

FLIP-CHIP BONDING EQUIPMENT

CROSS-REFERENCE TO RELATED APPLICATION

5 [0001] This application claims a priority of Chinese Patent Application No. 201510124424.3 filed on March 20, 2015, the disclosures of which are incorporated in their entirety by reference herein.

TECHNICAL FIELD

10 [0002] The present invention relates to a flip-chip bonding technical field, more specifically relates to a flip-chip bonding equipment.

BACKGROUND

[0003] With a rapid development of the global electronic and information
15 technology, consumers need a smaller portable electronic product and this makes advanced packaging and interconnection technologies go beyond the traditional techniques. In advanced packaging technology, semiconductor packaging and assembling are integrated to lower the cost of product, improve product performance, increase density and reduce product size. These advantages make the market demand
20 for flip-chip semiconductor packaging grow rapidly. Flip-chip is not only a high-density chip interconnection technology, but also an ideal chip bonding technology. Flip-chip is widely used in PGA, BGA and CSP. In flip-chip, interconnection lines are very short and I/O terminals are distributed throughout the whole chip surface. Further, SMT technical means are suitable for mass production in

the flip-chip industry. Thus, flip-chip has become the main direction of development of high-density packaging technology.

[0004] When performing flip-chip bonding, a chip with protrusions is picked up from a piece of blue tape and turned over so that joints pattern of the chip faces downward, and then the chip is placed on a substrate by means of machine vision identification. Flip-chip bonder determines accuracy, efficiency, and reliability of the flip-chip bonding. Thus, flip-chip bonder is the major equipment for the flip-chip packaging technology. Flip-chip bonder requires high speed and high precision, but the operation of the equipment may produce various kinds of vibration. Thus, the chip bonding precision may be substantially affected by the vibrations. With a further improvement of the semiconductor production efficiency, a size of wafer is increased and this causes an increase of a moving distance of the chip from the wafer to the bonding position on the substrate and bonding efficiency is greatly reduced.

[0005] In existing flip-chip bonding process and equipment, PCT Patent application WO2003/058708, which is applied by Hwee Seng Jimmy Chew et al. in Singapore ASM Company, discloses a flip-chip bonding equipment. The equipment picks up a chip from a piece of blue tape, flips the chip and transfers the chip to the bonding head, and loads the chip on a lead frame using the bonding head. The flipping mechanism has four nozzles, and bonding mechanism has eight nozzles. The flipping, picking-up, dipping in bond, and bonding are carried out in parallel, thereby improving the efficiency of loading the equipment. This equipment has a complicated structure and is difficult to be implemented. Chinese Patent CN 200610171125.6,

which is applied by Patrick Blessing et al. in Switzerland ESEC Company, discloses a flip-chip bonding equipment in which a bonding head swing mechanism is used for transferring the chip. This equipment can compensate the influence of heat-induced movement of an individual component. However, the swing mechanism used in this equipment reduces the accuracy of the chip loading. Further, Chinese Patent CN 201310173823.X, which is applied by Jung Hyun-Gyun et al. in Hanmi Semiconductor Corporation, discloses a flip-chip welding equipment. This equipment uses two sets of bonding structures to improve efficiency. However, the pick-up position of the chip is far away from the bonding position, and the substrate aiming camera is installed to the moving bonding head, thereby reduces both efficiency and accuracy.

SUMMARY

[0006] Regarding above-described technical problem existing in the prior art, the present disclosure provides a flip-chip bonding equipment including a precise chip transferring mechanism. With this configuration, the flip-chip bonding equipment can provide a higher reliability, enable flip-chip bonding for a large size substrate without reducing the efficiency, and greatly improve loading accuracy.

[0007] In order to solve the above-described technical difficulty, the present disclosure adopts the following technical solutions.

[0008] According to an aspect of the present disclosure, a flip-chip bonding equipment includes a chip transfer mechanism including a mounting portion and a

driving portion, the mounting portion including a plurality of working positions at which chips to be placed, the driving portion driving the mounting portion to move so that the chip placed at one of the working positions is transferred from a first position to a second position; a first chip picking mechanism picking up the chip, flipping the
5 chip from downside toward upside and placing the flipped chip at the working positions at the first position of the mounting portion; and a second chip picking mechanism picking up the chip placed at the working positions at the second position of the mounting portion and performing a chip bonding process.

[0009] The flip-chip bonding equipment further includes a wafer box. The
10 wafer box includes a wafer box main body in which slots are disposed in parallel on both inner sides of the wafer box main body opposite each other,, the slots receiving substrates on which wafers are placed; and a first motor including a first output apparatus and a support, the support is connected with the first output apparatus and is disposed under the wafer box main body.

15 [0010] The flip-chip bonding equipment further includes a working platform mechanism. The working platform mechanism includes a first working platform and a second working platform. The first chip picking mechanism picks up the chip from the first working platform and places the chip on the mounting portion. The second chip picking mechanism picks up the chip from the mounting portion and places the
20 chip on the second working platform.

[0011] The second working platform includes at least one base material platform for receiving a base material, an X-direction moving seat, and a Y-direction

moving seat. The X-direction moving seat and the Y-direction moving seat are capable of adjusting the base material platform and place the base material platform at a predetermined position.

[0012] The mounting portion includes a first conveyor belt and a plurality of first vacuum holes are provided thereon as the working positions. The driving portion includes a first driving wheel and a first driven wheel, and the first conveyor belt is connected with the first driving wheel and the first driven wheel.

[0013] The plurality of first vacuum holes are aligned in one line or in a plurality of lines on the first conveyor belt.

[0014] The mounting portion includes a second conveyor belt, a plurality of chip trays disposed at an outer side of the second conveyor belt, and a plurality of second vacuum holes are provided on the chip trays as the working positions. The driving portion includes a second driving wheel and a second driven wheel, and the second conveyor belt is connected with the second driving wheel and the second driven wheel.

[0015] The chip transfer mechanism further includes a vacuum suction structure. The vacuum suction structure includes a plurality of vacuum pipe connectors disposed on the mounting portion. The plurality of vacuum pipe connectors respectively correspond to working positions on the mounting portion and the plurality of working positions fix the chips by the corresponding vacuum pipe connectors in a vacuum suction manner.

[0016] The first chip picking mechanism includes a first chip picking unit picking up the wafer and placing the wafer on the first working platform; a first chip detection unit disposed above the first working platform and detecting position information of the chip in the wafer; a chip lifting unit disposed under the first working platform and lifting the chip by a predetermined height; a flipping unit disposed between the first chip detection unit and the first working platform, the flipping unit picking up the chip and flipping a top surface and a bottom surface of the chip; and a second chip picking unit disposed between the first chip detection unit and the flipping unit, the second chip picking unit sucking the flipped chip and placing the chip on the first position of the chip transfer mechanism.

[0017] The flipping unit includes a rotation lever, a first nozzle and a second nozzle disposed at respective ends of the rotation lever, a height adjusting mechanism adjusting a height of an up and down movement of the rotation lever, and a rotation adjusting mechanism adjusting a rotation movement of the rotation lever.

[0018] The second chip picking mechanism includes a second chip detection unit disposed above the chip transfer mechanism and detecting position information of the chip disposed at the second position; a bonding unit disposed above the second working platform and picking up the chip disposed at the second position; a dipping unit containing solder or adhesive material, the dipping unit dipping a protruded portion on a bottom surface of the chip, which is picked up by the bonding unit, into the solder or the adhesive material; and a third chip detection unit disposed above the

bonding unit and detecting position information of a position on the second working platform to which the chip is to be bonded.

[0019] The bonding unit includes a bonding head, a vacuum pipe connector, a compressed gas connector, and a bonding head cylinder. The compressed gas connector provides a pressure to the bonding head cylinder after a compressed gas is injected. The vacuum pipe connector is disposed at an outer side of the bonding head cylinder and is connected with the bonding head cylinder. The bonding head is disposed under the bonding head cylinder and is connected with the bonding head cylinder.

[0020] The dipping unit includes a bond dipping unit. The bond dipping unit includes a third motor, a third conveyor belt, a connecting plate, a bond box, and a scraping plate. The third motor includes a second output apparatus, and the second output apparatus is connected with the third conveyor belt. The third conveyor belt includes a gear structure at an inner side. The connecting plate has one end engaged with the gear structure. The scraping plate is connected with another end of the connecting plate and has a groove. The bond box is disposed above the scraping plate and contains the solder or the adhesive material.

[0021] The groove has a depth within a range from 10 to 100 micrometers.

[0022] The flip-chip bonding equipment further includes a fourth chip

detection unit detecting position information of the chips on the bonding unit, and the fourth chip detection unit is disposed under the scraping plate.

[0023] The dipping unit further includes a bond dispensing unit. The bond dispensing unit includes a bond dispensing head, an X-direction motor for bond dispensing head, a Y-direction motor for bond dispensing head, and a Z-direction motor for bond dispensing head. The X-direction motor for bond dispensing head, the Y-direction motor for bond dispensing head, and the Z-direction motor for bond dispensing head operate in a cooperation manner and drive the bond dispensing head to perform a bond dispensing process on the base material.

[0024] The flip-chip bonding equipment further includes a base material transfer mechanism. The base material transfer mechanism includes a manipulator control apparatus, a pedestal disposed above the manipulator control apparatus, and a manipulator disposed above the pedestal.

[0025] The present disclosure provides the following advantages. The flip-chip bonding equipment provided by the present disclosure includes the chip transfer mechanism, the first chip picking mechanism, and the second chip picking mechanism.

In the transfer process of the chips by the chip transfer mechanism, the first chip picking mechanism picks up the chips and then places the chips at the working position at the first position on the chip transfer mechanism. When the chips moved to the second position, the second chip picking mechanism picks up the chips from second position and performs a chip bonding process. By using the chip transfer mechanism, the flip-chip bonding equipment can perform the flip-chip bonding for large size substrates without reducing efficiency. Thus, loading accuracy of the flip-chip bonding equipment is greatly improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] Fig. 1 is a diagram showing a plan view of a flip-chip bonding equipment according to an embodiment of the present disclosure;

5 Fig. 2 is a diagram showing a front view of the flip-chip bonding equipment according to an embodiment of the present disclosure;

Fig. 3 is a diagram showing a configuration of a wafer box according to an embodiment of the present disclosure;

Fig. 4 is a diagram showing a configuration of a second working platform according to an embodiment of the present disclosure;

Fig. 5 is a diagram showing a partial configuration of a chip transfer mechanism according to an embodiment of the present disclosure;

Fig. 6 is a diagram showing a partial configuration of a chip transfer mechanism according to an embodiment of the present disclosure;

15 Fig. 7 is a diagram showing a configuration of a bonding unit according to an embodiment of the present disclosure;

Fig. 8 is a diagram showing a configuration of a bond dipping unit according to an embodiment of the present disclosure;

Fig. 9 is a diagram showing a configuration of a bond dispensing unit according to an embodiment of the present disclosure; and

Fig. 10 is a diagram showing a configuration of a base material transfer mechanism according to an embodiment of the present disclosure.

[0027] Names of reference symbols in the drawings:

1 chip transfer mechanism;

101 first conveyor belt;

102 first vacuum hole;

5 103 first driving wheel;

104 first driven wheel;

105 second conveyor belt;

106 chip tray;

107 second vacuum hole;

10 108 second driving wheel;

109 second driven wheel;

2 wafer box;

201 slot;

202 first motor;

15 203, support;

3 first working platform;

4 second working platform;

401 base material platform;

402 X-direction moving seat;

20 403 Y-direction moving seat;

5 first chip picking unit;

6 first chip detection unit;

	7	chip lifting unit;
	8	flipping unit;
	801	rotation lever;
	802	first nozzle;
5	803	second nozzle;
	9	second chip picking unit;
	901	picking head moving mechanism;
	902	picking head;
	10	second chip detection unit;
10	11	bonding unit;
	1101	bonding head moving mechanism;
	1102	bonding head mechanism;
	1103	bonding head;
	1104	vacuum pipe connector;
15	1105	compressed gas connector;
	1106	bonding head cylinder;
	1107	second motor;
	1108	calibration mechanism;
	12	third chip detection unit;
20	13	bond dipping unit;
	1301	third motor;
	1302	third conveyor belt;

1303 connecting plate;
1304 bond box;
1305 scraping plate;
14 fourth chip detection unit;
5 15 bond dispensing unit;
1501 bond dispensing head;
1502 X-direction motor for bond dispensing head;
1503 Y-direction motor for bond dispensing head;
1504 Z-direction motor for bond dispensing head;
10 16 base material transfer mechanism;
1601 manipulator control apparatus;
1602 pedestal;
1603 manipulator.

15 DETAILED DESCRIPTION

[0028] The following will describe, in detail, embodiments of the present disclosure with accompanying drawings for describing problem to be solved, technical solution and advantages of the present disclosure more specifically.

[0029] As shown in Fig. 1 and Fig. 2, an embodiment of the present disclosure
20 provides a flip-chip bonding equipment. The flip-chip bonding equipment includes a chip transfer mechanism 1, which includes a mounting portion and a driving portion to drive the mounting portion to move, wherein the mounting portion includes a

plurality of working positions at which a chip to be placed, when the mounting portion moves, the chip placed at one working position is moved from a first position to a second position; first chip picking mechanism for picking up the chip, flipping the chip from downside toward upside, and placing the flipped chip at the working position, at the first position, on the mounting portion; second chip picking mechanism for picking up the chip placed at the working position at the second position and performs bonding to the chip.

[0030] The flip-chip bonding equipment according to an embodiment of the present disclosure includes a chip transfer mechanism, a first chip picking mechanism, and a second chip picking mechanism. In the transfer process of the chip by the chip transfer mechanism, the first chip picking mechanism picks up the chip and then places the chip at the working position, at the first position, on the chip transfer mechanism. When the chip moves to the second position, the second chip picking mechanism picks up the chip from the second position and performs bonding to the chip. By using the chip transfer mechanism, the flip-chip bonding equipment can perform the flip-chip bonding for large size substrates without reducing efficiency. Thus, loading accuracy of the flip-chip bonding equipment is greatly improved.

[0031] Further, as shown in Fig. 1, the flip-chip bonding equipment further includes a wafer box 2. Fig. 3 shows a specific configuration of the wafer box 2. The wafer box 2 includes a wafer box main body and a first motor 202. In the wafer box main body, a plurality of slots 201 are disposed in parallel on both inner sides of the wafer box main body opposite each other, and the slots 201 receive a substrate on

which a wafer is placed. The first motor 202 includes a first output apparatus and a support 203. The support 203 is connected with the first output apparatus and is disposed under the wafer box main body. When the first chip picking mechanism picks up the wafer from the wafer box 2 that houses a plurality of layers of wafers, the support 203, which is driven by the first motor 202, pushes the wafer disposed at a lower layer to the working position.

[0032] Further, as shown in Fig. 1, the flip-chip bonding equipment further includes a working platform mechanism. The working platform mechanism includes a first working platform 3 and a second working platform 4. The first chip picking mechanism picks up the chip from the first working platform 3, and places the chip on the mounting portion. The second chip picking mechanism picks up the chip from the mounting portion, and places the chip on the second working platform 4. As shown in Fig. 4, the second working platform 4 includes at least one base material platform 401 for receiving the base material, an X-direction moving seat 402, and a Y-direction moving seat 403. The X-direction moving seat 402 and the Y-direction moving seat 403 are capable of adjusting the base material platform 401 to be placed at a predetermined position. As shown in Fig. 4, the base material platform 401 has a rectangular shape, and the second working platform 4 includes two base material platforms 401. The base material platform 401 may be shaped to a rectangular shape or a circle shape according to an actual need, and the number of the base material platform 401 may be equal to or greater than one.

[0033] The chip transfer mechanism 1 mainly performs a long distance transfer of the chip, and is a main component of the flip-chip bonding equipment. The following will describe a configuration of the chip transfer mechanism 1 in detail. Fig. 5 shows an exemplary configuration of the chip transfer mechanism 1. The chip transfer mechanism 1 includes a first conveyor belt 101, a plurality of first vacuum holes 102 are provided thereon as the working positions; a driving portion includes a first driving wheel 103 and a first driven wheel 104. The first conveyor belt 101 is connected with the first driving wheel 103 and the first driven wheel 104. The first driving wheel 103 drives the first driven wheel 104 to rotate, so as to drive the first conveyor belt 101 to move the chips from one side to another to accomplish the transfer of the chips.

[0034] Further, the plurality of first vacuum holes 102 may be aligned on the first conveyor belt 101 in one line or in a plurality of lines.

[0035] Fig. 6 shows another exemplary configuration of the chip transfer mechanism 1. This chip transfer mechanism 1 includes a mounting portion and a driving portion. The mounting portion includes a second conveyor belt 105 and a plurality of chip trays 106 disposed at an outer side of the second conveyor belt 105, a plurality of second vacuum holes 107 are provided on the chip trays 106 as the working positions. The driving portion includes a second driving wheel 108 and a second driven wheel 109. The second conveyor belt 105 is connected with the second driving wheel 108 and the second driven wheel 109. The second driving wheel 108 drives the second driven wheel 109 to rotate, so as to drive the second conveyor belt

105 and the chip trays 106 to move the chips from one side to another to accomplish the transfer of the chips.

[0036] It should be understood that the chip transfer mechanism 1 may have various kinds of configurations, the present disclosure only describes the above two examples. Under a principle of the chip transfer mechanism 1, any other improvements and modifications can be carried out to the chip transfer mechanism 1, and these improvements and modifications are also within the scope of the present disclosure.

[0037] Further, the chip transfer mechanism 1 includes a vacuum suction structure. The vacuum suction structure includes a plurality of vacuum pipe connectors disposed on the mounting portion. The plurality of vacuum pipe connectors respectively correspond to the plurality of working positions on the mounting portion. Each of the plurality of working positions fixes the chip by the corresponding vacuum pipe connector in a vacuum suction manner.

[0038] As shown in Fig. 1 and Fig. 2, the first chip picking mechanism includes a first chip picking unit 5 picking up the wafer and placing the wafer on the first working platform 3, a first chip detection unit 6 disposed above the first working platform 3 and detecting position information of the chip in the wafer, a chip lifting unit 7 disposed under the first working platform 3 and lifting the chip by a predetermined height, a flipping unit 8 disposed between the first chip detection unit 6 and the first working platform 3 for picking up the chip and flipping a top surface and a bottom surface of the chip, a second chip picking unit 9 disposed between the first

chip detection unit 6 and the flipping unit 8 for sucking the flipped chip and placing the chip on the first position of the chip transfer mechanism 1. The flipping unit 8 includes a rotation lever 801, a first nozzle 802 and a second nozzle 803 disposed at respective ends of the rotation lever 801, a height adjusting mechanism adjusting a height of an up and down movement of the rotation lever 801, and a rotation adjusting mechanism adjusting a rotation movement of the rotation lever 801. The second chip picking unit 9 includes a picking head moving mechanism 901 and a picking head 902. The picking head 902 is movable on the picking head moving mechanism 901, and the number of the picking heads may be properly set according to an actual need.

[0039] As shown in Fig. 1 and Fig. 2, the second chip picking mechanism includes a second chip detection unit 10 disposed above the chip transfer mechanism 1 and detecting position information of the chip disposed at the second position, a bonding unit 11 disposed above the second working platform 4 and picking up the chip disposed at the second position, a dipping unit containing solder or adhesive material, the dipping unit dipping a protruded portion on a bottom surface of the chip, which is picked up by the bonding unit 11, into the solder or the adhesive material, and a third chip detection unit 12 disposed above the bonding unit 11 and detecting position information of a position on the second working platform 4 to which the chip is to be bonded. The bonding unit 11 includes a bonding head moving mechanism 1101 and a bonding head mechanism 1102.

[0040] Fig. 7 shows a specific configuration of the bonding head mechanism 1102 of the bonding unit 11. The bonding head mechanism 1102 includes a bonding

head 1103, a vacuum pipe connector 1104, a compressed gas connector 1105, and a bonding head cylinder 1106. The compressed gas connector 1105 provides a pressure to the bonding head cylinder 1106 after a compressed gas is injected. The vacuum pipe connector 1104 is disposed at an outer side of the bonding head cylinder 1106 and is connected with the bonding head cylinder 1106. The bonding head 1103 is disposed under the bonding head cylinder 1106 and is connected with the bonding head cylinder 1106.

[0041] Further, as shown in Fig. 1 and Fig. 8, wherein Fig. 8 shows an

embodiment of the dipping unit and this embodiment corresponds to a flip-chip

bonding art which requires dipping of the solder or the adhesive material. In this case,

the dipping unit includes a bond dipping unit 13. The bond dipping unit 13 includes a

third motor 1301, a third conveyor belt 1302, a connecting plate 1303, a bond box

1304, and a scraping plate 1305. The third motor 1301 includes a second output

apparatus which is connected with the third conveyor belt 1302. The third conveyor

belt 1302 includes a gear structure at an inner side. The connecting plate 1303 has one

end engaged with the gear structure. The scraping plate 1305 is connected with

another end of the connecting plate 1303 and has a groove. A depth of the groove is

within a range from 10 to 100 micrometers. The bond box 1304 is disposed above the

scraping plate 1305 and the bond box 1304 contains solder or adhesive material

therein. When the chips move to a position above the bond dipping unit 13, the third

motor 1301 drives the third conveyor belt 1302 to move by a predetermined distance.

The third conveyor belt 1302 drives the scraping plate 1305 via the connecting plate

1303 so that the groove of the scraping plate 1305 completely passes over the above portion of the bond box 1304. At this time, the third motor 1301 rotates in a reverse direction for driving the scraping plate 1305 to be held out, and then the groove of the scraping plate 1305 is full with the solder or the adhesive material contained in the bond box 1304.

[0042] As shown in Fig. 2, in the flip-chip bonding art which requires dipping of the solder or the adhesive material, the flip-chip bonding equipment further includes a fourth chip detection unit 14. The fourth chip detection unit 14 detects position information of the chips on the bonding unit 11, and is disposed under the scraping plate 1305.

[0043] Further, as shown in Fig. 2 and Fig. 9, wherein Fig. 9 shows another embodiment of the dipping unit. In this embodiment, the flip-chip bonding art does not require dipping of the solder or the adhesive material. In this case, the dipping unit includes a bond dispensing unit 15. The bond dispensing unit 15 includes a bond dispensing head 1501, an X-direction motor 1502 for bond dispensing head, a Y-direction motor 1503 for bond dispensing head, and a Z-direction motor 1504 for bond dispensing head. The X-direction motor 1502 for bond dispensing head, the Y-direction motor 1503 for bond dispensing head, and the Z-direction motor 1504 for bond dispensing head operate in a cooperation manner, and drive the bond dispensing head 1501 to perform the bond dispensing on the base material. By coordinating the timing, the bonding head 1103 bonds the chip to the base material on which bond dispensing is carried out.

[0044] Further, as shown in Fig. 1, the flip-chip bonding equipment further includes a base material transfer mechanism 16. As shown in Fig. 10, the base material transfer mechanism 16 includes a manipulator control apparatus 1601, a pedestal 1602 disposed above the manipulator control apparatus 1601, and a manipulator 1603 disposed above the pedestal 1602. When the flip-chip bond of a piece of base material is finished, the manipulator 1603 extends into the second working platform 4 and lifts the base material. The manipulator control apparatus 1601 controls the manipulator 1603 to move the processed base material into a base material box, to lift a non-processed base material in the base material box, and to place the non-processed base material on the second working platform 4.

[0045] The above description are the preferred embodiments of the present disclosure, it should be noted that, for a person skilled in the art, various improvements and modifications can be made to the present disclosure without departing from a principle of the present disclosure. These improvements and modifications are also included in the scope of the present disclosure.

What is claimed is:

1. A flip-chip bonding equipment comprising:

a chip transfer mechanism including a mounting portion and a driving portion,

5 the mounting portion including a plurality of working positions at which chips to be placed, the driving portion driving the mounting portion to move so that the chip placed at one of the plurality of working positions is transferred from a first position to a second position, wherein the mounting portion includes a first conveyor belt and a plurality of first vacuum holes are provided thereon as the working positions, and the
10 driving portion includes a first driving wheel and a first driven wheel, the first conveyor belt is connected with the first driving wheel and the first driven wheel;

a first chip picking mechanism picking up the chip, flipping the chip from downside toward upside, and placing the flipped chip at the working position at the first position of the mounting portion; and

15 a second chip picking mechanism picking up the chip placed at the working position at the second position of the mounting portion and performing a chip bonding process.

2. A flip-chip bonding equipment comprising:

20 a chip transfer mechanism including a mounting portion and a driving portion, the mounting portion including a plurality of working positions at which chips to be placed, the driving portion driving the mounting portion to move so that the chip

placed at one of the plurality of working positions is transferred from a first position to a second position, wherein the mounting portion includes a second conveyor belt and a plurality of chip trays disposed at an outer side of the second conveyor belt, a plurality of second vacuum holes are provided on the chip trays as the working

5 positions, and the driving portion includes a second driving wheel and a second driven wheel, the second conveyor belt is connected with the second driving wheel and the second driven wheel;

a first chip picking mechanism picking up the chip, flipping the chip from downside toward upside, and placing the flipped chip at the working position at the
10 first position of the mounting portion; and

a second chip picking mechanism picking up the chip placed at the working position at the second position of the mounting portion and performing a chip bonding process.

15 3. The flip-chip bonding equipment according to claim 1 or 2, further comprising:

a wafer box including:

a wafer box main body in which slots are disposed in parallel on both inner sides of the wafer box main body opposite each other, the slots receiving substrates on
20 which wafers are placed; and

a first motor including a first output apparatus and a support, the support is connected with the first output apparatus and is disposed under the wafer box main body.

5 4. The flip-chip bonding equipment according to claim 1 or 2, further comprising:

a working platform mechanism including a first working platform and a second working platform, wherein

10 the first chip picking mechanism picks up the chip from the first working platform and places the chip on the mounting portion, and

the second chip picking mechanism picks up the chip from the mounting portion and places the chip on the second working platform.

15 5. The flip-chip bonding equipment according to claim 4, wherein the second working platform includes:

at least one base material platform for receiving a base material;

an X-direction moving seat; and

a Y-direction moving seat, wherein

20 the X-direction moving seat and the Y-direction moving seat are capable of adjusting the base material platform and place the base material platform at a predetermined position.

6. The flip-chip bonding equipment according to claim 1, wherein
the plurality of first vacuum holes are aligned in one line or in a plurality of
lines on the first conveyor belt.

5 7. The flip-chip bonding equipment according to claim 1 or 2, wherein
the chip transfer mechanism further includes a vacuum suction structure, and
the vacuum suction structure includes a plurality of vacuum pipe connectors
disposed on the mounting portion, the plurality of vacuum pipe connectors
respectively correspond to the plurality of working positions on the mounting portion,
10 each of the plurality of working positions fixes the chip by the corresponding vacuum
pipe connector in a vacuum suction manner.

8. The flip-chip bonding equipment according to claim 4, wherein
the first chip picking mechanism includes:
15 a first chip picking unit picking up the wafer and placing the wafer on the first
working platform;
a first chip detection unit disposed above the first working platform and
detecting position information of the chip in the wafer;
a chip lifting unit disposed under the first working platform and lifting the chip
20 by a predetermined height;

a flipping unit disposed between the first chip detection unit and the first working platform, the flipping unit picking up the chip and flipping a top surface and a bottom surface of the chip; and

a second chip picking unit disposed between the first chip detection unit and the flipping unit, the second chip picking unit sucking the flipped chip and placing the chip on the first position of the chip transfer mechanism.

9. The flip-chip bonding equipment according to claim 8, wherein the flipping unit includes:

10 a rotation lever;

a first nozzle and a second nozzle disposed at respective ends of the rotation lever;

a height adjusting mechanism adjusting a height of an up and down movement of the rotation lever; and

15 a rotation adjusting mechanism adjusting a rotation movement of the rotation lever.

10. The flip-chip bonding equipment according to claim 4, wherein the second chip picking mechanism includes:

20 a second chip detection unit disposed above the chip transfer mechanism and detecting position information of the chip disposed at the second position;

a bonding unit disposed above the second working platform and picking up the chip disposed at the second position;

a dipping unit containing solder or adhesive material, the dipping unit dipping a protruded portion on a bottom surface of the chip, which is picked up by the bonding unit, into the solder or the adhesive material; and

a third chip detection unit disposed above the bonding unit and detecting position information of a position on the second working platform to which the chip is to be bonded.

11. The flip-chip bonding equipment according to claim 10, wherein the bonding unit includes a bonding head, a vacuum pipe connector, a compressed gas connector, and a bonding head cylinder, wherein the compressed gas connector provides a pressure to the bonding head cylinder after a compressed gas is injected, the vacuum pipe connector is disposed at an outer side of the bonding head cylinder and is connected with the bonding head cylinder, and the bonding head is disposed under the bonding head cylinder and is connected with the bonding head cylinder.

12. The flip-chip bonding equipment according to claim 10, wherein the dipping unit includes a bond dipping unit,

the bond dipping unit includes a third motor, a third conveyor belt, a connecting plate, a bond box, and a scraping plate,

the third motor includes a second output apparatus, and the second output apparatus is connected with the third conveyor belt,

5 the third conveyor belt includes a gear structure at an inner side,

the connecting plate has one end engaged with the gear structure,

the scraping plate is connected with another end of the connecting plate and has a groove, and

the bond box is disposed above the scraping plate and contains the solder or
10 the adhesive material.

13. The flip-chip bonding equipment according to claim 12, wherein the groove has a depth within a range from 10 to 100 micrometers.

15 14. The flip-chip bonding equipment according to claim 12, further comprising:

a fourth chip detection unit detecting position information of the chips on the bonding unit, and the fourth chip detection unit is disposed under the scraping plate.

20 15. The flip-chip bonding equipment according to claim 10, wherein the dipping unit further includes a bond dispensing unit,

the bond dispensing unit includes a bond dispensing head, an X-direction motor for bond dispensing head, a Y-direction motor for bond dispensing head, and a Z-direction motor for bond dispensing head, and

the X-direction motor for bond dispensing head, the Y-direction motor for bond dispensing head, and the Z-direction motor for bond dispensing head operate in a cooperation manner and drive the bond dispensing head to perform a bond dispensing process on the base material.

16. The flip-chip bonding equipment according to claim 1 or 2, further comprising:

10 a base material transfer mechanism, wherein
the base material transfer mechanism includes:
a manipulator control apparatus;
a pedestal disposed above the manipulator control apparatus; and
a manipulator disposed above the pedestal.