

INK-JET PRINTER

TECHNICAL FIELD

The application relates to the technical field of ink-jet printing, and in particular to an automatic
5 ink-jet printer.

BACKGROUND

A keyboard is an input device, including an upper cover, a base, keys, an elastic member and
electronic circuitry, wherein the electronic circuitry includes a circuit board, a keyboard circuit
10 membrane component and a connecting wire with a plug. The keyboard circuit membrane component
needs to be subjected to ink-jet printing in the production process. In the existing technology, the
product needs to be placed on the ink-jet printer manually, and then the product is taken out manually
after the ink-jet printing is completed. This manual loading and unloading way leads to lower loading
and unloading efficiency of the product, resulting in low equipment processing efficiency and high
15 labor consumption.

SUMMARY

The application aims at solving at least one of the technical problems in the existing technology.
For this purpose, the application discloses an ink-jet printer, which can realize the automatic loading
20 and unloading of a product, thereby improving working efficiency of the printer.

According to embodiments of the application, an automatic ink-jet printer includes a placing
frame, a single-axis moving module, a jig, a positioning mechanism, an ink-jet printing module and
a manipulator, wherein a waiting chamber and a finished product chamber are arranged in the placing
frame. The single-axial moving module is arranged at one side of the placing frame, and a loading
25 and unloading station and an ink-jet printing station are sequentially arranged along a conveying
direction. The ink-jet printing module is arranged at the ink-jet printing station and is configured for
ink-jet printing on a product. The positioning mechanism is arranged on the single-axis moving
mechanism and is provided with at least one positioning protrusion. The jig is provided with at least
one positioning hole corresponding to the positioning protrusion, the jig is arranged on the positioning
30 mechanism, and the positioning protrusion is inserted into the corresponding positioning hole. The

manipulator is arranged at one side of the placing frame and is configured for taking the product from the waiting chamber and conveying the product to the jig at the loading and unloading station, and unloading the product printed in the jig at the loading and unloading station to the finished product chamber.

5 According to the embodiments of the application, the automatic ink-jet printer at least has the beneficial effects as follows:

10 In the application, the jig is first located at the loading and unloading station, the manipulator takes a product from the waiting chamber and then conveys the product to the jig, then the single-axis moving module drives the jig to move to the ink-jet printing station to convey the product below
15 the ink-jet printing module, and then the ink-jet printing module performs the ink-jet printing on the product. After the ink-jet printing is completed, the single-axis moving module drives the jig to move to the loading and unloading station, and the manipulator unloads the product printed in the jig into the finished product chamber and places the next product to be printed in the jig. Through the setting of the manipulator, the automatic loading and unloading of product can be realized, thus improving
20 working efficiency of the printer and reducing the labor consumption. Meanwhile, through the setting of the single-axis moving module, the product can be accurately conveyed below the ink-jet printing module, and the positioning of the jig during assembly is implemented by the positioning mechanism to ensure the accurate subsequent placement of the product, thus ensuring the accuracy of ink-jet printing. In addition, a space occupied by the printer is effectively reduced by setting the waiting
25 chamber and the finished product chamber in the same placing frame.

 According to some embodiments of the application, the ink-jet printer further includes a plurality of suction components, wherein the suction components are arranged on the manipulator and are configured for sucking the product.

25 According to some embodiments of the application, each of the suction components includes a connecting plate and a plurality of suction heads, the connecting plate is arranged on the manipulator, and the suction heads are arranged on the connecting plate.

30 According to some embodiments of the application, the connecting plate is provided with a plurality of adjusting holes, and a connecting end of each of the suction heads is inserted into a respective one of the adjusting holes and is capable of moving horizontally along an aperture direction of the adjusting hole.

 According to some embodiments of the application, the single-axis moving module includes a driving component, a transmission component and a sliding component, the transmission component is connected with the driving component and the sliding component, the jig is arranged on the sliding

component, and the driving component drives the transmission component to drive the sliding component, thereby driving the jig to move in a horizontal direction.

According to some embodiments of the application, the ink-jet printer further includes a protective casing, wherein the single-axial moving module is arranged in the protective casing, and the sliding component partially exposes out of a top surface of the protective casing.

According to some embodiments of the application, limiting bumps are formed on the jig by protruding upward from two ends of a top surface of the jig.

According to some embodiments of the application, a plurality of limiting grooves matched with bumps on two side surfaces of the product are respectively formed on surfaces of the two limiting bumps facing each other.

According to some embodiments of the application, the ink-jet printing further includes a bracket and an adjusting module, wherein the adjusting module is arranged on the bracket and the ink-jet printing module is arranged on the adjusting module, and the adjusting module is configured for adjusting a position of the ink-jet printing module.

According to some embodiments of the application, the ink-jet printing module includes a clamping member and an ink-jet printing gun, wherein the clamping member is arranged on the adjusting module and is configured for clamping the ink-jet printing gun, and the ink-jet printing gun is arranged above the jig and is configured for ink-jet printing on the product.

The additional aspects and advantages of the application will be partially given in the following description, and will be partially apparent from the following description, or will be understood via the practice of the application.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and/or additional aspects and advantages of the application will be more apparent from the following description of the embodiments in conjunction with the accompanying drawings, wherein:

FIG. 1 is a structural schematic diagram of an automatic ink-jet printer according to embodiments of the application;

FIG. 2 is a structural schematic diagram of a manipulator as shown in FIG. 1;

FIG. 3 is a structural schematic diagram of a jig, an ink-jet printing module and a single-axis moving module as shown in FIG. 1;

FIG. 4 is a structural schematic diagram of the jig, the ink-jet printing module and the single-axis moving module as shown in FIG. 1 from another perspective; and

FIG. 5 is a structural schematic diagram of the jig as shown in FIG. 1.

Numeral references:

5 100 refers to placing frame, 110 refers to waiting chamber, 120 refers to finished product chamber, 200 refers to single-axis moving module, 210 refers to driving component, 220 refers to transmission component, 230 refers to sliding component, 300 refers to jig, 310 refers to limiting bump, 320 refers to limiting groove, 330 refers to positioning hole, 400 refers to ink-jet printing module, 410 refers to clamping member, 420 refers to ink-jet printing gun, 500 refers to manipulator,
10 510 refers to suction component, 511 refers to connecting plate, 512 refers to suction head, 513 refers to adjusting hole, 514 refers to fixing nut, 600 refers to positioning mechanism, 610 refers to positioning protrusion, 700 refers to bracket, 800 refers to adjusting module, and 900 refers to protective casing.

15 **DETAILED DESCRIPTION**

The embodiments of the application will be described in detail hereinafter. Examples of the embodiments are shown in the accompanying drawings. The same or similar reference numerals throughout the drawings denote the same or similar elements or elements having the same or similar functions. The embodiments described below with reference to the accompanying drawings are
20 exemplary and are only intended to explain the application, but should not be construed as limiting the application.

In the description of the application, it should be understood that the orientation or position relation related to the orientation description, such as the orientation or position relation indicated by the terms upper, lower, front, rear, left, right, etc., is based on the orientation or position relation
25 shown in the drawings, which is only used for convenience of description of the application and simplification of description instead of indicating or implying that the indicated device or element must have a specific orientation, and be constructed and operated in a specific orientation, and thus shall not be understood as a limitation to the application.

In the description of the application, if first and second are described, the descriptions are used
30 for the purpose of distinguishing the technical features only, and cannot be understood as indicating or implying relative importance, or implicitly indicating the number of technical features indicated thereby, or implicitly indicating the precedence order of technical features indicated thereby.

In the description of the application, unless otherwise clearly defined, words such as setting,

installation, connection, and the like, shall be understood broadly, and those of ordinary skills in the art can reasonably determine the specific meanings of the above words in the application in combination with the specific contents of the technical solution.

Referring to FIG. 1 to FIG. 5, an automatic ink-jet printer according to an embodiment of the application is described as below.

Referring to FIG. 1 to FIG. 5, the automatic ink-jet printer of this embodiment includes a placing frame 100, a single-axis moving module 200, a jig 300, a positioning mechanism 600, an ink-jet printing module 400 and a manipulator 500, wherein a waiting chamber 110 and a finished product chamber 120 are arranged in the placing frame 100. The single-axis moving module 200 is arranged at one side of the placing frame 100, and a loading and unloading station and an ink-jet printing station are sequentially arranged along a conveying direction thereof. The ink-jet printing module 400 is arranged at the ink-jet printing station and is configured for ink-jet printing on a product. The positioning mechanism 600 is arranged on the single-axis moving mechanism 200 and is provided with at least one positioning protrusion 610. The jig 300 is provided with at least one positioning hole 310 corresponding to the positioning protrusion 610, the jig 300 is arranged in the positioning mechanism 600, and the positioning protrusion 610 is inserted into the corresponding positioning hole 310. The manipulator 500 is arranged at one side of the placing frame 100 and is configured for taking the product from the waiting chamber 110 and conveying the product to the jig 300 at the loading and unloading station, and unloading the product printed in the jig 300 at the loading and unloading station to the finished product chamber 120.

It may be understood that, in this embodiment, the single-axis moving module 200 is configured for driving the jig 300 to move in a linear direction, so as to ensure that the product can be accurately conveyed below the ink-jet printing module 400. Meanwhile, the single-axis moving module 200 can drive the jig 300 to reciprocate between the loading and unloading station and the ink-jet printing station. To be specific, when loading or unloading is required, the single-axis moving module 200 drives the jig 300 to be placed in the loading and unloading station, and when ink-jet printing is required, the single-axis moving module 200 drives the jig 300 to be placed in the ink-jet printing station.

It may be understood that, in this embodiment, the positioning mechanism 600 is provided as a positioning plate, and a top surface of the positioning plate is provided with at least one positioning protrusion 610, the jig 300 is placed at the top surface of the positioning plate, and the positioning protrusion 610 is inserted into the positioning hole 300, so as to accurately assemble the jig 300. Meanwhile, the product is also provided with a positioning hole 330 matched with the positioning protrusion 610. When the product is placed in the jig 300, the positioning hole 330 in the product is

in inserting cooperation with the positioning protrusion 610 to position the product, so as to ensure the accurate placement of the product, and thus ensuring the accuracy of subsequent ink-jet printing.

It may be understood that, in this embodiment, a plurality of products to be printed are first manually placed in the waiting chamber 110 of the placing frame 100, and the manipulator 500 takes
5 a product from the waiting chamber 110 and places the product in the jig 300, and unloads the printed product into the finished product chamber 120 of the placing frame 100.

To be specific, in the application, the jig 300 is first located at the loading and unloading station, the manipulator 500 takes a product from the waiting chamber 110 and then conveys the product to the jig 300, then the single-axis moving module 200 drives the jig 300 to move to the ink-jet printing
10 station to convey the product below the ink-jet printing module 400, and then the ink-jet printing module 400 performs the ink-jet printing on the product. After the ink-jet printing is completed, the single-axis moving module 200 drives the jig 300 to move to the loading and unloading station, and the manipulator 500 unloads the product printed in the jig 300 into the finished product chamber 120 and places the next product to be printed in the jig 300. Through the setting of the manipulator 500,
15 the automatic loading and unloading of product can be realized, thus improving working efficiency of the printer and reducing the labor consumption. Meanwhile, through the setting of the single-axis moving module 200, the product can be accurately conveyed below the ink-jet printing module 400, and positioning of the jig 300 during assembly is implemented by the positioning mechanism 600 to ensure the accurate subsequent placement of the product, thus ensuring the accuracy of ink-jet
20 printing. In addition, a space occupied by the printer is effectively reduced by setting the waiting chamber 110 and the finished product chamber 120 in the same placing frame 100.

It may be understood that, referring to FIG. 2, in this embodiment, the automatic ink-jet printer further includes a plurality of suction components 510, the suction components 510 are arranged on the manipulator 500 and are configured for sucking the product. To be specific, in this embodiment,
25 two groups of suction components 510 are provided, and the two groups of suction components 510 are driven to rotate and transpose via the manipulator 500. To be specific, after the first group of suction components 510 suck the product to be printed from the waiting chamber 110, the manipulator 500 first drives the second group of suction components 510 to reach above the jig 300, and the second group of suction components 510 suck the printed product in the jig 300, and then the
30 manipulator 500 drives the first group of suction component 510 and the second group of suction component 510 to rotate and transpose, and the first group of suction components 510 places the product to be printed in the jig 300, so as to realize the synchronous loading and unloading of the product, and thus improving the production efficiency. In addition, in some other embodiments, three or four groups of suction components 510 may also be provided, and the group number of the suction

components is not limited here.

In addition, in some other embodiments, the product can also be taken by clamping. To be specific, the manipulator 210 may be provided with a plurality of grippers, and the product may be gripped by the grippers.

5 It may be understood that, referring to FIG. 2, in this embodiment, the suction component 510 includes a connecting plate 511 and a plurality of suction heads 512, the connecting plate 511 is arranged on the manipulator 500, and the suction heads 512 are arranged on the connecting plate 511. To be specific, the suction heads 512 are connected with a vacuum generator. When the product needs to be sucked, the vacuum generator is turned on, so that the suction heads 512 can suck the product.
10 When the product needs to be put down, the vacuum generator is turned off, so that the suction heads 512 can release the product.

 In order to adjust the distance between the suction heads 512, referring to FIG. 2, in this embodiment, the connecting plate 511 is provided with a plurality of adjusting holes 513, and connecting ends of the suction heads 512 are inserted into the adjusting holes 513 and can move
15 horizontally along the aperture direction of the adjusting holes 513 respectively. To be specific, by adjusting the position of the suction head 512 in the adjusting hole 513, the distance between the plurality of suction heads 512 may be adjusted, so that the suction component 510 can meet the suction requirements of products in different sizes.

 It should be noted that, referring to FIG. 2, in this embodiment, the connecting end of the suction
20 head 512 may be locked to the adjusting hole 513 via a fixing nut 514. To be specific, the fixing nut 514 is threadedly connected with the connecting end of the suction head 512 and arranged above the connecting plate 511. When the suction head 512 is needed to be locked in the adjusting hole 513, the fixing nut 514 is rotated so that a bottom surface of the fixing nut 514 abuts against the top surface of the connecting plate 511, thereby fixing the suction head 512. When the position of the suction
25 head 512 is needed to be adjusted, the fixing nut 514 is loosened, then the suction head 512 is adjusted to the required position, and then the fixing nut 514 is locked. By setting the fixing nut 514, the suction head 512 and the connecting plate 511 may be stably connected to ensure the stability of the suction head 512 when sucking the product.

 It may be understood that, referring to FIG. 3, in this embodiment, the single-axis moving
30 module 200 includes a driving component 210, a transmission component 220 and a sliding component 230, the transmission component 220 is connected with the driving component 210 and the sliding component 230, the jig 300 is arranged in the sliding component 230, and the driving component 210 drives the transmission component 220 to drive the sliding component 230, so as to drive the jig 300 to move in a linear direction. To be specific, the single-axis moving module 200

drives the jig 300 to move in the linear direction, so that the movement of the jig 300 is more stable, and the jig 300 can be more accurately conveyed to the required position. In this way, the product can be accurately conveyed below the ink-jet printing module 400, thereby ensuring the accuracy of ink-jet printing.

5 To be specific, referring to FIG. 3, in this embodiment, the driving component 210 may use a motor for driving the transmission component. The transmission component 220 may use a lead screw for transmission. The sliding component 230 can move by using a sliding rail cooperatively with a sliding block. To be specific, the motor is connected with an end of the lead screw, and the sliding block is connected with a lead screw nut of the lead screw, and the motor drives the lead screw nut
10 to rotate, thereby driving the sliding block to slide on the sliding rail, and thus driving the jig 300 to move in a horizontal direction to convey the product.

It may be understood that, referring to FIG. 1, in this embodiment, the automatic ink-jet printer further includes a protective casing 900, the single-axial moving module 200 is arranged in the protective casing 900, and the sliding component 230 partially exposes out of the top surface of the
15 protective casing 900. To be specific, in this embodiment, the sliding block exposes out of the top surface of the protective casing 900, so that the positioning mechanism 600 and the jig 300 can expose out of the top surface of the protective casing 900. Through the setting of the protective casing 900, an operator may be effectively prevented from being injured by accidental collision when the single-axial moving module 200 moves.

20 It may be understood that, referring to FIG. 3 and FIG. 5, in this embodiment, two ends of the top surface of the jig 300 protrude upward to form a limiting bump 310. To be specific, the placement of the product is limited by the limiting bump 310 to ensure the accurate positioning of the product, and thus ensuring the accuracy of subsequent ink-jet printing.

It may be understood that two side surfaces of the product are respectively provided with a
25 plurality of protrusions protruding outwards. Referring to FIG. 3 and FIG. 5, in this embodiment, a plurality of limiting grooves 320 matched with the protrusions on two side surfaces of the product are respectively formed on surfaces of the two limiting bumps 310 facing each other. To be specific, the protrusions of the product are accommodated respectively by the limiting grooves 320, so that the product is placed more stably, and the product is prevented from shaking in the conveying process to
30 affect the accuracy of subsequent ink-jet printing.

It may be understood that, referring to FIG. 3, in this embodiment, the automatic ink-jet printer further includes a bracket 700 and an adjusting module 800, the adjusting module 800 is arranged on the bracket 700, the ink-jet printing module 400 is arranged on the adjusting module 800, and the adjusting module 800 is configured for adjusting the position of the ink-jet printing module 400. To

be specific, in this embodiment, the adjusting module 800 drives the ink-jet printing module 400 to move along X-axis and Y-axis directions, so as to fine-adjust the position of the ink-jet printing module 400, thereby ensuring the accuracy of ink-jet printing.

To be specific, in this embodiment, the adjusting module 800 may adjust the ink-jet printing module 400 via a fine-adjust sliding table. The fine-adjust sliding table is provided with an X-axis adjusting mechanism and a Y-axis adjusting mechanism, the X-axis adjusting mechanism is arranged on the Y-axis adjusting mechanism, and the bracket 700 is arranged on the Y-axis adjusting mechanism. To be specific, both the X-axis adjusting mechanism and the Y-axis adjusting mechanism include a sliding rail, a sliding block and a knob, the sliding block is slidably connected with the sliding rail and the knob is connected with the sliding block. The corresponding knob is manually rotated to drive the corresponding sliding block to move along the X-axis or Y-axis direction, so as to drive the ink-jet printing module 400 to move along the X-axis or Y-axis direction, and thus adjusting the position of the ink-jet printing module 400 to ensure the accuracy of ink-jet printing and enable the ink-jet printing module 400 to meet the ink-jet printing requirements at different positions.

It may be understood that, referring to FIG. 3, in this embodiment, the ink-jet printing module 400 includes a clamping member 410 and an ink-jet printing gun 420, wherein the clamping member 410 is arranged on the adjusting module 800 and is configured for clamping the ink-jet printing gun 420, and the ink-jet printing gun 420 is arranged above the jig 300 and is configured for ink-jet printing on a product. To be specific, in this embodiment, by opening the clamping member 410, the position of the ink-jet printing gun 420 may be adjusted in a vertical direction, so that the ink-jet printing gun 420 may be kept at an optimal ink-jet printing height, and the ink-jet printing gun 420 can adapt to the ink-jet printing requirements of products with different thicknesses.

Although the embodiments of the application have been illustrated and described, those having ordinary skills in the art should understand that various changes, modifications, substitutions and variations can still be made to these embodiments without departing from the principles and purposes of the application, and the scope of the application is defined by the claims and equivalents thereof.

CLAIMS

1. An automatic ink-jet printer, comprising:

a placing frame, wherein a waiting chamber and a finished product chamber are arranged in the placing frame;

5 a single-axis moving module, wherein the single-axis moving module is arranged at one side of the placing frame, and a loading and unloading station and an ink-jet printing station are sequentially arranged along a conveying direction of the single-axis moving module;

an ink-jet printing module, wherein the ink-jet printing module is arranged at the ink-jet printing station and is configured for ink-jet printing on a product;

10 a positioning mechanism, wherein the positioning mechanism is arranged on the single-axis moving mechanism and is provided with at least one positioning protrusion;

a jig, wherein the jig is provided with at least one positioning hole corresponding to the positioning protrusion, the jig is arranged on the positioning mechanism, and the positioning protrusion is inserted into the corresponding positioning hole; and

15 a manipulator, wherein the manipulator is arranged at one side of the placing frame and is configured for taking the product from the waiting chamber and conveying the product to the jig at the loading and unloading station, and unloading the product printed in the jig at the loading and unloading station to the finished product chamber.

2. The automatic ink-jet printer according to claim 1, further comprising a plurality of suction
20 components, wherein the suction components are arranged on the manipulator and are configured for sucking the product.

3. The automatic ink-jet printer according to claim 2, wherein each of the suction components comprises a connecting plate and a plurality of suction heads, the connecting plate is arranged on the manipulator, and the suction heads are arranged on the connecting plate.

25 4. The automatic ink-jet printer according to claim 3, wherein the connecting plate is provided with a plurality of adjusting holes, and a connecting end of each of the suction heads is inserted into a respective one of the adjusting holes and is capable of moving horizontally along an aperture direction of the adjusting hole.

30 5. The automatic ink-jet printer according to claim 1, wherein the single-axis moving module comprises a driving component, a transmission component and a sliding component, the transmission component is connected with the driving component and the sliding component, the jig is arranged

on the sliding component, and the driving component drives the transmission component to drive the sliding component, thereby driving the jig to move in a horizontal direction.

5 6. The automatic ink-jet printer according to claim 5, further comprising a protective casing, wherein the single-axial moving module is arranged in the protective casing, and the sliding component partially exposes out of a top surface of the protective casing.

7. The automatic ink-jet printer according to claim 1, wherein limiting bumps are formed on the jig by protruding upward from two ends of a top surface of the jig.

10 8. The automatic ink-jet printer according to claim 7, wherein a plurality of limiting grooves matched with bumps on two side surfaces of the product are respectively formed on surfaces of the two limiting bumps facing each other.

9. The automatic ink-jet printer according to claim 1, further comprising a bracket and an adjusting module, wherein the adjusting module is arranged on the bracket and the ink-jet printing module is arranged on the adjusting module, and the adjusting module is configured for adjusting a position of the ink-jet printing module.

15 10. The automatic ink-jet printer according to claim 9, wherein the ink-jet printing module comprises a clamping member and an ink-jet printing gun, the clamping member is arranged on the adjusting module and is configured for clamping the ink-jet printing gun, and the ink-jet printing gun is arranged above the jig and is configured for ink-jet printing on the product.