of the picker module is not mounted on the picker negative pressure transfer plate structure, the picker module may separate the conversion kit disposed on the table negative pressure transfer plate structure or place a new conversion kit on the table negative pressure transfer plate structure.

A system for automatically exchanging a conversion kit according to a fourth aspect of the present application may include: a package cutting device configured to cut a strip into packages; a drying device configured to dry the packages; a vision table on which the packages are seated; and a picker part disposed at the other side in a Z-axis direction of the package cutting device, the drying device, and the vision table and configured to convey the package between the package cutting device, the drying device, and the vision table, in which each of the package cutting device, the drying device, the vision table, and the picker part may include a suction module configured to hold the package by suction, the suction module may include a clamp capable of holding a conversion kit having a plurality of vacuum holes formed in the Z-axis direction, and the picker part may dispose or remove the conversion kit on/from the package cutting device, the drying device, the vision table, and the picker part.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the suction module may include the conversion kit; a negative pressure transfer plate structure having one surface in the Z-axis direction on which the conversion kit is disposed, and the negative pressure transfer plate structure being configured to allow a negative pressure generator to communicate with the vacuum holes of the conversion kit; the clamp provided at one side in the Z-axis direction of the negative pressure transfer plate structure and configured to hold the conversion kit in a basic state; and a protruding portion protruding from one surface in the Z-axis direction of the negative pressure transfer plate structure and configured to guide a neighboring clamp of a neighboring suction module being adjacent to and facing the suction module in the Z-axis direction to an outward movement state.

In addition, in the system for automatically exchanging a conversion kit

according to the embodiment of the present application, the picker part may be provided such that the suction module of the picker part faces the suction module of each of the package cutting device, the drying device, and the vision table.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the clamp may include: a clamp unit at least partially protruding from one surface in the Z-axis direction of the negative pressure transfer plate structure and having a protrusion protruding inward toward a portion where the conversion kit is disposed; a hinge unit configured to allow the clamp unit to rotate about an axis in a longitudinal direction of the negative pressure transfer plate structure; and an elastic member configured to provide an inward external force to the clamp unit.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the picker part may include: a first picker device configured to convey the conversion kit between the package cutting device and a loading/unloading device configured to prepare the conversion kit; a second picker device configured to convey the conversion kit between the package cutting device and the drying device; and a third picker device configured to convey the conversion kit between the drying device and the vision table, and each of the first to third picker devices may remove the conversion kit disposed previously on the package cutting device, the drying device, or the vision table and dispose a new conversion kit on the package cutting device, the drying device, or the vision table.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the clamp of the first picker device may further include a cylinder configured to rotate the hinge unit to rotate the

clamp unit.

In addition, in the system for automatically exchanging a conversion kit according to the embodiment of the present application, the clamp of each of the second and third picker devices may have a guide groove formed in an inner portion of the protrusion of the clamp unit, and the guide groove guides the entry of the neighboring suction module into the protruding portion.

A suction module according to a fifth aspect of the present application may include: a conversion kit having a plurality of vacuum holes formed in a Z-axis direction; a negative pressure transfer plate structure having one surface in the Z-axis direction on which the conversion kit is disposed, the negative pressure transfer plate structure being configured to allow a negative pressure generator to communicate with the vacuum holes of the conversion kit; a clamp at least partially protruding toward one side in the Z-axis direction of the negative pressure transfer plate structure and configured to hold the conversion kit in a basic state; and a protruding portion at least partially protruding toward one side in the Z-axis direction of the negative pressure transfer plate structure and configured to guide a neighboring clamp of a neighboring suction module being adjacent to and facing the suction module in the Z-axis direction to an outward movement state.

In the suction module according to the embodiment of the present application, the clamp may include: a clamp unit at least partially protruding from one surface in the Z-axis direction of the negative pressure transfer plate structure and having a protrusion protruding inward toward a portion where the conversion kit is disposed; a hinge unit configured to allow the clamp unit to rotate about an axis in a longitudinal direction of the negative pressure transfer plate structure; and an elastic member configured to provide an inward external force to the clamp unit.

In the suction module according to the embodiment of the present application, a depressed portion may be formed in an outer surface of the conversion kit, the protrusion of the clamp unit may be caught by and fastened to the depressed portion, and the clamp unit may have a depressed portion to hold the conversion kit in the basic state.

In the suction module according to the embodiment of the present application, a guide groove may be formed in an inner portion of the protrusion of the clamp unit, and the guide groove may guide the entry of the neighboring suction module into the protruding portion.

In the suction module according to the embodiment of the present application, the clamp unit is formed at a position corresponding to the protruding portion of the neighboring suction module. When the suction module and the neighboring suction module approach each other in the Z-axis direction, the protruding portion of the neighboring suction module enters the guide groove, and an outward external force is applied to the clamp unit, such that the clamp unit switches to the outward movement state. The elastic member may be compressed by the outward external force.

In the suction module according to the embodiment of the present application, the protruding portion may have a wedge shape.

In the suction module according to the embodiment of the present application, the clamp unit may release the conversion kit in the outward movement state.

In the suction module according to the embodiment of the present application, the negative pressure transfer plate structure may hold the conversion kit by vacuum suction.

A picker device according to a sixth aspect of the present application may include the suction module according to the fifth aspect of the present application.

A table part according to a seventh aspect of the present application may include the suction module according to the fifth aspect of the present application.

A suction module according to an eighth aspect of the present application may include: a conversion kit having a plurality of vacuum holes formed in a Z-axis direction; a negative pressure transfer plate structure having one surface in the Z-axis direction on which the conversion kit is disposed, the negative pressure transfer plate structure being configured to allow a negative pressure generator to communicate with the vacuum holes of the conversion kit; a clamp provided on one surface in the Z-axis direction of the negative pressure transfer plate structure and configured to hold the conversion kit in a basic state; and a protruding portion protruding from one surface in the Z-axis direction of the negative pressure transfer plate structure and configured to guide a neighboring clamp of a neighboring suction module being adjacent to and facing the suction module in the Z-axis direction to an outward movement state. The clamp may include a cylinder configured to guide the outward movement state.

In the suction module according to the embodiment of the present application, the clamp may include: a clamp unit protruding from one surface in the Z-axis direction of the negative pressure transfer plate structure and having a protrusion protruding inward toward a portion where the conversion kit is disposed; a hinge unit configured to allow the clamp unit to rotate about an axis in a longitudinal direction of the negative pressure transfer plate structure; and an elastic member configured to provide an inward external force to the clamp unit. The cylinder may rotate the hinge unit to rotate the clamp unit.

In the suction module according to the embodiment of the present application, a depressed portion may be formed in an outer surface of the conversion kit, the protrusion of the clamp unit may be caught by and fastened to the depressed portion, and the clamp

unit may be caught by and fastened to the depressed portion to hold the conversion kit in the basic state.

In the suction module according to the embodiment of the present application, the protruding portion may be formed at a position corresponding to the neighboring clamp, and when the suction module and the neighboring suction module approach each other in the Z-axis direction, the protruding portion enters the guide groove of the neighboring clamp unit and applies an outward external force to the neighboring clamp unit.

In the suction module according to the embodiment of the present application, the protruding portion may have a wedge shape.

In the suction module according to the embodiment of the present application, the clamp unit switches to the outward movement state by being moved outward by being rotated by the external force applied by the cylinder, and the elastic member may be compressed by the outward external force made by the outward movement of the clamp unit.

In the suction module according to the embodiment of the present application, the clamp unit may release the conversion kit in the outward movement state.

In the suction module according to the embodiment of the present application, the clamp unit may have a receiving portion capable of accommodating the protruding portion of the neighboring suction module.

In the suction module according to the embodiment of the present application, the negative pressure transfer plate structure may hold the conversion kit by vacuum suction.

A picker device according to a ninth aspect of the present application includes

the suction module according to the eighth aspect of the present application.

The technical solution is just illustrative but should not be interpreted as being intended to limit the present application. In addition to the above-mentioned exemplary embodiment, additional exemplary embodiments may be present in the drawings and the detailed description of the invention.

[Advantageous Effects]

According to the technical solution of the present application, the conversion kit may be mounted on the negative pressure transfer plate structure by the vacuum suction of the negative pressure transfer plate structure. Therefore, the conversion kit and the negative pressure transfer plate structure may be automatically fixed and released by setting whether to generate the vacuum suction. Therefore, the picker module may separate the conversion kit from the negative pressure transfer plate structure by holding the conversion kit by vacuum suction and convey the conversion kit while the fixing and the release are automatically performed, such that the previously disposed conversion kit may be automatically removed. When the picker module may convey and place a new conversion kit, the negative pressure transfer plate structure may hold the conversion kit by vacuum suction and automatically fix the position of the conversion kit, such that the new conversion kit may be automatically disposed and fixed.

In addition, the first picker module, the second picker module, and the third picker module may convey the conversion kits in relays and mount the conversion kits on the vision table, the third picker module, the drying device, the second picker module, and the package cutting device sequentially. The conversion kits may be efficiently placed even though the conversion kit of each of the vision table, the third picker module, the drying device, and the second picker module is different in type from the conversion

kit of the package cutting device.

In addition, since the conversion kit and the negative pressure transfer plate structure are fixed to each other by vacuum suction, the conversion kit and the negative pressure transfer plate structure may be released, and the conversion kit may be separated from the negative pressure transfer plate structure when the vacuum suction is stopped due to an unexpected problem. However, according to the technical solution of the present application, the picker module may have the fastening portion, and the conversion kit and the negative pressure transfer plate structure may be physically fixed by the fastening portion. As a result, even though the vacuum suction is stopped, the conversion kit may be prevented from being separated from the negative pressure transfer plate structure, thereby preventing damage to the conversion kit.

In addition, since the conversion kit is changed automatically, a speed of changing the conversion kit may be increased, an overall yield of the package manufacturing equipment may be improved, and a degree of completion of the operation of changing the conversion kit may be improved.

In addition, since the conversion kit and the negative pressure transfer plate structure are fixed to each other by vacuum suction, the conversion kit and the negative pressure transfer plate structure may be released, and the conversion kit may be separated from the negative pressure transfer plate structure when the vacuum suction is stopped due to an unexpected problem. However, according to the technical solution of the present application, the clamp physically holds the conversion kit, and the clamp releases the conversion kit by the cylinder or by the protruding portion of the neighboring suction module when the neighboring suction modules approach each other in the Z-axis direction. As a result, even though the vacuum suction is stopped due to an unexpected problem,

the conversion kit may be prevented from being unexpectedly separated from the negative pressure transfer plate structure, and as necessary, the conversion kit may be easily released and removed.

In addition, according to the technical solution of the present application, since the conversion kit is held by the clamp and fixed to the negative pressure transfer plate structure, it is possible to prevent the conversion kit from being moved upward and downward on the negative pressure transfer plate structure or deviating from the negative pressure transfer plate structure when a holding air is supplied to the vacuum holes of the conversion kit.

In addition, since the conversion kit is physically held by the clamp, a coupling force between the conversion kit and the negative pressure transfer plate structure may be increased even though a size of the conversion kit is decreased, a size of a portion (bezel portion) of the conversion kit, which is held by vacuum suction, is decreased, or a size of the conversion kit is minimized to be at least equal to a size of the strip.

[Description of Drawings]

FIG. 1 is a schematic perspective view of a system for automatically exchanging a conversion kit according to a first embodiment of the present application.

FIG. 2 is a schematic perspective view of the system for automatically exchanging a conversion kit according to the first embodiment of the present application when viewed at an angle different from an angle in FIG. 1.

FIG. 3 is a schematic perspective view of a table module of the system for automatically exchanging a conversion kit according to the first embodiment of the present application.

FIG. 4 is a schematic front view and a partial cross-sectional view of the table

module of the system for automatically exchanging a conversion kit according to the first embodiment of the present application.

FIG. 5 is a schematic perspective view of a negative pressure transfer plate structure of the system for automatically exchanging a conversion kit according to the first embodiment of the present application.

FIG. 6 is a schematic perspective view of a picker module of the system for automatically exchanging a conversion kit according to the first embodiment of the present application.

FIG. 7 is a schematic perspective view of the picker module of the system for automatically exchanging a conversion kit according to the first embodiment of the present application when viewed at an angle different from an angle in FIG. 6.

FIG. 8 is a schematic perspective view of the picker module of the system for automatically exchanging a conversion kit according to the first embodiment of the present application, which has no mounted conversion kit.

FIG. 9 is a schematic front view and a partial cross-sectional view of the picker module of the system for automatically exchanging a conversion kit according to the first embodiment of the present application.

FIG. 10 is a schematic front view of a table module of a flipper module of a drying device of the system for automatically exchanging a conversion kit according to the first embodiment of the present application.

FIG. 11 is a schematic perspective view of a suction module according to the first embodiment of the present application which is applied to a package cutting device, a drying device, and a vision table of a system for automatically exchanging a conversion kit according to a second embodiment of the present application.

FIG. 12A is a schematic front view, that is, a partial cross-sectional view of the suction module according to the first embodiment of the present application which is applied to the package cutting device, the drying device, and the vision table of the system for automatically exchanging a conversion kit according to the second embodiment of the present application.

FIG. 12B is an enlarged view of a part of FIG. 12A.

FIG. 12C is an enlarged view of a part of FIG. 12A.

FIG. 12D is a conceptual perspective view in which a part of a product is removed to explain a clamp unit and an elastic member of the suction module according to the first embodiment of the present application which is applied to the package cutting device, the drying device, and the vision table of the system for automatically exchanging a conversion kit according to the second embodiment of the present application.

FIG. 13 is a schematic perspective view of a negative pressure transfer plate structure of the suction module according to the first embodiment of the present application which has no mounted conversion kit and is applied to the package cutting device, the drying device, and the vision table of the system for automatically exchanging a conversion kit according to the second embodiment of the present application.

FIG. 14 is a schematic perspective view of a second picker device (or a third picker device) of the system for automatically exchanging a conversion kit according to the second embodiment of the present application.

FIG. 15 is a schematic perspective view of the second picker device (or the third picker device) of the system for automatically exchanging a conversion kit according to the second embodiment of the present application when viewed at an angle different from an angle in FIG. 14.

FIG. 16 is a schematic perspective view of the second picker device (or the third picker device) of the system for automatically exchanging a conversion kit according to the second embodiment of the present application, which has no mounted conversion kit.

FIG. 17 is a schematic perspective view of a first picker device of the system for automatically exchanging a conversion kit according to the second embodiment of the present application.

FIG. 18 is a schematic perspective view of the first picker device of the system for automatically exchanging a conversion kit according to the second embodiment of the present application when viewed at an angle different from an angle in FIG. 17.

FIG. 19 is a schematic perspective view of the first picker device of the system for automatically exchanging a conversion kit according to the second embodiment of the present application, which has no mounted conversion kit.

FIG. 20 is a schematic front view and a partial cross-sectional view of the first picker device of the system for automatically exchanging a conversion kit according to the second embodiment of the present application.

[Mode for Invention]

Hereinafter, exemplary embodiments of the present application will be described in detail with reference to the accompanying drawings so that those with ordinary skill in the art to which the present application pertains may easily carry out the exemplary embodiments. However, the present application may be implemented in various different ways and is not limited to the exemplary embodiments described herein. A part irrelevant to the description will be omitted in the drawings in order to clearly describe the present application, and similar constituent elements will be designated by similar reference numerals throughout the specification.

Throughout the specification of the present application, when one constituent element is referred to as being "connected to" another constituent element, one constituent element can be "directly connected to" the other constituent element, and one constituent element can also be "electrically connected to" the other element with other elements therebetween.

Throughout the specification, when one member is disposed "on", "at an upper side of", "at an upper end of", "below", "at a lower side of", or "at a lower end of" another member in the present specification of the present application, this includes not only a case where one member is brought into contact with another member, but also a case where still another member is present between the two members.

Throughout the specification of the present application, unless explicitly described to the contrary, the word "comprise" or "include" and variations, such as "comprises", "comprising", "includes" or "including", will be understood to imply the inclusion of stated constituent elements, not the exclusion of any other constituent elements.

The present application relates to a system for automatically exchanging a conversion kit, a table module, and an apparatus for automatically exchanging a conversion kit.

First, a system for automatically exchanging a conversion kit according to a first embodiment of the present application (hereinafter, referred to as 'the present first system') will be described.

For reference, in the present application, a picker module may be a concept including one or more of first to third picker modules 41, 42, and 43, a negative pressure transfer plate structure 112a or 112b may be a concept including one or both of a table

negative pressure transfer plate structure 112a of a table module 11 and a picker negative pressure transfer plate structure 112b of the picker module 41, a product depressed portion may be a concept including one or both of a table product depressed portion 1121a and a picker product depressed portion 1121b, and a kit depressed portion may be a concept including one or both of a table kit depressed portion 1122a and a picker kit depressed portion 1122b.

Referring to FIGS. 1 and 2, the present first system includes a package cutting device 1 that cuts a strip into packages. The package cutting device 1 may include the table module 11. The strip loaded onto the table module 11 of the package cutting device 1 may be cut into individual packages using a non-illustrated blade.

In addition, referring to FIGS. 1 and 2, the present first system includes a drying device 2 that dries the packages. The packages cut by the package cutting device 1 may be conveyed to the drying device 2, cleaned, and then dried. The drying device 2 may include a loading module 21 and a flipper module 22.

In addition, referring to FIGS. 1 and 2, the present first system may include a vision table 3 on which the packages are seated. The packages dried by the drying device 2 may be seated on the vision table 3 before an inspection process.

In addition, referring to FIGS. 1 and 2, the present first system includes a picker device 4 that holds the strip or the package by suction and conveys the strip or the package between the package cutting device 1, the drying device 2, and the vision table 3. Referring to FIG. 1, the picker device 4 may include the first picker module 41, the second picker module 42, and the third picker module 43. The first picker module 41 may convey the strip to the package cutting device 1, the second picker module 42 may convey the package from the package cutting device 1 to the drying device 2, and the third picker

module 43 may convey the package from the drying device 2 to the vision table 3.

Each of the package cutting device 1, the drying device 2, the vision table 3, and the picker device 4 may include a conversion kit 111, and the negative pressure transfer plate structure 112a or 112b on which the conversion kit 111 is mounted. This configuration will be specifically described below.

Referring to FIGS. 1 and 2, each of the package cutting device 1, the drying device 2, and the vision table 3 may include the table modules 11. For example, the package cutting device 1 may include the two table modules 11, the drying device 2 may include the two table modules 11, and the vision table 3 may include the two table modules 11. The strip or the package may be placed on the table module 11. For example, the strip may be placed on the table module 11 of the package cutting device 1, and the packages may be placed on the table modules 11 of the drying device 2 and the vision table 3. More specifically, the first picker module 41 may be supplied with the strip from a loading/unloading device 5 and place the strip on the table module 11 of the package cutting device 1, the strip may be cut by the blade in a state of being placed on the table module 11 of the package cutting device 1, the plurality of packages made by the cutting process may be conveyed by the second picker module 41 and loaded onto the table module 11 of the drying device 2 (a cleaning process may be performed during the process of conveying the packages), and the dried packages may be held by the third picker module 43 by a vacuum and placed on the table module 11 of the vision table 3.

Referring to FIGS. 3 and 4 together, the table module 11 may include the conversion kit 111 having a plurality of vacuum holes 1111 formed in a Z-axis direction. The strip or the package placed on the table module 11 may be placed on the conversion kit 111. For example, the conversion kit 111 may include a first plate 111a1 and a second

plate 111a2. Each of the vacuum holes 1111 may include a first tubular portion 11111 formed by penetrating the first plate 111a1 in the Z-axis direction, and a second tubular portion 11112 extending from the first tubular portion 11111 and formed by penetrating the second plate 111a2 in the Z-axis direction. For reference, referring to FIG. 4, in the description of the present application, a direction in relation to one side in the Z-axis direction and the other side in the Z-axis direction of the conversion kit 111 of the present application may be set such that based on the portion between the first plate 111a1 and the second plate 111a2 of the conversion kit 111, a direction toward the first plate 111a1 is set as the other side in the Z-axis direction, and a direction toward the second plate 111a2 is set as one side in the Z-axis direction. Therefore, one surface in the Z-axis direction of the conversion kit 111 may mean a surface on which the second tubular portions 11112 are formed, and the other surface in the Z-axis direction of the conversion kit 111 may mean a surface on which the first tubular portions 11111 are formed (a surface that comes into contact with the strip or the package when holding the strip or the package).

In addition, referring to FIGS. 3 to 5, the table module 11 may include the negative pressure transfer plate structure 112a (hereinafter, the negative pressure transfer plate structure 112a of the table module 11 is referred to as a 'table negative pressure transfer plate structure 112a'). The table negative pressure transfer plate structure 112a may hold the conversion kit 111 by suction and allow a negative pressure generator to communicate with the plurality of vacuum holes 1111 of the conversion kit 111.

In addition, referring to FIGS. 3 and 4, the conversion kit 111 may be disposed on the other surface in the Z-axis direction of the table negative pressure transfer plate structure 112a, and the table negative pressure transfer plate structure 112a may allow the

negative pressure generator (not illustrated) positioned at a lower side of the table negative pressure transfer plate structure 112a (at one side in the Z-axis direction) to communicate with the vacuum holes 1111. For example, referring to FIGS. 4 and 5 together, the table negative pressure transfer plate structure 112a may include the table product depressed portion 1121a made by depressing, toward one side in the Z-axis direction, a portion facing the portion of the conversion kit 111 having the plurality of vacuum holes 1111. The table product depressed portion 1121a may transmit the application of negative pressure and the release of the negative pressure made by the negative pressure generator to the vacuum holes 1111. Specifically, although not specifically illustrated in the drawings, the table negative pressure transfer plate structure 112a may include a communication port that allows the table product depressed portion 1121a to communicate with the negative pressure generator. When the negative pressure generator draws in a gas (the negative pressure is generated), the gas in the table product depressed portion 1121a is introduced into the side of the negative pressure generator, and therefore, the gas in the vacuum holes 1111 is introduced into the side of the negative pressure generator through the table product depressed portion 1121a. Therefore, the negative pressure is formed in the vacuum holes 1111, such that the package or the strip placed on the conversion kit 111 may be held by suction. In addition, when the negative pressure generator releases the negative pressure (stops generating the negative pressure), the generation of the negative pressure in the vacuum holes 1111 communicating with the negative pressure generator through the table negative pressure transfer plate structure 112a may be stopped, and the process of holding the strip or the package using the vacuum holes 1111 may be stopped.

In addition, referring to FIGS. 4 and 5 together, the table negative pressure

transfer plate structure 112a may include table kit depressed portions 1122a made by depressing, toward one side in the Z-axis direction, portions facing at least a part of a rim portion of the conversion kit 111, and the conversion kit 111 is held by the table kit depressed portions 1122a by vacuum suction. Although not illustrated in detail in the drawings, the table negative pressure transfer plate structure 112a may include a communication port that allows the table kit depressed portion 1122a to communicate with the negative pressure generator. When the negative pressure generator generates the negative pressure, the gas in the table kit depressed portion 1122a is introduced into the side of the negative pressure generator, and the negative pressure is formed in the table kit depressed portion 1122a, such that the table kit depressed portion 1122a may hold a lower surface of the rim portion of the conversion kit 111 by suction. In addition, when the negative pressure generator stops generating the negative pressure (releases the negative pressure), the negative pressure in the table kit depressed portion 1122a may be released, and the process of holding the conversion kit 111 may be stopped.

Therefore, when the table negative pressure transfer plate structure 112a holds the conversion kit 111 by vacuum suction, the position of the conversion kit 111 may be fixed by the table negative pressure transfer plate structure 112a. In addition, when the table negative pressure transfer plate structure 112a stops the operation of holding the conversion kit 111 by vacuum suction, the conversion kit 111 may be removed from the table negative pressure transfer plate structure.

The table kit depressed portion 1122a may have a cross section with a long hole shape extending in a longitudinal direction (an X-axis direction in FIG. 5) of the conversion kit 111.

In addition, referring to FIGS. 6 and 7, each of the first to third picker modules

41, 42, and 43 may include a negative pressure transfer plate structure on which the conversion kit 111 is mounted (hereinafter, the negative pressure transfer plate structure of each of the first to third picker modules 41, 42, and 43 is referred to as a 'picker negative pressure transfer plate structure 112b'). The picker negative pressure transfer plate structure 112b holds the conversion kit 111 by vacuum suction, such that the conversion kit 111 may be mounted on the picker negative pressure transfer plate structure 112b. Therefore, the conversion kit 111 may be mounted at one side in the Z-axis direction of the picker negative pressure transfer plate structure 112b (at the lower side in FIG. 7).

Specifically, referring to FIG. 8, the picker negative pressure transfer plate structure 112b may include a picker product depressed portion 1121b, and the picker product depressed portion 1121b is made by depressing, toward the other side in the Z-axis direction, at least a part of a portion of the picker negative pressure transfer plate structure 112b which faces the portion of the conversion kit 111 having the plurality of vacuum holes 1111. The picker product depressed portion 1121b transmits the application of negative pressure and the release of negative pressure made by the negative pressure generator to the vacuum holes 1111. Although not illustrated in detail in the drawings, the picker negative pressure transfer plate structure 112b may include a communication port that allows the picker product depressed portion 1121b to communicate with the negative pressure generator. Therefore, when the conversion kit 111 is mounted (normally mounted) on the picker negative pressure transfer plate structure 112b so that one surface in the Z-axis direction of the conversion kit 111 faces one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b, the conversion kit 111 may hold the package by vacuum suction by the operations of the vacuum holes 1111 and the picker product depressed portion 1121b of the picker

negative pressure transfer plate structure 112b. Because the contents related to the communication port and the picker product depressed portion 1121b are identical to the contents of the table negative pressure transfer plate structure 112a described above, a detailed description thereof will be omitted. In addition, for reference, when the conversion kit 111 to be mounted on the picker negative pressure transfer plate structure 112b is provided to the picker module, the picker module receives the conversion kit 111 in a state in which one surface in the Z-axis direction of the conversion kit 111 is disposed to be directed toward the other side in the Z-axis direction. Therefore, the conversion kit 111 may be normally mounted so that one surface in the Z-axis direction of the conversion kit 111 faces one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b, such that the picker kit depressed portion 1122b may hold the conversion kit 111 by vacuum suction. According to the embodiment of the present application, the conversion kit 111 to be mounted on the picker module may be accommodated in a magazine so that one surface in the Z-axis direction of the conversion kit 111 is directed upward, and the conversion kit 111 may be withdrawn from the magazine.

In addition, the picker negative pressure transfer plate structure 112b may include picker kit depressed portions 1122b made by depressing, toward the other side in the Z-axis direction, portions of the picker negative pressure transfer plate structure 112b facing the rim portion of the conversion kit 111, and the conversion kit 111 may be held by the picker kit depressed portions 1122b by suction. In addition, the picker negative pressure transfer plate structure 112b may include a communication port that allows the picker kit depressed portion 1122b to communicate with the negative pressure generator. Because the operations and the like of the communication port and the picker kit depressed

portions 1122b are identical to those of the table negative pressure transfer plate structure 112a described above, a detailed description thereof will be omitted.

With the above-mentioned configuration, when the picker negative pressure transfer plate structure 112b holds the conversion kit 111 by vacuum suction, the position of the conversion kit 111 may be fixed by the picker negative pressure transfer plate structure 112b. In addition, when the picker negative pressure transfer plate structure 112b stops the operation of holding the conversion kit 111 by vacuum suction, the conversion kit 111 may be removed from the picker negative pressure transfer plate structure.

For reference, when the conversion kit 111 is mounted (normally mounted) on the picker negative pressure transfer plate structure 112b so that one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b faces one surface in the Z-axis direction of the conversion kit 111, the picker module may hold the semiconductor or the strip. In addition, in a state in which the conversion kit 111 is not mounted on the picker negative pressure transfer plate structure 112b, the picker negative pressure transfer plate structure 112b may convey the conversion kit 111. In this case, the picker negative pressure transfer plate structure 112b may allow the conversion kit 111 to be mounted on the picker negative pressure transfer plate structure 112b so that one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b faces the other surface in the Z-axis direction of the conversion kit 111, and then the picker negative pressure transfer plate structure 112b may convey the conversion kit 111.

The picker kit depressed portion 1122b may have a cross section with a long hole shape extending in the longitudinal direction of the conversion kit 111.

In the present first system, the picker device 4 dispose or remove the conversion

kit 111 for holding the package by suction on/from the package cutting device 1, the drying device 2, the vision table 3, and the picker device 4. Specifically, in the state in which the conversion kit 111 is not normally mounted on the negative pressure transfer plate structure 112a of each of the first to third picker modules 41, 42, and 43, each of the first to third picker modules 41, 42, and 43 may convey the conversion kit 111 while holding the conversion kit 111 by suction. In this case, the operation of conveying the conversion kit 111 while holding the conversion kit 111 by suction may mean that each of the first to third picker modules 41, 42, and 43 removes the conversion kit 111 disposed previously on the package cutting device 1, the drying device 2, or the vision table 3 or disposes a new conversion kit 111.

Specifically, the second picker module 42 may convey the conversion kit 111 between the package cutting device 1 and the drying device 2, and the third picker module 43 may convey the conversion kit 111 between the drying device 2 and the vision table 3.

In addition, the picker module (one or more of the first to third picker modules 41, 42, and 43) may convey the conversion kit 111 in the state in which the conversion kit 111 is not normally mounted on the picker negative pressure transfer plate 112a (in the state in which the conversion kit 111 is not mounted in such a way that one surface in the Z-axis direction of the conversion kit 111 faces one surface in the Z-axis direction of the picker negative pressure transfer plate 112a).

Hereinafter, first, the operation of the picker device 4 disposing the conversion kit 111 on the negative pressure transfer plate structure (table negative pressure transfer plate structure 112b) of the table module 11 of each of the package cutting device 1, the drying device 2, and the vision table 3 will be described.

Before performing the process of disposing the conversion kit 111 on the table

negative pressure transfer plate structure 112b of the table module 11, the table module 11 may be in a state in which the conversion kit 111 disposed previously on the table negative pressure transfer plate structure 112b has been removed. The process of removing the previously disposed conversion kit 111 will be described below.

As another example, referring to FIG. 1, the present first system may include the loading/unloading device 5 for preparing the conversion kit 111, and the first picker module 41 may receive the conversion kit 111 from the loading/unloading device 5 and place the conversion kit 111 on the package cutting device 1. In more detail, the conversion kit 111 required to be installed is withdrawn from the loading/unloading device 5 by a gripper (not illustrated), and the first picker module 41 moves downward and holds, by vacuum suction, the withdrawn conversion kit 111 positioned on a rail (not illustrated). According to the embodiment of the present application, conversion kit magazines for accommodating the plurality of conversion kits 111 may be mounted on the loading/unloading device 5. The conversion kit magazines may be managed by being divided into the magazine for accommodating the conversion kits to be mounted and the magazines for accommodating the retrieved conversion kits. In addition, the magazines may be divided depending on the types of conversion kits and the sizes of the packages and accommodate the plurality of sorted conversion kits.

In addition, the second picker module 42 may pick up the conversion kit 111 placed on the package cutting device 1 and place the conversion kit 111 on the drying device 2. In addition, the second picker module 42 may place the conversion kit 111 on the drying device 2 and then additionally pick up the conversion kit 111 placed on the package cutting device 1. In addition, the third picker module 43 may pick up the conversion kit 111 placed on the drying device 2 and place the conversion kit 111 on the

vision table 3. In addition, the third picker module 43 may place the conversion kit 111 on the vision table 3 and then additionally pick up the conversion kit 111 placed on the drying device 2.

More specifically, referring to FIG. 1, for example, it is assumed that two conversion kits 111 need to be placed on the vision table 3, the third picker module 43 needs to have one conversion kit 111, two conversion kits 111 need to be placed on the drying device 2, the second picker module 42 needs to have one conversion kit 111, and two conversion kits 111 need to be placed on the package cutting device 1. The first picker module 41 may receive the conversion kits 111 from the loading/unloading device 5 and place the conversion kits 111 one by one on the table modules 11 of the package cutting device 1 (a vacant one of the two table modules 11 of the package cutting device 1) sequentially 8 (2+1+2+1+2) times. The conversion kit 111 placed on the package cutting device 1 by the first picker module 41 first may be picked up by the second picker module 42 and then placed on the table module 11 of the drying device 2, and the third picker module 43 may pick up the first conversion kit 111 and place the first conversion kit 111 on the table module 11 of the vision table 3. The operation of conveying a second conversion kit 111 may also be performed while the operation of conveying the first conversion kit 111 is performed. The first picker module 41 may convey the second conversion kit 111 after conveying the first conversion kit 111. The second conversion kit 111 conveyed to the table module 11 of the package cutting device 1 by the first picker module 41 may be placed on the table module 11 of the drying device 42 by the second picker module 42 that has completed the operation of conveying the first conversion kit 111. Thereafter, the third picker module 43, which has completed the operation of conveying the first conversion kit 111, may place the second conversion kit 111 on the

other table module 11 of the vision table 3. As described above, the operation of conveying the eight conversion kits 111 may be continuously performed. In this process, when the operation of placing the conversion kit 111 on the table module 11 of the vision table 3 is completed, the third picker module 43 may normally mount a third conversion kit 111 on the picker negative pressure transfer plate structure 112b thereof. In this case, as described above, in order to normally mount the conversion kit 111 on the picker module, the picker module normally mount the conversion kit 111 so that one surface in the Z-axis direction of the conversion kit 111 faces one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b. Unlike the first conversion kit 111, the second conversion kit 111, a fourth conversion kit 111, a fifth conversion kit 111, a seventh conversion kit 111, and an eighth conversion kit 111, which will be described below, the third conversion kit 111 to be normally mounted on the picker negative pressure transfer plate structure 112b of the third picker module 43 may be conveyed to the package cutting device 1, in a state in which one surface in the Z-axis direction of the third conversion kit 111 is directed toward the other side in the Z-axis direction (the upper side), and placed on the drying device 2 via the second picker module 42. In addition, the fourth conversion kit 111 may be conveyed to the table module 11 of the package cutting device 1 by the first picker module 41 and then placed one of the two table modules 11 of the drying device 1 by the second picker module 42. The fifth conversion kit 111 may be conveyed to the table module 11 of the package cutting device 1 by the first picker module 41 and then placed on the other of the two table modules 11 of the drying device 1 by the second picker module 42. Therefore, the operation of the placing the conversion kits 111 on the drying device 2 may be completed. Thereafter, a sixth conversion kit 111 conveyed to the table module 11 of the package cutting device 1 may

be normally mounted on the picker negative pressure transfer plate structure 112b of the second picker module 42. As described above, in order to normally mount the conversion kit 111 on the picker module, the picker module normally mount the conversion kit 111 so that one surface in the Z-axis direction of the conversion kit 111 faces one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b. Unlike the first conversion kit 111, the second conversion kit 111, the fourth conversion kit 111, the fifth conversion kit 111, the seventh conversion kit 111, and the eighth conversion kit 111, the sixth conversion kit 111 to be normally mounted on the picker negative pressure transfer plate structure 112b of the second picker module 42 may be placed on the package cutting device 1 in a state in which one surface in the Z-axis direction of the sixth conversion kit 111 is directed toward the other side in the Z-axis direction. Thereafter, each of the seventh conversion kit 111 and the eighth conversion kit 111 may be placed on one of the table modules 11 of the package cutting device 1 by the first picker module 41. The operation of automatically disposing the conversion kits 111 may be performed by the above-mentioned processes.

In addition, the operation of removing the previously disposed conversion kit 111 may include the following processes.

First, the first picker module 41 may pick up the conversion kit 111 placed on the package cutting device 1 and convey the conversion kit 111 to the loading/unloading device 5, and the second picker module 42 may pick up the conversion kit 111 placed on the drying device 2 and place the conversion kit 111 on the package cutting device 1. The third picker module 43 may pick up the conversion kit 111 placed on the vision table 3 and place the conversion kit 111 on the drying device 2.

Specifically, the first picker module 41 may pick up the conversion kit 111 on the

table module 11 of the package cutting device 1 and convey the conversion kit 111 to the loading/unloading device 5. In more detail, the first picker module 41 may pick up the conversion kit 111 on the table module 11 of the package cutting device 1 and place the conversion kit 111 on the rail (not illustrated). The conversion kit 111 may be retrieved by being pushed, by the gripper (not illustrated), to the magazine positioned on the loading/unloading device 5 and configured to retrieve the conversion kit. Therefore, when the conversion kit 111 is removed from the at least one table module 11 of the package cutting device 1, the second picker module 42 may place the conversion kit 111, which is normally mounted on the table negative pressure transfer plate structure 112b thereof, on the table module 11 of the package cutting device 1 from which the conversion kit 111 has been removed. In relays, the first picker module 41 may pick up the conversion kit 111 placed on the table module 11 of the package cutting device 1 by the second picker module 42 and convey the conversion kit 111 to the loading/unloading device 5, the second picker module 42 may remove the conversion kit 111 therefrom, sequentially pick up, one by one, the conversion kits 111 on the table modules 11 of the drying device 2, and then place the conversion kit 111 on the table module 11 of the package cutting device 1 from which the conversion kit 111 has been removed, and the first picker module 41 may sequentially convey, one by one, the conversion kits 111, placed by the second picker module 42, to the loading/unloading device 5. When the conversion kit 111 from the at least one table module 11 of the drying device 3, the third picker module 43 may place the conversion kit 111, which is normally mounted on the table negative pressure transfer plate structure 112b thereof, on the table module 11 of the drying device 2 from which the conversion kit 111 has been removed. Sequentially, the third picker module 43 may pick up, one by one, the conversion kits 111 on the table

module 11 of the vision table 3 and place the conversion kit 111 on the table module 11 of the drying device 2 from which the conversion kit 111 has been removed. The second picker module 42 may sequentially convey, one by one, the conversion kits 111, placed by the third picker module 43, to the table module 11 of the package cutting device 1. The conversion kit 111 may be automatically removed by the above-mentioned process.

According to the embodiment of the present application, the conversion kits 111 of each of the vision table 3, the drying device 2, the third picker module 43, and the second picker module 42 may be different in type from the conversion kit 111 of the package cutting device 1. This is because the conversion kit 111 of each of the vision table 3, the drying device 2, the third picker module 43, and the second picker module 42 holds, by a vacuum, the plurality of individually cut packages, whereas the conversion kit 111 of the package cutting device 1 holds the strip before the strip is cut into the packages. Therefore, the conversion kit 111 of the package cutting device 1 may have auxiliary lines (cutting grooves) formed between the positions of the packages in order to cut the strip into the plurality of packages. Therefore, it is necessary to identify and recognize the conversion kit 111 to be coupled to the package cutting device 1 and the conversion kit 111 to be coupled to each of the vision table 3, the drying device 2, the third picker module 43, and the second picker module 42, and it is necessary to primarily convey the conversion kit 111 to be coupled to each of the vision table 3, the drying device 2, the third picker module 43, and the second picker module 42 and then secondarily convey the conversion kit 111 to be coupled to the package cutting device 1.

In order to convey the conversion kit 111 to be mounted on each of the package cutting device 1, the drying device 2, and the vision table 3, instead of the conversion kit 111 to be mounted on the picker module, the picker module may hold and convey the

conversion kit 111 so that the other surface in the Z-axis direction of the conversion kit 111 faces one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b of the picker module.

In addition, the vacuum suction in the table kit depressed portion 1122a for holding the conversion kit 111 of the table module 11 may be released to remove the previously disposed conversion kit 111, and the picker kit depressed portion 1122b of the picker module for holding the conversion kit 111 may perform the vacuum suction in order to hold the conversion kit 111 to convey the conversion kit 111.

In addition, the picker modules 41, 42, and 43 may include the conversion kits 111. Therefore, in the state in which the conversion kit 111 is not normally mounted on the picker negative pressure transfer plate structure 112b of each of the picker modules 41, 42, and 43 (i.e., the state in which the conversion kit 111 is not normally mounted on the picker negative pressure transfer plate structure 112b), each of the picker modules 41, 42, and 43 may separate the conversion kit 111 disposed previously on the table negative pressure transfer plate structure 112b or place a new conversion kit 111.

In addition, referring to FIGS. 5 and 8, each of the negative pressure transfer plate structures 112a and 112b may include protruding protrusions 1123. For example, referring to FIG. 5, the table negative pressure transfer plate structure 112a may include the protrusions 1123 protruding toward the other side in the Z-axis direction. Referring to FIG. 8, the picker negative pressure transfer plate structure 112b may include the protrusions 1123 protruding toward one side in the Z-axis direction. In addition, referring to FIG. 3, the conversion kit 111 may have holes 1112 into which the protrusions 1123 are at least partially inserted. With the engagement between the protrusion 1123 and the hole 1112, the conversion kit 111 may be held and placed (disposed) at the exact

position on the negative pressure transfer plate structure 112a or 112b.

In addition, referring to FIGS. 7 and 8, the picker negative pressure transfer plate structure 112b may include protrusions 1126 protruding toward one side in the Z-axis direction.

In addition, referring to FIG. 3, the table negative pressure transfer plate structure 112a may have holes 1116 into which the protrusions 1126 are at least partially inserted. Therefore, when each of the picker modules 41, 42, and 43 disposes the conversion kit 111 on the table module 11 or when each of the picker modules 41, 42, and 43 mounts the plurality of packages on the conversion kit 111 installed on the table module 11, the picker negative pressure transfer plate structure 112b of each of the picker modules 41, 42, and 43 may be disposed at the exact position with respect to the table negative pressure transfer plate structure 112a to place the conversion kit 111 on the table negative pressure transfer plate structure 112a and accurately place the plurality of packages on the conversion kit 111 installed on the table module 11.

In addition, referring to FIGS. 4 and 9, the conversion kit 111 may include a pair of protruding portions 1115 protruding outward from two opposite lateral surfaces of the conversion kit 111 and extending in the longitudinal direction of the conversion kit 111 (in the X-axis direction in FIG. 4). In addition, referring to FIGS. 8 and 9, the picker negative pressure transfer plate structure 112b may include a pair of fastening portions 1125 protruding from two opposite lateral surfaces of the picker negative pressure transfer plate structure 112b toward one side in the Z-axis direction and configured to be fitted with the pair of protruding portions 1115.

The fastening portion 1125 may include one side member 11251 formed to be directed toward one side in the Z-axis direction, and the other side member 11252 bent

and extending outward from one side member 11251. The fastening portion 1125 may have a shape extending in a zigzag manner in the Z-axis direction. Therefore, an interval between one side member 11251 of one of the pair of fastening portions 1125 and one side member 11251 of the other of the pair of fastening portions 1125 may be decreased toward the other side in the Z-axis direction, and an interval between an endmost portion of one side member 11251 of one of the pair of fastening portions 1125 and an endmost portion of one side member 11251 of the other of the pair of fastening portions 1125 at the other side in the Z-axis direction may be smaller than a width of the portion of the conversion kit 111 having the protruding portion 1115. An interval between the other side members 11252 of the pair of fastening portions 1125 may be increased toward the other side in the Z-axis direction. Therefore, when the picker module picks up the conversion kit 111, the picker module moves (downward) in the Z-axis direction, until one surface in the Z-axis direction of the picker negative pressure transfer plate structure 112b comes into contact with one surface of the conversion kit 111, and then holds the conversion kit 111 by suction, the conversion kit 111 may pass through a portion between one side member 11251 of one of the pair of fastening portions 1125 and one side member 11251 of the other of the pair of fastening portions 1125 and then enter a portion between the endmost portion of one side member 11251 of one of the pair of fastening portions 1125 and the endmost portion of one side member 11251 of the other of the pair of fastening portions 1125 at the other side in the Z-axis direction. Therefore, the protruding portions 1115 and the fastening portions 1125 are in contact with each other with friction, such that the conversion kit 111 may be physically mounted on the picker negative pressure transfer plate structure 112b.

In addition, in order to place the conversion kit 111, the picker module may place

the conversion kit 111 on the table negative pressure transfer plate structure 112a of the table module 11. In this case, the table negative pressure transfer plate structure 112a may apply an external force downward to the conversion kit 111 by vacuum suction through the table kit depressed portion 1122a, and at the same time, the picker module may move upward. In this process, the protruding portions 1115 of the conversion kit 111 may be detached from the fastening portions 1125 of the picker negative pressure transfer plate structure 112b.

As described above, since the protruding portions 1115 of the conversion kit 111 and the fastening portions 1125 of the picker negative pressure transfer plate structure 112b are fastened, the conversion kit 111 may be kept mounted on the picker negative pressure transfer plate structure 112b without being separated from the picker negative pressure transfer plate structure 112b even though the vacuum suction of the picker negative pressure transfer plate structure 112b to the conversion kit 111 is stopped (e.g., due to the stop of the operation of the negative pressure generator).

According to the embodiment of the present application, as illustrated in FIG. 8, the fastening portions 1125 may be disposed in a staggered manner. This to allow the conversion kit 111 to be easily detached from the picker negative pressure transfer plate structure 112b by the vacuum suction of the table negative pressure transfer plate structure 112a and to allow the conversion kit 111 to be kept mounted on the stably picker negative pressure transfer plate structure 112b without being separated from the picker negative pressure transfer plate structure 112b even though the vacuum suction of the picker negative pressure transfer plate structure 112b to the conversion kit 111 is stopped (e.g., due to the stop of the operation of the negative pressure generator).

In addition, referring to FIG. 10, the fastening portions 1125 may be provided on

the table negative pressure transfer plate structure 112a of the table module 11 of the flipper module 22 of the drying device 2. This is because the table module 11 of the flipper module 22 rotates about the X-axis. That is, since the conversion kit 111 is fixed to the table negative pressure transfer plate structure 112a of the flipper module 22 by vacuum suction, the conversion kit 111 may be detached from the table negative pressure transfer plate structure 112a of the flipper module 22 when the vacuum suction is stopped in a state in which the table module 11 of the flipper module 22 is rotated by 180°. In consideration of this configuration, the fastening portions 1125 may also be provided on the table negative pressure transfer plate structure 112a of the table module 11 of the flipper module 22. Because the configuration and the function of the fastening portion 1125 of the table negative pressure transfer plate structure 112a of the table module 11 of the flipper module 22 are similar to the configuration and the function of the fastening portion 1125 of the picker module, a detailed description thereof will be omitted.

As described above, according to the present first system, in order to automatically change the conversion kit 111, the conversion kit 111 is mounted on the negative pressure transfer plate structure 112a or 112b by the vacuum suction of the negative pressure transfer plate structure 112a or 112b, and the state in which the conversion kit 111 may be detached from the negative pressure transfer plate structure 112a or 112b may be automatically provided by adjusting whether to generate the vacuum suction. In the state in which the vacuum suction is released and the conversion kit 111 may be detached, the picker module may remove the conversion kit 111 by holding the conversion kit 111 by vacuum suction, and the picker module may place the conversion kit 111. When a new conversion kit 111 is placed on the negative pressure transfer plate structure 112a or 112b, the vacuum suction is generated again, such that the conversion

kit 111 may be fixedly mounted automatically on the negative pressure transfer plate structure 112a or 112b.

In addition, according to the present first system, the table modules 11 of the picker module and the flipper module 22 may include the fastening portions 1125, thereby preventing the conversion kit 111 from being unexpectedly detached from the table modules 11 of the picker module and the flipper module 22 even though the vacuum suction is stopped due to an unexpected problem.

In addition, according to the embodiment of the present application, identification information may be marked on the conversion kit 111 to identify information about the conversion kit 111 (e.g., information about sizes of package seating portions of the conversion kit 111 according to the sizes of the packages and information about the types of conversion kits 111 suitable for the table modules). A sensor for scanning the identification information may be provided on the first picker module 41. When the scanning result by the sensor indicates that the conversion kit 111 withdrawn from the loading/unloading device 5 is an acceptable conversion kit 111, the first picker module 41 may pick up the conversion kit 111. If the conversion kit 111 is not an acceptable conversion kit, the operation of picking up the conversion kit 111 may be stopped.

In addition, the conversion kit 111, which is withdrawn from the loading/unloading device 5 and seated on the rail (not illustrated), may be picked up. In a case in which the conversion kit 111 is placed on the rail at an angle deviating from the exact position, the first picker module 41 may rotate to hold the conversion kit 111 disposed at the angle deviating from the exact position and convey the conversion kit 111 so that the conversion kit 111 has the exact position.

Hereinafter, the table module 11 according to the embodiment of the present application (hereinafter, referred to as 'the present table module'), which is applied to the present first system described above, will be described. However, in the description of the present table module 11, the constituent elements identical or similar to the above-mentioned constituent elements of the present first system will be assigned with the same reference numerals, and the repetitive description thereof will be briefly described or omitted.

The present table module 11 may include the conversion kit 111 having the plurality of vacuum holes 1111 formed in the Z-axis direction.

In addition, the present table module 11 includes the table negative pressure transfer plate structure 112a having the other surface in the Z-axis direction on which the conversion kit 111 is disposed, and the table negative pressure transfer plate structure 112a allows the negative pressure generator (not illustrated) to communicate with the vacuum holes 1111.

The table negative pressure transfer plate structure 112a may hold the conversion kit 111 by vacuum suction. Therefore, when the table negative pressure transfer plate structure 112a holds the conversion kit 111 by vacuum suction, the position of the conversion kit 111 may be fixed by the table negative pressure transfer plate structure 112a. In addition, when the table negative pressure transfer plate structure 112a stops the operation of holding the conversion kit 111 by vacuum suction, the conversion kit 111 may be removed from the table negative pressure transfer plate structure 112a.

The table negative pressure transfer plate structure 112a may include the table product depressed portion 1121a made by depressing, toward one side in the Z-axis direction, a portion facing the portion of the conversion kit 111 having the plurality of

vacuum holes 1111. The table product depressed portion 1121a may transmit the application of negative pressure and the release of the negative pressure made by the negative pressure generator to the vacuum holes 1111.

In addition, the table negative pressure transfer plate structure 112a may include the table kit depressed portions 1122a made by depressing, toward one side in the Z-axis direction, portions facing at least a part of a rim portion of the conversion kit 111, and the conversion kit 111 is held by the table kit depressed portions 1122a by vacuum suction.

The table kit depressed portion 1122 may have a cross section with a long hole shape extending in the longitudinal direction of the conversion kit 111.

The table negative pressure transfer plate structure 112a may include the protrusions 1123 protruding toward the other side in the Z-axis direction, and the picker negative pressure transfer plate structure 112b may include the protrusions 1123 protruding toward one side in the Z-axis direction. The conversion kit 111 may have the holes 1112 into which the protrusions 1123 are at least partially inserted.

In addition, an apparatus for automatically exchanging a conversion kit (hereinafter, referred to as 'the present apparatus') according to the embodiment of the present application, which includes the present table module 11 and is applied to the present first system, will be described below. However, in the description of the present apparatus, the constituent elements identical or similar to the above-mentioned constituent elements will be assigned with the same reference numerals, and the repetitive description thereof will be briefly described or omitted.

The present apparatus includes the present table module 11.

In addition, the present apparatus includes the picker module that may separate the conversion kit 111, which is disposed previously on the table negative pressure

transfer plate structure 112a, from the table negative pressure transfer plate structure 112a or place a new conversion kit 111 on the table negative pressure transfer plate structure 112a.

The picker module may include the picker negative pressure transfer plate structure 112b having one side in the Z-axis direction at which the conversion kit 11 is mounted. The picker negative pressure transfer plate structure 112b may hold the conversion kit 111 by vacuum suction.

The picker negative pressure transfer plate structure 112b may include the picker product depressed portion 1121b, and the picker product depressed portion 1121b is made by depressing, toward the other side in the Z-axis direction, at least a part of a portion of the picker negative pressure transfer plate structure 112b which faces the portion of the conversion kit 111 having the plurality of vacuum holes 1111. The picker product depressed portion 1121b transmits the application of negative pressure and the release of negative pressure made by the negative pressure generator to the vacuum holes 1111.

In addition, the picker negative pressure transfer plate structure 112b may include the picker kit depressed portions 1122b made by depressing, toward the other side in the Z-axis direction, the portions of the picker negative pressure transfer plate structure 112b facing the rim portion of the conversion kit 111, and the conversion kit 111 may be held by the picker kit depressed portions 1122b by suction.

The picker kit depressed portion 1122b may have a cross section with a long hole shape extending in the longitudinal direction of the conversion kit 111.

In addition, the picker negative pressure transfer plate structure 112b may include the protrusions 1126 protruding toward one side in the Z-axis direction, the table negative pressure transfer plate structure 112a may include the holes 1116 into which the

protrusions 1126 are at least partially inserted.

In addition, the conversion kit 111 may include the pair of protruding portions 1115 protruding outward from the two opposite lateral surfaces of the conversion kit 111 and extending in the longitudinal direction of the conversion kit 111. In addition, the picker negative pressure transfer plate structure 112b may include the pair of fastening portions 1125 protruding from the two opposite lateral surfaces of the picker negative pressure transfer plate structure 112b toward one side in the Z-axis direction and configured to be fitted with the pair of protruding portions 1115.

In addition, the picker modules 41, 42, and 43 may include the conversion kits 111. Therefore, in the state in which the conversion kit 111 is not normally mounted on the picker negative pressure transfer plate structure 112b of each of the picker modules 41, 42, and 43 (i.e., the state in which the conversion kit 111 is not normally mounted on the picker negative pressure transfer plate structure 112b), each of the picker modules 41, 42, and 43 may separate the conversion kit 111 disposed previously on the table negative pressure transfer plate structure 112b or place a new conversion kit 111.

Hereinafter, a system for automatically exchanging a conversion kit according to a second embodiment of the present application, a suction module according to the first embodiment of the present application, and a suction module according to the second embodiment of the present application will be described.

For reference, in the following description, the terms related to the directions or the positions (one side in the Z-axis direction, one surface in the Z-axis direction, the other side in the Z-axis direction, the other surface in the Z-axis direction, and the like) are set, with reference to FIG. 12A, such that based on the portion between a first plate 911a1 and a second plate 911a2 of a conversion kit 911, a direction toward the first

plate 9111a1 is set as one side in the Z-axis direction, and a direction toward the second plate 9111a2 is set as the other side in the Z-axis direction. One Z-axis surface (one surface in the Z-axis direction) may be a surface directed toward one side in the Z-axis direction set as described above, and the other Z-axis surface (the other surface in the Z-axis direction) may be a surface directed toward the other side in the Z-axis direction set as described above. In the embodiment of the present application, one side in the Z-axis direction may be disposed to be directed upward or downward in accordance with the use or the arrangement of the embodiment of the present application. In addition, the upper side and the lower side among the terms related to the direction or the position in the embodiment of the present application are set based on the arranged states of the respective components illustrated in the drawings. For example, when viewed from FIGS. 11 to 20, a side generally positioned in the direction of 12 o'clock may be set to the upper side, and a side generally positioned in the direction of 6 o'clock may be set to the lower side.

First, the system for automatically exchanging a conversion kit according to the second embodiment of the present application (hereinafter, referred to as 'the present second system') will be described. However, in the description of the present second system, the repetitive description of the contents related to the present first suction module and the present second suction module, which are identical to the above-mentioned contents, will be briefly described or omitted.

Referring to FIGS. 1 and 2, the present second system includes a package cutting device 1 that cuts the strip into packages. The package cutting device 1 may include a suction module 911. The suction module 911 of the package cutting device 1 of the present second system may be identical or similar to or correspond to the table module

11 of the package cutting device 1 of the present first system. Therefore, as described above, the strip conveyed to the suction module 911 of the package cutting device 1 may be cut into the individual packages by the non-illustrated blade. For example, the strip may be seated on the suction module 911 and cut in the seated state.

In addition, referring to FIGS. 1 and 2, the present second system includes a drying device 2 that dries the packages. Because the drying device 2 may be identical or similar to or correspond to the drying device 2 of the present first system, a detailed description thereof will be omitted.

In addition, referring to FIGS. 1 and 2, the present second system may include a vision table 3 on which the packages are seated. Because the vision table 3 of the present second system may be identical or similar to or correspond to the vision table 3 of the present first system, a detailed description thereof will be omitted.

In addition, referring to FIGS. 1 and 2, the present second system includes a picker part 4 that holds the strip or the package by suction and conveys the strip or the package between the package cutting device 1, the drying device 2, and the vision table 3. In addition, referring to FIG. 1, the picker part 4 may include a first picker device 41, a second picker device 42, and a third picker device 43. The picker part 4 is disposed at the other side in the Z-axis direction of the package cutting device 1, the drying device 2, and the vision table 3. This may mean the first to third picker devices 41, 42, and 43 are provided at the other side in the Z-axis direction of the package cutting device 1, the drying device 2, and the vision table 3.

For reference, the picker part 4 of the present second system may be identical or similar to or correspond to the picker device 4 of the present first system, and the first picker device 41, the second picker device 42, and the third picker device 43 of the present

second system may be identical or similar to or correspond to the first picker module 41, the second picker module 42, and the third picker module 43 of the present first system, respectively.

Therefore, in the present second system, the first picker device 41 may convey the strip supplied from the loading/unloading device (not illustrated) to the package cutting device 1, the second picker device 42 may convey the package from the package cutting device 1 to the drying device 2, and the third picker device 43 may convey the package from the drying device 2 to the vision table 3 so that the first picker device 41, the second picker device 42, and the third picker device 43 of the present second system correspond to the first picker module 41, the second picker module 42, and the third picker module 43 of the present first system, respectively.

Each of the package cutting device 1, the drying device 2, the vision table 3, and the picker part 4 includes the suction module 911 for holding the package by suction. In addition, the suction module 911 may include a conversion kit 9111 and a negative pressure transfer plate structure 9112 on which the conversion kit 9111 is mounted. For reference, the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3 may be identical or similar to or correspond to the table module 11 of the present first system, and the suction module 911 of the picker part 4 may be identical or similar to or correspond to the configuration including the picker negative pressure transfer plate structure 9112b and the conversion kit 9111 of the present first system. Therefore, a detailed description of numbers, functions, and the like of the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3 will be described.

Referring to FIGS. 11 and 12A together, the suction module 911 may include the

conversion kit 9111 having the plurality of vacuum holes 91111 formed in the Z-axis direction. The strip or the package placed on the suction module 911 may be placed on the conversion kit 9111. For example, referring to FIGS. 12A and 12B together, the conversion kit 9111 may include the first plate 9111a1 and the second plate 9111a2. Each of the vacuum holes 91111 may include a first tubular portion 911111 formed by penetrating the first plate 9111a1 in the Z-axis direction, and a second tubular portion 911112 extending from the first tubular portion 911111 and formed by penetrating the second plate 9111a2 in the Z-axis direction.

In addition, referring to FIGS. 11 to 13, the suction module 911 may include the negative pressure transfer plate structure 9112. The negative pressure transfer plate structure 9112 may hold the conversion kit 9111 by suction and allow the negative pressure generator (not illustrated, for example, positioned at the other side in the Z-axis direction of the negative pressure transfer plate structure 9112) to communicate with the plurality of vacuum holes 91111 of the conversion kit 9111.

In addition, referring to FIGS. 11 to 13 together, the conversion kit 9111 may be disposed on one surface in the Z-axis direction of the negative pressure transfer plate structure 9112, and the negative pressure transfer plate structure 9112 may allow the negative pressure generator (not illustrated) to communicate with the vacuum holes 91111. In addition, referring to FIGS. 12A and 12B, the negative pressure transfer plate structure 9112 may include product suction connection portions 91121 and 911281 and a kit suction portion 91122 in which the negative pressure is released, or the negative pressure is formed to hold the product and the conversion kit 9111 by suction. For example, referring to FIGS. 12B and 13 together, the negative pressure transfer plate structure 9112 may include the product suction connection portions 91121 and 911281 provided at a

portion facing the portion of the conversion kit 9111 having the plurality of vacuum holes 91111 and allow the negative pressure generator to communicate with the vacuum holes 91111. The product suction connection portions 91121 and 911281 may transmit the application of negative pressure and the release of the negative pressure made by the negative pressure generator to the vacuum holes 91111. Specifically, although not illustrated specifically in the drawings, the negative pressure transfer plate structure 9112 may include a communication port that allows the product suction connection portions 91121 and 911281 to communicate with the negative pressure generator. When the negative pressure generator draws in a gas (the negative pressure is generated), the gas in the product suction connection portions 91121 and 911281 is introduced into the side of the negative pressure generator, and thus the gas in the vacuum holes 91111 is introduced into the side of the negative pressure generator through the product suction connection portions 91121 and 911281. Therefore, the negative pressure is formed in the vacuum holes 91111, such that the package or the strip placed on the conversion kit 9111 may be held by suction. In addition, when the negative pressure generator releases the negative pressure (stops generating the negative pressure), the generation of the negative pressure in the vacuum holes 91111 communicating with the negative pressure generator through the negative pressure transfer plate structure 9112 may be stopped, and the process of holding the strip or the package using the vacuum holes 91111 may be stopped.

In addition, referring to FIGS. 12B and 13 together, the negative pressure transfer plate structure 9112 may include the kit suction portion 91122 made by depressing, toward the other side in the Z-axis direction, a portion facing at least a part of a rim portion of the conversion kit 9111, and the conversion kit 9111 is held by the kit suction portion 91122 by vacuum suction. Because the negative pressure transfer plate structure 9112

of the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3 are identical or similar to or correspond to the table negative pressure transfer plate structure 112a of the present first system, a detailed description thereof will be omitted.

In addition, the negative pressure transfer plate structure 9112 may include a main body portion 91128 and a rim portion 91129 disposed on one surface in the Z-axis direction of the main body portion 91128. The main body portion 91128 may have the suction depressed portion 911281 made by depressing, toward the other side in the Z-axis direction, a portion corresponding to the portion having the plurality of vacuum holes 91111, and the suction depressed portion 911281 may communicate with the negative pressure generator. In addition, the rim portion 91129 may have the kit suction portion 91122 formed in the form of a through port penetratively formed in the Z-axis direction. A communication port (not illustrated in the drawings), which allows the negative pressure generator to communicate with the kit suction portion 91122 may be formed in the portion positioned at the other side in the Z-axis direction of the kit suction portion 91122 of the main body portion 91128. Therefore, the negative pressure is formed, or the negative pressure is released in the kit suction portion 91122 by the negative pressure generator communicating with the kit suction portion 91122 through the communication port. In addition, the rim portion 91129 may have a connection space 91121 that allows the suction depressed portion 911281 to communicate with the plurality of vacuum holes 91111 of the conversion kit 9111. Therefore, the vacuum holes 91111 communicates with the negative pressure generator through the connection space 91121 and the suction depressed portion 911281, such that the negative pressure is formed, or the negative pressure is released in the vacuum holes 91111.

In addition, the suction module 911 may be disposed so that one surface in the Z-axis direction of the suction module 911 is directed downward or one surface in the Z-axis direction of the suction module 911 is directed upward. For example, referring to FIG. 1, the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3 may be disposed so that one surface in the Z-axis direction of the suction module 911 is directed upward, and the suction module 911 (identical or similar to or correspond to the configuration including the picker negative pressure transfer plate structure 112b and the conversion kit 9111 of the present first system) of each of the first to third picker devices 41, 42, and 43 of the picker part 4 may be disposed so that one surface in the Z-axis direction of the suction module 911 is directed downward.

Therefore, as described below, referring to FIGS. 11 to 12D, when the conversion kit 9111 is normally mounted on each of the package cutting device 1, the drying device 2, and the vision table 3, the conversion kit 9111 may be disposed such that one surface in the Z-axis direction of the conversion kit 9111 is directed upward. In addition, referring to FIG. 15, when the conversion kit 9111 is normally mounted on each of the second picker device 42 and the third picker device 43, the conversion kit 9111 may be disposed such that one surface in the Z-axis direction of the conversion kit 9111 is directed downward. In addition, referring to FIG. 18, when the conversion kit 9111 is normally mounted on the first picker device 41, the conversion kit 9111 may be disposed such that one surface in the Z-axis direction of the conversion kit 9111 is directed downward.

In addition, when the negative pressure transfer plate structure 9112 holds the conversion kit 9111 by vacuum suction, the conversion kit 9111 may be mounted on (fixed in position to) the negative pressure transfer plate structure 9112. In addition, when the vacuum suction applied to the conversion kit 9111 by the negative pressure

transfer plate structure 9112 is released, the conversion kit 9111 may be separated from the negative pressure transfer plate structure.

In addition, the conversion kit 9111 may be mounted on the negative pressure transfer plate structure 9112 so that one surface in the Z-axis direction of the conversion kit 9111 is directed toward the negative pressure transfer plate structure 9112 (temporarily mounted state). Alternately, the conversion kit 9111 may be mounted on the negative pressure transfer plate structure 9112 so that the other surface in the Z-axis direction of the conversion kit 9111 is directed toward the negative pressure transfer plate structure 9112 (normally mounted state). In this case, the suction module 911 may hold the semiconductor or the strip by suction in the state in which the conversion kit 9111 is normally mounted on the negative pressure transfer plate structure 9112. For example, when the conversion kit 9111 is normally mounted on the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43, each of the first to third picker devices 41, 42, and 43 may hold the semiconductor or the strip. In addition, when the conversion kit 9111 is normally mounted on the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3, the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3 may hold, by suction, the package or the strip placed thereon.

In addition, the suction module 911 (the negative pressure transfer plate structure 9112) may convey the conversion kit 9111 when the conversion kit 9111 is temporarily mounted on the negative pressure transfer plate structure 9112. The process of conveying the conversion kit 9111 will be described below in detail.

In the present system, the picker part 4 disposes or removes the conversion kit

9111 for holding the package by suction on/from each of the package cutting device 1, the drying device 2, the vision table 3, and the picker part 4. Specifically, each of the first to third picker devices 41, 42, and 43 may hold, by suction, and convey the conversion kit 9111 in the state in which the conversion kit 9111 is not normally mounted on the negative pressure transfer plate structure 9112. In this case, the configuration in which each of the first to third picker devices 41, 42, and 43 holds, by suction, and conveys the conversion kit 9111 may mean that each of the first to third picker devices 41, 42, and 43 removes the conversion kit 9111 disposed previously on the package cutting device 1, the drying device 2, or the vision table 3 or disposes a new conversion kit 9111.

Specifically, the first picker device 41 may convey the conversion kit 9111 between the loading/unloading device and the package cutting device 1, the second picker device 42 may convey the conversion kit 9111 between the package cutting device 1 and the drying device 2, and the third picker device 43 may convey the conversion kit 9111 between the drying device 2 and the vision table 3.

In addition, the picker device (one or more of the first to third picker devices 41, 42, and 43) may convey the conversion kit 9111 in the state in which the conversion kit 9111 is not normally mounted on the negative pressure transfer plate 9112.

Because the configuration in which the picker part 4 disposes the conversion kit 9111 on the negative pressure transfer plate structure (the negative pressure transfer plate structure 9112) of the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3 is identical or similar to or corresponds to the configuration in which the picker device 4 of the present first system disposes the conversion kit 111 on the negative pressure transfer plate structure (the table negative

pressure transfer plate structure 112b) of the table module 11 of each of the package cutting device 1, the drying device 2, and the vision table 3, a detailed description thereof will be omitted.

However, for reference, a ninth conversion kit 9111 mounted by the first picker device 41 may be prepared such that one surface in the Z-axis direction of the ninth conversion kit 9111 is directed downward, in other words, the other surface in the Z-axis direction of the ninth conversion kit 9111 is directed upward.

In addition, as described above, the conversion kit 9111 may be prepared in the conversion kit magazine. In this case, the first to ninth conversion kits 9111 may be prepared in this order so that the first to ninth conversion kits 9111 may be sequentially picked up. When the first to ninth conversion kits 9111 are prepared sequentially, the first, second, fourth, fifth, seventh, and eighth conversion kits 9111 are prepared so that one surface in the Z-axis direction of each of the first, second, fourth, fifth, seventh, and eighth conversion kits 9111 is directed upward, and the third, sixth, and ninth conversion kits 9111 may be prepared such that one surface in the Z-axis direction of each of the third, sixth, and ninth conversion kits 9111 is directed downward.

In addition, the process of removing the previously disposed conversion kit 9111 may also be performed. Because the process of removing the previously disposed conversion kit 9111 is identical or similar to or corresponds to the process of removing the previously disposed conversion kit 111 of the present first system, a detailed description thereof will be omitted.

In addition, according to the embodiment of the present application, the conversion kit 9111 of each of the vision table 3, the drying device 2, the third picker device 43, and the second picker device 42 is different in type from the conversion kit

9111 of the package cutting device 1. This is because the conversion kit 9111 of each of the vision table 3, the drying device 2, the third picker device 43, and the second picker device 42 holds, by a vacuum, the plurality of individually cut packages, whereas the conversion kit 9111 of the package cutting device 1 holds the strip before the strip is cut into the packages. Because this configuration has been described above with reference to the contents related to the present first system, a detailed description thereof will be omitted.

In order to convey the conversion kit 9111 to be mounted on each of the package cutting device 1, the drying device 2, and the vision table 3, instead of the conversion kit 9111 to be mounted on the picker device, the picker device may hold and convey the conversion kit 9111 so that one surface in the Z-axis direction of the conversion kit 9111 is directed toward the negative pressure transfer plate structure 9112 of the picker device.

In addition, in order to remove the previously disposed conversion kit 9111, the vacuum suction may be released in the kit suction portion 91122 of the negative pressure transfer plate structure 9112 on which the conversion kit 9111 to be removed is disposed, and a vacuum is applied to the kit suction portion 91122 of the negative pressure transfer plate structure 9112 of the picker device that picks up the conversion kit 9111 to be removed, such that the kit suction portion 91122 may hold the conversion kit 9111 by vacuum suction.

In addition, each of the first to third picker devices 41, 42, and 43 may include the conversion kit 9111. Therefore, in the state in which the conversion kit 9111 of each of the first to third picker devices 41, 42, and 43 is not mounted on the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43 (in other words, in the state in which the conversion kit 9111 is not normally mounted on the

negative pressure transfer plate structure 9112), each of the first to third picker devices 41, 42, and 43 may separate the conversion kit 9111 disposed previously on the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3 or place a new conversion kit 9111.

In addition, referring to FIGS. 11 to 13 and 15 to 16, the suction module 911 includes a clamp 9113 capable of holding the conversion kit 9111. Specifically, the clamp 9113 may be provided on one side in the Z-axis direction (one surface) of the negative pressure transfer plate structure 9112 and hold the conversion kit 9111 in a basic state. In this case, the basic state of the clamp 9113 (or the basic state of the clamp unit 91131) may mean a state in which a clamp unit 91131 stands in the Z-axis direction, as illustrated in FIG. 12C. In addition, as described below in detail, the clamp unit 91131 may have an outward movement state. Although not illustrated in detail in the drawings, referring to FIG. 12C, the outward movement state may mean a state in which one side portion in the Z-axis direction of the clamp unit 91131 moves outward, and the clamp unit 91131 is rotated about a hinge 91132 in the standing state of the clamp unit 91131 illustrated in FIG. 12C.

Specifically, referring to FIG. 12C, the clamp 9113 may include the clamp unit 91131, at least a part of the clamp unit 91131 protrudes from one surface in the Z-axis direction of the negative pressure transfer plate structure 9112, and the clamp unit 91131 has a protrusion 911319 protruding inward toward the portion where the conversion kit 9111 is disposed. The clamp unit 91131 may have a hook shape. In addition, a depressed portion 91119 may be formed in an outer surface of the conversion kit 9111, and the protrusion 911319 of the clamp unit 91131 is fastened to the depressed portion 91119. As the protrusion 911319 of the clamp unit 91131 is caught by and fastened to

the depressed portion 91119, the clamp unit 91131 may hold the conversion kit 9111.

In addition, referring to FIG. 12C, the clamp 9113 may include the hinge unit 91132 about which the clamp unit 91131 is rotatable about an axis in the longitudinal direction of the negative pressure transfer plate structure 9112. The hinge unit 91132 enables the clamp unit 91131 to rotate. Therefore, an end in the z-axis direction of the clamp unit 91131 may be moved outward away from the conversion kit 9111 from the state in which the clamp unit 91131 holds the conversion kit 9111. Therefore, the clamp unit 91131 may switch from a holding state to a released state.

In addition, referring to FIGS. 12C and 12D, the clamp 9113 may include an elastic member 91133 that provides an external force applied to the clamp unit 9113 inward (in a direction toward the conversion kit 9111). The elastic member 91133 is disposed in a compressed state on an outer surface of the clamp unit 9113 (a surface directed (outward) in a direction opposite to the direction toward the conversion kit 9111) and may operate elastically. Therefore, when the clamp unit 91131 is rotated by a predetermined angle, the elastic member 91133 provides an elastic restoring force to the clamp unit 91131, such that an inward external force may be applied to the clamp unit 91131.

That is, referring to FIG. 12C, since the protrusion 911319 may be caught by and fastened to the depressed portion 91119 in the basic state, the clamp unit 91131 may hold the conversion kit 9111. When an outward external force is applied to the clamp unit 91131, the clamp unit 91131 is rotated by the hinge unit 91132, such that a portion of the clamp unit 91131, which is directed toward one side in the Z-axis direction (i.e., a portion on which the protrusion 911319 is formed), is moved outward in an outward movement state. In this outward movement state, the conversion kit 9111 may be unfastened and

released in the released state. In addition, when the clamp unit 91131 is moved outward, the elastic member 91133 positioned on the outer surface of the clamp unit 91131 is compressed outward, and an inward external force may be applied to the clamp unit 91131 by the elastic member 91133. Therefore, when the external force applied outward by the clamp unit 91131 is equal to or lower than the external force applied inward by the elastic member 91133, the clamp unit 91131 may return to the basic state.

For reference, referring to FIGS. 12C and 12D, a receiving depressed portion 911311 may be formed in an outer surface of the clamp unit 91131 and accommodate at least a part of the elastic member 91133. Therefore, the elastic member 91133 may stably operate.

Meanwhile, the outward external force may be applied to the clamp unit 91131, as described below.

Referring to FIGS. 11 to 13 and 15 to 16, the suction module 911 may include a protruding portion 9114, and the protruding portion 9114 protrudes from one surface in the Z-axis direction of the negative pressure transfer plate structure 9112. The protruding portion 9114 guides, to the outward movement state, a neighboring clamp 9113 of a neighboring suction module 911 which is adjacent to and faces the suction module 911 in the z-axis direction.

First, the neighboring clamp 9113 will be described. The suction module 911 of at least one of the first picker device 41, the second picker device 42, and the third picker device 43 may be adjacent to and face, in the z-axis direction, the suction module 911 of at least one of the package cutting device 1, the drying device 2, and the vision table 3. For example, one surface of the suction module 911 of the first picker device 41 may be adjacent to and face, in the z-axis direction, one surface of the suction module

911 of the package cutting device 1. In this case, the suction module 911 of the first picker device 41 and the suction module 911 of the package cutting device 1 may serve as the neighboring suction modules 911 with respect to each other. In addition, one surface of the suction module 911 of the second picker device 42 may be adjacent to and face, in the z-axis direction, one surface of the suction module 911 of the package cutting device 1. In this case, the suction module 911 of the second picker device 42 and the suction module 911 of the package cutting device 1 may serve as the neighboring suction modules 911 with respect to each other. In addition, one surface of the suction module 911 of the second picker device 42 may be adjacent to and face, in the z-axis direction, one surface of the suction module 911 of the drying device 2. In this case, the suction module 911 of the second picker device 42 and the suction module 911 of the drying device 2 may serve as the neighboring suction modules 911 with respect to each other. In addition, one surface of the suction module 911 of the third picker device 43 may be adjacent to and face, in the z-axis direction, one surface of the suction module 911 of the drying device 2. In this case, the suction module 911 of the third picker device 43 and the suction module 911 of the drying device 2 may serve as the neighboring suction modules 911 with respect to each other. In addition, one surface of the suction module 911 of the third picker device 43 may be adjacent to and face, in the z-axis direction, one surface of the suction module 911 of the vision table 3. In this case, the suction module 911 of the third picker device 43 and the suction module 911 of the vision table 3 may serve as the neighboring suction modules 911 with respect to each other.

Therefore, the suction module 911 of the picker part 4 may face the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3. This may mean that the suction module 911 of at least one of the first to third

picker devices 41, 42, and 43 is disposed to be adjacent, in the z-axis direction, to the suction module 911 of at least one of the package cutting device 1, the drying device 2, and the vision table 3.

In addition, the protruding portion 9114 may be formed at a position corresponding to the clamp unit 91131 of the neighboring clamp 9113 in the z-axis direction. This may mean that the protruding portion 9114 is provided to face the clamp unit 91131 of the neighboring suction module 911 when the suction module 911 faces the neighboring suction module 911 in the z-axis direction. Therefore, the suction module 911 and the neighboring suction module 911 may have the same or the corresponding configurations. However, the protruding portion 9114 and the clamp unit 91131 of the suction module 911 and the protruding portion 9114 and the clamp unit 91131 of the neighboring suction module may be provided in a staggered manner so that the protruding portion 9114 of the suction module 911 faces the clamp unit 91131 of the neighboring suction module 911 and the clamp unit 91131 of the suction module 911 faces the protruding portion 9114 of the neighboring suction module 911 when the suction module 911 and the neighboring suction module 911 face each other in the Z-axis direction. For reference, as described above, the suction module 911 of each of the first to third picker devices 41, 42, and 43 and the suction module 911 of each of the package cutting device 1, the drying device 2, and the vision table 3 may serve as the neighboring suction modules 911 with respect to each other.

In addition, referring to FIGS. 13 and 16, a guide groove 911312 may be provided in an inner portion of the protrusion 911319 of the clamp unit 91131 and guide the entry of the protruding portion 9114 into the neighboring suction module 911. In addition, the protruding portion 9114 may have a wedge shape. Therefore, when the suction module

911 and the neighboring suction module 911 approach each other in the z-axis direction in the state in which the suction module 911 and the neighboring suction module 911 face each other, the protruding portion 9114 of the neighboring suction module 911 may enter the guide groove 911312, and the protruding portion 9114 may enter the guide groove 911312 of the clamp unit 91131 of the neighboring suction module 911. Therefore, as the suction module 911 and the neighboring suction module 911 become close to each other by being moved upward and downward, a degree to which the protruding portion 9114 of the neighboring suction module 911 enters the clamp unit 91131 of the suction module 911 is increased, such that the clamp unit 91131 is moved outward by the contact between the protruding portion 9114 of the neighboring suction module 911 and an inclined inner surface of the guide groove 911312 of the suction module 911. Further, as the degree to which the protruding portion 9114 of the suction module 911 enters the clamp unit 91131 of the neighboring suction module 911 is increased, the clamp unit 91131 of the neighboring suction module 911 may also be moved outward by the contact between the protruding portion 9114 of the suction module 911 and the inclined inner surface of the guide groove 911312 of the neighboring suction module 911. Therefore, the clamp 9113 of the suction module 911 and the clamp 9113 of the neighboring suction module 911 may switch to the released state.

Therefore, when the second and third picker devices 42 and 43 approach the package cutting device 1, the drying device 2, and the vision table 3 to dispose or remove the conversion kit 9111 on/from the negative pressure transfer plate structures 9112 of the package cutting device 1, the drying device 2, and the vision table 3, the clamp units 91131 of the second and third picker devices 42 and 43, the package cutting device 1, the drying device 2, and the vision table 3 switch to the outward movement state, such that

the second and third picker devices 42 and 43 may dispose or remove the conversion kit 9111.

Alternately, according to another embodiment of the present disclosure, referring to FIG. 20, the outward movement of the clamp unit 91131 may be performed by a cylinder 9116. Specifically, referring to FIG. 20, an extension portion 911318 may be formed on the other side portion in the Z-axis direction of the clamp unit 91131 and extend inward, and the cylinder 9116 may be provided at the other side in the Z-axis direction of the extension portion 911318. The cylinder 9116 may operate in the z-axis direction. When the cylinder 9116 moves toward one side in the Z-axis direction and applies an external force to one side in the Z-axis direction of the extension portion 911318, at least a part of the extension portion 911318 may be moved toward one side in the Z-axis direction, and the clamp unit 91131 may rotate and switch to the outward movement state.

Therefore, the clamp unit 91131 switches to the outward movement state when the first picker device 41 picks up the conversion kit 9111 from the loading/unloading device or the package cutting device 1, and the conversion kit 9111 may perform the vacuum suction. Therefore, the first picker device 41 may place the conversion kit 9111 on the loading/unloading device as the cylinder releases the conversion kit 9111 held by the clamp 9113 of the first picker device 41, such that the conversion kit 9111 may be placed on the loading/unloading device. Further, the first picker device 41 may place the conversion kit 9111 on the package cutting device 1 as the cylinder releases the conversion kit 9111 held by the clamp 9113 of the first picker device 41 and the clamp 9113 of the package cutting device 1 switches to the outward movement state by the protruding portion 9114 of the first picker device 41, such that the conversion kit 9111 may be placed on the package cutting device 1.

When the second and third picker devices 42 and 43 approach the package cutting device 1, the drying device 2, and the vision table 3 to dispose or remove the conversion kits 9111 on/from the negative pressure transfer plate structures 9112 of the package cutting device 1, the drying device 2, and the vision table 3, the clamp units 91131 of the second and third picker devices 42 and 43, the package cutting device 1, the drying device 2, and the vision table 3 switch to the outward movement state, such that the conversion kits 9111 may be disposed or removed.

In addition, for example, the outward movement state of the clamp unit 91131 of the suction module 911 of each of the package cutting device 1, the drying device 2, the vision table 3, the second picker device 42, and the third picker device 43 may be guided by the protruding portion 9114 of the neighboring suction module 911. In addition, the clamp unit 91131 of the suction module 911 of the first picker device 41 may be guided to the outward movement state by the cylinder 9116. This is because the first picker device 41 may pick up the conversion kit 9111 from the loading/unloading device, but it is difficult to provide the protruding portion 9114 on the rail (not illustrated) on which the conversion kit 9111 withdrawn from the loading/unloading device is seated.

In addition, referring to FIGS. 12 and 16, the negative pressure transfer plate structure 9112 may include a plurality of first protrusions 91123 protruding toward one side in the Z-axis direction. In addition, in comparison between FIG. 12 and FIG. 16, the first protrusion 91123 of the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43 may be positioned at a different position from the first protrusion 91123 of the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3. For example, the first protrusions 91123 may be formed on the negative pressure transfer plate

structures 9112 of the first to third picker devices 41, 42, and 43, the package cutting device 1, the drying device 2, and the vision table 3 so that a line connecting the pair of first protrusions 91123 of the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43 intersects a line connecting the pair of first protrusions 91123 of the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3. In addition, referring to FIG. 11 and 15, the conversion kit 9111 may have a plurality of holes 91112 into which the first protrusions 91123 are at least partially inserted. The holes 91112 may be formed at positions corresponding to the pair of first protrusions 91123 of the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43 and the pair of first protrusions 91123 of the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3. Therefore, four holes 91112 may be provided. The two pairs of first protrusions 91123 may be inserted into the four holes 91112, respectively, when the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43 approaches the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3 in order to place or pick up the conversion kit 9111. With the engagement between the first protrusion 91123 and the hole 91112, the conversion kit 9111 may be held or placed (disposed) at the exact position on the negative pressure transfer plate structure 9112. In addition, for reference, the hole 91112 may be formed by penetrating the conversion kit 911 in the z-axis direction. Alternately, the hole 91112 may be formed in a rim of the conversion kit 911 and provided in the form of a groove recessed from outside to inside of the conversion kit 911.

In addition, referring to FIGS. 15 and 18, the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43 may include second protrusions 91126 protruding from one side in the Z-axis direction. In addition, referring to FIGS. 11 and 13, the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3 may include holes 91116 into which the second protrusions 91126 are at least partially inserted. Therefore, the second protrusions 91126 are inserted into the holes 91116 when the conversion kit 9111 is disposed on the suction module 911 of each of the first to third picker devices 41, 42, and 43 or when each of the first to third picker devices 41, 42, and 43 places the plurality of packages on the conversion kit 9111 on each of the package cutting device 1, the drying device 2, and the vision table 3. Therefore, the negative pressure transfer plate structure 9112 of each of the first to third picker devices 41, 42, and 43 may be guided and disposed at the exact position with respect to the conversion kit 9111 on each of the package cutting device 1, the drying device 2, and the vision table 3, such that the negative pressure transfer plate structure 9112 may accurately place the conversion kit 9111 on the negative pressure transfer plate structure 9112 of each of the package cutting device 1, the drying device 2, and the vision table 3 or accurately place the plurality of packages on the conversion kit 9111 on each of the package cutting device 1, the drying device 2, and the vision table 3.

As described above, according to the present second system, in order to automatically change the conversion kit 9111, the conversion kit 9111 is mounted on the negative pressure transfer plate structure 9112 by the vacuum suction of the negative pressure transfer plate structure 9112, and the state in which the conversion kit 9111 may be detached from the negative pressure transfer plate structure 9112 may be automatically

provided by adjusting whether to generate the vacuum suction. In the state in which the vacuum suction is released and the conversion kit 9111 may be detached, the picker device may remove the conversion kit 9111 by holding the conversion kit 9111 by vacuum suction, and the picker device may place the conversion kit 9111. When a new conversion kit 9111 is placed on the negative pressure transfer plate structure 9112, the vacuum suction is generated again, such that the conversion kit 9111 may be fixedly mounted automatically on the negative pressure transfer plate structure 9112.

In addition, the suction module 911 of the present second system includes the clamp 9113 that physically holds the conversion kit 9111 and releases the conversion kit 9111 by the protruding portion 9114 of the neighboring suction module 911 when the neighboring suction modules 911 approach each other in the Z-axis direction. Therefore, a coupling force between the negative pressure transfer plate structure 9112 and the conversion kit 9111 may be increased. In order to dispose or remove the conversion kit 9111 on/from the negative pressure transfer plate structure 9112, the clamp 9113 releases the conversion kit 9111 to make the conversion kit 9111 removable. Therefore, it is possible to prevent the conversion kit 9111 from being unexpectedly detached from the negative pressure transfer plate structure 9112 even though the vacuum suction is stopped due to an unexpected problem.

In addition, if there is no clamping operation by the clamp 9113, there may be a problem in that the conversion kit 9111 is moved up and down on the negative pressure transfer plate structure 9112 when holding air is supplied into the vacuum holes of the conversion kit 9111. However, according to the present first suction module, since the conversion kit 9111 is held by the clamp 9113 and fixed to the negative pressure transfer plate structure 9112, thereby preventing the problem as mentioned above.

In addition, according to the embodiment of the present application, identification information may be marked on the conversion kit 9111 to identify information about the conversion kit 9111 (e.g., information about sizes of package seating portions of the conversion kit 9111 according to the sizes of the packages and information about the types of conversion kits 9111 suitable for the suction modules). A sensor for scanning the identification information may be provided on the first picker device 41. When the scanning result by the sensor indicates that the conversion kit 9111 withdrawn from the loading/unloading device is an acceptable conversion kit 9111, the first picker device 41 may pick up the conversion kit 9111. If the conversion kit 9111 is not an acceptable conversion kit, the operation of picking up the conversion kit 9111 may be stopped.

In addition, as described above, the conversion kit 9111, which is withdrawn from the loading/unloading device and seated on the rail (not illustrated), may be picked up. In a case in which the conversion kit 9111 is placed on the rail at an angle deviating from the exact position, the first picker device 41 may rotate to hold the conversion kit 9111 disposed at the angle deviating from the exact position and convey the conversion kit 9111 so that the conversion kit 9111 has the exact position.

Hereinafter, the suction module 911 according to the first embodiment of the present application (hereinafter, referred to as 'the present first suction module'), which is applied to the present second system, will be described below. However, in the description of the present first suction module 911, the constituent elements identical or similar to the above-mentioned constituent elements of the present second system and the present second suction module to be described below will be assigned with the same reference numerals, and the repetitive description thereof will be briefly described or

omitted.

The present first suction module 911 may include the conversion kit 9111 having the plurality of vacuum holes 91111 formed in the Z-axis direction.

In addition, the present first suction module 911 includes the negative pressure transfer plate structure 9112. The conversion kit 9111 is disposed on one surface in the Z-axis direction of the negative pressure transfer plate structure 9112, and the negative pressure transfer plate structure 9112 allows the negative pressure generator to communicate with the vacuum holes 91111 of the conversion kit 9111.

In addition, the present first suction module 911 includes the clamp 9113. The clamp 9113 may at least partially protrude from one side in the Z-axis direction of the negative pressure transfer plate structure 9112 and hold the conversion kit 9111 in a basic state.

In addition, the present first suction module 911 includes the protruding portion 9114. The protruding portion 9114 at least partially protrudes from one side in the Z-axis direction of the negative pressure transfer plate structure 9112 and guides the neighboring clamp 9113 of the neighboring suction module 911 to the outward movement state. In this case, the neighboring suction module 911 may mean the suction module 911 which is adjacent to and face the suction module 911 in the Z-axis direction. In addition, the protruding portion 9114 may be formed at the position corresponding to the clamp unit 91131 of the neighboring suction module 911.

In addition, the clamp 9113 may include the clamp unit 91131, at least a part of the clamp unit 91131 protrudes from one surface in the Z-axis direction of the negative pressure transfer plate structure 9112, and the clamp unit 91131 has a protrusion 911319 protruding inward toward the portion where the conversion kit 9111 is disposed.

In addition, the clamp 9113 may include the hinge unit 91132 about which the clamp unit 91131 is rotatable about the axis in the longitudinal direction of the negative pressure transfer plate structure 9112.

In addition, the clamp 9113 may include the elastic member 91133 that provides the external force applied to the clamp unit 9113 inward (in the direction toward the conversion kit 9111).

In addition, the depressed portion 91119 may be formed in the outer surface of the conversion kit 9111, and the protrusion 911319 of the clamp unit 91131 may be caught by and fastened to the depressed portion 91119. The depressed portion 91119 may be formed in the outer surface (the surface directed outward) of the conversion kit 9111 and depressed inward. In addition, the depressed portion 91119 may have a long hole shape. In addition, a stepped portion may be formed on the outer portion of the depressed portion 91119, and the stepped portion protrudes in the Z-axis direction so that the protrusion 911319 of the clamp unit 91131 may be caught by and fastened to the stepped portion. The protrusion 911319 of the clamp unit 91131 may be caught by and fastened to the stepped portion. The clamp unit 91131 may be caught by and fastened to the depressed portion 91119 so that the clamp unit 91131 holds the conversion kit 9111 in the basic state.

In addition, the guide groove 911312 may be provided in the inner portion of the protrusion 911319 of the clamp unit 91131 and guide the entry of the protruding portion 9114 into the neighboring suction module 911. In addition, the protruding portion 9114 may have a wedge shape.

Therefore, when the suction module 911 and the neighboring suction module 911 approach each other in the z-axis direction in the state in which the suction module 911 and the neighboring suction module 911 face each other, the protruding portion 9114 of

the neighboring suction module 911 may enter the guide groove 911312, and the protruding portion 9114 may enter the guide groove 911312 of the clamp unit 91131 of the neighboring suction module 911. Therefore, as the suction module 911 and the neighboring suction module 911 become close to each other, a degree to which the protruding portion 9114 of the neighboring suction module 911 enters the clamp unit 91131 of the suction module 911 is increased, such that the clamp unit 91131 is moved outward. Further, as the degree to which the protruding portion 9114 of the suction module 911 enters the clamp unit 91131 of the neighboring suction module 911 is increased, the clamp unit 91131 of the neighboring suction module 911 may also be moved outward. Therefore, the clamp 9113 of the suction module 911 and the clamp 9113 of the neighboring suction module 911 may switch to the released state. In addition, when the clamp unit 91131 is moved outward, the elastic member 91133 positioned on the outer surface of the clamp unit 91131 is compressed outward by an external force, and an inward external force may be applied to the clamp unit 91131 by an elastic restoring force of the elastic member 91133. Therefore, when the external force applied outward by the clamp unit 91131 is equal to or lower than the external force applied inward by the elastic member 91133, the position of the clamp unit 91131 may be returned to the basic state by the external force applied by the elastic member 91133.

In addition, the negative pressure transfer plate structure 9112 of the present first suction module 911 may hold the conversion kit 9111 by vacuum suction.

As described above, according to the present first suction module, in order to automatically change the conversion kit 9111, the conversion kit 9111 is mounted on the negative pressure transfer plate structure 9112 by the vacuum suction of the negative pressure transfer plate structure 9112, and the state in which the conversion kit 9111 may

be detached from the negative pressure transfer plate structure 9112 may be automatically provided by adjusting whether to generate the vacuum suction. In the state in which the vacuum suction is released and the conversion kit 9111 may be detached, the picker device may remove the conversion kit 9111 by holding the conversion kit 9111 by vacuum suction, and the picker device may place the conversion kit 9111. When a new conversion kit 9111 is placed on the negative pressure transfer plate structure 9112, the vacuum suction is generated again, such that the conversion kit 9111 may be fixedly mounted automatically on the negative pressure transfer plate structure 9112.

In addition, the present first suction module includes the clamp 9113 that physically holds the conversion kit 9111 and releases the conversion kit 9111 by the protruding portion 9114 of the neighboring suction module 911 when the neighboring suction modules 911 approach each other in the Z-axis direction. Therefore, a coupling force between the negative pressure transfer plate structure 9112 and the conversion kit 9111 may be increased. In order to dispose or remove the conversion kit 9111 on/from the negative pressure transfer plate structure 9112, the clamp 9113 releases the conversion kit 9111 to make the conversion kit 9111 removable. Therefore, it is possible to prevent the conversion kit 9111 from being unexpectedly detached from the negative pressure transfer plate structure 9112 even though the vacuum suction is stopped due to an unexpected problem.

In addition, if there is no clamping operation by the clamp 9113, there may be a problem in that the conversion kit 9111 is moved up and down on the negative pressure transfer plate structure 9112 when holding air is supplied into the vacuum holes of the conversion kit 9111. However, according to the present first suction module, since the conversion kit 9111 is held by the clamp 9113 and fixed to the negative pressure transfer

plate structure 9112, thereby preventing the problem as mentioned above.

The present first suction module 911 described above may be applied as the suction module 911 for the second picker device 42, the third picker device 43, the package cutting device 1, the drying device 2, and the vision table 3 of the system for automatically exchanging a conversion kit according to the embodiment of the present application.

In addition, the present application provides the picker device according to the embodiment of the present application including the suction module 911 according to the first embodiment of the present application. The picker device according to the embodiment of the present application may be applied as the second picker device 42 and the third picker device 43 of the system for automatically exchanging a conversion kit according to the embodiment of the present application. Because the picker device has been described above, a detailed description thereof will be omitted.

In addition, the present application includes a table part according to the embodiment of the present application including the suction module 911 according to the first embodiment of the present application. The table part according to the embodiment of the present application may be applied as the package cutting device 1, the drying device 2, and the vision table 3 of the first or second system according to the present application. Because the table part has been described above, a detailed description thereof will be omitted.

Hereinafter, the suction module 911 according to the second embodiment of the present application (hereinafter, referred to as 'the present second suction module'), which is applied to the present system, will be described below. However, in the description of the present second suction module 11, the constituent elements identical or similar to

the above-mentioned constituent elements of the present second system and the present first suction module will be assigned with the same reference numerals, and the repetitive description thereof will be briefly described or omitted.

The present second suction module 911 may include the conversion kit 9111 having the plurality of vacuum holes 91111 formed in the Z-axis direction.

In addition, the present second suction module 911 includes the negative pressure transfer plate structure 9112. The conversion kit 9111 is disposed on one surface in the Z-axis direction of the negative pressure transfer plate structure 9112, and the negative pressure transfer plate structure 9112 allows the negative pressure generator to communicate with the vacuum holes 91111 of the conversion kit 9111.

In addition, the present second suction module 911 includes the clamp 9113. The clamp 9113 may at least partially protrude from one side in the Z-axis direction of the negative pressure transfer plate structure 9112 and hold the conversion kit 9111 in a basic state.

In addition, the present second suction module 911 includes the protruding portion 9114. The protruding portion 9114 at least partially protrudes from one side in the Z-axis direction of the negative pressure transfer plate structure 9112 and guides the neighboring clamp 9113 of the neighboring suction module 911 to the outward movement state. In this case, the neighboring suction module 911 may mean the suction module 911 which is adjacent to and face the suction module 911 in the Z-axis direction. The protruding portion 9114 may have a wedge shape.

Therefore, when the suction module 911 and the neighboring suction module 911 approach each other in the z-axis direction in the state in which the suction module 911 and the neighboring suction module 911 face each other, the protruding portion 9114 of

the neighboring suction module 911 may enter the guide groove 911312, and the protruding portion 9114 may enter the guide groove 911312 of the clamp unit 91131 of the neighboring suction module 911. Therefore, as the suction module 911 and the neighboring suction module 911 become close to each other and a degree to which the protruding portion 9114 of the suction module 911 enters the clamp unit 91131 of the neighboring suction module 911 is increased, the clamp unit 91131 of the neighboring suction module 911 may also be moved outward. Therefore, the clamp 9113 of the neighboring suction module 911 may switch to the released state.

In addition, the clamp 9113 may include the clamp unit 91131, at least a part of the clamp unit 91131 protrudes from one surface in the Z-axis direction of the negative pressure transfer plate structure 9112, and the clamp unit 91131 has a protrusion 911319 protruding inward toward the portion where the conversion kit 9111 is disposed.

In addition, the depressed portion 91119 may be formed in the outer surface of the conversion kit 9111, and the protrusion 911319 of the clamp unit 91131 may be caught by and fastened to the depressed portion 91119. The depressed portion 91119 may be formed in the outer surface (the surface directed outward) of the conversion kit 9111 and depressed inward. In addition, the depressed portion 91119 may have a long hole shape. In addition, the stepped portion may be formed on the outer portion of the depressed portion 91119, and the stepped portion protrudes in the Z-axis direction so that the protrusion 911319 of the clamp unit 91131 may be caught by and fastened to the stepped portion. The protrusion 911319 of the clamp unit 91131 may be caught by and fastened to the stepped portion. The clamp unit 91131 may be caught by and fastened to the depressed portion 91119 so that the clamp unit 91131 holds the conversion kit 9111 in the basic state.

In addition, the clamp 9113 may include the hinge unit 91132 about which the clamp unit 91131 is rotatable about the axis in the longitudinal direction of the negative pressure transfer plate structure 9112. As the clamp unit 91131 rotates, the clamp 9113 may have the outward movement state or the basic state.

In addition, in the present second suction module 911, the clamp 9113 may include the cylinder 9116 that guides the outward movement state. Specifically, the extension portion may be formed on the other side portion in the Z-axis direction of the clamp unit 91131 and extend inward, and the cylinder 9116 may be provided at the other side in the Z-axis direction of the extension portion. The cylinder 9116 may operate in the z-axis direction. When the cylinder 9116 moves toward one side in the Z-axis direction and applies an external force to one side in the Z-axis direction of the extension portion, at least a part of the extension portion may be moved toward one side in the Z-axis direction, and the clamp unit 91131 may rotate and switch to the outward movement state.

In addition, the clamp 9113 may include the elastic member 91133 that provides the external force applied to the clamp unit 9113 inward (in the direction toward the conversion kit 9111). When the clamp unit 91131 is moved outward, the elastic member 91133 positioned on the outer surface of the clamp unit 91131 is compressed outward by an external force, and an inward external force may be applied to the clamp unit 91131 by an elastic restoring force of the elastic member 91133. Therefore, when the external force applied outward by the clamp unit 91131 is equal to or lower than the external force applied inward by the elastic member 91133, the position of the clamp unit 91131 may be returned to the basic state by the external force applied by the elastic member 91133.

That is, the clamp unit 91131 is rotated by the external force applied by the

cylinder 9116, and the end of the clamp unit 91131, which is directed toward one side in the Z-axis direction, is moved outward, such that the clamp unit 91131 switches to the outward movement state. In this case, the outward external force is applied to the elastic member 91133 by the outward movement of the clamp unit 91131, and thus the elastic member 91133 may be compressed, thereby applying an inward external force to the clamp unit 91131. In addition, when the external force applied outward by the clamp unit 91131 is equal to or lower than the external force applied inward by the elastic member 91133, the position of the clamp unit 91131 may be returned to the basic state by the external force applied by the elastic member 91133.

In addition, the protruding portion 9114 may be formed at the position corresponding to the clamp unit 91131 of the neighboring suction module 911. In addition, the clamp unit 91131 may be formed at the position corresponding to the protruding portion of the neighboring suction module 911. Therefore, when the present second suction module 911 and the neighboring suction module 911 approach each other in the Z-axis direction, the protruding portion 9114 enters the neighboring clamp unit (the clamp unit 91131 of the neighboring suction module 911), thereby applying an outward external force to the neighboring clamp unit 91131. More specifically, the protruding portion 9114 enters the neighboring clamp unit 91131 through the guide groove of the neighboring clamp unit 91131 and applies the external force to the neighboring clamp unit 91131, thereby increasing an interval between the conversion kit 9111 and the end of the neighboring clamp unit 91131 directed in the Z-axis direction and switching the neighboring clamp unit 91131 to the outward movement state.

Meanwhile, in the present second suction module 911 described above, the clamp unit 91131 may be switched to the outward movement state by the cylinder 9116. A

receiving portion 911315 capable of accommodating the protruding portion 9114 may be provided in the clamp unit 91131 so that the clamp unit 91131 does not interfere with the protruding portion 9114 of the neighboring suction module 911 when the present second suction module 911 and the neighboring suction module 911 approach each other in the Z-axis direction. Therefore, the clamp unit 91131 may not be switched to the outward movement state by the protruding portion 9114 of the neighboring suction module 911 even though the present second suction module 911 and the neighboring suction module 911 approach each other in the Z-axis direction.

In addition, the negative pressure transfer plate structure 9112 of the present second suction module 911 may hold the conversion kit 9111 by vacuum suction.

As described above, according to the present second suction module, in order to automatically change the conversion kit 9111, the conversion kit 9111 is mounted on the negative pressure transfer plate structure 9112 by the vacuum suction of the negative pressure transfer plate structure 9112, and the state in which the conversion kit 9111 may be detached from the negative pressure transfer plate structure 9112 may be automatically provided by adjusting whether to generate the vacuum suction. In the state in which the vacuum suction is released and the conversion kit 9111 may be detached, the picker device may remove the conversion kit 9111 by holding the conversion kit 9111 by vacuum suction, and the picker device may place the conversion kit 9111. When a new conversion kit 9111 is placed on the negative pressure transfer plate structure 9112, the vacuum suction is generated again, such that the conversion kit 9111 may be fixedly mounted automatically on the negative pressure transfer plate structure 9112.

In addition, the present second suction module includes the clamp 9113 that physically holds the conversion kit 9111 and releases the conversion kit 9111 by the

protruding portion 9114 of the neighboring suction module 911 when the neighboring suction modules 911 approach each other in the Z-axis direction. Therefore, a coupling force between the negative pressure transfer plate structure 9112 and the conversion kit 9111 may be increased. In order to dispose or remove the conversion kit 9111 on/from the negative pressure transfer plate structure 9112, the clamp 9113 releases the conversion kit 9111 to make the conversion kit 9111 removable. Therefore, it is possible to prevent the conversion kit 9111 from being unexpectedly detached from the negative pressure transfer plate structure 9112 even though the vacuum suction is stopped due to an unexpected problem.

In addition, if there is no clamping operation by the clamp 9113, there may be a problem in that the conversion kit 9111 is moved up and down on the negative pressure transfer plate structure 9112 when holding air is supplied into the vacuum holes of the conversion kit 9111. However, according to the present first suction module, since the conversion kit 9111 is held by the clamp 9113 and fixed to the negative pressure transfer plate structure 9112, thereby preventing the problem as mentioned above.

In addition, the present application provides the picker device according to the embodiment of the present application including the suction module 911 according to the second embodiment of the present application. The picker device according to the embodiment of the present application may be applied as the first picker device 41 of the system for automatically exchanging a conversion kit according to the embodiment of the present application. Because the table part has been described above, a detailed description thereof will be omitted.

It will be appreciated that the exemplary embodiments of the present application have been described above for purposes of illustration, and those skilled in the art may

understand that the present application may be easily modified in other specific forms without changing the technical spirit or the essential features of the present application. Therefore, it should be understood that the above-described exemplary embodiments are illustrative in all aspects and do not limit the present invention. For example, each component described as a single type may be carried out in a distributed manner. Likewise, components described as a distributed type can be carried out in a combined type.

The scope of the present application is represented by the claims to be described below rather than the detailed description, and it should be interpreted that the meaning and scope of the claims and all the changes or modified forms derived from the equivalent concepts thereto fall within the scope of the present application.

[CLAIMS]

[Claim 1]

An apparatus for automatically exchanging a conversion kit, the apparatus comprising:

a table module, the table module comprising:

a first conversion kit having a plurality of vacuum holes formed in a Z-axis direction; and

a table negative pressure transfer plate structure having the other surface in the Z-axis direction on which the first conversion kit is disposed, the table negative pressure transfer plate structure being configured to allow a negative pressure generator to communicate with the vacuum holes,

wherein the table negative pressure transfer plate structure is configured to hold the first conversion kit by vacuum suction,

wherein the first conversion kit is fixed to the table negative pressure transfer plate structure when the table negative pressure transfer plate structure holds the first conversion kit by vacuum suction, and

wherein the first conversion kit is removable from the table negative pressure transfer plate structure when the table negative pressure transfer plate structure releases the vacuum suction to the first conversion kit; and

a picker module configured to separate the first conversion kit disposed on the table negative pressure transfer plate structure from the table negative pressure transfer plate structure or place a new conversion kit on the table negative pressure transfer plate structure, wherein the picker module comprises a picker negative pressure transfer plate structure having one side in the Z-axis direction on which the first conversion kit is

mounted, and wherein the picker negative pressure transfer plate structure is configured to hold the first conversion kit by vacuum suction.

[Claim 2]

The apparatus of claim 1, wherein the picker negative pressure transfer plate structure comprises:

a picker product depressed portion made by depressing, toward the other side in the Z-axis direction, a portion of the picker negative pressure transfer plate structure facing a portion of the first conversion kit having the plurality of the vacuum holes, the picker negative pressure transfer plate structure being configured to transmit an application of negative pressure and a release of negative pressure made by the negative pressure generator to the vacuum holes; and

a picker kit depressed portion made by depressing, toward the other side in the Z-axis direction, a portion of the picker negative pressure transfer plate structure facing a rim portion of the first conversion kit, the picker kit depressed portion being configured to hold the first conversion kit by suction.

[Claim 3]

The apparatus of claim 2, wherein the picker kit depressed portion has a cross section having a long hole shape extending in a longitudinal direction of the first conversion kit.

[Claim 4]

The apparatus of claim 2, wherein the picker negative pressure transfer plate structure comprises a protrusion protruding toward one side in the Z-axis direction, and the table negative pressure transfer plate structure has a hole into which the protrusion is at least partially inserted.

[Claim 5]

The apparatus of claim 2, wherein the first conversion kit further comprises a pair of protruding portions protruding outward from two opposite lateral surfaces of the first conversion kit and extending in a longitudinal direction of the first conversion kit, and

wherein the picker negative pressure transfer plate structure further comprises a pair of fastening portions protruding toward one side in the Z-axis direction from the two opposite lateral surfaces of the picker negative pressure transfer plate structure and configured to be fitted with the pair of protruding portions.

[Claim 6]

The apparatus of claim 2, wherein the picker module further comprises a second conversion kit, and

wherein in a state in which the second conversion kit of the picker module is not mounted on the picker negative pressure transfer plate structure, the picker module separates the first conversion kit disposed on the table negative pressure transfer plate structure or places a new conversion kit on the table negative pressure transfer plate structure.