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(54) **HIGH-SPEED BUBBLE CAP BOXING INTEGRATED MACHINE**

(57) The present disclosure provides a high-speed blister cartoning integrated machine compatible with blisters of different specifications. The high-speed blister cartoning integrated machine includes a blister packaging machine and a cartoning machine, where the blister packaging machine includes a blister trimming device and a discharging grid conveyor device; the cartoning machine includes a feeding grid conveyor device; a synchronous spacing-changing conveyor device is provided in front of the discharging grid conveyor device; the synchronous spacing-changing conveyor device is provided

side by side with the feeding grid conveyor device; a blister discharging transfer manipulator is provided above the discharging grid conveyor device; and a blister feeding transfer manipulator is provided above the feeding grid conveyor device. The high-speed blister cartoning integrated machine can greatly improve the linkage production efficiency between the blister packaging machine and the cartoning machine and solves the problem of hard matching between blister packaging and cartoning in a specification change.

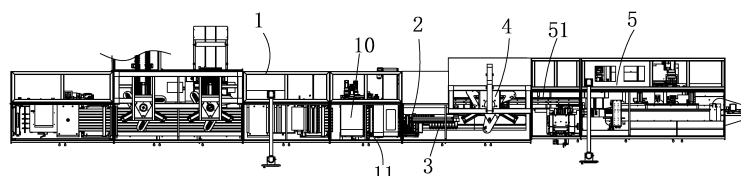


FIG. 1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a machine for packaging a medical article, and in particular, to a high-speed blister cartoning integrated machine.

BACKGROUND

[0002] In pharmaceutical packaging and packaging technological process, and particularly in linkage packaging from blister packaging to cartoning for liquid preparations (prefilled syringes, penicillin bottles, and ampoule bottles), how to realize high-speed integrated linkage operation between the preceding blister packaging machine (for blister forming and packaging) and the following cartoning machine (for blister cartoning) in a relatively compact pharmaceutical packaging workshop has become a technical problem to the current core process in the pharmaceutical packaging industry. According to original solutions, plastic blister supports packaged by a blister packaging machine are conveyed to a hopper of a cartoning machine through a conveyor belt or to a feeding station of the cartoning machine through a conveyor chain. For the former method combined with the conveyor belt and the hopper, the plastic blister supports are conveyed forward by a frictional force of the conveyor belt. In this process, the plastic blister supports have a slipping phenomenon on the conveyor belt. Particularly in the high-speed conveying process, due to the frictional force and inertial slipping, the plastic blister supports cannot accurately enter the feeding region of the hopper in the cartoning machine. Hence, large-scale synchronous linkage integrated packaging cannot be effectively realized. For the latter method using the conveyor chain, the conveyor chain usually uses a synchronous belt as a conveying base material. Stops are equidistantly provided on a surface of the synchronous belt to form the annular conveyor chain. In case of a specification change in the preceding blister packaging, after a production batch and a packaging specification are changed, spacings between the plastic blister supports packaged by the blister packaging machine are not always the same, and the number of trimmed blister plastic supports also changes with an actual size of medicines, such that the whole conveyor chain is to be replaced. Moreover, the conventional conveyor chain using the synchronous belt that is difficult to be replaced needs to be calibrated for its origin in each replacement. This is inconvenient for the large-scale synchronous integrated linkage production in the pharmaceutical packaging and hardly adaptable to the integrated linkage packaging technological process in the whole pharmaceutical industry.

SUMMARY

[0003] In view of shortages in the prior art, the present

disclosure provides a high-speed blister cartoning integrated machine capable of being compatible with blisters of different specifications.

[0004] A high-speed blister cartoning integrated machine includes a blister packaging machine and a cartoning machine, where the blister packaging machine includes a blister trimming device and a discharging grid conveyor device; the cartoning machine includes a feeding grid conveyor device; a synchronous spacing-changing conveyor device is provided in front of the discharging grid conveyor device; the synchronous spacing-changing conveyor device is provided side by side with the feeding grid conveyor device; a blister discharging transfer manipulator for transferring blisters on the discharging grid conveyor device to the synchronous spacing-changing conveyor device is provided above the discharging grid conveyor device; the blister discharging transfer manipulator includes a discharging vacuum nozzle; a blister feeding transfer manipulator for transferring blisters on the synchronous spacing-changing conveyor device to the feeding grid conveyor device is provided above the feeding grid conveyor device; the blister feeding transfer manipulator includes a feeding vacuum nozzle; the synchronous spacing-changing conveyor device includes a base; a first slideway and a second slideway are provided side by side on the base; a plurality of first sliding seats are slidably provided on the first slideway; a first tray is provided on each of the first sliding seats; a plurality of second sliding seats are slidably provided on the second slideway; a second tray is provided on each of the second sliding seats; the first sliding seat is connected to a hinge shaft; two cross-connecting rods are hinged crosswise on the hinge shaft; the second sliding seat is connected to a hinge shaft; two cross-connecting rods are hinged crosswise on the hinge shaft; cross-connecting rods on two adjacent first sliding seat and second sliding seat are hinged crosswise in one-to-one correspondence; one of the first sliding seats is connected to a first transmission belt; the first transmission belt is in transmission connection with a first power source; one of the second sliding seats is connected to a second transmission belt; and the second transmission belt is in transmission connection with a second power source.

[0005] A first supporting seat is provided on the first sliding seat; the first tray is provided on the first supporting seat; a first locating pin is provided on the first supporting seat; a first locating hole for allowing the first locating pin to insert into is formed in the first tray; a second supporting seat is provided on the second sliding seat; the second tray is provided on the second supporting seat; a second locating pin is provided on the second supporting seat; and a second locating hole for allowing the second locating pin to insert into is formed in the second tray.

[0006] A first locating fixture is provided on the first supporting seat; a first locating groove for allowing the first locating fixture to enter is formed at a bottom of the first tray; a second locating fixture is provided on the second supporting seat; and a second locating groove for

allowing the second locating fixture to enter is formed at a bottom of the second tray.

[0007] The feeding grid conveyor device includes a conveyor rack, a grid plate, first pushing plates, a first pushing plate transmission mechanism, and a pushing power source; the grid plate is provided with a feeding channel; the first pushing plates each are provided with a pushing portion capable of being located in the feeding channel; the first pushing plate transmission mechanism includes a first conveyor belt; the first pushing plates are connected to the first conveyor belt; the first conveyor belt is in transmission connection with the pushing power source; the feeding grid conveyor device includes second pushing plates and a second pushing plate transmission mechanism; the second pushing plates and the first pushing plates are arranged at intervals; the second pushing plates each are provided with a pushing portion capable of being located in the feeding channel; the second pushing plate transmission mechanism includes a second conveyor belt; the second conveyor belt is provided side by side with the first conveyor belt; the second pushing plates are connected to the second conveyor belt; and the second conveyor belt is in transmission connection with the pushing power source.

[0008] An end of each of the second pushing plates and the first pushing plates is connected to a roller, and a roller walkway for allowing the roller to walk is provided on the conveyor rack.

[0009] The discharging vacuum nozzle of the blister discharging transfer manipulator is provided on a rotating power source.

[0010] The blister trimming device is located above the discharging grid conveyor device; the blister trimming device includes a mounting rack, a concave trimming die, a convex trimming die, and a trimming power source; the convex trimming die is provided on the mounting frame; the concave trimming die is located below the convex trimming die; the concave trimming die is connected to a die supporting plate; the die supporting plate is connected to a lower end of a lifting guide post; the lifting guide post is slidably provided on the mounting frame; an upper end of the lifting guide post is connected to a lifting seat; the lifting seat is in transmission connection with the trimming power source; a vertical slideway is provided on the mounting rack; a sliding plate is slidably provided on the vertical slideway; the sliding plate is in transmission connection with a blanking power source for driving the sliding plate to move on the vertical slideway; the sliding plate is connected to a vacuum absorption die; a vacuum suction rod is provided on the vacuum absorption die; the convex trimming die is provided with a convex die hole for allowing the vacuum suction rod to pass through; the concave trimming die is provided with a concave die hole for allowing the convex trimming die to enter and allowing the vacuum suction rod to pass through; and the die supporting plate is provided with a supporting plate hole for allowing the vacuum suction rod to pass through.

[0011] The convex trimming die is connected to a die clamping guide post; the concave trimming die is connected to a guide sleeve; the die clamping guide post is located in the guide sleeve; a lower locking member is provided at one side of the concave trimming die; the lower locking member is provided with a locking groove; and a side edge of the concave trimming die and a side edge of the die supporting plate are located in the locking groove of the lower locking member.

[0012] A horizontal clamping groove is formed in the mounting rack; a side edge of the convex trimming die can enter the horizontal clamping groove of the mounting rack; the horizontal clamping groove is provided with an upper locking member; an upper bolt is provided on the mounting rack; the upper bolt is threadedly connected to the upper locking member; and the upper locking member can fix the convex trimming die in the horizontal clamping groove.

[0013] The trimming power source is in transmission connection with an eccentric shaft; an eccentric portion of the eccentric shaft is hinged to one end of a connecting rod; the other end of the connecting rod is hinged to a connecting rod shaft; and the connecting rod shaft is hinged to a supporting seat on the lifting seat.

[0014] The high-speed blister cartoning integrated machine provided by the present disclosure can greatly improve the linkage production efficiency between the blister packaging machine and the cartoning machine and solves the problem of hard matching between blister packaging and cartoning in a specification change.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a top view of a whole blister cartoning integrated machine according to the present disclosure; FIG. 2 is a partial schematic view of a blister cartoning integrated machine according to the present disclosure;

FIG. 3 is a partial front view of a blister cartoning integrated machine according to the present disclosure;

FIG. 4 is a stereoscopic view of a synchronous spacing-changing conveyor device;

FIG. 5 is a front view of a synchronous spacing-changing conveyor device;

FIG. 6 is an exploded view of a synchronous spacing-changing conveyor device;

FIG. 7 illustrates a spacing changing process of a synchronous spacing-changing conveyor device (a top view);

FIG. 8 illustrates a spacing changing process of a synchronous spacing-changing conveyor device (an internal structure);

FIG. 9 illustrates a process of blisters from a blister packaging machine to a synchronous spacing-changing conveyor device and then to a cartoning

machine;

FIG. 10 is a stereoscopic view of a discharging grid conveyor device;

FIG. 11 is a partial enlarged view of D in FIG. 10;

FIG. 12 illustrates positions of a blister trimming device and a discharging grid conveyor device;

FIG. 13 is a stereoscopic view according to the present disclosure;

FIG. 14 is a section view 1 of a blister trimming device;

FIG. 15 is a section view 2 of a blister trimming device;

FIG. 16 is an internal structural schematic view of a blister trimming device;

FIG. 17 is a rear view of a blister trimming device;

FIG. 18 illustrates a working principle of a blister trimming device;

FIG. 19 is an exploded view of a blister trimming device; and

FIG. 20 is a partial sectional view of a blister trimming device.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0016] As shown in FIGS. 1-3, a high-speed blister cartoning integrated machine includes blister packaging machine 1 and cartoning machine 5. The blister packaging machine 1 includes blister trimming device 10 and discharging grid conveyor device 11. Packaged blisters C trimmed by the blister trimming device 10 are placed into the discharging grid conveyor device 11 and then conveyed out by the discharging grid conveyor device 11.

[0017] The cartoning machine 5 includes feeding grid conveyor device 51. Packaged blisters are placed onto the feeding grid conveyor device 51, and conveyed by the feeding grid conveyor device 51 to a cartoning station of the cartoning machine 5 for cartoning (carton packaging).

[0018] The discharging grid conveyor device 11 has a different grid spacing from the feeding grid conveyor device 51. For the sake of matching between the two devices, synchronous spacing-changing conveyor device 3 is provided in front of the discharging grid conveyor device 11. The synchronous spacing-changing conveyor device 3 is provided side by side with the feeding grid conveyor device 51. Blister discharging transfer manipulator 2 for transferring blisters on the discharging grid conveyor device 11 to the synchronous spacing-changing conveyor device 3 is provided above the discharging grid conveyor device 11. The blister discharging transfer manipulator 2 includes discharging vacuum nozzle 20. Blister feeding transfer manipulator 4 for transferring blisters on the synchronous spacing-changing conveyor device 3 to the feeding grid conveyor device 51 is provided above the feeding grid conveyor device 51. The blister feeding transfer manipulator 4 includes feeding vacuum nozzle 40.

[0019] The high-speed blister cartoning integrated ma-

chine has the following working principle: Blisters are conveyed out from the discharging grid conveyor device 11 of the blister packaging machine 1. The blister discharging transfer manipulator 2 sucks the blisters C on the discharging grid conveyor device 11 through the discharging vacuum nozzle 20, and transfers them to the synchronous spacing-changing conveyor device 3. While moving forward, the synchronous spacing-changing conveyor device 3 changes a spacing between the blisters (as shown in FIG. 7), until the spacing is the same as the spacing of the feeding grid conveyor device 51. The blister feeding transfer manipulator 4 sucks the blisters on the synchronous spacing-changing conveyor device 3 through the feeding vacuum nozzle 40 and transfers them to the feeding grid conveyor device 51. The feeding grid conveyor device 51 transfers the blisters to the cartoning station of the cartoning machine 5 for cartoning. With the synchronous spacing-changing conveyor device 3, the present disclosure can greatly improve the linkage production efficiency between the blister packaging machine 1 and the cartoning machine 5 and solves the problem of hard matching between blister packaging and cartoning in a specification change.

[0020] Both the blister packaging machine and the cartoning machine are the prior art (refer to the patent application No. 201520906465.3). The blister discharging transfer manipulator is also the prior art (refer to the patent application No. 201910076327.X, in which the structure is the same, but the material to be transferred is different). The blister feeding transfer manipulator is also the prior art (refer to the patent application No. 202120863286.1). The high-speed blister cartoning integrated machine is novel for the synchronous spacing-changing conveyor device and the linkage layout using the synchronous spacing-changing conveyor device.

[0021] The following descriptions describe the structure and working principle of the synchronous spacing-changing conveyor device 3.

[0022] As shown in FIG. 4, the synchronous spacing-changing conveyor device 3 includes base 30. As shown in FIG. 6, first slideway 301 and second slideway 302 are provided side by side on the base 30. A plurality of first sliding seats 311 are slidably provided on the first slideway 301. First tray 321 (the first tray 321 is provided with a placement groove into which a blister can be placed) is provided on each of the first sliding seats 311. A plurality of second sliding seats 312 are slidably provided on the second slideway 302. Second tray 322 (the second tray 321 is provided with a placement groove into which a blister can be placed) is provided on each of the second sliding seats 312. The first sliding seat 311 is connected to a hinge shaft. Two cross-connecting rods 31 are hinged crosswise on the hinge shaft. The second sliding seat 312 is also connected to a hinge shaft. Two cross-connecting rods 31 are hinged crosswise on the hinge shaft. Cross-connecting rods 31 on two adjacent first sliding seat 311 and second sliding seat 312 are hinged crosswise in one-to-one correspondence (to form a scis-

sor-type structure). One of the first sliding seats 311 is connected to first transmission belt 351. The first transmission belt 351 is in transmission connection with first power source 361. One of the second sliding seats 312 is connected to second transmission belt 352. As shown in FIG. 4, the second transmission belt 352 is in transmission connection with second power source 362.

[0023] The synchronous spacing-changing conveyor device 3 has the following working principle: As shown in FIG. 7 and FIG. 8, after blisters are placed onto the first tray 321 and the second tray 322, the first power source 361 drives the first transmission belt 351 to rotate. Since one of the first sliding seats 311 is connected to the first transmission belt 351, the first sliding seats 311 move on the first slideway 301. Likewise, the second power source 362 drives the second transmission belt 352 to rotate. Since one of the second sliding seats 312 is connected to the second transmission belt 351, the second sliding seats 312 move on the second slideway 302. The first sliding seats 311 are connected to the second sliding seats 312 through the cross-connecting rods 31, so all of the first sliding seats 311 and all of the second sliding seats 312 move. Meanwhile, by adjusting the outputs of the power sources, a certain difference is kept between a transfer speed of the first transmission belt 351 and a transfer speed of the second transmission belt 351, and thus spacings between two adjacent ones of the first sliding seats 311 and the second sliding seats 312 change equidistantly, as shown in FIG. 8. The blisters have the same spacing as the following feeding grid conveyor device 5. After the blisters on the trays are taken away, the transmission belts move reversely, and the sliding seats are restored quickly for the next receiving. The above process is repeated. With the synchronous spacing-changing conveyor device 3, the preceding discharging grid conveyor device 1 can be matched with the following feeding grid conveyor device 5, no matter how the specification of the discharging grid conveyor device changes.

[0024] For the blisters of different specifications, different trays are required. For the convenience of replacement of the trays to place the blisters of different specifications, as shown in FIG. 6, first supporting seat 331 is provided on the first sliding seat 311. The first tray 321 is provided on the first supporting seat 331. First locating pin 371 is provided on the first supporting seat 331. A first locating hole for allowing the first locating pin 371 to insert into is formed in the first tray 321. When the first tray 321 is replaced necessarily, the first locating pin 371 is pulled out, and the first tray 321 is taken down, which is very convenient. Likewise, second supporting seat is provided on the second sliding seat 312. The second tray is provided on the second supporting seat. A second locating pin is provided on the second supporting seat. A second locating hole for allowing the second locating pin to insert into is formed in the second tray. When the second tray is replaced necessarily, the second locating pin is pulled out, and the second tray is taken down, which

is very convenient.

[0025] To avoid rotation of the trays, first locating fixture 341 is provided on the first supporting seat 321. A first locating groove for allowing the first locating fixture 341 to enter is formed at a bottom of the first tray 321. The first supporting seat 321 is clamped onto the first locating fixture 341 through the first locating groove, thereby preventing the rotation of the first tray 321. Likewise, the second supporting seat is connected to a second locating fixture. A second locating groove for allowing the second locating fixture to enter is formed at a bottom of the second tray 322. The second tray 322 is clamped onto the second locating fixture through the second locating groove, thereby preventing the rotation of the second tray 322.

[0026] The discharging grid conveyor device 1 of the blister packaging machine may use a common grid conveyor device. However, the present disclosure provides a novel grid conveyor device. As shown in FIG. 10 and FIG. 11, the discharging grid conveyor device 11 includes conveyor rack A10, grid plate A15, first pushing plates A11, a first pushing plate transmission mechanism, and pushing power source A19. The grid plate A15 is provided with feeding channel A150. The first pushing plates A15 each are provided with pushing portion A110 capable of being located in the feeding channel A150. The first pushing plate transmission mechanism includes first conveyor belt A13. The first pushing plates A11 are connected to the first conveyor belt A13. The first conveyor belt A13 is in transmission connection with the pushing power source A19. During operation, trimmed blisters C fall into the feeding channel A150 of the grid plate A15. The pushing power source A19 drives the first conveyor belt A13 to move. Since the first pushing plates A11 are connected to the first conveyor belt A13, the first conveyor belt A13 drives the first pushing plates A11 to move, and the pushing portions A110 of the first pushing plates A11 push the blisters C to move forward.

[0027] For the blisters of different specifications, the grid spacing of the discharging grid conveyor device 11 can also be adjusted as required, so as to realize a most efficient output. The discharging grid conveyor device 11 in the present disclosure further includes second pushing plates A12 and a second pushing plate transmission mechanism. The second pushing plates A12 and the first pushing plates A11 are arranged at intervals. The second pushing plates A12 each are provided with a pushing portion located in the feeding channel A150. The second pushing plate transmission mechanism includes second conveyor belt A14. The second conveyor belt A14 is provided side by side with the first conveyor belt A13. The second pushing plates A12 are connected to the second conveyor belt A14. The second conveyor belt A14 is in transmission connection with the pushing power source A19. The second pushing plate A12 has the same pushing principle as the first pushing plate A11, which is not repeated herein. When the grid spacing is adjusted necessarily, either or both of the first conveyor belt A13 and

the second conveyor belt A14 are adjusted to change a spacing between the first pushing plate A11 and the second pushing plate A12, thereby conveying the blisters of the different specifications.

[0028] To support the pushing plates, an end of each of the second pushing plates A12 and the first pushing plates A11 is connected to roller A16. Roller walkway A17 for allowing the roller A16 to walk is provided on the conveyor rack A10. While the pushing plates move, the rollers A16 walk on the roller walkway A17 of the conveyor rack A10, thereby supporting the pushing plates and making the pushing plates walk more stably.

[0029] As shown in FIG. 9, the discharging vacuum nozzle 20 of the blister discharging transfer manipulator 2 is provided on a rotating power source, such that the blisters from the discharging grid conveyor device 11 to the synchronous spacing-changing conveyor device 3 are rotated by 90°, and the transverse blisters are placed longitudinally to meet requirements on cartoning positions. With the rotating power source, the discharging vacuum nozzle 20 is rotated by 90° in movement. The manipulator is rotated when there are many blisters in a longitudinal direction. In case of a small number of blisters in the longitudinal direction, the manipulator is unnecessarily rotated. In addition, the blister feeding transfer manipulator 4 can track blister suction and placement, such that the synchronous spacing-changing conveyor device 3 and the feeding grid conveyor device 51 realize continuous conveyance to improve the packaging efficiency.

[0030] As shown in FIG. 12, the blister trimming device 10 continuously trims blisters on a blister card and places the blisters onto the discharging grid conveyor device 11. The blisters are conveyed forward by the discharging grid conveyor device 11.

[0031] The existing blister trimming device includes a convex trimming die, a concave trimming die, and a trimming power source. With the trimming power source, the convex trimming die and the concave trimming die are clamped to continuously trim the blisters from the blister card. The blisters fall onto the grid conveyor device and are continuously conveyed forward by the grid conveyor device. However, due to a certain drop between the blister trimming point and the grid conveyor device, the directly falling blisters may be bounced up, and cannot accurately enter grids of the grid conveyor device to affect subsequent normal operation.

[0032] In view of the above problem, the present disclosure provides a novel blister trimming device 10. As shown in FIG. 13 and FIG. 14, the novel blister trimming device 10 includes mounting rack B1, concave trimming die B2, convex trimming die B3, and trimming power source B4. The convex trimming die B3 is provided on the mounting frame B1. The concave trimming die B2 is located below the convex trimming die B3. In order to drive the concave trimming die B2 to move up and down, the concave trimming die B2 is connected to die supporting plate B5. The die supporting plate B5 is connected to a lower end of lifting guide post B6. The lifting guide

post B6 is slidably provided on the mounting frame B1. An upper end of the lifting guide post B6 is connected to lifting seat B7. The lifting seat 7 is in transmission connection with the trimming power source B4. With the trimming power source B4, the lifting seat B7 drives the die supporting plate B5 through the lifting guide post B6 to move up and down. The concave trimming die B2 connected to the die supporting plate B5 also moves up and down. The concave trimming die B2 is clamped with the convex trimming die B3 for trimming when moving up. The concave trimming die B2 is split with the convex trimming die B3 when moving down.

[0033] As shown in FIG. 15 and FIG. 16, vertical slideway B8 is provided on the mounting rack B1. Sliding plate B9 is slidably provided on the vertical slideway B8. The sliding plate B9 is in transmission connection with blanking power source B10 for driving the sliding plate B9 to move on the vertical slideway B8. With the blanking power source B10, the sliding plate B9 moves up and down. The sliding plate B9 is connected to vacuum absorption die B11 (the vacuum absorption die B11 is the prior art). Vacuum suction rod B 12 is provided on the vacuum absorption die B11 (a gas path is provided in the vacuum absorption die B11. The vacuum suction rod B12 is connected to the gas path). The convex trimming die B3 is provided with convex die hole B30 for allowing the vacuum suction rod B12 to pass through (only in this way can a blister be sucked from a front side). The concave trimming die B2 is provided with concave die hole B20 for allowing the convex trimming die B3 to enter and allowing the vacuum suction rod B12 to pass through. The die supporting plate B5 is provided with supporting plate hole B50 for allowing the vacuum suction rod B12 to pass through. As shown in FIG. 18, in response to trimming of the concave trimming die B2 and the convex trimming die B3, the vacuum suction rod B 12 sucks the blister. Upon completion of the trimming of the concave trimming die B2 and the convex trimming die B3, the blanking power source B10 drives the sliding plate B9 to move down. In this way, the vacuum suction rod B12 takes along the blister to pass through the concave die hole B20 of the concave trimming die B2 and the supporting plate hole B50 of the die supporting plate B5, and places the blister onto the discharging grid conveyor device 11 thereunder. Since the vacuum suction rod B12 sucks the blister and places it down, the blister can stably enter a grid of the discharging grid conveyor device 11.

[0034] For the sake of the accurate die clamping, the convex trimming die B3 is connected to die clamping guide post B30. The concave trimming die B2 is connected to guide sleeve B25. The die clamping guide post B30 is located in the guide sleeve B25. Under the guidance of the die clamping guide post B30, the concave trimming die B2 and the convex trimming die B3 can be clamped accurately. The concave trimming die B2 is further connected to the die supporting plate B5 (the die supporting plate B5 drives the concave trimming die B2 to move up and down). For the concave trimming die B2 to be con-

nected to the die supporting plate B5, and the concave trimming die B2 moves horizontally relative to the die supporting plate B5 (to ensure that the concave trimming die B2 moves up and down along the die clamping guide post B30, a common connection between the concave trimming die B2 and the die supporting plate B5 hardly realizes the accuracy for a mounting position of the concave trimming die B2 and thus the concave trimming die B2 must have a horizontal moving space), lower locking member B21 is provided at one side of the concave trimming die B2, as shown in FIG. 19 and FIG. 20. The lower locking member B21 is provided with a locking groove. A side edge of the concave trimming die B2 and a side edge of the die supporting plate B5 are located in the locking groove of the lower locking member B21 (the lower locking member B21 may be connected to the die supporting plate B5 or the concave trimming die B2 through a bolt. Certainly, the bolt may also be used unnecessarily). By locking the concave trimming die B2 and the die supporting plate B5 with the lower locking member B21, the moving die supporting plate B5 can drive the concave trimming die B2 to move up and down. Meanwhile, the concave trimming die B2 can move slightly in a horizontal direction in the locking groove of the lower locking member B21, which ensures that the concave trimming die B2 is not limited completely in the horizontal direction. Therefore, the concave trimming die B2 has a self-adjusting space when moving along the die clamping guide post B30 up and down.

[0035] As shown in FIG. 19, the concave trimming die B2 is connected to the die supporting plate B5. For the sake of quick location of the concave trimming die B2 on the die supporting plate B5, locating member B51 is provided on the die supporting plate B5. A locating groove for allowing the locating member B51 to enter is formed at one side of the concave trimming die B2. When the concave trimming die B2 is placed onto the die supporting plate B5, the locating member B51 may enter the locating groove of the concave trimming die B2. In this way, the concave trimming die B2 is basically determined, and then the lower locking member B21 is locked.

[0036] For the convenience of die replacement, the convex trimming die B3 is detachably provided on the mounting rack B1. When the dies are taken out necessarily, the convex trimming die B3 is detached, and the lower locking member B21 is taken down. Therefore, the concave trimming die B2 and the convex trimming die B3 can be taken out together.

[0037] In order to take out the dies conveniently, as shown in FIG. 19 and FIG. 20, die taking tool B22 is provided at one side of the convex trimming die B3. The die taking tool B22 includes a die taking plate and a handle. The handle is connected to the die taking plate. The die taking plate may be threadedly connected to the concave trimming die B2 and the convex trimming die B3 through a die taking bolt. When the dies are taken out necessarily, while the unlocking is ensured, the die taking plate is connected to the concave trimming die B2 and the convex

trimming die B3 through the bolt, and the handle is pulled. Therefore, the concave trimming die B2 and the convex trimming die B3 can be drawn out together, which is very convenient.

[0038] As described above, the convex trimming die B3 is detachably provided on the mounting rack B1. In order to provide the convex trimming die B3 conveniently, horizontal clamping groove B31 is formed in the mounting rack B1. A side edge of the convex trimming die B3 may enter the horizontal clamping groove B31 of the mounting rack B1. The convex trimming die B3 is locked with the mounting rack B1 through a bolt. The horizontal clamping groove B31 is also convenient to draw out the convex trimming die B3.

[0039] As shown in FIG. 19, in order to quickly lock the convex trimming die B3 on the mounting rack B1, the horizontal clamping groove B31 is provided with upper locking member B33. Upper bolt B32 is provided on the mounting rack B1. The upper bolt B32 is threadedly connected to the upper locking member B33. By screwing up the upper bolt B32, the upper locking member B33 can fix the convex trimming die B3 in the horizontal clamping groove B31. When the convex trimming die B3 is taken out necessarily, the upper bolt B32 is screwed down, which is very convenient.

[0040] As shown in FIG. 14, in order to drive the lifting seat B7 to lift, the trimming power source B4 is in transmission connection with eccentric shaft B13. An eccentric portion of the eccentric shaft B13 is hinged to one end of connecting rod B14. The other end of the connecting rod B14 is hinged to connecting rod shaft B15. The connecting rod shaft B15 is hinged to supporting seat B70 on the lifting seat B7. During operation, the trimming power source B4 drives the eccentric shaft B13 to rotate. The eccentric portion of the eccentric shaft B13 drives the connecting rod B14 to move up and down. The connecting rod B14 further drives the lifting seat B7 through the connecting rod shaft B15 to move up and down. Therefore, the concave trimming die B2 moves up and down. Certainly, there are many structures through which the trimming power source B4 drives the lifting seat B7 to lift. For example, the structure with a crank connecting rod, or other existing transmission structures like a cam transmission structure all fall within the protection scope of the present disclosure.

[0041] In order to drive the sliding plate B9 to move up and down, the blanking power source B10 is in transmission connection with the sliding plate B9 through crank connecting rod B16. Likewise, there are many structures through which the blanking power source B10 drives the sliding plate B9 to move up and down. For example, existing transmission structures like a cam transmission structure all fall within the protection scope of the present disclosure.

[0042] Finally, as shown in FIG. 17, in order to conveniently adjust the trimming device, sliding locating beam B17 is provided on the mounting rack B1. The sliding locating beam B17 is slidably provided on horizontal

slideway B19 of housing plate B18 (the housing plate B18 is provided on the blister packaging machine). Adjusting threaded rod B180 is rotatably provided on the housing plate B18. A nut is provided on the sliding locating beam B17. The nut is threadedly connected to the adjusting threaded rod B180. During adjustment, the adjusting threaded rod B180 is rotated. The sliding locating beam B17 of the mounting rack B1 moves on the horizontal slideway B19 of the housing plate B18. With a horizontal movement on the mounting rack B1, the whole blister trimming device can be adjusted.

Claims

1. A high-speed blister cartoning integrated machine, comprising a blister packaging machine (1) and a cartoning machine (5), wherein the blister packaging machine (1) comprises a blister trimming device (10) and a discharging grid conveyor device (11); the cartoning machine (5) comprises a feeding grid conveyor device (51); a synchronous spacing-changing conveyor device (3) is provided in front of the discharging grid conveyor device (11); the synchronous spacing-changing conveyor device (3) is provided side by side with the feeding grid conveyor device (51); a blister discharging transfer manipulator (2) for transferring blisters on the discharging grid conveyor device (11) to the synchronous spacing-changing conveyor device (3) is provided above the discharging grid conveyor device (11); the blister discharging transfer manipulator (2) comprises a discharging vacuum nozzle (20); a blister feeding transfer manipulator (4) for transferring blisters on the synchronous spacing-changing conveyor device (3) to the feeding grid conveyor device (51) is provided above the feeding grid conveyor device (51); the blister feeding transfer manipulator (4) comprises a feeding vacuum nozzle (40); the synchronous spacing-changing conveyor device (3) comprises a base (30); a first slideway (301) and a second slideway (302) are provided side by side on the base (30); a plurality of first sliding seats (311) are slidably provided on the first slideway (301); a first tray (321) is provided on each of the first sliding seats (311); a plurality of second sliding seats (312) are slidably provided on the second slideway (302); a second tray (322) is provided on each of the second sliding seats (312); the first sliding seat (311) is connected to a hinge shaft; two cross-connecting rods (31) are hinged crosswise on the hinge shaft; the second sliding seat (312) is connected to a hinge shaft; two cross-connecting rods (31) are hinged crosswise on the hinge shaft; cross-connecting rods (31) on two adjacent first sliding seat (311) and second sliding seat (312) are hinged crosswise in one-to-one correspondence; one of the first sliding seats (311) is connected to a first transmission belt (351); the first

transmission belt (351) is in transmission connection with a first power source (361); one of the second sliding seats (312) is connected to a second transmission belt (352); and the second transmission belt (352) is in transmission connection with a second power source (362).

2. The high-speed blister cartoning integrated machine according to claim 1, wherein a first supporting seat (331) is provided on the first sliding seat (311); the first tray (321) is provided on the first supporting seat (331); a first locating pin (371) is provided on the first supporting seat (331); a first locating hole for allowing the first locating pin (371) to insert into is formed in the first tray (321); a second supporting seat is provided on the second sliding seat (312); the second tray is provided on the second supporting seat; a second locating pin is provided on the second supporting seat; and a second locating hole for allowing the second locating pin to insert into is formed in the second tray.
3. The high-speed blister cartoning integrated machine according to claim 2, wherein a first locating fixture (341) is provided on the first supporting seat (331); a first locating groove for allowing the first locating fixture (341) to enter is formed at a bottom of the first tray (321); a second locating fixture is provided on the second supporting seat; and a second locating groove for allowing the second locating fixture to enter is formed at a bottom of the second tray.
4. The high-speed blister cartoning integrated machine according to claim 1, wherein the feeding grid conveyor device (11) comprises a conveyor rack (A10), a grid plate (A15), first pushing plates (A11), a first pushing plate transmission mechanism, and a pushing power source (A19); the grid plate (A15) is provided with a feeding channel (A150); the first pushing plates (A11) each are provided with a pushing portion (A110) capable of being located in the feeding channel (A150); the first pushing plate transmission mechanism comprises a first conveyor belt (A13); the first pushing plates (A11) are connected to the first conveyor belt (A13); the first conveyor belt (A13) is in transmission connection with the pushing power source (A19); the feeding grid conveyor device (11) comprises second pushing plates (A12) and a second pushing plate transmission mechanism; the second pushing plates (A12) and the first pushing plates (A11) are arranged at intervals; the second pushing plates (A12) each are provided with a pushing portion capable of being located in the feeding channel (150); the second pushing plate transmission mechanism comprises a second conveyor belt (A14); the second conveyor belt (A14) is provided side by side with the first conveyor belt (A13); the second pushing plates (A12) are connected to the second conveyor

belt (A14); and the second conveyor belt (A14) is in transmission connection with the pushing power source (A19).

5. The high-speed blister cartoning integrated machine according to claim 4, wherein an end of each of the second pushing plates (A12) and the first pushing plates (A11) is connected to a roller (A16), and a roller walkway (A17) for allowing the roller (A16) to walk is provided on the conveyor rack (A10). 5
6. The high-speed blister cartoning integrated machine according to claim 5, wherein the discharging vacuum nozzle (20) of the blister discharging transfer manipulator (2) is provided on a rotating power source. 10
7. The high-speed blister cartoning integrated machine according to claim 1, wherein the blister trimming device (10) is located above the discharging grid conveyor device (11); the blister trimming device (10) comprises a mounting rack (B1), a concave trimming die (B2), a convex trimming die (B3), and a trimming power source (B4); the convex trimming die (B3) is provided on the mounting frame (B1); the concave trimming die (B2) is located below the convex trimming die (B3); the concave trimming die (B2) is connected to a die supporting plate (B5); the die supporting plate (B5) is connected to a lower end of a lifting guide post (B6); the lifting guide post (B6) is slidably provided on the mounting frame (B1); an upper end of the lifting guide post (B6) is connected to a lifting seat (B7); the lifting seat (B7) is in transmission connection with the trimming power source (B4); a vertical slideway (B8) is provided on the mounting rack (B1); a sliding plate (B9) is slidably provided on the vertical slideway (B8); the sliding plate (B9) is in transmission connection with a blanking power source (B10) for driving the sliding plate (B9) to move on the vertical slideway (B8); the sliding plate (B9) is connected to a vacuum absorption die (B11); a vacuum suction rod (B12) is provided on the vacuum absorption die (B11); the convex trimming die (B3) is provided with a convex die hole (B30) for allowing the vacuum suction rod (B12) to pass through; the concave trimming die (B2) is provided with a concave die hole (B20) for allowing the convex trimming die (B3) to enter and allowing the vacuum suction rod (B12) to pass through; and the die supporting plate (B5) is provided with a supporting plate hole (B50) for allowing the vacuum suction rod (B12) to pass through. 20 25 30 35 40 45 50
8. The high-speed blister cartoning integrated machine according to claim 7, wherein the convex trimming die (B3) is connected to a die clamping guide post (B30); the concave trimming die (B2) is connected to a guide sleeve (B25); the die clamping guide post (B30) is located in the guide sleeve (B25); a lower 55

locking member (B21) is provided at one side of the concave trimming die (B2); the lower locking member (B21) is provided with a locking groove; and a side edge of the concave trimming die (B2) and a side edge of the die supporting plate (B5) are located in the locking groove of the lower locking member (B21).

9. The high-speed blister cartoning integrated machine according to claim 7, wherein a horizontal clamping groove (B31) is formed in the mounting rack (B1); a side edge of the convex trimming die (B3) enters the horizontal clamping groove (B31) of the mounting rack (B1); the horizontal clamping groove (B31) is provided with an upper locking member (B33); an upper bolt (B32) is provided on the mounting rack (B1); the upper bolt (B32) is threadedly connected to the upper locking member (B33); and the upper locking member (B33) fixes the convex trimming die (B3) in the horizontal clamping groove (B31).
10. The high-speed blister cartoning integrated machine according to claim 7, wherein the trimming power source (B4) is in transmission connection with an eccentric shaft (B 13); an eccentric portion of the eccentric shaft (B 13) is hinged to one end of a connecting rod (B 14); the other end of the connecting rod (B 14) is hinged to a connecting rod shaft (B15); and the connecting rod shaft (B 15) is hinged to a supporting seat (B70) on the lifting seat (B7).

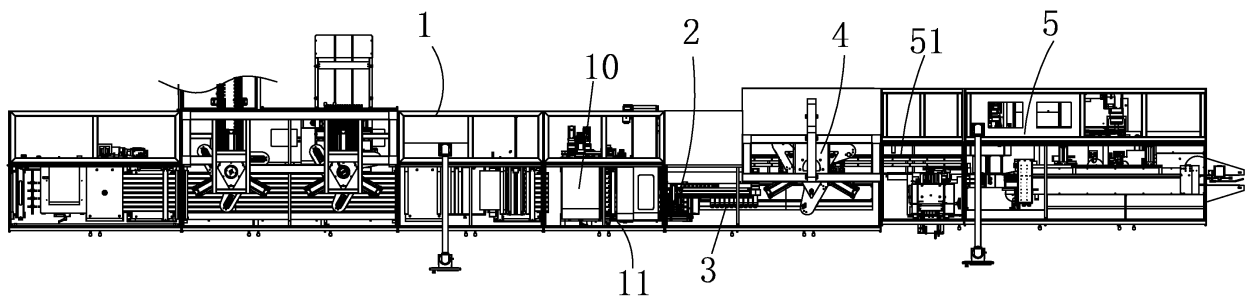


FIG. 1

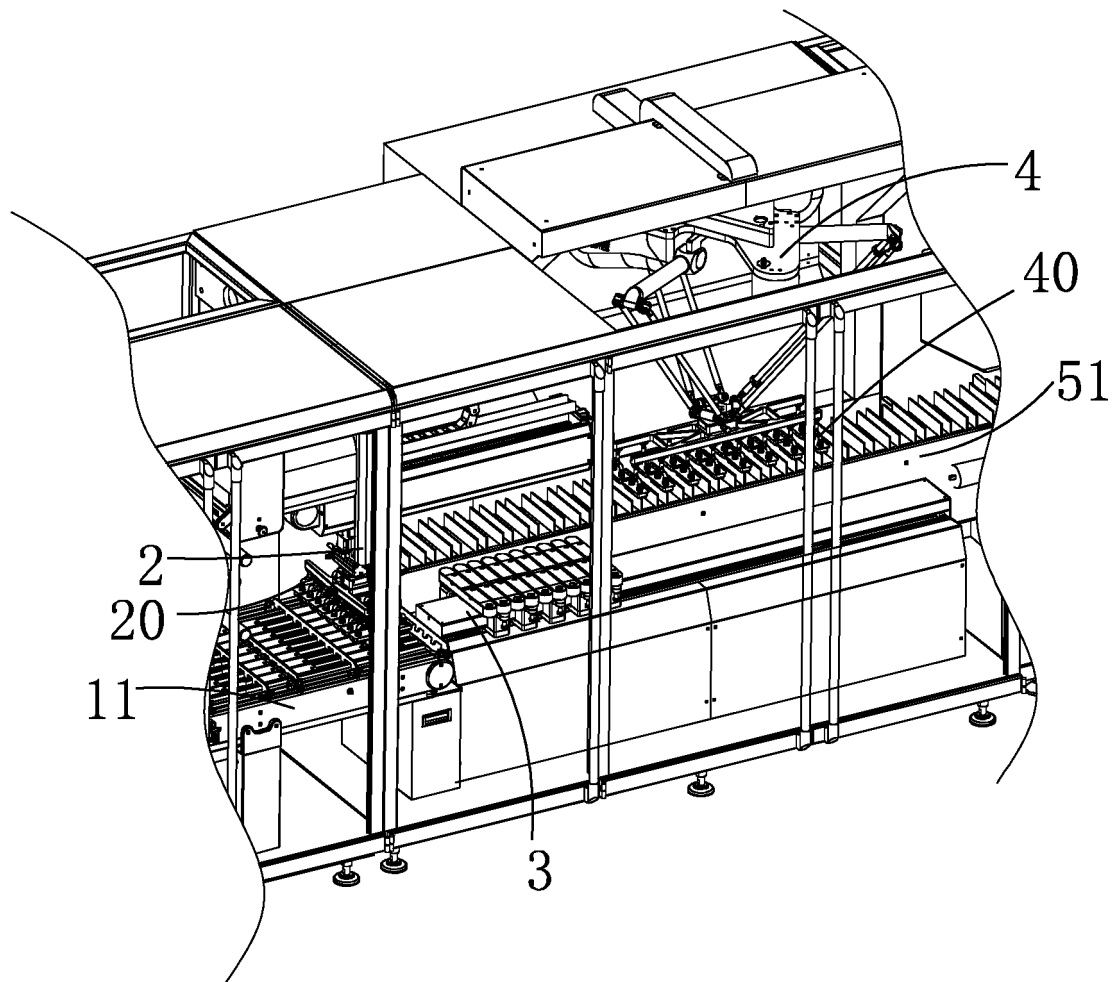


FIG. 2

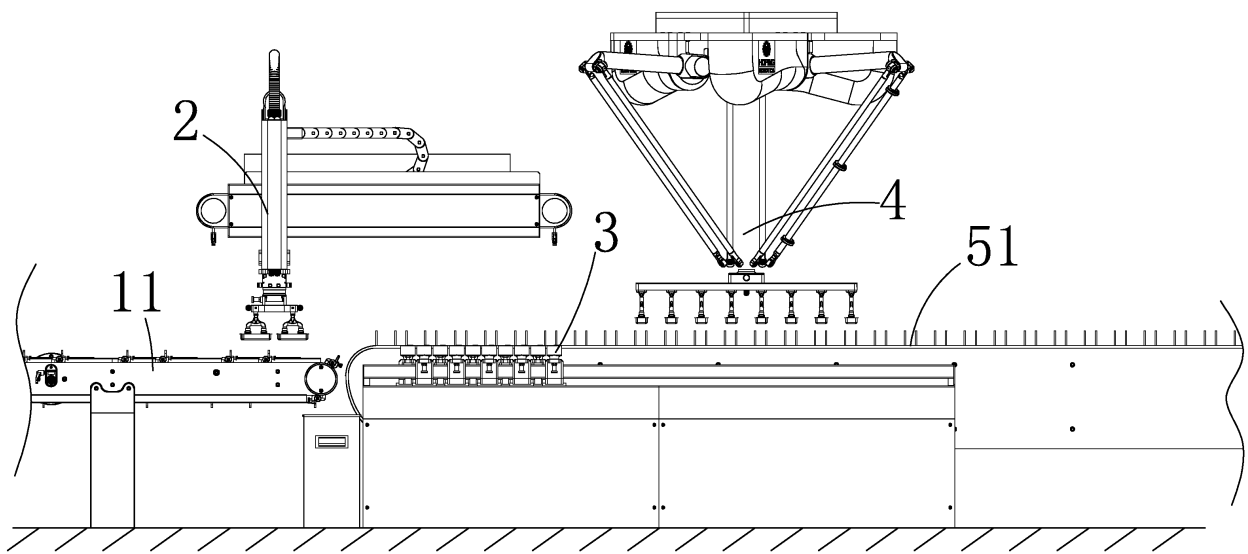


FIG. 3

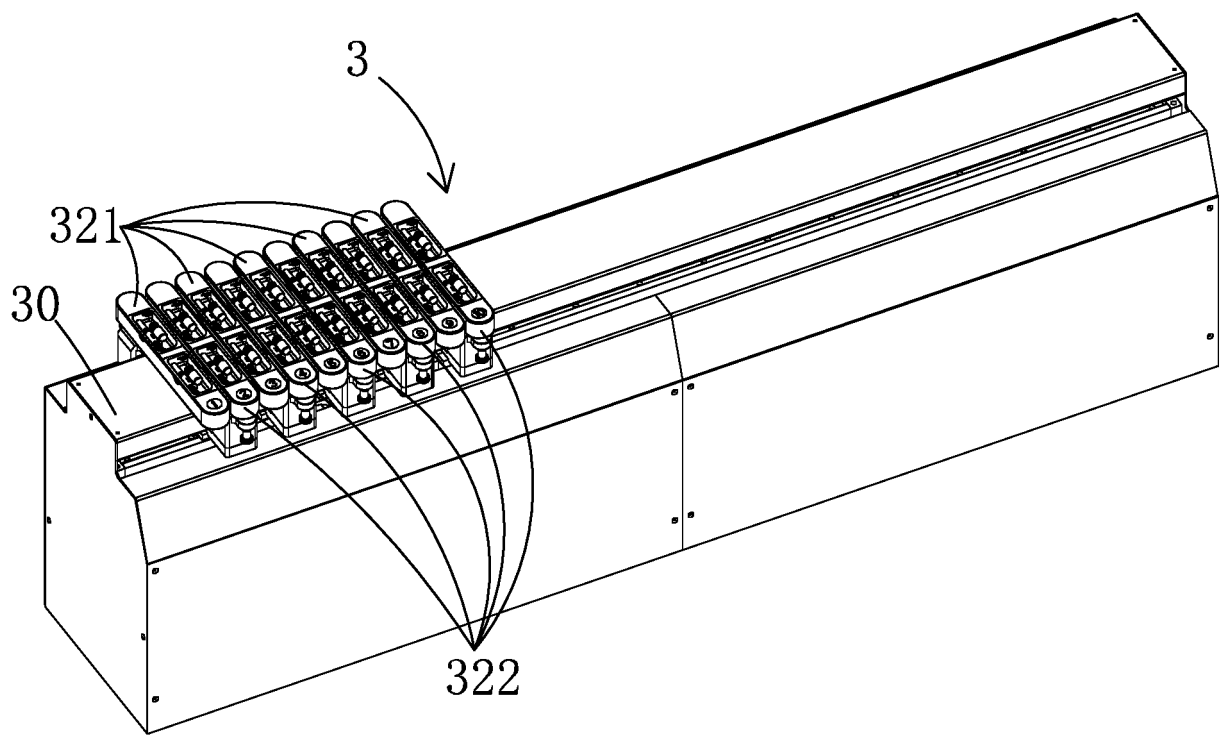


FIG. 4

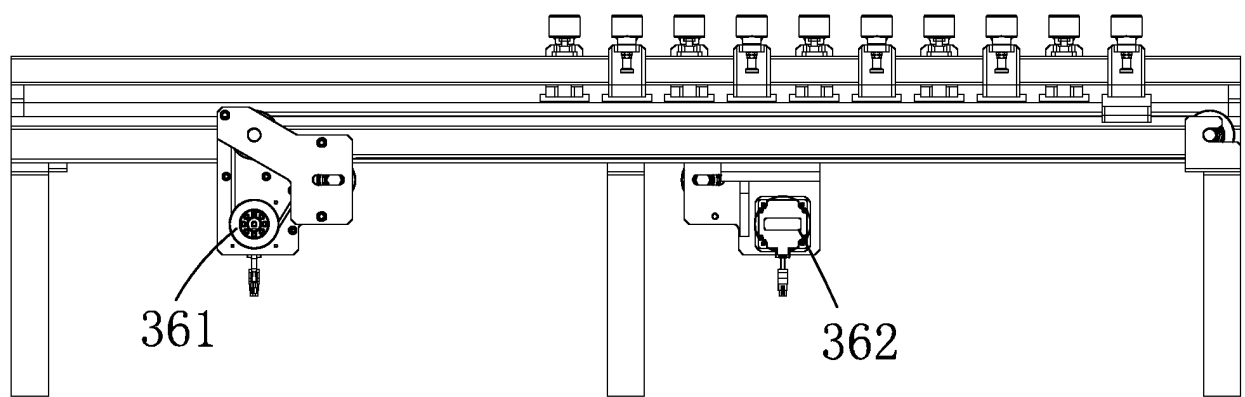


FIG. 5

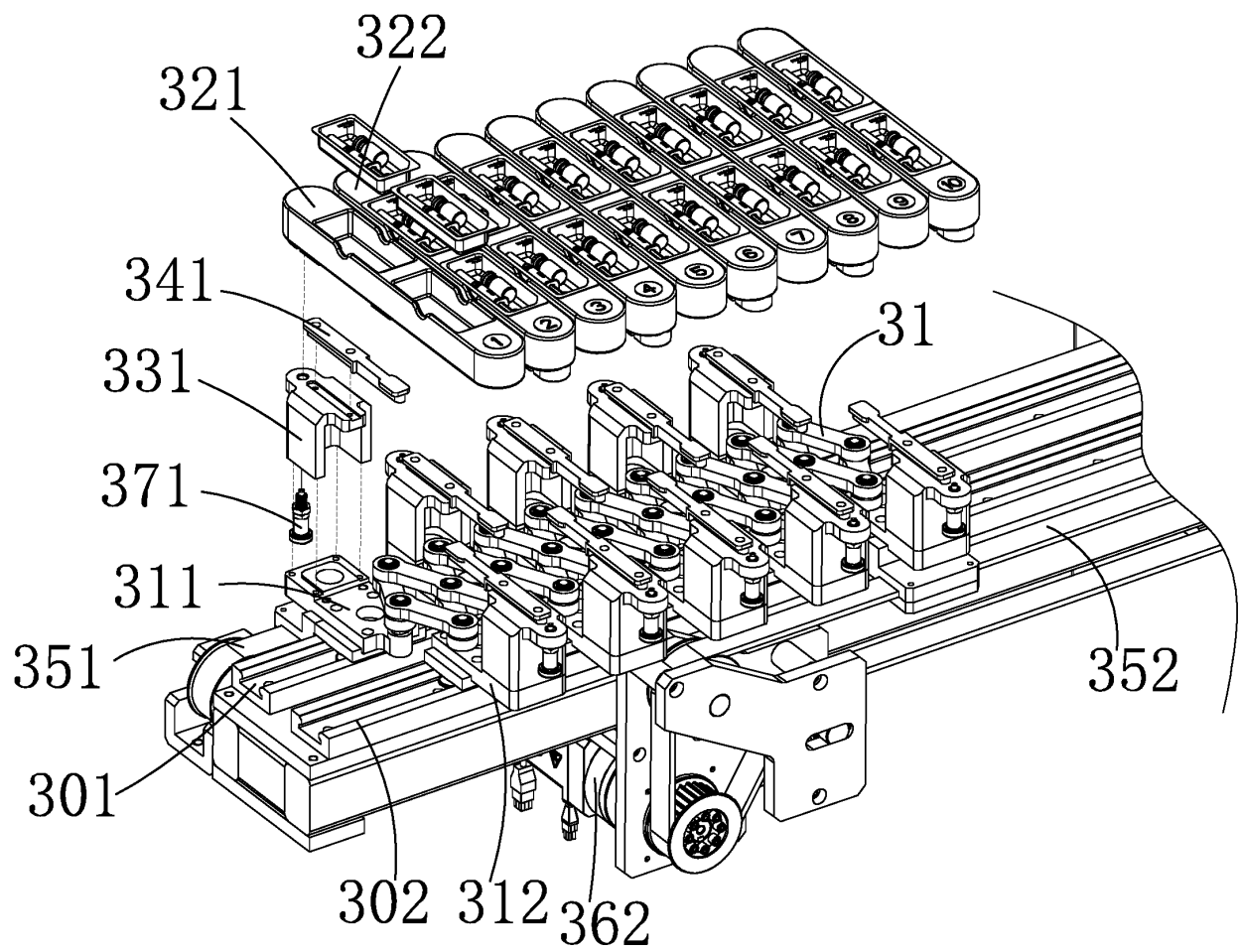


FIG. 6

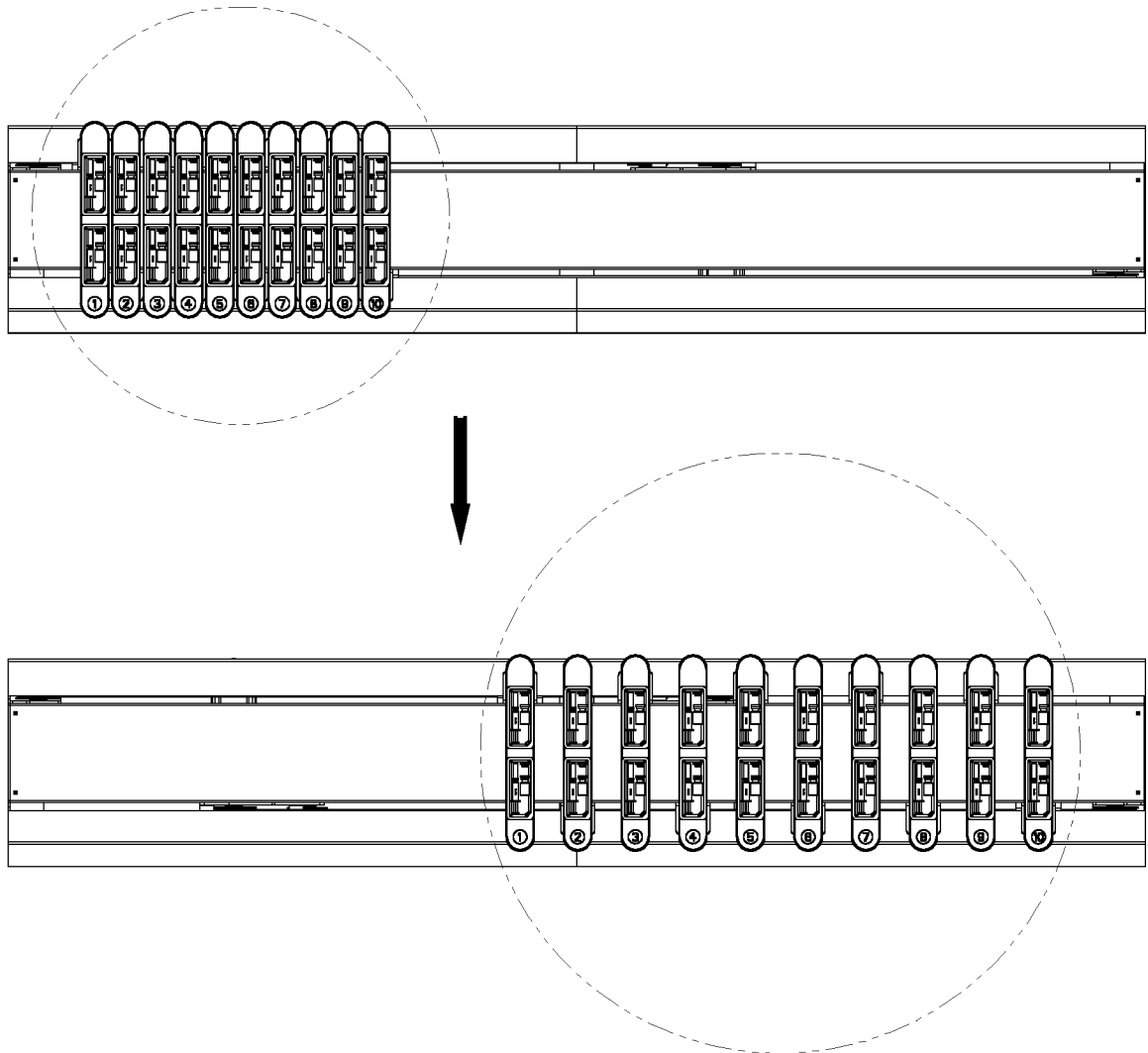


FIG. 7

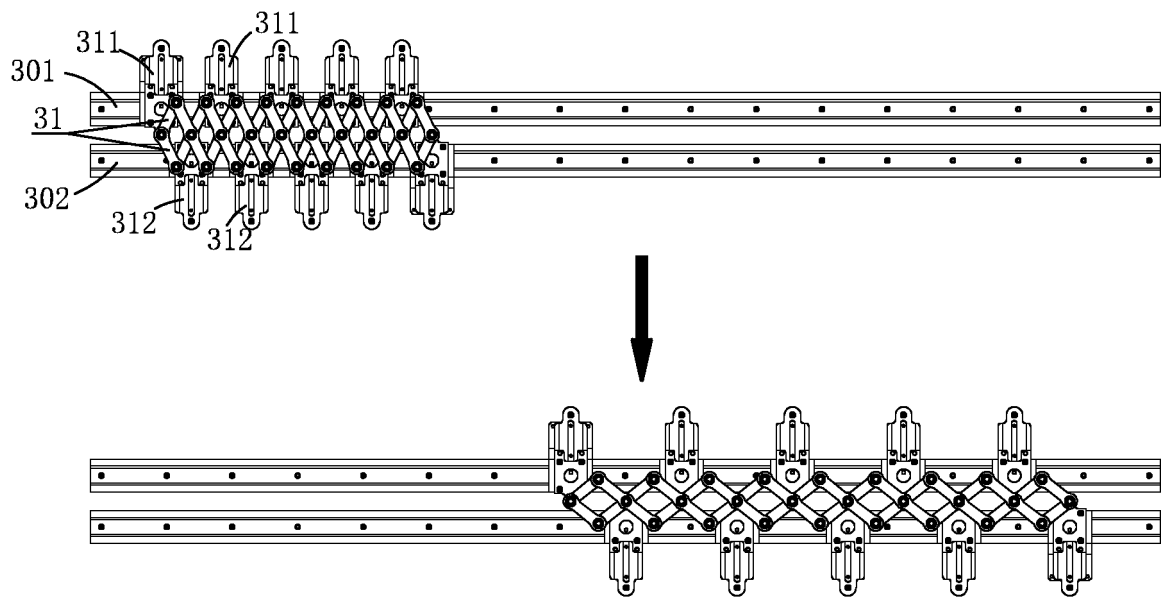


FIG. 8

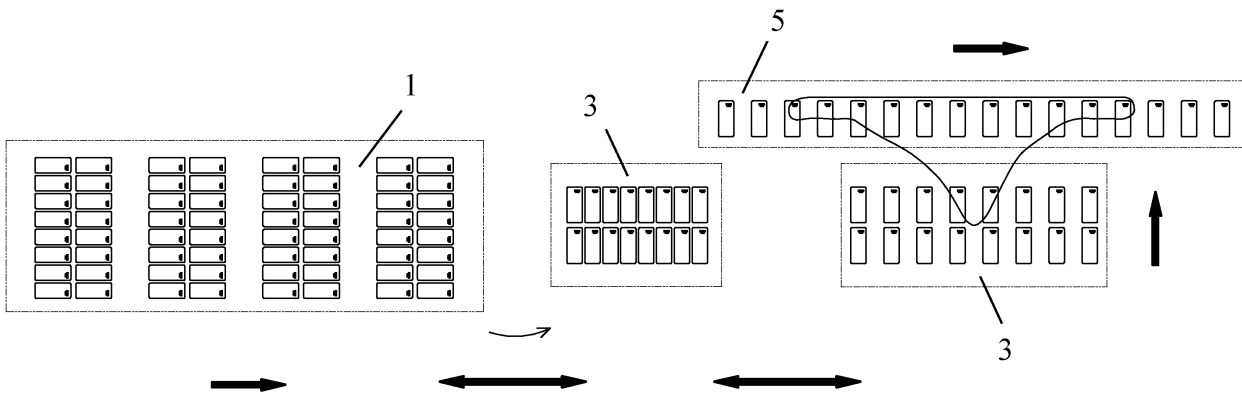


FIG. 9

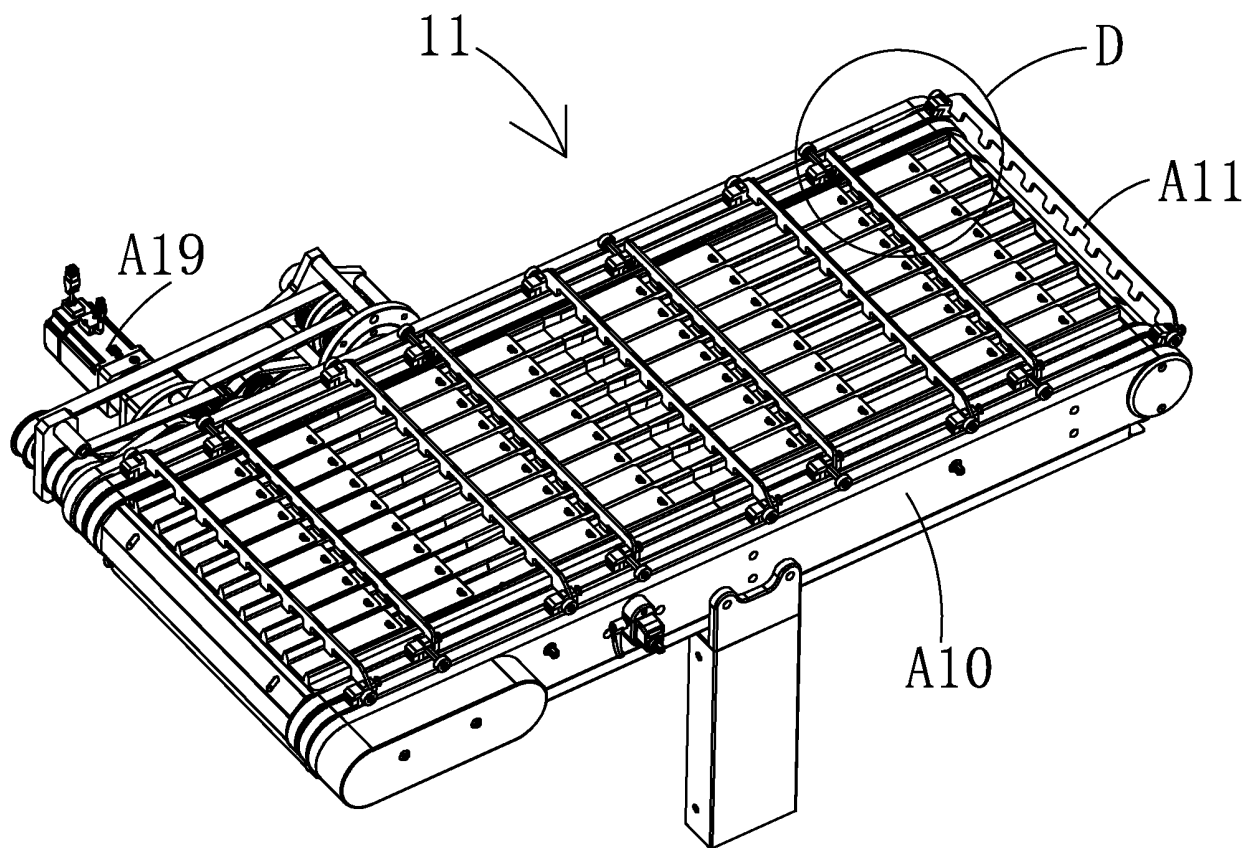


FIG. 10

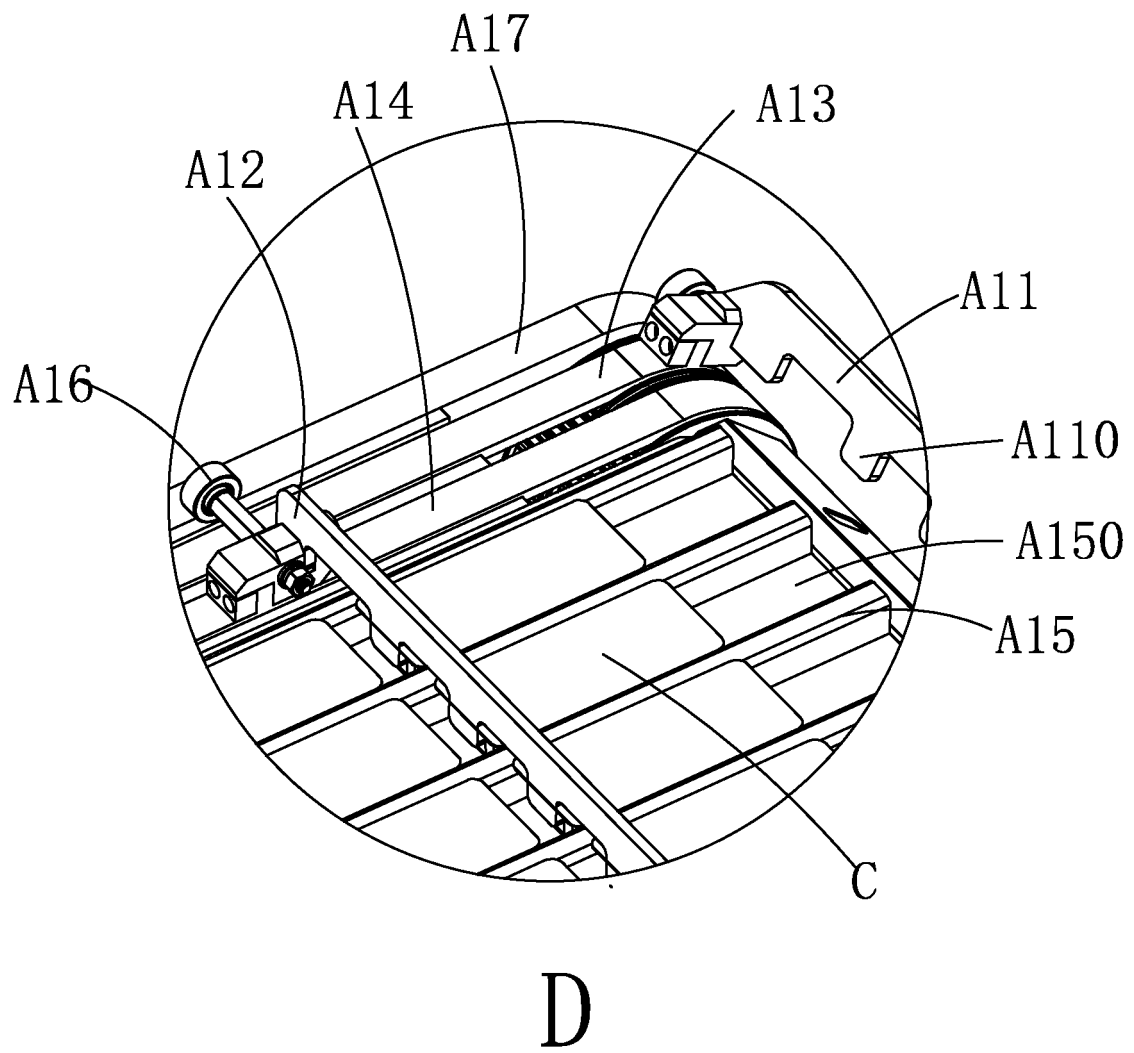


FIG. 11

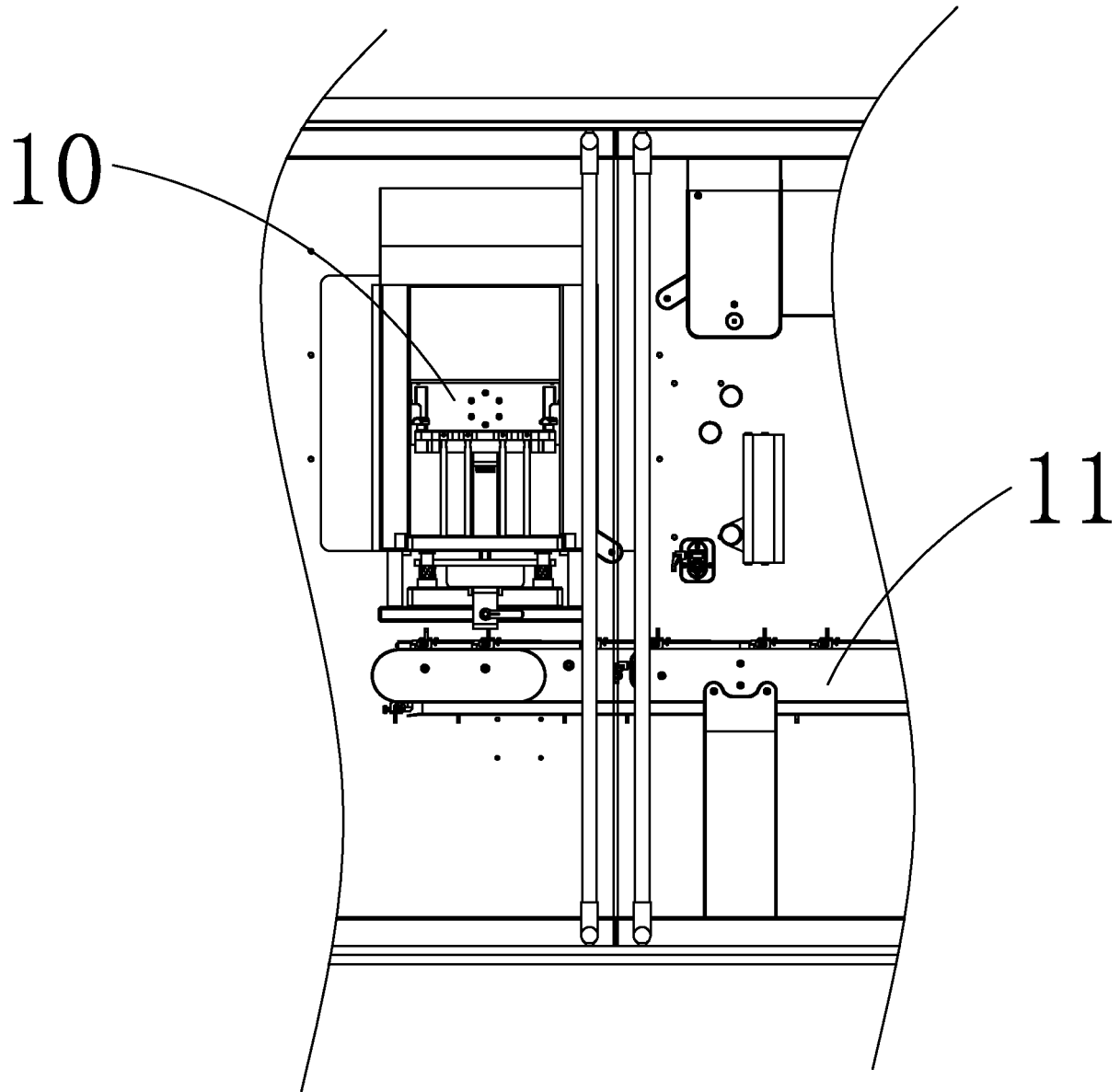


FIG. 12

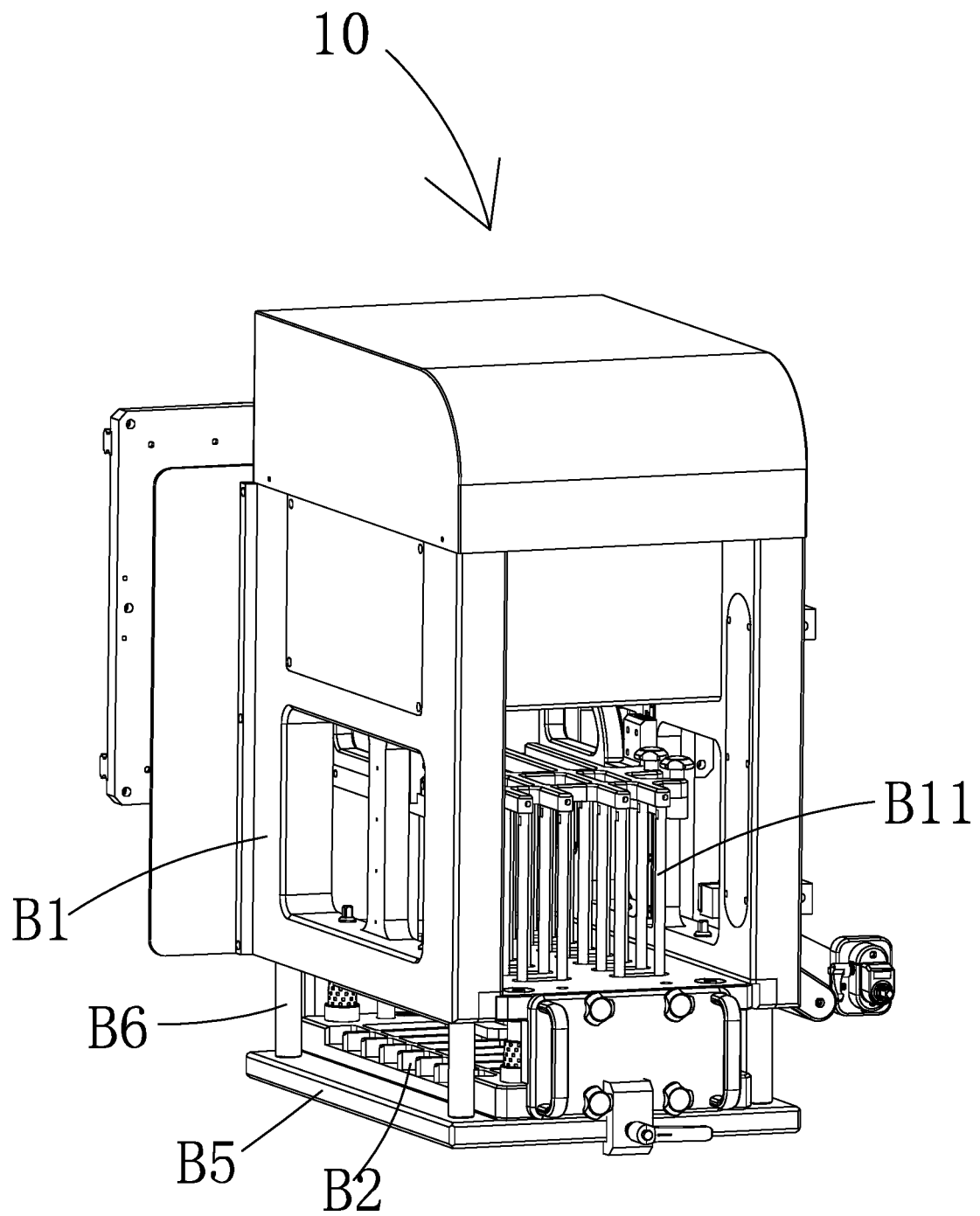


FIG. 13

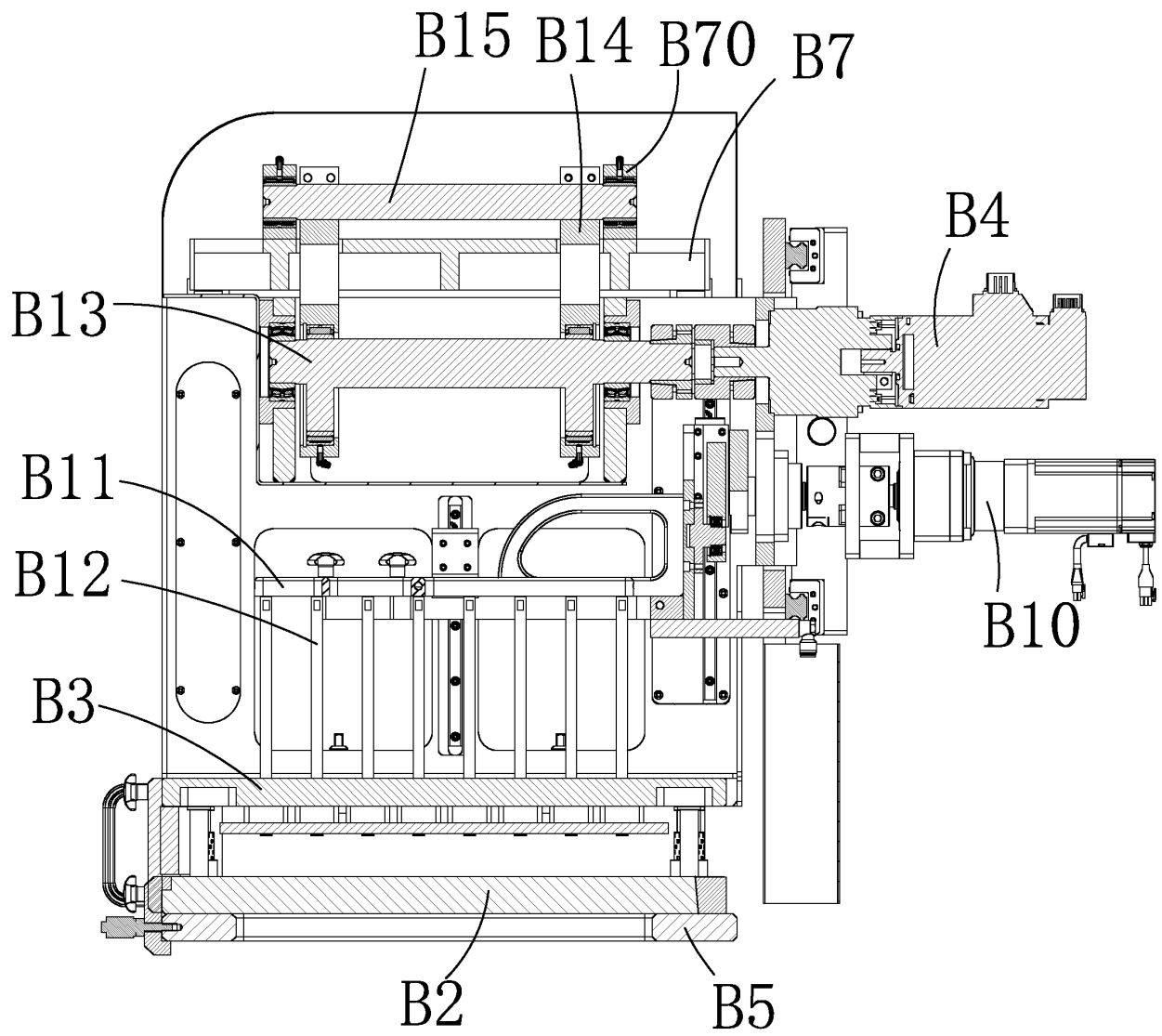


FIG. 14

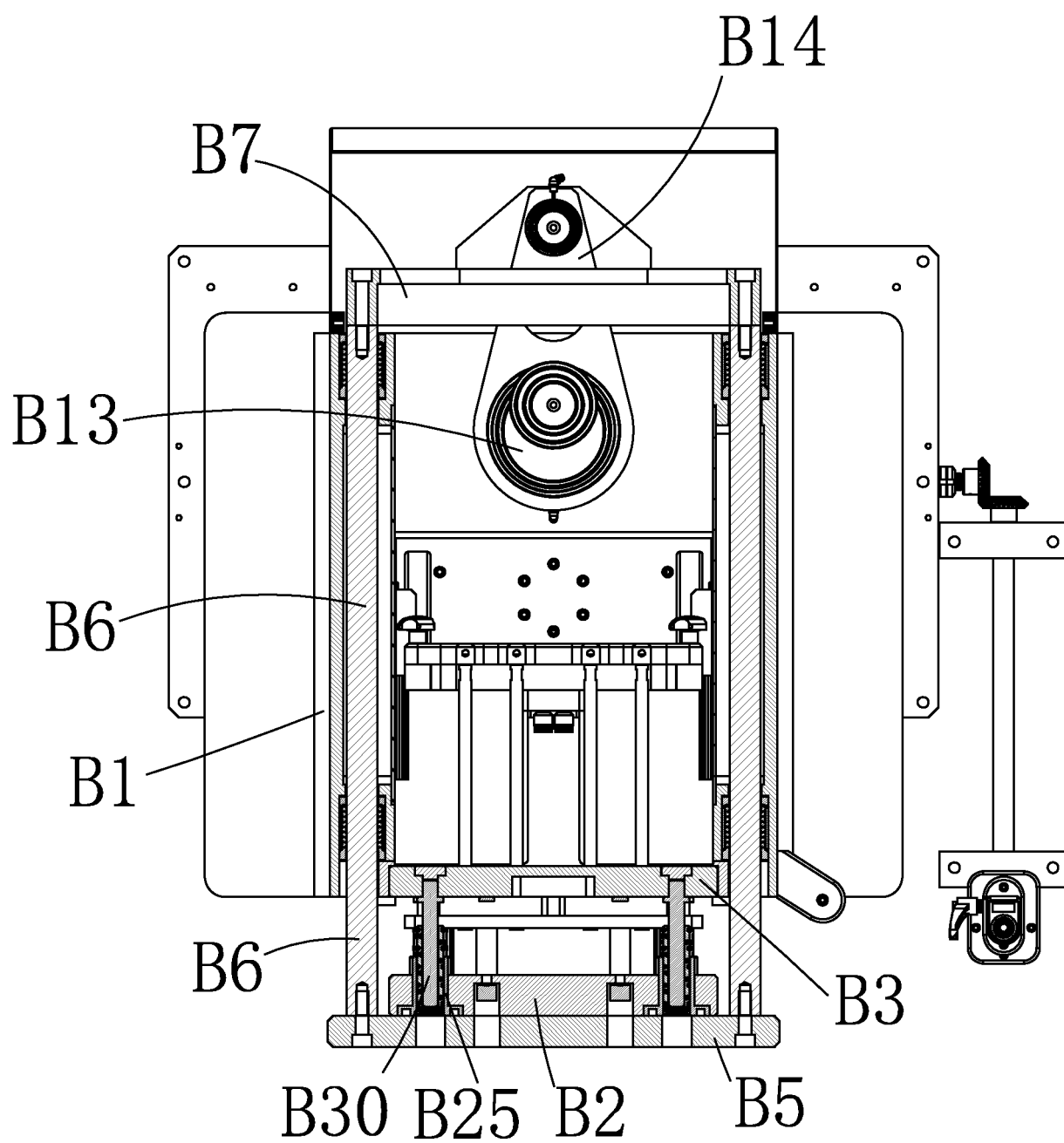


FIG. 15

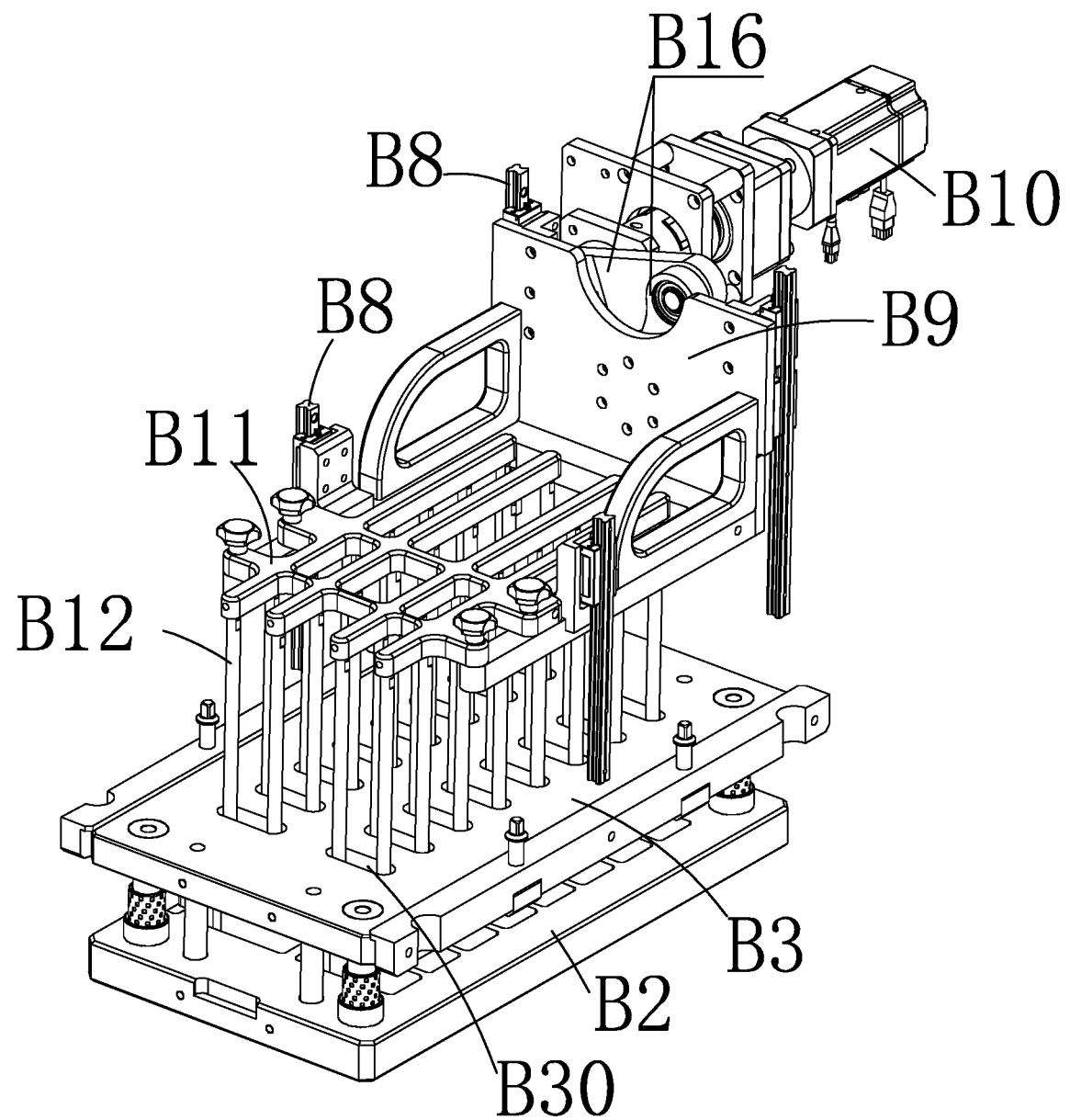


FIG. 16

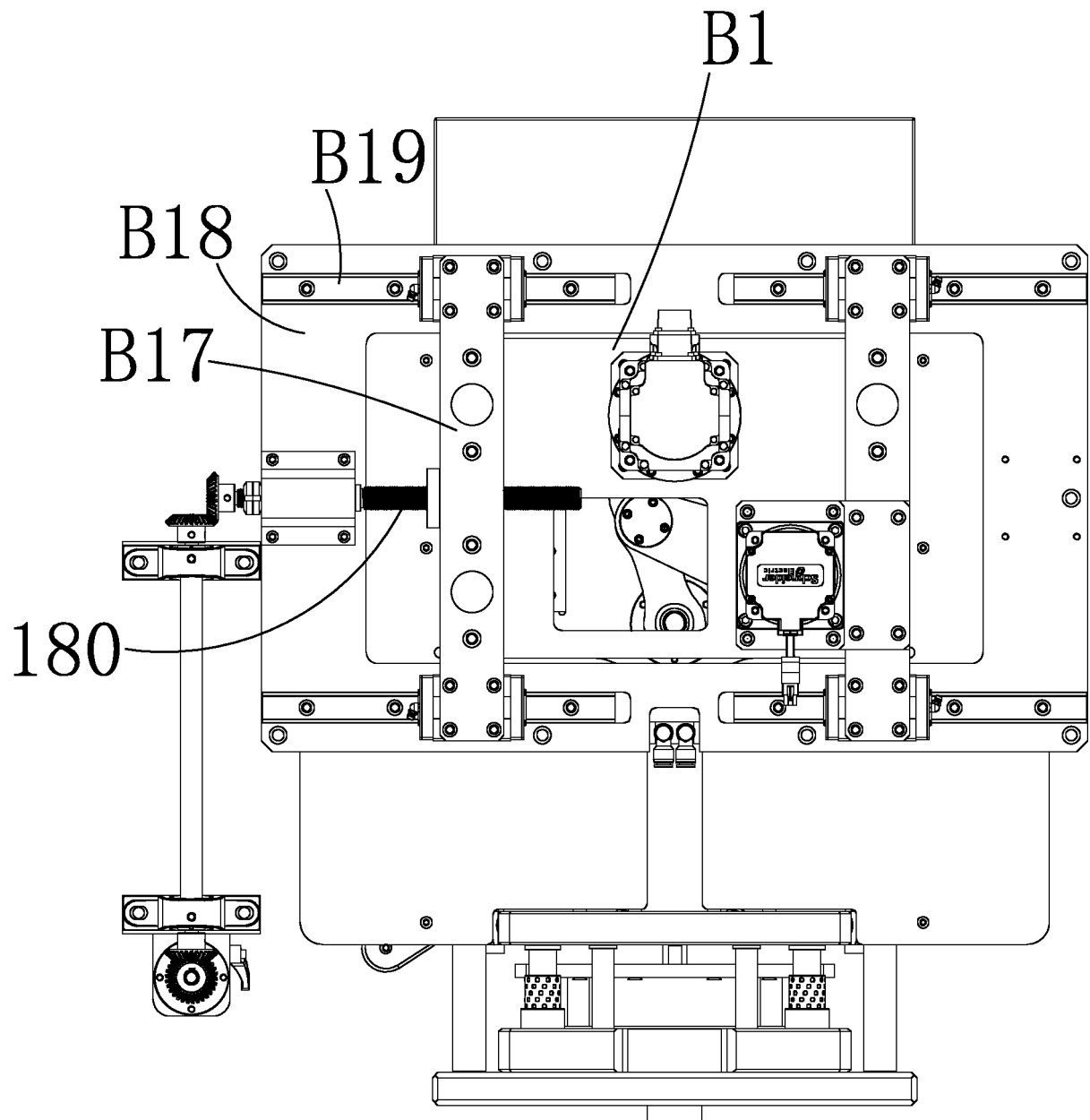


FIG. 17

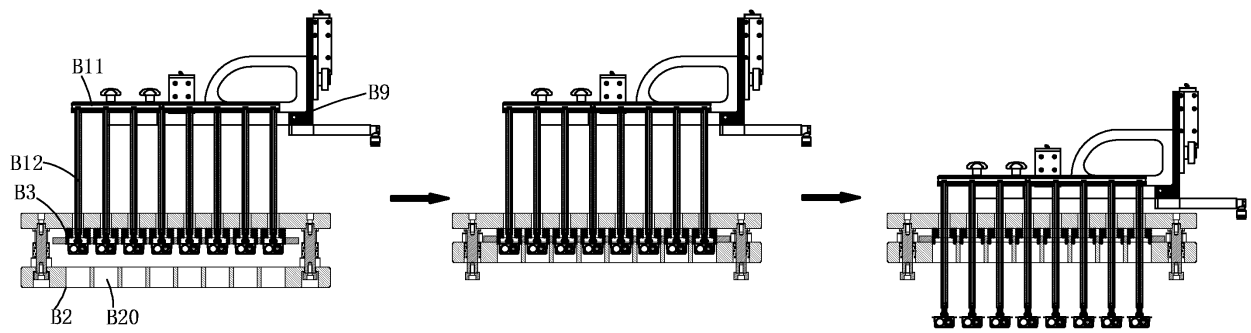


FIG. 18

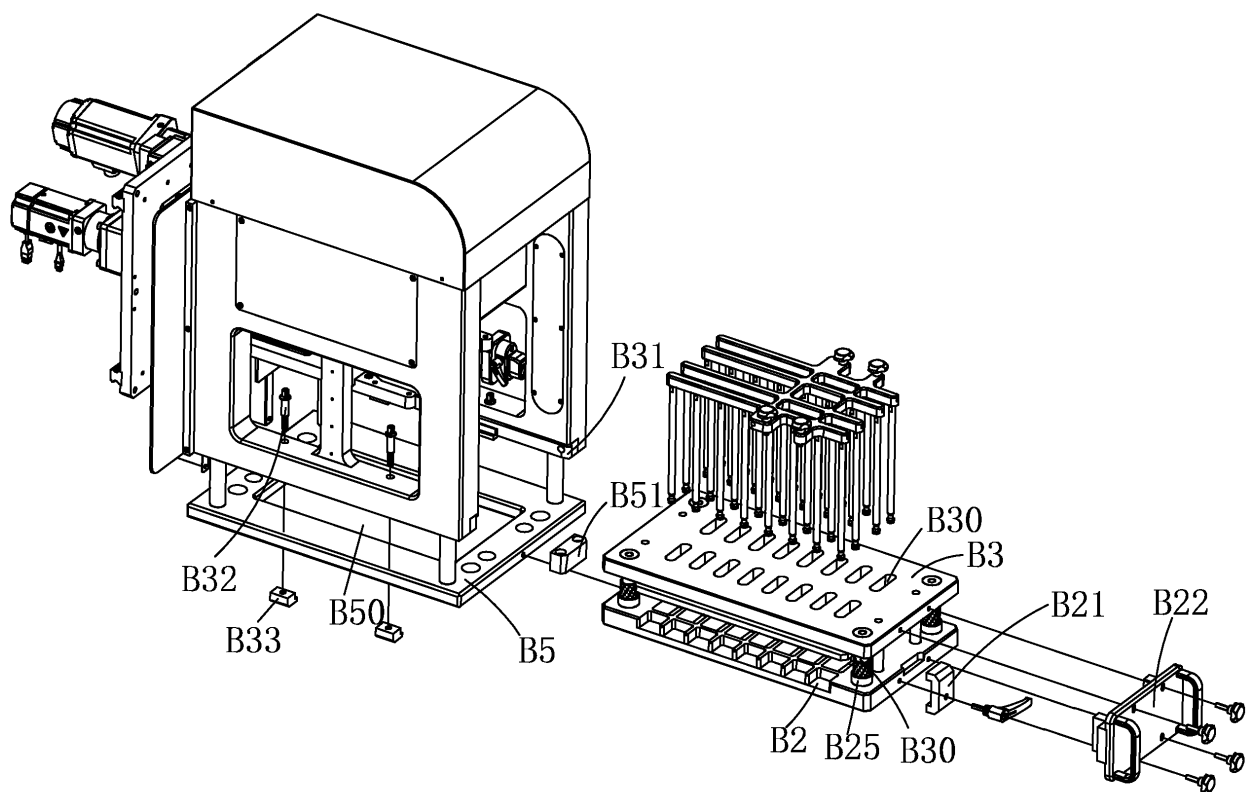


FIG. 19

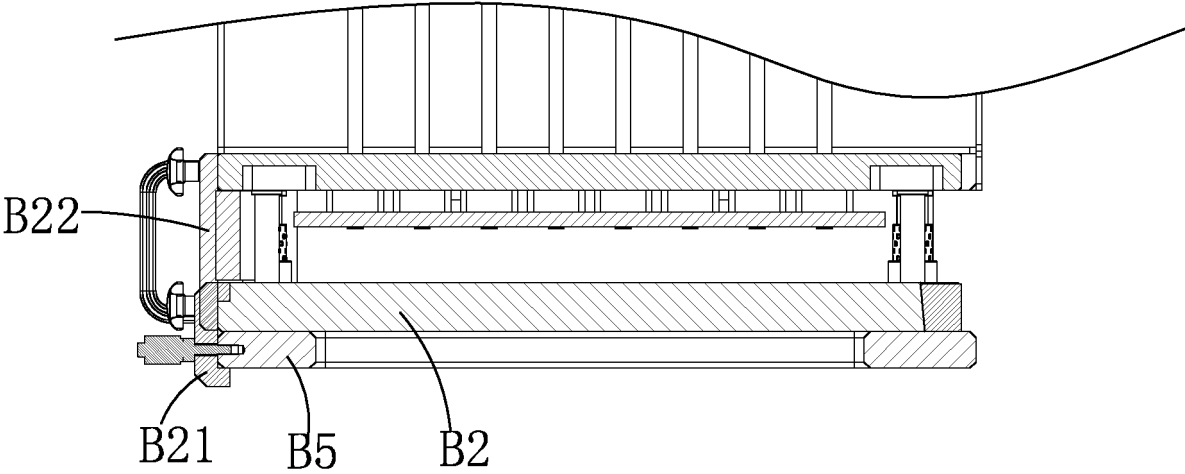


FIG. 20

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/109321

A. CLASSIFICATION OF SUBJECT MATTER B65B 35/38(2006.01)i; B65B 35/40(2006.01)i; B65B 59/00(2006.01)i; B65B 61/06(2006.01)i; B65B 11/52(2006.01)n According to International Patent Classification (IPC) or to both national classification and IPC																					
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) B65B; B65G Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CNABS; CNTXT; CNKI; WPABS; ENTXTC; VEN: 希望机械, 楚天科技, 泡罩, 泡壳, 变距, 分距, 推, 调, 间距, 距离, 冲裁, 裁切, 冲切, blister?, push+, adjust+, chang+, space, distance, punch+, cut+																					
C. DOCUMENTS CONSIDERED TO BE RELEVANT																					
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>PX</td> <td>CN 114524133 A (ZHEJIANG HOPING MACHINERY CO., LTD.) 24 May 2022 (2022-05-24) claims 1-10</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>CN 113023003 A (ZHEJIANG HAICHEN MACHINERY CO., LTD.) 25 June 2021 (2021-06-25) description, paragraphs [0002]-[0027], and figures 1-7</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>CN 112109966 A (YANTAI KAIBO AUTOMATION TECHNOLOGIES CO., LTD.) 22 December 2020 (2020-12-22) description, paragraphs [0028]-[0042], and figures 1-9</td> <td>1-10</td> </tr> <tr> <td>Y</td> <td>CN 112093173 A (ZHEJIANG HAICHEN MACHINERY CO., LTD.) 18 December 2020 (2020-12-18) description, paragraphs [0026]-[0034], and figures 1-8</td> <td>7-10</td> </tr> <tr> <td>Y</td> <td>CN 112249410 A (YANTAI KAIBO AUTOMATION TECHNOLOGIES CO., LTD.) 22 January 2021 (2021-01-22) description, paragraphs [0151]-[0160], and figures 1-11</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 215664348 U (TRUKING TECHNOLOGY LTD.) 28 January 2022 (2022-01-28) entire document</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	PX	CN 114524133 A (ZHEJIANG HOPING MACHINERY CO., LTD.) 24 May 2022 (2022-05-24) claims 1-10	1-10	Y	CN 113023003 A (ZHEJIANG HAICHEN MACHINERY CO., LTD.) 25 June 2021 (2021-06-25) description, paragraphs [0002]-[0027], and figures 1-7	1-10	Y	CN 112109966 A (YANTAI KAIBO AUTOMATION TECHNOLOGIES CO., LTD.) 22 December 2020 (2020-12-22) description, paragraphs [0028]-[0042], and figures 1-9	1-10	Y	CN 112093173 A (ZHEJIANG HAICHEN MACHINERY CO., LTD.) 18 December 2020 (2020-12-18) description, paragraphs [0026]-[0034], and figures 1-8	7-10	Y	CN 112249410 A (YANTAI KAIBO AUTOMATION TECHNOLOGIES CO., LTD.) 22 January 2021 (2021-01-22) description, paragraphs [0151]-[0160], and figures 1-11	1-10	A	CN 215664348 U (TRUKING TECHNOLOGY LTD.) 28 January 2022 (2022-01-28) entire document	1-10
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Date of the actual completion of the international search 23 October 2022	Date of mailing of the international search report 18 November 2022																				
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China Facsimile No. (86-10)62019451	Authorized officer Telephone No.																				

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INTERNATIONAL SEARCH REPORT

International application No.

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2022/109321

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		EP 2415675 B1	05 December 2012
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