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(54) **Packaging system**

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a packaging system that comprises two intermittent rotation-type bag filling and packaging apparatuses disposed in close proximity to each other.

2. Description of the Related Art

[0002] An intermittent rotation-type bag filling and packaging apparatus is an apparatus that holds two lateral edges of each one of bags using a pair of left and right grippers and intermittently conveys the bags along a circular conveying path in equiangular steps while successively performing packaging operations to each bag during the conveyance such as opening the mouth of the bag, filling the bag with the material to be packaged, sealing the mouth of the bag, and unloading a product bag (bag on which the packaging operations have been completed).

[0003] The intermittent rotation-type bag filling and packaging apparatus includes a rotary table which, for each of these packaging operations, has multiple pairs of right and left grippers disposed around the periphery of the table. The rotary table intermittently rotates, thereby causing the grippers to intermittently travel along circular travel paths in equiangular steps.

[0004] Other various packaging devices of the intermittent rotation-type bag filling and packaging apparatus include an empty bag supplying device that supplies empty bags to the grippers, a mouth-opening device that opens the mouths of the bags held by the grippers, a packaged material filling device that fills the bags held by the grippers with material to be packaged, a mouth-sealing device that seals the mouths of the bags held by the grippers, a product bag-unloading device that receives sealed product bags from the grippers and removes them from the conveying path. These packaging devices are disposed in the vicinity of the respective stop positions in the travel path of the grippers and successively perform the above-mentioned packaging operations.

[0005] US 2012/210675 A1 discloses a single rotation-type bag filling and packaging apparatus that holds two lateral edges of each one of bags using a pair of grippers to intermittently convey bags along a circular conveying path in equiangular steps and successively perform, during conveyance of bags, same packaging operations including opening mouths of bags, filling bags with material to be packaged, sealing the mouths of the bags, and unloading product bags. The intermittent rotation-type bag filling and packaging apparatus comprises:

a rotary table that has multiple pairs of grippers disposed around a periphery thereof and intermittently rotates, thereby causing the grippers to intermittently travel along a circular travel path in equiangular steps;

an empty bag supplying device for supplying a bag to the grippers;

a mouth-opening device for opening a mouth of the bag held by the grippers;

a packaged material filling device for filling the bag held by the grippers with material to be packaged;

a mouth-sealing device for sealing the mouth of the bag held by the grippers; and

a product bag unloading device that receives a sealed product bag from the grippers and removes the product bag from the conveying path.

[0006] The empty bag supplying device, mouth-opening device, packaged material filling device, mouth-sealing device, and product bag unloading device are disposed in vicinity of stop positions in the travel path of the grippers provided on the base of said rotary table. The empty bag supplying device and product bag unloading device are separated by a maintenance/reject station.

[0007] The intermittent rotation-type bag filling and packaging apparatuses generally comprises two types. One type of intermittent rotation-type bag filling and packaging apparatus uses a pair of right and left grippers to hold bags in an upright (vertical) orientation so that the bag mouth faces upward (see Japanese Patent Application Laid-Open (Kokai) No. 2007-126208), and the other type uses a pair of right and left grippers that hold bags in a horizontal attitude (see Japanese Patent Application Laid-Open (Kokai) No. H6-144403).

[0008] Intermittent rotation-type bag filling and packaging apparatuses have the following advantages.

(1) The packaging operations are carried out to grippers that have come to a stop in the travel path or to bags that have come to a stop in the conveying path. Accordingly, packaging can be performed in a reliable and stable manner.

(2) Unlike continuous transport-type bag filling and packaging apparatuses (see Japanese Patent Application Laid-Open (Kokai) No. 2001-72004), there is no need to provide follow-up mechanisms or synchronization mechanisms for each packaging device. Accordingly, the construction of each packaging device and the entire packaging apparatus can be made simpler and more compact, and costs can be reduced.

(3) Bags are conveyed along a circular conveying path in generally the bag width direction. Accordingly, bag swing motions are less likely to occurs during bag conveying process in comparison with intermittently conveying-type bag filling and packaging apparatuses, in which bags are conveyed along a rectilinear conveying path in the thickness direction of the bags (see Japanese Patent Application Laid-

Open (Kokai) No. 3-29650). In addition, various problems due to the swinging of the bags, such as, for example, downward slippage of heavy bags filled with the material to be packaged from the initial holding position of the grippers, the spilling of liquid substances that the bags are filled with, and adhesion of liquid substances to the portion to be sealed on the inner surface of the mouth, are less likely to occur.

(4) Each packaging device can be disposed around the periphery of the rotary tables, namely, in the vicinity of the peripheral edges of the packaging apparatus. Accordingly, it is easy to perform part replacements, to make adjustments, etc. associated with changes in the type of the product to be handled. For this reason, intermittent rotation-type bag filling and packaging apparatuses are highly versatile and easy to maintain and clean. By contrast, in intermittently conveying-type bag filling and packaging apparatuses (see Japanese Patent Application Laid-Open (Kokai) No. 3-29650), the packaging devices are disposed in the vicinity of the central portion of the packaging apparatus; accordingly, part replacements, adjustments, maintenance, cleaning, and the like are relatively difficult.

(5) The bag conveying path is circular. Accordingly, intermittent rotation-type bag filling and packaging apparatuses can effectively utilize substantially all of the conveying path for packaging and can provide space-saving and effective packaging operations. To the contrary, in intermittently conveying-type bag filling and packaging apparatuses (see Japanese Patent Application Laid-Open (Kokai) No. 3-29650), no packaging operations can be performed in the return portion of the chain conveyor.

[0009] Although the intermittent rotation-type bag filling and packaging apparatuses possess the above-described advantages, they have structural limitations on their speed of operation, and their processing power is inferior to that of continuous transport-type bag filling and packaging apparatuses. In addition, since intermittent rotation-type bag filling and packaging apparatuses convey bags in the bag width direction, they have a longer single conveying distance (conveying distance between the intermittent stop positions) than intermittently conveying-type bag filling and packaging apparatuses, which convey bags in the thickness direction (see Japanese Patent Application Laid-Open (Kokai) No. 3-29650), and their processing power is inferior to that of intermittently conveying-type bag filling and packaging apparatuses. Therefore, in order to achieve improvements in processing capacity while exploiting the advantages of intermittent rotation-type bag filling and packaging apparatuses, multiple-bag intermittent rotation-type bag filling and packaging apparatuses (see United States Patent No. 5,845,466 and Japanese Patent Application Laid-Open (Kokai) No. H10-77120) have been proposed, in which multiple empty bags are simultaneously fed to multiple pairs of grippers on rotary tables, and, while the multiple bags are being conveyed, the same packaging operations are simultaneously performed on the multiple bags in each stop position.

[0010] However, in multiple-bag intermittent rotation-type bag filling and packaging apparatuses, the diameter of the rotary tables, i.e., the diameter of the bag conveying path, is inevitably larger, and the conveying distance between the intermittent stop positions is also longer. This results in that even if the speed of rotation of the rotary tables is the same, the speed of bag conveyance and their acceleration/deceleration are high in comparison with ordinary single-bag intermittent rotation-type bag filling and packaging apparatuses. Accordingly, the bag swinging associated with intermittent transport increases, and there is a risk that various problems may arise due to such swinging (see (3) above). The problem is that, for this reason, in multiple-bag intermittent rotation-type bag filling and packaging apparatuses the speed of rotation of the rotary tables has to be made slower in comparison with single-bag intermittent rotation-type bag filling and packaging apparatuses, and, as a result, their processing power cannot be significantly improved. Consequently, in multiple-bag intermittent rotation-type bag filling and packaging apparatuses, improvement in the processing capacity is made by designing them such that the width dimensions of the bags being fed are limited to relatively small sizes and the diameter of the rotary tables is not excessively large.

[0011] On the other hand, installation of multiple intermittent rotation-type bag filling and packaging apparatuses has also been practiced in the past in order to achieve improvements in the processing capacity while exploiting the advantages of intermittent rotation-type bag filling and packaging apparatuses (see Japanese Patent Application Laid-Open (Kokai) No. H10-77120). However, the problem therein is that installing multiple intermittent rotation-type bag filling and packaging apparatuses requires a great amount of space for installation, and each packaging apparatus requires an operator (mainly for replenishing the supply of empty bags). In addition, each intermittent rotation-type bag filling and packaging apparatus needs to be provided with its own drive source, and moreover if product bags from individual intermittent rotation-type bag filling and packaging apparatuses are merged into a single stream, it is necessary to install dedicated equipment to deal with it, which makes the product bag carry-out line more complicated.

BRIEF SUMMARY OF THE INVENTION

[0012] The present invention is devised in view of the current state of the art in the field of intermittent rotation-type bag filling and packaging apparatuses, and it is an object of the invention to provide a packaging system that accomplishes improvements in processing capacity with a pair of intermittent rotation-type bag filling and

packaging apparatuses and further contributes installation space reduction and power savings in comparison with the existing art while at the same time simplifies product bag carry-out lines for such two packaging apparatuses.

[0013] The above object is accomplished by a unique structure of the present invention for a packaging system according to claim 1. It should be noted that "the same intermittent indexing mode" means that for both rotary tables, the duration of a single cycle of motion and stationary state, the distribution of travel time and stationary time during a single cycle, and the indexing angles are identical during the intermittent indexing motion of the rotary tables.

[0014] The packaging system according to the present invention can take the form of the following embodiments listed as examples:

(1) The timing of stop and rotation of the intermittent rotation of the two rotary tables is set to be substantially inverse to each other.

(2) In the above structure in which the tables rotate in opposite directions, the two intermittent rotation-type bag filling and packaging apparatuses have a common carry-out conveyor installed to discharge product bags supplied by each product bag unloading device in an alternating manner.

(3) In the two intermittent rotation-type bag filling and packaging apparatuses, the empty bag supplying devices, mouth-opening devices, packaged material filling devices, mouth-sealing devices, and product bag unloading devices are disposed in linearly symmetrical positions so that a line perpendicular to the line that connects the rotary shafts of the two rotary tables serves as an axis of symmetry.

(4) The grippers disposed on the rotary tables are of the duplex type, in which two pairs constitute a single set, and the holding surfaces of the two pairs of grippers of the same set used when holding a bag are disposed substantially in the same plane. When two bags held by two pairs of grippers of the same set are intermittently moved along the travel path, the above-described packaging operations are simultaneously performed on these two bags.

(5) The bags held by the grippers are in an upright orientation, with the bag mouths facing upward.

[0015] As seen from the above, in the packaging system according to the present invention, the two rotary tables are rotated in opposite directions, and two empty bag supplying devices and two product bag unloading devices are disposed adjacent each other on a common base between the two rotary tables. With this arrangement, the spacing between the two rotary tables can be narrower, and installation space reduction can be achieved for the entire packaging system.

[0016] In addition, such an arrangement as described above allows the direction of empty bag to be supplied to the two adjacent empty bag supplying devices to be the same. As a result, the burden of the operator who replenishes the supply of empty bags to the empty bag supplying device is greatly mitigated, and even a single operator can take care of the operation and management of the entire packaging system (that comprises two intermittent rotation-type bag filling and packaging apparatuses).

[0017] Furthermore, since the two product unloading devices are disposed adjacent each other, the product bags unloaded from the two intermittent rotation-type bag filling and packaging apparatuses are collected in a single location. Accordingly, the product bag transport line used to transport the product bags for post-processing is shared by the two intermittent rotation-type bag filling and packaging apparatuses and thus can be simplified, which also leads to installation space reduction.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0018]

FIG. 1 is a top view illustrating an example of a packaging system according to the present invention.

FIG. 2 is a top view illustrating another example of a packaging system according to the present invention.

FIG. 3 is a top view illustrating yet another example of a packaging system according to the present invention.

FIG. 4 is a top view illustrating still another example of a packaging system according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Below, a packaging system according to the present invention will be described in detail below with reference to Figures 1 to 4.

[0020] The packaging system illustrated in FIG. 1 is comprised of two intermittent rotation-type bag filling and packaging apparatuses 2, 3 which are installed adjacent each other on a common base 1. The intermittent rotation-type bag filling and packaging apparatuses 2, 3 include rotary tables 5, 6, respectively, that have multiple pairs (8 × 2 sets) of right and left grippers 4 disposed around their periphery. The rotary tables 5, 6 intermittently rotate, thereby causing the grippers 4 to intermittently travel along the circular travel paths in equiangular steps. The diameters of the travel paths of the grippers 4 of the rotary tables 5, 6 are set to be the same.

[0021] The intermittent rotation-type bag filling and packaging apparatuses 2, 3 make a duplex intermittent rotation-type bag filling and packaging apparatus (see Japanese Patent Application Laid-Open (Kokai) No. 2005-67644), in which two empty bags are simultaneously supplied to two pairs of grippers of the rotary tables

5, 6 and various packaging operations are simultaneously performed on the supplied two bags in each stop position while the two bags are being conveyed along the predetermined conveying paths.

[0022] A drive motor, etc. (not shown), which serves as a common drive source to rotate the rotary tables 5, 6, is provided in the base 1. The drive force of the drive motor is transmitted to the index devices (not shown) of the rotary tables 5, 6 through reduction gears (not shown) and is then transmitted to the rotary tables 5, 6. The transmission of the drive force to the index devices of the rotary tables 5, 6 can be individually enabled or blocked using, e.g., a clutch.

[0023] The intermittent indexing modes of the rotary tables 5, 6 (or the duration of a single cycle of motion and stationary state, the distribution of travel time and stationary time during a single cycle, and the indexing angles) are set using the indexing devices such that they are identical. In addition, the rotary tables 5, 6 are intermittently rotated in mutually opposite directions (the rotary table 5 of the intermittent rotation-type bag filling and packaging apparatus 2 is rotated counterclockwise while the rotary table 6 of the intermittent rotation-type bag filling and packaging apparatus 3 is rotated clockwise) and, at the same time, the timing of moving (rotation) and stopping is set to be substantially inverse to each other. In FIG. 1, the rotary table 5 is at a stop while the rotary table 6 is moving (rotating). In this manner, since the timing of moving and stopping of the rotary tables 5, 6 is set to be substantially inverse to each other (the timing of moving and stopping is shifted by a half-cycle), the load applied to the drive source is evened out, and it is possible to render the drive source more compact and improve its durability without reducing the processing power of the packaging system.

[0024] During each complete revolution, the rotary tables 5, 6 stop eight times at equiangular intervals, respectively. The position of closest proximity between the travel path of the grippers 4 of the rotary table 5 and the travel path of the grippers 4 of the rotary table 6 is selected as one of the stop positions (stop position H of the table 5 and stop position h of the table 6) of the grippers 4 in the travel path, and seven other stop positions (A-G of the table 5 and a-g of the table 6) are set at angular intervals of 45° from the stop positions H, h along the travel paths.

[0025] Product bag unloading devices 8, 9, which removes the product bags 7A out of the conveying path, are disposed so as to be adjacent each other on the base 1 in the vicinity of the most proximate stop positions H, h among the stop positions A-H and stop positions a-h, respectively. In addition, empty bag supplying devices 10, 11, which supply bags 7 (which are also called "empty bags 7") to the grippers 4, are provided adjacent each other on the base 1 in the vicinity of the next (in terms of the direction of rotation of the tables) stop positions A, a, respectively.

[0026] Further provided on the base 1 so as to surround the rotary tables 5, 6, respectively, are:

- bag height sensors 12 (for table 5), 13 (for table 6), which are disposed in the vicinity of stop positions B, b to detect the height of the bags 7 held by the grippers 4;
- mouth-opening devices 14 (for table 5), 15 (for table 6), which are disposed in the vicinity of stop positions C, c to open the mouths of the bags 7 held by the grippers 4;
- packaged material filling devices 16 (for table 5), 17 (for table 6), which are disposed in the vicinity of stop positions D, d to fill the bags 7 with the materials to be packaged (solid materials);
- packaged material filling devices 18 (for table 5), 19 (for table 6), which are disposed in the vicinity of stop positions E, e to fill the bags 7 with the materials to be packaged (liquid materials);
- steam degassing devices 20 (for table 5), 21 (for table 6), which are disposed in the vicinity of stop positions F, f to degas the inside of the bags 7 by blowing steam into the bags 7; and
- ultrasonic sealing devices 22 (for table 5), 23 (for table 6), which are disposed in the vicinity of stop positions G, g to seal the mouths of the bags 7.

[0027] The product bag unloading devices 8 and 9, empty bag supplying devices 10 and 11, bag height sensors 12 and 13, mouth-opening devices 14 and 15, packaged material filling devices 16 and 17, packaged material filling devices 18 and 19, steam degassing devices 20 and 21, and ultrasonic sealing devices 22 and 23 are disposed in substantially linearly symmetrical positions with reference to line Z which is perpendicular to an imaginary line connecting the rotary shafts (X, Y) (or connecting the centers) of the rotary tables 5, 6 and serves as an axis of symmetry.

[0028] The drive source that intermittently rotates the rotary tables 5, 6 is also the drive source that actuates the various packaging devices that are described above and provided around the tables 5, 6. The transmission of drive force to the various packaging devices, which is done in the same manner as to the rotary tables 5, 6, can be enabled or blocked using the clutch.

[0029] Furthermore, on the base 1, a quadruplex conveyor magazine-type empty bag supplying device 24 is provided so that it extends from the outside onto the base 1 with its front end being near the empty bag supplying devices 10, 11. In addition, below and between the adjacent product bag unloading devices 8, 9, a product bag carry-out conveyor 25 is provided so that it extends out to the outside of the base 1. These conveyor magazine-type empty bag supplying device 24 and product bag carry-out conveyor 25 are shared by the intermittent rotation-type bag filling and packaging apparatuses 2, 3, and therefore only one conveyor magazine-type empty bag supplying device 24 and one product bag carry-out conveyor 25 is sufficient for both filling and packaging

apparatuses.

[0030] The conveyor magazine-type empty bag supplying device 24 has quadruplex conveyors 24a-24d aligned longitudinally in parallel to each other. The right-hand duplex conveyors 24a, 24b simultaneously supply a total of two empty bags 7 to the empty bag supplying device 10 of the intermittent rotation-type bag filling and packaging apparatus 2, and the left-hand duplex conveyors 24c, 24d simultaneously supply a total of two empty bags 7 to the empty bag supplying device 11 of the intermittent rotation-type bag filling and packaging apparatus 3. The product bag carry-out conveyor 25 receives product bags 7A, which are alternatingly discharged from the two filling and packaging apparatuses 2, 3 two at a time, by the product bag unloading devices 8, 9 and carries them out of the system for post-processing (for example, disinfection, boxing, and the like). The direction of transport of the bags 7 in the conveyor magazine-type empty bag supplying device 24 and the carrying-out direction of the product bags 7A in the product bag carry-out conveyor 25 is the same, and these directions are perpendicular to the imaginary line that connects the rotary shafts of the rotary tables 5, 6 (and extends from the front side towards the opposite side in FIG. 1), thus being parallel to line Z

[0031] The packaging operations successively performed in the intermittent rotation-type bag filling and packaging apparatuses 2, 3 will be described below.

(1) Empty bags 7 positioned at the distal end of the conveyor magazine-type empty bag supplying device 24 are adhered by suction cups, not shown, and picked up thereby from the conveyors 24a-24d, with the orientation of the bags 7 changed to a vertical orientation, in which the mouths of the bags are oriented (or facing) upward (bags in such a vertical orientation are indicated with reference number "7a" in FIG. 1).

Subsequently, the chuck members (not shown) of the empty bag supplying devices 10, 11 clamp the empty bags 7 (7a), change the orientation of the empty bags 7 by a predetermined angle, while conveying them, in a horizontal plane, and supply them to the grippers 4 that have come to a stop in stop positions A, a (see the packaged bag supplying device S described in Patent No. 5,044,844, and the supplying device described in Utility Model Registration No. 3123709) of the tables 5, 6, respectively The chuck members of the empty bag supplying device 10 and the chuck members of the empty bag supplying device 11 operate in mutually opposite directions (in a linearly symmetrical manner).

The operation to supply the bags 7 (two at a time) to the grippers 4 of the intermittent rotation-type bag filling and packaging apparatus 2 by the empty bag supplying device 10 and the operation to supply the bags 7 (two at a time) to the grippers 4 of the intermittent rotation-type bag filling and packaging apparatus 3 by the empty bag supplying device 11 are performed in an alternating manner.

In the above, the operation to supply the bags 7 to the two intermittent rotation-type bag filling and packaging apparatuses 2, 3 (or to the empty bag supplying devices 10, 11) is executed using one conveyer magazine-type empty bag supplying device 24. Accordingly, it is possible to render the packaging system more compact and reduce its installation space, and the operation to replenish the supply of empty bags on the conveyors 24a-24d can be easily performed by the operator. In addition, since there is no need to provide two conveyer magazine-type empty bag supplying devices, the entire packaging system can be simplified, and installation space can be reduced.

(2) In stop positions B, b, the height of the bags 7 held by the grippers 4 is checked by the bag height sensors 12, 3, and the results are sent to a controller (not shown). In this checking of the height of the bags 7, if the height of any bag(s) deviates from the standard height by a specified value or more, then the controller (not shown) designates such bag(s) 7 as defective, and in the subsequent stop position no packaging operations are performed on such defective bag(s) 7. For example, in stop positions G, g, the grippers 4 are opened and such defective bag(s) 7 is discharged from the system through a chute and the like. Alternatively, packaging operations can still be performed on such defective bag(s) 7 in the subsequent stop position such that the elevation of the ultrasonic horn and anvil (not shown) of the ultrasonic sealing devices 22,23 is adjusted depending on the deviation of the height from the standard height.

(3) In stop positions C, c, the mouths of the bags 7 held by the grippers 4 are opened by the mouth-opening devices 14, 15.

(4) In stop positions D, d, the bags 7 held by the grippers 4 are filled with the material to be packaged (solid material) by the packaged material filling devices 16, 17.

(5) In stop positions E, e, the bags 7 held by the grippers 4 are filled with the material to be packaged (liquid material) by the packaged material filling devices 18, 19.

(6) In stop positions F, f, steam is injected into the bags 7 held by the grippers 4 by the steam degassing devices 20,21 in order to degas the inside of the bags.

(7) In stop positions G, g, the mouths of the bags 7 held by the grippers 4 are sealed by the ultrasonic sealing devices 22, 23.

(8) In stop positions H, h, the chuck members (not shown) of the product bag unloading devices 8, 9 clamp the product bags 7A held by the grippers 4 and, after the grippers 4 are opened, convey the product bags 7A in a horizontal plane to the product bag carry-out conveyer 25, and then release the

product bags 7A onto the carry-out conveyer 25. While the product bags 7A are being conveyed, their orientation is changed 90° in a horizontal plane. The product bag unloading devices 8, 9 are substantially the same as the empty bag supplying devices 10, 11. The chuck members (not shown) of the product bag unloading device 8 and the chuck members (not shown) of the product bag unloading device 9 operate in mutually opposite directions (in a linearly symmetrical manner).

[0032] The timing of the grippers 4 of the rotary table 5 coming to a stop in stop position H and of the grippers 4 of the rotary table 6 coming to a stop in stop position h are relatively shifted by a half-cycle, as a result of which the unloading of the product bags 7A by the product bag unloading devices 8, 9 is carried out in an alternating manner. Accordingly, the product bags 7A are transported out from the system in two rows by the product bag carry-out conveyer 25 and sent to the next step (disinfection, boxing, etc.).

[0033] Since the product bag unloading devices 8, 9 are disposed adjacent each other and the product bags 7A are discharged onto a common product bag carry-out conveyer 25, the product bag transport line is simplified and installation space can be reduced.

[0034] FIG. 2 shows another packaging system that differs from the packaging system illustrated in FIG. 1

[0035] The difference of the packaging system of FIG. 2 from that of FIG. 1 is that the timing of moving and stopping of the rotary tables 5, 6 is synchronized and, at the same time, ordinary chutes (not shown; see the product discharge (14) described in Japanese Patent Application Laid-Open (Kokai) No. 2007-126208), are provided adjacent each other in the vicinity of stop positions H, h as product unloading devices instead of the product unloading devices 8, 9. In other respects, the packaging system of FIG. 2 is essentially identical to the packaging system illustrated in FIG. 1. In FIG. 2, parts that are substantially the same as the parts of the packaging system illustrated in FIG. 1 are assigned the same reference numerals.

[0036] The packaging system illustrated in FIG. 2 is designed such that a total of four (4) product bags 7A (two at a time) are simultaneously released from the grippers 4 that have come to a stop in stop positions H, h and fall onto the product bag carry-out conveyer 25 through the chutes, and then the product bags 7A, aligned in two rows, are transported out of the system and sent to the next step (disinfection, boxing, etc.). In this packaging system of FIG. 2, the orientation of the product bags 7A transported on the product bag carry-out conveyer 25 differs from the orientation of transport in the packaging system illustrated in FIG. 1 by 90°, and the product bags 7A are transported in the width direction.

[0037] FIG. 3 shows still another packaging system that differs from the packaging system illustrated in FIG. I

[0038] The difference of the packaging system of FIG. 3 from that of FIG. 1 is that the timing of moving and stopping of the rotary tables 5, 6 is synchronized, and at the same time the spacing between the rotary tables 5, 6 is set larger or slightly expanded and the width of the product bag carry-out conveyer 25 is set also larger or increased. In other respects, the packaging system of FIG. 3 is essentially identical to the packaging system illustrated in FIG. 1. In FIG. 3, parts that are substantially the same as the parts of the packaging system illustrated in FIG. 1 are assigned the same numerals.

[0039] The packaging system illustrated in FIG. 3 is designed such that the two product bags 7A held by the grippers 4 that have come to a stop in stop position H of the table 5 are clamped by the chuck members (not shown) of the product bag unloading device 8, and the two product bags 7A held by the grippers 4 that have come to a stop in stop position h of the table 6 are clamped by the chuck members (not shown) of the product bag unloading device 9. After the grippers 4 of both intermittent rotation-type bag filling and packaging apparatuses 2, 3 are opened, the product bags 7A are conveyed in a horizontal plane to the product bag carry-out conveyer 25, and, after reaching the conveyor, the product bags 7A are released onto the carry-out conveyer 25. While the four product bags 7A are being conveyed, their orientation is changed 90° in a horizontal plane, and they are lined up in one row in the bag width direction on product bag carry-out conveyer 25, such that the two product bags 7A clamped by the chuck members of the product bag unloading device 8 fall on the right-hand side relative to the center of the product bag carry-out conveyer 25 and, simultaneously, the two product bag 7A clamped by the chuck members of the product bag unloading device 9 fall on the left-hand side relative to the center of the product bag carry-out conveyer 25. Consequently, the product bags 7A are transported out from the system in four rows by the product bag carry-out conveyer 25 and sent to the next step (disinfection, boxing, etc.).

[0040] In the above-described packaging systems, the two intermittent rotation-type bag filling and packaging apparatuses 2, 3 are both operated; however, it is also possible to operate only one of the apparatuses.

[0041] In addition, while in the above-described packaging systems the intermittent rotation-type bag filling and packaging apparatuses are of a type in which the bags are held by a pair of right and left grippers in an upright orientation with the bag mouth facing upward, the present invention is also applicable to bag filling and packaging apparatuses of the type in which the bags are held by a pair of right and left grippers in a horizontal attitude (see Japanese Patent Application Laid-Open (Kokai) No. H6-144403).

[0042] Furthermore, while in the above-described packaging systems, the product bag unloading devices 8, 9 are disposed adjacent each other in the vicinity of the most proximate stop positions H, h, and the empty bag supplying devices 10, 11 are disposed adjacent each other in the following stop positions A, a (located on the

downstream side of the stop positions H, h in terms of the direction of rotation of the tables), it is also possible to provide the empty bag supplying devices 10, 11 in the vicinity of stop positions H, h and provide the product bag unloading devices 8, 9 in the vicinity of the preceding stop positions G, g (located on the upstream side of the stop positions H, h in terms of the direction of rotation of the tables). One example of this structure is shown in FIG. 4.

[0043] The packaging system shown in FIG. 4 differs from the packaging system of FIG. 3 in that the empty bag supplying devices 10, 11 are disposed adjacent each other in the vicinity of the stop positions H, h, and the product bag unloading devices 8, 9 are disposed adjacent each other in the vicinity of the stop positions G, g that precede the stop positions H, h. in terms of the direction of rotation of the rotary tables 5, 6. In addition, in the packaging system shown in FIG. 4, the bag height sensors 12 and 13, mouth-opening devices 14 and 15, packaged material filling devices 16 and 17, packaged material filling devices 18 and 19, steam degassing devices 20 and 21, and ultrasonic sealing devices 22 and 23 are disposed at locations shifted 45 degrees, in terms of the direction opposite (backward) to the direction of rotation of the rotary tables 5 and 6, compared to the locations of those devices of the system shown in FIG. 3. In FIG.4, parts that are substantially the same as the parts of the packaging system illustrated in FIG. 1 are assigned the same reference numerals.

Claims

1. A packaging system wherein:

two intermittent rotation-type bag filling and packaging apparatuses (2, 3), which are provided in close proximity to each other, hold two lateral edges of each one of bags using a pair of grippers to intermittently convey bags along a circular conveying path in equiangular steps and successively perform, during conveyance of bags, same packaging operations including opening mouths of bags, filling bags with material to be packaged, sealing the mouths of the bags, and unloading product bags; and
each intermittent rotation-type bag filling and packaging apparatus comprises:

a rotary table (5, 6) that has multiple pairs of grippers (4) disposed around a periphery thereof and intermittently rotates, thereby causing the grippers to intermittently travel along a circular travel path in equiangular steps;
an empty bag supplying device (10, 11) for supplying a bag to the grippers;
a mouth-opening device (14, 15) for opening a mouth of the bag held by the grippers;
a packaged material filling device (16, 17; 18, 19) for filling the bag held by the grippers with material to be packaged;
a mouth-sealing device (22, 23) for sealing the mouth of the bag held by the grippers; and
a product bag unloading device (8, 9) that receives a sealed product bag (7A) from the grippers and removes the product bag from the conveying path; and

the empty bag supplying device (10, 11), mouth-opening device (14, 15), packaged material filling device (16, 17; 18, 19), mouth-sealing device (22, 23), and product bag unloading device (8, 9) are disposed in vicinity of stop positions in the travel path of the grippers (4),:
said packaging system being **characterized in that**:

said two rotary tables (5, 6) are disposed adjacent each other on a common base (1) and connected to a common drive source so as to intermittently rotate in mutually opposite directions in a same intermittent indexing mode,
said empty bag supplying device (10, 11), mouth-opening device (14, 15), packaged material filling device (16, 17; 18, 19), mouth-sealing device, and product bag unloading device (8, 9) are provided on the base (1) for each one of said rotary tables (5, 6), and
said product bag unloading devices (8, 9) are disposed adjacent each other in a most mutually proximate stop positions (H, h) among stop positions (A-H, a-h) of the rotary tables (5, 6), and said empty bag supplying devices (10, 11) are disposed adjacent each other in mutually proximate stop positions (A, a) that follow in terms of a direction of rotation of said two rotary tables (15, 16), said most mutually proximate stop positions (H, h; A, a), said product bag unloading devices (8, 9) and said empty bag supplying devices (10, 11) being located between said two intermittent rotation-type bag filling and packaging apparatuses (2, 3) or said empty bag supplying devices (10, 11) are disposed adjacent each other in a most mutually proximate stop positions (H, h) among stop positions (A-H; a-h) of the rotary tables (5, 6), and said product bag unloading devices (8, 9) are disposed adjacent each other in most mutually proximate stop positions (G, g) that precede in terms of a direction of rotation of said two rotary tables (5, 6), said most mu-

tually proximate stop positions (H, h; G, g), said product bag unloading devices (8, 9) and said empty bag supplying devices (10, 11) being located between said two intermittent rotation-type bag filling and packaging apparatuses (2, 3).

2. The packaging system according to claim 1, wherein timing of moving and stopping the intermittent rotation of said rotary tables is set to be substantially inverse to each other.

3. The packaging system according to claim 2, wherein
said two intermittent rotation-type bag filling and packaging apparatuses are provided with a common carry-out conveyor, and
said product bag unloading devices discharge the product bag in an alternating manner.

4. The packaging system according to claim 2 or 3, wherein in said two intermittent rotation-type bag filling and packaging apparatuses, the empty bag supplying devices, mouth-opening devices, packaged material filling devices, mouth-sealing devices, and product bag unloading devices are disposed in linearly symmetrical positions with a line perpendicular to a line that connects the rotary shafts of the two rotary tables serving as an axis of symmetry.

5. The packaging system according to any one of claims 1 through 4, wherein
said grippers disposed on the rotary tables are of a duplex type, in which two pairs of grippers constitute a single set, and
holding surfaces of said two pairs of grippers of a same set used when holding a bag are disposed substantially in a same plane, and,
while two bags held by two pairs of grippers of the same set intermittently travel along the travel path, the packaging operations are simultaneously performed on said two bags.

6. The packaging system according to any one of claims 1 through 5, wherein the bag held by said grippers is in an upright orientation with bag mouth thereof facing upward.

Patentansprüche

1. Verpackungssystem, wobei:

zwei Beutelfüll- und Verpackungsvorrichtungen (2, 3) mit intermittierender Drehung, die in unmittelbarer Nähe zueinander angeordnet sind, zwei Seitenkanten von jedem Beutel mit einem Paar von Greifern halten, um Beutel intermittierend längs eines kreisförmigen Bewegungspfads in gleichmäßige Winkelschritten zu bewegen und während der Beutelbeförderung schrittweise gleiche Verpackungsoperationen auszuführen, darunter Öffnen des Beuteleingangs, Füllen der Beutel mit dem zu verpackenden Material, Versiegeln der Beuteleingänge und Auswerfen von Produktbeuteln; und
wobei jede Beutelfüll- und Verpackungsvorrichtung mit intermittierender Drehung umfasst:

einen Drehtisch (5, 6), der mehrere an seinen Umfang angeordnete Greiferpaare (4) aufweist und sich intermittierend dreht, wodurch er die Greifer zum intermittierenden Bewegen längs eines kreisförmigen Bewegungspfads in gleichmäßige Winkelschritten veranlasst;
eine Leerbeutel-Bereitstellungseinheit (10, 11) zum Zuführen eines Beutels an die Greifer;
eine Beutefeingangs-Öffnungseinheit (14, 15) zum Öffnen eines Beuteleingangs, der von den Greifern gehalten wird;
eine Verpackungsmaterial-Fülleinheit (16, 17; 18, 19) zum Füllen des Beutels mit dem zu verpackenden Material, der von den Greifern gehalten wird;
eine Eingangs-Versiegelungseinheit (22, 23) zum Versiegeln des Eingangs des Beutels, der von den Greifern gehalten wird; und
eine Produktbeutel-Auswurfeinheit (8, 9), die einen versiegelten Produktbeutel (7A) von den Greifern erhält und den Produktbeutel aus dem Beförderungspfad entfernt; und
die Leerbeutel-Zuführungseinheit (10, 11), die Beuteleingangs-Öffnungseinheit (14, 15), die Verpackungsmaterial-Fülleinheit (16, 17; 18, 19), die Beuteleingangs-Versiegelungseinheit (22, 23) und die Produktbeutel-Auswurfeinheit (8, 9) in der Nähe der Stopppositionen in dem Bewegungspfad der Greifer (4) angeordnet sind;

wobei das Verpackungssystem **dadurch gekennzeichnet ist, dass**:

zwei Drehtische (5, 6) einander benachbart auf einem gemeinsamen Unterbau (1) angeordnet sind und mit einer gemeinsamen Antriebsquelle verbunden sind, sodass sie sich intermittierend in entgegengesetzte Richtungen in einem ebenso intermittierenden Indexierungsmodus drehen,
die Leerbeutel-Zuführungseinheit (10, 11), die Beuteleingangs-Öffnungseinheit (14,

15), die Fülleinheit für zu verpackendes Material (16, 17; 18, 19), die Beuteleingangs-Versiegelungseinheit und die Produktbeutel-Auswurfeinheit (8, 9) auf dem Unterbau (1) für jeden der Drehtische (5, 6) bereitgestellt werden, und
die Produktbeutel-Auswurfeinheiten (8, 9) nebeneinander an den relativ zueinander nächsten Stopppositionen (A H, h) unter den Stopppositionen (A-H, a-h) der Drehtische (5, 6) und die Leerbeutel-Zuführungseinheiten (10, 11) nebeneinander an den relativ zueinander nächsten Stopppositionen (A, a) angeordnet sind, die einer Drehrichtung der zwei Drehtische (15, 16) nachfolgen, wobei die relativ zueinander nächsten Stopppositionen (H, h; A, a) der Produktbeutel-Auswurfeinheiten (8, 9) und der Leerbeutel-Zuführungseinheiten (10, 11) mit intermittierender Drehung zwischen den zwei Beutelfüll- und Verpackungsvorrichtungen (2, 3) angeordnet sind oder die Leerbeutel-Zuführungseinheiten (10, 11) nebeneinander an den relativ zueinander nächsten Stopppositionen (H, h) unter den Stopppositionen (A-H; a-h) der Drehtische (5, 6) angeordnet sind und wobei die Produktbeutel-Auswurfeinheiten nebeneinander an den relativ zueinander nächsten Stopppositionen (G, g) angeordnet sind, die in einer Drehrichtung der zwei Drehtische (5, 6) vorauseilen, wobei die relativ zueinander nächsten Stopppositionen (H, h; G, g), die Produktbeutel-Auswurfeinheiten (8, 9) und
die Leerbeutel-Zuführungseinheiten (10, 11) zwischen den zwei Beutelfüll- und Verpackungsvorrichtungen (2, 3) mit intermittierender Drehung angeordnet sind.

2. Verpackungssystem nach Anspruch 1,
wobei die Zeitsteuerung des Bewegens und Anhaltens der intermittierenden Drehung der Drehtische im Wesentlichen relativ zueinander gegenläufig eingestellt ist.

3. Verpackungssystem nach Anspruch 2,
wobei
die zwei Beutelfüll- und Verpackungsvorrichtungen mit intermittierender Drehung mit einem gemeinsamen Durchführungs-Beförderungsband bereitgestellt werden, und
die Produktbeutel-Auswurfeinheiten den Produktbeutel alternierend auswerfen.

4. Verpackungssystem nach Anspruch 2 oder 3, wobei in den zwei Beutelfüll- und Verpackungsvorrichtungen mit intermittierender Drehung die Leerbeutel-Bereitstellungseinheiten, die Beuteleingangs-Öffnungseinheiten, die zu verpackendes Material-Fülleinheiten, die Beuteleingangs-Versiegelungseinheiten und die Produktbeutel-Auswurfeinheiten an linear symmetrischen Positionen relativ zu einer Gerade senkrecht auf einer Gerade angeordnet sind, die die Drehachsen der beiden Drehtische verbindet und als Symmetrieachse dient.

5. Verpackungssystem nach einem der Ansprüche 1 bis 4,
wobei
es sich bei den Greifern, die auf den Drehtischen angeordnet sind, um eine Duplexform handelt, bei der zwei Greiferpaare einen Einzelsatz bilden, und die Halteflächen der zwei Greiferpaare des gleichen Satzes, der beim Halten eines Beutels verwendet wird, im Wesentlichen in der gleichen Ebene angeordnet sind, und
während sich zwei Beutel, die durch zwei Greiferpaare des gleichen Satzes gehalten werden, intermittierend längs des Bewegungspfads bewegen, die Verpackungsoperationen an den zwei Beuteln gleichzeitig ausgeführt werden.

6. Verpackungssystem nach einem der Ansprüche 1 bis 5, wobei sich der Beutel, der durch die Greifer gehalten wird, aufrecht mit dem nach oben weisenden Beuteleingang gerichtet ist.

Revendications

1. Système d'emballage, dans lequel :

deux dispositifs d'emballage et de remplissage de sacs de type à rotation intermittente (2, 3), qui sont disposés à proximité immédiate l'un de l'autre, tiennent deux bords latéraux de chacun des sacs en utilisant une paire de pinces pour transporter de manière intermittente les sacs le long d'un chemin de transport circulaire par étapes équiangles et pour réaliser successivement, au cours du transport des sacs, les mêmes opérations d'emballage comprenant l'ouverture des embouchures des sacs, le remplissage des sacs avec le matériau à emballer, la fermeture hermétique des embouchures des sacs, et le déchargement des sacs de produit ; et
chaque dispositif d'emballage et de remplissage de sacs du type à rotation intermittente comprend :

une table tournante (5, 6) qui a de multiples paires de pinces (4) disposées autour de la périphérie de celle-ci et qui tourne de manière intermittente, amenant ainsi les pinces à se déplacer de manière intermittente

le long du chemin de transport circulaire par étapes équiangles ;
une unité de mise à disposition de sacs vides (10, 11) destinée à alimenter les pinces en sacs ;
une unité d'ouverture d'embouchure (14, 15) destinée à l'ouverture de l'embouchure du sac tenu par les pinces ;
une unité de remplissage de matériau emballé (16, 17 ; 18, 19) destinée au remplissage du sac tenu par les pinces avec le matériau à emballer ;
une unité de fermeture hermétique d'embouchure (22, 23) destinée à la fermeture hermétique de l'embouchure du sac tenu par les pinces ; et une unité de déchargement de sac de produit (8, 9) qui réceptionne un sac de produit fermé hermétiquement (7A) à partir des pinces et retire le sac de produit du chemin de transport ; et
l'unité de mise à disposition de sacs vides (10, 11), l'unité d'ouverture d'embouchure (14, 15), l'unité de remplissage de matériau emballé (16, 17 ; 18, 19), l'unité de fermeture hermétique d'embouchure (22, 23), et l'unité de déchargement de sac de produit (8, 9) sont placées à proximité de positions d'arrêt dans le chemin de transport des pinces (4) ;

ledit système d'emballage étant **caractérisé en ce que** :

lesdites deux tables tournantes (5, 6) sont placées au voisinage l'une de l'autre sur une base commune (1) et sont reliées à une force motrice commune de sorte à pivoter de manière intermittente dans des sens mutuellement opposés dans un même mode d'indexation intermittent, ladite unité de mise à disposition de sacs vides (10, 11), ladite unité d'ouverture d'embouchure (14, 15), ladite unité de remplissage de matériau emballé (16, 17 ; 18, 19), ladite unité de fermeture hermétique d'embouchure, et ladite unité de déchargement de sacs de produit (8, 9) sont mises en place sur la base (1) pour chacune desdites tables tournantes (5, 6), et
lesdites unités de déchargement de sacs de produit (8, 9) sont disposées de manière adjacente l'une par rapport à l'autre dans des positions d'arrêt les plus proches mutuellement (A H, h) parmi les positions d'arrêt (A-H, a-h) des tables tournantes (5, 6), et lesdites unités de mise à disposition de sacs vides (10, 11) sont disposées de manière adjacente l'une par rapport à l'autre dans des positions d'arrêt les plus proches mutuellement (A, a) qui suivent en termes de sens de rotation desdites deux tables tournantes (15, 16), lesdites positions d'arrêt les plus proches mutuellement (H, h ; A, a), lesdites unités de déchargement de sacs de produit (8, 9) et lesdites unités de mise à disposition de sacs vides (10,11) étant situées entre lesdits deux dispositifs d'emballage et de remplissage de sacs du type à rotation intermittente (2, 3) ou lesdites unités de mise à disposition de sacs vides (10, 11) sont disposées de manière adjacente l'un par rapport à l'autre dans des positions d'arrêt les plus proches mutuellement (H, h) parmi les positions d'arrêt (A-H ; a-h) des tables tournantes (5, 6), et lesdites unités de déchargement de sacs de produit (8, 9) sont disposées de manière adjacente l'une par rapport à l'autre dans des positions d'arrêt le plus proches mutuellement (G, g) qui précèdent en termes de sens de rotation desdites deux tables tournantes (5, 6) lesdites positions d'arrêt les plus proches mutuellement (H, h ; G, g), lesdites unités de déchargement de sacs de produit (8, 9) et lesdites unités de mise à disposition de sacs vides (10, 11) étant situées entre lesdits deux dispositif d'emballage et de remplissage de sacs du type à rotation intermittente (2, 3).

2. Système d'emballage selon la revendication 1, dans lequel le rythme de mouvement et d'arrêt de la rotation par intermittence desdites tables tournantes est établi pour être principalement inversé pour l'une par rapport à l'autre.

3. Système d'emballage selon la revendication 2, dans lequel
lesdits deux dispositifs d'emballage et de remplissage de sacs du type à rotation intermittente sont pourvus d'un transporteur d'exécution commun, et lesdites unités de déchargement de sacs de produit déchargent les sacs de produit d'une manière alternative.

4. Système d'emballage selon la revendication 2 ou 3, dans lequel, dans lesdits deux dispositifs d'emballage et de remplissage de sacs du type à rotation intermittente, les unités de mise à disposition de sacs, les unités d'ouvertures des embouchures, les unités de remplissage de matériau emballé, les unités de fermeture hermétique des embouchures, et les unités de déchargement de sacs de produit sont disposées dans des positions linéairement symétriques par rapport à une ligne perpendiculaire à une ligne qui relie les axes de rotation des deux tables

de rotation servant en tant qu'axe de symétrie.

5. Système d'emballage selon l'une quelconque des revendications 1 à 4, dans lequel
lesdites pinces placées sur les tables tournantes sont de type duplex, deux paires de pinces formant un ensemble unique, et
les surfaces de retenue desdites deux paires de pinces d'un même ensemble utilisé pour tenir un sac sont disposées principalement dans un même plan, et pendant que les sacs tenus par les deux paires de pinces d'un même ensemble se déplacent de manière intermittente le long du chemin de transport, les opérations d'emballage sont réalisées simultanément sur lesdits deux sacs.

6. Système d'emballage selon l'une quelconque des revendications 1 à 5, dans lequel le sac tenu par lesdites pinces est dans une orientation verticale avec l'embouchure de celui-ci faisant face vers le haut.

FIG. 1

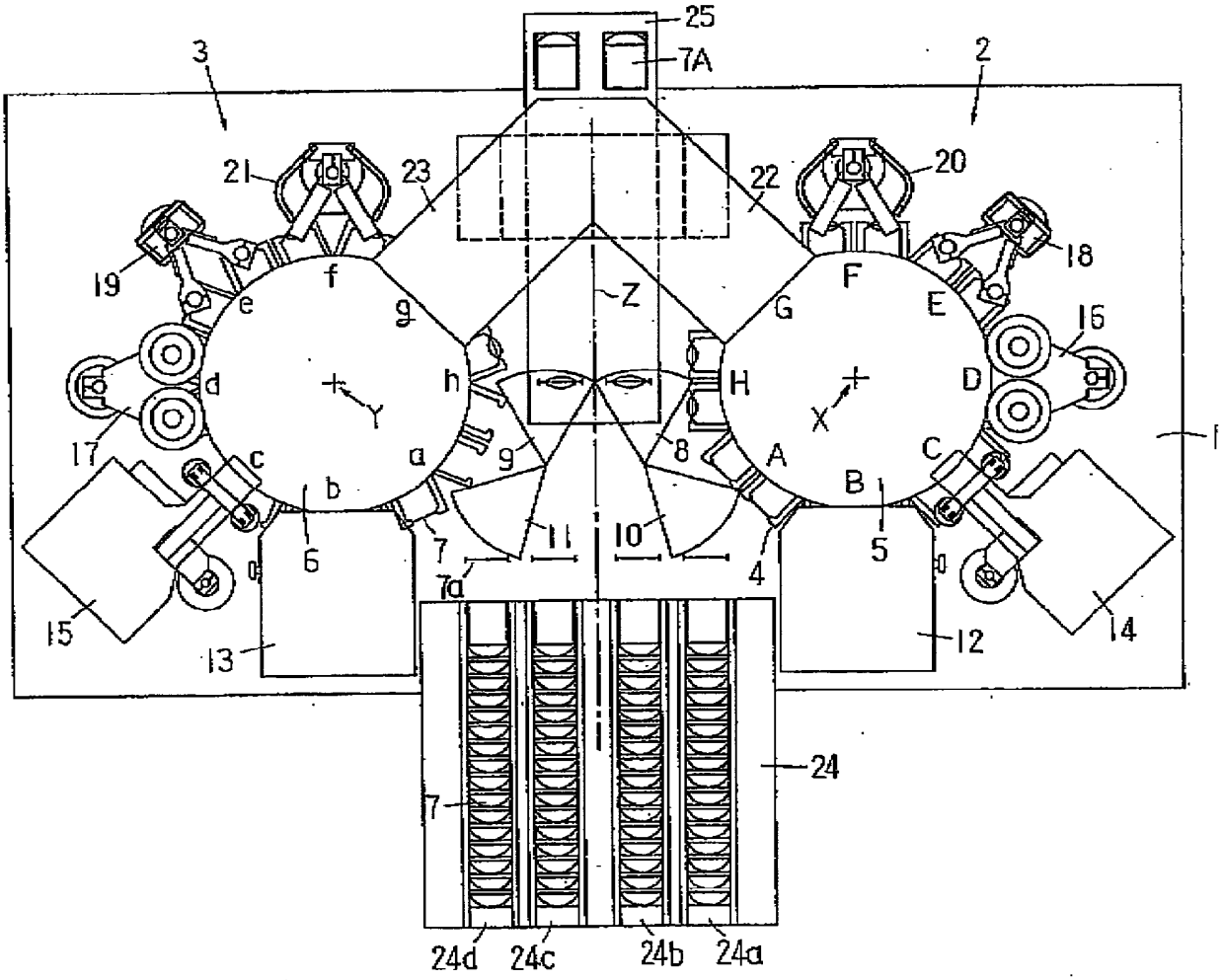

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7A
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18
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16
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h
H
D
Y
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17
c
a
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8
A
C
1
b
B
6
7
11
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7a
4
15
13
12
14
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7
24d
24c
24b
24a

FIG. 2

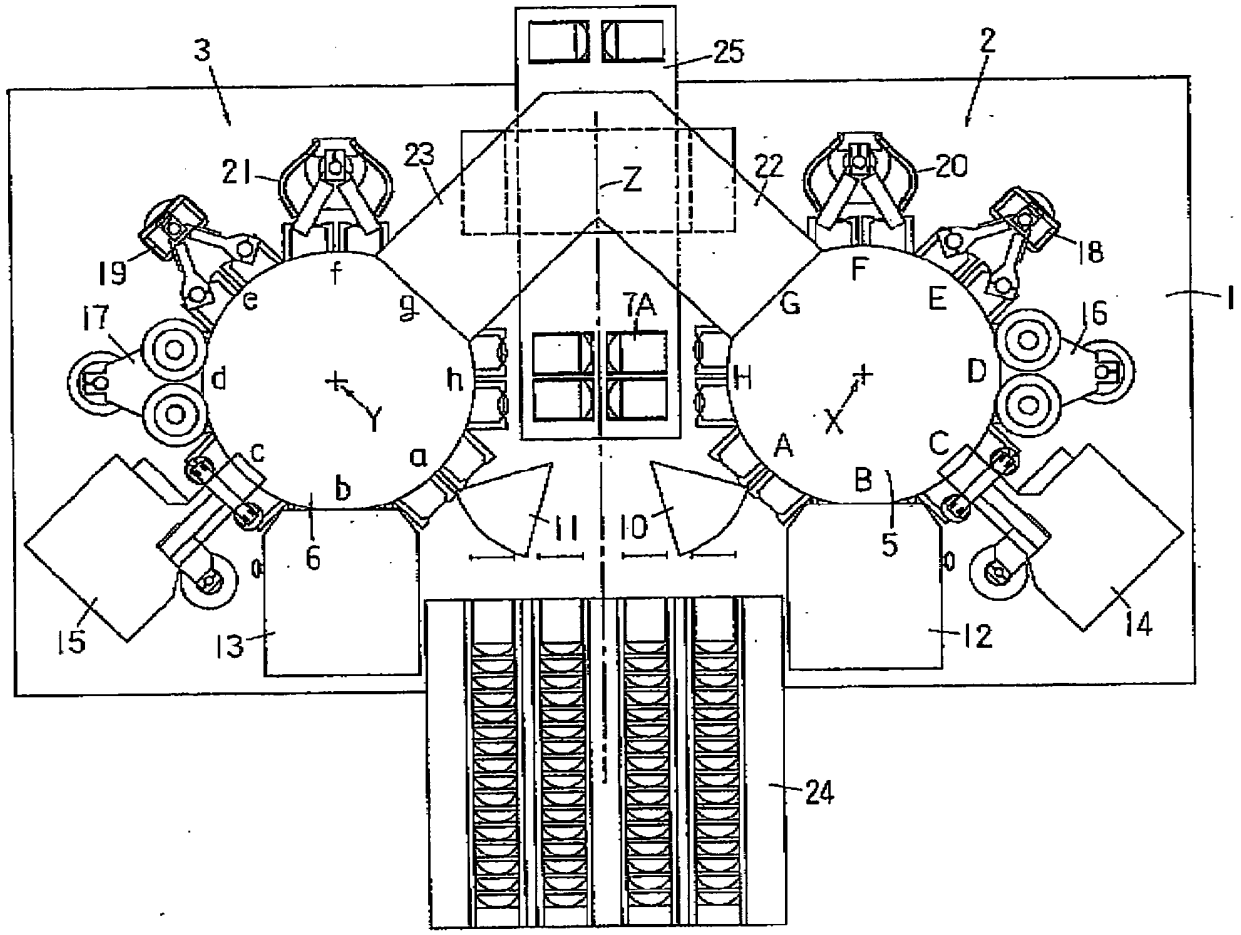

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FIG. 3

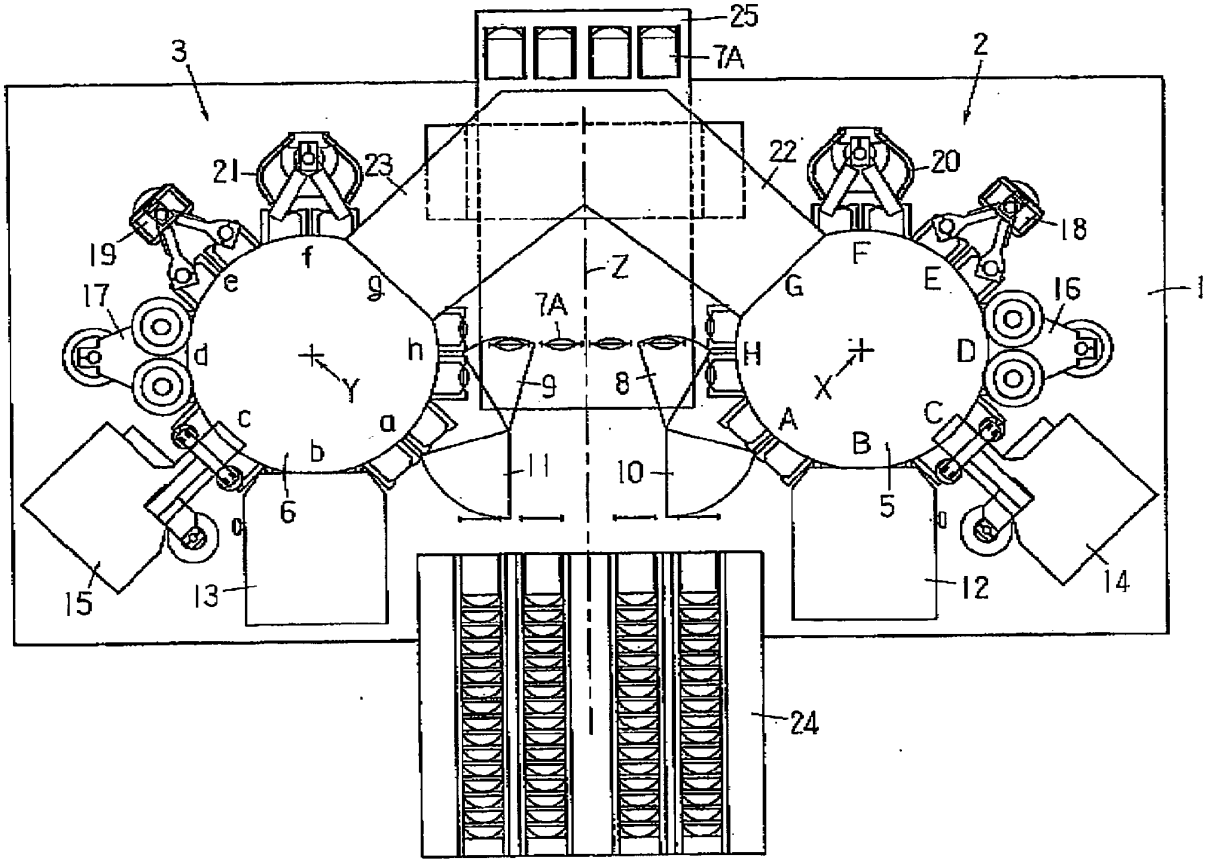
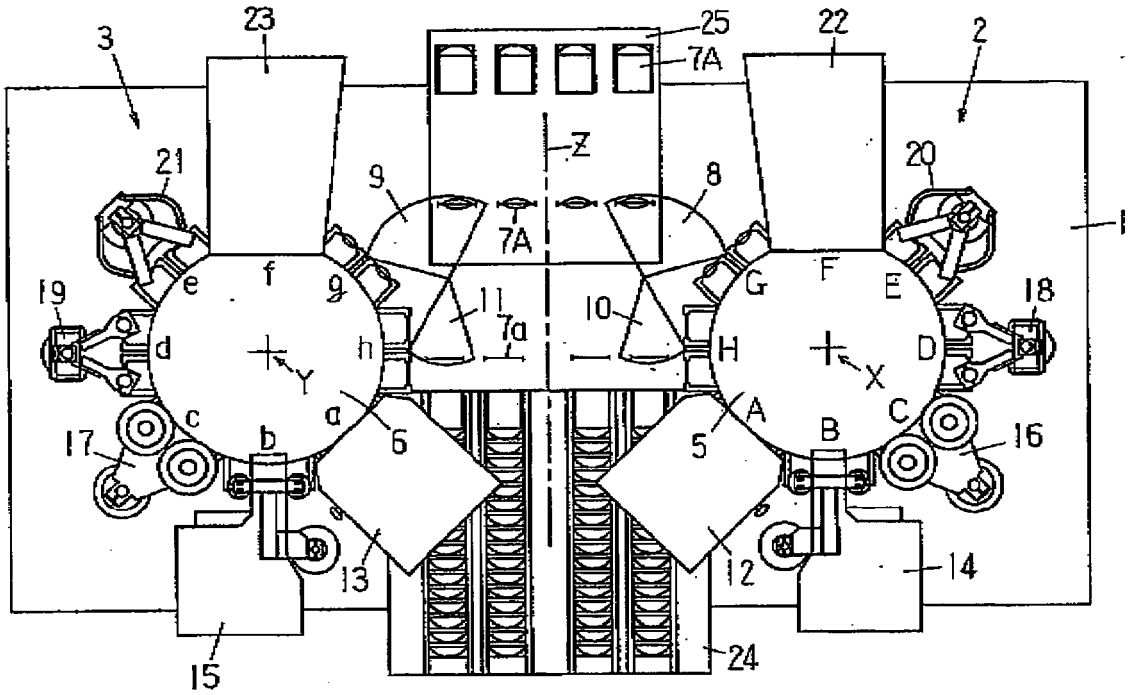

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FIG. 4


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7A
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Y
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REFERENCES CITED IN THE DESCRIPTION

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