

【DESCRIPTION】**TRANSFER TOOL AND DEVICE HANDLER COMPRISING SAME****【TECHNICAL FIELD】**

[0001] The present invention relates to device handler and, more specifically, to a transfer tool for picking up and transferring device for inspection, classification and the like of the device, and device handle including the same.

【BACKGROUND ART】

[0002] Semiconductor devices (hereinafter referred to as “device”) such as D RAM, flash RAM, LSI, LED, and WL-CSP devices are generally shipped to the market after completing a sewing process, a packaging process, or the like after completing a semiconductor process.

[0003] In addition, in order to ensure the reliability of products shipped to the market, good quality products are selected and shipped to the market through automatic inspection and classification according to inspection results by an inspection apparatus, a classification apparatus, an inspection and classification apparatus, or the like.

[0004] Moreover, the types of chips in devices are becoming more diverse, with terminal structures such as lead frames and BGAs becoming more diverse.

[0005] Recently, in response to the demand for miniaturization and high integration of devices, there is a growing trend for devices to be turned into final products at a wafer level without going through a molding process using resin or the like.

[0006] Meanwhile, as competition intensifies in the market of semiconductors such as LSI such as mobile CPU, SD RAM, and mobile SD RAM, device manufacturing costs

need to be reduced, and ultimately, it is very important to increase productivity.

[0007] In addition, as semiconductor production is carried out within a clean room, and the processing speed of equipment that performs each process within the clean room is directly related to productivity. Thus, it is also important for device handler that unloads devices at a wafer level without or before a packaging process to increase the processing speed of the equipment.

[0008] In particular, in semiconductor production, it is important to increase the processing speed of device handler, which unloads devices at a wafer level, and the performance of a transfer tool, which performs device pickup and transfer, is an important factor in the processing speed of the device handler.

[0009] In addition, as the size of devices which are to be handled has become very small recently, there is a great need for a transfer tool to pick up and transfer extremely small devices with high precision.

[0010] (Patent document 1) KR10-2010-0081277 A

[0011] (Patent document 2) KR10-0580816 B

[0012] (Patent document 3) KR10-2004-0096409 A

[0013] (Patent document 4) KR10-2017-0082862 A

[0014] (Patent document 5) KR10-2017-0082476 A

[0015] (Patent document 6) KR10-1754628 B

[0016] (Patent document 7) KR10-1177319 B

[0017] (Patent document 8) KR10-2016-0133125 A

【DISCLOSURE OF THE INVENTION】

【TECHNICAL PROBLEM】

[0018] Recognizing the above-described problems and needs, the present invention

provides a transfer tool for rapidly and precisely picking up and transferring a device, and device handle including the same.

【TECHNICAL SOLUTION】

[0019] In accordance with an embodiment of the present invention, a transfer tool includes: a support body unit 400 installed on device handler to transfer device 1 from a pick-up position to a placement position; a plurality of pick-up units 100 disposed so as to have an X-axis direction interval ΔX on the support body unit 400, and for picking up the device 1; a plurality of Z-axis direction moving units 300 installed to be movable in the X-axis direction with respect to the body unit 400, and for respectively moving the pick-up units 100 in the Z-axis direction; and an X-axis direction pitch adjusting unit 200 installed on the support body unit 400 and for moving the plurality of Z-axis direction moving units 300 in the X-axis direction so as to adjust the X-axis direction interval ΔX by moving the pick-up units 100 in the X-axis direction, wherein each of the Z-axis direction moving units 300 includes: a base unit 310 which is installed on the support body unit 400 so as to move in the X-axis direction by means of the X-axis direction pitch adjusting unit 200 and to which the pick-up units 100 are coupled to be movable in the Z-axis direction; and a linear driving unit 320 coupled to the base unit 310 to linearly drive the pick-up units 100 in the Z-axis direction in accordance with a control signal of a controller.

[0020] In the support body unit 400, a first receiver 530 may be installed to transmit a control signal from an externally installed control apparatus to the linear driving unit 320 of each Z-axis direction moving units 300, and the first receiver 530 may be connected to the linear driving unit 320 by a flexible signal transmission cable 510.

[0021] The first receiver 530 may receive power for driving the linear driving unit 320 and the control signal.

[0022] The first receiver 530 may include a plurality of first control boards 531 installed corresponding to the number of the plurality of Z-axis direction moving units 300 and equipped with a first connection terminal part 511 for connection to one end of the signal transmission cable 510, and the linear driving unit 320 of each Z-axis direction moving units 300 may include: a linear motor 321 driven according to the application of electricity; and a second control board 323 in which a second connection terminal part 512 is installed for connection with the other end of the signal transmission cable 510 connected to the first control boards 531 and which controls the linear motor 321 with a control signal transmitted through the signal transmission cable 510.

[0023] The signal transmission cable 510 may form a flexible flat cable structure by coupling a plurality of signal transmission lines.

[0024] The signal transmission cable 510 may be coupled to the first connection terminal part 511 and the second connection terminal part 512 so that a normal direction N1 of the signal transmission cable (510) is parallel to a virtual plane formed by an X axis and a Z axis.

[0025] The first control board 531 and the second control board 323 may have a normal line N2 parallel to a virtual plane formed by the X axis and the Z axis.

[0026] The first control board 531 and the second control board 323 may be installed so that the normal line N2 is parallel to the X axis, and the signal transmission cable 510 may be coupled to the first connection terminal part 511 and the second connection terminal part 512 in the +Z-axis direction and the -Z-axis direction, respectively.

[0027] The signal transmission cable 510 may be installed to be bent concavely with respect to an X-axis direction center line C of the plurality of pick-up units 100.

[0028] In accordance with another embodiment of the present invention, disclosed is

device handler which performs at least one of sorting, exchanging, and inspecting of device 1 and includes at least one transfer tool that transfers the device 1 from a preset pick-up position to a preset placement position, wherein the transfer tool has the same configuration as above.

【ADVANTAGEOUS EFFECTS】

[0029] A transfer tool and device handler having the same according to the present invention, with respect to a transfer tool having a plurality of pickers, that is, pick-up units, wherein the pitch of each pick-up unit can be adjusted, have an advantage in that the pickup and transfer of devices may be performed quickly and precisely by effectively responding to cases where a first interval between devices when picking up and a second interval between devices when placing are different.

[0030] In addition, as a configuration is made to allow adjustment of a pitch of each pick-up unit, there is an advantage in that the pickup and transfer of devices may be performed quickly and precisely in response to overload even when an interval of devices being picked up changes depending on device specifications, sizes, or the like.

[0031] Meanwhile, the transfer tool and the device handler having the same according to the present invention include a linear motor that is linearly driven by applying electricity to drive the up and down movement of each picker, that is, a pick-up unit, when picking up a device, and thus have an advantage in that a pick-up head is movable up and down quickly.

[0032] Furthermore, in the installation of a signal transmission cable 510 for power supply and control of the linear motor forming a linear driving unit, by coupling a first connection terminal part 511 and a second connection terminal part 512 so that a normal

direction N1 of the signal transmission cable 510 having a flexible structure is parallel to a virtual plane formed by an X axis and a Z axis, movement resistance to the pick-up units 100 and fatigue applied to a signal transmission line may be minimized.

【BRIEF DESCRIPTION OF THE DRAWINGS】

[0033] FIG. 1 is a front view showing a transfer tool according to the present invention.

[0034] FIG. 2 is a front view showing a state in which an X-axis direction interval between pick-up units in the transfer tool of FIG. 1 is reduced.

[0035] FIG. 3 is an enlarged view of portion A in FIG. 1.

[0036] FIG. 4 is an enlarged view of portion B in FIG. 1.

[0037] FIG. 5 is a side view showing the transfer tool of FIG. 1.

[0038] FIG. 6 is an enlarged view of portion C in FIG. 5.

[0039] FIG. 7 is an enlarged view of portion D in FIG. 5.

[0040] FIGS. 8A and 8B are conceptual diagrams showing the configuration and operating principle of an X-axis direction pitch adjusting unit in the transfer tool of FIG. 1.

【MODE FOR CARRYING OUT THE INVENTION】

[0041] Hereinafter, a transfer tool and device handler having the same according to the present invention will be described with reference to the attached drawings.

[0042] The transfer tool according to the present invention is a transfer tool that is installed in device handler to perform device classification, exchange, inspection, or the like and performs device pickup and transfer, and may have various configurations depending on the installation position, transfer target, and transfer contents in the device

handler.

[0043] Here, the device handler, which has a configuration in which one or more transfer tools according to the present invention are installed, may have various configurations depending on the performance of device classification, exchange, inspection, or the like, and may have various configurations depending on the processing details of a device, such as device classification, device exchange, and device inspection, of device sorting apparatus disclosed in patent document 7 and device handler disclosed in patent document 8.

[0044] Meanwhile, as shown in FIGS. 1 and 2, a transfer tool according to the present invention, which is a transfer tool that picks up and transfers a plurality of devices 10, includes: a support body unit 400 installed on device handler to transfer device 1 from a pick-up position to a placement position; a plurality of pick-up units 100 disposed so as to have an X-axis direction interval ΔX on the support body unit 400, and for picking up the device 1; a plurality of Z-axis direction moving units 300 installed to be movable in the X-axis direction with respect to the body unit 400, and for respectively moving the pick-up units 100 in the Z-axis direction; and an X-axis direction pitch adjusting unit 200 installed on the support body unit 400 and for moving the plurality of pick-up units 100 in the X-axis direction so as to adjust the X-axis direction interval ΔX of the pick-up units 100.

[0045] The support body unit 400, which is a configuration installed in device handler to allow each pick-up unit 100 to pick up the device 1 at a pick-up position, transfer the same to a placement position, and move from the pick-up position to the placement position for seating of the device 1, may be composed of various members such as plates and frames as a configuration for directly or indirectly supporting the pick-up units 100, the Z-axis direction moving units 300, the X-axis direction pitch adjusting unit 200, and

the like, which will be described later.

[0046] Meanwhile, as being installed on the device handler to be movable between the pick-up position and the placement position, the support body 400 may be installed in various structures depending on a movement method, for example, may be installed to move in the X-axis or Y-axis direction in the device handler depending on a linear movement method implemented, or may be installed to move in the X-axis and Y-axis directions.

[0047] To this end, an X-axis guide robot, a Y-axis guide robot, an X-Y-axis guide robot, or the like may be installed in the device handler to drive and guide the linear movement of the support body 400.

[0048] In addition, in the device handler, an image acquisition apparatus (not shown) may be installed to capture a pick-up status of the device 1 picked up by the pick-up units 100, which will be described later, in a transfer path of the transfer tool between a pick-up position and a placement position.

[0049] At this time, the support body 400 may be installed to be rotatable around the Z-axis direction as a rotation axis for stable seating of the device 1 depending on the pick-up state of the device 1 captured by the image acquisition apparatus.

[0050] The plurality of pick-up units 100 are arranged to have an X-axis direction interval ΔX on the support body unit 400 and are configured to pick up the device 1, and the number thereof may be determined depending on the number of devices 1 to be picked up.

[0051] Here, the X-axis direction interval ΔX may be defined in one direction among the horizontal directions, and defined as an interval formed by the pick-up units 100 in a direction parallel to one side of a rectangle in device handler having a rectangular planar

shape.

[0052] In addition, the pick-up units 100 may have various configurations depending on the type and size of the device to be picked up, and may include a pick-up head 110 that picks up device 10 by vacuum pressure, and a vacuum rod 120 to which the pick-up head 110 is coupled and which is coupled to a pneumatic pressure transmission pipe 520 from an externally installed vacuum pressure generating apparatus (not shown) to transmit pneumatic pressure to the pick-up head 110.

[0053] The pick-up head 110, which has a configuration for picking up the device 10 by vacuum pressure, is desirable to use an elastic member with elasticity to avoid impact to the device 1 and may have various structures depending on the type and size of the device 1 to be picked up.

[0054] The vacuum rod 120, which has a configuration in which the pick-up head 110 is coupled and which is coupled to the pneumatic pressure transmission pipe 520 to transmit pneumatic pressure to the pick-up head 110 from an externally installed vacuum pressure generating apparatus, may have various configurations depending on a vacuum pressure transmission structure, and may be composed as a rod with a length in the Z-axis direction.

[0055] The plurality of Z-axis direction moving units 300, which have a configuration which is movably installed in the X-axis direction with respect to the body unit 400 and moves each pick-up unit 100 in the Z-axis direction, may have various configurations.

[0056] The Z-axis direction moving units 300, which have a configuration which moves the pick-up units 100 up and down, that is, in the Z-axis direction so that the device 1 is picked up at a pick-up position and the device 1 is placed at a placement position, may have various configurations depending on a up and down movement structure.

[0057] As an example, each Z-axis direction moving units 300 may include: a base unit 310 installed to move in the X-axis direction on the support body unit 400 by the X-axis direction pitch adjusting unit 200 and allowing the pick-up units 100 to be movable in the Z-axis direction; and a linear driving unit 320 coupled to the base unit 310 and linearly driving the pick-up units (100) in the Z-axis direction according to a control signal of a control apparatus (not shown).

[0058] The base unit 310, which has a configuration which is installed to be move in the X-axis direction on the support body unit 400 by the X-axis direction pitch adjusting unit 200 and to which the pick-up units 100 are coupled to be movable in the Z-axis direction, may have various configurations.

[0059] As an example, the base unit 310 may have a plate-shaped rod structure with a length in the Z-axis direction, and may be coupled to one or more X-axis linear guide members 410 installed on the support body unit 400.

[0060] To the upper side of the front surface of the base unit 310, the linear driving unit 320, which will be described later, may be fixedly coupled, and at the lower side thereof, a Z-axis linear movement guide member 330 that guides the linear movement in the Z-axis direction of the pick-up units 100 may be installed.

[0061] The linear driving unit 320, which has a configuration which is coupled to the base unit 310 and linearly drives the pick-up units 100 in the Z-axis direction according to a control signal of a control apparatus, may have various configurations depending on the linear driving principle.

[0062] As an example, the linear driving unit 320 may include: a linear motor 321 that generates a linear driving force by applying electricity; and a linear movement rod 322 that moves linearly according to the linear driving force of the linear motor 321.

[0063] The linear motor 321, which is driven by electricity and generates a linear driving force as a so-called linear motor, may generate a linear driving force to linearly move the linear movement rod 322.

[0064] The linear movement rod 322, which has a configuration that moves linearly according to the linear driving force of the linear motor 321, has an end to which the pick-up units 100, which will be described later, are coupled, and the pick-up units 100 may be moved in the Z-axis direction by linear movement.

[0065] At this time, as the pick-up unit 100 is linearly moved by the linear movement rod 322, the pick-up units 100 may include, in addition to the configuration of the vacuum rod 120, a linear movement block 130 that is coupled to the linear movement rod 322 and linearly moves along the Z-axis linear movement guide member 330.

[0066] The linear movement block 130 may be composed of a linear movement block linearly moved along the Z-axis linear movement guide member 330 as a configuration which is coupled to the linear movement rod 322 and moves linearly along the Z-axis linear movement guide member 330 in addition to the configuration of the vacuum rod 120.

[0067] In addition, the linear movement block 130 may include: a first coupling part 140 extending in the Y-axis direction at the upper end thereof and coupled to the linear movement rod 322 to be able to be installed spaced apart from the base unit 310 in the Y-axis direction; and a second coupling part 150 extending in the Y-axis direction at the lower end thereof and coupled to the vacuum rod 120 integrally or as a separate member.

[0068] Meanwhile, the linear driving unit 320 may include, in addition to the configuration of the linear motor 321 driven by electricity application, a second control board 323 in which a second connection terminal part 512 is installed for connection to the other end of a signal transmission cable 510 connected to a first control board 531, which

will be described later, and which controls the linear motor 321 with a control signal transmitted through the signal transmission cable 510.

[0069] The second control board 323, which has a configuration for controlling the linear motor 321 of the linear driving unit 320 constituting each Z-axis direction moving units 300, may have various configurations.

[0070] As an example, the second control board 323 may be composed of a PCB in which the second connection terminal part 512 is installed for connection to the other end of the signal transmission cable 510 connected to the first control board 531, which will be described later, and which controls the linear motor 321 with a control signal transmitted through the signal transmission cable 510.

[0071] Here, the first control board 531, which has a configuration for receiving a control signal from an externally installed control apparatus installed in the support body unit 400 in response to each Z-axis direction moving units 300 and transmitting the same to the signal transmission cable 510 for control of the linear motor 321 of the linear driving unit 320 constituting each Z-axis direction moving units 300, may be composed of a PCB.

[0072] In addition, in the first control board 531, a first connection terminal part 511 to which one end of the signal transmission cable 510 described later is connected is installed.

[0073] In addition, the signal transmission cable 510, which has a configuration in which one end is fitted with the first connection terminal part 511 installed on the first control board 531 and the other end is fitted with the second connection terminal part 512 installed on the second control board 323 so as to transmit a control signal as well as power supply, may be composed of a flat cable having a terminal connection structure where both ends are fitted with the first connection terminal part 511 and the second connection

terminal part 512.

[0074] That is, the signal transmission cable 510 may form a flexible structure, that is, a flexible flat cable structure, by integrally coupling a plurality of signal transmission lines.

[0075] In addition, the signal transmission cable 510 is preferably configured as a flexible signal transmission cable so that the pick-up units 100 and the Z-axis direction moving units 300 coupled thereto are transformable when the X-axis direction interval ΔX is adjusted.

[0076] Meanwhile, the signal transmission cable 510 is characterized in that one end is coupled to the first control board 531 and the other end is coupled to the second control board 323 to supply power and transmit a control signal. As previously described, there is a problem that when the X-axis direction interval ΔX is adjusted with respect to the pick-up units 100 and the Z-axis direction moving units 300 coupled thereto, the signal transmission cable 510 acts as resistance to the movement of the Z-axis direction moving units 300 in the X-axis direction interval ΔX .

[0077] In addition, the signal transmission cable 510 has a problem that when the X-axis direction interval ΔX is adjusted, the pick-up units 100 and the Z-axis direction moving units 300 coupled thereto repeat transformation and due to increased fatigue, a plurality of signal transmission lines that make up the signal transmission cable 510 are damaged.

[0078] Accordingly, in order to minimize movement resistance to the pick-up units 100 and fatigue applied to the signal transmission lines, the signal transmission cable 510 is preferably coupled to the first connection terminal part 511 and the second connection terminal part 512 so that a normal direction N1 is parallel to a virtual plane formed by an X axis and a Z axis, as shown in FIGS. 1 to 7.

[0079] That is, the signal transmission cable 510 is preferably coupled to the first connection terminal part 511 and the second connection terminal part 512 to be bent about a Y axis, which is perpendicular to the virtual plane formed by the X axis and the Z axis.

[0080] At this time, in the first control board 531 and second control board 323, for a coupling structure of the signal transmission cable 510 as above, it is more preferable that a normal line N2 is parallel to the virtual plane formed by the X axis and the Z axis.

[0081] In particular, the first control board 531 and the second control board 323 may be installed so that the normal line N2 is parallel to the X axis, and the signal transmission cable 510 may be coupled to the first connection terminal part 511 and the second connection terminal part 512 in the +Z-axis direction and/or the -Z-axis direction, respectively.

[0082] In addition, the first control board 531 and the second control board 323 may be installed so that the normal line N2 is parallel to the X axis, and the signal transmission cable 510 may be coupled to the first connection terminal part 511 and the second connection terminal part 512 in the +X-axis direction and/or the -X-axis direction, respectively.

[0083] As shown in FIGS. 1 and 2, due to the coupling structure as above, the signal transmission cable 510 may be installed to be concavely bent about a center line C on the basis of an X-axis direction center line C of the plurality of pick-up units 100.

[0084] The coupling structure of the signal transmission cable 510 as above may minimize movement resistance to the pick-up units 100 and fatigue applied to the signal transmission lines.

[0085] Meanwhile, in connection with the coupling structure of the signal transmission cable 510 as above, the support body unit 400 may have a first receiver 530

installed to connect to an externally installed control apparatus to transmit a control signal to the linear driving unit 320 of the Z-axis direction moving units 300.

[0086] The first receiver 530, which has a configuration installed on the support body unit 400 to connect to an externally installed control apparatus and transmit a control signal to the linear driving unit 320 of the Z-axis direction moving units 300, may have various configurations depending on control signal transmission and reception.

[0087] As an example, the first receiver 530 may include a plurality of first control boards 531 installed corresponding to the number of the plurality of Z-axis direction moving units 300 and equipped with the first connection terminal part 511 for connection to one end of the signal transmission cable 510.

[0088] The first control board 531 is the same as described above.

[0089] Meanwhile, the first receiver 530 may be configured to receive a control signal for controlling the linear driving unit 320, particularly the linear motor 321, as well as power for driving the linear driving unit 320, that is, the linear motor 321.

[0090] In addition, as the linear driving unit 320 is configured to linearly drive each corresponding pick-up unit 100, the receiver 530 may be installed with a first pneumatic connection part 521 to which one end of a pneumatic transmission pipe 520 for pneumatic control of the pick-up unit 100 corresponding to the corresponding linear driving unit 320 is coupled.

[0091] The first pneumatic connection part 521, which has a configuration installed in the receiver 530 so that one end of the pneumatic transmission pipe 520 for pneumatic control of the pick-up unit 100 corresponding to the corresponding linear driving unit 320 is coupled, may be composed of a port to which the pneumatic transmission pipe 520 is easily connectable.

[0092] In addition, the first pneumatic connection part 521 may be connected to a pneumatic control apparatus (not shown) installed externally so that pneumatic pressure (negative or positive vacuum pressure) is transmittable to the pneumatic transmission pipe 520.

[0093] Meanwhile, as the pneumatic transmission pipe 520 connected to the first pneumatic connection part 521, it is preferable to use a flexible pneumatic transmission pipe in order to minimize movement resistance to the pick-up units 100 (interference with movement in the X-axis direction of the pick-up units).

[0094] In addition, the other end of the pneumatic transmission pipe 520 is coupled to the first pneumatic connection part 521 coupled to the vacuum rod 120.

[0095] Meanwhile, the pneumatic transmission pipe 520 connected to the first pneumatic connection part 521 may be fixed by one or more pipe coupling members 523, 524 in order to minimize movement resistance to the pick-up units 100 (interference with movement in the X-axis direction of the pick-up units).

[0096] The one or more pipe coupling members 523, 524, which has a configuration in which the pneumatic transmission pipe 520 is installed so as not to apply movement resistance to the pick-up units 100 (interference with movement in the X-axis direction of the pick-up units), may include a first pipe coupling member 523 coupled to the previously described receiver 530, a second pipe coupling member 523 coupled to the second control board 323, or the like.

[0097] The first pipe coupling member 523, the second control board 323, or the like, which has a configuration which appropriately supports and fixes the pneumatic transmission pipe 520 so that the pneumatic transmission pipe 520 does not apply movement resistance to the pick-up units 100 (interference with movement in the X-axis

direction of the pick-up units), may have various configurations.

[0098] Here, the pneumatic transmission pipe 520, the first pipe coupling member 523, the second control board 323, or the like may be coupled by appropriate length and bending so that the pneumatic transmission pipe 520 does not apply movement resistance to the pick-up units 100.

[0099] Meanwhile, the plurality of pick-up units 100 are arranged to have the X-axis direction interval ΔX on the support body unit 400, and an interval between devices to be picked up when picking up the devices and an interval between devices when seating the devices, that is, placing the devices may vary.

[00100] Accordingly, it is preferable that the plurality of pick-up units 100 are installed so that the X-axis direction interval ΔX is adjusted by the plurality of Z-axis direction moving units 300.

[00101] The X-axis direction pitch adjusting unit 200, which has a configuration installed on the support body unit 400 to move the pick-up units 100 in the X-axis direction to adjust the X-axis direction interval ΔX , may have any configuration as long as the X-axis direction interval ΔX formed by the pick-up units 100 is adjustable.

[00102] The X-axis direction pitch adjusting unit 200 may have various configurations depending on a pitch adjustment method, such as a plate structure with a guide groove as in patent document 3 and a belt or a wire and a pulley structure as in patent documents 4 and 5.

[00103] As an example, as shown in FIGS. 1, 2, 5, 8A, and 8B, the X-axis direction pitch adjusting unit 200 may include: a driving pulley part 210 that is rotationally driven by a driving motor 210 for generating rotational force and includes a plurality of driving pulleys 221 with different outer diameters; a driven pulley part 230 that is installed to face

the driving pulley part 210 and correspond to the driving pulley part 210 and includes a plurality of driven pulleys 231 with different outer diameters; and rotation members 240 respectively wound around the driving pulleys 221 and the driven pulleys 231.

[00104] Here, each of the rotation members 240 may be connected to the base unit 310 and a connection member 240 to which the pick-up units 100 are coupled, so that the base unit 310 moves in the X-axis direction by the movement of the rotation members 240.

[00105] Since the X-axis direction pitch adjusting unit 200 has a structure similar to those of patent documents 4 and 5, a detailed description will be omitted.

[00106]

[00107] Since the above is only a description of some of the preferred embodiments that can be implemented by the present invention, as is well known, the scope of the present invention should not be construed as limited to the above embodiments, and the technical idea underlying the technical idea of the present invention described above will all be included in the scope of the present invention.

【CLAIMS】

1. A transfer tool, comprising:

a support body unit (400) installed on device handler to transfer device (1) from a pick-up position to a placement position;

a plurality of pick-up units (100) disposed so as to have an X-axis direction interval (ΔX) on the support body unit (400) and configured to pick up the device (1);

a plurality of Z-axis direction moving units (300) installed to be movable in the X-axis direction with respect to the support body unit (400) and configured to respectively move the pick-up units (100) in the Z-axis direction; and

an X-axis direction pitch adjusting unit (200) installed on the support body unit (400) to move the plurality of pick-up units (100) in the X-axis direction so as to adjust the X-axis direction interval (ΔX) of the pick-up units (100),

wherein each of the Z-axis direction moving units (300) comprises:

a base unit (310) which is installed on the support body unit (400) to move in the X-axis direction by the X-axis direction pitch adjusting unit (200) and to which the pick-up units (100) are coupled to be movable in the Z-axis direction; and

a linear driving unit (320) coupled to the base unit (310) to linearly drive the pick-up units (100) in the Z-axis direction in accordance with a control signal of a controller.

2. The transfer tool of claim 1, wherein, in the support body unit (400), a first receiver (530) is installed to transmit the control signal from the externally installed controller to the linear driving unit (320) of each Z-axis direction moving units (300), and

the first receiver (530) is connected to the linear driving unit (320) by a flexible

signal transmission cable (510).

3. The transfer tool of claim 2, wherein the first receiver (530) receives power for driving the linear driving unit (320) and the control signal.

4. The transfer tool of claim 3, wherein the first receiver (530) comprises a plurality of first control boards (531) installed corresponding to the number of the plurality of Z-axis direction moving units (300) and equipped with a first connection terminal part (511) for connection to one end of the signal transmission cable (510), and

the linear driving unit (320) of each Z-axis direction moving units (300) comprises:

a linear motor (321) driven according to the applying of electricity; and

a second control board (323) in which a second connection terminal part (512) is installed for connection with the other end of the signal transmission cable (510) connected to the first control boards (531) and which controls the linear motor (321) with a control signal transmitted through the signal transmission cable (510).

5. The transfer tool of claim 4, wherein the signal transmission cable (510) provides a flexible flat cable structure by integrally coupling a plurality of signal transmission lines.

6. The transfer tool of claim 4, wherein the signal transmission cable (510) is coupled to the first connection terminal part (511) and the second connection terminal part (512) so that a normal direction (N1) of the signal transmission cable (510) is parallel to a

virtual plane defined by an X axis and an Z axis.

7. The transfer tool of claim 4, wherein the first control board (531) and the second control board (323) have a normal line (N2) parallel to a virtual plane defined by the X axis and the Z axis.

8. The transfer tool of any one of claims 5 to 7, wherein the first control board (531) and the second control board (323) are installed so that the normal line (N2) is parallel to the X axis, and the signal transmission cable (510) is coupled to the first connection terminal part (511) and the second connection terminal part (512) in a +Z-axis direction and a -Z-axis direction, respectively.

9. The transfer tool of any one of claims 5 to 7, wherein the signal transmission cable (510) is installed to be bent concavely with respect to an X-axis direction center line (c) of the plurality of pick-up units (100).

10. Device handler for performing at least one of sorting, exchanging, or inspecting of device (1), the device handler comprising at least one transfer tool configured to transfer the device (1) from a preset pick-up position to a preset placement position,

wherein the transfer tool is the transfer tool according to any one of claims 1 to 7.