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(71) Applicant: **Kabushiki Kaisha Toshiba**
Tokyo
105-8001 (JP)

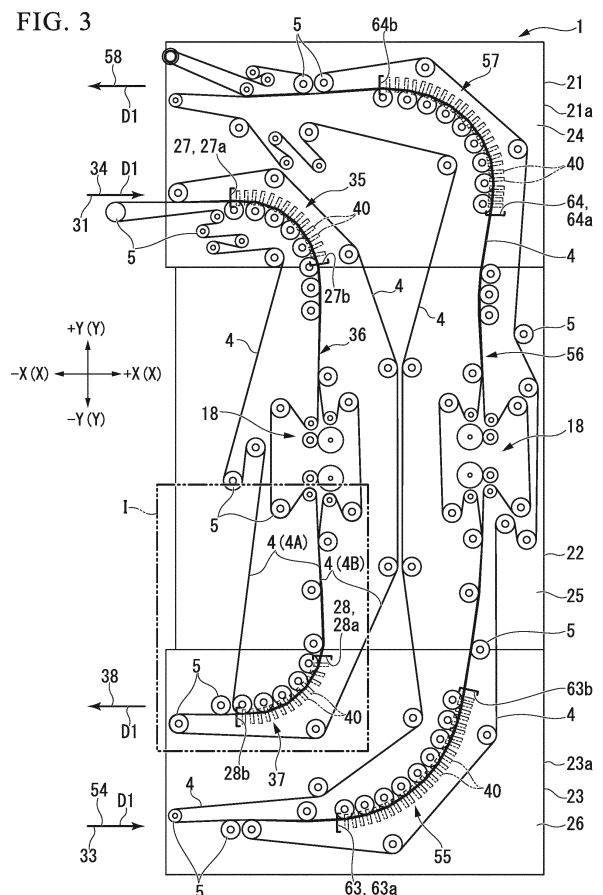
(72) Inventor: **HORIUCHI, Haruhiko**
Minato-ku, Tokyo 105-8001 (JP)

(74) Representative: **Horn Kleimann Waitzhofer**
Patentanwälte PartG mbB
Ganghoferstrasse 29a
80339 München (DE)

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(54) **DELIVERY PROCESSING APPARATUS**

(57) According to one embodiment, a delivery processing apparatus includes a conveying mechanism and a plurality of accumulators. The conveying mechanism includes a conveyor, at least a pair of conveying belts (4), and a driver. The conveyor is provided with a conveying route including a direction change path (35, 37, 55, 57) configured to change a conveying direction of a delivery object. The pair of conveying belts is configured to sandwich the delivery object from both sides to convey the delivery object along the conveying route. The driver is configured to drive the conveying belts. The delivery object conveyed by the conveying mechanism is to be accumulated in the plurality of accumulators. One of the pair of conveying belts is an inner periphery conveying belt provided in the direction change path. The other of the pair of conveying belts is an outer periphery conveying belt which is extendable greater than the inner periphery conveying belt and faces an outer peripheral surface of the inner periphery conveying belt. The direction change path includes one or a plurality of rotating supports (40) that are configured to come into contact with the delivery object and are rotatable around an axis intersecting the conveying direction.



Description

FIELD

[0001] Embodiments of the present invention relate to a delivery processing apparatus.

BACKGROUND

[0002] A delivery processing apparatus used by a postal service provider or the like performs a process of specifying a delivery section destination on the basis of a destination indicated on a delivery object or the like and conveying the delivery object to an accumulator corresponding to the delivery section destination.

[0003] Recently, delivery objects wrapped in bag-shaped packages made of plastic have been increasing.

[0004] In a conventional delivery processing apparatus, there is a possibility of a package rubbing off due to sliding on a surface of a conveying route when the delivery object is conveyed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005]

FIG. 1 is a plan view schematically showing a configuration of a delivery processing apparatus of an embodiment.

FIG. 2 is a diagram showing a schematic configuration of a classifying preprocessor.

FIG. 3 is a plan view showing a portion of a configuration of a conveying mechanism.

FIG. 4 is a perspective view showing a portion of a configuration of a conveying mechanism.

FIG. 5 is a perspective view showing a configuration of a direction change path for a portion I of FIG. 3 (a portion II of FIG. 4).

FIG. 6 is a perspective view showing an example of a conveying roller.

FIG. 7 is a plan view schematically showing a configuration of a direction change path for a portion I of FIG. 3.

FIG. 8 is a side view schematically showing a configuration of a direction change path.

FIG. 9 is a side view schematically showing a configuration of a portion of a direction change path.

FIG. 10 is a side view schematically showing a configuration of a portion of a direction change path.

FIG. 11 is a side view schematically showing a configuration of a portion of a direction change path.

FIG. 12 is a perspective view showing a configuration of a direction change path for a portion III of FIG. 4.

FIG. 13 is a plan view showing a portion of a configuration of a conveying mechanism.

FIG. 14 is a perspective view showing a portion of a configuration of a conveying mechanism.

FIG. 15 is a plan view schematically showing a con-

figuration of a direction change path.

FIG. 16 is a side view schematically showing a configuration of a floor conveying belt.

FIG. 17 is a side view schematically showing a configuration of a portion of a floor conveying belt.

FIG. 18 is a plan view showing a modified example of a conveying mechanism.

FIG. 19 is an enlarged plan view showing the conveying mechanism of FIG. 18.

DETAILED DESCRIPTION

[0006] According to one embodiment, a delivery processing apparatus includes a conveying mechanism and a plurality of accumulators. The conveying mechanism includes a conveyor, at least a pair of conveying belts, and a driver. The conveyor is provided with a conveying route including a direction change path configured to change a conveying direction of a delivery object. The pair of conveying belts is configured to sandwich the delivery object from both sides to convey the delivery object along the conveying route. The driver is configured to drive the conveying belts. The delivery object conveyed by the conveying mechanism is to be accumulated in the plurality of accumulators. One of the pair of conveying belts is an inner periphery conveying belt provided in the direction change path. The other of the pair of conveying belts is an outer periphery conveying belt which is extendable greater than the inner periphery conveying belt and faces an outer peripheral surface of the inner periphery conveying belt. The direction change path includes one or a plurality of rotating supports that are configured to come into contact with the delivery object and are rotatable around an axis intersecting the conveying direction.

[0007] Hereinafter, a delivery processing apparatus of an embodiment will be described with reference to the drawings.

[0008] First, FIG. 1, FIG. 2, and an overall configuration of a delivery processing apparatus 1 of an embodiment will be described.

[0009] FIG. 1 is a plan view schematically showing a configuration of the delivery processing apparatus 1 of an embodiment.

[0010] FIG. 2 is a diagram schematically showing a configuration of a classifying preprocessor.

[0011] As shown in FIGS. 1 and 2, the delivery processing apparatus 1 is an apparatus which recognizes a destination indicated on or attached to a delivery object S such as a sealed letter or the like, and classifies and accumulates the delivery objects S in a stacker corresponding to the destination.

[0012] The delivery processing apparatus 1 is a postal matter processing and classifying machine installed at a post office or the like, for example.

[0013] In the following description, an XY coordinate system may be used.

[0014] An X direction represents a length direction (a

lateral direction in FIG. 1) of the delivery processing apparatus 1.

[0015] A Y direction represents a direction perpendicular to the X direction on a surface of a conveying route 2 and is a width direction (a vertical direction in FIG. 1) of the delivery processing apparatus 1.

[0016] A plan view refers to viewing in a direction perpendicular to an XY plane.

[0017] In FIG. 1, one direction (a right direction) of the X direction is referred to as a +X direction and the opposite direction thereof is referred to as a -X direction.

[0018] One direction (an upward direction) of the Y direction is referred to as a +Y direction and the opposite direction thereof is referred to as a -Y direction.

[0019] As shown in FIG. 1, the delivery processing apparatus 1 includes a conveying mechanism 20 and a classifier 70, for example.

[0020] The classifier 70 has a plurality of stackers 71 (accumulators).

[0021] The number of the stackers 71 may be any number of two or more.

[0022] The stackers 71 include a plurality of one-side stackers 71A (first accumulators) provided at an outer side (+Y direction) of one side of a conveying table 3 and a plurality of other-side stackers 71B (second accumulators) provided at an outer side (-Y direction) of the other side of the conveying table 3.

[0023] The plurality of one-side stackers 71A and the plurality of other-side stackers 71B are provided to be aligned in a length direction (X direction) of the conveying mechanism 20.

[0024] As shown in FIGS. 1 and 2, the conveying mechanism 20 includes a classifying preprocessor 10, the conveying table 3 having the conveying route 2, a conveying belt 4 (see FIG. 3 or the like), a support pulley 5 (see FIG. 3 or the like), a driver 6, and a controller 7.

[0025] The classifying preprocessor 10 includes a supplier 11, a position aligner 12, a conveyability determiner 13, an exclusion accumulator 14, a reader 15, a video coding (VC) requester 16, an ink jet printer (IJP) 17, and a gap corrector 18 (see FIG. 1 or the like).

[0026] In the supplier 11, a plurality of delivery objects S are taken out one by one.

[0027] In the position aligner 12, lower end positions of the delivery objects S are aligned, for example.

[0028] In the conveyability determiner 13, sizes, postures, overlap of multiple pieces, presence of foreign matters or metals, or the like of the delivery objects S are detected.

[0029] When a size, a thickness, or the like of the delivery object S is not within regulations, multiple pieces of the delivery objects S overlap, a foreign matter or the like is included in the delivery object S, or a posture of the delivery object S is not within regulations, such delivery objects S are determined to be non-conveyable and are sent to the exclusion accumulator 14.

[0030] Other delivery objects S pass along their path.

[0031] The reader 15 includes a camera (a line sensor)

which image-captures the delivery object S.

[0032] The reader 15 can read a bar code (a bar code for classifying or the like) displayed on the delivery object S.

[0033] The reader 15 also functions as an optical character recognition (OCR) processor such that the reader 15 performs OCR processing for the images captured by the camera and reads information such as a postal code, a destination, a sender, or the like of the delivery object S.

[0034] As shown in FIG. 2, the VC requester 16 transmits an image (an illegible image) of the delivery object S, from which the reader 15 cannot read all or some of the information, to a video coding (VC) terminal 90 via a network NW, and the VC requester 16 receives information (a postal code and a destination, for example) related to the delivery object S from the VC terminal 90.

[0035] In the VC terminal 90, an image received from the delivery processing apparatus 1 is displayed to an operator and information input by the operator is returned to the delivery processing apparatus 1.

[0036] The process of displaying the image and receiving the input is referred to as VC processing.

[0037] The VC requester 16 has the function of an information transmitter by which an illegible image is transmitted to the VC terminal 90 and the function of an information receiver by which information related to the illegible image (information input by an operator) is received from the VC terminal 90.

[0038] The IJP 17 (a printer) prints an object encoded with information of the delivery object S obtained by the reader 15 or the VC requester 16 on the delivery object S as a stealth bar code.

[0039] The printed stealth bar code is read by a bar code reader 19 (see FIG. 1) attached to the IJP 17 to perform a verification process.

[0040] The gap corrector 18 shown in FIG. 1 corrects a gap between the plurality of delivery objects S to an appropriate range by adjusting a conveying speed of the delivery objects S.

[0041] As shown in FIG. 1, the conveying table 3 (a conveyor) includes a first extending portion 21, an intermediate connecting portion 22, and a second extending portion 23.

[0042] Each of the first extending portion 21 and the second extending portion 23 extends in a straight line in the X direction in a plan view.

[0043] The first extending portion 21 and the second extending portion 23 are disposed in parallel to each other at an interval.

[0044] The intermediate connecting portion 22 is provided between one end portion 21a (an end portion in the +X direction) of the first extending portion 21 and one end portion 23a (an end portion in the +X direction) of the second extending portion 23.

[0045] The conveying route 2 is a path along which the delivery object S is conveyed toward the stacker 71 on an upper surface of the conveying table 3.

[0046] The conveying route 2 includes a first conveying

path 31 (an inner conveying path) having a U-shape in a plan view, a halfway direction change path 32, and a second conveying path 33 (an outer conveying path) having a U-shape in a plan view.

[0047] A direction in which the delivery object S is conveyed is referred to as a conveying direction D1.

[0048] The first conveying path 31 sequentially includes a first partial path 34, a first direction change path 35, an intermediate path 36, a second direction change path 37, and a second partial path 38 in the conveying direction D1.

[0049] The first partial path 34 is formed on an upper plate 24 of the first extending portion 21 substantially in a length direction (the X direction) of the first extending portion 21.

[0050] The first partial path 34 extends from the supplier 11 toward the end portion 21a of the first extending portion 21 via the position aligner 12, the conveyability determiner 13, the reader 15, and the VC requester 16.

[0051] The conveying mechanism 20 will be described with reference to FIGS. 3 to 17.

[0052] FIG. 3 is a plan view showing a portion of a configuration of the conveying mechanism 20.

[0053] FIG. 4 is a perspective view showing a portion of a configuration of the conveying mechanism 20.

[0054] FIG. 5 is a perspective view showing a configuration of the second direction change path 37 for a portion I of FIG. 3 (a portion II of FIG. 4).

[0055] FIG. 6 is a perspective view showing a conveying roller 40.

[0056] FIG. 7 is a plan view schematically showing a configuration of the second direction change path 37 for a portion I of FIG. 3.

[0057] As shown in FIG. 3, the first direction change path 35 is formed to be curved on the upper plate 24 of the first extending portion 21 in a plan view.

[0058] The first direction change path 35 is formed in a circular arc shape corresponding to a quarter-circle in a plan view, for example.

[0059] The first direction change path 35 can change a conveying direction (+X direction) of the delivery object S in the first partial path 34 to the -Y direction.

[0060] The intermediate path 36 is formed on an upper plate 25 of the intermediate connecting portion 22 in a length direction (Y direction) of the intermediate connecting portion 22.

[0061] The second direction change path 37 is formed to be curved on an upper plate 26 of the second extending portion 23 in a plan view.

[0062] The second direction change path 37 is formed in a circular arc shape corresponding to a quarter-circle in a plan view, for example.

[0063] The second direction change path 37 can change a conveying direction (-Y direction) of the delivery object S in the intermediate path 36 to the -X direction.

[0064] Each of the first direction change path 35 and the second direction change path 37 has a plurality of conveying rollers 40 (rotating supports).

[0065] Hereinafter, a configuration of a direction change path having the conveying rollers 40 will be described in detail with the second direction change path 37 taken as an example with reference to FIGS. 4 to 11.

[0066] As shown in FIGS. 4 and 5, the second direction change path 37 is constituted by the plurality of conveying rollers 40 provided at an opening 28 formed on the upper plate 26.

[0067] As shown in FIG. 6, each of the conveying rollers 40 has a central shaft portion 41 (a central axis, an axis) and a body portion 42.

[0068] The body portion 42 is formed in a cylindrical shape, for example, and is supported by the central shaft portion 41.

[0069] The body portion 42 is configured to be rotatable in a circumferential direction of the body portion 42 (in a direction around the axis of the central shaft portion 41).

[0070] It is preferable that at least an outer circumferential surface 42b be formed of a metal (stainless steel, for example).

[0071] Therefore, abrasion of the outer circumferential surface 42b due to contact with the delivery object S can be suppressed.

[0072] At least a portion of the conveying roller 40 may be made of a polymer material (a resin such as polyacetal, nylon, polyethylene terephthalate, or the like, for example).

[0073] At least a portion of the body portion 42 may be made of the polymer material.

[0074] Therefore, the body portion 42 becomes light in weight to facilitate rotation of the conveying roller 40.

[0075] Therefore, friction between the delivery object S and the conveying roller 40 can be reduced.

[0076] The central shaft portion 41 is provided along the central axis of the body portion 42.

[0077] End portions 41a and 41a of the central shaft portion 41 respectively protrude outward (in a direction away from the body portion 42) from end portions 42a and 42a of the body portion 42 in a central axis direction of the body portion 42.

[0078] As shown in FIGS. 5 and 7, the opening 28 is formed in a curved shape in a plan view, for example, in a circular arc shape corresponding to a quarter-circle.

[0079] A tangential direction at one end 28a of the opening 28 is aligned with a direction of the intermediate path 36 (Y direction) and a tangential direction at the other end 28b of the opening 28 is aligned with a direction of the second partial path 38 (X direction).

[0080] As shown in FIG. 5, the plurality of conveying rollers 40 are provided to be aligned in a length direction of the opening 28.

[0081] The conveying rollers 40 are disposed at intervals in the length direction of the opening 28, for example.

[0082] A direction of the central shaft portion 41 of the conveying rollers 40 is a direction perpendicular to the length direction of the opening 28 (a radial direction of the opening 28 in a circular arc shape) in the XY plane, for example.

[0083] The end portions 41a and 41a of the central shaft portion 41 of the conveying rollers 40 are supported by an inner peripheral edge portion 28c and an outer peripheral edge portion 28d of the opening 28.

[0084] The body portion 42 is positioned in the opening 28 in a plan view and is rotatable around the central shaft portion 41 (see FIG. 6).

[0085] An extending direction of the opening 28 is the same as the conveying direction D1 of the delivery object S.

[0086] The second direction change path 37 can convey the delivery object S while the delivery object S is stably supported by the plurality of conveying rollers 40 because the second direction change path 37 has the plurality of conveying rollers 40 aligned in the length direction of the opening 28.

[0087] Also, a direction of the central shaft portion 41 of the conveying rollers 40 is not limited to the direction perpendicular to the length direction of the opening 28 but may be a direction intersecting the length direction of the opening 28 (the conveying direction D1).

[0088] In addition, the number of the conveying rollers 40 constituting one direction change path is not limited to a plural number but may be one.

[0089] FIG. 8 is a side view schematically showing a configuration of the second direction change path 37.

[0090] FIG. 9 is a side view schematically showing a configuration of a portion of the second direction change path 37.

[0091] An upward direction in FIGS. 8 and 9 is a direction perpendicular to the XY plane, a direction away from the upper plate 26, and a height direction.

[0092] As shown in FIGS. 8 and 9, in the second partial path 38, a portion 38A (a sliding path) provided so as to be continuous with a downstream side of the second direction change path 37 in the conveying direction D1 has a sliding surface 38a in which the delivery object S is slidable, for example.

[0093] As shown in FIG. 9, it is preferable that, among the conveying rollers 40 which constitute the second direction change path 37, an uppermost portion 40Ba of a conveying roller 40B at the most downstream side in the conveying direction D1 be positioned at a higher position relative to the sliding surface 38a.

[0094] A height difference H1 between the uppermost portion 40Ba of the conveying roller 40B and the sliding surface 38a is 0.5 mm or more, for example.

[0095] As shown in FIGS. 9 and 10, when the uppermost portion 40Ba of the conveying roller 40B is positioned at a higher position relative to the sliding surface 38a, the delivery object S moves from a higher position than the sliding surface 38a to the sliding surface 38a.

[0096] Thus, conveyance of the delivery object S from the conveying roller 40B to the sliding surface 38a becomes smooth without a problem such as the delivery object S being caught by the other end 28b of the opening 28 or the like.

[0097] Also, the uppermost portion of the conveying

roller 40 is a portion at the highest position with respect to the surface (a horizontal surface) of the conveying route 2.

[0098] As shown in FIG. 11, among the intermediate path 36, a portion 36A provided so as to be continuous with an upstream side of the second direction change path 37 in the conveying direction D1 has a sliding surface 36a along which the delivery object S is slidable, for example.

[0099] It is preferable that, among the conveying rollers 40 which constitute the second direction change path 37, an uppermost portion 40Aa of a conveying roller 40A at the most upstream side of the conveying direction D1 be at the same height as the sliding surface 36a or at a lower position than the sliding surface 36a.

[0100] Therefore, conveyance of the delivery object S from the sliding surface 36a to the conveying roller 40A becomes smooth.

[0101] As shown in FIG. 3, the first direction change path 35 is constituted by the plurality of conveying rollers 40 provided at an opening 27 formed at the upper plate 24, as in the second direction change path 37.

[0102] The opening 27 is formed in a curved shape in a plan view, for example, in a circular arc shape corresponding to a quarter-circle.

[0103] A tangential direction at one end 27a of the opening 27 is aligned with a direction of the first partial path 34 (X direction) and a tangential direction at the other end 27b of the opening 27 is aligned with a direction of the intermediate path 36 (Y direction).

[0104] The plurality of conveying rollers 40 are provided to be aligned in a length direction of the opening 27.

[0105] A direction of the central shaft portion 41 of the conveying rollers 40 is in a direction perpendicular to a length direction of the opening 27 (a radial direction of the opening 27 in a circular arc shape) in the XY plane, for example.

[0106] The body portion 42 of the conveying roller 40 is rotatable around the central shaft portion 41 (see FIG. 6).

[0107] As shown in FIGS. 1 and 3, the second partial path 38 is formed on the upper plate 26 of the second extending portion 23.

[0108] The second partial path 38 extends from the second direction change path 37 toward an end portion 23b in the other side of the second extending portion 23 (an end portion in the -X direction).

[0109] As shown in FIG. 1, the second partial path 38 sequentially includes a main path 44 and an avoidance path 45 in the conveying direction D1.

[0110] The main path 44 is formed in a straight line in a length direction (X direction) of the second extending portion 23 in a plan view.

[0111] The avoidance path 45 sequentially includes an outwardly inclined path 46, an intermediate path 47, and an inwardly inclined path 48 in the conveying direction D1.

[0112] The outwardly inclined path 46 is inclined out-

ward (-Y direction) in the conveying direction D1 in a plan view.

[0113] The intermediate path 47 is formed in a straight line in a length direction (X direction) of the second extending portion 23 in a plan view.

[0114] The inwardly inclined path 48 is inclined inward (+Y direction) in the conveying direction D1 in a plan view.

[0115] The IJP 17 and the bar code reader 19 are provided at a position close to an inner side (+Y direction) of the intermediate path 47.

[0116] The intermediate path 47 is positioned at an outer side (-Y direction) compared to the main path 44 from a positional perspective in a width direction (Y direction) of the second extending portion 23.

[0117] Therefore, a sufficient installation space for the IJP 17 and the bar code reader 19 is secured on the second extending portion 23.

[0118] A range of the first partial path 34 downstream from the VC requester 16 in the conveying direction D1, the first direction change path 35, the intermediate path 36, the second direction change path 37, the main path 44, and a range 45A of the avoidance path 45 upstream from the IJP 17 in the conveying direction D1 belong to a conveyance delaying path.

[0119] The conveyance delaying path refers to a path for securing time needed for an operator in the VC terminal 90 (see FIG. 2) to input information (for VC processing).

[0120] The delivery objects S of which classifying information cannot be recognized are processed without being excluded due to the time for the VC processing secured by the conveyance delaying path, and thereby an operation rate of the apparatus can be improved.

[0121] As shown in FIGS. 13 to 15, the halfway direction change path 32 is formed to be curved on the upper plate 26 of the second extending portion 23 in a plan view.

[0122] The halfway direction change path 32 is formed in a circular arc shape corresponding to almost a semi-circle in a plan view, for example.

[0123] The halfway direction change path 32 is curved so that the conveying direction D1 turns counterclockwise in a plan view.

[0124] The halfway direction change path 32 can change a conveying direction of the delivery objects S in the second partial path 38 to the +X direction.

[0125] The halfway direction change path 32 includes the plurality of conveying rollers 40 as in the first direction change path 35 and the second direction change path 37.

[0126] As shown in FIGS. 14 and 15, the halfway direction change path 32 is constituted by the plurality of conveying rollers 40 (see FIG. 6) provided in an opening 49 formed at the upper plate 26.

[0127] The opening 49 is formed in a curved shape in a plan view, for example, in a circular arc shape corresponding to almost a semicircle.

[0128] A tangential direction at one end 49a of the opening 49 is aligned with a direction of the inwardly inclined path 48 and a tangential direction at the other end

49b of the opening 49 is aligned with a direction of a straight path 51 (X direction).

[0129] The plurality of conveying rollers 40 are provided to be aligned in a length direction of the opening 49.

[0130] The conveying rollers 40 are arranged at intervals in a length direction of the opening 49, for example.

[0131] A direction of the central shaft portion 41 of the conveying rollers 40 is a direction perpendicular to a length direction of the opening 49 (a radial direction of the opening 49 in a circular arc shape) in the XY plane, for example.

[0132] As shown in FIG. 14, the end portions 41a and 41b of the central shaft portion 41 of the conveying rollers 40 are supported by an inner circumferential edge portion 49c and an outer circumferential edge portion 49d of the opening 49.

[0133] The body portion 42 is positioned in the opening 49 in a plan view and is rotatable around the central shaft portion 41 (see FIG. 6).

[0134] Also, a direction of the central shaft portion 41 of the conveying rollers 40 is not limited to the direction perpendicular to the length direction of the opening 49 but may be a direction intersecting the length direction of the opening 49.

[0135] It is preferable that, among the conveying rollers 40 which constitute the halfway direction change path 32, an uppermost portion of the conveying roller 40 at the most downstream side in the conveying direction D1 be positioned at a higher position relative to a sliding surface of the second conveying path 33 which is a portion provided so as to be continuous with the downstream side of the halfway direction change path 32 in the conveying direction D1 (see FIG. 9).

[0136] A height difference between the uppermost portion of the conveying roller 40 at the most downstream side in the conveying direction D1 and the sliding surface is 0.5 mm or more, for example.

[0137] Therefore, conveyance of the delivery object S from the conveying roller 40 to the sliding surface becomes smooth without a problem such as the delivery object S being caught by the other end 49b of the opening 49.

[0138] It is preferable that, among the conveying rollers 40 which constitute the halfway direction change path 32, an uppermost portion of the conveying roller 40 at the most upstream side of the conveying direction D1 be the same height as the sliding surface of the inwardly inclined path 48 which is a portion provided so as to be continuous with the upstream side of the halfway direction change path 32 in the conveying direction D1 or at a lower position than the sliding surface (see FIG. 11).

[0139] Therefore, conveyance of the delivery object S from the sliding surface to the conveying roller 40 becomes smooth.

[0140] As shown in FIG. 1, the second conveying path 33 sequentially includes the second partial path 54, a first direction change path 55, an intermediate path 56, a second direction change path 57, and a first partial path

58 in the conveying direction D1.

[0141] The second partial path 54 is formed on the upper plate 26 of the second extending portion 23.

[0142] The second partial path 54 extends from the halfway direction change path 32 toward the end portion 23a of the second extending portion 23 (an end portion in the +X direction).

[0143] The second partial path 54 sequentially includes the straight path 51, an inwardly inclined path 52, and a main path 53 in the conveying direction D1.

[0144] The second partial path 54 is positioned to be spaced outward (-Y direction) from the second partial path 38 of the first conveying path 31.

[0145] The straight path 51 is formed in a substantially straight line in a length direction (the X direction) of the second extending portion 23 in a plan view.

[0146] The inwardly inclined path 52 is inclined inward (the +Y direction) in the conveying direction D1 in a plan view.

[0147] The main path 53 is formed in a straight line in a length direction (the X direction) of the second extending portion 23 in a plan view.

[0148] As shown in FIG. 13, a floor conveying belt 59 (a floor conveyor) is provided on a portion of the straight path 51.

[0149] As shown in FIGS. 13 and 16, the floor conveying belt 59 includes a pair of pulleys 60 and 60 (a rotation member) provided to be spaced apart from each other in the length direction (the X direction) of the second extending portion 23 and an endless belt 61 stretched between the pulleys 60 and 60.

[0150] The floor conveying belt 59 is provided in an opening 62 formed at the upper plate 26 of the second extending portion 23.

[0151] The floor conveying belt 59 can drive the pulley 60 by rotating the pulley 60 by use of a driver such as a motor or the like (not shown in the figure).

[0152] A driving speed of the floor conveying belt 59 can be the same as a driving speed of the conveying belt 4.

[0153] As shown in FIG. 17, when a surface at a portion provided so as to be continuous with a downstream side of the floor conveying belt 59 of the straight path 51 in the conveying direction D1 is a sliding surface 51b, it is preferable that an uppermost portion 59b of an end portion of the downstream side of the endless belt 61 in the conveying direction D1 be positioned at a higher position with respect to the sliding surface 51b of the straight path 51 at the downstream side of the conveying direction D1.

[0154] A height difference H2 between the uppermost portion 59b and the sliding surface 51b is 0.5 mm or more, for example.

[0155] When the uppermost portion 59b of the end portion of the floor conveying belt 59 is located at a position higher than that of the sliding surface 51b, conveyance of the delivery object S from the floor conveying belt 59 to the sliding surface 51b becomes smooth.

[0156] As shown in FIG. 16, it is preferable that an up-

permost portion 59a of an end portion of an upstream side of the floor conveying belt 59 in the conveying direction D1 be the same height as a sliding surface 51a at the upstream side of the conveying direction D1 or at a lower position than the sliding surface 51a.

[0157] Therefore, conveyance of the delivery object S from the sliding surface 51a to the floor conveying belt 59 becomes smooth.

[0158] It is possible to reduce a pressing force applied to the delivery object S when the delivery object S is sandwiched to be held in a portion of a range in which the floor conveying belt 59 is provided by adjusting tension of the conveying belt 4 or a position of the support pulley 5.

[0159] A separation distance between the conveying belts 4 and 4 may be increased to reduce the pressing force applied to the delivery object S.

[0160] Therefore, the delivery object S is lowered due to the weight thereof to be brought into contact with the floor conveying belt 59, and a posture of the delivery object S can be normalized.

[0161] For example, when a lower edge of the delivery object S in a rectangular shape tilted with respect to a surface of the upper plate 26 is lowered due to the weight thereof to be brought into contact with the floor conveying belt 59, the lower edge of the delivery object S assumes a horizontal posture along an XY plane.

[0162] As shown in FIGS. 1 and 13, a range 45B on a downstream side of the conveying direction D1 from the IJP 17 in the avoidance path 45, the halfway direction change path 32, and a range 54A on an upstream side of the conveying direction D1 from the main path 53 in the second partial path 54 constitute a drying path in which the stealth bar code printed to the delivery object S by the IJP 17 is dried.

[0163] The bar code is reliably dried due to the drying path, and thereby scratching, ink bleeding, or the like of the bar code cannot easily occur.

[0164] Therefore, it is possible to prevent the bar code from becoming difficult to read due to contact with another delivery object S when delivery objects S are accumulated in the stacker 71.

[0165] The main path 53 is formed on the upper plate 26 of the second extending portion 23 in the length direction (the X direction) of the second extending portion 23.

[0166] The main path 53 is positioned to be spaced outward (-Y direction) from the main path 44 of the first conveying path 31.

[0167] The main path 53 is formed in a range in which the other-side stackers 71B are provided in the length direction (X direction) of the second extending portion 23.

[0168] As shown in FIGS. 3, 4, and 12, the first direction change path 55 is formed to be curved on the upper plate 26 of the second extending portion 23 in a plan view.

[0169] The first direction change path 55 is formed in a circular arc shape corresponding to a quarter-circle in a plan view, for example.

[0170] The first direction change path 55 can change a conveying direction (+X direction) of the delivery objects S in the second partial path 54 to the +Y direction.

[0171] As shown in FIGS. 3 and 12, the first direction change path 55 is constituted by the plurality of conveying rollers 40 provided at an opening 63 formed on the upper plate 26.

[0172] The opening 63 is formed in a curved shape in a plan view, for example, in a circular arc shape corresponding to a quarter-circle.

[0173] A tangential direction at one end 63a of the opening 63 is aligned with a direction of the second partial path 54 (X direction) and a tangential direction at the other end 63b of the opening 63 is aligned with a direction of the intermediate path 56 (Y direction).

[0174] The plurality of conveying rollers 40 are provided to be aligned in a length direction of the opening 63.

[0175] A direction of the central shaft portion 41 of the conveying rollers 40 is in a direction perpendicular to a length direction of the opening 63 (a radial direction of the opening 63 in a circular arc shape) in the XY plane, for example.

[0176] The first direction change path 55 is separately positioned toward an outer peripheral side relative to the second direction change path 37 of the first conveying path 31.

[0177] As shown in FIG. 3, the intermediate path 56 is formed on the upper plate 25 of the intermediate connecting portion 22 in a length direction (Y direction) of the intermediate connecting portion 22.

[0178] The intermediate path 56 is separately positioned toward an outer peripheral side (+X direction) relative to the intermediate path 36 of the first conveying path 31.

[0179] The second direction change path 57 is formed to be curved on the upper plate 24 of the first extending portion 21 in a plan view.

[0180] The second direction change path 57 is formed in a circular arc shape corresponding to a quarter-circle in a plan view, for example.

[0181] The second direction change path 57 can change a conveying direction (the +Y direction) of the delivery objects S in the intermediate path 56 to the -X direction.

[0182] The second direction change path 57 is constituted by the plurality of conveying rollers 40 provided in an opening 64 formed on the upper plate 24.

[0183] The opening 64 is formed in a curved shape in a plan view, for example, in a circular arc shape corresponding to a quarter-circle.

[0184] A tangential direction at one end 64a of the opening 64 is aligned with a direction of the intermediate path 56 (Y direction) and a tangential direction at the other end 64b of the opening 64 is aligned with a direction of the first partial path 58 (X direction).

[0185] The plurality of conveying rollers 40 are provided to be aligned in a length direction of the opening 64.

[0186] A direction of the central shaft portion 41 of the

conveying rollers 40 is a direction perpendicular to a length direction of the opening 64 (a radial direction of the opening 64 in a circular arc shape) in the XY plane, for example.

[0187] The second direction change path 57 is separately positioned toward an outer peripheral side relative to the first direction change path 35 of the first conveying path 31.

[0188] As shown in FIG. 1, the first partial path 58 is formed on the upper plate 24 of the first extending portion 21 in a length direction (X direction) of the first extending portion 21.

[0189] The first partial path 58 extends from the second direction change path 57 toward an end portion 21b in the other side of the first extending portion 21.

[0190] The first partial path 58 is separately positioned toward an outer side (+Y direction) relative to the first partial path 34 of the first conveying path 31.

[0191] The first partial path 58 is formed in a range in which the one-side stackers 71A are provided in the length direction (X direction) of first extending portion 21.

[0192] A portion of the first partial path 34 and the main path 44 which are a portion of the conveyance delaying path is provided at an inner side of the second conveying path 33 (between the second partial path 54 and the first partial path 58).

[0193] As shown in FIGS. 4 and 7, at least a pair of the conveying belts 4 are provided on the conveying table 3 so that the delivery object S can be conveyed along the conveying route 2.

[0194] The conveying belt 4 is an endless belt, for example, and is supported by a plurality of support pulleys 5 (belt supports) provided at the conveying table 3 (the first extending portion 21, the intermediate connecting portion 22, and the second extending portion 23).

[0195] In FIG. 7, a pair of conveying belts 4 and 4 (an inside conveying belt 4A and an outside conveying belt 4B) provided in a range including the second direction change path 37 in the conveying route 2 are shown.

[0196] The inside conveying belt 4A (an inner periphery conveying belt) is the conveying belt 4 passing through an inner peripheral side of the second direction change path 37 and the outside conveying belt 4B (an outer periphery conveying belt) is the conveying belt 4 passing through an outer peripheral side of the second direction change path 37.

[0197] A portion of the outside conveying belt 4B faces an outer peripheral surface 4Aa of the inside conveying belt 4A in a portion of the intermediate path 36 and the second direction change path 37.

[0198] The inside conveying belt 4A and the outside conveying belt 4B can sandwich the delivery object S from both sides in a portion of the intermediate path 36 and the second direction change path 37 to convey the delivery object S.

[0199] The inside conveying belt 4A is supported by a plurality of support pulleys 5 (5A to 5I).

[0200] The outside conveying belt 4B is supported by

a plurality of support pulleys 5 (5J to 5N).

[0201] Each of the support pulleys 5 is formed in a columnar shape, for example.

[0202] The support pulleys 5 are rotatably supported around axes of support columns (a support column 5a shown in FIGS. 5 and 7, for example) erected on the conveying table 3, for example.

[0203] The support pulleys 5 come into contact with the conveying belts 4 and 4 from the inner peripheral side of the second direction change path 37, and thereby a moving path of the conveying belts 4 and 4 along the second direction change path 37 is determined.

[0204] In FIG. 15, a pair of conveying belts 4 and 4 (an inside conveying belt 4C and an outside conveying belt 4D) provided at a range including the halfway direction change path 32 in the conveying route 2 are shown.

[0205] The inside conveying belt 4C is the conveying belt 4 passing through an inner peripheral side of the halfway direction change path 32 and the outside conveying belt 4D is the conveying belt 4 passing through an outer peripheral side of the halfway direction change path 32.

[0206] A portion of the outside conveying belt 4D faces an outer peripheral surface 4Ca of the inside conveying belt 4C in the halfway direction change path 32.

[0207] The inside conveying belt 4C and the outside conveying belt 4D can sandwich the delivery object S from both sides in the halfway direction change path 32 to convey the delivery object S.

[0208] Each of the inside conveying belt 4C and the outside conveying belt 4D is supported by a plurality of support pulleys 5.

[0209] The conveying belts 4 (4A to 4D) are formed of a resin such as polyester or the like, for example.

[0210] A surface of the conveying belt 4 may be formed with a coating layer composed of a resin such as polyurethane or the like, for example.

[0211] Elongation of the outside conveying belts 4B and 4D is preferably greater than elongation of the inside conveying belts 4A and 4C. That is, it is preferable that the outside conveying belts 4B and 4D are extendable greater than the inside conveying belts 4A and 4C.

[0212] The elongation of the outside conveying belts 4B and 4D can be set to 2 to 20%, for example (2.5 to 7.5%, for example).

[0213] The elongation of the outside conveying belts 4B and 4D may be 5%, for example.

[0214] The elongation of the inside conveying belts 4A and 4C can be set to 0.1 to 5%, for example (0.5 to 2%, for example).

[0215] The elongation of the inside conveying belts 4A and 4C may be 1%, for example.

[0216] Also, as elongation index, there is JIS K 7161 or the like, for example.

[0217] When the elongation of the outside conveying belts 4B and 4D is greater than the elongation of the inside conveying belts 4A and 4C, the pressing force applied to the delivery object S can be reduced when the

delivery object S is sandwiched and held.

[0218] Thus, a force pushing the delivery object S against a surface (the surfaces of the upper plate 24, 25, and 26) of the conveying route 2 can be reduced.

[0219] Also, since upward movement (movement away from the conveying route 2) of the delivery object S is facilitated due to the reduced pressing force applied to the delivery object S, a large force due to an irregularities can be prevented from being applied to the delivery object S even when the conveying route 2 has irregularities.

[0220] Accordingly, damage to the delivery object S can be avoided.

[0221] It is preferable that tension when the outside conveying belts 4B and 4D are elongated be smaller than tension when the inside conveying belts 4A and 4C are elongated.

[0222] The tension of the outside conveying belts 4B and 4D can be set to a range of 5 to 50 N (10 to 30 N, for example) at 5% elongation, for example.

[0223] The tension of the outside conveying belts 4B and 4D may be 20 N at 5% elongation, for example.

[0224] The tension of the inside conveying belts 4A and 4C can be set to a range of 50 to 500 N (100 to 200 N, for example) at 1% elongation, for example.

[0225] The tension of the inside conveying belts 4A and 4C may be 160 N at 1% elongation, for example.

[0226] The elongation of the conveying belts 4 (4A to 4D) can be confirmed as follows, for example.

[0227] A plurality of marker lines having a predetermined interval (100 mm, for example) in a length direction are drawn on the conveying belt 4 in a state in which the conveying belt 4 is not elongated.

[0228] The above-described conveying belt 4 is attached to the support pulley 5, the interval between the marker lines is measured in that state (in the elongated state), and the elongation is calculated on the basis of the measured value.

[0229] For example, when the interval between the marker lines of the conveying belt 4 in the un-elongated state is 100 mm and the interval of the marker lines in the elongated state is 105 mm, it can be confirmed that the conveying belt 4 is elongated by 5%.

[0230] At least a portion of the support pulleys 5 is rotated by the driver 6 such as a motor or the like (see FIG. 2) to drive the conveying belts 4 (4A to 4D) and thereby the delivery object S can be conveyed in the conveying direction D1.

[0231] As shown in FIG. 2, the controller 7 controls a driving amount (a rotation speed of the motor, for example) of the driver 6 and can arbitrarily adjust a conveying speed of the delivery object S with the conveying belts 4, for example.

[0232] For example, the conveying speed of the delivery object S is switchable between a first conveying speed and a second conveying speed which is different from the first conveying speed.

[0233] As shown in FIGS. 4, 5, and 14, a plurality of

outer guide plates 65 and a plurality of inner guide plates 66 are provided at the first extending portion 21, the intermediate connecting portion 22, and the second extending portion 23 along the conveying route 2 (the first conveying path 31, the halfway direction change path 32, and the second conveying path 33).

[0234] The outer guide plates 65 and the inner guide plates 66 are plates formed of a resin, a metal or the like.

[0235] The outer guide plates 65 and the inner guide plates 66 are formed perpendicular to the XY plane, for example.

[0236] The outer guide plates 65 and the inner guide plates 66 are supported by a plurality of support posts 67 standing on the upper plates 24, 25, and 26 of the first extending portion 21, the intermediate connecting portion 22, and the second extending portion 23.

[0237] The outer guide plates 65 and the inner guide plates 66 are provided at positions separated upward from the upper plates 24, 25, and 26, for example.

[0238] As shown in FIG. 5, it is preferable that the outer guide plates 65 and the inner guide plates 66 be formed with upper ends thereof positioned to be higher than a height of the delivery object S.

[0239] The outer guide plates 65 are provided substantially along the first conveying path 31, the halfway direction change path 32, and the second conveying path 33 at a position separated toward an outer peripheral side from the first conveying path 31, the halfway direction change path 32, and the second conveying path 33 in a plan view.

[0240] The inner guide plates 66 are provided at a position separated toward an inner peripheral side from the first conveying path 31, the halfway direction change path 32, and the second conveying path 33 in a plan view.

[0241] The inner guide plates 66 are provided substantially along the first conveying path 31, the halfway direction change path 32, and the second conveying path 33 in a range excluding the direction change paths 35, 37, 32, 55, and 57 in the first conveying path 31, the halfway direction change path 32, and the second conveying path 33, for example.

[0242] The outer guide plates 65 and the inner guide plates 66 can restrict the delivery object S from being inclined and prevent posture of the delivery object S from being disturbed.

[0243] Next, a method of processing the delivery object S by use of the delivery processing apparatus 1 will be described.

[0244] The delivery object S, for example, is paper sheets wrapped in a bag-shaped package made of a plastic (polyethylene, for example).

[0245] The delivery object S supplied from the supplier 11 is conveyed in the conveying direction D1 via the first conveying path 31, the halfway direction change path 32, and the second conveying path 33.

[0246] The delivery object S moves in the conveying direction D1 while coming into contact with the outer circumferential surface 42b of the body portion 42 of the

conveying rollers 40 to be supported by the conveying rollers 40 when the delivery object S passes through the direction change paths 35, 37, 32, 55, and 57.

[0247] At this time, a contact area between the delivery object S and the outer circumferential surface 42b becomes small because the delivery object S comes into contact with only the uppermost portion of the outer circumferential surface 42b of the conveying roller 40.

[0248] The conveying roller 40 may or may not be rotated around the central shaft portion 41 as the delivery object S moves.

[0249] A classifying destination of the delivery object S is determined on the basis of information acquired by the reader 15 or the VC requester 16, and the delivery object S is introduced into the stacker 71 corresponding to the classifying destination.

[0250] When the corresponding stacker 71 is in the other-side stackers 71B, for example, the delivery object S is introduced into the corresponding other-side stackers 71B from the main path 53 of the second conveying path 33.

[0251] When the corresponding stacker 71 is in the one-side stackers 71A, for example, the delivery object S is introduced into the corresponding one-side stackers 71A from the first partial path 58 of the second conveying path 33.

[0252] According to at least one embodiment described above, since the first direction change path 35, the second direction change path 37, the halfway direction change path 32, the first direction change path 55, and the second direction change path 57 have the conveying rollers 40, the delivery object S moves in the conveying direction D1 while coming into contact with the outer circumferential surface 42b of the body portion 42 of the conveying rollers 40 to be supported by the conveying rollers 40.

[0253] The conveying roller 40 is rotatable around the central shaft portion 41 as the delivery object S moves and has a small contact area with the delivery object S, and thereby a frictional force acting on the delivery object S is reduced.

[0254] In the direction change path in which a conveying direction of the delivery object S is changed, it becomes easy for a frictional force against the conveying path surface to locally act on the delivery object S due to a posture change or the like of the delivery object S caused by a centrifugal force or the like.

[0255] On the other hand, since the frictional force acting on the delivery object S can be suppressed in the delivery processing apparatus 1, it is possible to prevent the package of the delivery object S from rubbing off and being damaged.

[0256] Therefore, it is possible to prevent contents of the delivery object S from being discharged to the outside of the package.

[0257] Since the conveying belt 4 has the inside conveying belt 4A and the outside conveying belt 4B which is extendable greater than the inside conveying belt 4A,

a pressing force applied to the delivery object S can be reduced when the delivery object S is sandwiched and held therebetween.

[0258] Thus, the force pushing the delivery object S onto the surface of the conveying route 2 (the surface of the upper plates 24, 25, and 26) can be reduced.

[0259] Also, since the pressing force due to the conveying belt 4 is reduced, upward movement (movement away from the conveying route 2) of the delivery object S is facilitated.

[0260] Thus, a large force due to the irregularities can be prevented from being applied to the delivery object S even when the conveying route 2 has irregularities.

[0261] Accordingly, damage to the package of the delivery object S can be avoided.

[0262] Since the frictional force acting on the delivery object S can be suppressed to prevent damage, the delivery processing apparatus 1 can cope with heavy delivery objects S.

[0263] Therefore, there are few restrictions on sizes, types, or the like of the delivery object S, and various types of delivery objects S can be processed.

[0264] For example, since classifying out large-sized delivery objects for separate processing is unnecessary, it is possible to simplify the work and reduce the processing cost.

[0265] Since the conveying roller 40 has a cylindrical shape and the outer circumferential surface 42b of the body portion 42 which comes into contact with the delivery object S is a cylindrical surface along the central shaft portion 41 serving as a rotating shaft, the conveying roller 40 can stably support the delivery object S.

[0266] Therefore, the delivery object S can be stably processed.

[0267] Since the controller 7 controls a driving amount (a rotation speed of the motor, for example) of the driver 6, the controller 7 can arbitrarily adjust a conveying speed of the delivery object S by the conveying belts 4.

[0268] Thus, it is possible to lower the conveying speed of the delivery object S.

[0269] For example, the conveying speed of the delivery object S can be set to be reduced to about one-half of the conventional speed.

[0270] Therefore, it is possible to further lower the frictional force acting on the delivery object S and prevent the package of the delivery object S from being damaged.

[0271] Further, in the delivery processing apparatus 1, a portion of the first conveying path 31 (a portion of the first partial path 34, the first direction change path 35, the intermediate path 36, the second direction change path 37, the main path 44, and a portion of the range 45A of the avoidance path 45) is a conveyance delaying path for securing time needed for an operator in the VC terminal 90 (see FIG. 2) to input information (for VC processing).

[0272] The delivery objects S of which classifying information cannot be recognized are processed without being excluded due to the time for the VC processing

secured by the conveyance delaying path, and thereby an operation rate of the apparatus can be improved.

[0273] As described above, although the conveyance delaying path for securing time for the VC processing can be provided in the delivery processing apparatus 1, since the conveying path becomes long, there is a problem in that the overall size of the delivery processing apparatus 1 increases.

[0274] In the delivery processing apparatus 1, since a portion of the conveyance delaying path (a portion of the first partial path 34 and the main path 44) is provided inside the second conveying path 33 (between the second partial path 54 and the first partial path 58), it is possible to efficiently utilize an inner side space of the second conveying path 33.

[0275] Thus, it is possible to reduce a size of the delivery processing apparatus 1 as compared to the case in which a space for the conveyance delaying path is secured at an outer side of the second conveying path 33.

[0276] FIGS. 18 and 19 are plan views showing modified examples of the conveying mechanism.

[0277] As shown in FIGS. 18 and 19, in a second direction change path 37A, the inside conveying belt 4A is supported while an inner peripheral side thereof comes into contact with a plurality of support pulleys 5 (5A to 5I).

[0278] As shown in FIG. 19, a region of the conveying belt 4 (the inside conveying belt 4A) which comes into contact with the support pulley 5 is referred to as a contact region 81.

[0279] A position of the second direction change path 37A in an extending direction is referred to as a "path direction position".

[0280] The position of the second direction change path 37A in the extending direction is a position of the second direction change path 37A in a circumferential direction of the circular arc shape, for example.

[0281] A portion of the conveying rollers 40 of the second direction change path 37 shown in FIG. 7 overlaps the path direction position with a region of the conveying belt 4 which comes into contact with the support pulleys 5.

[0282] That is, a path direction position of the uppermost portion of the first, fourth, seventh, tenth, and thirteenth conveying rollers 40F from the one end 28a of the opening 28 includes a path direction range of the contact region of the conveying belt 4.

[0283] Therefore, the uppermost portion of the conveying rollers 40F overlaps the path direction position with the contact region of the conveying belt 4.

[0284] On the other hand, an uppermost portion of the other conveying rollers 40 does not overlap the path direction position with the contact region of the conveying belt 4.

[0285] The second direction change path 37A shown in FIGS. 18 and 19 has a configuration in which a portion (conveying rollers 40D shown by a virtual line in FIGS. 18 and 19) of the conveying rollers 40 shown in FIG. 7 is omitted.

[0286] Conveying rollers 40C of the second direction

change path 37A (shown by solid lines in FIGS. 18 and 19) have the same configuration as the third, sixth, ninth, and twelfth conveying rollers 40G from the one end 28a in the second direction change path 37 shown in FIG. 7.

[0287] The second direction change path 37A does not include the conveying roller 40 that overlaps the path direction position with the contact region 81 (the first, fourth, seventh, tenth, and thirteenth conveying rollers 40F from the one end 28a in FIG. 7, for example).

[0288] Therefore, a path direction position of an uppermost portion 40Ca (refer to FIG. 19) of the conveying rollers 40C which configure the second direction change path 37A is different from a path direction position of the contact region 81.

[0289] When a distance between an end portion of the opening 28 (one end 28a, for example) and the conveying roller 40C is excessively long, a conveying roller may be additionally installed between the end portion of the opening 28 and the conveying roller 40C that is closest thereto.

[0290] In FIGS. 18 and 19, a conveying roller 40E is additionally installed at a position closest to the one end 28a of the opening 28.

[0291] Therefore, the delivery object S is supported at a plurality of locations, posture of the delivery object S can be stabilized, and thus a corner portion of the delivery object S can be prevented from colliding with the conveying roller 40C when the delivery object S is inclined.

[0292] Reference numeral 40Ea denotes an uppermost portion of the conveying roller 40E, and a path direction position of the uppermost portion 40Ea is different from the path direction position of the contact region 81.

[0293] In the conveying mechanism shown in FIGS. 18 and 19, since the conveying rollers 40C and 40E whose path direction positions of the uppermost portions 40Ca and 40Ea are different from the path direction position of the contact region 81 are used, damage (breakage of the package, for example) of the delivery object S cannot easily occur.

[0294] The following conjecture is possible for the reason why the delivery object S is not easily damaged due to the above-described configuration of the conveying mechanism.

[0295] While a pressing force in a thickness direction is applied to the delivery object S due to the support pulleys 5 at the locations at which the support pulleys 5 come into contact with the inside conveying belt 4A, since there is no conveying roller 40 at a path direction position which is the same as the contact region 81 in the conveying mechanism shown in FIGS. 18 and 19, it is possible to prevent the delivery object S from being strongly pressed by the uppermost portion of the conveying rollers 40 due to the force from the support pulleys 5.

[0296] Since the path direction position of the uppermost portions 40Ca and 40Ea of the conveying rollers 40C and 40E are different from the path direction position of the contact regions 81, the pressing force of the delivery object S against the conveying rollers 40C and 40E

is relatively decreased.

[0297] Therefore, damage to the delivery object S (breakage of the package, for example) cannot easily occur.

[0298] In the conveying mechanism shown in FIGS. 18 and 19, since the number of conveying rollers 40 (40C and 40E) is few, it is easy to rotate the conveying rollers 40 and it is possible to reduce energy loss when the delivery object S is conveyed.

[0299] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope of the inventions.

Claims

1. A delivery processing apparatus comprising:

a conveying mechanism comprising a conveyor provided with a conveying route including a direction change path configured to change a conveying direction of a delivery object, at least a pair of conveying belts configured to sandwich the delivery object from both sides to convey the delivery object along the conveying route, and a driver configured to drive the conveying belts; and

a plurality of accumulators in which the delivery object conveyed by the conveying mechanism is to be accumulated, wherein

one of the pair of conveying belts is an inner periphery conveying belt provided in the direction change path and the other of the pair of conveying belts is an outer periphery conveying belt which is extendable greater than the inner periphery conveying belt and faces an outer peripheral surface of the inner periphery conveying belt, and

the direction change path comprises one or a plurality of rotating supports that are configured to come into contact with the delivery object and are rotatable around an axis intersecting the conveying direction.

2. The delivery processing apparatus of claim 1, wherein

each of the rotating supports is a cylindrical roller that is rotatable around the axis that is a central axis.

3. The delivery processing apparatus of claim 1 or 2,

wherein

the direction change path comprises the plurality of rotating supports aligned in the conveying direction.

4. The delivery processing apparatus according to any one of claims 1 to 3, wherein the conveying route further comprises a sliding path provided so as to be continuous with a downstream side of the direction change path in the conveying direction, and an uppermost portion of the rotating support at the most downstream side in the conveying direction among the rotating supports constituting the direction change path is located at a higher position relative to the sliding surface of the sliding path. 5
10
5. The delivery processing apparatus according to any one of claims 1 to 4, wherein the conveying mechanism further comprises a controller configured to control a driving amount of the driver. 20
6. The delivery processing apparatus according to any one of claims 1 to 5, wherein the conveyor further comprises a belt support, the belt support configured to determine a moving path of the conveying belt along the direction change path by coming into contact with a contact region of the conveying belt from an inner peripheral side of the direction change path, wherein a position at an uppermost portion of the rotating support in an extending direction of the direction change path is different from a position of the contact region in the extending direction of the direction change path. 25
30
35
7. The delivery processing apparatus according to any one of claims 1 to 6, wherein at least a portion of the rotating support is made of a polymer material. 40
8. A delivery processing apparatus comprising:
 - a conveying mechanism comprising a conveyor provided with a conveying route in which a delivery object is to be conveyed, a reader configured to read information from an image of the delivery object, an information transmitter configured to transmit an illegible image from which the reader is not able to read all or some of the information, an information receiver configured to receive information related to the illegible image, and at least a pair of conveying belts configured to sandwich the delivery object from both sides to convey the delivery object along the conveying route in a conveying direction; and
 - a plurality of accumulators in which the delivery object conveyed by the conveying mechanism

is to be accumulated, the accumulators being first accumulators and second accumulators, the first accumulators being provided at an outer side of one side of the conveyor in a plan view, the second accumulators being provided at an outer side of the other side of the conveyor in a plan view, wherein

the conveying route comprises a first conveying path in which the delivery object which has passed the information transmitter is to be conveyed, and a second conveying path in which the delivery object which has passed the first conveying path is to be conveyed; the second conveying path comprises a first partial path in which the delivery object is to be conveyed to the first accumulators, and a second partial path in which the delivery object is to be conveyed to the second accumulators; and at least a portion of the first conveying path is provided between the first partial path and the second partial path of the second conveying path in a plan view.

FIG. 1

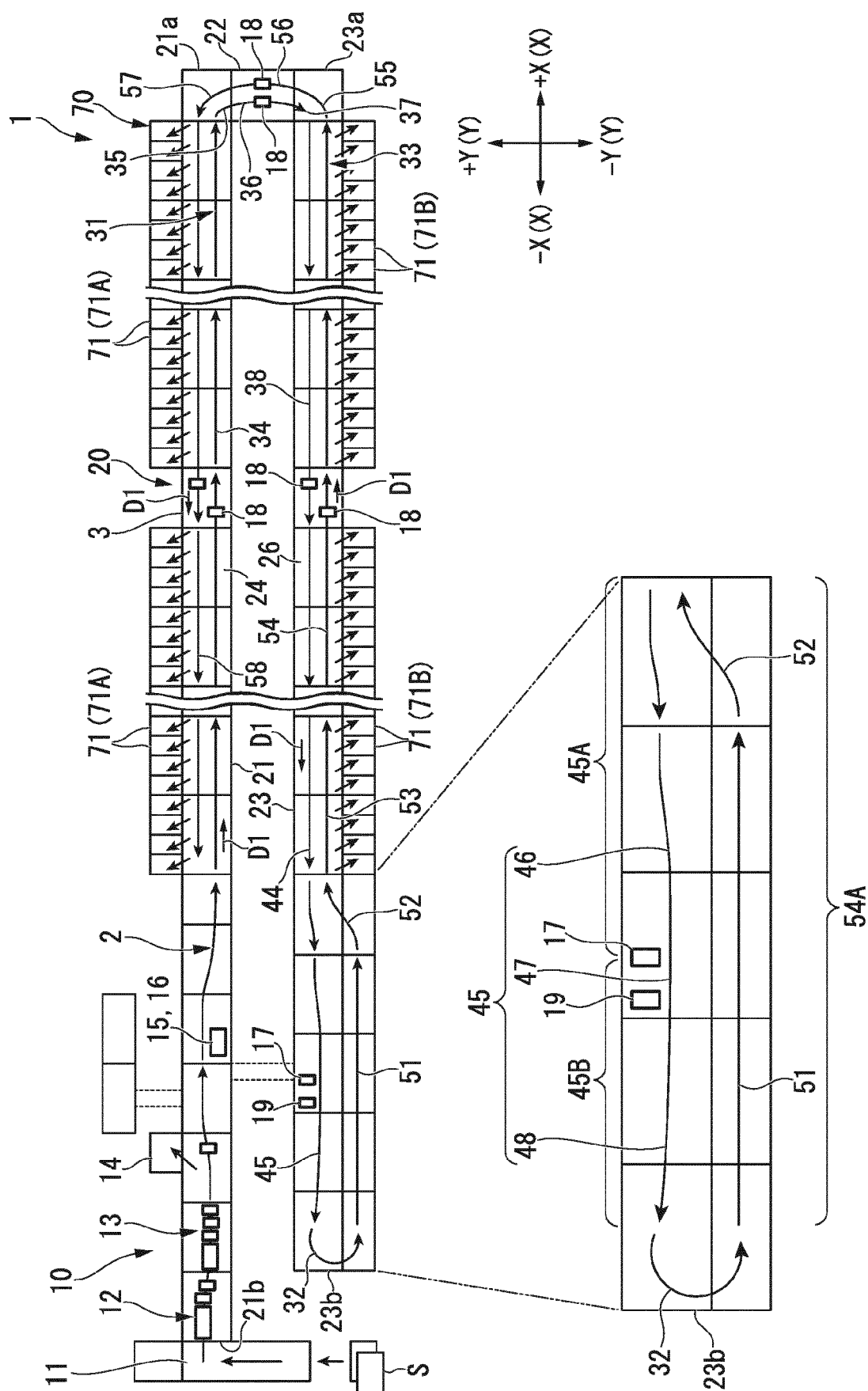


FIG. 2

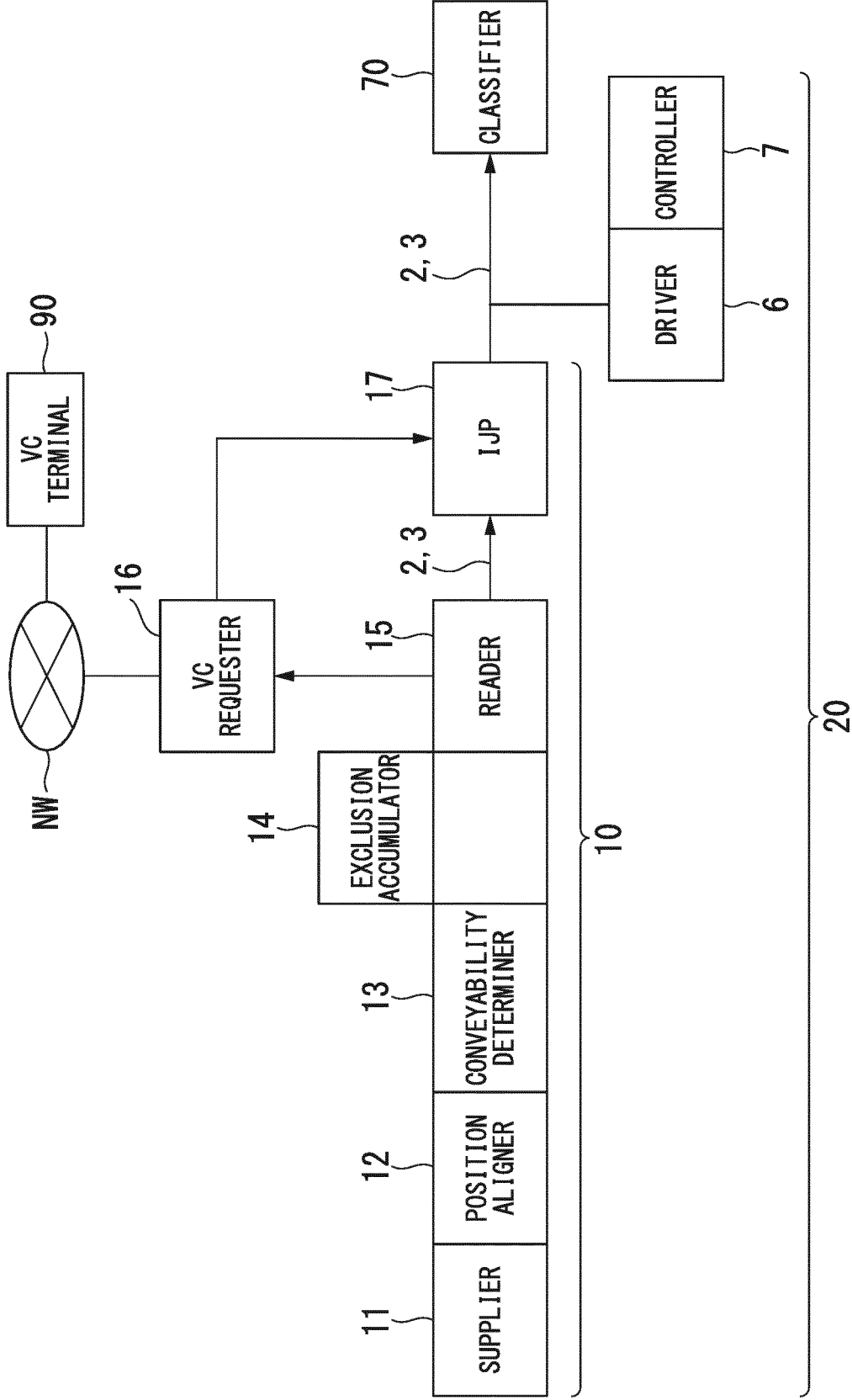


FIG. 3

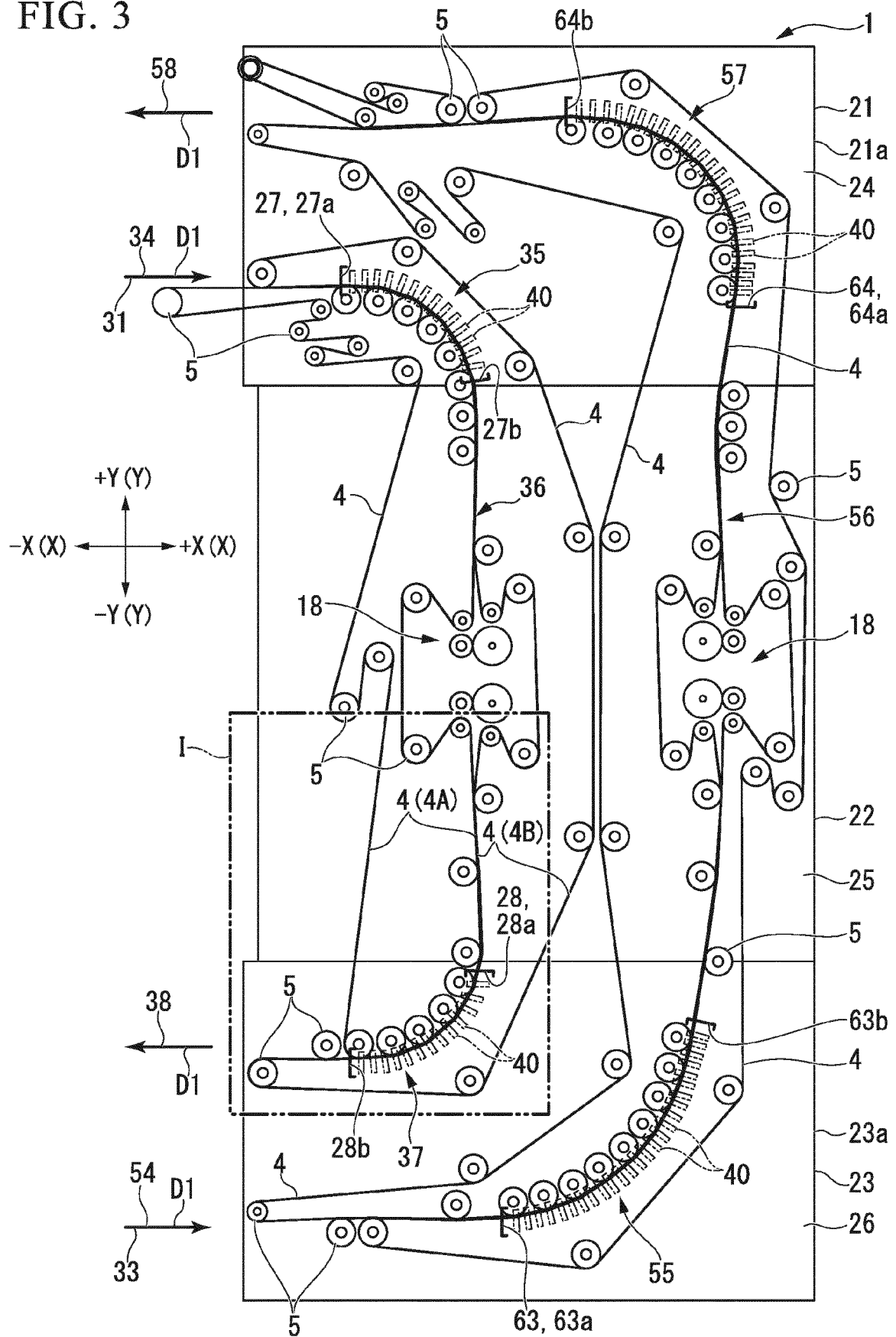


FIG. 4

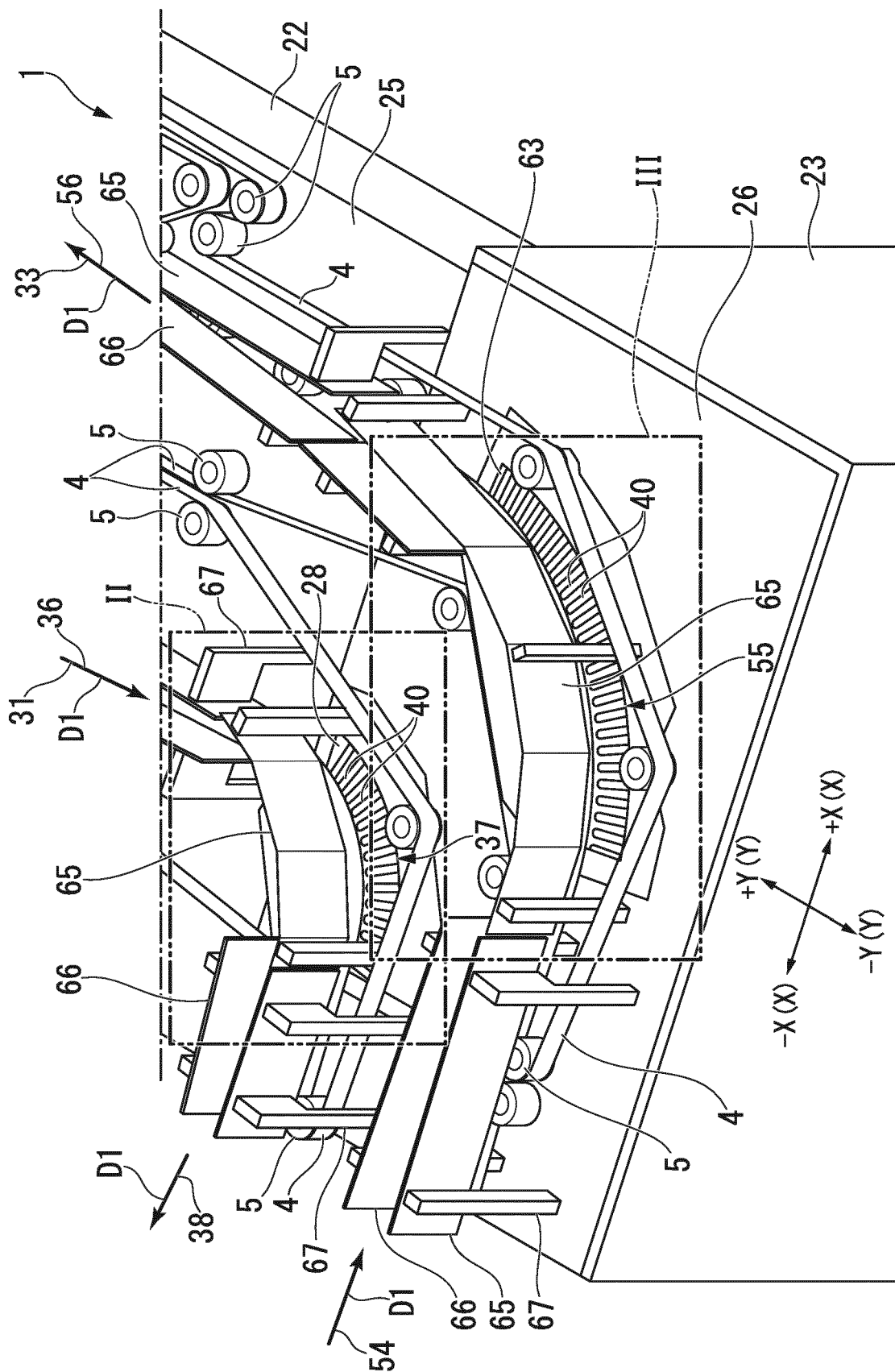


FIG. 5

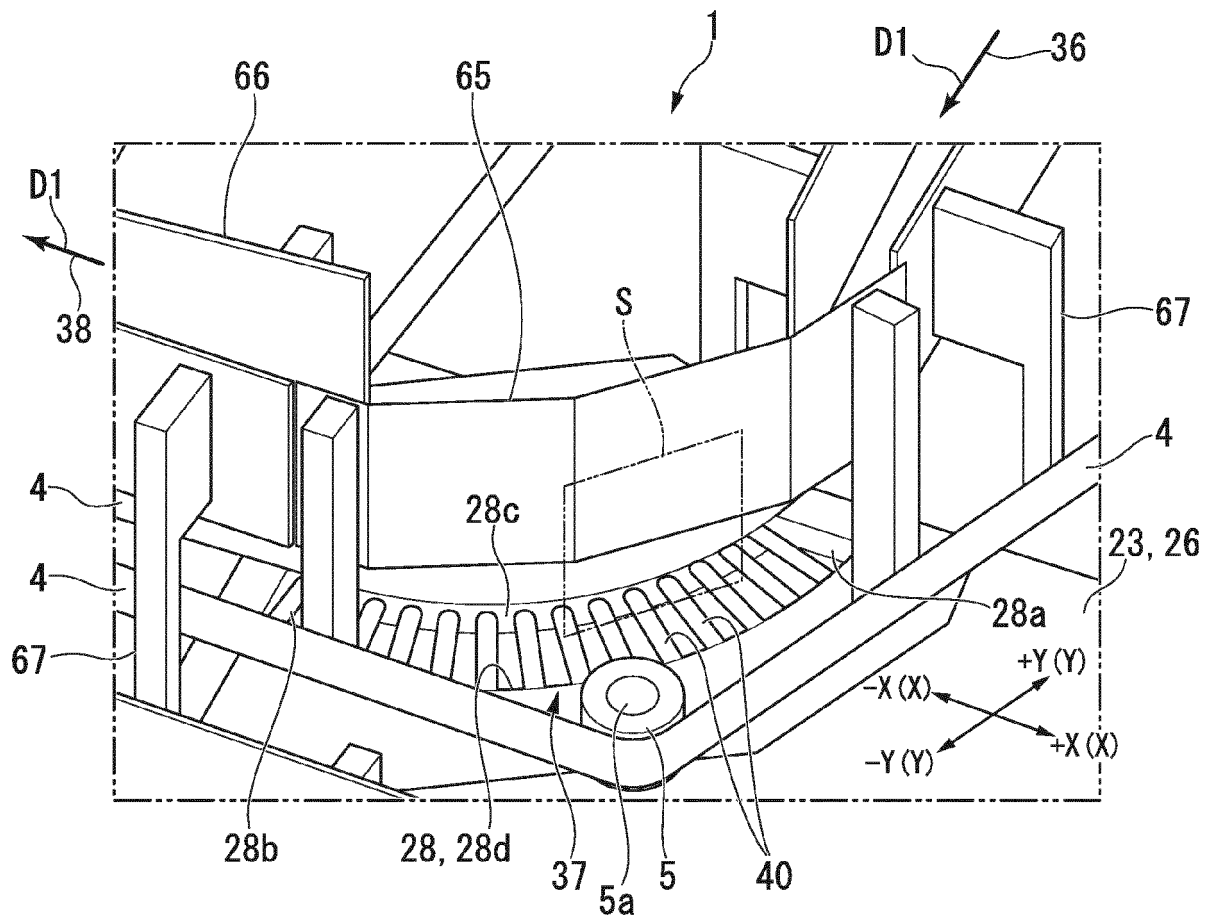


FIG. 6

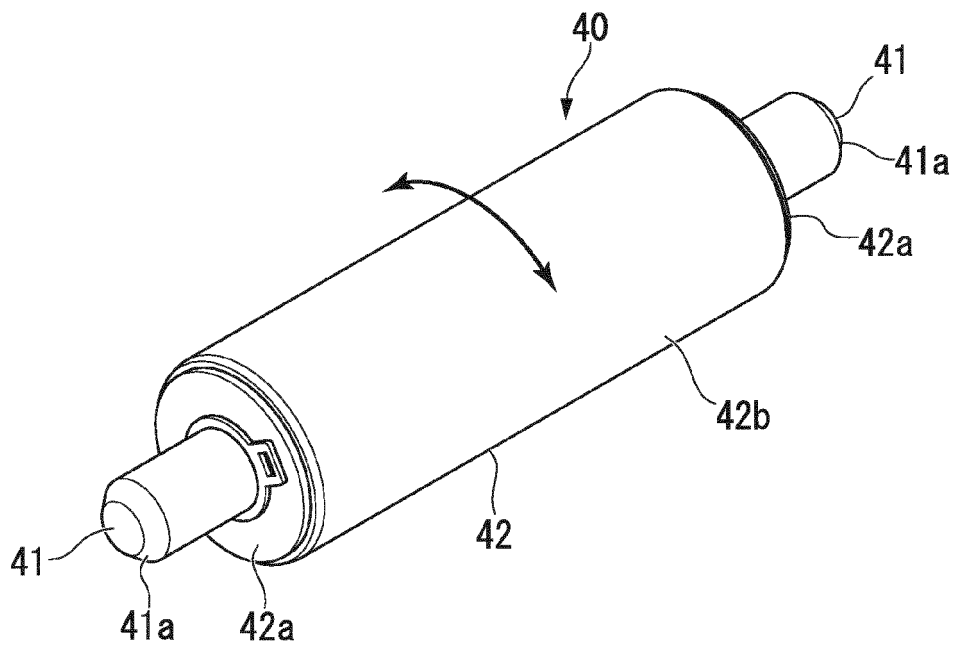


FIG. 7

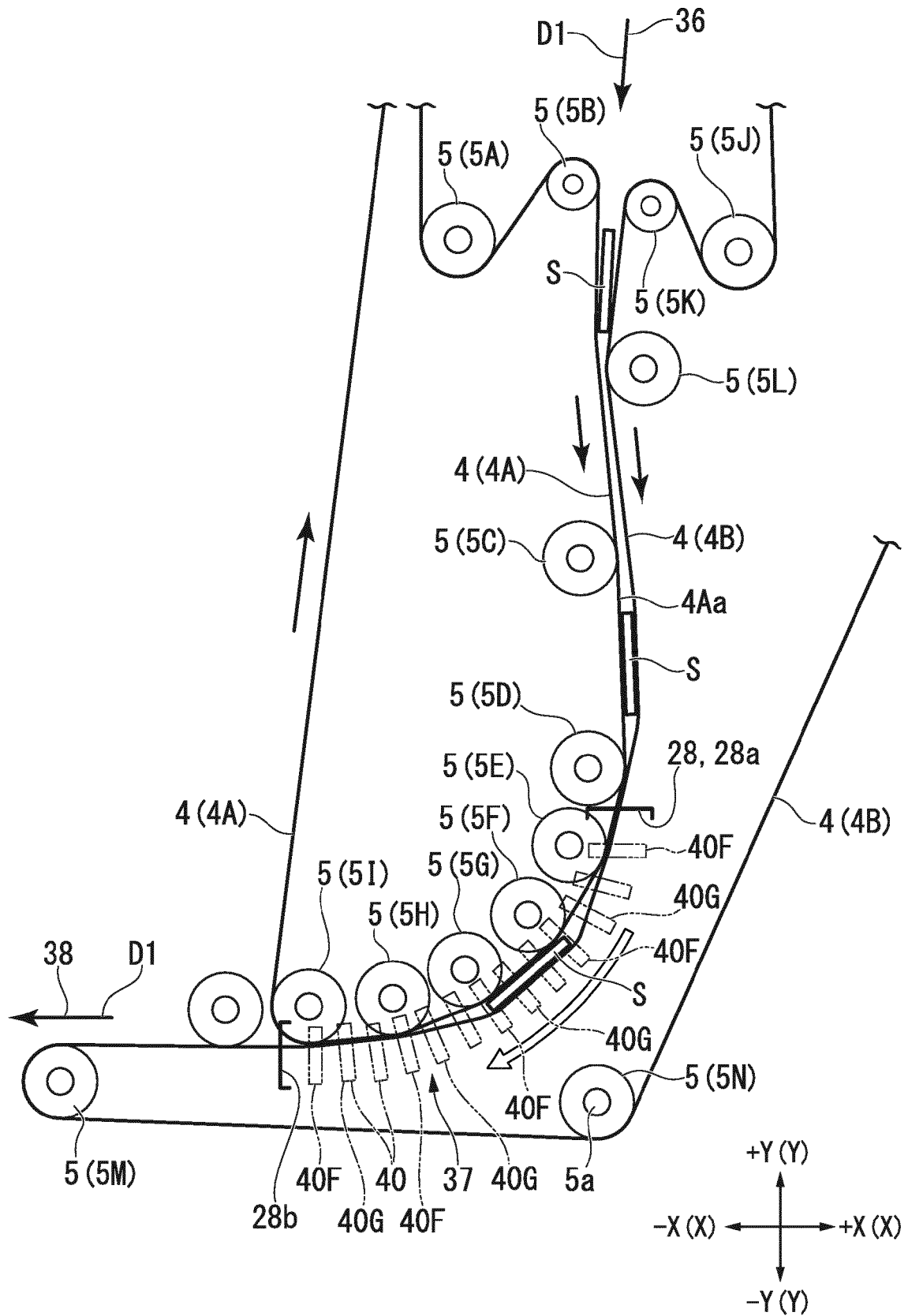


FIG. 8

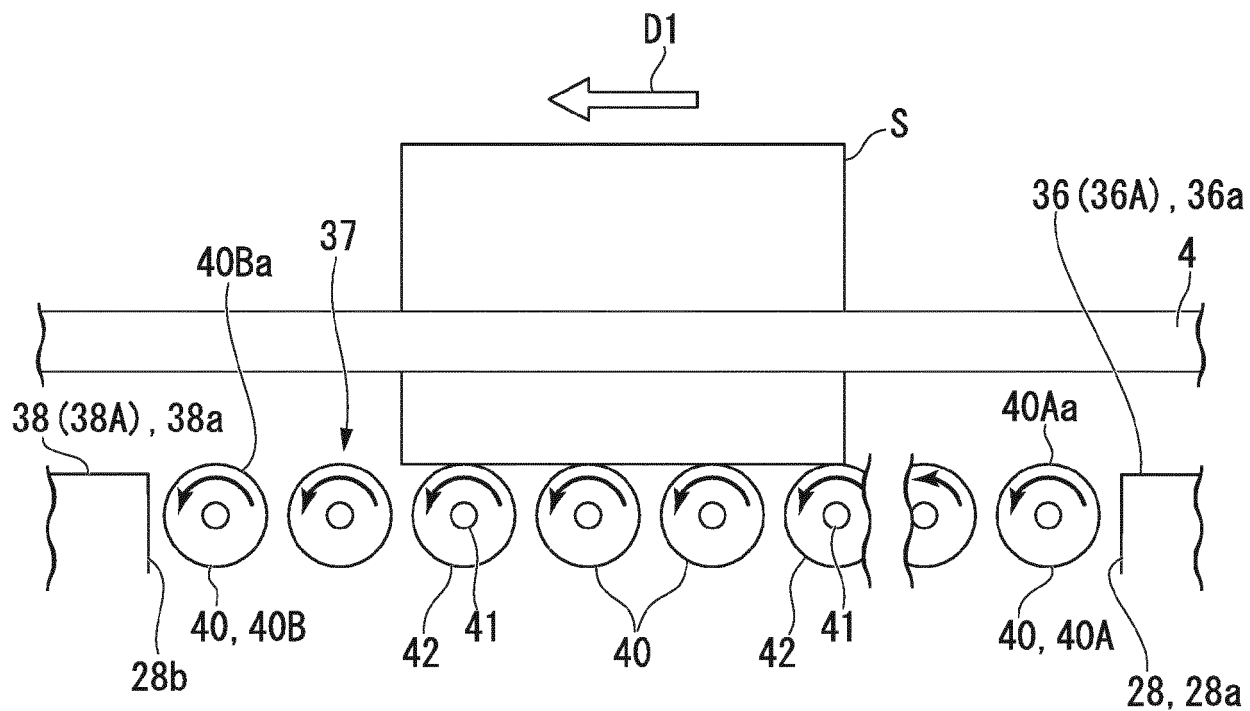


FIG. 9

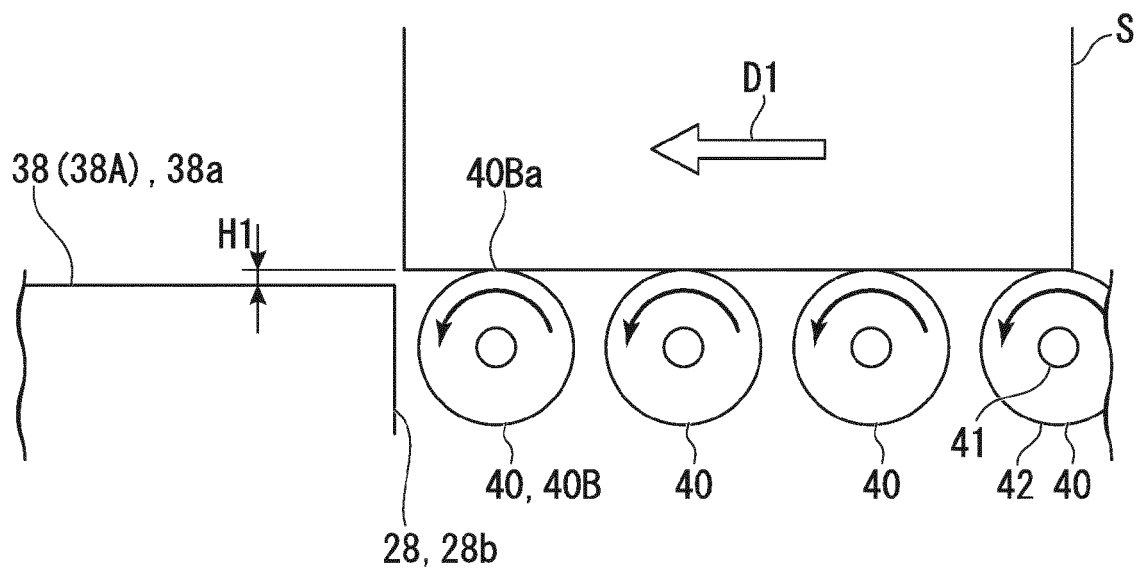


FIG. 10

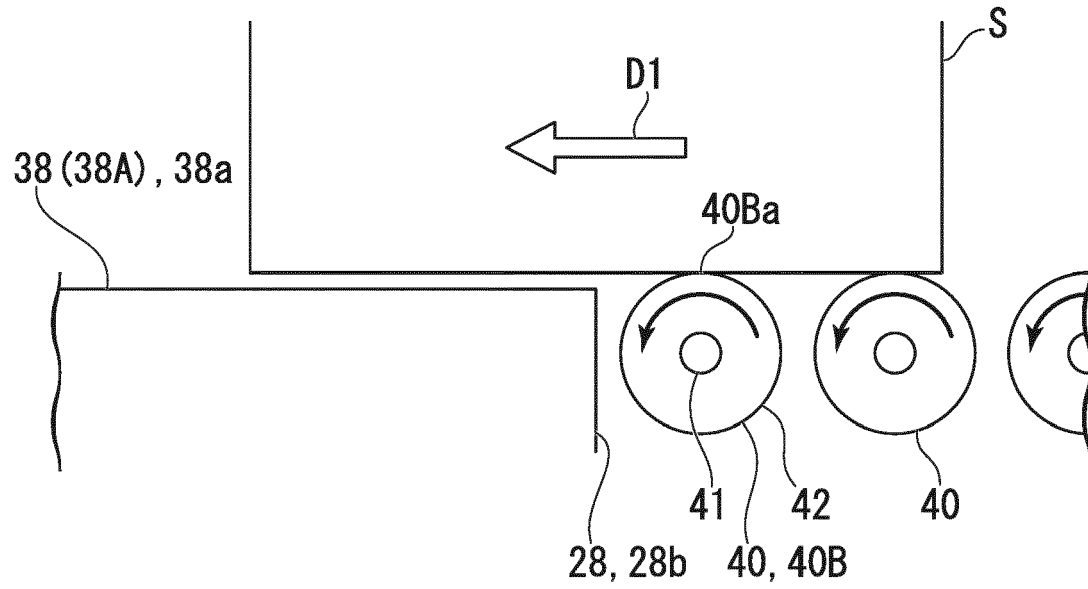


FIG. 11

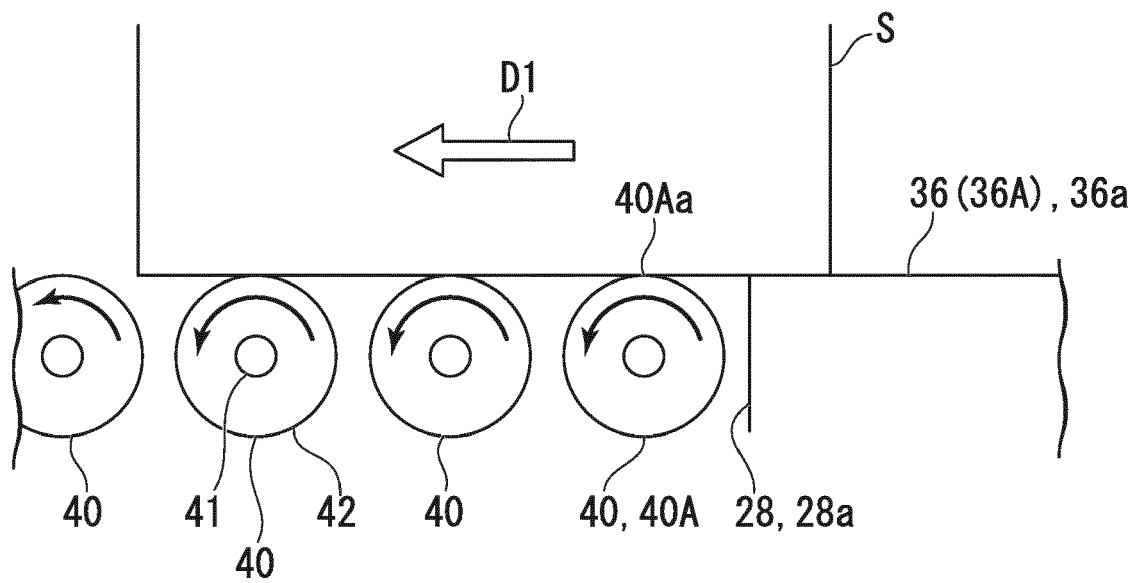


FIG. 12

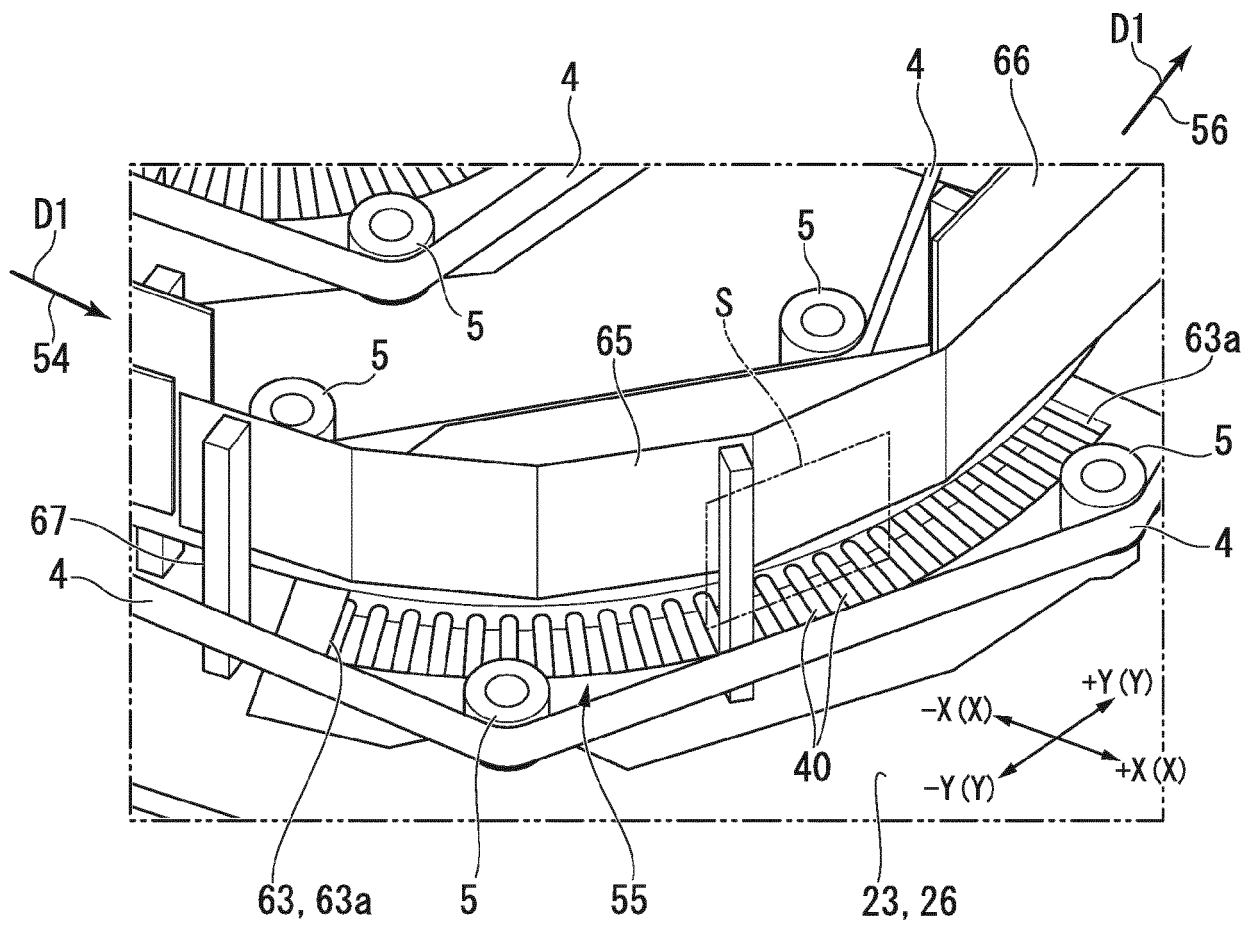


FIG. 13

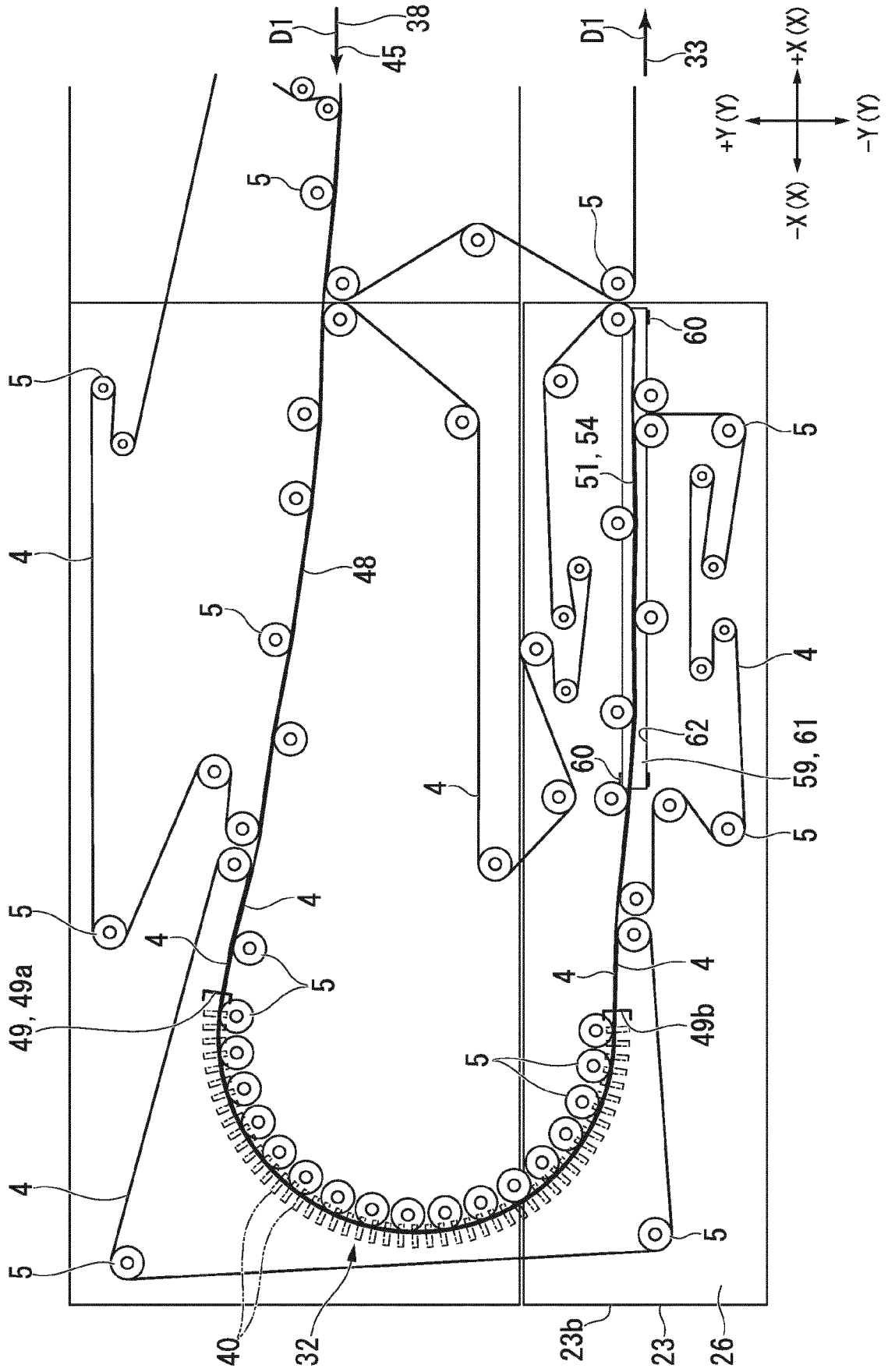


FIG. 14

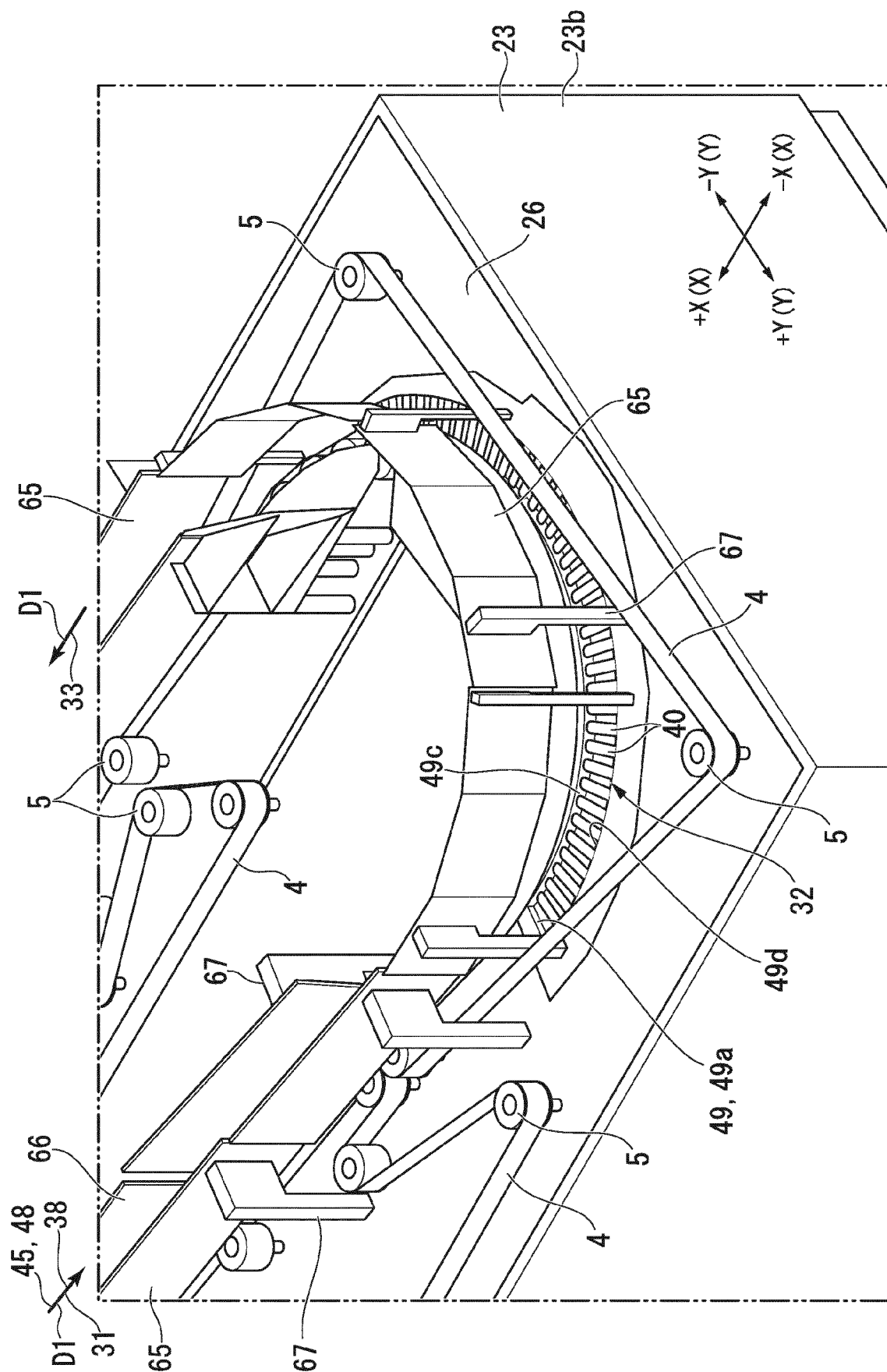


FIG. 15

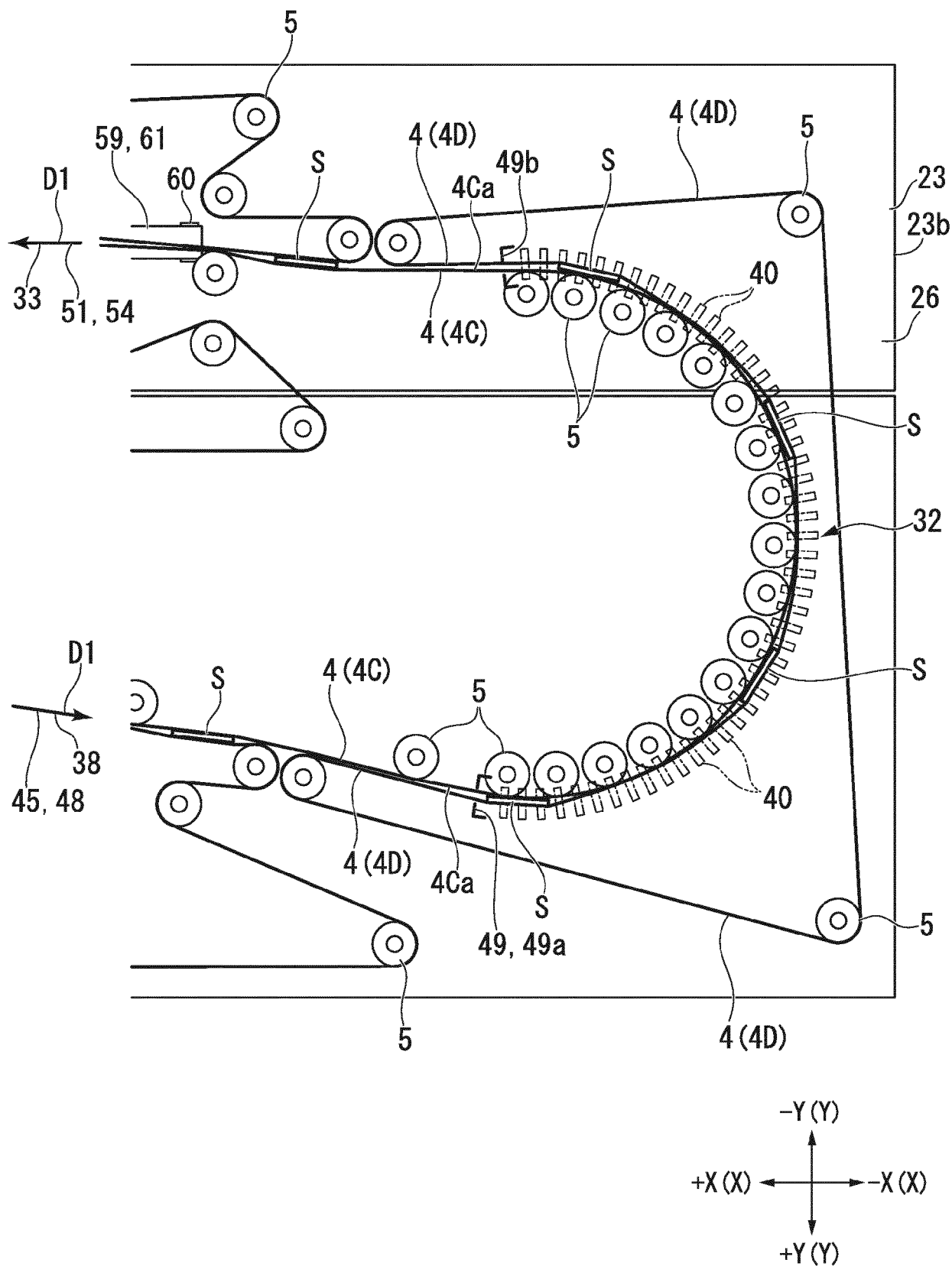


FIG. 16

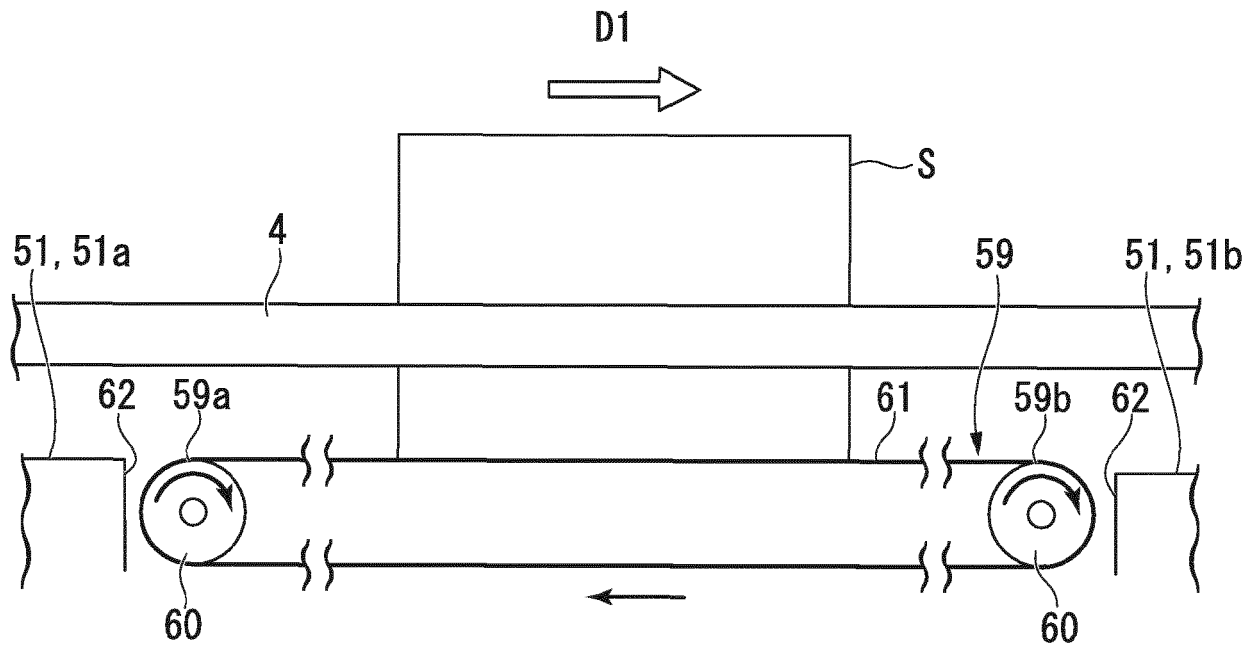


FIG. 17

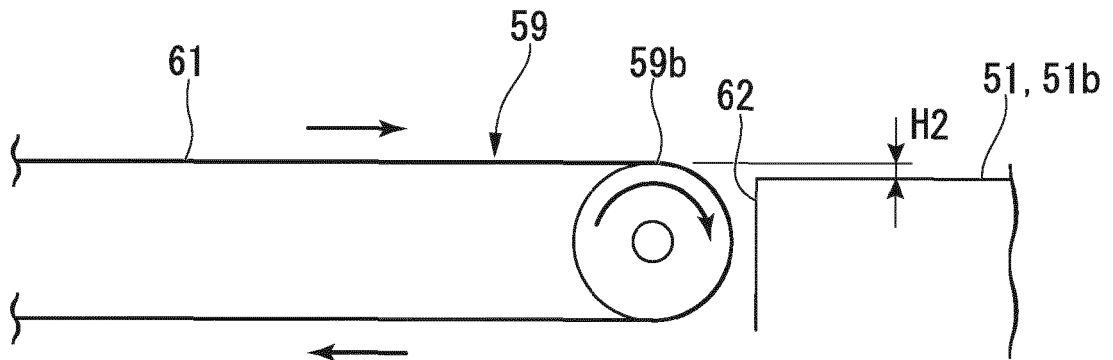


FIG. 18

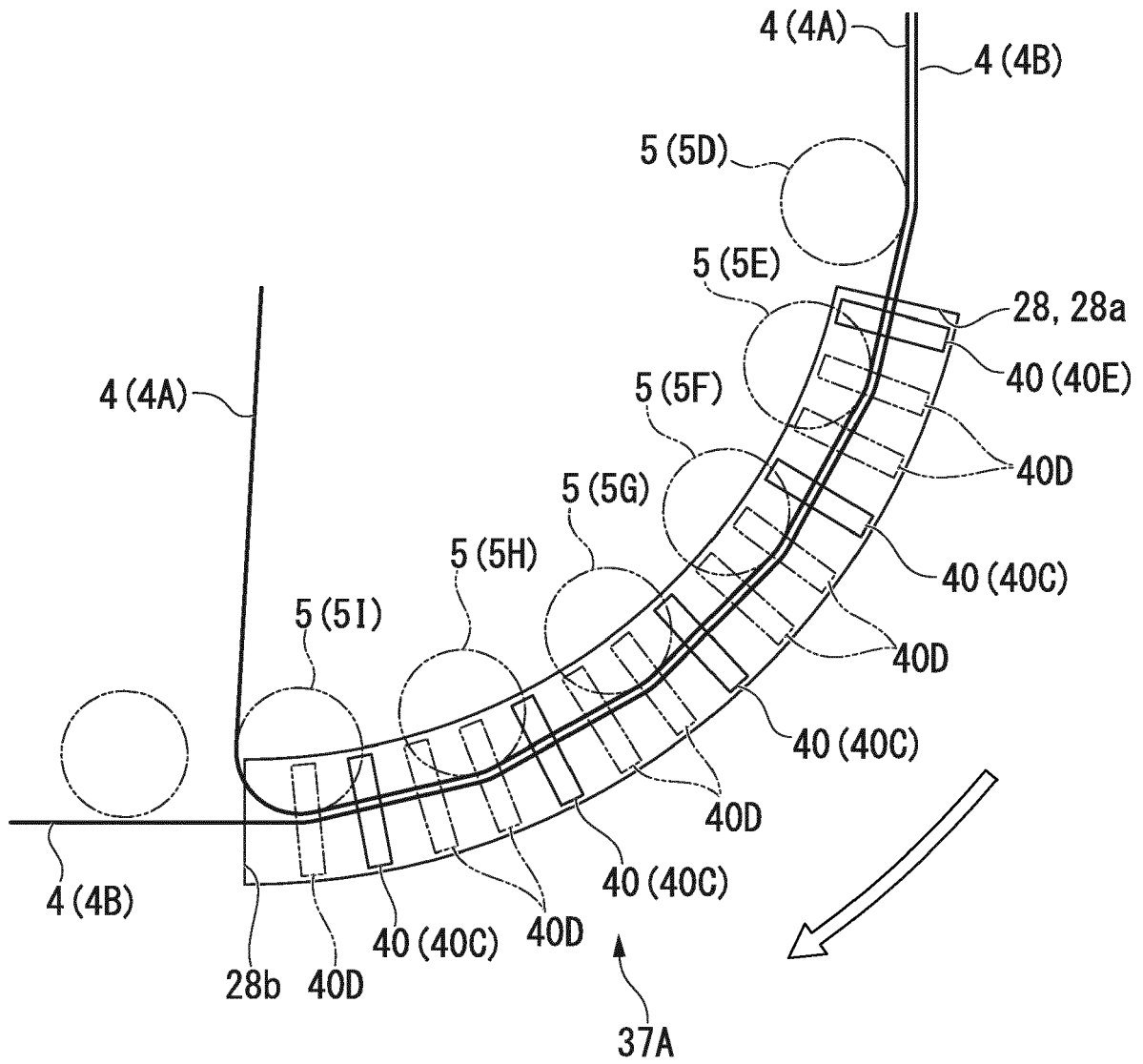


FIG. 19

