

## DESCRIPTION

### PICKER

#### 5 TECHNICAL FIELD

The present invention relates to a picker mounted on a pick-and-place apparatus for transferring a device by sucking the same.

#### 10 BACKGROUND ART

In general, a picker is an instrument installed in a pick-and-place apparatus for picking up a device and then transferring to place the device at a predetermined placing position to suck the device, including a rod having a suction  
15 passage in which vacuum pressure acts and one end to which a suction unit for sucking a device is coupled and an up-down driving unit for moving the rod in up-down direction.

The up-down driving unit is activated by pneumatic pressure and includes a cylinder providing a space in which  
20 the pneumatic pressure acts and a piston moving in a sliding manner in the cylinder by the pneumatic pressure. Also, the piston and the rod of the up-down driving unit are connected through a link, and, accordingly, the rod is moved in up-down direction by sliding movement of the piston inside of the  
25 cylinder.

Meanwhile, a conventional picker picks up a device by forming vacuum pressure, i.e., negative pressure in a suction unit when picks up a device at a pick-up position and loads the device at a loading position by releasing the vacuum  
30 pressure in the suction unit.

In particular the conventional picker generally forms positive pressure in the suction unit to quickly load the device at the loading position.

However, as a device such as an LED element becomes  
5 miniaturized in size, when the conventional picker forms a positive pressure in the suction unit for sucking a device, the device is scattered or is not loaded in an accurate state in the loading position.

Also, since a predetermined time is required to  
10 transfer the positive pressure to a suction head of the picker, the conventional picker is not in correspondence to a trend requiring a fast device handing and thus, limiting the improvement in a handling speed of the apparatus.

In detail, since the positive pressure or the negative  
15 pressure in the suction head of the picker is formed through pneumatic pressure transfer line, and a time required for forming the positive pressure or the negative pressure through the pneumatic pressure transfer line is determined by a length of the pneumatic pressure transfer line, there is a  
20 limitation for minimizing the length of the pneumatic pressure transfer line so as to shorten the time for forming the positive pressure or the negative pressure, which results in limiting the handling speed of the apparatus.

Meanwhile, as a device that is an object to be  
25 transferred becomes micro-sized, the picker for transferring the device becomes smaller in size. Accordingly, various issues such as convenience in attachment and detachment, convenience in maintenance, and improvement in wearability have been raised.

30 Also, in correspondence to a demand of the faster

device handling than that of a related art, the picker for transferring a device is also required to quickly move from a pick-up position to a loading position and pick up and load the device in the more faster manner to improve productivity of a device.

#### **DISCLOSURE OF THE INVENTION**

##### **TECHNICAL PROBLEM**

The object of the present invention is to provide a picker capable of picking-up and loading a device in the more faster manner to solve the above-described limitations of the related art.

The object of the present invention is also to provide a picker having a structure capable of lightening a device thereof to quickly move from a pick-up position to a loading position.

The object of the present invention is also to provide a picker capable of quickly and stably placing a picked device by further including atmospheric pressure forming unit capable of quickly forming atmospheric pressure in a suction unit to release a pick-up of a device.

##### **TECHNICAL SOLUTION**

In accordance with an embodiment of the present invention, a picker including a rod 200 having a suction passage 210 in which vacuum pressure acts and one end to which a suction unit 220 for sucking a device 10 is coupled; and an up-down driving unit 100 for moving the rod (200) in up-down direction, wherein the up-down driving unit 100 includes: a first body unit 110 detachably coupled to a support structure and to which the rod 200 is coupled in an

up-down movable manner; a second body unit 120 for moving the rod 200 with respect to the first body unit 110 in at least one of upward and downward directions while fixedly coupled to the rod 200 to be moved in up-down direction by electric driving with respect to the first body unit 110; and an electric driving unit installed on at least one of the first body unit 110 and the second body unit 120 to drive a movement in at least one of the upward and downward directions of the second body unit 120 with respect to the first body unit 110, is disclosed.

The first body unit 110 may have a rectangular parallelepiped shape to which the rod 200 is coupled while passing therethrough in an up-down movable manner, and the second body unit 120 may have a thin-type rectangular parallelepiped shape in correspondence to the shape of the first body unit 100.

A fixedly coupling portion 121 having a slot having a U shape when viewed from above so that the rod 200 passes therethrough in up-down direction may be formed in the second body unit 120, so that the rod 200 is fixedly coupled to the second body unit 120.

The up-down driving unit may include at least one guide member 130 fixedly coupled to the second body unit 120 in parallel to a longitudinal direction of the rod 200 and coupled to the first body unit 110 in an up-down movable manner.

The electric driving unit may include one of a linear motor, a piezo-element, a solenoid, and a VCM.

The electric driving unit may include: an electromagnetic unit 510 installed on the first body unit 110

to generate magnetic force when electricity is applied; and a magnetic force response member 520 installed on the second body unit 120 to act on the magnetic force so that attraction force acts between the first body unit 110 and the second body unit 120 when the magnetic force is generated from the electromagnetic unit 510.

The electric driving unit may include a first electric driving unit for driving an upward movement of the second body unit 120 with respect to the first body unit 110 and a second electric driving unit for driving a downward movement of the second body unit 120 with respect to the first body unit 110.

The electric driving unit may drive a movement of the rod 200 in one of upward and downward directions of the second body unit 120 with respect to the first body unit 110, and the up-down driving unit may include at least one elastic member 150 for a movement of the second body unit 120 in an opposite direction with respect to the first body unit 110.

In accordance with another embodiment of the present invention, a picker including: a rod 200 having a suction passage 210 in which vacuum pressure acts and one end to which a suction unit 220 for sucking a device 10 is coupled; an up-down driving unit 100 for moving the rod 200 in up-down direction; and an atmospheric pressure forming unit 400 for forming atmospheric pressure in the suction unit 220 when the vacuum pressure in the suction passage 210 is released, is disclosed.

The atmospheric pressure forming unit 400 may include: first and second flow path forming members 410 and 420 coupled to a lower end of the rod 200 to form a connection

flow path connected to the suction flow path 210; a piston member 430 moving upward along the connection flow path when vacuum pressure is transferred through the suction flow path 210 to transfer the vacuum pressure to the suction unit 220; and an elastic member 440 moving the piston member 430 downward when the vacuum pressure in the suction flow path 210 is released to transfer atmospheric pressure to the suction unit 220 by the piston member 430.

In the second flow path forming member 420, a piston space 429 in which the piston member 430 is movable may be formed, at least one side through-hole 421 passing through a side surface of the second flow path forming member 420 to connect the piston space 429 to the outside may desirably be formed, and a communication groove 422 extending upward along an inner circumferential surface of the second flow path forming member 420 above the side through-hole 421 and communicated with the suction passage 210 may desirably be formed.

A first port 431 may be formed in a side surface of the piston member 430, and a pneumatic pressure transfer flow path 433 connecting a second port 432 formed in a bottom surface at a position corresponding to an up-down through-hole 423 formed in the second flow path forming member 420 may be formed in the piston member 430, as the first port 431 is communicated with the side through-hole 421 in a state in which the first port 431 is disposed at a lower side, external atmospheric pressure may be transferred to the suction unit 220 through the pneumatic pressure transfer flow path 433, the second port 432, and the up-down through-hole 423, and, as the piston member 430 is moved upward by vacuum

pressure when the vacuum pressure is transferred from above the piston member 430, and the first port 431 is moved upward along the piston space 429, the first port 431 may be communicated with the communication groove 422, and a side surface of the piston space 429 may block the side through-hole 421, so that the atmospheric pressure is not transferred to the suction unit 220.

The atmospheric pressure forming unit 400 may include: a main body 510 coupled to the rod 200, through which vacuum pressure connecting flow path 513 connected to the suction flow path 210 passes upwardly and downwardly, and in which atmospheric pressure connecting flow path for connecting the vacuum pressure connecting flow path 513 to the outside is formed; and a valve member 531 installed in the main body 510 to allow the vacuum pressure connecting flow path 513 and the atmospheric pressure connecting flow path to communicate with each other or be blocked therebetween.

The valve member 531 may block communication between the atmospheric pressure connecting flow path and the vacuum pressure connecting flow path 513 by vacuum pressure in the suction flow path 210 when the vacuum pressure is formed in the suction flow path 210 and release the blocking of the communication between the atmospheric pressure connecting flow path and the vacuum pressure connecting flow path 513 by elastic force or a self-weight of the elastic member when the vacuum pressure in the suction flow path 210 is released.

The atmospheric pressure forming unit 400 may include a housing 521 inserted into an insertion groove 519 formed in the main body 510 so that at least a portion thereof crosses the atmospheric pressure connecting flow path and allowing

the valve member 531 to be movable therein.

An opening 540 communicated with the vacuum pressure connecting flow path 513 and opened and closed by the valve member 531 may be formed in the housing 521.

5       The valve member 531 may be installed in the housing 521 so that the valve member 531 is dropped by its self-weight when the vacuum pressure in the suction flow path 210 is released.

10       An elastic member 532 applying elastic force to the valve member 531 so that the valve member 531 opens the opening 540 when the vacuum pressure in the suction flow path 210 is released may be installed in the housing 521.

15       The atmospheric pressure forming unit may include: atmospheric pressure connecting tube connected to the suction passage 220; an air tank storing compressed air for forming atmospheric pressure in a space corresponding to a volume including the suction passage, the suction unit, and the atmospheric pressure connecting tube when opened; and an opening and closing valve installed between the air tank and  
20       the atmospheric pressure connecting tube to open and close the air tank.

25       At least one side through-hole may be formed in one of the rod and the suction unit while passing through from an outer circumferential surface to the inside thereof, and the atmospheric pressure forming unit may include: an opening and closing member moving along the outer circumferential surface of one of the rod and the suction unit to open and close the side through-hole; and an opening and closing member moving unit moving the opening and closing member along the outer  
30       circumferential surface of one of the rod and the suction

unit.

The atmospheric pressure connecting flow path may include a connection flow path forming portion 561 having one end connected to the vacuum pressure connecting flow path 513 and opened and closed by a movement of the valve member 531 and the other end communicated with the outside of the main body 510, and the connection flow path forming portion 561 may have a cylindrical structure having an inner diameter D1 that is greater than an outer diameter D0 of the valve member 531 so that the valve member (531) having a spherical shape is moved and air is introduced.

One end of the connection flow path forming portion 561 may be formed such that a connecting portion 564 connected to the vacuum pressure connecting flow path 513 has an inner diameter that is less than the outer diameter D0 of the valve member 531 so as to be easily opened and closed by a movement of the valve member 531.

A separation prevention means for communicating with the outside of the main body 510 and preventing the valve member 531 from being escaped to the outside of the main body 510 may desirably be provided at the other end of the connection flow path forming portion 561.

The separation prevention means may include: an expanded flow path 562 having an inner diameter D2 that is greater than the inner diameter D1 of the connection flow path forming portion 561 to connect the other end of the connection flow path forming portion 561 to an outer surface of the main body 510; and an insertion member 534 inserted into the expanded flow path 562 to allow air to be introduced into the connection flow path forming portion 561 from the

main body 510.

The connection flow path forming portion 561 may be formed in a longitudinal direction of the main body 510, and an auxiliary flow path 566 connecting the connection flow path forming portion 561 to the vacuum pressure connecting flow path 513 may be formed in the main body 510.

The atmospheric pressure forming unit 400 may further include an elastic member 532 releasing blocking of the connection flow path forming portion 561 with respect to the pressure connecting flow path 513 by applying elastic force to the valve member 531 so that the valve member 531 is moved away from one end of the connection flow path forming portion 561 when vacuum pressure in the vacuum pressure connecting flow path 513 is released, and an elastic member insertion groove 563 extending inward from the one end of the connection flow path forming portion 561 may be additionally formed in the main body 510.

A communication flow path 568 communicating with the outside of the main body 510 may be formed in the connecting portion 564 connected to the connection flow path forming portion 561 so that atmospheric pressure outside the main body 510 is quickly transferred to the vacuum pressure connecting flow path 513.

The separation prevention means may include a coupling ring 591 coupled to the main body 510 so as to cover the connection flow path forming portion 561.

A recessed groove 519 into which the coupling ring 591 is inserted may be formed in the main body 510 for smooth coupling of the coupling ring 519.

The connecting portion 564 connected to the vacuum

pressure connecting flow path 513 may have a longitudinal cross-sectional shape that is a tapered shape in which an inner diameter gradually decreases in a direction toward the vacuum pressure connecting flow path 513 so as to be smoothly  
5 opened and closed by the valve member 531.

### **ADVANTAGEOUS EFFECTS**

As the rod picking up the device is driven in up-down direction by electricity such as solenoid, the picker in  
10 accordance with the present invention may have the fast response speed and the light weight in comparison with the conventional picker using the pneumatic pressure cylinder.

In particular, as the picker has the improved response speed and the light weight, the process of picking up and  
15 loading the device may be more quickly performed, and, as the moving speed of the picker is improved through the lightening of the picker, the total device handling speed may be improved.

Furthermore, since the inertia generated while the  
20 transfer tool including the plurality of pickers is moved is reduced in virtue of the lightening of the picker, and the vibration generated during the operation of the apparatus is reduced, the device handling may be more stably performed.

Also, the picker in accordance with the present  
25 invention may stably perform the placement of the picked device by further including the atmospheric pressure forming unit capable of quickly forming the atmospheric pressure in the suction unit to release the pick-up of the device.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

  
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FIG. 1 is a perspective view illustrating a picker in accordance with the present invention;

FIG. 2 is a longitudinal sectional view illustrating the picker in FIG. 1 to show a state in which a device is picked  
5 up;

FIG. 3 is a longitudinal sectional view illustrating a state in which a rod is moved upward by an up-down driving unit before picking a device or to place a device in the picker in FIG. 1;

10 FIG. 4 is a cross-sectional view illustrating a state in which atmospheric pressure is formed in a pick-up unit by atmospheric pressure forming unit in FIG. 2;

FIG. 5 is a partial cross-sectional view precisely illustrating the atmospheric pressure forming unit in FIG. 4;

15 FIG. 6 is a partial cross-sectional view illustrating a state in which vacuum pressure is formed in a pick-up unit to pick up a device in FIGS. 2 and 3;

FIGS. 7 to 9 are side views illustrating embodiments of formation positions of the atmospheric pressure forming unit  
20 in FIG. 5;

FIG. 10a is a partial cross-sectional view illustrating a state in which vacuum pressure is formed in a suction unit to suck a device as another embodiment of the atmospheric pressure forming unit coupled to the picker in FIG. 1;

25 FIG. 10b is a partial cross-sectional view illustrating a state in which atmospheric pressure is formed in a suction unit by the atmospheric pressure forming unit in the configuration of FIG. 10a;

FIG. 11a is a partial cross-sectional view illustrating  
30 a state in which vacuum pressure is formed in a suction unit

to suck a device as another embodiment of the atmospheric pressure forming unit coupled to the picker in FIG. 1;

FIG. 11b is a partial cross-sectional view illustrating a state in which atmospheric pressure is formed in a suction unit by the atmospheric pressure forming unit in the configuration of FIG. 11a;

FIG. 12a is a partial cross-sectional view illustrating a state in which vacuum pressure is formed in a suction unit to suck a device as another embodiment of the atmospheric pressure forming unit coupled to the picker in FIG. 1;

FIG. 12b is a partial cross-sectional view illustrating a state in which atmospheric pressure is formed in a suction unit by the atmospheric pressure forming unit in the configuration of FIG. 12a;

FIG. 13a is a partial cross-sectional view illustrating a state in which vacuum pressure is formed in a suction unit to suck a device as another embodiment of the atmospheric pressure forming unit coupled to the picker in FIG. 1;

FIG. 13b is a partial cross-sectional view illustrating a state in which atmospheric pressure is formed in a suction unit by the atmospheric pressure forming unit in the configuration of FIG. 13a;

FIG. 14a is a partial cross-sectional view illustrating a state in which vacuum pressure is formed in a suction unit to suck a device as another embodiment of the atmospheric pressure forming unit coupled to the picker in FIG. 1;

FIG. 14b is a partial cross-sectional view illustrating a state in which atmospheric pressure is formed in a suction unit by the atmospheric pressure forming unit in the configuration of FIG. 14a;

FIG. 14c is a partial perspective view illustrating a part of a configuration including the atmospheric pressure forming unit in FIG. 14a;

FIG. 15 is a circuit diagram for controlling pneumatic pressure illustrating another embodiment of the atmospheric pressure forming unit coupled to the picker; and

FIGS. 16a and 16b are conceptual views illustrating another embodiment of the atmospheric pressure forming unit coupled to the picker.

#### **MODE FOR CARRYING OUT THE INVENTION**

Hereinafter, a picker in accordance with the present invention will be described below with reference to the accompanying drawings.

As illustrated in FIGS. 1 and 2, the picker in accordance with the present invention includes a rod 200 having a suction passage 210 in which vacuum pressure acts and one end to which a suction unit for sucking a device 10 is coupled and an up-down driving unit 100 for moving the rod 200 in up-down direction.

The rod 200 includes the suction passage 210 in which vacuum pressure acts and one end to which the suction unit 220 for sucking the device 10 is coupled. The rod 200 may be variously provided in configuration.

For example, the rod 200 may be a hollow cylinder so that a pneumatic pressure transmission pipe (not shown) transferring vacuum pressure for sucking the device 10 is connected thereto. Here, a transverse cross-section of the rod 200 may have various shapes such as a circle and a polygon.

Meanwhile, the suction unit 220 coupled to a lower end of the rod 200 is a member picking up the device 10 by using vacuum pressure transferred through the suction passage 210. The suction unit 220 may include one or more members and structures depending on kind, size, and structure of the device.

The up-down driving unit 100 is a component for moving the rod 200 in up-down direction. The up-down driving unit 100 may be variously provided in configuration.

In particular, the up-down driving unit 100 in accordance with the present invention may have any component as long as the component uses electricity, such as a solenoid and voice coil motor (VCM) which use electricity.

For example, the up-down driving unit 100 may include: a first body unit 110 detachably coupled to a support structure and to which the rod 200 is coupled in an up-down movable manner; a second body unit 120 moving the rod 200 in at least one direction of upward and downward directions with respect to the first body unit 110 while fixedly coupled to the rod 200 in an up-down movable manner by electric driving with respect to the first body unit 110; and an electric driving unit installed on at least one of the first body unit 110 and the second body unit 120 to drive the movement in at least one direction of the upward and downward directions of the second body unit 120 with respect to the first body unit 110.

The first body unit 110 is detachably coupled to the support structure and coupled to the rod 200 so that the rod 200 is movable in up-down direction. The first body unit 110 may be variously provided in configuration.

For example, the first body unit 110 is detachably coupled to the support structure and has a thin-type rectangular parallelepiped shape so that the rod 200 may move in up-down direction.

5 Here, the first body unit 110 having the rectangular parallelepiped shape is detachably coupled to the support structure desirably through a side surface having a smaller width.

When the first body unit 110 is detachably coupled to  
10 the support structure through the side surface having a smaller width, a distance between adjacent pickers may be minimized.

Also, the rod 200 is desirably coupled to the first body unit 110 having the rectangular parallelepiped shape  
15 such that the rod 200 passes upwardly and downwardly through the first body unit 110 in an up-down movable manner.

To this end, the first body unit 110 has a first through-hole 111 passing in up-down direction therethrough so that the rod 200 is inserted.

20 Also, bushes 512 and 513 are installed on upper and lower ends of the first through-hole 111 so that the rod 200 may smoothly move in up-down direction.

Also, a ground member 516 that enables static electricity generated due to friction caused by the up-down  
25 movement of the rod 200 to be grounded may be installed on the first through-hole 111.

Also, a second through-hole 112 may be additionally formed in the first body unit 110 for up-down movement of a guide member 130 that will be described later.

30 The second through-hole 112 is formed similarly to the

first through-hole 111, and bushes 514 and 515 are installed on upper and lower ends of the second through-hole 112 for smooth movement of the guide member 130.

5 The second body unit 120 is fixedly coupled to the rod 200 and moved in up-down direction by electric driving with respect to the first body unit 110, so as to move the rod 200 in at least one direction of upward and downward directions with respect to the first body unit 110.

10 For example, the second body unit 120 may have a thin-type rectangular parallelepiped shape in correspondence to the shape of the first body unit 100.

Also, a structure for fixedly coupling the second body unit 120 to the rod 200 is formed or installed on the second body unit 120.

15 For example, the rod 200 is fixedly coupled to the second body unit 120 in such a manner that a fixedly coupling portion 121 in which a slot having a shape in which a side surface is opened as the rod 200 passes therethrough in up-down direction, i.e., an U-shape when viewed from above is formed, and the rod 200 and the second body unit 120 are tightened by a bolt 511 after the rod 200 passes therethrough.

20 As described above, the rod 200 is upwardly and downwardly driven by the first body unit 110 to which the rod 200 is coupled in an up-down movable manner, the second body unit 120 to which the rod 200 is fixedly coupled, and the up-down driving of the up-down driving unit that will be described later.

30 Meanwhile, in the up-down movement by the combination of the first body unit 110 and the second body unit 120, when the rod 200 is coupled to only the first body unit 110,

vibration in an axial direction may be generated.

Here, the up-down driving unit may further include at least one guide member 130 fixedly coupled to the second body unit 120 in parallel to a longitudinal direction of the rod 200 and coupled to the first body unit 110 in an up-down movable manner.

The guide member 130 is fixedly coupled to the second body unit 120 in parallel to the longitudinal direction of the rod 200 and coupled to the first body unit 110 in an up-down movable manner. The guide member 130 may be variously provided in configuration.

Here, the vibration in the vertical direction and rotation when the rod 200 is moved in up-down direction may be prevented by the coupling between the rod 200 and the first body unit 110 and the coupling between the guide member 130 and the first body unit 110.

Meanwhile, when two or more guide members 130 are installed, the rod 200 and the first body unit 110 are not necessarily coupled to each other.

Also, the coupling between the guide member 130 and the second body unit 120 is the same or similar to the coupling structure of the rod 200, which is previously described.

Also, the coupling between the guide member 130 and the first body unit 110 is the same or similar to the coupling structure of the rod 200, which is previously described.

Meanwhile, although the second body unit 120 is disposed below the first body unit 110 in an embodiment of the present invention, the second body unit 120 may be disposed above the first body unit 110.

The electric driving unit may be installed on at least

one of the first body unit 110 and the second body unit 120 to drive the movement of the second body unit 120 with respect to the first body unit 110 in at least one of the upward and downward directions. The electric driving unit may  
5 be variously provided in configuration.

In particular, the electric driving unit may include various components such as a linear motor, a piezo-element, a solenoid, and a VCM according to an operation principle thereof.

10 For example, as illustrated in FIGS. 1 to 4, the electric driving unit may include an electromagnet unit 510 installed on the first body unit 110 to generate magnetic force when electricity is applied and a magnetic force response member 520 installed on the second body unit 120 to  
15 apply attraction force between the first body unit 110 and the second body unit 120 in response to the magnetic force when the magnetic force is generated, such as a iron metal member or a permanent magnet.

Meanwhile, the electric driving unit necessarily  
20 further include a component for driving a movement in an opposite direction when driven in only one direction of the upward and downward directions like a solenoid, unlike a case when driven in all of the upward and downward directions like a VCM.

25 Accordingly, the electric driving unit may include a first electric driving unit for driving the upward movement and a second electric driving unit for driving the downward movement.

Also, the electric driving unit may drive the rod 200  
30 in one direction of the upward and downward directions, and

the up-down driving unit may further include at least one elastic member 130 for the movement in the opposite direction like a spring.

5 The elastic member 150 may be installed between the first body unit 110 and the second body unit 120 to act as a repulsive force in consideration of the electric driving unit that acts as attraction force between the first body unit 110 and the second body unit 120.

10 Alternatively, the elastic member 150 may be installed between the first body unit 110 and the second body unit 120 to act as attraction force when the electric driving unit acts as a repulsive force between the first body unit 110 and the second body unit 120.

15 Meanwhile, the elastic member 150 may include a first coil spring into which the rod 200 is inserted and a second coil spring into which the guide member 130 is inserted between the first body unit 110 and the second body unit 120.

20 As illustrated in FIGS. 2 and 4, the picker having the above-described configuration maintains a state in which the first body unit 110 and the second body unit 120 are spaced apart from each other and the rod 200 is moved downward when the electric driving unit is not driven.

25 Also, as illustrated in FIG. 3, when the electric driving unit is driven, a gap between the first body unit 110 and the second body unit 120 of the picker is narrowed, and the rod 200 is moved upward.

30 Meanwhile, a first technical subject of the present invention is to install the electric driving unit on at least one of the first body unit 110 and the second body unit 120 to drive the up-down movement with respect to the first body

unit 110 by the electric driving in terms of the up-down driving of the up-down driving unit.

Accordingly, the up-down driving unit using electricity may include any component as long as the component is  
5 upwardly and downwardly driven by using electricity, such as a piezo-element, a ball screw including an electric motor, a linear motor, a solenoid, or a VCM.

Meanwhile, a conventional picker picks up a device by forming vacuum pressure, i.e., a negative pressure in a  
10 suction unit when picking up a device at a pick-up position and loads the device at a load position by releasing the vacuum pressure of the suction unit.

In particular, the conventional picker generally forms a positive pressure in the suction unit to quickly load the  
15 device at the load position.

However, as a device such as an LED element becomes miniaturized in size, when the conventional picker forms a positive pressure in the suction unit for sucking a device, the device is scattered or is not loaded in an accurate state.

20 Accordingly, the picker in accordance with the present invention may further include the atmospheric pressure forming unit 400 coupled to the rod 200 to quickly form atmospheric pressure in the suction unit 220 when the picked device is released.

25 Here, as illustrated in FIGS. 7 to 9, the atmospheric pressure forming unit 400 is coupled to the rod 200 and disposed at one of the upper end, lower end, and intermediate portion of the rod 200.

In particular, since the atmospheric pressure is  
30 desirably transferred to a portion adjacent to the suction

unit 220 to increase a response speed when loading the device, the atmospheric pressure forming unit 400 is desirably installed at a lower end of the rod 200.

Also, the atmospheric pressure forming unit 400 may be  
5 integrated with the suction unit 220.

Meanwhile, the atmospheric pressure forming unit 400 may have various structures as long as the structure quickly forms atmospheric pressure in the suction unit 220 when the picked element is released.

10 In accordance with an embodiment (a first embodiment), as illustrated in FIGS. 1 to 6, the atmospheric pressure forming unit 400 may include: first and second flow path forming members 410 and 420 for forming a vacuum flow path, e.g., forming a connection flow path coupled to the lower end  
15 of the rod 200 and connected to the suction flow path 210; a piston member 430 transferring vacuum pressure to the suction unit 220 through the suction flow path 210 along the connection flow path while moved upward when the vacuum pressure is transferred; and an elastic member 440  
20 transferring atmospheric pressure to the suction unit 220 through the piston member 430 by moving the piston member 430 downward when the vacuum pressure in the suction flow path 210 is released.

The first and second flow path forming members 410 and  
25 420 may be vacuum flow paths that are, e.g., connection flow paths coupled to the lower end of the rod 200 and connected to the suction flow path 210. The first and second flow path forming members 410 and 420 may be variously provided in configuration.

30 For example, a piston space 429 in which the piston

member 430 that will be described later is movable, at least one side through-hole 421 passing through a side surface to connect the piston space 429 to the outside, and a communication groove 422 extending upward along an inner  
5 circumferential surface above the side through-hole 421 may be formed in the second flow path forming member 420.

The piston space 429 may be formed in the second flow path forming member 420 to allow the piston member 430 to be moved and formed as a cylinder space having a shape  
10 corresponding to an outer shape of the piston member 430.

The at least one side through-hole 421 passes through a side surface of the second flow path forming member 420 to connect the piston space 429 to the outside and allows the external atmospheric pressure of the second flow path forming  
15 member 420 to be transferred to the suction unit when connected to a first port 431 and a pneumatic pressure transfer flow path 433, which will be described later.

The communication groove 422 extends upward along the inner circumferential surface of the second flow path forming  
20 member 420 above the side through-hole 421 and is communicated with the suction passage 210 so as to receive the vacuum pressure from the suction passage 210 to transfer the vacuum pressure formed in the suction passage 210 to the suction unit 220 when connected to the first port 431 and the  
25 pneumatic pressure transfer flow path 433, which will be described later.

Here, the communication groove 422 may be communicated with the suction passage 210 by virtue of various structures such as a recessed groove 439 formed in an upper surface of  
30 the piston member 430.

Meanwhile, an up-down through-hole 423 passing through in a downward direction to transfer vacuum pressure or atmospheric pressure to the suction unit 220 is formed in the second flow path forming member 420.

5        In particular, an extension portion 424 in which the up-down through-hole 423 is formed has a shape in which an outer diameter is reduced to be smoothly coupled to the suction unit 220 and desirably disposed at a lower end of the second flow path forming member 420.

10        The first flow path forming member 410 is coupled to the second flow path forming member 420 to form the piston space 429 in which the piston member 430 is movable, and an up-down through hole 411 for receiving vacuum pressure is formed above the piston space 429.

15        Also, a hub portion 412 protruding downward for stably installing the elastic member 440 that will be described later is provided on the first flow path forming member 410.

      The piston member 430 is moved upward when vacuum pressure is transferred through the suction flow path 210  
20 along the connection flow path to transfer vacuum pressure to the suction unit. The piston member 430 may be variously provided in configuration.

      In particular, the piston member 430 has a cylindrical shape to be able to move along the piston space 420, the  
25 first port 431 is formed in a side surface thereof, and the pneumatic pressure transfer flow path 433 connecting the second port 432 formed in a bottom surface at a position corresponding to the up-down through-hole 423 is formed therein.

30        As illustrated in FIG. 5, the first port 431 is formed

in the side surface of the piston member 430 and communicated with the side through-hole 421 that is previously described in a state in which the piston member 430 is disposed at a lower side, so that the external atmospheric pressure is transferred to the suction unit 220 through the pneumatic pressure transfer flow path 433, the second port 432, and the up-down through-hole 423.

Here, a ring shaped recessed groove 434 recessed in a portion including the first port 431 is desirably formed in an outer circumferential surface of the piston member 430 for smooth communication with the first port 431 and the side through-hole 421.

Meanwhile, as illustrated in FIG. 6, when vacuum pressure is transferred from above the piston member 430, the piston member 430 is moved upward due to the vacuum pressure in a state in which the piston member 430 blocks the piston space 429 although elastic force of the elastic member 440 is applied.

Here, the first port 431 is moved upward along the piston space 429 and communicated with the communication groove 422 that is previously described.

Here, when the piston member 430 is moved upward, the side surface of the piston space 429 is blocked by the side through-hole 421, so that the atmospheric pressure is not transferred to the suction unit 220.

On the contrary, as the first port 431 is communicated with the communication groove 422, vacuum pressure formed above the piston member 430 is transferred to the suction unit 220 through the pneumatic pressure transfer flow path 433, the second port 432, and the up-down through-hole 423.

Meanwhile, the piston member 430 is desirably made of engineering plastic in consideration of processability, friction force, and sealing ability.

When the vacuum pressure in the suction flow path 210 is released, the elastic member 440 moves the piston member 430 downward to transfer the atmospheric pressure to the suction unit 220 by the piston member 430. The elastic member 440 may be variously provided in configuration.

For example, the elastic member 440 may include a coil spring.

In accordance with other embodiments (second and third embodiments), as illustrated in FIGS. 10a to 11b, the atmospheric pressure forming unit 400 may include a main body 510 coupled to the rod 200 and in which vacuum pressure connecting flow path 513 connected to the suction flow path 210 passes therethrough in up-down direction, and an atmospheric pressure connecting flow path connecting the vacuum pressure connecting flow path 513 to the outside is formed; and a valve member 531 installed on the main body 510 to allow the vacuum pressure connecting flow path 513 and the atmospheric pressure connecting flow path to communicate with each other or be blocked.

The main body 510 is coupled to the rod 200, the vacuum pressure connecting flow path 513 connected to the suction flow path 210 passes therethrough in up-down direction, and the atmospheric pressure connecting flow path is formed therein so as to connect the vacuum pressure connecting flow path 513 to the outside. The main body 510 may be variously provided in configuration.

For example, the main body may be detachably coupled to

the rod 200 so as to communicate with the suction flow path 210 of the rod 200, and the suction part 220, i.e., the suction head may be detachably coupled to a lower end of the main body 510.

5        The valve member 531 is installed in the main body 510 to allow the vacuum pressure connecting flow path 513 and the atmospheric pressure connecting flow path to communicate with each other or be blocked. The valve member 531 may be variously provided in configuration.

10        In particular, the valve member 531 may be variously provided in configuration according to a type of installation on the main body 510 as in the second embodiment in FIGS. 10a and 10b and the third embodiment in FIGS. 11a and 11b.

15        In detail, as illustrated in FIGS. 10a and 10b, the valve member 531 may block communication between the atmospheric pressure connecting flow path and the vacuum pressure connecting flow path 513 by the vacuum pressure in the suction flow path 210 when the vacuum pressure is formed in the suction flow path 210 and release the blocking of the communication between the atmospheric pressure connecting flow path and the vacuum pressure connecting flow path 513 by the elastic force of the elastic member when the vacuum pressure in the suction flow path 210 is released.

25        Here, the atmospheric pressure forming unit 400 may include a housing 521 inserted into an insertion groove 519 formed in the main body 510 so that at least a portion of the atmospheric pressure forming unit 400 crosses the atmospheric pressure connecting flow path and in which the valve member 531 is movable.

30        Also, an opening 540 that is communicated with the

vacuum pressure connecting flow path 513 and opened and closed by the valve member 531 may be formed in the housing 521, and an elastic member 532 applying elastic force to the valve member 531 so that the valve member 531 opens the opening 540 when the vacuum pressure is released may be installed in the housing 521.

Also, upper and lower ends of the housing 521 may be sealed by at least one sealing member 522 so that the valve member 531 is installed and the atmospheric pressure connecting flow path is formed in the housing 521.

In detail, a first sealing member 522 may be installed on one end of the housing 521, and a second sealing member 523 in which at least one through-hole 523a that is communicated with the outside is formed may be installed on the other end of the housing 521.

Here, the valve member 531 may be installed at a second sealing member 523 side, and the elastic member 532 may be installed between the valve member 531 and the first sealing member 522.

Also, an auxiliary cylinder member 524 may be additionally installed on an inner circumferential surface of the housing 521 to install the elastic member 532 and define the opening 540.

Also, at least one recessed groove 525 may be formed along an outer circumferential surface of the valve member 531 in the housing 521 so that the valve member 531 may linearly move and the air may be communicated to the outer circumferential surface.

Also, through-holes 521a and 521b formed along the vacuum pressure connecting flow path 513 are formed in the

side surface of the housing 521 so that the vacuum pressure connecting flow path 513 formed in the main body 513 is connected in up-down direction.

Meanwhile, the opening 540 that is opened and closed by the valve member 531 may be variously formed. For example, the opening 540 may be formed by the auxiliary cylinder member 524.

The valve member 531 is installed in the main body 510 to allow the vacuum pressure connecting flow path 513 and the atmospheric pressure connecting flow path to communicate with each other or be blocked therebetween. The valve member 531 may be variously provided in configuration.

For example, the valve member 531 may have any structure including a spherical shape as long as a structure may open and close the opening 540 that is previously described.

Meanwhile, as illustrated in FIGS. 11a and 11b, the valve member 531 may block communication between the atmospheric pressure connecting flow path 550 and the vacuum pressure connecting flow path 513 by the vacuum pressure in the suction flow path 210 when the vacuum pressure is formed in the suction flow path 210 and release the blocking of the communication between the atmospheric pressure connecting flow path 550 and the vacuum pressure connecting flow path 513 by the self-weight when the vacuum pressure in the suction flow path 210 is released.

The atmospheric pressure connecting flow path 550 is formed in the side surface of the main body 510 to connect the vacuum pressure connecting flow path 513 and opened and closed by the valve member 531.

Here, the atmospheric pressure connecting flow path 550 may be formed by one or more liner flow paths 551 and 552.

For example, the linear flow paths 551 and 552 include a first linear flow path 551 connected to the vacuum pressure connecting flow path 513 in a side surface direction of the main body 510 and a second linear flow path 552 connected to the first linear flow path 551 in an up-down direction of the main body 510 and the outside of the main body 510.

Here, the first linear flow path 551 may be perforated by virtue of a mechanical processing in the side surface direction of the main body 510, and then, sealed by a sealing member 536 in the side surface portion of the main body.

The sealing member 536 is inserted into the first linear flow path 551 to seal an end portion of the first linear flow path 551. The sealing member 536 may be variously provided in configuration. For example, the sealing member 536 may include a spherical shaped member that is fixed by being pressed into the first linear flow path 551.

Also, the atmospheric pressure forming unit 400 may include a housing 521 inserted into the insertion groove 519 formed in the main body 510 so that at least a portion of the atmospheric pressure forming unit 400 crosses the atmospheric pressure connecting flow path 550 and in which the valve member 531 is movable.

Also, an opening 540 that is communicated with the vacuum pressure connecting flow path 513 and opened and closed by the valve member 531 may be formed in the housing 521, and a valve member 531 may be installed in the housing 521 so that the valve member 531 is dropped by virtue of self-weight when the vacuum pressure in the suction flow path

210 is released.

Also, the upper and lower ends of the housing 521 may be sealed by at least one sealing member 529 so that the valve member 531 is installed and the atmospheric pressure  
5 connecting flow path 550 is formed in the housing 521.

In detail, a first sealing member 529 may be installed on one end of the housing 521, and a second sealing member 528 in which the opening 530 that is communicated with the outside and opened and closed by the valve member 531 is  
10 formed may be installed on the other end of the housing 521.

The valve member 531 is installed in the main body 510 to allow the vacuum pressure connecting flow path 513 and the atmospheric pressure connecting flow path to communicate with each other or be blocked therebetween. The valve member 531  
15 may be variously provided in configuration.

For example, the valve member 531 may have any structure including a spherical shape as long as a structure may open and close the opening 540 that is previously described.

20 Here, desirably, the valve member 531 is installed below the second sealing member 528 and has a size that is less than the inner circumferential surface of the housing 521.

Meanwhile, the configuration of the atmospheric pressure forming unit in accordance with the embodiments illustrated in FIGS. 11a to 15b is not limited in mechanical configuration such as processing or assembling when applied to the picker for picking up the device 10 having an  
25 extremely small size.

30 According to other embodiments (fourth and fifth

embodiments), as illustrated in FIGS. 12a to 14b, the atmospheric pressure forming unit 400 may include a main body 510 coupled to a rod 200 and in which vacuum pressure connecting flow path 513 connected to a suction flow path 210 passes therethrough in up-down direction, and atmospheric pressure connecting flow path connecting vacuum pressure connecting flow path 513 to the outside is formed; and a valve member 531 installed on the main body 510 to allow the vacuum pressure connecting flow path 513 and the atmospheric pressure connecting flow path to communicate with each other or be blocked therebetween. Here, an installation structure of the atmospheric pressure connecting flow path formed in the main body and the valve member 531 may be maximally simplified.

The valve member 531 includes any member as long as the member may open and close the vacuum pressure connecting flow path 513 that will be described later. Desirably, the valve member 531 has a spherical shape in consideration of a processing property and an assembling property.

The atmospheric pressure connecting flow path may include a connection flow path forming portion 561 having one end connected to the vacuum pressure connecting flow path 513 and opened and closed by movement of the valve member 531 and the other end communicated with the outside of the main body 510.

The connection flow path forming portion 561 is a structure allowing the valve member 531 to be movable. Desirably, the connection flow path forming portion 561 has a cylindrical structure having an inner diameter D1 that is greater than an outer diameter D0 of the valve member 531 so

as to allow the valve member 531 to move and air to be introduced therethrough.

Here, the connection flow path forming portion 561 has a length that is appropriately selected in consideration of a processing property on the basis of a total size of the main  
5 body 510 and the diameter D0 and linear movement of the valve member 531.

Also, the connection flow path forming portion 561 has one end having an inner diameter that is less than the outer  
10 diameter D0 of the valve member 531 so that the connecting portion 564 connected to the vacuum pressure connecting flow path 513 is easily opened and closed by the movement of the valve member 531.

In particular, the connecting portion 564 connected to  
15 the vacuum pressure connecting flow path 513 may desirably have a longitudinal cross-sectional shape of a tapered shape in which an inner diameter gradually decreases in a direction toward the vacuum pressure connecting flow path 513 so as to be easily opened and closed by the valve member 531.

Meanwhile, the connection flow path forming portion 561  
20 has the other end at which a separation prevention means that may communicate with the outside of the main body 510 and prevent the valve member 531 from being escaped to the outside of the main body 510 is provided.

The separation prevention means may include any  
25 structure as long as the structure prevents the valve member 531 from being escaped to the outside of the main body 510 from the connection flow path forming portion 561.

For example, the separation prevention means may be  
30 formed such that the valve member 531 is inserted into the

connection flow path forming portion 561, and then the other end of the connection flow path forming portion 561 is modified (i.e., the inner diameter of the other end of the connection flow path forming portion 561 is reduced) through  
5 a mechanical processing.

For another example, the separation prevention means may be formed such that the valve member 531 is inserted into the connection flow path forming portion 561, and then the separation prevention member is inserted into and fixedly  
10 coupled to the other end of the connection flow path forming portion 561.

For another example, as illustrated in FIGS. 12a to 13b, the separation prevention means may include: an expanded flow path 562 having an inner diameter D2 that is greater than an  
15 inner diameter D1 of the connection flow path forming portion 561 to connect the other end of the connection flow path forming portion 561 to the outer surface of the main body 510; and an insertion member 534 inserted into the expanded flow path 562 to allow air to be introduced from the main  
20 body 510 to the connection flow path forming portion 561.

The expanded flow path 562 has an inner diameter D2 that is greater than the inner diameter D1 of the connection flow path forming portion 561 and connects the other end of the connection flow path forming portion 561 to the outer  
25 surface of the main body 510. The expanded flow path 562 has a structure similar to that of the connection flow path forming portion 561.

The insertion member 534 is inserted into the expanded flow path 562 and allows the air to be introduced from the  
30 main body 510 to the connection flow path forming portion 561.

The insertion member 534 may be variously provided in configuration.

For example, the insertion member 534 may be a spherical shaped member having an outer diameter D1 that is greater than the inner diameter D1 of the connection flow path forming portion 561 and less than the inner diameter D2 of the expanded flow path 562.

Here, the insertion member 534 is prevented from being escaped to the outside of the main body 510 in such a manner that the insertion member 534 is inserted, and then, a mechanical processing (refer to reference symbol 535 in FIGS. 12a to 13b) is performed on the expanded flow path 562.

Also, the expanded flow path 562 may be blocked when the insertion member 534 is inserted and then fixed to the expanded flow path 562 through the mechanical processing on the expanded flow path 562.

Accordingly, the atmospheric pressure may be transferred from the outside of the main body 510 to the connection flow path forming portion 561 through various methods. For example, a groove in a longitudinal direction may be formed in an inner circumferential surface of the expanded flow path 562, or roughness may be applied on a surface of the insertion member 534.

Also, although the expanded flow path 562 is blocked, the atmospheric pressure may be transferred to the connection flow path forming portion 561 by virtue of formation of a communication flow path 568 that will be described later.

Meanwhile, when vacuum pressure is formed in the vacuum pressure connecting flow path 513, the valve member 531 inserted into the connection flow path forming portion 561 is

moved to an one end side of the connection flow path forming portion 561 due to a pressure difference between both sides with respect to the valve member 531 to block the connection flow path forming portion 561 with respect to the vacuum pressure connecting flow path 513.

Also, when the vacuum pressure in the vacuum pressure connecting flow path 513 is released, the valve member 531 is moved away from the one end of the connection flow path forming portion 561 to release the blocking of the connection flow path forming portion 561 with respect to the vacuum pressure connecting flow path 513.

Here, when the vacuum pressure in the vacuum pressure connecting flow path 513 is released, the valve member 531 is not necessary to move away from the one end of the connection flow path forming portion 561.

However, as illustrated in FIGS. 13a and 13b, when the connection flow path forming portion 561 is formed in the longitudinal direction of the main body 510, i.e., an up-down direction, the valve member 531 is dropped by virtue of self-weight. Thus, when the vacuum pressure in the vacuum pressure connecting flow path 513 is released, the valve member 531 may move away from the one end of the connection flow path forming portion 561 to release the blocking of the connection flow path forming portion 561 with respect to the vacuum pressure connecting flow path 513.

Here, as illustrated in FIGS. 13a and 13b, when the connection flow path forming portion 561 is formed in the longitudinal direction of the main body 510, an auxiliary flow path 566 connecting the connection flow path forming portion 561 to the vacuum pressure connecting flow path 513

may be formed.

The auxiliary flow path 566 connects the connection flow path forming portion 561 to the vacuum pressure connecting flow path 513. The auxiliary flow path 566 may be formed such that the flow path is perforated from the side surface of the main body 510 to be connected to the vacuum pressure connecting flow path 513 through a mechanical processing, and then, the side surface portion of the main body 510 is sealed by the sealing member 535.

The sealing member 535 seals an end of the auxiliary flow path 566 in the side surface portion of the main body 510. The sealing member 535 may include various members such as a spherical shaped member pressed into the end of the auxiliary flow path 566.

Alternatively, the end of the auxiliary flow path 566 may be sealed by another sealing unit such as welding in addition to the sealing member 535.

Meanwhile, as illustrated in FIGS. 12a and 12b, when the connection flow path forming portion 561 is formed in a direction perpendicular to the longitudinal direction of the main body 510, i.e., a horizontal direction, the state in which the connection flow path forming portion 561 blocks the vacuum pressure connecting flow path 513 may be maintained.

Accordingly, when the vacuum pressure in the vacuum pressure connecting flow path 513 is released, the atmospheric pressure forming unit 400 may further include an elastic member 532 releasing the blocking of the connection flow path forming portion 561 with respect to the vacuum pressure connecting flow path 513 by applying elastic force to the valve member 531 so that the valve member 531 is moved

away from one end of the connection flow path forming portion 561.

When the vacuum pressure in the vacuum pressure connecting flow path 513 is released, the elastic member 532  
5 applies elastic force to the valve member 531 so that the valve member 531 is moved away from the one end of the connection flow path forming portion 561. The elastic member 532 may be variously provided in configuration.

Here, an elastic member insertion groove 563 extending  
10 inward from one end of the connection flow path forming portion 561 may be further formed to install the elastic member 532.

The elastic member insertion groove 563 is a recessed groove formed in the main body 510 to install the elastic  
15 member 532. The elastic member insertion groove 563 may have a cylindrical structure having an inner diameter D3 that is less than an inner diameter D0 of the valve member 531 in consideration of the shape of the connection flow path forming portion 561 having a cylindrical structure and the  
20 shape and size of the valve member 531.

Here, the elastic member insertion groove 563 is formed through a mechanical processing such as milling. As illustrated in FIGS. 12a and 12b, the elastic member insertion groove 563 is primarily formed, and then, the  
25 connecting portion 564, the connection flow path forming portion 561, and the expanded flow path 562 may be formed in order.

Meanwhile, when the vacuum pressure in the vacuum pressure connecting flow path 513 is released, as the valve  
30 member 531 is moved away from one end of the connection flow

path forming portion 561, and the blocking of the connection flow path forming portion 561 with respect to the vacuum pressure connecting flow path 513 is released, the atmospheric pressure outside the main body 510 may be transferred to vacuum pressure connecting flow path 513, and the atmospheric pressure may be quickly transferred to the suction unit 220 for sucking the device 10.

Here, a communication flow path 568 communicating with the outside of the main body 510 may be desirably formed in the connection flow path forming portion 561, in particular, in the connecting portion 564 connected to the vacuum pressure connecting flow path 513 so that the atmospheric pressure outside the main body 510 is quickly transferred to the vacuum pressure connecting flow path 513.

The communication flow path 568 may be used for preventing a blocking possibility of the expanded flow path 562 due to the insertion member 534.

The communication flow path 568 transfers the atmospheric pressure outside the main body 510 to the vacuum pressure connecting flow path 513 in a quicker manner. The communication flow path 568 may be formed as a through-hole passing through from the outside of the main body until the connection flow path forming portion 561, in particular, until the connecting portion 564 connected to the vacuum pressure connecting flow path 513.

In detail, the communication flow path 568 may be formed as a through-hole passing through in the longitudinal direction of the main body 510 or from a side circumferential surface to the connecting portion 564.

Also, although not shown, the communication flow path

568 may be variously provided in configuration such as a recessed groove formed in a longitudinal direction of the inner circumferential surface of the connection flow path forming portion 561.

5        Meanwhile, the connection flow path forming portion 561 has the other end at which a separation prevention means that may communicate with the outside of the main body 510 and prevent the valve member 531 from being escaped to the outside of the main body 510 is provided.

10        The separation prevention means may include any structure as long as the structure prevents the valve member 531 from being escaped to the outside of the main body 510 from the connection flow path forming portion 561.

15        For example, the separation prevention means may be formed such that the valve member 531 is inserted into the connection flow path forming portion 561, and then, the other end of the connection flow path forming portion 561 is modified (i.e., the inner diameter of the other end of the connection flow path forming portion 561 is reduced) through  
20 a mechanical processing.

25        Meanwhile, as another example of the separation prevention means, unlike the embodiments illustrated in FIGS. 12a to 13b, as illustrated in FIGS. 14a to 14b, a coupling ring 591 coupled to the main body 510 to cover the connection flow path forming portion 561 may be provided.

      The coupling ring 591 is coupled to the main body 510 to cover the connection flow path forming portion 561. The coupling ring 591 may be variously provided in configuration such as a C-clip ring.

30        Here, a recessed groove 519 into which the coupling

ring 591 is inserted for smooth coupling of the coupling ring 591 may be formed in the main body 510.

The recessed groove 519 into which the coupling ring 591 is inserted for smooth coupling of the coupling ring 591 may be variously provided in configuration.

In particular, the recessed groove 519 and the coupling ring 591 are desirably coupled to each other within a predetermined error for smooth flow of the external air through the connection flow path forming portion 561.

That is, although members are disposed adjacent to each other in the drawings, air flow enough for forming the atmospheric pressure through a micro-gap between the main body 510 and the coupling ring 591 due to an error generated during manufacturing and surface roughness may be possible. Also, in other embodiments in addition to those in FIGS. 14a and 14b, since the drawings are ideally expressed, the air flow enough for forming the atmospheric pressure through a micro-gap between members due to selection of a material and assembling error may be substantially possible.

Also, the recessed groove 519 and the coupling ring 591 may be approximately selected to have a distance enough for smooth opening and closing of the connecting portion 564 at which the valve member 531 is connected to the vacuum pressure connecting flow path 513.

Also, the coupling ring 591 may be elastically deformed to be coupled to the recessed groove 519 through self-deformation.

Meanwhile, the connecting portion 564 connected to the vacuum pressure connecting flow path 513 may desirably have a longitudinal cross-sectional shape of a tapered shape in

which an inner diameter gradually decreases in a direction toward the vacuum pressure connecting flow path 513 so as to be smoothly opened and closed by the valve member 531.

In virtue of the above-described configuration, when  
5 the vacuum pressure is formed in the vacuum pressure connecting flow path 513, the spherical shaped valve member 531 is moved toward the connecting portion 564 connected to the vacuum pressure connecting flow path 513 to block the connecting portion 564 due to the vacuum pressure.

10 On the contrary, when the vacuum pressure is broken in the vacuum pressure connecting flow path 513, as the spherical shaped valve member 531 is spaced apart from the connecting portion 564 due to the tapered shape of the connecting portion 564, and the external air is connected to  
15 the vacuum pressure connecting flow path 513 due to a fine difference between the inner diameter of the vacuum pressure connecting flow path 513 and the outer diameter of the valve member 531, the atmospheric pressure may be quickly formed in the suction unit 220.

20 Meanwhile, in the embodiments illustrated in FIGS. 10a to 14b, the atmospheric pressure forming unit 400 may be variously embodied such that the atmospheric pressure forming unit 400 is integrated with other members such as the rod 200 or formed as a separated member.

25 Meanwhile, as another embodiment (seventh embodiment), as illustrated in FIG. 15, the atmospheric pressure forming unit may include: an atmospheric pressure connecting tube 920 connected to the suction passage 210; an air tank 910 in which compressed air for forming the atmospheric pressure in  
30 a space corresponding to a volume including the suction

passage 210, the suction unit 220, and the atmospheric pressure connecting tube 920 when opened is stored; and an opening and closing valve 930 installed between the air tank 910 and the atmospheric pressure connecting tube 920 to open  
5 and close the air tank 910.

The atmospheric pressure connecting tube 920 that is connected to the suction passage 210 may include a member similar to or identical to the vacuum pressure connecting tube.

10 Also, the atmospheric pressure connecting tube 920 may be coupled to the rod 10 at a connecting point that may be separately coupled or branched from a predetermined portion of the vacuum pressure connecting tube.

Here, a switching valve for switching to the  
15 atmospheric pressure or the vacuum pressure may be installed at the branch point.

The atmospheric pressure connecting tube 920 is desirably connected to a portion that is maximally adjacent to the suction unit 220 to minimize air supply time required  
20 for supplying the air to the suction passage 210.

The air tank 910 in which compressed air for forming the atmospheric pressure in a space corresponding to a volume including the suction passage 210, the suction unit 220 when opened, and the atmospheric pressure connecting tube 920 is  
25 stored may be variously provided in configuration.

Here, the air tank 910 is desirably connected to a portion that is maximally adjacent to the suction unit 220 to minimize air supply time required for supplying the air to the suction passage 210.

30 The opening and closing valve 930 that is installed

between the air tank 910 and the atmospheric pressure connecting tube 920 to open and close the air tank 910 may be variously provided in configuration.

5 In particular, the opening and closing valve 930 that is a switching valve for switching to the vacuum pressure or the atmospheric pressure may be installed at a branch point of the vacuum pressure and the atmospheric pressure.

Meanwhile, as another embodiment (ninth embodiment), as illustrated in FIGS. 16a and 16b, the atmospheric pressure forming unit may include an opening and closing member 942 opening and closing a side through-hole 941 by moving one of the rod 200 and the suction unit 220 along an outer circumferential surface of one of the rod 200 and the suction unit 220 when at least one side through-hole 941 passes through inward from the outer circumferential surface; and an opening and closing member moving portion 943 moving the opening and closing member 942 along an outer circumferential surface of one of the rod 200 and the suction unit 220.

20 The opening and closing member 942 that is moved along the outer circumferential surface of one of the rod 200 and the suction unit 220 to open and close the side through-hole 941 may be variously provided in configuration.

25 For example, as illustrated in FIGS. 16a and 16b, the opening and closing member 942 may have a hollow cylinder structure surrounding the outer circumferential surface of one of the rod 200 and the suction unit 220, and an exposure hole 944 opened to the outside may be formed therein when matched with the side through-hole 941.

30 Here, as the opening and closing member 942 moves in an up-down direction to cover or open the side through-hole 941,

the side through-hole 941 is exposed to the outside and switched to the atmospheric pressure.

The opening and closing member moving portion 943 that moves opening and closing member 942 along an outer  
5 circumferential surface of one of the rod 200 and the suction unit 220 may be variously provide in configuration.

For example, the opening and closing member moving portion 943 may include a VCM or a solenoid.

Meanwhile, in the embodiments illustrated in FIGS. 16a  
10 and 16b, the atmospheric pressure forming unit 400 may be integrated with the rod 200 or installed by virtue of a separated auxiliary member 90 coupled to the rod 200.

Here, the auxiliary member 90 may be formed such that an extended suction passage 721 allowing the suction passage  
15 220 to extend and communicating with the side through-hole 941 passes upwardly and downwardly through.

Although the exemplary embodiments of the present invention have been described, it is understood that the present invention should not be limited to these exemplary  
20 embodiments but various changes and modifications can be made by one ordinary skilled in the art within the spirit and scope of the present invention as hereinafter claimed.

**CLAIMS**

1. A picker comprising: a rod (200) having a suction passage (210) in which vacuum pressure acts and one end to which a suction unit (220) for sucking a device (10) is coupled; and an up-down driving unit (100) for moving the rod (200) in up-down direction,

wherein the up-down driving unit (100) comprises:

a first body unit (110) detachably coupled to a support structure and to which the rod (200) is coupled in an up-down movable manner;

a second body unit (120) for moving the rod (200) with respect to the first body unit (110) in at least one of upward and downward directions while fixedly coupled to the rod (200) to be moved in up-down direction by electric driving with respect to the first body unit (110); and

an electric driving unit installed on at least one of the first body unit (110) and the second body unit (120) to drive a movement in at least one of the upward and downward directions of the second body unit (120) with respect to the first body unit (110).

2. The picker of claim 1, wherein the first body unit (110) has a rectangular parallelepiped shape to which the rod (200) is coupled while passing therethrough in an up-down movable manner, and

the second body unit (120) has a thin-type rectangular parallelepiped shape in correspondence to the shape of the first body unit (100).

3. The picker of claim 2, wherein a fixedly coupling portion (121) having a slot having a U shape when viewed from above so that the rod (200) passes therethrough in up-down direction is formed in the second body unit (120), so that  
5 the rod (200) is fixedly coupled to the second body unit (120).

4. The picker of claim 1, wherein the up-down driving unit comprises at least one guide member (130)  
10 fixedly coupled to the second body unit (120) in parallel to a longitudinal direction of the rod (200) and coupled to the first body unit (110) in an up-down movable manner.

5. The picker of any one of claims 1 to 4, wherein  
15 the electric driving unit comprises one of a linear motor, a piezo-element, a solenoid, and a VCM.

6. The picker of any one of claims 1 to 4, wherein the electric driving unit comprises:

20 an electromagnetic unit (510) installed on the first body unit (110) to generate magnetic force when electricity is applied; and

a magnetic force response member (520) installed on the second body unit (120) to act on the magnetic force so that  
25 attraction force acts between the first body unit (110) and the second body unit (120) when the magnetic force is generated from the electromagnetic unit (510).

7. The picker of any one of claims 1 to 4, wherein  
30 the electric driving unit comprises a first electric driving

unit for driving an upward movement of the second body unit (120) with respect to the first body unit (110) and a second electric driving unit for driving a downward movement of the second body unit (120) with respect to the first body unit (110).

8. The picker of any one of claims 1 to 4, wherein the electric driving unit drives a movement of the rod (200) in one of upward and downward directions of the second body unit (120) with respect to the first body unit (110), and

the up-down driving unit comprises at least one elastic member (150) for a movement of the second body unit (120) in an opposite direction with respect to the first body unit (110).

9. A picker comprising:

a rod (200) having a suction passage (210) in which vacuum pressure acts and one end to which a suction unit (220) for sucking a device (10) is coupled;

an up-down driving unit (100) for moving the rod (200) in up-down direction; and

atmospheric pressure forming unit (400) for forming atmospheric pressure in the suction unit (220) when the vacuum pressure in the suction passage (210) is released.

10. The picker of claim 9, wherein the atmospheric pressure forming unit (400) comprises:

first and second flow path forming members (410 and 420) coupled to a lower end of the rod (200) to form a connection flow path connected to the suction flow path

(210);

a piston member (430) moving upward along the connection flow path when vacuum pressure is transferred through the suction flow path (210) to transfer the vacuum pressure to the suction unit (220); and

an elastic member (440) for moving the piston member (430) downward when the vacuum pressure in the suction flow path (210) is released to transfer atmospheric pressure to the suction unit (220) by the piston member (430).

11. The picker of claim 10, wherein, in the second flow path forming member (420),

a piston space (429) in which the piston member (430) is movable is formed,

at least one side through-hole (421) passing through a side surface of the second flow path forming member (420) to connect the piston space (429) to the outside is formed, and

a communication groove (422) extending upward along an inner circumferential surface of the second flow path forming member (420) above the side through-hole (421) and communicated with the suction passage (210) is formed.

12. The picker of claim 11, wherein a first port (431) is formed in a side surface of the piston member (430), and a pneumatic pressure transfer flow path (433) connecting a second port (432) formed in a bottom surface at a position corresponding to an up-down through-hole (423) formed in the second flow path forming member (420) is formed in the piston member (430),

as the first port (431) is communicated with the side

through-hole (421) in a state in which the first port (431) is disposed at a lower side, external atmospheric pressure is transferred to the suction unit (220) through the pneumatic pressure transfer flow path (433), the second port (432), and  
5 the up-down through-hole (423), and

as the piston member (430) moves upward by vacuum pressure when the vacuum pressure is transferred from above the piston member (430), and the first port (431) is moved upward along the piston space (429), the first port (431) is  
10 communicated with the communication groove (422), and a side surface of the piston space (429) blocks the side through-hole (421), so that the atmospheric pressure is not transferred to the suction unit (220).

15 13. The picker of claim 9, wherein the atmospheric pressure forming unit (400) comprises:

a main body (510) coupled to the rod (200), through which a vacuum pressure connecting flow path (513) connected to the suction flow path (210) passes upwardly and downwardly,  
20 and in which atmospheric pressure connecting flow path for connecting the vacuum pressure connecting flow path (513) to the outside is formed; and

a valve member (531) installed in the main body (510) to allow the vacuum pressure connecting flow path (513) and  
25 the atmospheric pressure connecting flow path to communicate with each other or be blocked therebetween.

14. The picker of claim 13, wherein the valve member (531) blocks communication between the atmospheric pressure  
30 connecting flow path and the vacuum pressure connecting flow

path (513) by vacuum pressure in the suction flow path (210) when the vacuum pressure is formed in the suction flow path (210) and releases the blocking of the communication between the atmospheric pressure connecting flow path and the vacuum pressure connecting flow path (513) by elastic force or a self-weight of the elastic member when the vacuum pressure in the suction flow path (210) is released.

15. The picker of claim 14, wherein the atmospheric pressure forming unit (400) comprises a housing (521) inserted into an insertion groove (519) formed in the main body (510) so that at least a portion thereof crosses the atmospheric pressure connecting flow path and allowing the valve member (531) to be movable therein.

16. The picker of claim 15, wherein an opening (540) communicated with the vacuum pressure connecting flow path (513) and opened and closed by the valve member (531) is formed in the housing (521).

17. The picker of claim 16, wherein the valve member (531) is installed in the housing (521) so that the valve member (531) is dropped by its self-weight when the vacuum pressure in the suction flow path (210) is released.

18. The picker of claim 16, wherein an elastic member (532) applying elastic force to the valve member (531) so that the valve member (531) opens the opening (540) when the vacuum pressure in the suction flow path (210) is released is installed in the housing (521).

19. The picker of claim 9, wherein the atmospheric pressure forming unit comprises: an atmospheric pressure connecting tube connected to the suction passage (220); an  
5 air tank storing compressed air for forming atmospheric pressure in a space corresponding to a volume comprising the suction passage, the suction unit, and the atmospheric pressure connecting tube when opened; and an opening and closing valve installed between the air tank and the  
10 atmospheric pressure connecting tube to open and close the air tank.

20. The picker of claim 9, wherein at least one side through-hole is formed in one of the rod and the suction unit  
15 while passing through from an outer circumferential surface to the inside thereof, and

the atmospheric pressure forming unit comprises: an opening and closing member moving along the outer circumferential surface of one of the rod and the suction  
20 unit to open and close the side through-hole; and an opening and closing member moving unit moving the opening and closing member along the outer circumferential surface of one of the rod and the suction unit.

25 21. A picker comprises:

a rod (200) having a suction passage (210) in which vacuum pressure acts and one end to which a suction unit (220) for sucking a device (10) is coupled;

an up-down driving unit (100) for moving the rod (200)  
30 in up-down direction; and

an atmospheric pressure forming unit (400) for forming atmospheric pressure in the suction unit (220) when vacuum pressure in the suction passage is released.

5           22. The picker of claim 21, wherein the atmospheric pressure connecting flow path comprises a connection flow path forming portion (561) having one end connected to the vacuum pressure connecting flow path (513) and opened and closed by a movement of the valve member (531) and the other  
10 end communicated with the outside of the main body (510), and the connection flow path forming portion (561) has a cylindrical structure having an inner diameter (D1) that is greater than an outer diameter (D0) of the valve member (531) so that the valve member (531) having a spherical shape is  
15 moved and air is introduced.

23. The picker of claim 22, wherein one end of the connection flow path forming portion (561) is formed such that a connecting portion (564) connected to the vacuum  
20 pressure connecting flow path (513) has an inner diameter that is less than the outer diameter (D0) of the valve member (531) so as to be easily opened and closed by a movement of the valve member (531).

25           24. The picker of claim 23, wherein a separation prevention means for communicating with the outside of the main body (510) and preventing the valve member (531) from being escaped to the outside of the main body (510) is provided at the other end of the connection flow path forming  
30 portion (561).

25. The picker of claim 24, wherein the separation prevention means comprises: an expanded flow path (562) having an inner diameter (D2) that is greater than the inner diameter (D1) of the connection flow path forming portion (561) to connect the other end of the connection flow path forming portion (561) to an outer surface of the main body (510); and an insertion member (534) inserted into the expanded flow path (562) to allow air to be introduced into the connection flow path forming portion (561) from the main body (510).

26. The picker of any one of claims 23 to 24, wherein the connection flow path forming portion (561) is formed in a longitudinal direction of the main body (510), and an auxiliary flow path (566) connecting the connection flow path forming portion (561) to the vacuum pressure connecting flow path (513) is formed in the main body (510).

27. The picker of any one of claims 23 to 24, wherein the atmospheric pressure forming unit (400) further comprises an elastic member (532) releasing blocking of the connection flow path forming portion (561) with respect to the pressure connecting flow path (513) by applying elastic force to the valve member (531) so that the valve member (531) is moved away from one end of the connection flow path forming portion (561) when vacuum pressure in the vacuum pressure connecting flow path (513) is released, and

an elastic member insertion groove (563) extending inward from the one end of the connection flow path forming

portion (561) is additionally formed in the main body (510).

28. The picker of any one of claims 23 to 24, wherein a communication flow path (568) communicating with the outside of the main body (510) is formed in the connecting portion (564) connected to the connection flow path forming portion (561) so that atmospheric pressure outside the main body (510) is quickly transferred to the vacuum pressure connecting flow path (513).

29. The picker of claim 22, wherein the separation prevention means comprises a coupling ring (591) coupled to the main body (510) so as to cover the connection flow path forming portion (561).

30. The picker of claim 29, wherein a recessed groove (519) into which the coupling ring (591) is inserted is formed in the main body (510) for smooth coupling of the coupling ring (519).

31. The picker of claim 29, wherein the connecting portion (564) connected to the vacuum pressure connecting flow path (513) has a longitudinal cross-sectional shape that is a tapered shape in which an inner diameter gradually decreases in a direction toward the vacuum pressure connecting flow path (513) so as to be smoothly opened and closed by the valve member (531).