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(54) **STRIP PACK DEVICE**

(57) In a strip pack device, a sealed part (Z) located on a front side of a bag (X) in a conveying direction is drawn into a drawn-in position (P1) by a brush unit (7), and wrinkles or creases are smoothed out. When the bag (X) received by a grasping unit (8) is then moved to an attaching position (P2) in an attachment unit (9), grip fingers (81, 81) for grasping the sealed parts (Z) move through an arc shown by a symbol (A) so as to move the bag from the drawn-in position (P1) in the opposite direction of a draw-in direction (b) to the attaching position (P2).

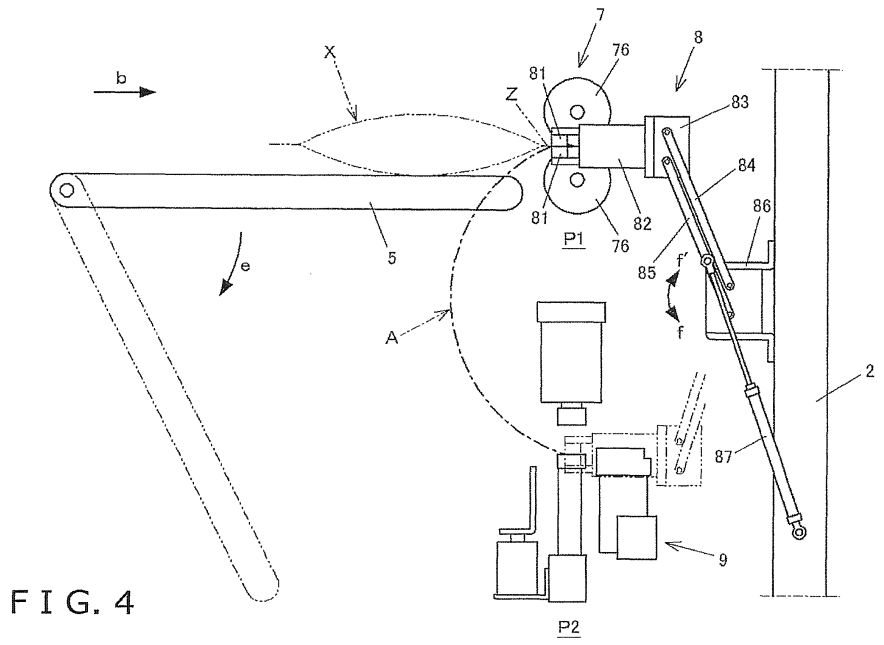

FIG. 4

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Description

TECHNICAL FIELD

[0001] The present invention relates to a strip pack device for manufacturing a product known as a strip pack, wherein a plurality of articles are attached to a strip and displayed while hanging therefrom, and the present invention pertains to the technological field of article packaging machinery.

BACKGROUND ART

[0002] There are products known as strip packs, wherein a plurality of articles filled with snack food or the like are aligned on and attached to a strip, that are hung when displayed. The advantage of a strip pack is that less space is needed for the display, and the displays in aisles or other areas of a store, for example, are more likely to be noticed by consumers, which promotes sales.

[0003] An example of a strip pack device for manufacturing such strip packs is the device disclosed in Japanese Laid-open Patent Application No. 2004-182302. This device is installed directly below a vertical form-fill-seal device and is configured so that both sides at the tops of articles manufactured by the device are grasped by a pair of left and right grasping arms, the articles are moved downward to an attaching position, and the top ends of the articles are then attached to a strip. The device disclosed in the Description of U.S. Patent No. 3864895 is also installed directly below a vertical form-fill-seal device, and is configured so that the tops of the articles manufactured by the device are suctioned on one side by a suction cup, the articles are moved forward to an attaching position, and the top ends of the articles are then attached to a strip.

DISCLOSURE OF THE INVENTION

<Technical Problems>

[0004] Since the strip pack devices disclosed in the aforementioned publications are directly connected to vertical form-fill-seal devices located directly thereabove, only articles manufactured by the devices can be attached to the strip. Quality testing of weight, seal quality, and the like cannot be performed before the articles manufactured by the devices are attached to the strip. In view of this, a demand has existed for there to be proposed a highly versatile strip pack device having a configuration independent of upstream devices and downstream devices. The essential configuration thereof would include conveying means for conveying articles in a substantially horizontal direction, and moving means for holding articles received from the conveying means and moving the articles to an attaching position.

[0005] In this case, where the attaching position is disposed in relation to the conveying means becomes a problem. For example, placing the attaching position directly below the conveying means necessitates a configuration for withdrawing the conveying means becoming obstructive every time an article is moved directly downward, which complicates the configuration and operation of the device and is therefore a hindrance to accelerating the operation. In view of this, consideration has been given to placing the attaching position ahead of the conveying means in the conveying direction. In this case, the strip pack device is not as complicated as when the attaching position is placed directly below the conveying means.

[0006] If there are wrinkles or creases in the ends of the bagged articles conveyed by the conveying means, they might be visually unattractive and might have a lower product value when the articles are attached at the ends to the strip. There is also a potential of the articles peeling away from the strip as a result of sufficient adhesion strength not being obtained because the bond between the ends of the articles and the strip is weakened. In view of this, the wrinkles or creases in the ends of the articles conveyed by the conveying means are sometimes smoothed out before the articles are attached to the strip.

[0007] In this case, effective means for smoothing out wrinkles or creases is a structure wherein the ends facing ahead in the direction in which incoming articles are conveyed are drawn in, and stretched out from the top and bottom sides, the structure being located ahead of the articles in the conveying direction. However, if the drawing-in means is placed ahead of the conveying means in the conveying direction, the drawing-in means will, upon having drawn in the ends of the articles, interfere with the route by which the movement means causes the articles to move downward, for example, the route being ahead of the articles in the conveying direction. This will lead to a problem that the articles can no longer be moved to the attaching position.

[0008] In view of this fact, an object of the present invention is to provide a highly versatile strip pack device having a structure independent of upstream devices and downstream devices, wherein drawing-in means is provided for drawing the forward ends of articles conveyed by conveying means into a predetermined position, and the articles are moved smoothly from the drawn-in position to an attaching position.

<Solution to Problems>

[0009] A strip pack device according to the present invention is a strip pack device for manufacturing products of articles attached to a strip, the strip pack device comprising conveying means, drawing-in means, moving means, and attachment means. The conveying means conveys the article in a substantially horizontal direction. The drawing-in means draws to a predetermined position an end of the article conveyed by the conveying means, the end being located frontward in the conveying direction. The moving means receives the article at a prede-

termined position in the drawing-in means and moves the article to an attaching position. The attachment means attaches the end of the article to a strip, the article having been moved to the attaching position by the moving means. The moving means begins to move the article from the predetermined position in the opposite direction of the draw-in direction of the drawing-in means, and moves the article to the attaching position.

[0010] The moving means preferably has grasping means, and the moving means is preferably configured from a pivoting link. The grasping means is provided at a pivoting end, and grasps the end of the article at the predetermined position, the end being located frontward in the conveying direction. The grasping means, when beginning to move from the predetermined position, moves in the opposite direction of the draw-in direction, and moves to the attaching position while describing an arcuate path.

[0011] The strip pack device preferably comprises opposite-direction-moving means. The opposite-direction-moving means moves the grasping means in the direction opposite the draw-in direction when the grasping means begins to move away from the predetermined position.

[0012] The moving means is preferably configured so that the end of the article grasped by the grasping means assumes a predetermined orientation in the attaching position, the end being located frontward in the conveying direction. In this case, the moving means preferably has a parallel link mechanism, and the grasping means is preferably provided at a pivoting end of the parallel link mechanism.

[0013] Instead of being configured from a parallel link mechanism, the moving means may be configured from a pivoting link, a first toothed rotor, a second toothed rotor, and a wrapping drive member. The first toothed rotor is provided at a pivoting fulcrum of the link so as to be incapable of rotating regardless of pivoting of the link. The second toothed rotor is rotatably provided at a pivoting end of the link. The wrapping drive member is wound between the first toothed rotor and the second toothed rotor. In this case, the grasping means is anchored to the second toothed rotor.

<Advantageous Effects of Invention>

[0014] According to the present invention, there is realized a highly versatile strip pack device having a configuration independent of upstream devices and downstream devices. Since the moving means moves the articles from a predetermined position in the opposite direction of the draw-in direction to an attaching position, the articles can be moved smoothly from the predetermined position to the attaching position.

[0015] Furthermore, the configuration and control of the device are simplified in cases in which the moving means has grasping means provided at the pivoting ends, the grasping means moves in the opposite direction of the draw-in direction when beginning to move away from the predetermined position, and the grasping means moves through an arcuate path to the attaching position.

[0016] In cases in which the strip pack device comprises opposite-direction-moving means for moving the grasping means in the opposite direction of the draw-in direction when the grasping means begins to move away from the predetermined position, the ends of the articles drawn in by the drawing-in means move reliably in the direction in which they are pulled out. Consequently, interference between the drawing-in means and the articles moved by the moving means is even more reliably avoided, and the articles are moved even more smoothly from the drawn-in position to the attaching position.

[0017] In cases in which the moving means is configured so that the ends in the front in the conveying direction of the articles grasped by the grasping means have a predetermined orientation in the attaching position, the ends constantly have an orientation appropriate for the attachment means.

[0018] Furthermore, in cases in which the moving means comprises parallel link mechanisms, the grasping means is consistently maintained in the same orientation throughout its entire movement from the predetermined position to the attaching position. Consequently, the ends of the articles grasped by the grasping means are moved to the attaching position while retaining the same orientation from when the ends are received in the predetermined position by the moving means.

[0019] In cases in which the moving means is configured from links, first toothed rotors, second toothed rotors, and wrapping drive members, when the toothed rotors have the same number of teeth, the grasping means is consistently maintained in the same orientation throughout its entire movement from the predetermined position to the attaching position. Consequently, the ends of the articles grasped by the grasping means are moved to the attaching position while retaining the same orientation from when the ends are received in the predetermined position by the moving means in this case as well.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG 1 is a side view of the strip pack device according to the first embodiment of the present invention.

FIG. 2A is a plan view of a bag supplied to the strip pack device.

FIG. 2B is a plan view of a strip pack manufactured by the strip pack device.

FIG. 3 is a side view for describing the configuration of the brush unit.

FIG. 4 is a side view of the grasping units.

FIG. 5 is a plan view of the grasping units.

FIG. 6 is a side view of the attachment unit.

FIG. 7 is a partial side view showing the action when

a bag is grasped by the grasping units and the bag begins to move.

FIG. 8 is a partial side view for describing the configuration of the grasping units in the strip pack device according to the second embodiment of the present invention.

FIG. 9 is a partial side view showing the action when the grasping units grasp and begin to move a bag.

FIG. 10 is a side view for describing the configuration of the grasping units in the strip pack device according to the third embodiment of the present invention.

FIG. 11 is a cross-sectional view showing a selection of a part for describing the configuration of the grasping units. and

FIG. 12 is a plan view for describing the configuration of the grasping units.

EXPLANATION OF THE REFERENCE NUMERALS/ SYMBOLS/SIGNS

[0021]

1	Strip pack device
7	Brush unit (drawing-in means)
8, 108, 208	Grasping unit (moving means)
9	Attachment unit (attachment means)
81	Grip finger (grasping means)
84, 85	Link mechanism (link, parallel link mechanism)
188	Pneumatic cylinder (opposite-direction-moving means)
284	Link member (link)
289A	Toothed pulley (first toothed rotor)
289B	Toothed pulley (second toothed rotor)
289C	Toothed timing belt (wrapping drive member)
P1	Drawn-in position (pre-determined position)
P2	Attaching position
SP	Strip pack (product)
T	Tape (strip)
X	Bag (article)
Z	Sealed part (end of article)

BEST MODE FOR CARRYING OUT THE INVENTION

<First Embodiment>

(Overall configuration of strip pack device)

[0022] A strip pack device 1 according to the first embodiment of the present invention comprises a main unit 2, a supply conveyor 3, an induction conveyor 4, a drop conveyor 5, a discharge conveyor 6, a brush unit 7, grasping units 8, an attachment unit 9, a tape feed unit 10, a falloff prevention member 12, a cradle 13, and other components, as shown in FIG. 1.

[0023] Bags X filled with, e.g., snack foods or the like are supplied as handled articles to the supply conveyor 3 from an upstream device.

[0024] The induction conveyor 4 guides bags X supplied in the direction of the arrow a by the supply conveyor 3 into the main device 1, as shown by the arrow b.

[0025] The drop conveyor 5 constitutes the terminal end of the induction conveyor 4.

[0026] The discharge conveyor 6 discharges a strip pack SP made of a plurality of bags X...X attached to a tape to a downstream device as shown by the arrow c.

[0027] The brush unit 7 is disposed farther forward in the conveying direction b than the terminal end of the drop conveyor 5, and the brush unit 7 draws in the ends of the bags X guided in by the drop conveyor 5 and smoothes out wrinkles or creases in the ends.

[0028] The grasping units 8 are disposed farther forward in the conveying direction b than the terminal end of the drop conveyor 5, and the grasping units 8 grasp the ends of the bags X received from the drop conveyor 5 and move the ends from a drawn-in position P1 to an attaching position P2. The attaching position P2 is positioned below and farther forward in the conveying direction b than the terminal end of the drop conveyor 5.

[0029] The attachment unit 9 attaches the ends of the bags X to the tape, the bags X having been grasped and moved to the attaching position P2 by the grasping units 8.

[0030] The tape feed unit 10 feeds the tape synchronously with the manufacturing of the strip pack SP. A roll 11 of the tape is set up at the top of the main unit 2.

[0031] The falloff prevention member 12 is placed at the starting end of the induction conveyor 4, and the falloff prevention member 12 prevents bags X falling from the supply conveyor 3 from falling off of the main device 1.

[0032] The cradle 13 is provided in order to relay the manufactured strip pack SP from the attachment unit 9 to the discharge conveyor 6, and is inclined downward.

[0033] The bags X supplied to the main device 1 each have a main body part Y filled with snack food or the like, and sealed parts Z, Z as two ends, one upper and one lower, as shown in FIG. 2A. The strip pack SP manufactured by the main device 1 is made of a plurality of bags X...X attached to a long, thin tape T and aligned by their respective upper sealed parts Z...Z, as shown in FIG. 2B. A punch hole T1 for interlocking with the strip pack SP and displaying the strip pack SP in a hanging state is formed in one end of the tape T.

(Detailed configuration of brush unit)

[0034] The brush unit 7 is a component for drawing in the sealed parts Z of the bags X in the same direction as the conveying direction b and smoothing out wrinkles or creases in the sealed parts Z. The brush unit 7 has a drive pulley 71, a driven pulley 73, an upper shaft pulley 74, an upper rotating shaft 75, an upper brush 76, and other components, as shown in FIG. 3. The drive pulley 71 is driven by a motor. The rotation of the drive pulley

71 is transmitted to the driven pulley 73 through a timing belt 72. The rotation of the driven pulley 73 is transmitted to the upper shaft pulley 74 through a timing belt. The upper rotating shaft 75 rotates integrally with the shaft pulley 74. The upper brush 76 is attached to the rotating shaft 75. The driven pulley 73, the upper shaft pulley 74, the upper rotating shaft 75, and the upper brush 76 are supported on an upper support member 77.

[0035] A drive roller 78 that rotates integrally with the driven pulley 73 is also supported on the upper support member 77. A driven roller 79, a lower shaft pulley 74, a lower rotating shaft 75, and a lower brush 76 are supported on a lower support member 77 located on the lower side. The driven roller 79 is caused to rotate by being in contact with the drive roller 78. The rotation of the driven roller 79 is transmitted to the lower shaft pulley 74 through a timing belt. The lower rotating shaft 75 rotates integrally with the shaft pulley 74. The lower brush 76 is attached to the rotating shaft 75.

[0036] In other words, the brush unit 7 is configured such that the sealed parts Z of the bags X are drawn in and stretched out by the upper and lower brushes 76, 76 rotating in the directions of the arrows d while the sealed parts Z are in contact with the brushes from above and below.

[0037] The brushes 76 have a structure in which a plurality of relatively thin discoid separated brushes is aligned at predetermined intervals on the rotating shafts 75. The brushes 76 are preferably, e.g., sponge-like brushes, steel wool-like brushes in which wires are interwoven radially, or the like.

[0038] A positioning member 76A is set up in pectinate fashion between the adjacent separated brushes constituting the brushes 76. The positioning member 76A is supported on the lower support member 77, and the positioning member 76A comes in contact with the sealed parts Z in the front of the bags X in the conveying direction to position the bags X.

[0039] The drawn-in position P1 is the position of the bags X when they have been positioned by the positioning member 76A. In cases in which a positioning member 76A is not included, the drawn-in position is the position of the bags X when they have been drawn in by the upper and lower brushes 76, 76 and stopped.

(Detailed configuration of grasping units)

[0040] The grasping units 8 are disposed farther forward in the conveying direction b than the terminal end of the drop conveyor 5, as shown in FIGS. 4 and 5. The drop conveyor 5 pivots around the starting end in the direction of the arrow e. The grasping units 8 grasp the tops and bottoms of the sealed parts Z located frontward of the bags X in the conveying direction from the front of the conveying direction b, using pairs of pivoting top and bottom grip fingers 81, 81. The grasping units 8 move the grasped bags X from the drawn-in position P1 in the brush unit 7 to the attaching position P2 in the attachment unit 9 underneath.

[0041] The grip fingers 81, 81 are mounted on hands 82. The hands 82 are linked via attachment members 83 to one end of each of two pairs of long, thin, upper and lower, and left and right link members 84, 84, 85, 85. The other ends of the link members 84, 84, 85, 85 are linked to support members 86 provided on the main unit 2. The proximal ends of the lower pair of link members 85 are linked at specific locations to the distal ends of reciprocating rods of pneumatic cylinders 87 supported on the main unit 2.

[0042] Specifically, parallel link mechanisms are configured from the attachment members 83, the link members 84, 84, 85, 85, and the support members 86. In these parallel link mechanisms, when the link members 84, 84, 85, 85 pivot in the direction of the arrow f, f by the reciprocation of the rods of the pneumatic cylinders 87, the attachment members 83 and the support members 86 remain parallel as shown by the solid lines and double-dashed lines in FIG. 4. The grip fingers 81, 81 keep the sealed parts Z of the bags X in the orientation in FIG. 4, i.e., a substantially horizontal orientation while the link members 84, 84, 85, 85 are pivoting. The distal ends of the grip fingers 81, 81 move between the drawn-in position P1 and the attaching position P2 in an arcuate motion indicated by the symbol A.

[0043] A pair of grasping units 8 are provided to the left and right relative to the bags X. In the drawn-in position P1, the pairs of left and right grip fingers 81...81 grasp the sealed parts Z on both sides of the brushes 76, 76 of the brush unit 7.

(Detailed configuration of attachment unit)

[0044] The attachment unit 9 incorporated in the main unit 2 is configured from a heater 91, a clamp 92, a pneumatic cylinder 93, a punch cutter unit 94, a melt prevention member 95, a pneumatic cylinder 96, and other components, as shown in FIG 6.

[0045] The heater 91 is a heat source for fusing together the tape T and the bags X.

[0046] The clamp 92, together with the heater 91, clamps the tape T and the bags X.

[0047] The pneumatic cylinder 93 raises and lowers the clamp 92.

[0048] The punch cutter unit 94 forms a suitable punch hole T1 or perforation in the tape T.

[0049] The melt prevention member 95 moves upward, thereby lifting the tape T off the heater 91 and preventing the tape T from melting.

[0050] The pneumatic cylinder 96 raises and lowers the melt prevention member 95.

(Action of grasping units)

[0051] Next, the characteristic action of the grasping units 8 in the main device 1 will be described.

[0052] First, when the bags X are conveyed by the drop

conveyor 5 in a substantially horizontal direction to the brush unit 7 as shown in FIGS. 4 and 5, the sealed parts Z in the front of the bags X in the conveying direction are drawn in between the rotating upper and lower brushes 76, 76 and are positioned in the drawn-in position P1 by the positioning member 76A. In this state, the upper and lower brushes 76, 76 rotate from the proximal ends of the sealed parts Z toward the edges, thereby stretching out the sealed parts Z and smoothing out wrinkles or creases.

[0053] Next, when the sealed parts Z of the bags X are grasped on both sides of the brush unit 7 by the grip fingers 81...81 of the grasping units 8, 8, the drop conveyor 5 pivots around the starting end in the direction of the arrow e (see FIG. 4). A space is thereby formed in front of the brush unit 7, the grasping units 8, and the attachment unit 9, making it possible for the bags X to be moved by the grasping units 8 from the drawn-in position P 1 to the attaching position P2. The rods of the pneumatic cylinders 87 of the grasping units 8 lower, thereby causing the link members 84, 84, 85, 85 to pivot in the direction of the arrow f around their ends adjacent to the support members 86.

[0054] The result is that the attachment members 83, the hands 82, and the grip fingers 81, 81 linked to the pivoting ends of the link members 84, 84, 85, 85 begin to move in the opposite direction of the draw-in direction b from the drawn-in position P1 of the brush unit 7 while maintaining the orientation in FIG. 4, and these members continue to move to the attaching position P2 while moving in an arcuate shape as shown by the symbol A. The bag X grasped by the grip fingers 81, 81 is attached to the tape T at the sealed part Z by the attachment unit 9 in the attaching position P2. After the bag is attached, the rods of the pneumatic cylinders 87 extend, whereby the link members 84, 84, 85, 85 pivot in the direction of the arrow f, and the grip fingers 81,81 return to the state (position) shown by the solid lines in FIG. 4.

(Characteristics of strip pack device)

(1)

[0055] First, since the strip pack device comprises a drop conveyor 5 for conveying bags X in a substantially horizontal direction, grasping units 8 for receiving bags X from the drop conveyor 5 and moving the bags to the attaching position P2, and an attachment unit 9 for attaching bags X moved by the grasping units 8 to the attaching position P2 to the tape T at the sealed parts Z, the result is a highly versatile strip pack device 1 having a configuration independent of upstream devices and downstream devices.

(2)

[0056] Moreover, the strip pack device 1 comprises a brush unit 7 for drawing the sealed parts Z in the front of the bags X in the conveying direction into the drawn-in position P1, the brush unit being disposed in front of the bags X in the conveying direction, and the grasping units 8 receive the bags X at the drawn-in position P1 and move the bags to the attaching position P2 below. The grasping units 8 move the bags X in the opposite direction of the draw-in direction b from the drawn-in position P1 to the attaching position P2. Therefore, even though there is a brush unit 7, the brush unit 7 is outside of the path through which the bags X are moved by the grasping units 8, and the bags X can be moved smoothly from the drawn-in position P1 to the attaching position P2.

(3)

[0057] In the grasping units 8, grip fingers 81, 81 are provided at the pivoting ends of the pivoting link members 84, 84, 85, 85, and when these grip fingers 81, 81 begin to move away from the drawn-in position P1, the grip fingers move in the opposite direction of the draw-in direction b of the upper and lower brushes 76, 76, as shown in FIG. 7. The grip fingers 81, 81 then move in the arc shown by the symbol A until reaching the attaching position P2. Therefore, the distal ends of the sealed parts Z of the bags X also draw an arcuate path shown by the symbol A in FIG. 4. Therefore, the bags X grasped by the grasping units 8 move without interfering with the lower brush 76 or the positioning member 76A of the brush unit 7. Thus, since interference between the brush unit 7 and the bags X moved by the grasping units 8 is avoided, a configuration is adopted for the main strip pack device 1 wherein the pivoting ends provided with the grip fingers 81, 81 go through a simple arcuate motion, and the configuration and control of the device are simplified.

(4)

[0058] The grasping units 8 cause the sealed parts Z in the front of the bags X in the conveying direction grasped by the grip fingers 81, 81 to have a predetermined orientation in the attaching position P2. Specifically, the grasping units 8 cause the sealed parts Z in the front of the bags X in the conveying direction to have a substantially horizontal orientation. Therefore, the orientation of the sealed parts Z is always suited to the attachment unit 9 configured to press the tape T and the sealed parts Z of the bags X together from above and below.

[0059] Specifically, the grasping units 8 comprise parallel link mechanisms, and the grip fingers 81, 81 are provided at the pivoting ends of the parallel link mechanisms. Therefore, the grip fingers 81, 81 are maintained consistently in the same orientation, i.e., in this case a substantially horizontal orientation throughout the entire movement from the drawn-in position P1 to the attaching position P2. Consequently, the sealed parts Z of the bags X grasped by the grip fingers 81, 81 are also moved to the attaching position P2 while retaining the same orientation as when they are received by the grasping units 8

at the drawn-in position P1.

<Second Embodiment>

[0060] Next, a strip pack device according to the second embodiment of the present invention will be described. Structural elements common to the first embodiment previously described are denoted by the same numerical symbols.

[0061] This strip pack device has the same configuration as the first embodiment except for the grasping units. With these grasping units 108, it is possible to adjust the forward-backward positions of the grip fingers 81, 81 for grasping the sealed parts Z of bags X drawn in by the upper and lower brushes 76, 76 of the brush unit 7, and pneumatic cylinders 188 are provided for this purpose, as shown in FIG. 8. The grip fingers 81, 81 are attached via hands 82 to the distal ends of rods that reciprocate in the direction of the arrow g, g' of the pneumatic cylinders 188. The pneumatic cylinders 188 are linked via attachment members 183 to the ends on one side of link members 84, 84, 85, 85 (only one pair on one side is shown).

[0062] The action of the grasping units 108 will now be described. Before the attachment members 83, the hands 82, and the grip fingers 81, 81 are moved in an arcuate shape by the action of the pneumatic cylinders 87 in the grasping units 8 previously described, the rods of the pneumatic cylinders 188 extend by a predetermined length in the opposite direction g of the direction b the bags X are conveyed by the drop conveyor 5 (i.e., the direction b the bags are drawn in by the upper and lower brushes 76, 76 of the brush unit 7), and the sealed parts Z of the bags X drawn in by the brush unit 7 in the drawn-in position P1 are pulled out while being grasped by the grip fingers 81, 81 of the grasping units 108, as shown in FIG. 9.

[0063] Next, when the link members 84, 84, 85, 85 pivot in the direction of the arrow f as described in the first embodiment, the distal ends of the sealed parts Z of the bags X grasped by the grip fingers 81, 81 move in the arcuate shape shown by the symbol A, and the grasped bags X approach the attaching position P2 in the attachment unit 9 from the drawn-in position P 1 in the brush unit 7. Though not shown in the drawing, when the rods of the pneumatic cylinders 188 retract a predetermined length in the direction of the arrow g', the sealed parts Z of the bags X come to be positioned in a predetermined attaching position P2 such as is shown in FIG. 4. If the attaching position is set to be at the ending point at the bottom of the arcuate motion, there is no need for the rods to retract in the direction of the arrow g' as previously described.

[0064] According to the second embodiment, since pneumatic cylinders 188 are provided for moving the grip fingers 81, 81 straight in the opposite direction g of the draw-in direction b when the grip fingers begin to move away from the drawn-in position P1, the sealed parts Z of the bags X drawn into the brush unit 7 reliably move in the direction g in which the bags are withdrawn. Consequently, interference between the brush unit 7 and the bags X moved by the grasping units 8 is avoided to an even more reliable degree, and the bags X are moved even more smoothly from the drawn-in position P1 to the attaching position P2.

[0065] In cases in which pneumatic cylinders 188 are provided for adjusting the forward-backward positions of the grip fingers 81, 81, another drive source for moving the bags X in the opposite direction g of the draw-in direction b is not needed because the pneumatic cylinders 188 are used, which has the merit of not increasing the number of pieces of equipment.

<Third Embodiment>

[0066] Next, a strip pack device according to the third embodiment will be described. Structural elements common to the first embodiment are denoted by the same numerical symbols in this case as well.

[0067] The configuration of this strip pack device is also the same as the first embodiment except for the grasping units. Specifically, the grasping units 208 in this case are disposed farther forward in the conveying direction b than the terminal end of the drop conveyor 5 that pivots around the starting end in the direction of the arrow e, as shown in FIGS. 10 through 12. The grasping units 208 grasp the sealed parts Z in the front of the bags X in the conveying direction from above and below in the front of the conveying direction b, by a pair of upper and lower grip fingers 81, 81, similar to the first embodiment. The grasping units 208 move the grasped bags X from the drawn-in position P1 in the brush unit 7 to the attaching position P2 in the attachment unit 9.

[0068] The grip fingers 81, 81 are mounted on hands 82. The hands 82 are linked via attachment members 283 to the ends on one side of a pair of long extending left and right link members 284, 284. The other ends of the link members 284, 284 are linked to support members 286 provided to the main unit 2.

[0069] The output shafts of motors 287 are linked to the ends of the link members 284, 284 adjacent to the support members 286. The link members 284, 284 are capable of pivoting around their ends in the directions of the arrows f, f by the rotation of the output shafts of the motors 287. First toothed pulleys 289A are provided to the ends of the link members 284, 284 via fixed members 286A extending from the support members 286. The first toothed pulleys 289A are incapable of rotating regardless of the pivoting of the link members 284, 284. Second toothed pulleys 289B capable of rotating in relation to the link members 284, 284 are provided at the pivoting ends of these link members 284, 284. The first toothed pulleys 289A and the second toothed pulleys 289B have the same number of teeth. Toothed timing belts 289C are wound between the toothed pulleys 289A, 289B. The attachment members 283 that come to support the hands

82 and the grip fingers 81, 81 are fixed to the second toothed pulleys 289B at the pivoting ends of the link members 284, 284. The attachment members 283 rotate integrally with the second toothed pulleys 289B.

[0070] Specifically, in the configuration previously described, when the link members 284, 284 pivot a predetermined angle in the direction of the arrow f by the rotation of the output shafts of the motors 287, the first toothed pulleys 289A adjacent to the support members 286 do not rotate. Meanwhile the second toothed pulleys 289B at the pivoting ends rotate a predetermined angle in the direction of the arrow f. Therefore, the grip fingers 81, 81 supported on the second toothed pulleys 289B via the attachment members 283 retain the orientation in FIG. 10, i.e., a substantially horizontal orientation throughout their entire movement from the drawn-in position P1 to the attaching position P2.

[0071] The characteristic action of the grasping units 208 will now be described.

[0072] First, when the bags X are conveyed up to the brush unit 7 by the drop conveyor 5, the sealed parts Z in the front of the bags X in the conveying direction are drawn in between the upper and lower rotating brushes 76, 76 and are positioned at the drawn-in position P1 by the positioning member 76A, as shown in FIGS. 10 and 12. In this state, the upper and lower brushes 76, 76 rotate from the proximal ends of the sealed parts Z toward the edges, thereby stretching out the sealed parts Z and smoothing out wrinkles or creases.

[0073] Next, when the upper and lower pairs of grip fingers 81, 81 of the grasping units 208 pivot and grasp the sealed parts Z of the bags X on both sides of the brush unit 7, the drop conveyor 5 pivots around the starting end in the direction of the arrow e, making it possible for the bags X to be moved by the grasping units 208. The output shafts of the motors 287 then rotate, whereby the link members 284, 284 pivot in the direction of the arrow f around their ends adjacent to the support members 286.

[0074] The result is that the attachment members 283, the hands 82, and the grip fingers 81, 81 linked at the pivoting ends of the link members 284, 284 retain the orientation in FIG. 10 while moving from the drawn-in position P1 in the brush unit 7 in the opposite direction of the draw-in direction b to the attaching position P2, drawing an arcuate movement as shown by the symbol A. Specifically, the distal ends of the sealed parts Z of the bags X also describe the arcuate movement shown by the symbol A as described in the first embodiment in this case as well, and the bags X grasped by the grasping units 8 therefore move without interfering with the lower brushes 76 or the positioning member 76A of the brush unit 7. The bags X grasped by the grip fingers 81, 81 are then attached at the sealed parts Z to the tape T by the attachment unit 9.

[0075] As described above, the grasping units 208 comprise the pivoting link members 284, 284, the first toothed pulleys 289A that are provided to the pivot fulcra of the link members 284, 284 so as to be incapable of rotating regardless of the pivoting of the link members 284, 284, the second toothed pulleys 289B provided to be capable of rotating in relation to the pivoting ends of the link members 284, 284, and the toothed timing belts 289C wound between the toothed pulleys 289A, 289B. The grip fingers 81, 81 are fixed to the second toothed pulleys 289B at the pivoting ends. Therefore, the second toothed pulleys 289B at the pivoting ends rotate in the opposite direction f of the pivoting direction f of the link members 284, 284.

[0076] Specifically, when the pairs of toothed pulleys 289A, 289B have the same number of teeth, the grip fingers 81, 81 are kept consistently in the same orientation; i.e., a substantially horizontal orientation in this case, throughout their entire movement from the drawn-in position P1 to the attaching position P2. Consequently, the sealed parts Z of the bags X grasped by the grip fingers 81, 81 are moved to the attaching position P2 while retaining the same orientation as when they were received in the drawn-in position P1 by the grasping units 208 in this case as well.

[0077] Furthermore, in the third embodiment, in cases in which pneumatic cylinders 188 are provided for adjusting the grip fingers 81, 81 forward and backward in a manner similar to that described for the second embodiment, the bags X may be moved by a predetermined length in the opposite direction g of the draw-in direction b by the action of the pneumatic cylinders 188 before the grip fingers 81, 81 describe an arcuate movement via the action of the motors 287 of the grasping units 208.

<Other Embodiments>

[0078] The present invention is not limited to the embodiments specifically described herein, but preferably no departure is made from the scope of the present invention.

[0079] For example, in the third embodiment, the pair of toothed pulleys 289A, 289B have the same number of teeth; however, when the pulleys have different numbers of teeth, the pivoting angle of the link members 284, 284 in the direction of the arrow f will be different from the rotational angle of the toothed pulleys 289B at the pivoting ends in the direction of the arrow f'. Specifically, it is possible for the orientation of the sealed parts Z of the bags X grasped by the grip fingers 81, 81 to differ between the drawn-in position P1 and the attaching position P2.

[0080] In the third embodiment, toothed timing belts 289C were wound between the pairs of toothed pulleys 289A, 289B, but another possibility is a configuration in which endless chains are wound between pairs of sprockets.

INDUSTRIAL APPLICABILITY

[0081] As described above, according to the present invention, it is possible to provide a highly versatile strip

pack device having a configuration independent of upstream devices and downstream devices, wherein drawing-in means is provided for drawing the forward ends of articles conveyed by conveying means into a drawn-in position, and the articles can be moved smoothly from the drawn-in position to an attaching position. Specifically, the present invention is widely applicable to the technological field of article-packaging machinery.

Claims

1. A strip pack device for manufacturing products having an article attached to a strip, said strip pack device comprising:

   conveying means for conveying the article in a substantially horizontal direction;
   drawing-in means for drawing to a predetermined position an end of the article conveyed by the conveying means, the end being located frontward in the conveying direction;
   moving means for receiving the article at a predetermined position in the drawing-in means and moving the article to an attaching position; and
   attachment means for attaching the end of the article to a strip, the article having been moved to the attaching position by the moving means; wherein
   the moving means begins to move the article from the predetermined position in the opposite direction of the draw-in direction of the drawing-in means, and moves the article to the attaching position.

2. The strip pack device according to claim 1, wherein the moving means is configured from a pivoting link, and a pivoting end thereof has grasping means for grasping the end of the article at the predetermined position, the end being located frontward in the conveying direction; and
   the grasping means, when beginning to move from the predetermined position, moves in the opposite direction of the draw-in direction, and moves to the attaching position while describing an arcuate path.

3. The strip pack device according to claim 2, further comprising:

   opposite-direction-moving means for moving the grasping means in the opposite direction of the draw-in direction when the grasping means begins to move away from the predetermined position.

4. The strip pack device according to claim 2 or 3, wherein
   the moving means is configured so that the end of the article grasped by the grasping means assumes a predetermined orientation in the attaching position, the end being located frontward in the conveying direction.

5. The strip pack device according to claim 4, wherein the moving means has a parallel link mechanism; and
   the grasping means is provided at a pivoting end of the parallel link mechanism.

6. The strip pack device according to claim 4, wherein the moving means has:

   a pivoting link;
   a first toothed rotor provided at a pivoting fulcrum of the link so as to be incapable of rotating regardless ofpivoting of the link;
   a second toothed rotor rotatably provided at a pivoting end of the link; and
   a wrapping drive member wound between the first toothed rotor and the second toothed rotor; wherein
   the grasping means is anchored to the second toothed rotor.

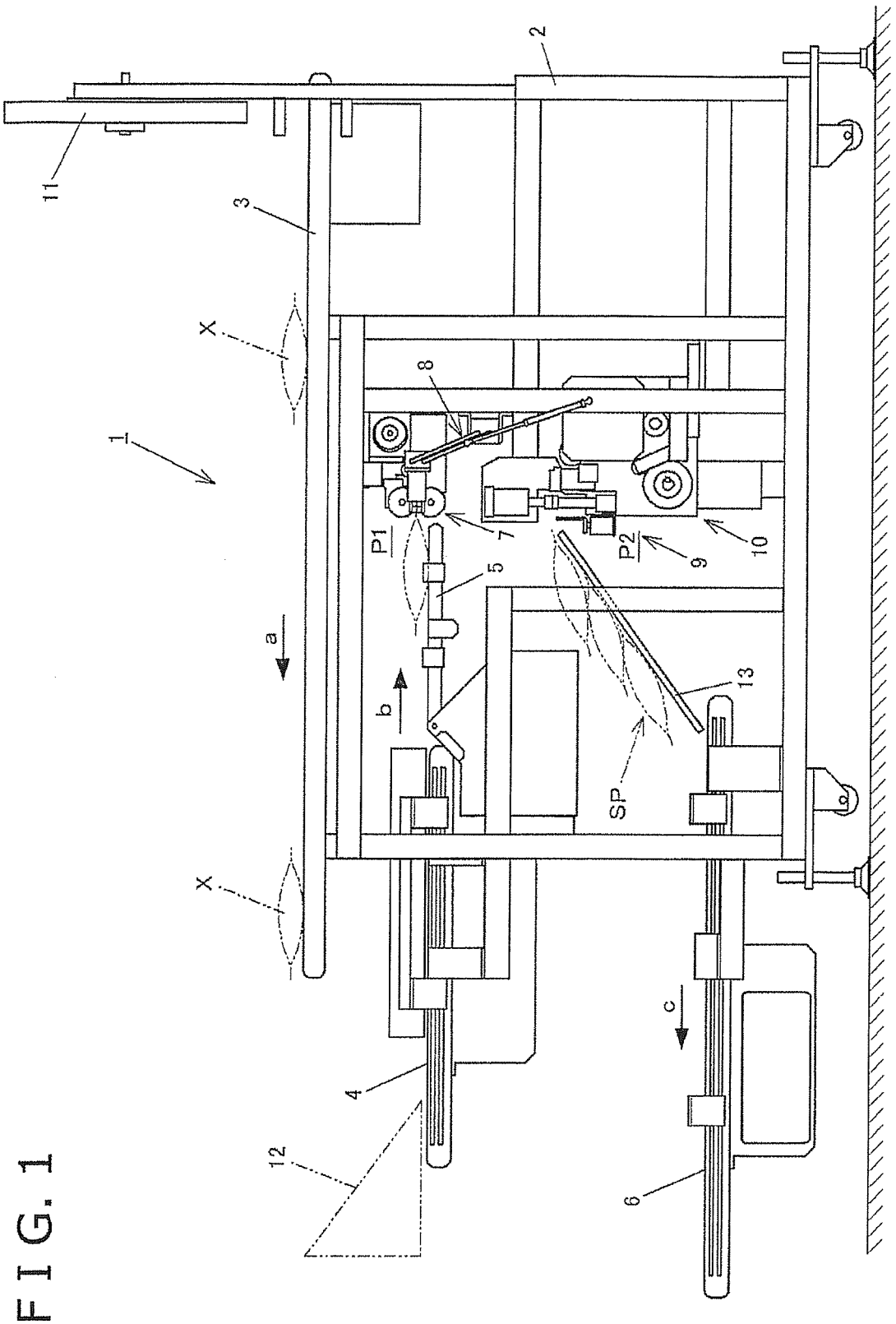


FIG. 1

FIG. 2A

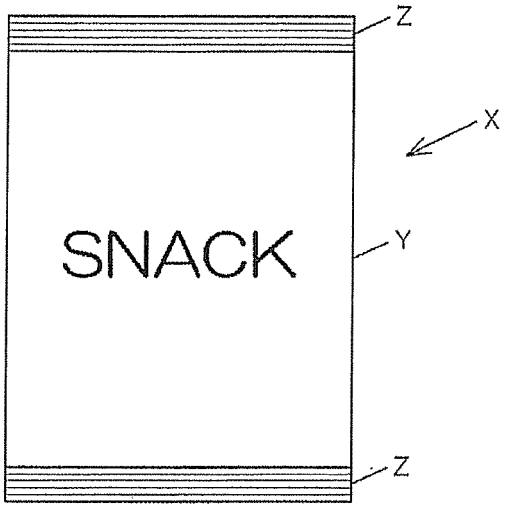
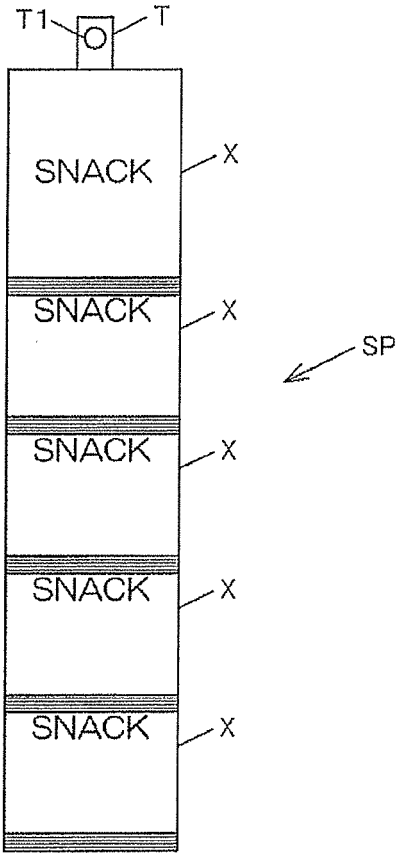


FIG. 2B



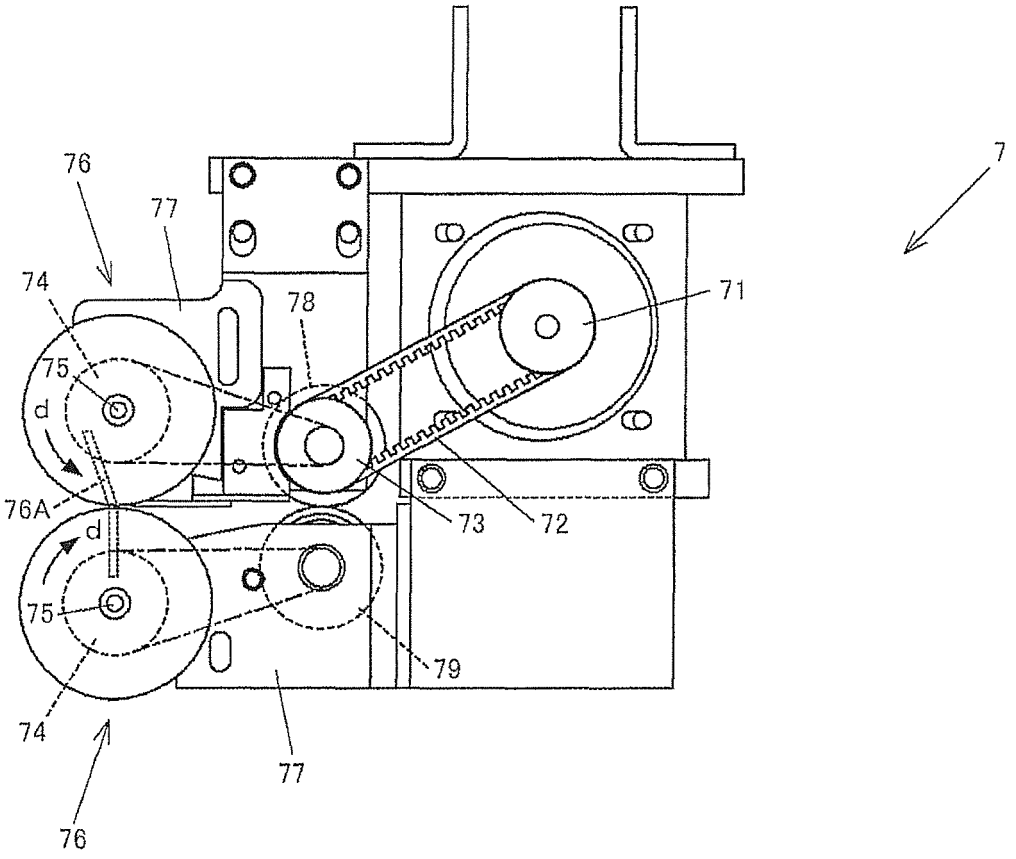


FIG. 3

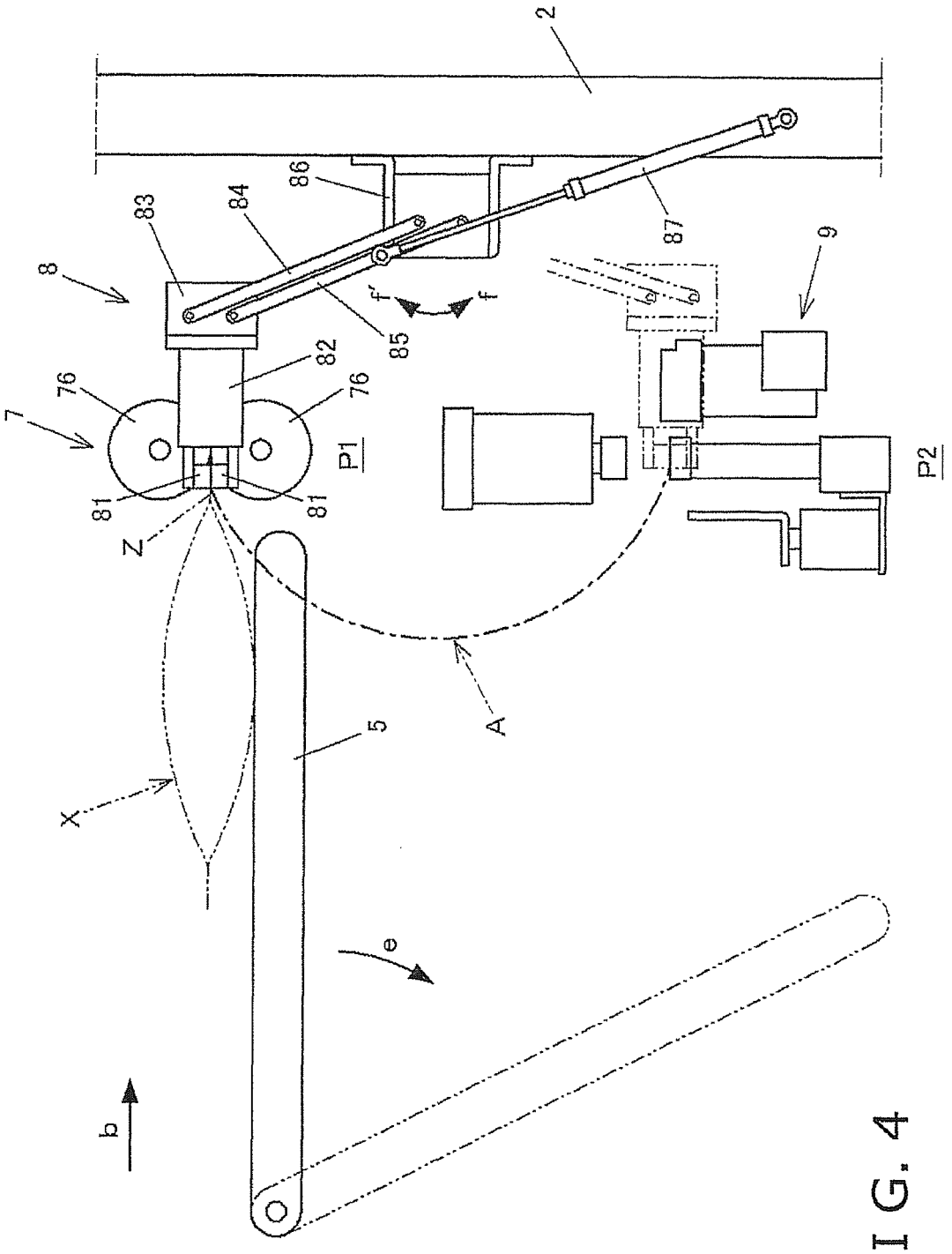


FIG. 4

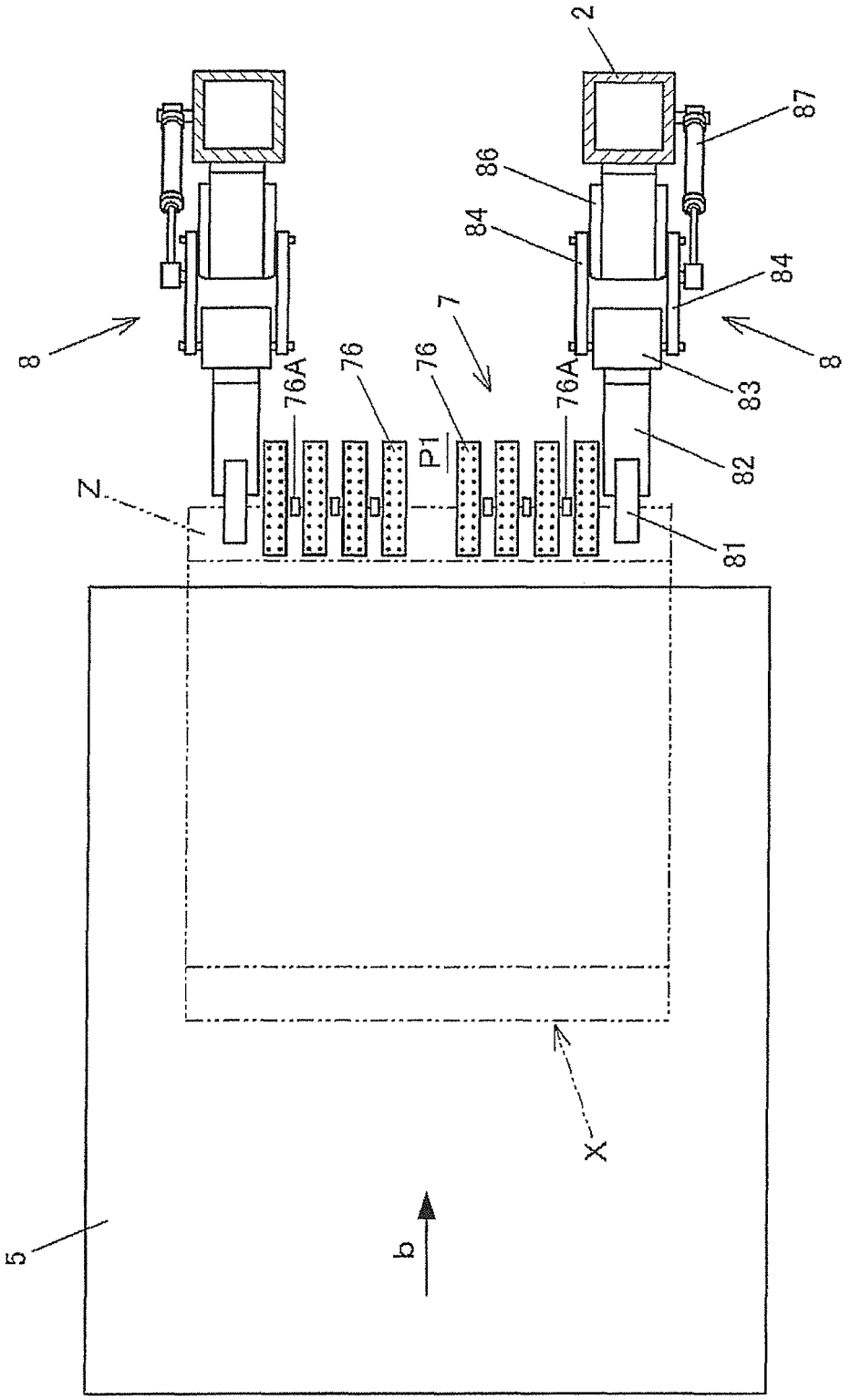


FIG. 5

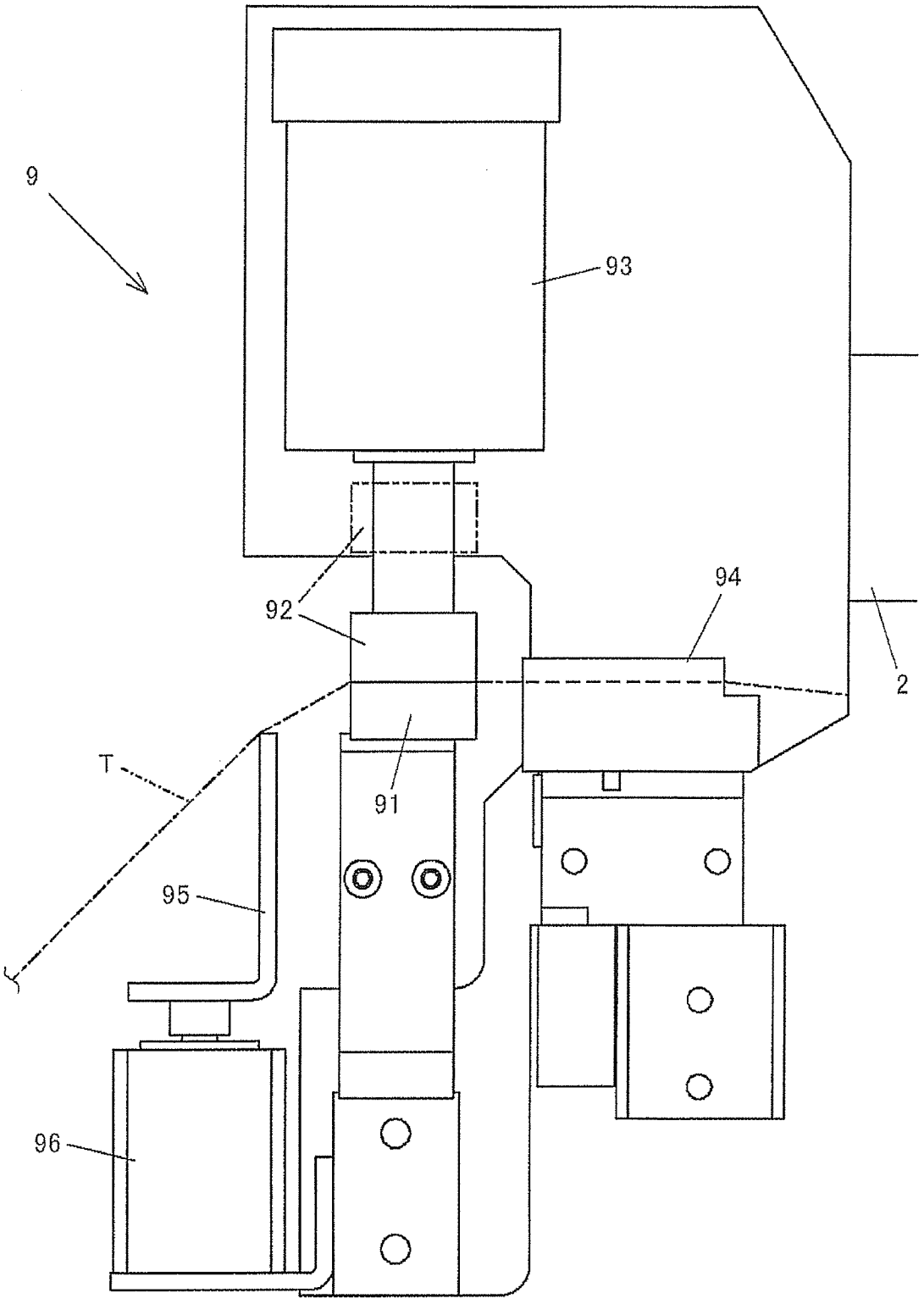


FIG. 6

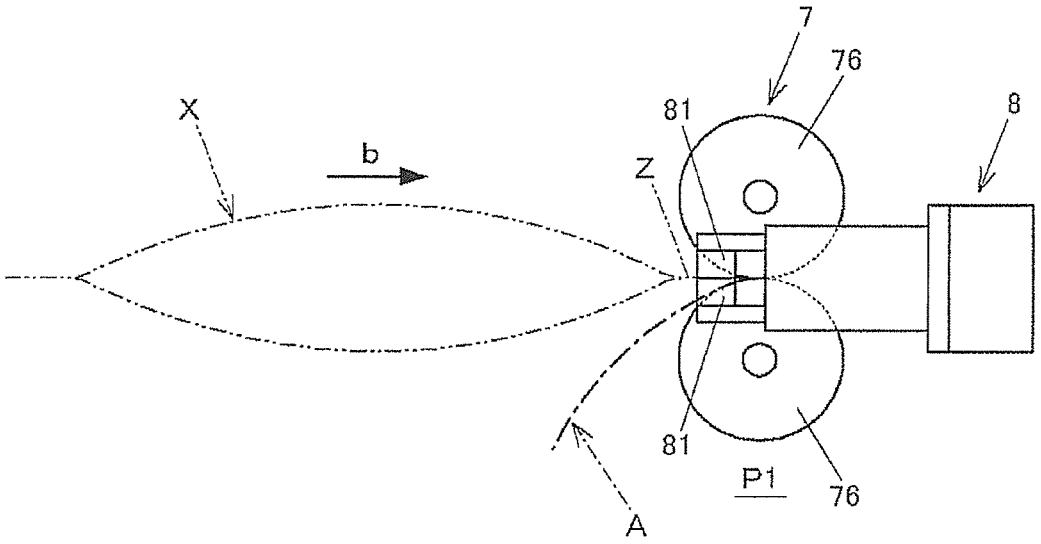


FIG. 7

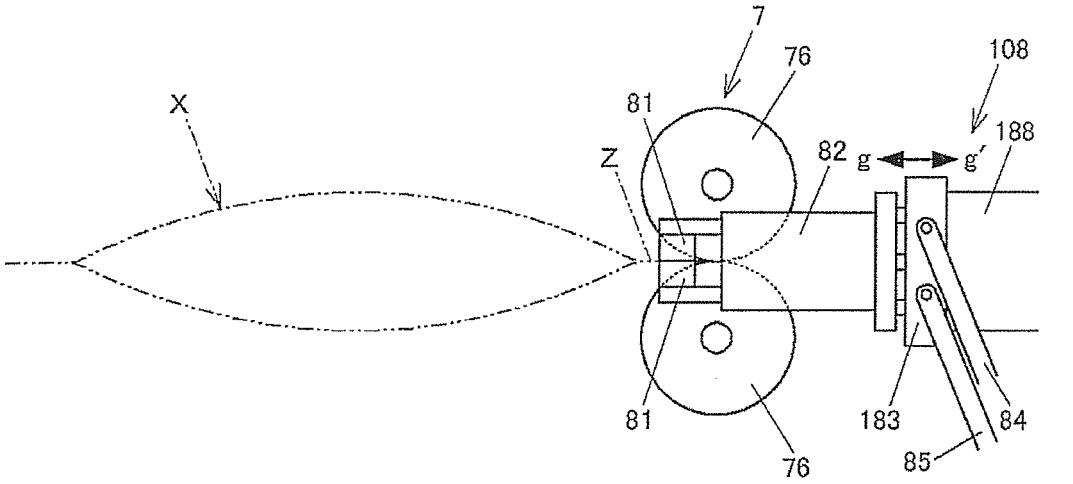


FIG. 8

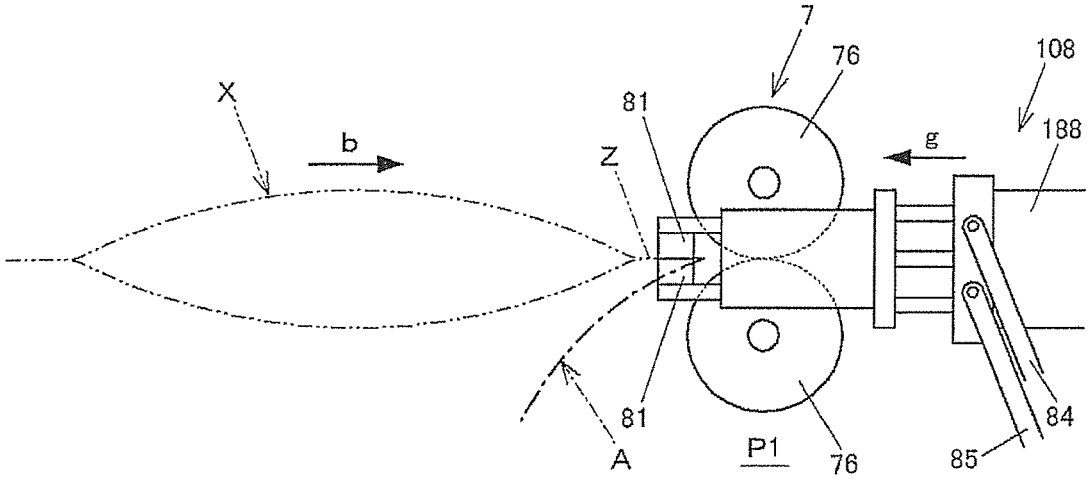


FIG. 9

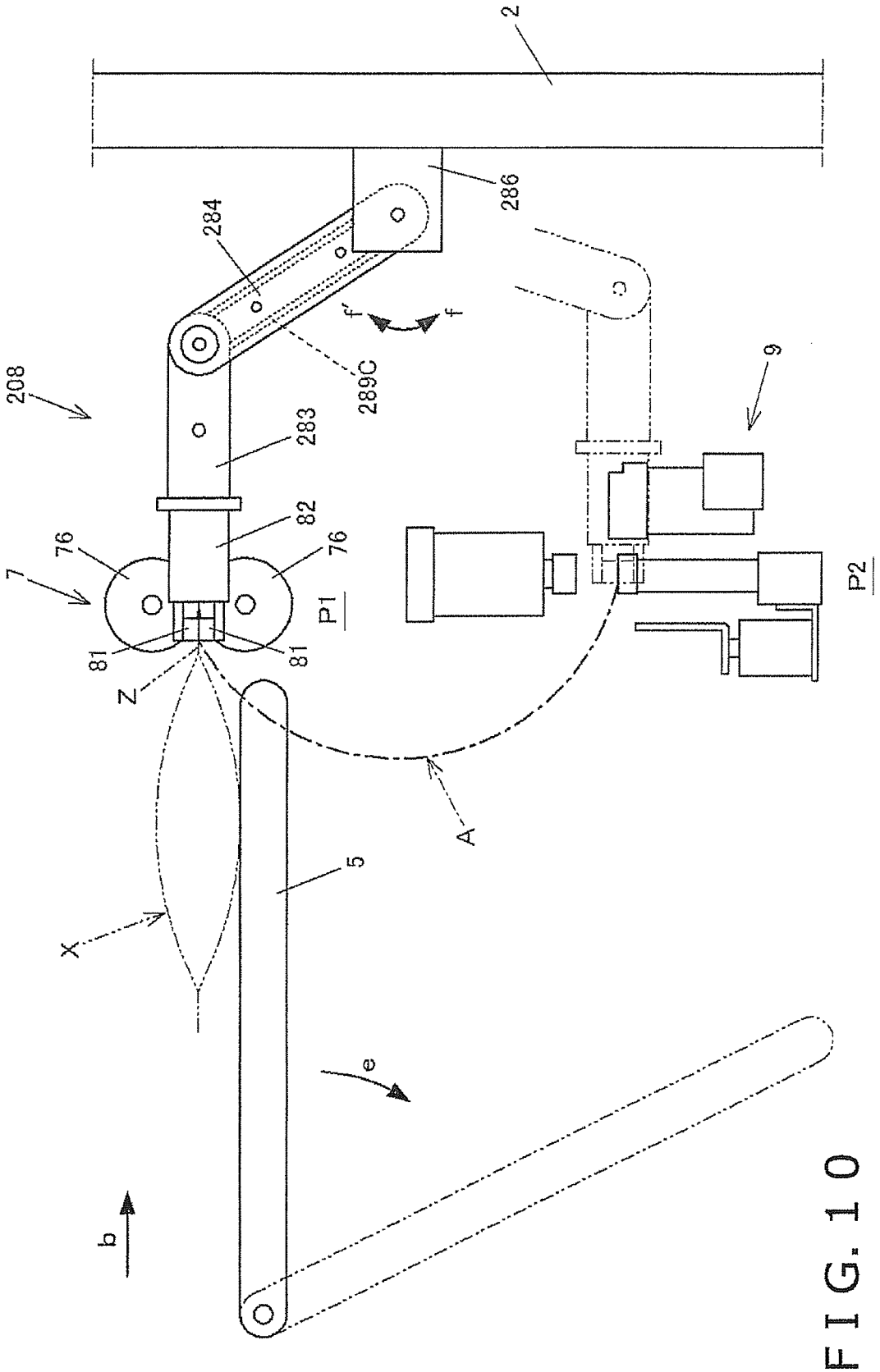


FIG. 10

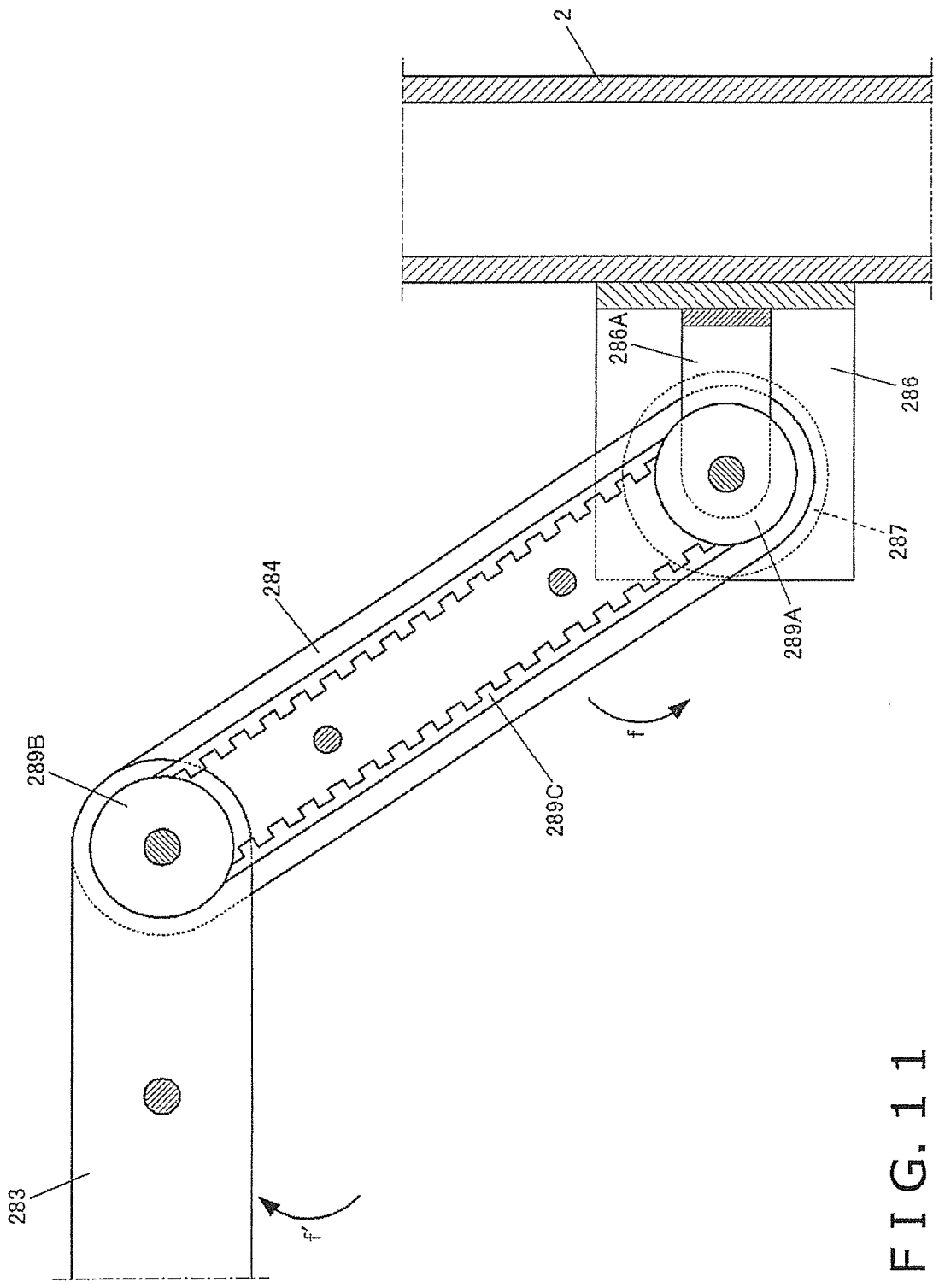
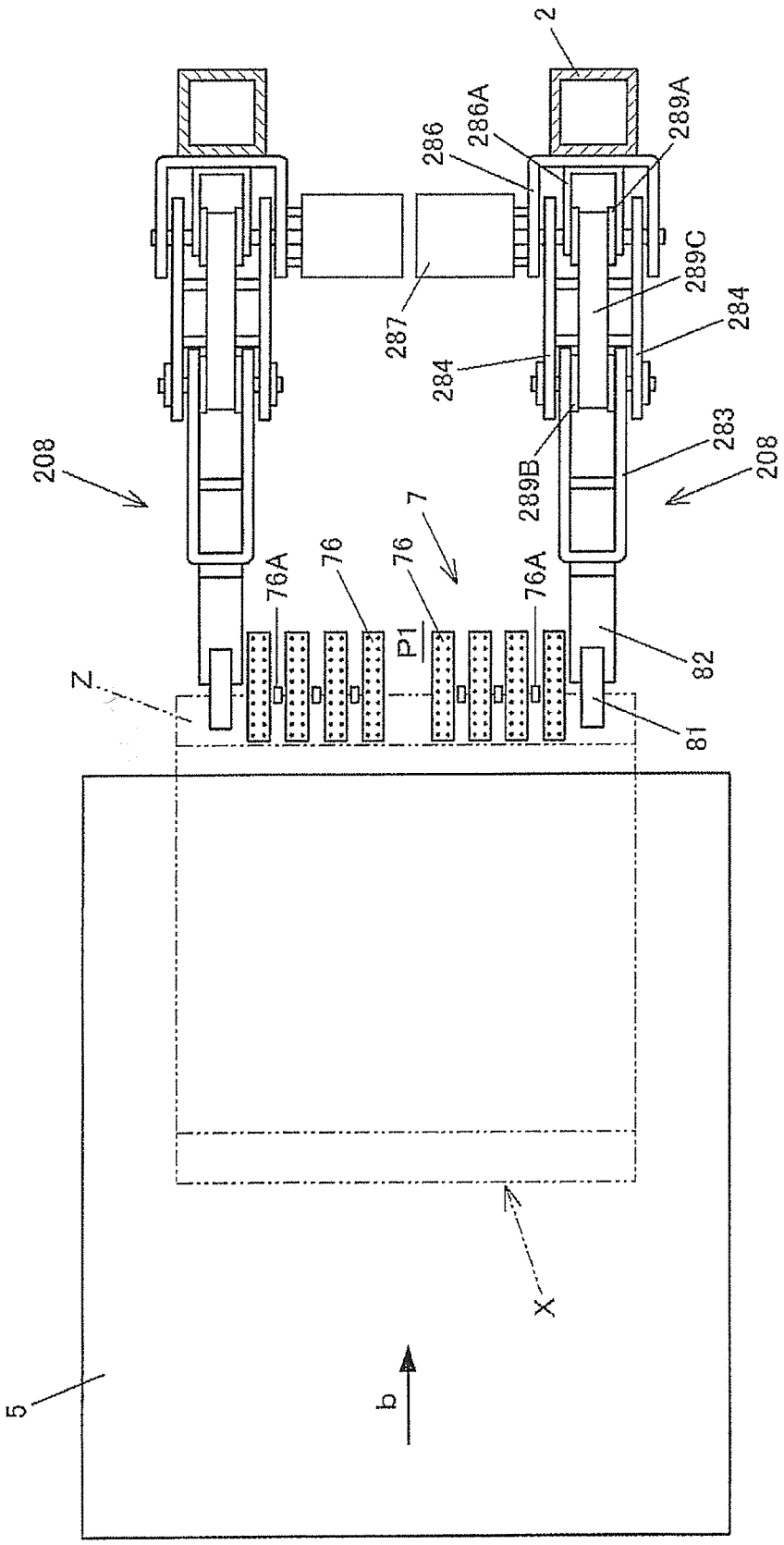


FIG. 11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289C
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208
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289B
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76A
P1
82
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Z
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FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2008/068166

A. CLASSIFICATION OF SUBJECT MATTER
B65B15/04(2006.01)i

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)
B65B15/00-15/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2008
Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2007-112502 A (Ishida Co., Ltd.), 10 May, 2007 (10.05.07), Full text; all drawings (Family: none)	1-6
A	JP 2004-090948 A (Ishida Co., Ltd.), 25 March, 2004 (25.03.04), Full text; all drawings & EP 1394040 A2 & US 2004/0043882 A1	1-6
A	US 3864895 A (WRIGHT MACHINERY CO. INC.), 11 February, 1975 (11.02.75), Full text; all drawings (Family: none)	1-6

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 December, 2008 (08.12.08)	16 December, 2008 (16.12.08)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2008/068166

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2004-262482 A (Ishida Co., Ltd.), 24 September, 2004 (24.09.04), Full text; all drawings & EP 1452447 A2 & US 2004/0168774 A1	1-6

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2004182302 A **[0003]**
- US 3864895 A **[0003]**