# Description

# PICKER FOR TRANSFER TOOL AND TRANSFER TOOL HAVING THE SAME

## Technical Field

[1] The present invention relates to a picker for a transfer tool, and more particularly, to a picker for a transfer tool capable of picking up an object to be transferred such as a semiconductor device, and a transfer tool having the same.

## Background Art

[2] In a process for fabricating semiconductor devices, semiconductor devices having undergone packaging process have to undergo various tests such as electric characteristic test, for example DC characteristic and a burn-in test for testing reliability against external heat. According to the test results, the semiconductor devices are sorted to be good or bad.

[3] For test or sorting process, the semiconductor devices are loaded on each tray and/or a board, and the trays are sequentially transferred.

[4] The semiconductor devices loaded on each tray and/or board are picked up and transferred by a transfer tool, to a socket, a tray, a board, etc. of a testing apparatus thus to be tested or sorted.

[5] The conventional transfer tool for picking up semiconductor devices includes a suction rod having a suction head at an end thereof, the suction head for sucking an upper surface of a semiconductor device by forming a vacuum pressure; and a pneumatic cylinder unit for vertically moving the suction rod.

[6] Here, the pneumatic cylinder unit is provided with a connection portion connected with an air supply pipe for supplying air, thereby upwardly or downwardly moving the suction rod by air supply.

[7] The transfer tool is configured to have two, four, eight pickers, etc. as one set, thereby transferring a plurality of semiconductor devices at one time. The number and the arrangement of the pickers for the transfer tool are determined according to the structure of the transfer tool.

[8] Since the number of semiconductor devices to be transferred is determined according to the number and the arrangement of the pickers in one set, the structure of the pickers for the transfer tool greatly influences on performance of a semiconductor device tester or a semiconductor device sorter using such transfer tool.

[9] Besides, when the suction heads of the pickers for the transfer tool come in contact with semiconductor devices for a transferring process, the semiconductor devices may be damaged or leads of the semiconductor devices may be deformed due to contact

pressure applied thereto.

[10] Furthermore, since the height of semiconductor devices may be changed, additional pickers for the transfer tool should be provided according to the changed height of semiconductor devices.

## Disclosure of Invention

## Technical Problem

[11] Therefore, it is an object of the present invention to provide a transfer tool having a structure enabling a plurality of pickers to form one set of pickers.

[12] It is another object of the present invention to provide a picker for a transfer tool capable of minimizing pressure applied to semiconductor devices to be transferred.

[13] It is still another object of the present invention to provide a picker for a transfer tool capable of transferring semiconductor devices without limitation of different height of the semiconductor devices according to the type of semiconductor devices.

## Technical Solution

[14] To achieve these objects, there is provided a picker for a transfer tool, comprising: a picker body coupled to a transfer module for moving a picker; a suction rod installed at the picker body so as to be vertically movable, the suction rod having a vacuum pipe path therein penetratingly formed in upper and lower directions, a suction head for sucking a semiconductor device at a lower end thereof, and a pneumatic connection portion at an upper end thereof, the pneumatic connection portion being connected to a vacuum pressure generator for generating vacuum pressure so that the suction head may suck a semiconductor device; an elastic member for maintaining the suction rod in a downwardly moved state with respect to the picker body by downwardly applying elastic force to the suction rod; and a pneumatic cylinder unit installed at the picker body, for upwardly moving the suction rod with respect to the picker body by pneumatic pressure.

[15] The picker body may be formed with one or more guide holes for preventing the suction rod from being rotated when the suction rod vertically moves.

[16] The guide hole may be formed to have a polygonal shape, and a part of the suction rod which moves along the guide hole has a polygonal shape.

[17] The elastic member may be a coil spring installed below the picker body and inserted with the suction rod.

[18] The picker body may include a first body portion; and a second body portion coupled to the first body portion, the second body portion having the pneumatic cylinder unit therein.

[19] The pneumatic cylinder unit may include a piston pipe movably inserted into an upwardly opened cylinder space of the second body portion, the piston pipe being

coupled to the suction rod at the upper end, for moving the suction rod by movement of the piston pipe, and an air outlet for exhausting air is formed at a lower end of the piston pipe, an upper end of the piston pipe is connected to an air supply pipe for supplying air to the air outlet, and a sealing portion for upwardly moving the piston pipe by pressure of air supplied through the air outlet by preventing air discharged to the air outlet from flowing outside the cylinder space is formed on an outer circumferential surface of the piston pipe.

[20] The first body portion may be formed with supporting protrusions at upper and lower sides thereof so that upper and the lower ends of the second body portion can be inserted and coupled thereto.

[21] To achieve these objects, there is also provided a transfer tool, comprising: the one or more pickers; and a transfer module coupled with the pickers, for moving the pickers.

[22] To achieve these objects, there is still also provided a picker for a transfer tool, comprising: a picker body coupled to a transfer module for moving a picker; a suction rod installed at the picker body so as to be vertically movable, the suction rod having a vacuum pipe path therein penetratingly formed in upper and lower directions, a suction head for sucking a semiconductor device at a lower end thereof, and a pneumatic connection portion at an upper end thereof, the pneumatic connection portion being connected to a vacuum pressure generator for generating a vacuum pressure so that the suction head may suck a semiconductor device; an elastic member for downwardly applying an elastic force to the suction rod with respect to the picker body; and a pneumatic cylinder unit installed at the picker body, for vertically moving the suction rod with respect to the picker body by pneumatic pressure.

[23] The pneumatic cylinder unit may be configured to have two pneumatic chambers. And, the pneumatic cylinder unit may comprise: first and second guide shafts installed at the picker body in parallel with each other, first and second guide shafts having a pipe path therein; and a cylinder body coupled to the first and the second guide shafts so as to be vertically movable, the cylinder body having a first pneumatic chamber coupled to the pipe path of the first guide shaft, and a second pneumatic chamber divided into two chamber spaces by a sealing portion coupled to the second guide shaft, the two chamber spaces connected to the pipe path of the second guide shaft and the first pneumatic chamber, respectively, and the suction rod is installed at one side of the cylinder body so as to be vertically movable.

[24] The cylinder body may be formed with one or more guide holes connected with the suction rod for preventing the suction rod from being rotated.

[25] The guide hole may be formed to have a polygonal shape, and a part of the suction rod which moves along the guide hole has a polygonal shape, and the elastic member

may be a coil spring installed below the picker body and inserted with the suction rod.

## Advantageous Effects

[26] The picker for a transfer tool according to the present invention has an advantage in that since a single pneumatic cylinder is used to reduce a space occupied by the pneumatic cylinder, the installation space for the picker is minimized.

[27] The picker for a transfer tool according to the present invention has an advantage in that since a single pneumatic cylinder is used to reduce a space occupied by the picker, a transfer tool may be provided with pickers of more large number. Particularly, the picker for a transfer tool may be applied to any device of different standards by minimizing an interval between adjacent pickers and adjusting the interval.

[28] The picker for a transfer tool according to the present invention has an advantage in that since the picker for a transfer tool minimizes a contact force of the suction head to an upper surface of a semiconductor device to be sucked, damage of the semiconductor device or deformation of a lead of the semiconductor device due to the contact force may be prevented.

[29] The picker for a transfer tool according to the present invention has an advantage in that since the suction head is configured to be upwardly movable when contacting an upper surface of a semiconductor device to be picked up, the picker for a transfer tool can transfer semiconductor devices without limitation of different height of the semiconductor devices according to the type of semiconductor devices.

## Brief Description of the Drawings

[30] FIG. 1 is a perspective view of a picker for a transfer tool in accordance with the present invention

[31] FIG. 2 is a disassembled perspective view of the picker for the transfer tool of FIG. 1;

[32] FIG. 3 is a sectional view of the picker for the transfer tool of FIG. 1;

[33] FIG. 4 is a view showing a state that a suction head of the picker for the transfer tool of FIG. 1 is upwardly moved after sucking a semiconductor device;

[34] FIG. 5 is a disassembled perspective view of a picker for the transfer tool according to a second embodiment of the present invention

[35] FIG. 6 is a sectional view of the picker for the transfer tool of FIG. 5; and

[36] FIG. 7 is a sectional view showing a state that the picker for the transfer tool of FIG. 6 is downwardly moved so as to suck a semiconductor device.

## Mode for the Invention

[37] Hereinafter, a picker for a transfer tool according to the present invention will be explained in more detail with reference to the attached drawings.

[38] FIG. 1 is a perspective view of a picker for a transfer tool in accordance with the

present invention, FIG. 2 is disassembled perspective view of the picker for the transfer tool of FIG. 1, FIG. 3 is a sectional view of the picker for the transfer tool of FIG. 1, and FIG. 4 is a view showing a state that a suction head of the picker for the transfer tool of FIG. 1 is upwardly moved after sucking a semiconductor device.

[39] The transfer tool according to the present invention comprises a transfer module (not shown) moved under control of a controller (not shown); and one or more pickers coupled to the transfer module so as to be moved as the transfer module moves, for picking up a semiconductor device 1 and loading the picked-up semiconductor device 1 to another position.

[40] The transfer module includes a mounting portion for mounting one or more pickers, and a transfer device for moving the mounting portion in the X direction or the Y direction, or the X-Y direction, etc.

[41] As shown in FIGS. 1 to 3, the picker includes a picker body 100, a suction rod 200 installed at the picker body 100 so as to be vertically movable, an elastic member 310 for applying elastic force to a lower side of the suction rod 200, and a pneumatic cylinder unit 300 for upwardly moving the suction rod 200.

[42] As shown in FIGS. 1 and 2, one side of the picker body 100 is coupled to the transfer module by a screw, etc. so that the suction rod 200 can be vertically moved.

[43] The picker body 100 may be implemented as one member. Or as shown in FIGS. 1 and 2, the picker body 100 may be implemented as a plurality of members including a first body portion 110 having the suction rod 200 movably installed, and a second body portion 120 fixedly coupled to the first body portion 110 and installed with the pneumatic cylinder unit 300 therein. Here, the second body portion 120 may have screw hole 121 so as to be coupled to the transfer module therethrough.

[44] The first body portion 110 of the picker body 100 may be formed with one or more guide holes 111 for preventing the suction rod 200 from being rotated when the suction rod 200 vertically moves.

[45] The guide hole 111 may be implemented so that its section can have various shapes, and may have a polygonal shape such as a square so as to prevent the suction rod 200 inserted thereinto from being rotated. The suction rod 200 may be configured such that a part of the suction rod 200 which moves along the guide hole 111 has a polygonal shape in correspondence with a sectional shape of the guide hole 111. An inner circumferential surface of the guide hole 111 and an outer circumferential surface of the suction rod 200 may have any shape as long as the suction rod 200 can be prevented from being rotated.

[46] The first and the second body portions 110 and 120 may be relatively moved with respect to each other in upper and lower directions. In order to prevent the relative movement of the first and the second body portions 110 and 120, the first and the

second body portions 110 and 120 may preferably be inserted and coupled to each other. The first body portion 110 may be formed with supporting protrusions 112 and 113 at upper and lower sides thereof so that upper and lower ends of the second body portion 120 can be inserted and coupled thereto.

[47] The suction rod 200 is installed at the picker body 100 so as to be vertically movable, and has a vacuum pipe path 210 therein penetratingly formed in upper and lower directions.

[48] A suction head 200 for sucking a semiconductor device 1 may be formed at a lower end of the suction rod 200, or may be coupled thereto as an additional member. A pneumatic connection portion 230 may be formed at an upper end of the suction head 200, or may be coupled thereto as an additional member. Here, the pneumatic connection portion 230 is connected by a pneumatic transmission pipe to a vacuum pressure generator for generating vacuum pressure so that the suction head 200 can suck the semiconductor device 1.

[49] The elastic member 310 may be configured to apply elastic force to a lower side of the suction rod 200 with respect to the picker body 100, that is, towards the semiconductor device 1. It is also possible to implement the elastic member 310 so as to provide elastic force in a direction opposite to the semiconductor device 1.

[50] The elastic member 310 may be implemented as a coil spring installed below the picker body 100 and inserted with the suction rod 200. Here, a protrusion jaw 241 for supporting the coil spring may be formed on an outer circumferential surface of the suction rod 200.

[51] The pneumatic cylinder unit 300 is installed at the picker body 100, thereby upwardly moving the suction rod 200 with respect to the picker body 100 by pneumatic pressure.

[52] The pneumatic cylinder unit 300 may include a piston pipe 320 movably inserted into an upwardly opened cylinder space 123 of the second body portion 120, the piston pipe 320 being coupled to the suction rod 200 at the upper end, for moving the suction rod 200 by movement of the piston pipe 320.

[53] A pipe path 321 is penetratingly formed at the piston pipe 320 in upper and lower directions. An air outlet 322 for exhausting air into the cylinder space 123 is formed at a lower end of the piston pipe 320. And, an air supply pipe (not shown) for supplying air to the air outlet 322 is connected to an upper end of the piston pipe 320.

[54] On an outer circumferential surface of the piston pipe 320, may be formed a sealing portion 324 for upwardly moving the piston pipe 320 by pressure of air supplied through the air outlet 322 by preventing air discharged to the air outlet 322 from flowing outside the cylinder space 123.

[55] As shown in FIG. 3, the sealing portion 324 may be implemented as a ring-shaped

protrusion outwardly protruded. Additional sealing member for maintaining a sealed state of the sealing portion 324 reducing frictional force with an inner wall of the cylinder space 123 may be installed at a peripheral portion of the sealing portion 324.

[56] A guide ring 325 for inserting the piston pipe 320 and preventing the piston pipe 320 from outwardly deviating and from laterally moving may be coupled to an upper end of the cylinder space 123. A through hole (not shown) may be penetratingly formed at a side wall of the second body portion 120, so that air inside an upper space of the cylinder space 123 divided into two spaces by the sealing portion 324 due to the installation of the guide ring 325 can be smoothly exhausted.

[57] The piston pipe 320 is connected to the suction rod 200 by a connection member 330 so that its vertical movement can be transferred to the suction rod 200.

[58] The operation of the picker for a transfer tool will be explained in more detail with reference to the attached drawings.

[59] The picker for a transfer tool is moved by a transfer module above a semiconductor device 1 to be picked-up. As shown in FIG. 4, the suction rod 200 of the picker for a transfer tool is in an upwardly moved state. Here, the semiconductor device 1 is not sucked to the suction rode, yet.

[60] The pneumatic cylinder unit 300 maintains the upwardly moved state of the suction rod 200 by maintaining a state that air is injected into the cylinder space 123 through the air outlet 322 of the piston pipe 320.

[61] When the picker for a transfer tool is moved toward the semiconductor device 1 to be transferred the pneumatic cylinder unit 300 stops injecting air into the cylinder space 123 through the air outlet 322. Accordingly, an elastic force is applied to the suction rod 200 by the elastic member 310, thereby downwardly moving the suction rod 200, that is, on an upper surface of the semiconductor device 1.

[62] As the suction rod 200 is downwardly moved, the suction head 220 of the suction rod 200 comes in contact with the semiconductor device 1 mounted on a tray or a socket, etc. Here, a lead of the semiconductor device 1 may be minutely deformed due to a contact force of the suction head 220. In order to prevent the lead from being minutely deformed, an elastic member such as a coil spring of which contact force can be easily controlled is used by adjusting elasticity of the coil spring, instead of using a pneumatic pressure of which contact force can not be easily controlled.

[63] When the suction rod 200 is moved above the semiconductor device 1, air is sucked to the suction head 220 through the pneumatic connection portion 230 connected to the suction rod 200. Accordingly, vacuum pressure by which air is sucked is generated below the suction head 220.

[64] By the vacuum pressure generated below the suction head 220, the semiconductor device 1 is sucked to the suction head 220 thus to be ready to be picked-up.

[65] Here, the pneumatic cylinder unit 300 injects air into the cylinder space 123 through the air outlet 322 of the piston pipe 320. Accordingly, as shown in FIG. 4, the suction rod 200 is upwardly moved, and the semiconductor device 1 is upwardly moved with a sucked state to the suction rod 200.

[66] Once the semiconductor device is upwardly moved with a sucked state to the suction rod 200, the transfer module is moved by a control signal to a position where the semiconductor device 1 is to be moved.

[67] In the picker for a transfer tool according to the present invention, a single pneumatic cylinder is used to reduce a space occupied by the pneumatic cylinder. Accordingly, a pitch interval between the adjacent pickers is minimized thus to provide a transfer tool enabling a plurality of pickers to form one set of pickers in more large number.

[68] The technical feature of the present invention is to minimize a contact force applied to an upper surface of a semiconductor device to be sucked from a picker for a transfer tool when the picker approaches a semiconductor device. Therefore, the present invention may be also applied to a double acting cylinder using two pneumatic cylinders, or a cylinder using two or more pneumatic cylinders.

[69] FIG. 5 is a disassembled perspective view of a picker for the transfer tool according to a second embodiment of the present invention, FIG. 6 is a sectional view of the picker for the transfer tool of FIG. 5, and FIG. 7 is a sectional view showing a state that the picker for the transfer tool of FIG. 6 is downwardly moved so as to suck a semiconductor device.

[70] As shown in FIGS. 5 to 7, a picker for a transfer tool according to a second embodiment of the present invention comprises: a picker body 400 coupled to a transfer module for moving a picker; a suction rod 500 installed at the picker body 400 so as to be vertically movable, the suction rod 500 having a vacuum pipe path 510 therein penetratingly formed in upper and lower directions, a suction head 520 for sucking a semiconductor device 1 at a lower end thereof, and a pneumatic connection portion 530 at an upper end thereof, the pneumatic connection portion 530 being connected to a vacuum pressure generator (not shown) for generating vacuum pressure so that the suction head 520 may suck the semiconductor device 1, an elastic member 710 for downwardly applying an elastic force to the suction rod 500 with respect to the picker body 400 and a pneumatic cylinder unit 600 installed at the picker body 400, for vertically moving the suction rod 500 with respect to the picker body 400 by pneumatic pressure.

[71] The picker body 400 may have various shapes and configurations to be detachably coupled to the transfer module. Here, the picker body 400 may have at least one screw hole 401 at one side thereof so as to be coupled to the transfer module therethrough.

[72] The suction rod 500 is installed so as to be vertically movable with respect to the picker body 100, and is formed with a vacuum pipe path510 therein penetratingly formed in upper and lower directions.

[73] The suction head 520 for sucking the semiconductor device 1 may be formed at a lower end of the suction rod 500, or may be coupled thereto as an additional member. A pneumatic connection portion 530 may be formed at an upper end of the suction head 500, or may be coupled thereto as an additional member. Here, the pneumatic connection portion 530 is connected by a pneumatic transmission pipe to a vacuum pressure generator for generating vacuum pressure so that the suction head 520 can suck the semiconductor device 1.

[74] The elastic member 710 may be configured to maintain a downwardly moved state of the suction rod 500 with respect to the picker body 400 by providing an elastic force to a lower side of the suction rod 500, that is, towards the semiconductor device 1. It is also possible to implement the elastic member 710 so as to provide an elastic force in a direction opposite to the semiconductor device 1.

[75] The elastic member 710 may be installed at an upper side or a lower side of the suction rod 500, and may be implemented as a coil spring inserted with the suction rod 500. Here, a protrusion jaw 541 for supporting the coil spring, i.e. the elastic member 710 may be formed on an outer circumferential surface of the suction rod 500.

[76] The pneumatic cylinder unit 600 coupled to the suction rod 500 for vertically moving the suction rod 500 may have various configurations, and may have two pneumatic chambers.

[77] As shown in FIGS. 6 and 7, the pneumatic cylinder unit 600 may comprise: first and second guide shafts 610, 620 installed at the picker body 400 in parallel with each other, the first and the second guide shafts 610, 620 having pipe paths 611, 621 therein; and a cylinder body 630 coupled to the first and the second guide shafts 610, 620 so as to be vertically moved, the cylinder body 630 having a first pneumatic chamber 631 coupled to the pipe path 611 of the first guide shaft 610, and a second pneumatic chamber 632 connected to the pipe path 621 of the second guide shaft 620 respectively.

[78] The first and the second guide shafts 610, 620 are fixedly coupled to one or more coupling holes 403 formed at the picker body 400 by a screw, etc. And, the pipe paths 611, 621 respectively formed at the first and the second guide shafts 610, 620 are respectively connected to a pneumatic transmission device by a pneumatic transmission pipe. Here, reference numeral 404 denotes a fixing member for fixing the first and the second guide shafts 610, 620 to the picker body 400.

[79] The suction rod 500 is installed at one side of the cylinder body 630 so as to be vertically movable. One or more guide holes 635 for coupling the suction rod 500 with

preventing it from being rotated may be formed at one side of the cylinder body 630.

[80] The guide hole 635 may be formed to have a polygonal shape so as to prevent the suction rod 500 from being rotated, and the suction rod 500 may be configured such that a part of the suction rod 500 which moves along the guide hole 635 has a polygonal shape. An inner circumferential surface of the guide hole 635 and an outer circumferential surface of the suction rod 500 may have any shape as long as the suction rod 500 can be prevented from being rotated.

[81] The cylinder body 630 is composed of one or more members, and formed with the first and the second pneumatic chambers 631, 632.

[82] The first and the second guide shafts 610, 620 are inserted into the first and the second pneumatic chambers 631, 632, respectively. The first pneumatic chamber 631 is connected to the pipe path 611 of the first guide shaft 610, and the second pneumatic chamber 632 is divided into two chamber spaces 632a, 632b by a sealing portion 612 coupled to the second guide shaft 620. Here, the two chamber spaces 632a, 632b are connected by a connection path 633 to the pipe path 621 of the second guide shaft 620 and the first pneumatic chamber 631, respectively.

[83] Here, the first and the second pneumatic chambers 631, 632 are respectively sealed by upper and lower sealing members 645. And, the sealing members 645 are respectively fitted into the first and the second guide shafts 610, 620 so as to vertically move along the first and second guide shafts 610, 620 in a sealed state.

[84] The sealing portion 612 may include a protrusion portion 612b coupled or protruding to/from the second guide shaft 620 so as to divide the second pneumatic chamber 632 into upper and lower chamber spaces 632a, 632b; and a sealing member 612a installed at the protrusion portion 612b for separating the two chamber spaces 632a, 632b from each other.

[85] The operation of the picker for a transfer tool according to a second embodiment of the present invention will be explained in more detail with reference to the attached drawings.

[86] The picker for a transfer tool coupled to a transfer module is moved to a certain position above a semiconductor device to be picked-up under control of a controller (not shown). As shown in FIG. 7, the suction rod 500 of the picker for a transfer tool is in the uppest side.

[87] Once the picker for a transfer tool is moved above the semiconductor devices 1 corresponding to the respective pickers, the pneumatic cylinder unit 600 moves the suction rod 500 to a lower side, that is, towards an upper surface of the semiconductor device 1 under control of the controller.

[88] While downwardly moving, the suction rod 500 comes in contact with an upper surface of the semiconductor device 1. When the height of the semiconductor device 1

is changed or the semiconductor device 1 is unstably mounted on a tray, an upper surface of the semiconductor device 1 may be positioned to be higher than a lowest position of the suction rod 500.

[89] The suction rod 500 is installed at the picker body 400 so as to be vertically movable. Accordingly, even if the pneumatic cylinder unit 600 moves the suction rod 500 towards a position lower than an upper surface of the semiconductor device 1, the suction rod 500 is not lowered since it is vertically movable at the picker body 400.

[90] The suction rod 500 maintains a contact state to an upper surface of the semiconductor device 1 by the elastic member 710 that provides an elastic force to a lower side of the suction rod 500. Accordingly, once a vacuum pressure occurs at the vacuum pipe path 510, the semiconductor device 1 is smoothly sucked to the suction head 520 of the suction rod 500. Here, a contact force applied to the semiconductor device 1 can be optimized by adjusting an elastic coefficient of the elastic member 710.

[91] Once the semiconductor device 1 is sucked to the suction rod 500, the pneumatic cylinder unit 600 upwardly moves the suction rod 500. And, the semiconductor device 1 is transferred to a position by a transfer module.

[92] The operation of the pneumatic cylinder unit 600 will be explained in more detail.

[93] As shown in FIG. 6, when the suction rod 500 is downwardly moved, a pneumatic pressure is transmitted to the first pneumatic chamber 631 through the pipe path 611 of the first guide shaft 610.

[94] Then, the pneumatic pressure is transmitted to a lower chamber space 632b of the second pneumatic chamber 632 below the first pneumatic chamber 631 by the connection path 633. Accordingly, the cylinder body 630 downwardly moves with respect to the picker body 400 due to the expanded chamber, so that the suction rod 500 coupled to the cylinder body 630 also downwardly moves.

[95] On the contrary, as shown in FIG. 7, when the suction rod 500 is upwardly moved, a pneumatic pressure is transmitted to an upper chamber space 632a of the second pneumatic chamber 632 through the pipe path 621 of the second guide shaft 620. As the chamber space 632b of the second pneumatic chamber 632 is expanded due to the transmitted pneumatic pressure, the cylinder body 630 upwardly moves with respect to the picker body 400, and thereby the suction rod 500 coupled to the cylinder body 630 also upwardly moves.

[96] It will also be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

# Claims

[1] A picker for a transfer tool, comprising:
a picker body coupled to a transfer module for moving a picker;
a suction rod installed at the picker body so as to be vertically movable, the suction rod having a vacuum pipe path therein penetratingly formed in upper and lower directions, a suction head for sucking a semiconductor device at a lower end thereof, and a pneumatic connection portion at an upper end thereof, the pneumatic connection portion being connected to a vacuum pressure generator for generating vacuum pressure so that the suction head may suck a semi-conductor device;
an elastic member for maintaining the suction rod in a downwardly moved state with respect to the picker body by downwardly applying an elastic force to the suction rod; and
a pneumatic cylinder unit installed at the picker body, for upwardly moving the suction rod with respect to the picker body by pneumatic pressure.

[2] The picker for a transfer tool of claim 1, wherein the picker body is formed with one or more guide holes for preventing the suction rod from being rotated when the suction rod vertically moves.

[3] The picker for a transfer tool of claim 2, wherein the guide hole is formed to have a polygonal shape, and a part of the suction rod which moves along the guide hole has a polygonal shape.

[4] The picker for a transfer tool of claim 1, wherein the elastic member is a coil spring installed below the picker body and inserted with the suction rod.

[5] The picker for a transfer tool of claim 1, wherein the picker body comprises:
a first body portion; and
a second body portion coupled to the first body portion, the second body portion having the pneumatic cylinder unit therein.

[6] The picker for a transfer tool of claim 5, wherein the pneumatic cylinder unit has a piston pipe movably inserted into an upwardly opened cylinder space of the second body portion, the piston pipe being coupled to the suction rod at the upper end, for moving the suction rod by movement of the piston pipe,
wherein an air outlet for exhausting air is formed at a lower end of the piston pipe, an upper end of the piston pipe is connected to an air supply pipe for supplying air to the air outlet, and a sealing portion for upwardly moving the piston pipe by pressure of air supplied through the air outlet by preventing air discharged to the air outlet from flowing outside the cylinder space is formed on an outer circumferential surface of the piston pipe.

[7] The picker for a transfer tool of claim 5, wherein the first body portion is formed with supporting protrusions at upper and lower sides thereof so that upper and the lower ends of the second body portion can be inserted and coupled thereto.

[8] A transfer tool, comprising:
the one or more pickers of any one claim among claims 1 to 7; and
a transfer module coupled with the pickers, for moving the pickers.

[9] A picker for a transfer tool, comprising:
a picker body coupled to a transfer module for moving a picker;
a suction rod installed at the picker body so as to be vertically movable, the suction rod having a vacuum pipe path therein penetratingly formed in upper and lower directions, a suction head for sucking a semiconductor device at a lower end thereof, and a pneumatic connection portion at an upper end thereof, the pneumatic connection portion being connected to a vacuum pressure generator for generating vacuum pressure so that the suction head may suck a semi-conductor device;
an elastic member for downwardly applying elastic force to the suction rod with respect to the picker body; and
a pneumatic cylinder unit installed at the picker body, for vertically moving the suction rod with respect to the picker body by pneumatic pressure.

[10] The picker for a transfer tool of claim 9, wherein the pneumatic cylinder unit has two pneumatic chambers.

[11] The picker for a transfer tool of claim 10, wherein the pneumatic cylinder unit comprises:
first and second guide shafts installed at the picker body in parallel with each other, the first and the second guide shafts having a pipe path therein; and
a cylinder body coupled to the first and the second guide shafts so as to be vertically movable, the cylinder body having a first pneumatic chamber coupled to the pipe path of the first guide shaft, and a second pneumatic chamber divided into two chamber spaces by a sealing portion coupled to the second guide shaft, the two chamber spaces connected to the pipe path of the second guide shaft and the first pneumatic chamber, respectively;
wherein the suction rod is installed at one side of the cylinder body so as to be vertically movable.

[12] The picker for a transfer tool of any one of claims 9 to 11, wherein the cylinder body is formed with one or more guide holes connected with the suction rod for preventing the suction rod from being rotated.

[13] The picker for a transfer tool of claim 12, wherein the guide hole is formed to have a polygonal shape, and a part of the suction rod which moves along the

guide hole has a polygonal shape.

[14] The picker for a transfer tool of one of claims 9 to 11, wherein the elastic member is a coil spring installed below the picker body and inserted with the suction rod.