

ADHESIVE-DISPENSING AND ATTACHING DEVICE FOR WORKPIECE

TECHNICAL FIELD

[0001] The present disclosure relates to the field of chip processing technology, in particular to a glue-dispensing and attaching apparatus for a workpiece.

BACKGROUND

[0002] During chip packaging processing, a workpiece needs to be subject to multiple processing procedures such as glue dispensing, heat dissipation cover attaching, hot pressing, and detection, and the processing procedures need to be completed within a certain time while avoiding glue solidification. During the processing procedures, the chip is easily affected by various environmental factors, leading to a decreased yield.

SUMMARY

[0003] The present disclosure aims to solve at least one of the technical problems existing in the related art. Therefore, this disclosure proposes a glue-dispensing and attaching apparatus for a workpiece, which has the advantage of continuous production throughout the entire process of workpiece processing.

[0004] A glue-dispensing and attaching apparatus for a workpiece according to an embodiment of the present disclosure includes: two loading and unloading mechanisms, wherein the workpiece is movable between the two loading and unloading mechanisms, one of the two loading and unloading mechanisms is configured to load the workpiece to be processed, and another one of the two loading and unloading mechanisms is configured to unload the processed workpiece; a dual-valve asynchronous glue-dispensing device; a heat dissipation cover attaching device; and a hot pressing device. The dual-valve asynchronous

glue-dispensing device, the heat dissipation cover attaching device, and the hot pressing device are sequentially arranged between the two loading and unloading mechanisms along a movement direction of the workpiece.

5 **[0005]** The beneficial effect of this disclosure is that the structure of the present disclosure is simple, and the dual-valve asynchronous glue-dispensing device, the heat dissipation cover attaching device, and the hot pressing device are sequentially arranged between the two loading and unloading mechanisms. Therefore, the continuous processing of multiple processes is automatically completed during the conveying process from loading to unloading of the workpiece, avoiding the retention of the workpiece and improving the yield.

10 **[0006]** According to some embodiments of the present disclosure, the dual-valve asynchronous glue-dispensing device includes: a frame; a workpiece conveying device disposed inside the frame and carrying the workpiece thereon; a height automatic compensation and stable measurement device, which includes a compensation part and a measurement part, the compensation part being disposed below the workpiece, and the
15 measurement part being disposed on the frame and located above the workpiece to measure the workpiece; and a leveling and adsorption locking fixture disposed on the compensation part of the height automatic compensation and stable measurement device, the leveling and adsorption locking fixture being movable upwards under the driving of the compensation part to hold up the workpiece.

20 **[0007]** According to some embodiments of the present disclosure, the workpiece conveying device includes a workpiece transport device configured to transport and move the workpiece in an x direction. The workpiece transport device includes: two conveying components, which are a first conveying component and a second conveying component, and are symmetrically arranged about an xz plane, where a z direction is a vertical direction and
25 the x direction is a horizontal direction perpendicular to the z direction; a plurality of detection optical fibers arranged on the first conveying component and the second conveying component to detect a conveying status of the workpiece; and a workpiece carrier board arranged on the two conveying components and carrying the workpiece thereon.

[0008] According to some embodiments of the present disclosure, each of the two conveying components includes a base plate and a belt drive device disposed on a side of the base plate facing towards the workpiece carrier board.

[0009] According to some embodiments of the present disclosure, the plurality of detection optical fibers includes a feed entry detection optical fiber, a deceleration detection optical fiber, an arrival detection optical fiber, and a discharge detection optical fiber, wherein the feed entry detection optical fiber, the deceleration detection optical fiber, the arrival detection optical fiber, and the discharge detection optical fiber are sequentially arranged on the base plate along the x direction.

[0010] According to some embodiments of the present disclosure, the workpiece transport device further includes: a side pushing component disposed on the base plate and located between the deceleration detection optical fiber and the arrival detection optical fiber; and a blocking device disposed on the base plate. A connecting line between the blocking device and the arrival detection optical fiber is parallel to a y axis, and the y direction is perpendicular to the z direction and the x direction.

[0011] According to some embodiments of the present disclosure, the plurality of detection optical fibers further includes a feed warpage detection optical fiber and a discharge warpage detection optical fiber, wherein the feed warpage detection optical fiber and the discharge warpage detection optical fiber are movably arranged on the base plate along the z direction, and the feed warpage detection optical fiber and the discharge warpage detection optical fiber are located on two sides of the side pushing component, respectively.

[0012] According to some embodiments of the present disclosure, the height automatic compensation and stable measurement device includes: a three-dimensional motion platform disposed above the workpiece conveying device, a height measurement device and a visual recognition device being provided on the three-dimensional motion platform, wherein the height measurement device and the visual recognition device are movable in an xy plane under the driving of the three-dimensional motion platform; and a jacking mechanism disposed below the workpiece, a part of the jacking mechanism being movable along a z axis

to jack up the workpiece.

[0013] According to some embodiments of the present disclosure, the jacking mechanism includes: a jacking substrate; a bearing seat fixing block disposed on the jacking substrate; a jacking plate located above the jacking substrate; an adjustment block disposed on the jacking
5 plate; and a lead screw assembly, wherein a part of the lead screw assembly is connected to the bearing seat fixing block, and another part of the lead screw assembly is connected to the adjustment block; the lead screw assembly is rotatable to drive the adjustment block and the jacking plate to move along the z axis, where a z-axis direction is a vertical direction.

[0014] According to some embodiments of the present disclosure, the lead screw
10 assembly includes: a first screw shaft, which is perpendicular to a plane where the jacking plate is located; a screw support block rotatably sleeved on the first screw shaft; and a screw slider sleeved on the first screw shaft, wherein an inner peripheral edge of the screw slider is connected to an outer peripheral edge of the first screw shaft through threads, and an outer
15 peripheral edge of the screw slider is rotatably connected to an inner peripheral edge of the adjustment block.

[0015] According to some embodiments of the present disclosure, the three-dimensional motion platform includes: a y-direction motion mechanism; an x-direction motion mechanism disposed on the y-direction motion mechanism, wherein the y-direction motion mechanism is configured to drive the x-direction motion mechanism to move along a y axis, and wherein
20 the height measurement device and the visual recognition device are arranged on the x-direction motion mechanism; two z-direction motion mechanisms disposed on the x-direction motion mechanism, wherein the x-direction motion mechanism is configured to drive the two z-direction motion mechanisms to move along an x axis, a fluid dispenser being provided on one of the two z-direction motion mechanisms; and a y-direction fine adjustment
25 device disposed on the other z-direction motion mechanism, wherein the other z-direction motion mechanism is configured to drive the y-direction fine adjustment device to move along the y axis, and wherein another fluid dispenser is provided on the y-direction fine adjustment device, and the y-direction fine adjustment device is configured to drive the

another fluid dispenser for fine adjustment along the y axis. The y-direction fine adjustment device includes: a housing, a linear guide rail assembly being provided outside the housing; a first servo motor disposed on a side of the housing; a second screw shaft rotatably disposed inside the housing and directly connected to an output end of the first servo motor; and a
5 movable block, wherein a part of the movable block is slidably arranged on the linear guide rail assembly, and another part of the movable block is movably arranged on the second screw shaft through a nut slider, and wherein the another fluid dispenser is provided on the movable block.

[0016] According to some embodiments of the present disclosure, the leveling and
10 adsorption locking fixture includes: a universal installation adapter plate, which is a straight plate member, wherein four leveling bolt components are provided around the universal installation adapter plate and fix the universal installation adapter plate to the jacking mechanism, the four leveling bolt components being twistable to adjust an upper surface of the universal installation adapter plate to be level; and an adsorption locking fixture disposed
15 on the upper surface of the universal installation adapter plate and carrying the workpiece thereon.

[0017] According to some embodiments of the present disclosure, the universal installation adapter plate has four fine thread holes opened along a thickness direction thereof, wherein one end of each of the four leveling bolt components is arranged in a corresponding
20 fine thread hole, and the other end of the leveling bolt component is connected to the jacking mechanism, and wherein the universal installation adapter plate further has four slits opened along the thickness direction, the slits being in communication with the fine thread holes. Four horizontal locking screws are provided around the universal installation adapter plate, each of the four horizontal locking screws penetrating through a corresponding slit, wherein
25 the horizontal locking screw is rotatable to adjust a size of the slit, thereby adjusting a size of the fine thread hole, and an axis of the horizontal locking screw is perpendicular to an axis of the leveling bolt component.

[0018] According to some embodiments of the present disclosure, the leveling bolt

component includes: a leveling member, which is cylindrical, an outer peripheral edge of the leveling member having a fine external thread, the fine external thread being engaged with the fine thread hole, and the leveling member having a leveling hole penetrating the leveling member along a thickness direction thereof; a spherical gasket disposed between the leveling member and the jacking mechanism; and a connecting member, one end of the connecting member passing through the leveling hole and the spherical gasket to be connected to the jacking mechanism. An upper part of the leveling hole is a hexagonal countersunk head, a middle part of the leveling hole is a cylindrical countersunk hole, and the other end of the connecting member is clamped inside the cylindrical countersunk hole.

10 **[0019]** According to some embodiments of the present disclosure, the dual-valve asynchronous glue-dispensing device further includes: an automatic weighing and glue-breaking device disposed on the workpiece conveying device. The automatic weighing and glue-breaking device includes: a weighing windproof device defining a first accommodating chamber inside; a weighing device disposed in the first accommodating chamber; a fluid segmentation device disposed above the weighing windproof device and having a second accommodating chamber, the second accommodating chamber be in communication with the first accommodating chamber; and a fluid receiving container disposed in the second accommodating chamber and located above the weighing device, wherein the fluid receiving container has two states, a glue breaking state and a weighing state, wherein when in the glue breaking state, the fluid receiving container moves upward to receive a glue, and when in a weighing state, the fluid receiving container moves downwards to be placed on the weighing device, to weigh the glue.

25 **[0020]** According to some embodiments of the present disclosure, the loading and unloading mechanism includes a profile frame, a silo transverse displacing and lifting mechanism, and a workpiece gripping and transport mechanism. The silo transverse displacing and lifting mechanism and the workpiece gripping and transport mechanism are installed inside the profile frame; the silo transverse displacing and lifting mechanism is configured to carry a silo thereon, move the carried silo up and down and transversely move the carried silo, to place the silo opposite to the workpiece gripping and transport mechanism;

the workpiece gripping and transport mechanism is configured to grip the workpiece from a silo opposite thereto and load it onto a conveyor belt, or push the workpiece on the conveyor belt into a silo opposite thereto; the loading and unloading mechanism further includes an intermediate partition plate configured to separate the silo carried by the silo transverse displacing and lifting mechanism from the workpiece gripping and transport mechanism, the intermediate partition plate having a through hole for the workpiece to pass through; the silo transverse displacing and lifting mechanism is configured to transversely move the carried silo and move the carried silo up and down, to place the silo opposite to the through hole; and the workpiece gripping and transport mechanism is configured to grip the workpiece inside the silo through the through hole, or push the workpiece into the silo through the through hole.

[0021] According to some embodiments of the present disclosure, the heat dissipation cover attaching device includes a conveyor rail module, an attaching module, a heat dissipation cover loading device, and a locating module. The conveyor rail module is configured to convey a carrier board to an assembly station, the carrier board carrying a chip inside; the heat dissipation cover loading device is configured to convey a heat dissipation cover to a suction station; the locating module is installed at a locating station; and the attaching module is configured to move between the suction station, the locating station, and the assembly station, wherein the attaching module moves to the locating station after absorbing the heat dissipation cover at the suction station, the locating module locates and identifies the heat dissipation cover absorbed by the attaching module, and after the locating module locates and identifies the heat dissipation cover absorbed, the attaching module moves the heat dissipation cover to the assembly station and assembles the heat dissipation cover onto the chip inside the carrier board at the assembly station.

[0022] According to some embodiments of the present disclosure, the heat dissipation cover loading device includes a loading part, a picking and positioning part, an unloading part, and a first transverse displacement assembly that spans the loading part, the picking and positioning part, and the unloading part. After the loading part jacks up a heat dissipation cover carrier into position, the first transverse displacement assembly moves the heat

dissipation cover carrier from the loading part to the picking and positioning part, the picking and positioning part positions and fixes the heat dissipation cover carrier, a picking mechanism picks up the heat dissipation cover on the heat dissipation cover carrier, and the first transverse displacement assembly moves the heat dissipation cover carrier, from which the heat dissipation cover has been picked up, from the picking and positioning part to the unloading part.

[0023] According to some embodiments of the present disclosure, the hot pressing device includes: a detection part, a heating and force maintaining part, and a conveying device. Only one detection part is provided, the detection part being disposed at an upstream workstation or a downstream workstation of the heating and force maintaining part; or two detection parts are provided, the two detection parts being arranged at the upstream workstation and the downstream workstation of the heating and force maintaining part, respectively. The conveying device is configured to convey a load fixture loaded with the workpiece to the detection part and the heating and force maintaining part; the detection part is configured to measure a rated height of the workpiece at at least one position on the workpiece and inspect an appearance of the workpiece, wherein the rated height of the workpiece refers to a height difference between a height at a position on the workpiece and a height at another position on the load fixture at a predetermined distance from the position; and the heating and force maintaining part is configured to heat and maintain a force on the workpiece located at the heating and force maintaining part.

[0024] According to some embodiments of the present disclosure, two detection parts are provided, namely a first detection part located at the upstream workstation of the heating and force maintaining part and a second detection part located at the downstream workstation of the heating and force maintaining part. The first detection part is configured to measure a rated height of the workpiece at at least one position on the workpiece and inspect an appearance of the workpiece to obtain a first set of detection data; the second detection part is configured to measure the rated height of the workpiece at the at least one position on the workpiece and inspect the appearance of the workpiece to obtain a second set of detection data; and the hot pressing device further includes a processor electrically connected to the first

detection part and the second detection part, the processor being configured to determine whether a process of heating and maintaining the force on the workpiece by the heating and force maintaining part meets requirements based on the first set of detection data and the second set of detection data.

5 **[0025]** Additional aspects and advantages of the present disclosure will be set forth in part in the following description which follows, and some will become apparent from the following description or learned through practice of the present disclosure. The purpose and other advantages of this disclosure are realized and obtained through the structures specifically indicated in the description, claims, and accompanying drawings.

10 **BRIEF DESCRIPTION OF DRAWINGS**

[0026] The above and/or additional aspects and advantages of the present disclosure will become apparent and readily appreciated from the following description of embodiments, taken in conjunction with the accompanying drawings, in which:

15 **[0027]** FIG. 1 is a three-dimensional schematic structural diagram of a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0028] FIG. 2 is a three-dimensional schematic structural diagram of a dual-valve asynchronous glue-dispensing device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

20 **[0029]** FIG. 3 is a three-dimensional schematic structural diagram of a height automatic compensation and stable measurement device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0030] FIG. 4 is a three-dimensional schematic structural diagram of a jacking mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

25 **[0031]** FIG. 5 is a cross-sectional structural diagram of a jacking mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

- [0032]** FIG. 6 is a schematic diagram of a local three-dimensional structure of a three-dimensional motion platform in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0033]** FIG. 7 is a cross-sectional schematic structural diagram of a y-direction fine
5 adjustment device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0034]** FIG. 8 is a three-dimensional schematic structural diagram of a workpiece conveying device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- 10 **[0035]** FIG. 9 is a schematic structural diagram of a top view of a workpiece transport device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0036]** FIG. 10 is a three-dimensional schematic structural diagram of a workpiece transport device in a glue-dispensing and attaching apparatus for a workpiece according to the
15 present disclosure;
- [0037]** FIG. 11 is a three-dimensional schematic structural diagram of a belt drive device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0038]** FIG. 12 is a three-dimensional schematic structural diagram of a leveling and
20 adsorption locking fixture in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0039]** FIG. 13 is a schematic structural diagram of a top view of a leveling and adsorption locking fixture in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- 25 **[0040]** FIG. 14 is a partial cross-sectional schematic structural diagram of a leveling and adsorption locking fixture in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

- [0041]** FIG. 15 is a cross-sectional schematic structural diagram of a leveling bolt component in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0042]** FIG. 16 is a cross-sectional schematic structural diagram of an automatic weighing and glue-breaking device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0043]** FIG. 17 is a three-dimensional schematic structural diagram of an automatic weighing and glue-breaking device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0044]** FIG. 18 is a partial cross-sectional schematic structural diagram of an automatic weighing and glue-breaking device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0045]** FIG. 19 is a schematic structural diagram of a loading and unloading mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure, when viewed from a visible angle;
- [0046]** FIG. 20 is a schematic structural diagram of a loading and unloading mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure, when viewed from another visible angle;
- [0047]** FIG. 21 is a schematic structural diagram of a silo transverse movement and jacking mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;
- [0048]** FIG. 22 is a schematic structural diagram of a workpiece gripping and transferring mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure, when viewed from an angle;
- [0049]** FIG. 23 is a schematic structural diagram of a workpiece gripping and transferring mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure, when viewed from another angle;

[0050] FIG. 24 is a schematic structural diagram of a workpiece gripping and transferring mechanism in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure, when viewed from still another angle;

[0051] FIG. 25 is a schematic structural diagram of a press wheel assembly in a
5 glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0052] FIG. 26 is an external schematic diagram of a heat dissipation cover attaching device in a workpiece dispensing and attaching device according to the present disclosure;

[0053] FIG. 27 is a schematic structural diagram of a heat dissipation cover attaching
10 device in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0054] FIG. 28 is a top view of a heat dissipation cover attaching device provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure when absorbing a heat dissipation cover;

[0055] FIG. 29 is a top view of a heat dissipation cover attaching device provided in a
15 glue-dispensing and attaching apparatus for a workpiece according to the present disclosure when assembled with a heat dissipation cover;

[0056] FIG. 30A is a schematic structural diagram of an attaching module provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0057] FIG. 30B is a cross-sectional view of an attaching module provided in a
20 glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0058] FIG. 30C is a front-view schematic diagram of an attaching module provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0059] FIG. 30D is a schematic diagram of a vacuum suction cup provided in a
25 glue-dispensing and attaching apparatus for a workpiece according to the present disclosure, when being leveled;

[0060] FIG. 31A is a schematic structural diagram of a heat dissipation cover loading

device provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0061] FIG. 31B is a top view of a heat dissipation cover loading device provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

5 **[0062]** FIG. 31C is a schematic structural diagram of a picking and positioning part provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0063] FIG. 31D is a schematic structural diagram of a jacking and loading assembly provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0064] FIG. 31E is a schematic diagram of a heat dissipation cover carrier provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure when loaded to a loading part;

15 **[0065]** FIG. 31F is a schematic diagram of a heat dissipation cover carrier provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure when moved to a material picking and positioning part;

[0066] FIG. 31G is a schematic diagram of a heat dissipation cover carrier provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure when moved to an unloading part;

20 **[0067]** FIG. 32 is a schematic structural diagram of a hot pressing device provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0068] FIG. 33 is a schematic structural diagram of a detection part provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

25 **[0069]** FIG. 34 is a schematic structural diagram of a force applying device provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0070] FIG. 35 is a cross-sectional view of a force applying device provided in a

glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

[0071] FIG. 36 is a schematic diagram of air path control based on a cylinder force applying principle provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure;

5 **[0072]** FIG. 37 is a schematic structural diagram of a workpiece force applying device provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure; and

[0073] FIG. 38 is a cross-sectional view of a workpiece force applying device provided in a glue-dispensing and attaching apparatus for a workpiece according to the present disclosure.

10 **[0074]** Reference numerals:

[0075] Two loading and unloading mechanisms 1, dual-valve asynchronous glue-dispensing device 2, heat dissipation cover attaching device 3, hot pressing device 4, frame 100, workpiece conveying device 200, height automatic compensation and stable measurement device 300, leveling and adsorption locking fixture 400, three-dimensional
15 motion platform 1a, height measurement device 2a, visual recognition device 3a, jacking mechanism 5a, automatic weighing and glue-breaking device 6a, y-direction adjustment guide rail assembly 51, jacking substrate 52, z-direction guide component 53, jacking plate 54, bearing seat fixing block 55, motor 56, synchronous belt 57, master synchronous belt pulley 58, slave synchronous belt pulley 59, first screw shaft 510, screw support block 511, screw
20 slider 512, adjustment block 513, y-direction fine adjustment device 1a1, housing 1a11, first servo motor 1a12, second screw shaft 1a13, movable block 1a14, nut slider 1a15, linear guide rail assembly 1a16, workpiece transport device 1c, jacking mechanism 5a, workpiece carrier board 4c, base plate 10, base 11, y-direction guide rail 12, belt drive device 13, feed entry detection optical fiber 14, deceleration detection optical fiber 15, feed warpage detection
25 optical fiber 16, side pushing component 17, arrival detection optical fiber 18, first coupling 19, spline shaft 110, discharge detection optical fiber 111, blocking device 112, discharge warpage detection optical fiber 113, jacking bracket 114, synchronous belt 13a, tensioning wheel 13b, first driven wheel 13c, belt support strip 13d, first drive wheel 13e, first drive

motor 13f, universal installation adapter plate 141, heating plate 142, heat insulation plate 143,
 adsorption locking fixture 144, leveling bolt component 145, horizontal locking screw 146,
 fine thread hole 141a, slit 141b, leveling member 145a, spherical gasket 145b, connecting
 member 145c, fine external thread 145a1, hexagonal countersunk head 145a2, cylindrical
 5 countersunk hole 145a3, body 144a, suction cup 144b, vacuum joint 144c, light compensating
 plate 144d, weighing device 1b, weighing windproof device 2b, fluid receiving container 3b,
 fluid segmentation device 4b, bottom plate 21, windproof cover 22, inner conical surface 31,
 outer conical surface 32, z-direction motion cylinder 41, cylinder connection block 42, first
 sealing ring 43, elastic ring 44, weighing cover 45, positive pressure blowing joint 46, sealing
 10 cover 47, boss 47a, holding ring 48, vacuum negative pressure joint 49, second sealing ring
 410, sealing base 411, weighing pan 412, glue breaking opening 45a, annular groove 45b,
 counterbore 45c, positive pressure groove 45d, air guide hole 45e, flared hole 45f, profile
 frame a1, silo transverse displacing and lifting mechanism a2, second servo motor a21, lead
 screw a22, second coupling a23, sliding nut a24, lifting platform a25, slider connecting plate
 15 a26, first vertical guide rail a27, transverse displacement platform a28, first profile column
 a29, transverse displacement module a230, silo platform a231, workpiece gripping and
 transport mechanism a3, conveying platform bottom plate a31, second profile column a32,
 transverse guide rail a33, sliding column installation block a34, guide rail slider a35a, slider
 installation plate a35b, movable installation vertical plate a36, fixed column a37, fixed
 20 installation vertical plate a38, conveyor belt drive wheel a391, conveyor belt tensioning idle
 wheel a392, first drive motor a393, conveyor belt a340, gripper reclaiming mechanism a341,
 second drive motor a3411, second drive wheel a3412, second driven wheel a3413, belt a3414,
 gripper a3415, cylinder a3416, cylinder installation block a3417, linear guide rail a3418,
 sliding block a3419, press wheel assembly a350, press wheel a351, rubber ring a352, rotation
 25 shaft a353, lifting shaft a354, mechanism block a355, intermediate partition plate a4, silo a5,
 conveyor rail module b1, attaching module b2, vacuum suction cup b21, force sensor b22,
 conduction rod b23, spring b24, tracheal joint b251, sealing chamber b252, third sealing ring
 b253, fourth sealing ring b254, spline b26, pre-pressure adjustment seat b27, third servo
 motor b281, third coupling b282, first synchronous wheel b283, second synchronous wheel

b285, transmission sleeve b286, rotation shaft b287, belt tensioning screw b288, first leveling plate b291, second leveling plate b292, adjusting rotation shaft b293, first leveling screw b294, second leveling screw b295, action bracket b296, adjustment bracket b297, heat dissipation cover loading device b3, loading part b31, first jacking plate b311, jacking and positioning sensor b312, first jacking assembly b313, first jacking motor b3131, first jacking guide rail b3132, first jacking lead screw b3133, first sliding block b3134, first transverse slide rail b314, picking and positioning part b32, jacking and positioning block b321, jacking and loading assembly b322, loading motor b3221, loading lead screw b3222, jacking rod b3223, second vertical guide rail b3224, unloading part b33, second jacking plate b331, second jacking assembly b332, second slide rail b333, first transverse displacement assembly b34, movable member b341, clamping block b342, heat dissipation cover carrier b35, handle b36, Tray loading plate b37, locating module b4, device frame b5, display screen b6, foldable keyboard b7, attaching module drive assembly b8, second drive motor b81, conveyor rail b82, installation bracket b83, third drive motor b84, first detection part c100, second detection part c101, second transverse displacement assembly c11, height sensor head c12, AOI camera c13, heating and force maintaining part c20, conveying device c30, load fixture c40, workpiece c50, force applying device d1, force applying device bottom plate d11, low friction cylinder d12, linear bearing d13, force guide rod d14, heat insulated workpiece pressing plate d15, temperature sensor head d16, workpiece pressing plate anti rotation plate d17, cylinder installation bottom plate d18, connecting column d19, air storage tank d110, electrical proportional valve d111, heating and jacking assembly d2, workpiece fixture assembly d3.

DESCRIPTION OF EMBODIMENTS

[0076] Embodiments of the present disclosure are described in detail below, and examples of the embodiments are shown in the accompanying drawings, throughout which the same or similar numerals represent the same or similar components or components with the same or similar functions. The embodiments described below with reference to the accompanying drawings are exemplary and are merely intended to explain the present disclosure and cannot be understood as limiting the present disclosure.

[0077] In the description of this disclosure, it should be understood that the orientation or positional relationship indicated by the term "center", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial",
5 "circumferential" or the like is based on the orientation or positional relationship shown in the accompanying drawings, and is only for the convenience of describing the present disclosure and simplifying the description, rather than indicating or implying that the device or component referred to must have a specific orientation, be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation to the present
10 disclosure. In addition, features defined with "first" and "second" may explicitly or implicitly include one or more of these features. In the description of this disclosure, "plurality of" means two or more, unless otherwise stated.

[0078] In the description of this disclosure, it should be noted that unless otherwise specified and defined, the terms "installation", "connected", and "connection" should be
15 understood in a broad sense, for example, they can be a fixed connection, a detachable connection, or an integrated connection; a mechanical connection or an electrical connection; a direct connection, or an indirect connection through an intermediate medium, or an internal connection between two components. Those skilled in the art can understand the specific meanings of the above terms in this disclosure in specific circumstances.

[0079] The following is a specific description of a glue-dispensing and attaching
20 apparatus for a workpiece according to the embodiments of the present disclosure with reference to the accompanying drawings.

[0080] As shown in FIGS. 1 to 38, the glue-dispensing and attaching apparatus for the workpiece according to the embodiments of the present disclosure includes: two loading and
25 unloading mechanisms 1, two dual-valve asynchronous glue-dispensing devices 2, two heat dissipation cover attaching devices 3, and a hot pressing device 4. The workpiece moves between the two loading and unloading mechanisms 1, one for loading the workpiece to be processed, and the other for unloading the processed workpiece. The two dual-valve

asynchronous glue-dispensing devices 2, the two heat dissipation cover attaching devices 3, and the hot pressing device 4 are sequentially arranged between the two loading and unloading mechanisms 1 along a movement direction of the workpiece.

5 **[0081]** The loading and unloading mechanisms 1, the dual-valve asynchronous glue-dispensing devices 2, the heat dissipation cover attaching devices 3, and the hot pressing device 4 each have a component for conveying the workpiece, and these components for conveying the workpiece are sequentially connected.

10 **[0082]** As shown in FIGS. 2 to 18, the dual-valve asynchronous glue-dispensing device 2 according to an embodiment of the present disclosure includes a frame 100, a workpiece conveying device 200, a height automatic compensation and stable measurement device 300, and a leveling and adsorption locking fixture 400. The workpiece conveying device 200 is located inside the frame 100, and the workpiece is carried on the workpiece conveying device 200. The height automatic compensation and stable measurement device 300 includes a compensation part and a measurement part. The compensation part is located below the
15 workpiece, and the measurement part is provided on the frame 100 and is located above the workpiece to measure the workpiece. The leveling and adsorption locking fixture 400 is provided on the compensation part of the height automatic compensation and stable measurement device 300. The leveling and adsorption locking fixture 400 is movable upwards under the driving of the compensation part to hold up the workpiece.

20 **[0083]** According to this disclosure, the workpiece conveying device 200 conveys the workpiece, and the measuring part measures the workpiece. At the same time, the compensation part drives the leveling and adsorption locking fixture 400 to lift the workpiece upwards, and the leveling and adsorption locking fixture 400 can adsorb and lock the workpiece when jacking the workpiece, thereby completing the fixation before dispensing the
25 glue. The conveying, detection, and compensation processes of the workpiece cooperate with each other and can operate independently of each other, meeting the requirements of stable workpiece conveying and automatic detection and compensation before processing.

[0084] As shown in FIGS. 2 and 3, the height automatic compensation and stable

measurement device 300 according to an embodiment of the present disclosure includes: a three-dimensional motion platform 1a and a jacking mechanism 5a. The workpiece is carried on the workpiece conveying device 200. The three-dimensional motion platform 1a is provided above the workpiece conveying device 200, and a height measurement device 2a and a visual recognition device 3a are provided on the three-dimensional motion platform 1a. The height measurement device 2a and the visual recognition device 3a are movable in an xy plane under the driving of the three-dimensional motion platform 1a. The jacking mechanism 5a is provided below the workpiece, and a part of the jacking mechanism 5a is movable along the z axis to jack the workpiece up. In this disclosure, the z direction is a vertical direction, and the x direction and the y direction are perpendicular to the z direction and perpendicular to each other. The present disclosure provides a simple structure. By setting the height measurement device 2a and the visual recognition device 3a to move within the xy plane, measurement errors in the height direction are avoided. At the same time, the jacking mechanism 5a is used to adjust the height of the workpiece, achieving automatic height compensation, separation of detection from debugging, and no interference between them. Therefore, the detection accuracy and processing effect are improved.

[0085] According to an embodiment of the present disclosure, as shown in FIGS. 3 and 7, the three-dimensional motion platform 1a includes a y-direction motion mechanism, an x-direction motion mechanism, two z-direction motion mechanisms, and a y-direction fine adjustment device 1a1. The x-direction motion mechanism is provided on the y-direction motion mechanism, and the y-direction motion mechanism is configured to drive the x-direction motion mechanism to move along the y axis. The height measurement device 2a and the visual recognition device 3a are provided on the x-direction motion mechanism. The two z-direction motion mechanisms are provided on the x-direction motion mechanism, which is configured to drive the two z-direction motion mechanisms to move along the x axis. A fluid dispenser is provided on one of the two z-direction motion mechanisms. The y-direction fine adjustment device 1a1 is provided on the other z-direction motion mechanism, which is configured to drive the y-direction fine adjustment device 1a1 to move along the y axis. Another fluid dispenser is provided on the y-direction fine adjustment device 1a1, and

the y-direction fine adjustment device 1a1 is configured to drive the another fluid dispenser for fine adjustment along the y axis. The y-direction motion mechanism, the x-direction motion mechanism, and the z-direction motion mechanisms are independent of each other, without interference, and can move above the workpiece accurately.

5 **[0086]** Furthermore, as shown in FIG. 7, the y-direction fine adjustment device 1a1 includes a housing 1a11, a first servo motor 1a12, a second screw shaft 1a13, and a movable block 1a14. A linear guide rail assembly 1a16 is provided outside the housing 1a11. The first servo motor 1a12 is provided on one side of the housing 1a11, the second screw shaft 1a13 is rotatably provided inside the housing 1a11, and the second screw shaft 1a13 is directly
10 connected to an output end of the first servo motor 1a12. A part of the movable block 1a14 is slidable on the linear guide rail assembly 1a16, and another part of the movable block 1a14 is slidable on the second screw shaft 1a13 through a nut slider 1a15. The another fluid dispenser is provided on the movable block 1a14.

[0087] According to an embodiment of the present disclosure, as shown in FIGS. 4 and 5,
15 the jacking mechanism 5a includes: a jacking substrate 52, a bearing seat fixing block 55, a jacking plate 54, an adjustment block 513, and a lead screw assembly. The bearing seat fixing block 55 is provided on the jacking substrate 52. The jacking plate 54 is located above the jacking substrate 52. The adjustment block 513 is provided on the jacking plate 54. A part of the lead screw assembly is connected to the bearing seat fixing block 55, and another part of
20 the lead screw assembly is connected to the adjustment block 513. By rotating the lead screw assembly, the adjustment block 513 and the jacking plate 54 are driven to move along the z axis. Furthermore, as shown in FIG. 3, the lead screw assembly includes a first screw shaft 510, a screw support block 511, and a screw slider 512. The first screw shaft 510 is perpendicular to a plane where the jacking plate 54 is located. The screw support block 511 is
25 rotatably sleeved on the first screw shaft 510. The screw slider 512 is sleeved on the first screw shaft 510, and an inner peripheral edge of the screw slider 512 is connected to an outer peripheral edge of the first screw shaft 510 through threads. An outer peripheral edge of the screw slider 512 is rotatably connected to an inner peripheral edge of the adjustment block 513, resulting in a tighter transmission of the lead screw assembly and higher adjustment

accuracy.

[0088] As a preferred embodiment of the present disclosure, the jacking mechanism 5a further includes a motor 56, a master synchronous belt pulley 58, a slave synchronous belt pulley 59, and a synchronous belt 57. The motor 56 is provided on a side surface of the jacking substrate 52. The master synchronous belt pulley 58 is provided at one end of the first screw shaft 510. The slave synchronous belt pulley 59 is provided at an output end of the motor 56. The synchronous belt 57 is sleeved on the master synchronous belt pulley 58 and the slave synchronous belt pulley 59. The synchronous belt 57 is used to transmit the power of the motor 56, and the transmission process is stable. The motor 56 is located on a side of the first screw shaft 510, further simplifying the structure and reducing the volume of the jacking mechanism 5a.

[0089] As a preferred embodiment of the present disclosure, the jacking mechanism 5a further includes two z-direction guide components 53, which are disposed on the left and right sides of the bearing seat fixing block 55. One end of the z-direction guide component 53 is connected to the jacking substrate 52, and the other end of the z-direction guide component 53 is connected to the jacking plate 54. The two z-direction guide components 53 are used for guidance on both sides of the lead screw assembly, ensuring smooth movement of the jacking plate 54 during jacking.

[0090] Furthermore, an installation groove is provided on an upper surface of the jacking substrate 52, and the bearing seat fixing block 55 is disposed inside the installation groove. A peripheral surface of the screw support block 511 has a circular protrusion, and a part of the bearing seat fixing block 55 abuts against the circular protrusion to press the screw support block 511 into the installation groove. The installation groove plays a role of positioning while installing, further reducing the installation height of the bearing seat fixing block 55 and improving the compactness of the jacking mechanism 5a.

[0091] Furthermore, one end of the first screw shaft 510 extends below the jacking substrate 52, and the synchronous belt 57 is located below the jacking substrate 52.

[0092] According to an embodiment of the present disclosure, the jacking mechanism 5a

further includes two y-direction adjustment guide rail assemblies 51, which are disposed on the workpiece conveying device 200, and are both parallel to the y axis. The jacking substrate 52 is located on the two y-direction adjustment guide rail assemblies 51, and is movable along the y axis under the driving of the two y-direction adjustment guide rail assemblies 51. The two y-direction adjustment guide rail assemblies 51 enable the jacking plate 54 to move correspondingly with the position of the workpiece on the workpiece conveying device 200, avoiding deviation during jacking.

[0093] According to an embodiment of the present disclosure, the jacking mechanism 5a further includes a reset photoelectric switch and a photoelectric stopper. The reset photoelectric switch is disposed on a side surface of the bearing seat fixing block 55, and the photoelectric stopper is disposed on the z-direction guide component 53 and is movable along the z axis with the z-direction guide component 53. The reset photoelectric switch and the photoelectric stopper can determine whether the reset is in place after each jacking, avoiding deviation in the initial position of the jacking mechanism 5a due to long-term use.

[0094] During operation, the height measurement device 2a and the visual recognition device 3a move above the workpiece under the driving of the y-direction motion mechanism and the x-direction motion mechanism, the motor 56 operates and drives the first screw shaft 510 to rotate through the synchronous belt 57, and the screw slider 512 moves upwards, thereby driving the jacking plate 54 to move upwards and jack the workpiece up to an appropriate position.

[0095] As shown in FIGS. 8 to 11, the workpiece transport device 4a according to an embodiment of the present disclosure includes a workpiece transport device 1c and a workpiece carrier board 4c. The workpiece transport device 1c is configured to transport the workpiece along the x direction, and the workpiece transport device 1c includes two conveying components and a plurality of detection optical fibers. The two conveying components are a first conveying component and a second conveying component, which are symmetrically arranged about the xz plane. The plurality of detection optical fibers is displaced on the first and second conveying components to detect the conveying status of the

workpiece. The workpiece carrier 4c is disposed on these two conveying components, and the workpiece is carried on the workpiece carrier 4c. The structure of the present disclosure is simple. The plurality of detection optical fibers is disposed on the workpiece conveying path to, on the one hand, detect the workpiece conveying position for easy positioning, and on the other hand, detect the workpiece status to avoid the waste of processing resources and processing time caused by poor workpiece status, thereby improving production efficiency, reducing processing costs, reducing subsequent detection work, and improving the final yield.

[0096] In some specific embodiments of the present disclosure, as shown in FIG. 11, the conveying component includes a base plate 10 and a belt drive device 13. The belt drive device 13 is disposed on a side of the base plate 10 facing towards the workpiece carrier board 4c. During the movement of the workpiece carrier board 4c driven by the belt drive device 13, the base plate 10 can perform guidance to avoid deviation of the workpiece carrier board 4c during the movement.

[0097] According to an embodiment of the present disclosure, the belt drive device 13 includes two first driven wheels 13c, a belt support strip 13d, a synchronous belt 13a, and a plurality of tensioning wheels 13b. The two first driven wheels 13c are arranged at the left and right ends of the base plate 10. The belt support strip 13d is arranged on the base plate 10 and between the two first driven wheels 13c. The synchronous belt 13a is sleeved on the two first driven wheels 13c and the belt support strip 13d. The plurality of tensioning wheels 13b is disposed on the base plate 10 and abuts against an outer peripheral edge of the synchronous belt 13a. Furthermore, a first drive wheel 13d and a first drive motor 13f are provided on one belt drive device 13. The first drive wheel 13d is engaged with an inner peripheral edge of the synchronous belt 13a. An output end of the first drive motor 13f is connected to the first drive wheel 13d, and the first drive motor 13f is disposed on a base 11. Furthermore, the workpiece transport device 1c further includes a first coupling 19 and a spline shaft 110. One end of the spline shaft 110 is directly connected to the first driven wheel 13c of the first conveying component, and the one end of the spline shaft 110 can be movably inserted in the y-direction into the center of the first driven wheel 13c of the first conveying component. When processing workpieces of different sizes, the distance between two base plates 10 needs to be

adjusted, the direct connection of the spline shaft 110 ensures that the two base plates 10 remain in a direct connection state regardless of getting close to or far away from each other, and the power transmission process is not affected. The other end of the spline shaft 110 is connected to one end of the first coupling 19, and the other end of the first coupling 19 is connected to the first driven wheel 13c of the other conveying component. When only one first drive motor 13f is used to simultaneously drive two synchronous belts 13a, the motion process can be uniformly controlled, avoiding the occurrence of asynchronous motion when two first drive motors 13f drive two synchronous belts 13a to move separately. The first coupling 19 and the spline shaft 110 connect the two belt drive devices 13, ensuring that the motion of the two synchronous belts 13a remains consistent when the two belt drive devices 13 move. This further enhances the stability of the movement of the workpiece carrier board 4c in the x direction.

[0098] According to an embodiment of the present disclosure, as shown in FIGS. 9 and 10, the plurality of detection optical fibers include an feed entry detection optical fiber 14, a deceleration detection optical fiber 15, an arrival detection optical fiber 18, and a discharge detection optical fiber 111. The feed entry detection optical fiber 14, the deceleration detection optical fiber 15, the arrival detection optical fiber 18, and the discharge detection optical fiber 111 are sequentially arranged on the base plate 10 along the x direction to detect and control the entire process of the workpiece carrier board 4c from entering the conveying component to leaving the conveying component, which can constantly obtain the motion status of the workpiece carrier 4c, thereby facilitating controlling the processing equipment to process the workpiece at an appropriate position.

[0099] According to an embodiment of the present disclosure, the workpiece transport device 1c further includes a side pushing component 17 and a blocking device 112. The side pushing component 17 is disposed on the base plate 10 and is located between the deceleration detection optical fiber 15 and the arrival detection optical fiber 18. The blocking device 112 is disposed on the base plate 10, and a connecting line between the blocking device 112 and the arrival detection optical fiber 18 is parallel to the y axis.

[0100] Furthermore, the plurality of detection optical fibers further include a feed warpage detection optical fiber 16 and an discharge warpage detection optical fiber 113. The feed warpage detection optical fiber 16 and the discharge warpage detection optical fiber 113 can be movable on the base plate 10 along the z direction. The feed warpage detection optical fiber 16 and the discharge warpage detection optical fiber 113 are located on two sides of the side pushing component 17, respectively. The feed warpage detection optical fiber 16 is configured to detect the state of the workpiece before being processed, and timely detect the warped workpiece, avoiding processing defects caused by processing on the warped workpiece. The discharge warpage detection optical fiber 113 is configured to detect the processed workpiece and combine the detection results of the feed warpage detection optical fiber 16 to comprehensively determine whether the processing process has caused workpiece warpage, and then adjust the processing process. The feed warpage detection optical fiber 16 and the discharge warpage detection optical fiber 113 are both fixed to the base plate 10 through the jacking bracket 114. When the size of the workpiece changes, the heights of the feed warpage detection optical fiber 16 and the discharge warpage detection optical fiber 113 are adjusted through the jacking bracket 114 based on the thickness of the workpiece, thereby improving the applicability of the detection process.

[0101] According to an embodiment of the present disclosure, the workpiece transport device 1c further includes a base 11 and two y-direction guide rails 12. The two y-direction guide rails 12 are disposed on the base 11, the two y-direction guide rails 12 are arranged parallel to the y axis, and the conveying components are slidably arranged on the two y-direction guide rails 12. Each y-direction guide rail 12 has two sliding blocks, and the two base plates 10 are connected to the two sliding blocks, respectively. The relative position of the two base plates 10 is adjusted by the two sliding blocks, which is convenient for processing workpieces of different sizes and adjusting the relative position of the two base plates 10.

[0102] According to an embodiment of the present disclosure, the workpiece transport device 4a further includes a jacking mechanism 5a and a leveling and adsorption locking fixture 3c. The jacking mechanism 5a is disposed on the base 11 and is located directly below

the motion trajectory of the workpiece carrier board 4c, and the leveling and adsorption locking fixture 3c is fixed on an upper surface of the jacking mechanism 5a.

[0103] As shown in FIGS. 12 to 15, the leveling and adsorption locking fixture 400 according to the embodiment of the present disclosure includes a universal installation adapter plate 141 and an adsorption locking fixture 144. The universal installation adapter plate 141 is a straight plate member, and four leveling bolt components 145 are provided around the universal installation adapter plate 141. The leveling bolt components 145 fix the universal installation adapter plate 141 to the jacking mechanism 5a, and the four leveling bolt components 145 are twistable to adjust the upper surface of the universal installation adapter plate 141 to be level. The adsorption locking fixture 144 is disposed on the upper surface of the universal installation adapter plate 141, and the workpiece is carried on the adsorption locking fixture 144.

[0104] The beneficial effect of this disclosure is that the structure of the present disclosure is simple, and the heights of the four corners of the universal installation adapter plate 141 are adjusted through the four leveling bolt components 145, indirectly adjusting the workpiece on the adsorption locking fixture 144 to be level. The leveling process is convenient, while avoiding direct interference between the leveling and the workpiece.

[0105] According to an embodiment of the present disclosure, the universal installation adapter plate 141 has four fine thread holes 141a opened along the thickness direction thereof. One end of each leveling bolt component 145 is arranged in a corresponding fine thread hole 141a, and the other end of the leveling bolt component 145 is connected to the jacking mechanism 5a. The universal installation adapter plate 141 has four slits 141b opened along the thickness direction thereof, and the slits 141b are in communication with the fine thread holes 141a. Four horizontal locking screws 146 are provided around the universal installation adapter plate 141, each of which penetrates through a corresponding slit 141b. Rotation of the horizontal locking screw 146 enables adjusting the size of the slit 141b, and then adjusting the size of the fine thread hole 141a, and finally achieving tight connection between the fine thread hole 141a and the leveling bolt component 145. Furthermore, the axis of the horizontal

locking screw 146 is perpendicular to the axis of the leveling bolt component 145. The horizontal locking screw 146 is used for locking from the side surface, avoiding the z-direction force generated during locking, thereby reducing the interference of the locking process on the leveling process.

5 **[0106]** According to an embodiment of the present disclosure, as shown in FIG. 15, the leveling bolt component 145 includes a leveling member 145a, a spherical gasket 145b, and a connecting member 145c. The leveling member 145a is cylindrical, and an outer peripheral edge of the leveling member 145a has a fine external thread 145a1. The fine external thread 145a1 is engaged with the fine thread hole 141a, and the leveling member 145 has a leveling
10 hole penetrating the leveling member 145a along the thickness direction thereof. The spherical gasket 145b is arranged between the leveling member 145 and the jacking mechanism. One end of the connecting member 145c passes through the leveling hole and the spherical gasket 145b to be connected to the jacking mechanism 5a. Furthermore, an upper part of the leveling hole is a hexagonal countersunk head 145a2, which is convenient for
15 leveling operations after a wrench is screwed in. The middle part of the leveling hole is a cylindrical countersunk hole 145a3, and the other end of the connecting member 145c is clamped in the cylindrical countersunk hole 145a3. By the cooperation of the cylindrical countersunk hole 145a3 with the connecting member 145c, interference between the thread connection of the fine external thread 145a1 and the changing leveling angle is avoided. The
20 upper and lower gaskets of the spherical gasket 145b are in contact through spherical surfaces, ensuring that the leveling effect is not affected by angle changes during the leveling process. Preferably, the connecting member 145c is a hexagon socket head cap screw.

[0107] According to an embodiment of the present disclosure, as shown in FIG. 12, the leveling and adsorption locking fixture 400 further includes a heating plate 142 and a heat
25 insulation plate 143. The heating plate 142 is disposed between the universal installation adapter plate 141 and the jacking mechanism 5a. The heat insulation plate 143 is disposed between the heating plate 142 and the jacking mechanism 15a. Each of the heating plate 142 and the heat insulation plate 143 has a through hole that is in clearance fit with the leveling bolt component 145.

[0108] According to an embodiment of the present disclosure, as shown in FIG. 14, the adsorption locking fixture 144 includes a body 144a, a plurality of suction cups 144b, and a vacuum joint 144c. The plurality of suction cups 144b are spaced apart from each other on an upper surface of the body 144a, and workpieces are adsorbed on the suction cups 144b. The vacuum joint 144c is disposed on a side surface of the body 144a and is in communication with the plurality of suction cups 144b.

[0109] Furthermore, the adsorption locking fixture 144 further includes a light compensating plate 144d, which is disposed on the upper surface of the body 144a. The upper surface of the light compensating plate 144d is a mirror surface, which facilitates the visual recognition device to recognize the contour of the workpiece using the mirror reflection, to enhance the light source for contour recognition and improve the accuracy of workpiece contour recognition.

[0110] When in use, the leveling member 145a is screwed into the fine thread hole 141a, then the connecting member 145c is placed into the leveling hole and rotated to fix the lower end of the connecting member 145c to the jacking mechanism, and then the leveling member 145a is rotated for leveling. After the leveling is completed, the horizontal locking screw 146 is tightened to complete the locking of the leveling bolt component 145.

[0111] As shown in FIGS. 16 to 18, an automatic weighing and glue-breaking device 6a according to an embodiment of the present disclosure includes: a weighing windproof device 2b, wherein the weighing windproof device 2b has a first accommodating chamber defined inside; a weighing device 1b disposed in the first accommodating chamber; a fluid segmentation device 4b disposed above the weighing windproof device 2b and having a second accommodating chamber in communication with the first accommodating chamber; a fluid receiving container 3b disposed in the second accommodating chamber and above the weighing device 1b. The fluid receiving container 3b has two states: a glue breaking state and a weighing state. When in the glue breaking state, the fluid receiving container 3b moves upwards to receive the glue. When in the weighing state, the fluid receiving container 3b moves downwards to be placed on the weighing device 1b, to weigh the glue. The present

disclosure has a simple structure. By placing the weighing device 1b and the fluid receiving container 3b in the accommodating chambers, the weighing process is ensured to be interference free. The fluid segmentation device 4b is configured to segment the glue, ensuring a more accurate dispensing amount for each measurement.

5 **[0112]** According to an embodiment of the present disclosure, as shown in FIG. 16, the weighing windproof device 2b includes a bottom plate 21 and a windproof cover 22. The weighing device 1b is disposed on an upper surface of the bottom plate 21. The windproof cover 22 covers the weighing device 1b from above and is sealed and connected to the edge of the bottom plate 21. The upper end of the windproof cover 22 has an opening, and the fluid
10 segmentation device 4b is arranged on the opening.

[0113] According to an embodiment of the present disclosure, as shown in FIGS. 17 and 18, the fluid segmentation device 4b includes a sealing base 411, a sealing cover 47, a weighing pan 412, a holding ring 48, and a z-direction motion cylinder 41. The sealing base 411 is arranged at the opening, and the middle part of the sealing base 411 has a through hole.
15 The sealing cover 47 is located on the sealing base 411, and the lower end of the sealing cover 47 is arranged in the through hole. The sealing cover 47 has an upper opening and a lower opening, and an inner peripheral edge of the lower opening protrudes inwards to form a boss 47a. The weighing pan 412 is disposed inside the sealing cover 47, and when the fluid receiving container 3b is in the glue breaking state, the weighing pan 412 is clamped on the
20 boss 47a. The holding ring 48 is sleeved on the sealing cover 47. One end of the z-direction motion cylinder 41 is disposed on the sealing base 411, and the other end of the z-direction motion cylinder 41 is connected to the holding ring 48 through a cylinder connection block 42 to drive the sealing cover 47 to move up and down.

[0114] According to an embodiment of the present disclosure, as shown in FIG. 18, the
25 fluid receiving container 3b is disposed on the weighing pan 412. The fluid receiving container 3b includes an outer conical surface 32 and an inner conical surface 31, with the diameter of the outer conical surface 32 decreasing from top to bottom, and the diameter of the inner conical surface 31 increasing from top to bottom. The inner conical surface 31 is

provided inside the outer conical surface 32, and a lower edge of the inner conical surface 31 is connected to a lower edge of the outer conical surface 32. A glue accommodating chamber is formed between the inner conical surface 31 and the outer conical surface 32. Furthermore, an upper edge of the inner conical surface 31 is higher than an upper edge of the outer conical surface 32, and each of the inner conical surface 31 and the outer conical surface 32 is a frustum surface. It is easier for the frustum surface to come into contact with the glue compared to the straight cylindrical surface, and when to break the glue, it is easier for the glue to fall along the inner conical surface 31 or the outer conical surface 32. At the same time, the upper space of the glue accommodating chamber formed between the inner conical surface 31 and the outer conical surface 32 is relatively large, so that the glue head will not collide with the inner conical surface 31 or the outer conical surface 32.

[0115] According to an embodiment of the disclosure, as shown in FIGS. 17 and 18, the fluid segmentation device 4b further includes a weighing cover 45, which is arranged at the upper opening. The weighing cover 45A has a glue breaking opening 45a, and an orthographic projection of a center point of the glue breaking opening 45a falls on the inner conical surface 31. An elastic ring 44 is further provided on the glue breaking opening 45a, and the elastic ring 44 is configured to buffer the glue head to avoid hard contact between the glue head and the glue breaking opening 45a. This design allows that when the glue head enters the glue breaking opening 45a to break the glue, the center of the glue head is located above the inner conical surface 31, and the glue falls onto the inner conical surface 31 and slides down along the inner conical surface 31.

[0116] According to an embodiment of the present disclosure, a peripheral side surface of the weighing cover 45 is connected to the inner peripheral surface of the upper opening, two annular grooves 45b and a positive pressure groove 45d are defined on the peripheral side surface of the weighing cover 45, and the positive pressure groove 45d is located between the two annular grooves 45b.

[0117] According to a preferred embodiment of the present disclosure, as shown in FIG. 18, the weighing cover 45 has a flared hole 45f and a plurality of air guide holes 45e. The

flared hole 45f is located directly below the glue breaking opening 45a and is in communication with the glue breaking opening 45a. The flared hole 45f is a bell mouth with a downward opening. The plurality of air guide holes 45e are arranged in a circular array centered on the center point of the glue breaking opening 45a. One end of the air guide hole 45e is in communication with the flared hole 45f, and the other end of the air guide hole 45e is connected to the positive pressure groove 45d. Air is introduced through the positive pressure groove 45d, and at the same time, the air guide hole 45e introduces the air into the flared hole 45f. The bell mouth can concentrate the air and spray the air downwards, ensuring that the glue is peeled off from the glue head when the air moves downwards.

10 **[0118]** According to an embodiment of the present disclosure, as shown in FIG. 17, the fluid segmentation device 4b further includes a positive pressure blowing joint 46 and a vacuum negative pressure joint 49. The positive pressure blowing joint 46 is in communication with the positive pressure groove 45d. The vacuum negative pressure joint 49 is disposed at the lower part of the outer conical surface 32 and is in communication with the glue accommodating chamber. By using the positive pressure air to blow air from the glue head and using the negative pressure air to suck air from the inside of the glue accommodating chamber, it ensures that the glue moves along the flow direction of the air from top to bottom, facilitating the detachment of the glue from the glue head.

20 **[0119]** According to an embodiment of the present disclosure, as shown in FIG. 18, the fluid segmentation device 4b further includes two first sealing rings 43 and a second sealing ring 410, and the two first sealing rings 43 are located within the two annular grooves 45b, respectively. The second sealing ring 410 is disposed between the sealing cover 47 and the sealing base 411. By setting the first sealing rings 43 and the second sealing ring 410, it is ensured that the sealing cover 47 and the windproof cover 22 are always in a windless state during the two processes of glue breaking and weighing, avoiding external interference and ensuring accurate measurement results.

25 **[0120]** During operation, the workpiece is placed on the workpiece carrier board 4c, both ends of the workpiece carrier board 4c move along the x axis under the driving of the

synchronous belt 13a, and the feed entry detection optical fiber 14 detects whether the workpiece carrier board 4c enters the conveying component. When the deceleration detection optical fiber 15 detects the workpiece carrier board 4c, the first drive motor 13f starts to slow down, and at the same time, the feed warpage detection optical fiber 16 performs detection on the upper surface of the passing workpiece. If any workpiece warps, an alarm will be issued. When the workpiece carrier board 4c moves to the arrival detection optical fiber 18, the blocking device 112 rises upwards to block the workpiece carrier board 4c. Then, the side pushing component 17 pushes the workpiece carrier board 4c to abut against the base plate 10, ensuring that the workpiece carrier board 4c is positioned in the x direction and the y direction. Then, the jacking mechanism 5a jacks the workpiece carrier board 4c upwards, and the leveling and adsorption locking fixture 400 adsorbs and fixes the workpiece. The height measurement device 2a and the visual recognition device 3a move above the workpiece under the driving of the y-direction motion mechanism and the x-direction motion mechanism. After the height measurement device 2a measures the height of the workpiece carrier board 4c, the jacking mechanism 5a compensates for the height to complete the z-direction positioning, and then the visual recognition device 3a takes photos for detection. The y-direction motion mechanism, the x-direction motion mechanism, and one z-direction motion mechanism work collaboratively to move a fluid dispenser directly above a chip for glue dispensing processing. The x-direction motion mechanism and the other z-direction motion mechanism work collaboratively to move another fluid dispenser onto another chip, and then the y-direction fine adjustment device 1a1 is used to perform fine adjustment in the y direction to enable the another fluid dispenser move directly above the another chip for glue dispensing processing. After the processing is completed, during the discharge, the workpiece is subject to secondary detection by the discharge warpage detection optical fiber 113, and the discharge position of the workpiece carrier board 4c is detected by the discharge detection optical fiber 111.

[0121] Every time the device starts or the fluid dispenser is replaced, the glue dispensing amount is calibrated by weighing. The z-direction motion cylinder 41 drives the sealing cover 47 to move upwards, causing the boss 47a to lift up the weighing pan 412 and the fluid receiving container 3b. Then, the glue head of the fluid dispenser extends into the glue

breaking opening 45a and enters the flared hole 45f. The positive pressure blowing joint 46 and the vacuum negative pressure joint 49 work, through blowing and suction, to introduce the glue on the glue head smoothly into the fluid receiving container 3b. Then, the positive pressure blowing joint 46 and the vacuum negative pressure joint 49 stop working, and the
5 z-direction motion cylinder 41 moves downwards, causing the weighing pan 412 and the fluid receiving container 3b to fall onto the weighing device 1b for weighing.

[0122] As shown in FIGS. 19 and 20, the loading and unloading mechanism 1 provided in this disclosure may include a profile frame a1, a silo transverse displacing and lifting mechanism a2, and a workpiece gripping and transport mechanism a3. The silo transverse
10 displacing and lifting mechanism a2 and the workpiece gripping and transport mechanism a3 are both installed inside the profile frame a1.

[0123] Here, the size and shape of the profile frame a1 may be set according to actual needs, and this disclosure does not impose too much restriction on this. Optionally, the profile frame a1 here can be an aluminum profile.

[0124] The silo transverse displacing and lifting mechanism a2 is configured to carry a silo a5 thereon, move the carried silo a5 up and down and transversely move the carried silo a5, in order to place the silo a5 opposite to the workpiece gripping and transport mechanism a3.
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[0125] In the application scenario of the loading end, the workpiece gripping and transport mechanism a3 is used to grip a workpiece from a silo a5 opposite thereto and load it
20 onto the conveyor belt. Alternatively, in the application scenario of the discharge end, the workpiece gripping and transport mechanism a3 is used to push the workpiece on the conveyor belt into a silo a5 opposite thereto.

[0126] In a possible implementation, the loading and unloading mechanism may further
25 include an intermediate partition plate a4, which is configured to separate the silo a5 carried by the silo transverse displacing and lifting mechanism a2 from the workpiece gripping and transport mechanism a3. The intermediate partition plate a4 has a through hole for the workpiece to pass through.

[0127] The silo transverse displacing and lifting mechanism a2 is configured to transversely move the carried silo a5 and move the carried silo a5 up and down, to place the silo a5 opposite to the through hole. The workpiece gripping and transport mechanism a3 grips the workpiece in the silo a5 through the through hole or pushes the workpiece into the silo a5 through the through hole.

[0128] As shown in FIG. 21, the silo transverse displacing and lifting mechanism a2 provided in this disclosure may include a second servo motor a21, a lead screw a22, a second coupling a23, a sliding nut a24, a lifting platform a25, a slider connecting plate a26, a first vertical guide rail a27, a transverse displacement platform a28, a first profile column a29, a transverse displacement module a230, and a silo platform a231.

[0129] A first end of the lead screw a22 is connected to the second servo motor a21 through the second coupling a23, and a second end of the lead screw a22 is connected to the lifting platform a25 through the sliding nut a24. The lifting platform a25 is installed with the slider connecting plate a26, which is installed on the first vertical guide rail a27. The second servo motor a21 is configured to drive, through the lead screw a22, the lifting platform a25 to move up and down along the first vertical guide rail a27.

[0130] The lifting platform a25 is connected to the transverse displacement platform a28 through the first profile column a29, and the transverse displacement module a230 is installed at the upper end of the first profile column a29. A silo platform a231 is installed on the transverse displacement platform a28 and is used to carry at least one silo a5. The silo a5 can move transversely under the driving of the transverse displacement module a230.

[0131] As shown in FIGS. 22 to 24, the workpiece gripping and transport mechanism a3 provided in this disclosure may include a transport platform bottom plate a31, a second profile column a32, a transverse guide rail a33, a sliding column installation block a34, a guide rail slider a35a, a slider installation plate a35b, a movable installation vertical plate a36, a fixed column a37, a fixed installation vertical plate a38, a conveyor belt drive component, two conveyor belts a340, and a gripper reclaiming mechanism a341.

[0132] A plurality of workpiece carrier boards 4c is stacked in the silo a5. One end of the

movable installation vertical plate a36 and one end of the fixed installation vertical plate a38 are close to one end of the base plate 10, facilitating the transportation of the workpiece carrier board 4c to the workpiece transport device 1c from the silo a5 .

5 **[0133]** The transport platform bottom plate a31 is installed on the upper end of the second profile column a32.

10 **[0134]** The transverse guide rail a33 is installed at one end of the transport platform bottom plate a31 along a first horizontal direction. The sliding column installation block a34 is installed on the transverse guide rail a33 through the guide rail slider a35a and the slider installation plate a35b. The movable installation vertical plate a36 is installed on the sliding column installation block a34.

15 **[0135]** The fixed column a37 is fixedly installed on the other end of the transport platform bottom plate a31 and is spaced apart from and faces towards the movable installation vertical plate a36. The fixed installation vertical plate a38 is installed on the fixed column a37, and the two conveyor belts a340 are installed on the movable installation vertical plate a36 and the fixed installation vertical plate a38, respectively. The conveyor belt drive component is configured to drive the two conveyor belts a340 to rotate synchronously.

20 **[0136]** The gripper reclaiming mechanism a341 is installed on the fixed installation vertical plate a38. The gripper reclaiming mechanism a341 is movable towards or away from the silo a5 opposite thereto to place the workpiece gripped from the silo a5 onto the conveyor belt, or push the workpiece on the conveyor belt into the silo a5.

25 **[0137]** Optionally, the conveyor belt drive component may include a conveyor belt drive wheel a391, a conveyor belt tensioning idle wheel a392, and a first drive motor a393. The drive end of the first drive motor a393 is connected to the conveyor belt drive wheel a391, and the conveyor belt a340 is wound on the conveyor belt drive wheel a391 and the conveyor belt tensioning idle wheel a392. The first drive motor a393 drives the conveyor belt a340 to rotate through the conveyor belt drive wheel a391.

[0138] In a possible implementation, the gripper reclaiming mechanism a341 may include

a belt drive component and a gripper reclaiming component. The gripper reclaiming component is installed on the belt drive component, and the belt drive component drives the gripper reclaiming component to move towards or away from the silo a5 opposite thereto.

[0139] As shown in FIG. 24, the belt drive component may include a second drive motor a3411, a second drive wheel a3412, a second driven wheel a3413, and a belt a3414. Among them, the second drive motor a3411, the second drive wheel a3412, and the second driven wheel a3413 are all installed on the fixed installation vertical plate a38, and the belt a3414 is wound on the second drive wheel a3412 and the second driven wheel a3413. The drive end of the second drive motor a3411 is connected to the second drive wheel a3412. The second drive motor a3411 drives the second drive wheel a3412 to drive the belt a3414 to rotate.

[0140] As shown in FIG. 24 again, the gripper reclaiming component may include a gripper a3415, a cylinder a3416, a cylinder installation block a3417, a linear guide rail a3418, and a sliding block a3419. One end of the sliding block a3419 is fixedly connected to the belt a3414, the other end of the sliding block a3419 is installed on the linear guide rail a3418. The gripper a3415 is installed on the cylinder a3416, and the cylinder a3416 is fixed to the sliding block a3419 through the cylinder installation block a3417. The linear guide rail a3418 is arranged to face towards the silo a5 opposite thereto. The sliding block a3419 is driven by the belt a3414 to move along the linear guide rail a3418 to drive the gripper to move towards or away from the opposite silo a5.

[0141] In practical applications, the drive motor rotates in a forward direction, driving the gripper a3415 to move towards the silo a5. The cylinder a3416 controls the opening and closing of the gripper a3415 to grip the workpiece in the silo a5. Alternatively, the drive motor rotates in a reverse direction, driving the gripper a3415 to move away from the silo a5 along the linear guide rail a3418 to place the gripped workpiece on the conveyor belt of the conveyor belt drive component.

[0142] The cylinder a3416 controls the gripper a3415 to be closed, and the motor rotates in the forward direction, driving the gripper a3415 to push the workpiece on the conveyor belt of the conveyor belt drive component.

[0143] As shown in FIG. 25, the workpiece gripping and transport mechanism a3 provided in the present disclosure further includes a press wheel assembly a350, which includes a press wheel a351, a rubber ring a352, a rotation shaft a353, a lifting shaft a354, and a mechanism block a355. Among them, the rubber ring a352 is sleeved on the press wheel a351, the press wheel a351 is locked on the lifting shaft a354 through the rotation shaft a353, and the lifting shaft a354 penetrates through the mechanism block a355 to be installed on the upper end of the movable installation vertical plate a36. The press wheel a351 is located on an inner side of the movable installation vertical plate a36 near the fixed installation vertical plate a38. The press wheel a351 is configured to flatten the workpiece gripped by the gripping reclaiming mechanism a341.

[0144] In summary, the loading and unloading mechanism 1 provided in this disclosure integrates the silo transverse displacing and lifting mechanism and the workpiece gripping and transport mechanism onto the same machine. By setting the silo transverse displacing and lifting mechanism, automatic docking between the silo and the workpiece gripping and transport mechanism can be achieved, providing guarantee for the workpiece gripping and transport mechanism to grip the workpiece from the silo or push the workpiece into the silo. In addition, the setting of the workpiece gripping and transport mechanism achieves automatic loading by picking up the workpiece from the silo and loading it onto the conveyor belt, as well as automatic discharge by pushing the workpiece from the conveyor belt to the silo, thus achieving automatic loading and unloading of workpieces, improving the efficiency of workpiece loading and unloading. This structure can be applied to both the loading end and the discharge end, with better applicability.

[0145] FIG. 26 is an external schematic diagram of a heat dissipation cover attaching device provided in an embodiment of the present disclosure, and FIG. 27 is a schematic structural diagram of a heat dissipation cover attaching device provided in an embodiment of the present disclosure. The heat dissipation cover attaching device provided in the present disclosure may include a conveyor rail module b1, an attaching module b2, a heat dissipation cover loading device b3, and a locating module b4.

[0146] The conveyor rail module b1 is configured to transport the carrier board to an assembly station, and the carrier board carries a chip inside. The heat dissipation cover loading device b3 is configured to transport the heat dissipation cover to a suction station. The locating module b4 is installed at a locating station.

5 **[0147]** The attaching module b2 is configured to move between the suction station, the locating station, and the assembly station. The attaching module b2 moves to the locating station after absorbing the heat dissipation cover at the suction station. The locating module b4 locates and identifies the heat dissipation cover absorbed by the attaching module b2, and after the locating module b4 locates and identifies the heat dissipation cover absorbed, the
10 attaching module b2 moves the heat dissipation cover to the assembly station, and assembles the heat dissipation cover onto the chip inside the carrier board at the assembly station.

[0148] Usually, the heat dissipation cover attaching device may further include a device frame b5. The conveyor rail module b1, the attaching module b2, the heat dissipation cover loading device b3, and the locating module b4 are installed inside the device frame b5. The
15 heat dissipation cover attaching device further includes a display screen b6 and a foldable keyboard b7. The display screen b6 is installed above the device frame b5, and the foldable keyboard b7 is installed on a side surface of the device frame b5.

[0149] In a possible implementation, in order to achieve the movement of the attaching module b2 between the suction station, the locating station, and the assembly station, the heat
20 dissipation cover attaching device provided in the present disclosure may further include an attaching module drive assembly b8, which includes a second drive motor b81, two conveyor rails b82 that are parallel with and spaced apart from each other, and an installation bracket b83 mounted on the two conveyor rails b82. The conveyor rails b82 span the conveyor rail module b1, the locating module b4, and the heat dissipation cover loading device b3. The
25 drive end of the second drive motor b81 is in transmission connection with the installation bracket b83. Two ends of the installation bracket b83 are installed on the conveyor rails b82 through sliders, respectively, and the attaching module b2 is installed on the installation bracket b83. The second drive motor b81 drives, through the installation bracket b83, the

attaching module b2 to move along the conveyor rails b82.

[0150] In addition, the attaching module drive component b8 may further include a third drive motor b84, and a drive end of the third drive motor b84 is connected to the attaching module b2 to drive the attaching module b2 to move on the installation bracket b83 along the installation bracket b83.

[0151] FIG. 28 is a top view of the heat dissipation cover attaching device provided in an embodiment of the present disclosure when absorbing the heat dissipation cover. FIG. 29 is a top view of the heat dissipation cover attaching device provided in an embodiment of the present disclosure when assembled with the heat dissipation cover. Combining FIGS. 28 and 29, in the present disclosure, the carrier board is conveyed to the assembly station through the conveyor rail module b1; a heat dissipation cover carrier (carrying the heat dissipation cover) is loaded onto the heat dissipation cover loading device b3, and the heat dissipation cover loading device b3 loads the heat dissipation cover carrier onto the suction station; the attaching module b2 moves to the suction station to absorb the heat dissipation cover, as shown in FIG. 3, and then the attaching module b2 moves the absorbed heat dissipation cover to the locating station, and the locating module b4 locates and identifies the heat dissipation cover absorbed by the attaching module b2; then the attaching module b2 moves the absorbed heat dissipation cover to the assembly station, and assembles the heat dissipation cover onto the chip inside the carrier board at the assembly station, as shown in FIG. 29, to achieve automatic loading, positioning, and assembling of the heat dissipation cover. As the heat dissipation cover can be located before being assembled, the assembling can be carried out based on the locating information of the heat dissipation cover during the assembling process, making the assembling more accurate and complying with the assembling requirements.

[0152] Several main modules in the heat dissipation cover attaching device are explained below.

[0153] In a possible implementation, the conveyor rail module b1 may include a conveyor rail and a jacking and locating module b4 located between a loading end and an unloading end of the conveyor rail. The conveyor rail receives the carrier board at the loading end of the

conveyor rail and conveys the carrier board above the jacking and locating module b4. The jacking and locating module b4 jacks the carrier board upwards and locates and fixes the carrier board after the carrier board is jacked into place. After the assembling and packaging of the heat dissipation cover on the chip inside the carrier board, the conveyor rail conveys the carrier board to the unloading end of the conveyor rail for discharging.

[0154] In conjunction with FIGS. 30A and 30B, the attaching module 2 provided in this disclosure is explained.

[0155] FIG. 30A is a schematic structural diagram of the attaching module provided in an embodiment of the present disclosure, FIG. 30B is a cross-sectional view of the attaching module provided in an embodiment of the present disclosure, and FIG. 30C is a front-view schematic diagram of the attaching module provided in an embodiment of the present disclosure. In conjunction with FIGS. 30A to 30C, the attaching module b2 provided in the present disclosure may include a negative pressure gas supply component, a vacuum suction cup b21, an angle adjustment component, a force sensor b22, a transmission component, a conduction rod b23, and a spring b24.

[0156] A tracheal joint b251 of the negative pressure gas supply component is connected to an air inlet of the vacuum suction cup b21 to provide negative pressure to the vacuum suction cup b21. That is to say, the negative pressure gas supply component provides negative pressure to the vacuum suction cup b21 through the tracheal joint b251.

[0157] The vacuum suction cup b21 is installed at a first end of the transmission component, and a second end of the transmission component abuts against a first end of the spring b24. A second end of the spring b24 abuts against a first end of the conduction rod b23, and a second end of the conduction rod b23 abuts against the force sensor b22. In this way, when the vacuum suction cup b21 adsorbs the heat dissipation cover, the transmission component will transmit a pressing force to the force sensor b22 through the spring b24, enabling the force sensor b22 to sense a value of the pressing force of the vacuum suction cup b21 on the adsorbed heat dissipation cover.

[0158] The angle adjustment component is in transmission connection with the vacuum

suction cup b21, and the angle adjustment component drives the vacuum suction cup b21 for angle adjustment. That is to say, the angle adjustment component can drive the vacuum suction cup b21 to rotate to adjust an angle between the vacuum suction cup b21 and the horizontal direction. For example, the angle adjustment component can drive the vacuum suction cup b21 to adjust the angle in a 360°direction.

[0159] In a possible implementation, the negative pressure gas supply component may include a tracheal joint b251, a sealing chamber b252, and a sealing ring. Among them, the tracheal joint b251 enters the sealing chamber b252, the sealing chamber b252 is in communication with the vacuum suction cup b21, and the sealing chamber b252 is sealed through the sealing ring.

[0160] The number of sealing rings can be set according to the actual situation of the sealing chamber b252. For example, a third sealing ring b253 and a fourth sealing ring b254 are provided in FIG. 27.

[0161] In a possible implementation, the transmission component may include a spline b26, which is a hollow structure. A predetermined segment of the spline b26 has a through hole and is arranged inside the sealing chamber b252. The sealing chamber b252 is in communication with the vacuum suction cup b21 through the through hole and the hollow structure of the spline b26.

[0162] The tracheal joint b251 enters the sealing chamber b252, and the other end of the tracheal joint b251 is connected to a load providing device. In this way, the load providing device will introduce negative pressure into the sealing chamber b252 through the tracheal joint b251. Due to the hollow structure of the spline b26 and the provision of the through hole in the part in the sealing chamber b252, the negative pressure inside the sealing chamber b252 can be in communication with the vacuum suction cup b21 to achieve adsorption control of the vacuum suction cup b21.

[0163] Optionally, an upper end of the spline b26 abuts against the first end of the spring b24. The up and down movement of the spline b26 is transmitted to the spring b24, and a pressing force generated by the deformation of the spring b24 is transmitted to the force

sensor b22 through the conduction rod b23. That is to say, after the vacuum suction cup b21 adsorbs the heat dissipation cover, the spline b26 transmits the pressing force to the force sensor b22 through the spring b24, and the force sensor b22 senses the magnitude of the pressing force, enabling real-time monitoring of the pressing force generated when the vacuum suction cup b21 adsorbs the heat dissipation cover.

[0164] In order to facilitate the adjustment of the initial compression amount of the spring b24, the attaching module b2 provided in this disclosure may further include a pre-pressure adjustment seat b27, which is installed above the force sensor b22 for adjusting the initial compression amount of the spring b24.

[0165] In a possible implementation, the angle adjustment component may include a third servo motor b281, a third coupling b282, a first synchronous wheel b283, a belt, a second synchronous wheel b285, a transmission sleeve b286, and a rotation shaft b287.

[0166] A drive rod of the third servo motor b281 is in transmission connection with the first synchronous wheel b283 through the third coupling b282. The first synchronous wheel b283 is fixed at a first end of the rotation shaft b287, and the second synchronous wheel b285 and the transmission sleeve b286 are both fixed at a second end of the rotation shaft b287. The second synchronous wheel b285 and the transmission sleeve b286 rotate synchronously with the rotation shaft b287.

[0167] The belt is sleeved on the first synchronous wheel b283 and the second synchronous wheel b285, and the transmission sleeve b286 is sleeved and fixed on the spline b26 of the transmission component.

[0168] When the transmission component includes the aforementioned spline b26, the transmission sleeve b286 referred to here usually refers to a sleeve of the spline b26.

[0169] In practical applications, it is usually necessary to tension the belt. In order to facilitate the adjustment of tension of the belt, the angle adjustment component may further include a belt tensioning screw b288, which is used to adjust the tension force of the belt.

[0170] Usually, an adsorption surface of the attaching module b2 may be tilted after

installation. To meet process requirements, the attaching module b2 provided in this disclosure may further include a leveling component, which is in transmission connection with the vacuum suction cup b21 to adjust the horizontal angle of the vacuum suction cup b21.

5 **[0171]** In a possible implementation, the attaching module b2 may further include brackets, which include an action bracket b296 and an adjustment bracket b297. The vacuum suction cup b21 is installed on the action bracket b296. In addition, the negative pressure gas supply component, the angle adjustment component, the force sensor b22, the transmission component, the conduction rod b23, the spring b24, etc. are also fixed on the action bracket
10 b296.

[0172] The leveling component may include a first leveling plate b291 and a second leveling plate b292. The first leveling plate b291 is installed on the adjustment bracket b297 through the adjustment rotation shaft b293, and the adjustment bracket b297 is fixed on the action bracket b296 through the second leveling plate b292.

15 **[0173]** As shown in FIGS. 30A and 30C, the leveling component may further include a first leveling screw b294 and a second leveling screw b295. A first screw perforation seat and a second screw perforation seat are fixedly provided on an upper end and a lower end of the second leveling plate b292. The first leveling screw b294 passes through the first screw perforation seat to be inserted into the upper end of the first leveling plate b291, and the
20 second leveling screw b295 passes through the second screw perforation seat to be inserted into the lower end of the second leveling plate b292.

[0174] When the first leveling screw b294 is tightened towards the first leveling plate b291, it drives the first leveling plate b291 to rotate counterclockwise about the adjustment rotation shaft b293; when the second leveling screw b295 is tightened towards the first
25 leveling plate b291, it drives the second leveling plate b292 to rotate clockwise about the adjustment rotation shaft b293.

[0175] Please refer to FIG. 30D, which is a schematic diagram of the vacuum suction cup provided in an embodiment of the present disclosure when being leveled. The vacuum suction

cup 21 before being leveled is shown in (a) in FIG. 30D, and the vacuum suction cup 21 after being leveled is shown in (b) in FIG. 30D.

[0176] The attaching module provided in this disclosure can accurately adjust the angle of the vacuum suction cup by the provision of the angle adjustment component, and can meet the attachment and installation of heat dissipation covers of different sizes and specifications, and can monitor the force of the vacuum suction cup on the adsorbed workpiece in real time by the provision of the force sensor, thereby achieving force feedback during attachment and installation, meeting process requirements while avoiding the risk of product damage during assembling. In addition, the provision of the angle adjustment component with a high precision can ensure the assembling accuracy.

[0177] In conjunction with FIGS. 31A and 31B, the heat dissipation cover loading device provided in the present disclosure is explained.

[0178] FIG. 31A is a schematic structural diagram of the loading and unloading device for the heat dissipation cover carrier b3 provided in an embodiment of the present disclosure, and FIG. 31B is a top view of the loading and unloading device for the heat dissipation cover carrier b3 provided in an embodiment of the present disclosure. In conjunction with FIGS. 31A and 31B, the loading and unloading device for the heat dissipation cover carrier b3 provided in the present disclosure may include a loading part b31, a picking and positioning part b32, an unloading part b33, and a first transverse displacement assembly b34. The first transverse displacement assembly b34 spans the loading part b31, the picking and positioning part b32, and the unloading part b33.

[0179] After the loading part b31 jacks up the heat dissipation cover carrier b35 into position, the first transverse displacement assembly b34 moves the heat dissipation cover carrier b35 from the loading part b31 to the picking and positioning part b32. The picking and positioning part b32 positions and fixes the heat dissipation cover carrier b35, and the picking mechanism picks up the heat dissipation cover on the heat dissipation cover carrier b35. The first transverse displacement assembly b34 moves the heat dissipation cover carrier b35, from which the heat dissipation cover has been picked up, from the picking and positioning part

b32 to the unloading part b33.

[0180] Generally speaking, the picking and positioning part b32 is located between the loading part b31 and the unloading part b33 to reduce the movement stroke of the first transverse displacement assembly b34, with a simple space layout and high space utilization.

5 **[0181]** In a possible implementation, the loading part b31 may include a first jacking plate b32, a jacking and positioning sensor b312, and a first jacking assembly b313. The first transverse displacement assembly b34 includes a clamping cylinder and a clamping block b342. Among them, a first jacking plate b32 is installed on a jacking end of the first jacking assembly b313, and the upper part of the first jacking plate b32 is used to carry the heat
10 dissipation cover carrier b35. The drive end of the clamping cylinder is connected to the clamping block b342 to drive the clamping block b342 to open and close. The first jacking assembly b313 jacks the heat dissipation cover carrier b35 up to the sensor, and the clamping cylinder drives the clamping block b342 to clamp the heat dissipation cover carrier b35.

[0182] The jacking and positioning sensor b312 mentioned here can be a photoelectric sensor or the like. The photoelectric sensor usually includes a light emitter and a light receiver
15 that are installed opposite to each other. When the heat dissipation cover carrier b35 is jacked up between the light emitter and the light receiver, the light receiver will generate a changing electrical signal to determine whether the heat dissipation cover carrier b35 is jacked up to the position of the photoelectric sensor.

20 **[0183]** Optionally, the first jacking assembly b313 may include the first jacking motor b3131, a first jacking guide rail b3132, and a first jacking lead screw b3133. The first jacking plate b32 is installed on the first jacking guide rail b3132 through a first sliding block b3134, and the first jacking lead screw b3133 is installed between the first jacking motor b3131 and the first jacking plate b32. The first jacking motor b3131 drives, through the first jacking lead
25 screw b3133, the first jacking plate b32 to move up and down along the first jacking guide rail b3132.

[0184] In practical applications, the heat dissipation cover carrier b35 may be either a Tray loading plate b3 that carries the heat dissipation cover or a cartridge clip that carries the

heat dissipation cover.

[0185] Taking the heat dissipation cover carrier b35 as the Tray loading plate b3 as an example, the Tray loading plate b3 of the loading part b31 is located above the first jacking plate b32, and the Tray loading plate b3 carries the heat dissipation cover. The first jacking assembly b313 jacks the Tray loading plate b3 up through the first jacking plate b32 to jack the Tray loading plate b3 up to the position of the jacking and positioning sensor b312. The loading part b31 further includes a first transverse slide rail b314, and the Tray loading plate b3 is loaded right above the first jacking plate b32 along the first transverse slide rail b314 under an external force.

[0186] In order to facilitate the operation of the Tray loading plate b3 by the operator, a handle b36 can be fixed and installed at an end of the Tray loading plate b3. The operator can operate the handle b36 to act on the Tray loading plate b3, to achieve pulling on the first transverse slide rail b314. Correspondingly, the Tray loading plate b3 is loaded right above the first jacking plate b32 along the first transverse slide rail b314 under an external force (usually referring to a force applied by the operator, or a mechanical force applied in other forms).

[0187] The picking and positioning part b32 may include a plurality of jacking and positioning blocks b321. The first transverse displacement assembly b34 further includes a movable member b341 and a drive module for the movable member b341. The clamping block b342 cylinder is fixedly installed on the movable member b341, and the drive module for the movable member b341 drives the movable member b341 to rotate. The movable member b341 drives the clamping cylinder and the clamping block b342 to move, to move the heat dissipation cover carrier b35 clamped by the clamping block b342 above the jacking and positioning block b321, and the jacking and positioning block b321 rises to be inserted into a corresponding socket of the heat dissipation cover carrier b35 to achieve the positioning and fixation of the heat dissipation cover carrier b35.

[0188] Optionally, the plurality of jacking and positioning blocks b321 are located respectively at two ends of the picking and positioning part b32 to ensure balanced force

application when positioning the heat dissipation cover carrier b35 and reduce the angle deviation of the heat dissipation cover carrier 35.

[0189] After the heat dissipation covers on the heat dissipation cover carrier b35 are all picked up, the drive module for the movable member b341 drives the movable member b341 to rotate, to move the heat dissipation cover carrier b35 to the unloading part b33, and the clamping block b342 opens to release the heat dissipation cover carrier to the unloading part b33.

[0190] The movable member b341 mentioned here may be a belt, and the corresponding drive module for the movable member b341 may include a driver (such as a motor, etc.), a drive wheel, and a driven wheel. The drive wheel and the driven wheel are spaced apart from each other and are arranged on an outer side of the loading part b31 and an outer side of the unloading part b33, respectively. The drive end of the driver is connected to the drive wheel, and the belt is wound on the drive wheel and the driven wheel. The driver drives the drive wheel, to drive the belt to rotate between the loading part b31 and the unloading part b33.

[0191] The movable member b341 mentioned here may alternatively be a lead screw, and the corresponding drive module for the movable member b341 may be a drive motor. The drive end of the drive motor is installed with a lead screw, and the drive motor drives the lead screw to rotate.

[0192] When the heat dissipation cover carrier b35 is the Tray loading plate b3, as the heat dissipation cover is usually directly placed on the Tray loading plate b3 and no obstruction is provided above or around the heat dissipation cover, a picking head can directly pick up the heat dissipation cover from the Tray loading plate b3. When the heat dissipation cover carrier b35 is a cartridge clip, since the heat dissipation cover is carried in the cartridge clip, the picking head usually needs to first push the heat dissipation cover out of the cartridge clip or jack the heat dissipation cover up to an upper end of the cartridge clip, in order to facilitate the picking head to pick up the heat dissipation cover.

[0193] In order to be compatible with the loading of the heat dissipation cover through the cartridge clip, as shown in FIGS. 31C and 31D, the picking and positioning part b32 provided

in this disclosure may further include a jacking and loading assembly b322, which includes a loading motor b3221, a loading lead screw b3222, a jacking rod b3223, a second vertical guide rail b3224, and a synchronous belt. The loading motor b3221 is in transmission connection with a screw nut on the loading lead screw b3222. The jacking rod b3223 is installed on the screw nut, and the screw nut is installed on the second vertical guide rail b3224 through a sliding block. The loading motor b3221 drives the screw nut to move upwards along the second vertical guide rail b3224. The jacking rod b3223 jacks the heat dissipation cover inside the cartridge clip out of the cartridge clip.

[0194] Still referring to FIG. 31A and FIG. 31B, the unloading part b33 may include: a second jacking plate b331 and a second jacking assembly b332. The second jacking plate b331 is installed on a jacking end of the second jacking assembly b332, and the second jacking plate b331 is used to carry the heat dissipation cover carrier b35, from which the heat dissipation cover has been removed, from above. The second jacking assembly b332 drives the second jacking plate b331 to rise or fall.

[0195] Similarly, the second jacking assembly b332 may include a second jacking motor, a second jacking guide rail, and a second jacking lead screw. The second jacking plate b331 is installed on the second jacking guide rail through a sliding block, and the second jacking lead screw is installed between the second jacking motor and the second jacking plate b331. The second jacking motor drives, through the second jacking lead screw, the second jacking plate b331 to move up and down along the second jacking guide rail.

[0196] The heat dissipation cover carrier b35 is the Tray loading plate b3, and the loading part b33 may further include a second slide rail b333. The Tray loading plate b3 is located above the second jacking plate b331. The second jacking assembly b332 drives, through the second jacking plate b331, the Tray loading plate b3 from which the heat dissipation cover has been removed, to fall down, to place the Tray loading plate b3 on the second slide rail b333. The Tray loading plate b3 moves along the second slide rail b333 under an external force to be extracted from the unloading part b33.

[0197] In practical applications, taking the heat dissipation cover carrier b35 as the Tray

loading plate b3 as an example, the operator first places the Tray loading plate b3 on the loading part b31. For example, as shown in FIG. 31E, the Tray loading plate b37 is pushed onto the jacking plate of the loading part b31, and the first jacking assembly b313 of the loading part b31 jacks the Tray loading plate b37 up to the position of a jacking and positioning sensor b312. After that, the clamping cylinder drives the clamping block b342 to clamp the Tray loading plate b37; then, the transverse displacement module drives, through the movable member b341, the clamping cylinder and the clamping block b342 to move transversely, thereby moving the Tray loading plate b37 to the picking and positioning part b32, as shown in FIG. 31F, and the jacking and positioning block b321 of the picking and positioning part b32 positions the Tray loading plate b37; the picking head picks up the heat dissipation cover from the Tray loading plate b37, and after the picking is completed, the transverse displacement module continues to move the empty Tray loading plate b37 onto the second jacking plate b331 of the unloading part b33, as shown in FIG. 31G.

[0198] If the heat dissipation cover carrier b35 is a cartridge clip, usually after the cartridge clip is moved to the picking and positioning part b32 and positioned, the jacking and loading assembly b322 will jack the heat dissipation cover inside the cartridge clip up to facilitate the picking head to pick up the heat dissipation cover from the cartridge clip. The rest of the workflow is similar to that with the Tray loading plate b37.

[0199] The loading and unloading device for the heat dissipation cover carrier b3 provided in the present disclosure includes the first transverse displacement assembly b3 that spans the loading part b3, the picking and positioning part b3, and the unloading part b3. The heat dissipation cover carrier b3 loaded on the loading part b3 is moved to the picking and positioning part b3 by the first transverse displacement assembly b3 to pick up the heat dissipation cover, and after the picking is completed, the empty heat dissipation cover carrier b3 is transported by the first transverse displacement assembly b3 to the unloading part b3 for unloading, achieving automatic loading and unloading of the heat dissipation cover carrier b3, avoiding the manner of halting for loading or unloading, and providing guarantee for continuous operation of the production line. By setting the jacking and loading assembly b3 in the picking and positioning part b3, the loading and unloading device for the heat dissipation

cover carrier b3 can be compatible with the application of cartridge clip type loading, meeting more usage needs.

[0200] In summary, the heat dissipation cover attaching device provided in this disclosure can locate the absorbed heat dissipation cover by the locating module before assembling the heat dissipation cover onto the chip inside the carrier board, improving the accuracy of the assembling of the heat dissipation cover.

[0201] In addition, since the angle adjustment component is provided in the attaching module, the angle of the vacuum suction cup can be accurately adjusted to meet the attachment of heat dissipation covers of different sizes and specifications. By providing the force sensor, the force of the vacuum suction cup on the adsorbed workpiece can be monitored in real time, achieving force feedback during the attachment. This not only meets the process requirements, but also avoids the risk of product damage during the assembling process.

[0202] By providing the first transverse displacement assembly that spans the loading part, the picking and positioning part, and the unloading part in the conveyor rail module, the heat dissipation cover carrier loaded on the loading part is moved to the picking and positioning part by the first transverse displacement assembly to pick up the heat dissipation cover. After the picking is completed, the empty heat dissipation cover carrier is transported by the first transverse displacement assembly to the unloading part for unloading, achieving automatic loading and unloading of the heat dissipation cover carrier, avoiding the manner of halting for loading or unloading, and providing guarantee for continuous operation of the production line.

[0203] FIG. 32 is a schematic structural diagram of a hot pressing device provided in an embodiment of the present disclosure. The hot pressing device provided in the present disclosure may include a detection part (FIG. 32 shows a first detection part c100 and a second detection part c101), a heating and force maintaining part c20, and a conveying device c30.

[0204] In a possible implementation, only one detection part is provided, and the detection part is arranged at an upstream workstation or a downstream workstation of the

heating and force maintaining part c20.

[0205] In another possible implementation, as shown in FIG. 32, two detection parts are provided, namely the first detection part c100 and the second detection part c101, which are arranged at the upstream workstation and the downstream workstation of the heating and force maintaining part c20, respectively.

[0206] In practical applications, the detection part(s) can be arranged at the upstream and/or downstream stations of the heating and force maintaining part c20 according to analysis needs.

[0207] In actual production, the conveying device c30 transports a load fixture c40 loaded with a workpiece c50 to the detection part and the heating and force maintaining part c20.

[0208] The detection part measures a rated height of the workpiece at at least one position on the workpiece c50 and inspects the appearance of the workpiece c50.

[0209] The rated height of the workpiece mentioned here refers to a height difference between a height at a position on the workpiece c50 and a height at another position on the load fixture c40 at a predetermined distance from the position.

[0210] For example, a height at position A on the workpiece c50 is H_a , a height at position A' on the load fixture c40 at a predetermined distance from that position A is h_a , and the resulting rated height of the workpiece is $\Delta h_a = h_a - H_a$. The predetermined distance mentioned here can usually be set based on the size of the workpiece c50. Generally speaking, the position on the workpiece c50 and the position on the load fixture c40 that are used to calculate the rated height of the workpiece are very close to each other, resulting in a relatively low calculation error.

[0211] The heating and force maintaining part c20 heats and maintains the force on the workpiece c50 located at the heating and force maintaining part c20.

[0212] Please refer to FIG. 33, which is a schematic structural diagram of the detection part provided in an embodiment of the present disclosure. The detection part may include a second transverse displacement assembly c11, a height sensor head c12, and an AOI camera

C13. The height sensor head c12 and the AOI camera C13 are installed on the second transverse displacement assembly c11 and are movable in a horizontal adjustment direction under the driving of the transverse displacement assembly c11. The horizontal adjustment direction is perpendicular to a conveying direction of the conveying device c30.

5 **[0213]** The height sensor head c12 measures a height at a predetermined position on the workpiece c50 and a height at a position on the load fixture c40 at a predetermined distance from the predetermined position. The AOI camera C13 takes photos of and inspects the appearance of the workpiece c50.

10 **[0214]** In a possible implementation, as shown in FIG. 32, two detection parts are provided, namely the first detection part c100 located at the upstream workstation of the heating and force maintaining part c20 and the second detection part c101 located at the downstream workstation of the heating and force maintaining part c20.

15 **[0215]** The first detection part c100 can measure the rated height of the workpiece at at least one position on the workpiece c50 and inspect the appearance of the workpiece c50 to obtain a first set of detection data.

20 **[0216]** For example, the height sensor head c12 measures heights (height data H1, H2, H3...) at three positions (multiple positions) on the workpiece c50, and also measures heights (height data h1, h2, h3...) at points on the load fixture c40 that are close to the positions of test points on the workpiece c50. For the test points, the generated rated heights of the workpiece are: ($\Delta h1$, $\Delta h2$, $\Delta h3$...), where $\Delta h1=h1-H1$, $\Delta h2=h2-H2$, $\Delta h3=h3-H3$...).

25 **[0217]** The second detection part c101 can measure the rated height of the workpiece at at least one position on the workpiece c50 and inspect the appearance of the workpiece c50 to obtain a second set of detection data.

30 **[0218]** For example, the height sensor head c12 measures heights (height data H1', H2', H3'...) at three positions (multiple positions) on the workpiece c50, and also measures heights (height data h1', h2', h3'...) at points on the load fixture c40 which are close to the positions of test points on the workpiece c50. For the test points, the generated rated heights of the

workpiece are: (Δh_1 ', Δh_2 ', Δh_3 '...).

[0219] Usually, the hot pressing device also includes a processor electrically connected to the first detection part c100 and the second detection part c101. The processor determines whether the process of heating and maintaining the force on the workpiece c50 by the heating and force maintaining part c20 meets the requirements based on the first set of detection data and the second set of detection data.

[0220] Generally speaking, the detection positions of the second set of detection data are the same as the detection positions of the first set of detection data. This allows for a comparison between the first set of detection data and the second set of detection data to determine whether the heating and force maintaining process meets the requirements.

[0221] For example, after heating and force maintaining, the rate of change of the rated height of the workpiece should be lower than a predetermined threshold. If the rate of change calculated based on the second set of detection data and the first set of detection data is lower than the predetermined threshold, it indicates that the heating and force maintaining process meets the requirements; otherwise, it will be determined that the heating and force maintaining process does not meet the requirements.

[0222] In a possible implementation, the rate of change here can be obtained by calculating the difference between the second set of detection data and the first set of detection data and dividing the absolute value of the difference by the first set of detection data to obtain the rate of change.

[0223] In actual production, when the appearance of the workpiece c50 is detected to be unqualified, it is usually necessary to remove the unqualified workpiece c50. Therefore, the detection part provided in this disclosure may further include a transfer device and a recycling box. When the AOI camera C13 detects that the appearance of the workpiece c50 is unqualified, the transfer device will transport the workpiece c50 and/or the load fixture c40 to the recycling box.

[0224] In summary, the hot pressing device provided in this disclosure increases the

determination factors of the heating and force maintaining effect by adding the AIO detection of the rated height and appearance of the workpiece before and after the heating and force maintaining process, and improves the excellent and good rate of workpiece packaging.

[0225] Adding inspection of the appearance of the workpiece before the heating and force maintaining process facilitates the direct removal of defective workpieces, and only heating and maintaining a force on qualified workpieces, thereby avoiding the heating and force maintaining of defective workpieces and improving the excellent and good rate of workpiece packaging. Adding inspection of the appearance of the workpiece after the heating and force maintaining process facilitates the removal of defective workpieces that have quality problems caused after heating and force maintaining, avoiding the flow of defective workpieces after heating and force maintaining into the subsequent packaging process, and further improving the excellent and good rate of workpiece packaging. Adding inspection of the appearance of the workpiece and detection of rated height of the workpiece before and after the heating and force maintaining process allows to analyze whether the heating and force maintaining process meets the requirements based on the detection data of the workpiece before and after the heating and force maintaining process, and the corresponding process, structures, or parameters in the heating and force maintaining process can thus be optimized.

[0226] FIG. 34 is a schematic structural diagram of a force applying device provided in an embodiment of the present disclosure. FIG. 35 is a cross-sectional view of the force applying device provided in an embodiment of the present disclosure. In conjunction with FIG. 34 and FIG. 35, the force applying device d1 provided in the present disclosure may include a force applying device bottom plate d11, a low friction cylinder d12, a linear bearing d13, a force guide rod d14, a heat insulated workpiece pressing plate d15, a temperature sensor head d16, and a workpiece pressing plate anti rotation plate d17. The installation relationship of the components is as follows.

[0227] A push rod of the low friction cylinder d12 is connected to a first end of the force guide rod d14. Generally speaking, when applying a pressing force to the workpiece, the

direction in which the pressing force is applied is a downward direction, so the push rod of the low friction cylinder d12 is usually vertically set, that is, the low friction cylinder d12 is located above the force guide rod d14, and the push rod of the low friction cylinder d12 is connected to the first end of the force guide rod d14.

5 **[0228]** The force guide rod d14 is installed inside the force applying device bottom plate d11, and a second end of the force guide rod d14 is installed with the heat insulated workpiece pressing plate d15. The temperature sensor is installed on a force applying surface of the heat insulated workpiece pressing plate d15 to facilitate real-time testing of the temperature of the workpiece to which the pressing force is applied.

10 **[0229]** The linear bearing d13 is disposed inside the force applying device bottom plate d11, and the force guide rod d14 is accommodated in the linear bearing d13. The linear bearing d13 can support and guide the force guide rod d14.

15 **[0230]** The workpiece pressing plate anti rotation plate d17 is installed under the force applying device bottom plate d11, and the heat insulated workpiece pressing plate d15 is accommodated in an anti-rotation groove of the workpiece pressing plate anti rotation plate d17.

20 **[0231]** In a possible embodiment disclosed in the present disclosure, one low friction cylinder d12 corresponds to one force guide rod d14, and one heat insulated workpiece pressing plate d15 is correspondingly installed under one force guide rod d14. The force applying surface of each heat insulated workpiece pressing plate d15A is installed with one temperature sensor, and one heat insulated workpiece pressing plate d15 is usually used to apply force to one workpiece.

25 **[0232]** In order to ensure the installation and fixation of the low friction cylinder d12, the force applying device d1 provided in this disclosure may further include a cylinder installation bottom plate d18, and the low friction cylinder d12 is installed on the cylinder installation bottom plate d18.

30 **[0233]** Optionally, the force applying device d1 provided in this disclosure may further

include a connecting column d19. Two ends of the connecting column d19 are installed on the cylinder installation bottom plate d18 and the force applying device bottom plate d11, respectively.

5 [0234] In order to prevent the heat insulated workpiece pressing plate d15 from rotating during the force application process on the workpiece, the heat insulated workpiece pressing plate d15 can be of a square design, and the anti-rotation groove of the workpiece pressing plate anti rotation plate d17 matches the heat insulated workpiece pressing plate d15 in shape.

10 [0235] In a possible implementation, referring to FIG. 36, which is a schematic diagram of air path control based on the cylinder force applying principle provided in an embodiment of the present disclosure. The force applying device d1 provided in the present disclosure may further include an air storage tank d110 and an air cavity pipeline. The air storage tank d110 is connected to an air inlet of the low friction cylinder d12 through the air cavity pipeline.

[0236] The air storage tank d110 can increase the air cavity in the loop, reducing the impact of air pressure changes on the output force of the cylinder.

15 [0237] The force applying device d1 may further include an electrical control unit and an electrical proportional valve d111. The electrical proportional valve d111 is electrically connected to the electrical control unit. The electrical proportional valve d111 is installed on the air cavity pipeline, and the electrical control unit controls the air pressure value at the outlet of the electrical proportional valve d111. The air pressure at the outlet of the electrical
20 proportional valve d111 enters the low friction cylinder d12, causing a force to be applied to the push rod of the low friction cylinder d12.

[0238] In practical applications, the pressure value of the electrical proportional valve d111 is usually set at a predetermined pressure. The predetermined pressure is set based on a total weight of the force guide rod d14, the heat insulated workpiece pressing plate d15, and
25 the temperature sensor head d16, as well as the value of the pressing force applied to the workpiece.

[0239] The required pressing force for the workpiece is equal to a total weight G of the

force guide rod d14, the square heat insulated workpiece pressing plate d15, and the temperature sensor head d16, plus a pushing force of the cylinder. The required pressing force F for the workpiece is as follows:

$$F=G+P_a * S,$$

5 **[0240]** where F is the pressing force applied to the workpiece, P_a is the pressure set for the electrical proportional valve d111, and S is a bore area of the low friction cylinder d12.

[0241] From the above equation, it can be seen that it is only necessary to adjust the pressure set for the electrical proportional valve d111 in order to adjust the value of F.

10 **[0242]** In summary, the force applying device provided in this disclosure solves the limitations of using weights to apply force to the workpiece by providing the low friction cylinder in the force applying device and applying the force to the workpiece through the pushing force of the low friction cylinder, thereby reducing the weight of the force applying device; and by providing the temperature sensor head, the temperature of the workpiece to which the force is applied can be measured in real time, and the temperature changes of the
15 workpiece during the force application process can be controlled at any time.

[0243] In addition, by providing the electrical proportional valve, the pressure of the electrical proportional valve can be set based on the total weight of the force guide rod, the heat insulated workpiece pressing plate, and the temperature sensor head, as well as the pressing force applied to the workpiece, so that the force applied to the low friction cylinder
20 by the air pressure at the outlet of the electrical proportional valve can be controlled, thereby reducing defective products caused by excessive or insufficient force applied.

[0244] FIG. 37 is a schematic structural diagram of the workpiece force applying device provided in an embodiment of the present disclosure. FIG. 38 is a cross-sectional view of the workpiece force applying device provided in an embodiment of the present disclosure. In
25 conjunction with FIG. 37 and FIG. 38, the workpiece force applying device provided in the present disclosure may include a heating and jacking assembly d2, a workpiece fixture assembly d3, and a force applying device d1. The force applying device d1 mentioned here

can be seen in FIG. 34 and FIG. 35 and will not be further elaborated here. It should be noted that the workpiece force applying device here is one of the structures of the heating and force maintaining part c20.

5 [0245] The workpiece fixture assembly d3 is located above the heating and jacking assembly d2 and is configured to carry the workpiece to which the force is to be applied.

[0246] The force applying device d1 is arranged opposite to a jacking end of the heating and jacking assembly d2 and is configured to apply a force on the workpiece carried by the workpiece fixture assembly d3.

10 [0247] When the conveying mechanism transports the workpiece fixture assembly d3 above the heating and jacking assembly d2, the heating and jacking assembly d2 heats the workpiece inside the workpiece fixture assembly d3, and jacks the workpiece fixture assembly d3 up to the force applying surface of the force applying device d1, the low friction cylinder d12 in the force applying device d1 pushes the force guide rod d14 to apply a force to the workpiece, and the temperature sensor head d16 in the force applying device d1 senses the
15 temperature on the workpiece.

[0248] Since the heating and jacking assembly d2 has a heating effect on the workpiece, the workpiece force applying device provided in this disclosure may further include a control unit, and the temperature sensor head d16 is electrically connected to the control unit. When the temperature sensor head d16 detects that the temperature of the workpiece is not within a
20 predetermined temperature range, that is, the heating temperature for the workpiece is inappropriate, the control unit can be used to adjust the heating temperature of the heating and jacking assembly d2, to better monitor the production process.

[0249] Optionally, the electrical control unit in the force applying device d1 controls the value of the air pressure at the outlet of the electrical proportional valve d111, causing the low
25 friction cylinder d12 to push the force guide rod d14 under a constant pressure value to apply a force to the workpiece. During the entire force application process, the pressure set for the electrical proportional valve d111 remains unchanged, and the pressing force to the workpiece will also remain unchanged.

[0250] In practical applications, when the conveying mechanism transports the workpiece fixture assembly d3 above the heating and jacking assembly d2, the heating and jacking assembly d2 heats the workpiece inside the workpiece fixture assembly d3, the heating and jacking assembly d2 jacks the workpiece fixture assembly d3 up to cause the workpiece to
5 contact the heat insulated workpiece pressing plate d15 of the force applying device d1, and then the heating and jacking assembly d2 continues the jacking for a predetermined distance to enable the heat insulated workpiece pressing plate d15 to push the force guide rod d14 to compress the push rod of the low friction cylinder d12. In this way, the force of the low friction cylinder d12 is applied to the workpiece.

10 **[0251]** In summary, the workpiece force applying device provided in this disclosure solves the limitations of using weights to apply a force to the workpiece by providing the low friction cylinder in the force applying device and applying a force to the workpiece through the pushing force of the low friction cylinder, thereby reducing the weight of the force applying device; and by providing the temperature sensor head, the temperature of the
15 workpiece to which a force is applied can be measured in real time, and the temperature changes of the workpiece during the force application process can be controlled at any time.

[0252] In addition, by providing the electrical proportional valve, the pressure of the electrical proportional valve can be set based on the total weight of the force guide rod, the heat insulated workpiece pressing plate, and the temperature sensor head, as well as the force
20 applied to the workpiece, so that the force applied to the low friction cylinder by the air pressure at the outlet of the electrical proportional valve can be controlled, thereby reducing defective products caused by excessive or insufficient force applied.

[0253] In the description of this specification, the description with reference to the terms "an embodiment", "some embodiments", "illustrative embodiments", "examples", "specific
25 examples", or "some examples" indicates that the specific features, structures, materials, or characteristics described in conjunction with the embodiment or example are included in at least one embodiment or example of this disclosure. In this specification, the schematic expressions of the above terms do not necessarily refer to the same embodiment or example.

[0254] While embodiments of the present disclosure have been shown and described, it will be understood by those of ordinary skill in the art that various changes, modifications, substitutions and variants can be made to the embodiments without departing from the principles of the disclosure, the scope of which is defined by the claims and their equivalents.

CLAIMS

What is claimed is:

1. A glue-dispensing and attaching apparatus for a workpiece, comprising:

two loading and unloading mechanisms (1), wherein the workpiece is movable between the two loading and unloading mechanisms (1), one of the two loading and unloading mechanisms (1) is configured to load the workpiece to be processed, and another one of the two loading and unloading mechanisms (1) is configured to unload the processed workpiece;

a dual-valve asynchronous glue-dispensing device (2);

a heat dissipation cover attaching device (3); and

a hot pressing device (4),

wherein the dual-valve asynchronous glue-dispensing device (2), the heat dissipation cover attaching device (3), and the hot pressing device (4) are sequentially arranged between the two loading and unloading mechanisms (1) along a movement direction of the workpiece,

wherein the dual-valve asynchronous glue-dispensing device (2) comprises:

a frame (100);

a workpiece conveying device (200) disposed inside the frame (100) and carrying the workpiece thereon;

a height automatic compensation and stable measurement device (300), which comprises a compensation part and a measurement part, the compensation part being disposed below the workpiece, and the measurement part being disposed on the frame (100) and located above the workpiece to measure the workpiece; and

a leveling and adsorption locking fixture (400) disposed on the compensation part of the height automatic compensation and stable measurement device (300), the leveling and adsorption locking fixture (400) being movable upwards under the driving of the compensation part to hold up the workpiece.

2. The glue-dispensing and attaching apparatus for the workpiece according to claim 1,

wherein the workpiece conveying device (200) comprises a workpiece transport device (1c) configured to transport and move the workpiece in an x direction, the workpiece transport device (1c) comprising:

two conveying components, which are a first conveying component and a second conveying component, and are symmetrically arranged about an xz plane, where a z direction is a vertical direction and the x direction is a horizontal direction perpendicular to the z direction;

a plurality of detection optical fibers arranged on the first conveying component and the second conveying component to detect a conveying status of the workpiece; and

a workpiece carrier board (4c) arranged on the two conveying components and carrying the workpiece thereon.

3. The glue-dispensing and attaching apparatus for the workpiece according to claim 2, wherein each of the two conveying components comprises a base plate (10) and a belt drive device (13) disposed on a side of the base plate (10) facing towards the workpiece carrier board (4c).

4. The glue-dispensing and attaching apparatus for the workpiece according to claim 3, wherein the plurality of detection optical fibers comprise a feed entry detection optical fiber (14), a deceleration detection optical fiber (15), an arrival detection optical fiber (18), and a discharge detection optical fiber (111), wherein the feed entry detection optical fiber (14), the deceleration detection optical fiber (15), the arrival detection optical fiber (18), and the discharge detection optical fiber (111) are sequentially arranged on the base plate (10) along the x direction.

5. The glue-dispensing and attaching apparatus for the workpiece according to claim 4, wherein the workpiece transport device (1c) further comprises:

a side pushing component (17) disposed on the base plate (10) and located between the deceleration detection optical fiber (15) and the arrival detection optical fiber (18); and

a blocking device (112) disposed on the base plate (10), a connecting line between the blocking device (112) and the arrival detection optical fiber (18) is parallel to a y axis, where the y direction is perpendicular to the z direction and the x direction.

6. The glue-dispensing and attaching apparatus for the workpiece according to claim 5,

wherein the plurality of detection optical fibers further comprises an feed warpage detection optical fiber (16) and an discharge warpage detection optical fiber (113), wherein the feed warpage detection optical fiber (16) and the discharge warpage detection optical fiber (113) are movably arranged on the base plate (10) along the z direction, and the feed warpage detection optical fiber (16) and the discharge warpage detection optical fiber (113) are located on two sides of the side pushing component (17) respectively.

7. The glue-dispensing and attaching apparatus for the workpiece according to any one of claims 1 to 6, wherein the height automatic compensation and stable measurement device (300) comprises:

a three-dimensional motion platform (1a) disposed above the workpiece conveying device (200), a height measurement device (2a) and a visual recognition device (3a) being provided on the three-dimensional motion platform (1a), wherein the height measurement device (2a) and the visual recognition device (3a) are movable in an xy plane under the driving of the three-dimensional motion platform (1a), where a y direction is perpendicular to the z direction and the x direction; and

a jacking mechanism (5a) disposed below the workpiece, a part of the jacking mechanism (5a) being movable along a z axis to jack up the workpiece.

8. The glue-dispensing and attaching apparatus for the workpiece according to claim 7, wherein the jacking mechanism (5a) comprises:

a jacking substrate (52);

a bearing seat fixing block (55) disposed on the jacking substrate (52);

a jacking plate (54) located above the jacking substrate (52);

an adjustment block (513) disposed on the jacking plate (54); and

a lead screw assembly, wherein a part of the lead screw assembly is connected to the bearing seat fixing block (55), and another part of the lead screw assembly is connected to the adjustment block (513); the lead screw assembly is rotatable to drive the adjustment block (513) and the jacking plate (54) to move along the z axis, where a z-axis direction is a vertical direction.

9. The glue-dispensing and attaching apparatus for the workpiece according to claim 8, wherein the lead screw assembly comprises:

a first screw shaft (510), which is perpendicular to a plane where the jacking plate (54) is located;

a screw support block (511) rotatably sleeved on the first screw shaft (510); and

a screw slider (512) sleeved on the first screw shaft (510), wherein an inner peripheral edge of the screw slider (512) is connected to an outer peripheral edge of the first screw shaft (510) through threads, and an outer peripheral edge of the screw slider (512) is rotatably connected to an inner peripheral edge of the adjustment block (513).

10. The glue-dispensing and attaching apparatus for the workpiece according to any one of claims 7 to 9, wherein the three-dimensional motion platform (1a) comprises:

a y-direction motion mechanism;

an x-direction motion mechanism disposed on the y-direction motion mechanism, wherein the y-direction motion mechanism is configured to drive the x-direction motion mechanism to move along a y axis, and wherein the height measurement device (2a) and the visual recognition device (3a) are arranged on the x-direction motion mechanism;

two z-direction motion mechanisms disposed on the x-direction motion mechanism, wherein the x-direction motion mechanism is configured to drive the two z-direction motion mechanisms to move along an x axis, a fluid dispenser being provided on one of the two z-direction motion mechanisms; and

a y-direction fine adjustment device (1a1) disposed on the other z-direction motion mechanism, wherein the other z-direction motion mechanism is configured to drive the y-direction fine adjustment device (1a1) to move along the y axis, and wherein another fluid dispenser is provided on the y-direction fine adjustment device (1a1), and the y-direction fine adjustment device (1a1) is configured to drive the another fluid dispenser for fine adjustment along the y axis,

wherein the y-direction fine adjustment device (1a1) comprises:

a housing (1a11), a linear guide rail assembly (1a16) being provided outside the housing (1a11);

a first servo motor (1a12) disposed on a side of the housing (1a11);

a second screw shaft (1a13) rotatably disposed inside the housing (1a11) and directly

connected to an output end of the first servo motor (1a12); and

a movable block (1a14), wherein a part of the movable block (1a14) is slidably arranged on the linear guide rail assembly (1a16), and another part of the movable block (1a14) is movably arranged on the second screw shaft (1a13) through a nut slider (1a15), and wherein the another fluid dispenser is provided on the movable block (1a14).

11. The glue-dispensing and attaching apparatus for the workpiece according to any one of claims 1 to 10, wherein the leveling and adsorption locking fixture (400) comprises:

a universal installation adapter plate (141), which is a straight plate member, wherein four leveling bolt components (145) are provided around the universal installation adapter plate (141) and fix the universal installation adapter plate (141) to the jacking mechanism, the four leveling bolt components (145) being twistable to adjust an upper surface of the universal installation adapter plate (141) to be level; and

an adsorption locking fixture (144) disposed on the upper surface of the universal installation adapter plate (141) and carrying the workpiece thereon.

12. The glue-dispensing and attaching apparatus for the workpiece according to claim 11, wherein

the universal installation adapter plate (141) has four fine thread holes (141a) opened along a thickness direction thereof, wherein one end of each of the four leveling bolt components (145) is arranged in a corresponding fine thread hole (141a), and the other end of the leveling bolt component (145) is connected to the jacking mechanism, and wherein the universal installation adapter plate (141) further has four slits (141b) opened along the thickness direction, the slits (141b) being in communication with the fine thread holes (141a); and

four horizontal locking screws (146) are provided around the universal installation adapter plate (141), each of the four horizontal locking screws (146) penetrating through a corresponding slit (141b), wherein the horizontal locking screw (146) is rotatable to adjust a size of the slit (141b), thereby adjusting a size of the fine thread hole (141a), and an axis of the horizontal locking screw (146) is perpendicular to an axis of the leveling bolt component (145).

13. The glue-dispensing and attaching apparatus for the workpiece according to claim

12, wherein the leveling bolt component (145) comprises:

a leveling member (145a), which is cylindrical, an outer peripheral edge of the leveling member (145a) having a fine external thread (145a1), the fine external thread (145a1) being engaged with the fine thread hole (141a), and the leveling member (145a) having a leveling hole penetrating the leveling member (145a) along a thickness direction thereof;

a spherical gasket (145b) disposed between the leveling member (145) and the jacking mechanism; and

a connecting member (145c), one end of the connecting member (145c) passing through the leveling hole and the spherical gasket (145b) to be connected to the jacking mechanism,

wherein an upper part of the leveling hole is a hexagonal countersunk head (145a2), a middle part of the leveling hole is a cylindrical countersunk hole (145a3), and the other end of the connecting member (145c) is clamped inside the cylindrical countersunk hole (145a3).

14. The glue-dispensing and attaching apparatus for the workpiece according to any one of claims 1 to 13, wherein the dual-valve asynchronous glue-dispensing device (2) further comprises:

an automatic weighing and glue-breaking device (400) disposed on the workpiece conveying device (200), wherein the automatic weighing and glue-breaking device (400) comprises:

a weighing windproof device (2b) defining a first accommodating chamber inside;

a weighing device (1b) disposed in the first accommodating chamber;

a fluid segmentation device (4b) disposed above the weighing windproof device (2b) and having a second accommodating chamber, the second accommodating chamber being in communication with the first accommodating chamber; and

a fluid receiving container (3b) disposed in the second accommodating chamber and located above the weighing device (1b), wherein the fluid receiving container (3b) has two states, a glue breaking state and a weighing state, wherein when in the glue breaking state, the fluid receiving container (3b) moves upward to receive a glue, and when in a weighing state, the fluid receiving container (3b) moves downwards to be placed on the

weighing device (1b) to weigh the glue.

15. The glue-dispensing and attaching apparatus for the workpiece according to any one of claims 1 to 14, wherein the loading and unloading mechanism (1) comprises a profile frame (a1), a silo transverse displacing and lifting mechanism (a2), and a workpiece gripping and transport mechanism (a3), wherein

the silo transverse displacing and lifting mechanism (a2) and the workpiece gripping and transport mechanism (a3) are installed inside the profile frame (a1);

the silo transverse displacing and lifting mechanism (a2) is configured to carry a silo (a5) thereon, move the carried silo (a5) up and down and transversely move the carried silo (a5), to place the silo (a5) opposite to the workpiece gripping and transport mechanism (a3);

the workpiece gripping and transport mechanism (a3) is configured to grip the workpiece from a silo (a5) opposite thereto and load it onto a conveyor belt (a340), or push the workpiece on the conveyor belt (a340) into a silo (a5) opposite thereto;

the loading and unloading mechanism (1) further comprises an intermediate partition plate (a4) configured to separate the silo (a5) carried by the silo transverse displacing and lifting mechanism (a2) from the workpiece gripping and transport mechanism (a3), the intermediate partition plate (a4) having a through hole for the workpiece to pass through;

the silo transverse displacing and lifting mechanism (a2) is configured to transversely move the carried silo (a5) and move the carried silo (a5) up and down, to place the silo (a5) opposite to the through hole; and

the workpiece gripping and transport mechanism (a3) is configured to grip the workpiece inside the silo (a5) through the through hole, or push the workpiece into the silo (a5) through the through hole.

16. The glue-dispensing and attaching apparatus for the workpiece according to any one of claims 1 to 15, wherein the heat dissipation cover attaching device (3) comprises a conveyor rail module (b1), an attaching module (b2), a heat dissipation cover loading device (b3), and a locating module, wherein

the conveyor rail module (b1) is configured to convey a carrier board to an assembly station, the carrier board carrying a chip inside;

the heat dissipation cover loading device (b3) is configured to convey a heat

dissipation cover to a suction station;

the locating module is installed at a locating station; and

the attaching module (b2) is configured to move between the suction station, the locating station, and the assembly station, wherein the attaching module (b2) moves to the locating station after absorbing the heat dissipation cover at the suction station, the locating module locates and identifies the heat dissipation cover absorbed by the attaching module (b2), and after the locating module locates and identifies the heat dissipation cover absorbed, the attaching module (b2) moves the heat dissipation cover to the assembly station and assembles the heat dissipation cover onto the chip inside the carrier board at the assembly station.

17. The glue-dispensing and attaching apparatus for the workpiece according to claim 16, wherein the heat dissipation cover loading device (b3) comprises a loading part (b31), a picking and positioning part (b32), an unloading part (b33), and a first transverse displacement assembly (b34) that spans the loading part (b31), the picking and positioning part (b32), and the unloading part (b33), wherein

after the loading part (b31) jacks up a heat dissipation cover carrier (b35) into position, the first transverse displacement assembly (b34) moves the heat dissipation cover carrier (b35) from the loading part (b31) to the picking and positioning part (b32), the picking and positioning part (b32) positions and fixes the heat dissipation cover carrier (b35), a picking mechanism picks up the heat dissipation cover on the heat dissipation cover carrier (b35), and the first transverse displacement assembly (b34) moves the heat dissipation cover carrier (b35), from which the heat dissipation cover has been picked up, from the picking and positioning part (b32) to the unloading part (b33).

18. The glue-dispensing and attaching apparatus for the workpiece according to any one of claims 1 to 17, wherein the hot pressing device (4) comprises: a detection part, a heating and force maintaining part (c20), and a conveying device (c30), wherein

only one detection part is provided, the detection part being disposed at an upstream workstation or a downstream workstation of the heating and force maintaining part (c20), or

two detection parts are provided, the two detection parts being arranged at the upstream workstation and the downstream workstation of the heating and force maintaining part (c20), respectively, wherein

the conveying device (c30) is configured to convey a load fixture (c40) loaded with the workpiece (c50) to the detection part and the heating and force maintaining part (c20);

the detection part is configured to measure a rated height of the workpiece (c50) at at least one position on the workpiece (c50) and inspect an appearance of the workpiece (c50), wherein the rated height of the workpiece (c50) refers to a height difference between a height at a position on the workpiece (c50) and a height at another position on the load fixture (c40) at a predetermined distance from the position; and

the heating and force maintaining part (c20) is configured to heat and maintain a force on the workpiece (c50) located at the heating and force maintaining part (c20).

19. The glue-dispensing and attaching apparatus for the workpiece according to claim 18, wherein two detection parts are provided, namely a first detection part (c100) located at the upstream workstation of the heating and force maintaining part (c20) and a second detection part (c101) located at the downstream workstation of the heating and force maintaining part (c20), wherein

the first detection part (c100) is configured to measure a rated height of the workpiece (c50) at at least one position on the workpiece (c50) and inspect an appearance of the workpiece (c50) to obtain a first set of detection data;

the second detection part (c101) is configured to measure the rated height of the workpiece (c50) at the at least one position on the workpiece (c50) and inspect the appearance of the workpiece (c50) to obtain a second set of detection data; and

the hot pressing device (4) further comprises a processor electrically connected to the first detection part (c100) and the second detection part (c101), the processor being configured to determine whether a process of heating and maintaining the force on the workpiece (c50) by the heating and force maintaining part (c20) meets requirements based on the first set of detection data and the second set of detection data.