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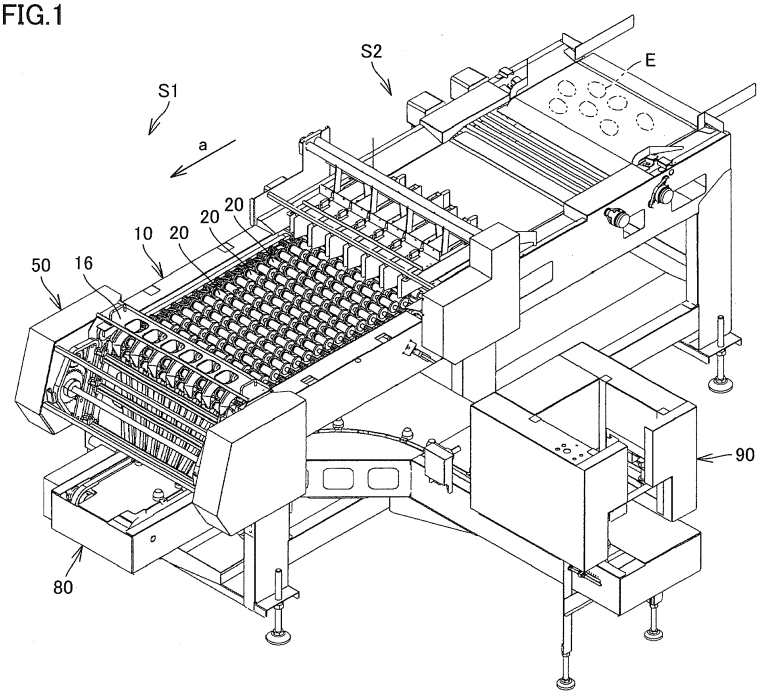
(54) **Drop assistance apparatus, filler system, and filling assistance method**

(57) A drop assistance apparatus (50) includes a slider (52) over which an object slides down and a catch and hold assembly (54) catching and holding the object sliding down over the slider (52) in cooperation with the slider (52). The catch and hold assembly (54) includes a catch and hold member (56) catching and holding the object so as to support the same from below in cooperation with an inclined surface of the slider (52), a support member (58) supporting the catch and hold member (56) so as to catch and hold the object and moving in a direction away from the slider (52), and a force application member (62) applying rotational force biasing toward the slider (52) to the catch and hold member (56). The catch and hold member (56) is rotatably supported by the support member (58) so that the object is caught and held by the catch and hold member (56) as the force application member (62) applies the rotational force biasing toward the slider (52).

FIG.1



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a drop assistance apparatus, a filler system, and a filling assistance method suppressing a speed of drop of an object in an apparatus in which objects such as agricultural and livestock products and industrial components slide down over a slider.

Description of the Background Art

[0002] Agricultural and livestock products, industrial components, and the like which are mass produced are transported through a transportation system before they are distributed to the market or delivered to clients or during production. For example, agricultural and livestock products are packed before distribution to the market, and during this time period as well, they are packed while they are transported through the transportation system. The industrial components are assembled in an assembly-line operation during production, and during this time period as well, they are assembled while they are transported through the transportation system.

[0003] Some of such transportation systems include a slide down portion (a slider) transporting an object to be transported (agricultural and livestock products, industrial components, and the like) by allowing the object to slide down. For example, a chicken egg representing one of agricultural and livestock products may be oriented in such a state that a long axis thereof extends in a vertical direction by making use of a falling motion of chicken eggs after they are produced in a poultry house and before a tray for transportation is filled with chicken eggs, the chicken eggs may be adapted to a pitch between trays, and then the tray may be filled with the chicken eggs.

[0004] An egg filler apparatus (a vertical transportation and supply apparatus) as described in Patent Literature 1 (Japanese Patent Laying-Open No. 5-193732) is available as such a filler apparatus. With this filler apparatus, a catch and hold member (a control finger) moving along an egg sliding down over a slider catches and holds the egg in cooperation with the slider so as to restrict a speed of the sliding down egg. In addition, the catch and hold member releases the egg from the caught and held state as the catch and hold member moves away from the slider around a terminal end of the slider and allows the egg to drop onto a tray. In addition, when the catch and hold member moves away from the slider, the catch and hold member is rotated in a direction of catching and holding an egg by a protruding member provided in a path along which the catch and hold member moves, so that a speed of drop of the egg is further decreased.

[0005] Therefore, the speed of slide down of the egg is restricted to a moving speed of the catch and hold member, and the speed of drop is decreased at the time when the egg is released from the catch and hold member and the tray is filled with the egg.

SUMMARY OF THE INVENTION

[0006] Provision of a protruding member in a path of the catch and hold member, however, impedes movement of the catch and hold member, which becomes a cause for failure of the filler apparatus. In addition, in a mechanism in which a protruding member is provided in a path of the catch and hold member, the protruding member should be manufactured such that the catch and hold member appropriately decreases a speed of drop of an object, and attachment to the filler apparatus is complicated.

[0007] The present invention was made in view of the problems above, so as to allow an object to drop slowly with a simplified structure.

[0008] One drop assistance apparatus according to the present invention has at least one slider and at least one catch and hold assembly. The at least one slider has an inclined surface over which an object slides down and passes the sliding down object to a next step. The at least one catch and hold assembly moves along a direction of extension of the inclined surface while it catches and holds the object sliding down over the inclined surface in cooperation with the inclined surface and allows the caught and held object to drop. The catch and hold assembly includes a catch and hold member, a support member, and a force application member. The catch and hold member has a catch and hold surface opposed to the inclined surface and catches and holds the object sliding down over the inclined surface such that the inclined surface and the catch and hold surface support the object from below. The support member supports the catch and hold surface and moves in a direction away from the slider so as to release the caught and held object in a lower portion of the inclined surface. The force application member applies rotational force biasing the catch and hold member toward the slider. The catch and hold surface of the catch and hold member is arranged as being inclined with respect to the inclined surface such that a distance between the inclined surface and the catch and hold surface gradually decreases downward. The catch and hold member is pivotably supported by the support member such that inclination is variable.

[0009] According to one drop assistance apparatus of the present invention, a speed of slide down of the object sliding down over the slider is restricted by the catch and hold member catching and holding the object so as to support the object from below in cooperation with the inclined surface of the slider. The catch and hold member is rotatably supported by the support member so that the object is caught and held by the catch and hold member as the force application member applies rotational force biasing toward the slider to the catch and hold member.

[0010] As the support member moves from a state that the object is caught and held in a direction in which the support member moves away from the slider, the catch and hold member also moves in a direction away from the slider and the object is released. Here, as the force application member continuously applies rotational force biasing toward the slider to the catch and hold member, the catch and hold member gradually releases the object while it moves away from the slider. Therefore, the drop assistance apparatus can allow the object to slowly drop with a simplified structure.

[0011] A filler system according to the present invention is a filler system filling a tray with chicken eggs which is provided with the drop assistance apparatus above, and it includes an orientator and a tray transportation apparatus. The orientator allows a chicken egg being transported to drop onto the drop assistance apparatus while an orientation of a long axis of the chicken egg is varied. The tray transportation apparatus supplies a container receiving the chicken egg from the drop assistance apparatus and filled therewith.

[0012] According to the filler system of the present invention, a chicken egg transported such that a long axis of the chicken egg extends in a lateral direction is allowed to slowly drop onto the drop assistance apparatus while an orientation of the long axis is varied, so that the chicken egg can be accommodated in the container with the long axis being oriented in a vertical direction.

[0013] A filling assistance method according to the present invention is a filling assistance method in a drop assistance apparatus including a slider allowing an object to slide down and passing the object to a next step, a catch and hold member catching and holding the object sliding down over the slider in cooperation with the slider, and a force application member applying rotational force biasing toward the slider to the catch and hold member such that the catch and hold member catches and holds the object from below, and it includes the following steps. The slider and the catch and hold member catch and hold the object therebetween. The catch and hold member is moved in a direction away from the slider.

[0014] According to the filling assistance method of the present invention, a speed of slide down of the object sliding down over the slider is restricted by the catch and hold member catching and holding the object so as to support the object from below in cooperation with the inclined surface of the slider. The catch and hold member is rotatably supported by the support member so that the object is caught and held as the force application member applies rotational force biasing toward the slider to the catch and hold member. As the support member moves from a state that the object is caught and held in a direction in which the support member moves away from the slider, the catch and hold member also moves in a direction away from the slider and the object is released. Here, as the force application member continuously applies rotational force biasing toward the slider to the catch and hold member, the catch and hold member gradually releases the object while it moves away from the slider. Therefore, the drop assistance apparatus can allow the object to slowly drop with a simplified structure.

[0015] According to the present invention, an object can be allowed to slowly drop.

[0016] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 is a perspective view showing a filler system according to the present invention.

Fig. 2 is a perspective view showing a container used in the filler system according to the present invention.

Fig. 3 is a plan view showing an orientator of the filler system in Fig. 1.

Fig. 4 is a plan view showing in an enlarged manner, a part of the orientator in Fig. 3.

Fig. 5 is a schematic side view for illustrating a behavior of drop of a chicken egg, with a part of the orientator in Fig. 3 being enlarged.

Fig. 6 is a perspective view showing in an enlarged manner, a part of the orientator in Fig. 3.

Fig. 7 is a schematic plan view for illustrating a behavior of change in direction of a chicken egg, with a terminal end portion of the orientator in Fig. 3 being enlarged.

Fig. 8 is a schematic plan view for illustrating a behavior of inclination of a position of a chicken egg, with the terminal end portion of the orientator in Fig. 3 being enlarged.

Fig. 9 is a perspective view showing in an enlarged manner, a push-up portion of the orientator in Fig. 3.

Fig. 10 is a perspective view showing a behavior of a drop assistance apparatus of the filler system in Fig. 1 dropping a chicken egg.

Fig. 11 is a perspective view showing the drop assistance apparatus of the filler system in Fig. 1.

Fig. 12 is a perspective view showing in an enlarged manner, the drop assistance apparatus of the filler system in Fig. 1.

Fig. 13 is a perspective view showing a catch and hold assembly of the drop assistance apparatus in Fig. 11, with (A) being a perspective view mainly showing a front face of the catch and hold assembly and (B) being a perspective view mainly showing a rear face of the catch and hold assembly.

Fig. 14 is a side view showing in an enlarged manner, the catch and hold assembly in Fig. 13.

Fig. 15 is a schematic side view showing a track of an endless track structure of the drop assistance apparatus in Fig. 11.

Fig. 16 is a conceptual side view showing an oper-

ation of the drop assistance apparatus in Fig. 11.

Fig. 17 is a conceptual side view showing an operation of the drop assistance apparatus in Fig. 16, of catching and holding a chicken egg and then allowing the chicken egg to slide down.

Fig. 18 is a conceptual side view for illustrating an operation of the drop assistance apparatus in Fig. 16, of release and drop of the chicken egg.

Fig. 19 is a perspective view showing a transportation apparatus in Fig. 1.

Fig. 20 is a conceptual plan view for illustrating an operation of the transportation apparatus in Fig. 19, of transportation of a container, with (A) being a conceptual view of the container being transported with transmission means being engaged with a center of the container and (B) being a conceptual view of the container being transported with the transmission means being engaged with an inner side of the container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] A filler system according to an embodiment of the present invention will be described. In the description below, a filler system filling a container with a number of chicken eggs E will be described with reference to a suitable embodiment by referring to the drawings.

[Filler System]

[0019] As shown in Fig. 1, a filler system S1 according to the embodiment of the present invention is what is called such a farm packer that a container T (Fig. 2) having a rectangular two-dimensional shape like a tray is filled with chicken eggs E laid in a poultry house. For example, a filler system described in Japanese Patent Laying-Open No. 5-8851 is available as a conventional farm packer.

[0020] As shown in Fig. 2, a two-dimensional shape of container T is formed to be rectangular and has a plurality of projection portions formed. Container T forms one accommodation space Tz with four projection portions forming a quadrangle. The accommodation spaces are formed in grids of n columns and m rows (n, m being an ordinal number), and one chicken egg E is accommodated in each accommodation space Tz so that container T is filled with a plurality of chicken eggs E.

[0021] In the present embodiment, an American tray having a plane formed in a square shape and having accommodation spaces Tz in 6 columns and 5 rows will be described as the container, however, various trays called a mold tray, a setter tray, and the like are available as trays. For example, a tray described in Japanese Patent Laying-Open No. 2003-276779 is also available.

[0022] Referring again to Fig. 1, filler system S1 is connected to a distribution system S2, it receives chicken eggs E distributed by distribution system S2, and fills container T with chicken eggs E such that directions thereof are aligned. For example, a distribution and alignment system (apparatus) described in Japanese Patent No. 5055483 is available as the distribution system.

[0023] Container T filled with chicken eggs E is passed to a process subsequent to filler system S1, and then wrapped, stored, transported, or the like. Distribution system S2 transports chicken eggs E toward filler system S1 such that an acute end side of chicken egg E is oriented to any of left and right directions (a direction substantially perpendicular to a direction of transportation (a direction shown with an arrow a)), that is, such that a long axis extends along the left-right direction (a lateral direction) while chicken egg E is rotated with the long axis being defined as a center of rotation.

[0024] Filler system S1 includes an orientator 10, a drop assistance apparatus 50, and a tray transportation apparatus 80. Orientator 10 transports a number of chicken eggs E in a plurality of columns and allows chicken eggs E to drop at its terminal end with an acute end of chicken egg E being oriented downward. Drop assistance apparatus 50 assists chicken eggs E which drop with their directions being aligned. Tray transportation apparatus 80 transports to a position of reception of chicken egg E, container T to be filled with chicken eggs E which drop as being assisted.

[0025] Orientator 10, drop assistance apparatus 50, tray transportation apparatus 80, and a tray supply apparatus 90 of filler system S 1 operate in synchronization with one another, and ideally, filling with chicken eggs E transported in 6 columns by orientator 10 is carried out such that missing in each row is avoided in 6 columns of accommodation spaces Tz. Thereafter, container T filled with chicken eggs E by filler system S 1 is passed to a process subsequent to the filler system while it is filled with chicken eggs E in all accommodation spaces Tz.

[Orientator]

[0026] As shown in Figs. 1 and 3 to 9, orientator 10 includes a transportation portion 12 receiving chicken eggs E from distribution system S2 and transporting chicken eggs E forward (the direction shown with arrow a), a push-up portion 14 pushing up transported chicken egg E around a terminal end of transportation portion 12, and a guide portion 16 provided at the terminal end of transportation portion 12 and guiding chicken egg E pushed up by push-up portion 14 to drop assistance apparatus 50.

[0027] In the present embodiment, transportation portion 12 is a roller bar conveyor which has conventionally been well known. As shown in Figs. 1 and 3, transportation portion 12 includes transportation lines 18 in 6 columns. Each transportation line 18 receives chicken eggs E distributed by distribution system S2 and successively transports a plurality of chicken eggs E forward (the direction shown with arrow a) while the long axis extends along the left-right direction. Each transportation line 18 includes a plurality of rollers 20 aligned in a front-rear

direction at equal intervals, and a first shaft member 22 like a rod passes through rollers 20 adjacent in the left-right direction of each transportation portion 12.

[0028] Transportation portion 12 further includes a pair of first endless track structures 19 (see Fig. 5) arranged on respective opposing sides of transportation lines 18 in 6 columns and a first drive source (not shown) rotating first endless track structure 19. The pair of first endless track structures 19 is arranged to form a racetrack-shaped frame extending in a direction of transportation (see Fig. 5) and rotates as it forms a circulating track in a racetrack shape by means of the first drive source. Distribution system S2 distributes a number of chicken eggs E in order to uniformly supply chicken eggs E to each transportation line of orientator 10.

[0029] Opposing ends of first shaft member 22 are rotatably coupled to the pair of first endless track structures 19, respectively. In addition, transportation portion 12 includes a guide 24 arranged on each of the opposing sides of transportation lines 18 in 6 columns. Guide 24 guides first shaft member 22 along the circulating track.

[0030] In transportation portion 12, first shaft members 22 move, that is, revolve, along the circulating track of first endless track structure 19 as the pair of first endless track structures 19 rotates. Each guide 24 is provided correspondingly above the circulating track of first endless track structure 19, first shaft members 22 move forward (the direction shown with arrow a) while they come in contact with an upper surface of guide 24, and they rotate in a direction of rotation (a direction shown with an arrow b in Fig. 5) the same as that of the circulating track of first endless track structure 19.

[0031] Thus, first shaft members 22 revolve while they move along the circulating track of first endless track structure 19. In addition, since first shaft members 22 are rotatably coupled to first endless track structure 19, they rotate in the same rotation direction. Since rollers 20 are joined to first shaft member 22, they revolve with revolution of first shaft member 22 and rotates with rotation of first shaft member 22.

[0032] As shown in Fig. 4, each transportation line 18 supports one chicken egg E with a pair of rollers 20 adjacent in the front-rear direction above the circulating track, and transports forward chicken egg E with revolution of rollers 20. Each roller 20 is formed in such a shape of a bobbin that a pair of disk-shaped members 28 is attached to opposing ends of a columnar member (see Fig. 8). Chicken egg E is supported by a pair of rollers 20 adjacent in a direction of transportation while the long axis extends along the left-right direction (see Fig. 3).

[0033] Since each roller 20 rotates, chicken egg E is transported forward with movement of each roller while it rotates in a direction reverse (a direction shown with an arrow c in Fig. 5) to a direction of rotation of each roller, with the long axis being defined as the rotation axis. Chicken egg E has such a characteristic that it moves in the long axis direction from the obtuse end toward the acute end as it rotates around the long axis defined as the rotation axis. Therefore, chicken egg E rotating over bobbin-shaped roller 20 moves in the long axis direction from the obtuse end toward the acute end and is transported forward while the acute end rides on disk-shaped member 28 of roller 20.

[0034] In the present embodiment, though a bobbin roller in a bobbin shape is used as the roller, instead, what is called a hand drum roller in a Japanese hand drum shape (in a shape of a paraboloid of revolution) which has conventionally been well known may be employed. It is noted that chicken egg E can reliably be brought closer to one side of the roller by transporting chicken egg E with the use of the bobbin roller.

[0035] As shown in Fig. 3, push-up portion 14 includes 6 push-up members 30 corresponding to the transportation lines in 6 columns and a second shaft member 32 (see Fig. 9) passing through 6 push-up members 30 in the left-right direction. As shown in Fig. 9, each push-up member 30 includes a cross-shaped base 30a through which second shaft member 32 passes and which includes extension portions extending in four directions and four blocks 30b attached to the respective extension portions of cross-shaped base 30a.

[0036] As shown in Fig. 9, base 30a is formed from a thick plate in a cross shape, and block 30b has a bottom surface and an upper surface formed in a pentagonal prism shape like a home base. As block 30b is attached to base 30a, each push-up member 30 has a gear shape having four projection portions 30A at equal intervals when viewed in the left-right direction.

[0037] Second shaft member 32 is joined to the first drive source and it rotates in synchronization with first endless track structure 19 or eventually with roller 20. Each push-up member 30 is arranged at a position at which projection portion 30A projects from between rollers 20, and it successively pushes up chicken eggs E from between continuously moving rollers 20 as it rotates in synchronization with roller 20 (see Fig. 5). As shown in Fig. 8, push-up member 30 causes projection portion 30A to project from between the pair of rollers 20, so that chicken egg E is inclined such that the acute end side is oriented downward (see Fig. 8).

[0038] Though push-up member 30 is assembled from base 30a and block 30b in the present embodiment, it may integrally be constructed from one material. For example, it may be formed in a plate shape small in thickness in the left-right direction. Alternatively, push-up portion 14 may otherwise be structured so long as chicken egg E can be pushed up and a position thereof can be inclined. For example, such a mechanism that a rod-shaped member carries out vertical reciprocal motion so as to project from between a pair of rollers may be applicable.

[0039] As shown in Figs. 6 and 7, guide portion 16 is provided around the terminal end of each transportation line 18, and it includes 6 guide structures 34 in correspondence with the transportation lines in 6 columns and a joint member 36 joining guide structures 34. Each guide

structure 34 includes a pair of guide plates 40. The pair of guide plates 40 is arranged to be opposed to each other in the left-right direction with a transportation pathway for chicken eggs E transported along each transportation line 18 lying therebetween.

[0040] Guide plate 40 is arranged around the terminal end of transportation line 18 such that the acute end side of chicken egg E of which position has been inclined by push-up member 30 abuts thereto. Thus, guide structure 34 abuts to a part of the acute end side of chicken egg E of which acute end is oriented obliquely downward by push-up member 30 and guides abutting chicken egg E such that it drops from the acute end side.

[0041] As shown in Fig. 5, guide plate 40 is formed from a first plate-shaped member 40 having a fan-shaped plane, and it extends in an arc shape along a path in which chicken eggs E are transported and drop. Thus, the pair of guide plates 40 guides chicken egg E of which position has been inclined by push-up member 30 such that chicken egg E drops with its acute end being oriented downward.

[0042] As above, as shown in Fig. 7, in transportation line 18, the substantial center of chicken egg E transported to a portion around the terminal end thereof is pushed up by push-up member 30 (see Fig. 8) and a position of chicken egg E of which substantial center is pushed up is inclined such that the acute end side is oriented obliquely between forward and downward. Chicken egg E of which position has been inclined has a part on the acute end side abutting to guide structure 34, that is, a guide portion 40a of guide plate 40.

[0043] As chicken egg E of which position has been inclined abuts to guide portion 40a, it receives force shown with an arrow k. The force shown with arrow k can be resolved into force shown with an arrow k1 in a direction of normal to a virtual line 1 in parallel to the long axis with the long axis of an egg being defined as the reference and force shown with k2 in a tangential direction. The force shown with arrow k1 at a point of contact with guide plate 40 becomes rotational force orienting the acute end side of chicken egg E forward. Therefore, since chicken egg E drops along guide portion 40a while it receives force shown with arrow k, it drops with its acute end being oriented forward with the force shown with arrow k1. Thus, the acute end of chicken egg E is oriented downward at the terminal end of transportation line 18.

[0044] Chicken egg E drops from guide portion 40a along a guidance portion 40b. Therefore, the acute end of chicken egg E is oriented downward by guide portion 40a, guided by a slider 52 of drop assistance apparatus 50 which will be described later, and received by slider 52 with the acute end being reliably oriented downward.

[0045] In the present embodiment, as shown in Figs. 5 and 6, a pair of guide plates 40 is arranged to lie across a pathway of transportation of chicken egg E, and bent at a virtual line i shown with a chain dotted line such that a portion closer to drop assistance apparatus 50 (downstream of a pathway of drop) is closer to the pathway of transportation of chicken eggs E, that is, oriented to an inner side of each transportation line 18.

[0046] A portion close to transportation portion 12 from the virtual line functions as guide portion 40a for orienting the acute end of chicken egg E downward, and a portion close to drop assistance apparatus 50 from virtual line i functions as guidance portion 40b guiding chicken egg E of which acute end is oriented ahead to slider 52 of drop assistance apparatus 50 which will be described later.

[0047] Guide plate 40 is bent to form a gently curved surface such that a boundary between guide portion 40a and guidance portion 40b is not clear. It is noted that it may be bent at an angle so as to clarify a boundary.

[0048] In the pair of guide plates 40 lying across the pathway of transportation of chicken eggs E, a distance between opposing guide portions 40a is greater than a diameter of chicken egg E in a direction of the long axis, and a distance between tip ends of guidance portion 40b is set to a distance smaller than the diameter of chicken egg E in the direction of the long axis and greater than a diameter perpendicular to the direction of the long axis. Therefore, the pair of guidance portions 40b is formed to maintain a distance through which chicken egg E cannot pass with its long axis being oriented to the left-right direction. It is noted that a distance between opposing guide portions 40a or opposing guidance portions 40b of the pair of guide plates 40 can be adjusted.

[0049] In the present embodiment, guide portion 40a of each guide plate 40 is arranged to extend along a surface perpendicular to the left-right direction. In addition, in a set of adjacent guide plates 40 in adjacent transportation lines 18, outer surfaces of transportation lines 18 are bonded to each other in guide portion 40a thereof. Thus, the set of adjacent guide plates 40 forms one plate-shaped portion placed perpendicularly to the left-right direction in guide portion 40a. It is noted that guide plate 40 may be arranged along a surface inclined in the left-right direction.

[0050] Since each guide structure 34 is formed to be removable from transportation portion 12 and joined by joint member 36, guide portion 16 including a plurality of guide structures 34 can together be removed from transportation portion 12. Thus, in cleaning a portion around the terminal end of transportation portion 12, guide portion 16 can readily be removed and hence maintenance is facilitated. In addition, though guide portion 16 comes in contact with chicken egg E and tends to be contaminated, if removal of the guide portion is easy, cleaning of guide portion 16 is also facilitated.

[0051] Though the guide plate is formed of a stainless material low in friction with respect to chicken egg E and excellent in sanitary aspects in the present embodiment, it may be formed of other materials. If chicken egg E breaks, however, contents may adhere to a guide plate to which an acute end abuts. Therefore, the guide plate is desirably formed of a stainless material excellent in sanitary aspects. In addition, the guide plate may be in

other shapes so long as it guides chicken egg E of which position has been inclined by a push-up member such that chicken egg E drops with its acute end being oriented downward.

[0052] The guide structure is not limited to the guide plate, and it may be another member guiding chicken egg E with an acute end thereof abutting thereto. For example, the guide portion may be a bending rod-shaped member such as a rail guiding an acute end of chicken egg E, or a plurality of columnar rollers may be aligned along a pathway of drop of chicken eggs E so as to form a guide roller guiding an acute end of chicken egg E with rotation of the rollers.

[0053] In the present embodiment, though transportation portion 12 has transportation lines 18 in 6 columns, it should only include at least one column of transportation portion 12. Though each transportation portion 12 is implemented by a roller bar conveyor transporting chicken eggs E with a plurality of rollers 20, it may be implemented by another conveyor so long as chicken eggs E can be transported with the long axis extending along the left-right direction. In that case as well, push-up portion 14 should only be able to incline a position such that chicken egg E is pushed up from the pathway of transportation of the conveyor and the acute end is oriented downward, and guide portion 16 should only be able to guide chicken eggs E such that they can drop with the acute end being oriented downward.

[0054] As above, the orientator according to the present embodiment includes at least one transportation line transporting forward a plurality of eggs while the long axis is oriented to any of the left and the right directions and allowing the egg to drop at the terminal end, the push-up member provided around the terminal end of each transportation line and inclining the acute end obliquely downward by pushing up the substantial center of the egg transported along each transportation line, and the guide structure provided around the terminal end of each transportation line, abutting to a part on the acute end side of chicken egg E of which acute end is oriented obliquely downward by the push-up portion, and guiding abutting chicken egg E to drop from the acute end side.

[0055] Chicken eggs include eggs for consumption used for cooking and hatching eggs for production of chicks. These eggs are transported and managed as a tray is filled with eggs after the eggs are laid by chickens. For example, in a process for producing hatching eggs, a number of eggs laid by a number of chickens are transported from a poultry house and accommodated in a dedicated vessel called a setter tray.

[0056] Chicken egg E has an acute end relatively low in curvature and an obtuse end relatively high in curvature, and a virtual axial line connecting the tip end on the acute end side and the tip end on the obtuse end side to each other is referred to as the long axis. In general, an air cell is located on the obtuse end side of the egg. A setter tray is filled with hatching eggs with the obtuse end being oriented upward, in order to facilitate gas exchange of an embryo in a hatching egg through the air cell. Alternatively, an American tray is filled not only with hatching eggs but also eggs for consumption with the acute end side high in strength of egg shell being oriented downward, that is, the obtuse end side being oriented upward.

[0057] Chicken eggs E, however, are transported by a conveyor or the like with the long axis extending in a lateral direction in order to facilitate transportation until a tray is filled therewith. Therefore, in order to fill a tray with chicken eggs E with the obtuse end being oriented upward, that is, the long axis being oriented in the up-down direction (vertical direction), positions of chicken eggs E should be changed and aligned.

[0058] Such an apparatus for aligning the obtuse ends of chicken eggs E upward and orienting eggs E is exemplified by an orientator described in Japanese Patent Laying-Open No. 5-8851. This orientator includes a first transportation portion transporting chicken eggs and a second transportation portion receiving chicken eggs dropping at a terminal end of the first transportation portion and further transporting chicken eggs E.

[0059] A first transportation line is implemented by a roller bar conveyor, and chicken eggs are caught and held by a pair of rollers adjacent in a front-rear direction such that a long axis is oriented in a left-right direction and transported forward from the rear. The first transportation portion includes, around its terminal end, a push-up member pushing up the substantial center in the left-right direction of the transported chicken egg from between a pair of rollers and a pressing member pressing an acute end side of chicken egg E of which center has been lifted up in a direction of transportation, that is, forward. The push-up member lifts up the substantial center of transported chicken egg E and inclines egg E such that the acute end side is oriented downward.

[0060] The pressing member presses the acute end of chicken egg E inclined by the push-up member forward at a speed faster than a speed of transportation of chicken eggs E. As a pressing member, a plate-shaped member rotating in order to press the acute end of chicken egg E forward and a drive mechanism for rotating the plate-shaped member are provided around a terminal end of a conveyor. In addition, the pressing member is formed from an elastic body in order to adjust force with which an egg is pressed.

[0061] According to the construction of the conventional orientator, a position of chicken egg E transported to a portion around the terminal end of the first transportation line is inclined as the center thereof is lifted up by a lifting member such that the acute end thereof is oriented downward. The acute end side of chicken egg E is pressed forward by the pressing member with its position being inclined, chicken egg E reaches the terminal end of the first transportation line with the acute end being oriented forward, and then it drops. Therefore, chicken egg E drops with its acute end being oriented downward and is received by a second transportation line. Thus,

chicken egg E is transported by the second transportation line with the obtuse end being oriented upward and moved from the second transportation line to a tray, and the tray is filled with the chicken eggs with the obtuse ends being oriented upward.

[0062] In the orientator in Japanese Patent Laying-Open No. 5-8851, the first transportation line is provided with a pressing member having a drive mechanism, and hence a structure of an apparatus has extremely been complicated.

[0063] According to the orientator in the present embodiment, as in the conventional orientator, a push-up member provided around the terminal end of the transportation line pushes up the substantial center of chicken egg E transported to a portion around the terminal end of the transportation line. In the orientator according to the present embodiment, however, unlike conventional orientation, the acute end side of chicken egg E abuts to a guide structure provided at the terminal end of the transportation line such that a position is inclined with the acute end side being oriented downward. Thus, the guide structure guides chicken eggs E such that they drop with the acute ends being oriented downward. Therefore, in the orientator according to the present embodiment as well, an orientation of chicken egg E can be changed from a state of orientation of the acute end in the left-right direction (the long axis extending in the lateral direction) to a state that it is oriented downward (the long axis extending in the vertical direction) and directions of chicken eggs E can thus be aligned.

[0064] According to the orientator in the present embodiment, since a static guide structure fixed to a transportation line can orient eggs, such a dynamic mechanism as a pressing member operated by a drive mechanism does not have to be provided at the terminal end of the transportation line for orientation. Thus, a structure of the orientator can be simplified, the apparatus can be provided inexpensively, and maintenance of the apparatus is also facilitated.

[Drop Assistance Apparatus]

[0065] As shown in Figs. 10 to 12, drop assistance apparatus 50 includes at least one slider 52 receiving chicken egg E which drops at the terminal end of orientator 10 and passing chicken egg E to container T (next step) as chicken egg E slides down over the same, a plurality of catch and hold assemblies 54 catching and holding chicken eggs E in cooperation with each slider 52, and a second endless track structure 55 for moving each catch and hold assembly 54.

[0066] In the present embodiment, drop assistance apparatus 50 includes 6 sliders 52 in correspondence with transportation lines 18 in 6 columns. Each slider 52 linearly extends in a state slightly inclined with respect to a vertical direction when viewed from the side. A plurality of sliders 52 are arranged as being aligned in the left-right direction so as to receive chicken eggs E from the terminal end of each transportation line 18 when viewed from the front.

[0067] In the present embodiment, a pitch between columns of transportation lines 18 (a pitch in the left-right direction) is greater than a pitch in the left-right direction in container T to be filled with chicken eggs E. Therefore, upper portions of the plurality of sliders 52 are adapted to a pitch in a direction of transportation width of transportation portion 12, and lower portions of the plurality of sliders are adapted to a pitch in container T. Namely, the plurality of sliders 52 are arranged such that the pitch decreases toward a lower portion.

[0068] As an angle of slider 52 in the left-right direction is changed, a pitch between the upper portions and the lower portions of sliders 52 can be changed. Therefore, a case that a pitch in the left-right direction of transportation line 18 is smaller than a pitch in the left-right direction in the container or a case that a pitch in the left-right direction of the transportation line is equal to a pitch in the left-right direction in the container can also be addressed.

[0069] Each slider 52 includes the upper portion receiving chicken egg E from corresponding transportation line 18, a slide down portion continuing from the upper portion and allowing received chicken egg E to slide down, and the lower portion passing sliding down chicken egg E to the container, and it forms one semi-cylindrical shape. Thus, slider 52 has a slide surface curved in a U-shape when viewed in a direction of slide down, in correspondence with a shape of chicken egg E, for allowing chicken egg E to slide down.

[0070] Each slider 52 is formed of such a synthetic resin as plastic such that the slide surface provides moderate friction to chicken egg E. The slider may be formed of another material or another structure unless chicken egg E is prevented from sliding down.

[0071] The plurality of catch and hold assemblies 54 are arranged at equal intervals in a direction of slide down of chicken eggs E and catch and hold chicken eggs E in cooperation with slider 52. As shown in Figs. 13 and 14, each catch and hold assembly 54 includes a catch and hold member 56 catching and holding chicken egg E in cooperation with the slide surface of slider 52, a support member 58 rotatably supporting catch and hold member 56 toward the slider and moving along the slider, a pair of attachment members 60 interposed between catch and hold member 56 and support member 58, a force application member 62 applying rotational force biasing toward slider 52 to the catch and hold member, and a stopper 64 for preventing catch and hold member 56 from rotating in a direction reverse (a second rotation direction) to a direction toward the slide surface (a first rotation direction).

[0072] Catch and hold member 56 includes a plate-shaped member 66 extending in a direction substantially orthogonal to a direction of slide down of chicken eggs E and a joint member 68 joining plate-shaped member 66 to attachment member 60. Plate-shaped member 66

is coupled to joint member 68 by a screw 67 and catch and hold member 56 is attached to attachment member 60 in a fixed manner.

[0073] One catch and hold member 56 and 6 sliders 52 catch and hold 6 chicken eggs E aligned in a direction of width of slide down. Catch and hold member 56 is rotatably supported by support member 58. One surface (a catch and hold surface) of plate-shaped member 66 of the catch and hold member is arranged as being inclined with respect to the slide surface such that a distance between that one surface and the slide surface of slider 52 gradually decreases downward (see Fig. 16), and catches and holds chicken egg E so as to support the chicken egg from below in cooperation with slider 52.

[0074] Though plate-shaped member 66 is made of a stainless material, it may be made of another material and may be in another shape so long as it does not prevent chicken egg E from being caught and held. Though the catch and hold member includes plate-shaped member 66 and joint member 68, it may be formed from one integral member. In addition, though one catch and hold assembly 54 catches and holds a plurality of chicken eggs E, the catch and hold assembly may be used based on one-to-one relation with chicken egg E. Namely, the catch and hold assembly may include a plurality of catch and hold members and one catch and hold member may be provided in correspondence with one slider. Various constructions for a catch and hold assembly can be adopted so long as chicken eggs can be caught and held as being supported from below in cooperation with the slider (inclined surface).

[0075] Support member 58 is constituted of a pair of supports 70 provided at a distance in a direction of extension of plate-shaped member 66, with catch and hold member 56 lying therebetween. Each support 70 has a through hole 72 through which one end of joint member 68 of catch and hold member 56 passes, and catch and hold member 56 is rotatably supported by support member 58 with joint member 68 passing through through hole 72 being defined as the axis. Namely, a virtual straight line passing through opposing ends of catch and hold member 56 forms a rotation axis of catch and hold member 56. Thus, support member 58 rotatably supports catch and hold member 56 such that inclination of a catch and hold surface with respect to the slide surface is variable.

[0076] A pair of attachment members 60 is interposed between the ends of catch and hold member 56 and support 70, and a part of catch and hold member 56 passes therethrough. Each attachment member 60 is coupled to catch and hold member 56 in a fixed manner, and it can rotate together with catch and hold member 56 with respect to support 70.

[0077] Force application member 62 is a rod-shaped weight extending along catch and hold member 56 and supported by the pair of attachment members 60. Force application member 62 is arranged such that a center of gravity of the weight is located on a side opposite to a side where a center of gravity of catch and hold member 56 is located, with a virtual vertical surface (a chain dotted line D in Fig. 16) passing through a center of rotation of catch and hold member 56 lying therebetween, so that it applies rotational force biasing toward slider 52 to catch and hold member 56. The force application member may apply rotational force to the catch and hold member based on elasticity.

[0078] As force application member 62 is arranged farther from the center of rotation of catch and hold member 56, it can apply greater force to catch and hold member 56 with the same weight. In addition, rotational force applied to catch and hold member 56 can be adjusted by weight and arrangement of the weight. Force application member 62 may be attached to another member of the catch and hold assembly without being limited to attachment member 60, so long as it can apply rotational force biasing toward slider 52 to catch and hold member 56.

[0079] Stopper 64 includes a pair of disk-shaped rollers 74 rotatably coupled to each attachment member. Referring again to Fig. 12, stopper 64 abuts to a guide 76 provided in drop assistance apparatus 50 and guides catch and hold assembly 54. Guide 76 includes a pair of rod-shaped members 78 provided in drop assistance apparatus 50 and arranged at positions corresponding to opposing sides of 6 sliders 52. Each rod-shaped member 78 extends along a direction of extension of slider 52 and it is arranged substantially in parallel to the slide surface when viewed from a side surface. Rod-shaped member 78 is formed from a stainless member and roller 74 abuts thereto. Rod-shaped member 78 is provided immovably with respect to slider 52.

[0080] Each stopper 64 can move away from guide 76. Thus, catch and hold member 56 is prevented from rotating in a second rotation direction while stopper 64 is abutting to guide 76, however, it does not prevent rotation in a first rotation direction. Namely, as guide 76 and stopper 64 abut to each other, catch and hold member 56 is prevented from rotating only in a direction away from slider 52.

[0081] As stopper 64 slides over rod-shaped member 78 extending in parallel to a direction of extension of slider 52 while rotating, catch and hold assembly 54 can smoothly move along the direction of extension of slider 52. Second endless track structure 55 to which catch and hold assembly 54 is coupled is constituted of a pair of chains arranged at a distance in a direction of width of transportation, and coupled to corresponding support 70 in a fixed manner at a distance in a direction of extension of catch and hold member 56, with catch and hold assembly 54 lying therebetween.

[0082] As shown in Fig. 15, each second endless track structure 55 forms substantially trapezoidal outer geometry when viewed from a side surface, for circulating motion of catch and hold assembly 54. Therefore, second endless track structure 55 carries out rotational motion along the substantially trapezoidal outer geometry upon receiving motive power from a first drive portion.

[0083] Namely, second endless track structure 55 includes a first straight portion 55a extending in a direction of extension of the slider, a first turn-around portion 55b continuing from a lower side of the first straight portion and forming a turn-around point for circulating motion, a second straight portion 55c continuing from the first turn-around portion and extending in a direction away from the first straight portion toward its upper portion, a second turn-around portion 55d continuing from an upper side of the second straight portion and forming a turn-around point for circulating motion, a third straight portion 55e continuing from the second turn-around portion and extending in a direction closer to the first straight portion toward an upper portion, a third turn-around portion 5 5f continuing from an upper side of the third straight portion, forming a turn-around point for circulating motion, and extending substantially in a horizontal direction, a fourth straight portion 55g continuing from the third turn-around portion and extending substantially in the horizontal direction, and a fourth turn-around portion 55h continuing from the fourth straight portion and continuing to an upper side of the first straight portion.

[0084] At each turn-around portion of the chain, a sprocket is arranged as necessary. Thus, motive power is transmitted to second endless track structure 55 while second endless track structure 55 turns around. In addition, the first straight portion extends substantially in parallel to a direction of extension of guide 76 when viewed from a side surface.

[0085] Since each catch and hold assembly 54 is coupled to an endless track structure with a support being interposed, it carries out circulating motion while drawing a track substantially in a trapezoidal shape with rotation of the endless track structure. Therefore, the track of the catch and hold assembly includes a first track moving along the slide down surface of the slider at a position corresponding to the first straight portion, a second track moving in a direction away from the slider at a position corresponding to the first turn-around portion, a third track moving upward from below at a position corresponding to the second straight portion, a fourth track turned around in a direction closer to the slider at a position corresponding to the second turn-around portion, a fifth track moving in a direction closer to the slider at a position corresponding to the third straight portion, a sixth track turned around in a direction toward the slider at a position corresponding to the third turn-around portion, a seventh track moving in a direction toward the slider at a position corresponding to the fourth straight portion, and an eighth track turned around in a direction downward at a position corresponding to the fourth turn-around portion.

[0086] Namely, each catch and hold assembly 54 moves to draw the first to eighth tracks. The first track corresponding to first straight portion 55a functions such that the catch and hold assembly catches and holds chicken egg E in cooperation with slider 52 and allows slide down of chicken egg E, and the second track corresponding to first turn-around portion 55b functions such that catch and hold assembly 54 moves away from slider 52 and allows chicken egg E to drop onto container T.

[0087] As shown in Figs. 13 and 14, support 70 coupling catch and hold assembly 54 to second endless track structure 55 is coupled to second endless track structure 55 at a coupling position 73 at a distance from through hole 72 through which a part of catch and hold member 56 is inserted. Support 70 is coupled to second endless track structure 55 such that coupling position 73 is located on an outer side of circulating motion of catch and hold assembly 54 and through hole 72 is located on an inner side of circulating motion.

[0088] Thus, because of difference in a radius of rotation of circulating motion between through hole 72 and coupling position 73, in the second, fourth, sixth, and eighth tracks of circulating motion of the catch and hold member, a speed in a tangential direction of through hole 72 is lower than a speed in a tangential direction of coupling position 73. On the other hand, in the first, third, fifth, and seventh tracks, through hole 72 and coupling position 73 move linearly in parallel and therefore their speeds are the same. Namely, as compared with a case that catch and hold assembly 54 linearly moves, catch and hold assembly 54 decelerates at a position corresponding to each turn-around portion of the endless track structure.

[0089] Therefore, since catch and hold assembly 54 releases chicken egg E at the position corresponding to the second track, catch and hold member 56 releases chicken egg E while it slows down a moving speed. Thus, catch and hold assembly 54 can fill container T slowly with chicken eggs E.

[0090] Though a plurality of catch and hold assemblies 54 are attached to second endless track structure 55 in the present embodiment, a drop assistance apparatus may be constructed by attaching a single catch and hold assembly 54 to the second endless track structure. The number and a speed of catch and hold assembly (assemblies) are adjusted based on the number of eggs processed by filler system S1 in synchronization with orientator 10.

[0091] An operation model of drop assistance apparatus 50 will now be described with reference to Figs. 16 to 18. Fig. 16 shows a state of drop assistance apparatus 50 while chicken egg E is not caught and held. As shown in Fig. 16, catch and hold member 56 can rotate in a direction shown with a double-headed arrow d, with a part passing through through hole 72 of support 70 being defined as a rotation center 56A. Support 70, that is, rotation center 56A, is coupled to second endless track structure 55 and it moves along a chain double dotted line A corresponding to first straight portion 55a.

[0092] A solid line B shows guide 76 and a solid line C shows slider 52. In addition, a solid line extending from rotation center 56A to stopper 64 or force application member 62 corresponds to attachment member 60. While catch and hold assembly 54 does not catch and

hold chicken egg E, a position of catch and hold assembly 54 is maintained mainly by balance between weight of force application member 62 and weight of catch and hold member 56.

[0093] Namely, catch and hold member 56 is rotated toward slider 52 until a distance between a slide surface of slider 52 and the tip end of catch and hold member 56 is smaller than a size of chicken egg E. Here, the slide surface of slider 52 and catch and hold member 56 are arranged such that a distance between catch and hold member 56 (catch and hold surface) and the slide surface of slider 52 gradually decreases downward. In addition, in this state, stopper 64 and guide 76 do not abut to each other.

[0094] Fig. 17 shows a state of drop assistance apparatus 50 at a position where chicken egg E is caught and held between slider 52 and catch and hold assembly 54 and then slides down, that is, a slide down portion of slider 52. As shown in Fig. 17, while chicken egg E is caught and held between slider 52 and catch and hold assembly 54, catch and hold member 56 receives the weight of chicken egg E, catch and hold member 56 rotates in a direction away from slider 52, and a distance between the lower portion of catch and hold member 56 (catch and hold surface) and the lower portion of the slide surface of slider 52 is wider than in a case that a chicken egg is not caught and held.

[0095] As stopper 64 and guide 76 abut to each other in this state, catch and hold member 56 is maintained at a position where chicken egg E does not drop. It is noted that, even though stopper 64 and guide 76 are not provided, catch and hold member 56 may be maintained at any position based on balance in weight between force application member 62 and chicken egg E.

[0096] Though catch and hold assembly 54 moves along slider 52 while it catches and holds chicken egg E, stopper 64 moves as abutting to guide 76. Therefore, catch and hold assembly 54 moves substantially in parallel to slider 52 as being guided along solid line C. Stopper 64 slides over guide 76 as roller 74 abutting to guide 76 rotates.

[0097] Figs. 17 (A) and 17 (B) show states that catch and hold assembly 54 catches and holds chicken eggs different in size. Namely, slider 52 and catch and hold assembly 54 catch and hold a small chicken egg E1 in Fig. 17 (A) and a large chicken egg E2 in Fig. 17 (B). Catch and hold member 56 catches and holds both of small chicken egg E1 and large chicken egg E2 at the same position as stopper 64 and guide 76 abut to each other. Thus, since the slide surface of slider 52 and catch and hold member 56 are arranged such that a distance between catch and hold member 56 (catch and hold surface) and the slide surface of slider 52 gradually decreases downward, both of small chicken egg E1 and large chicken egg E2 can reliably be caught and held at a position corresponding to chicken egg E.

[0098] Fig. 18 shows a state of drop assistance apparatus 50 at a position where chicken egg E is released from catch and hold between slider 52 and catch and hold assembly 54 and drops, that is, at the lower portion of slider 52. As shown in Fig. 18, when catch and hold assembly 54 reaches a position to drop chicken egg E, that is, the lower portion of slider 52, support 70, that is, rotation center 56A, moves in a direction away from slider 52 along chain double dotted line A.

[0099] Thus, the distance between slider 52 and catch and hold member 56 increases, and chicken egg E begins to be released from a caught and held state. Here, catch and hold member 56 receives force of rotation in a direction shown with an arrow e from force application member 62. Thus, though the distance between the lower portion of catch and hold member 56 (catch and hold surface) and the lower portion of the slide surface of slider 52 gradually increases, chicken egg E continues to receive force in accordance with weight of force application member 62 while it is in contact with catch and hold member 56. Therefore, according to drop assistance apparatus 50 in the present embodiment, chicken egg E can slowly drop.

[0100] Figs. 18 (A) and 18 (B) are different from each other in size of a caught and held chicken egg. Namely, slider 52 and catch and hold assembly 54 catch and hold small chicken egg E1 in Fig. 18 (A) and large chicken egg E2 in Fig. 18 (B). As support member 70 moves in a direction away from slider 52, catch and hold member 56 also moves away from the slider. However, as force application member 62 applies force in a direction shown with an arrow b in an orientation of rotation of catch and hold member 56, chicken egg E is caught and held with substantially the same force until it drops regardless of a size of the egg. Thus, chicken egg E can slowly drop regardless of a size of the chicken egg.

[0101] Referring to Figs. 18 (A) and 18 (B), chicken egg E2 rather than chicken egg E1 is caught and held between catch and hold member 56 and slider 52 as far as a position where support member 70 is distant from slider 52. Namely, according to drop assistance apparatus 50 in the present embodiment, a larger egg is later in timing of release from catch and hold, and a larger egg is lower in impact of drop. Impact of drop is greater as weight of an egg is greater. Therefore, according to drop assistance apparatus 50, a larger egg great in impact can experience lower impact of drop.

[0102] Chicken egg E has been described as an object to be dropped in the present embodiment. An object to be dropped is not limited to chicken egg E in the drop assistance apparatus, and other objects such as industrial products and agricultural products may be applicable.

[Tray Transportation Apparatus]

[0103] Tray transportation apparatus 80 according to the embodiment of the present invention transports container (tray) T to be filled with chicken eggs E. Tray transportation apparatus 80 receives the container from tray

supply apparatus 90 and transports container T to a portion below drop assistance apparatus 50 of filler system S1 along a transportation path 82. Therefore, tray transportation apparatus 80 functions as a next step of the drop assistance apparatus.

[0104] Tray supply apparatus 90 is provided at one end of tray transportation apparatus 80 (see Fig. 1), and containers T are supplied by dropping layered containers T onto one end of the transportation path of tray transportation apparatus 80 one by one, as has conventionally been well known. Tray supply apparatus 90 is in synchronization with tray transportation apparatus 80, and it supplies the containers as appropriate in accordance with an operation of tray transportation apparatus 80.

[0105] As shown in Fig. 19, transportation path 82 includes in a transportation surface, a first straight region 82A, a curved region 82B continuing from first straight region 82A, and a second straight region 82C continuing from curved region 82B on a side opposite to the first straight region. Namely, transportation path 82 forms an L-shaped transportation pathway of which corner portion is rounded. The curved region is curved at a prescribed curvature. First straight region 82A is provided with tray supply apparatus 90 thereabove, and the second straight region is located below drop assistance apparatus 50.

[0106] Transportation path 82 includes a first transmission member 84 provided from first straight region 82A through curved region 82B to second straight region 82C and a second transmission member 86 provided only in second straight region 82C. Transportation path 82 has a curved region side of first straight region 82A as a terminal end of the first straight region and a side opposite thereto as a starting end of first straight region 82A. In addition, transmission path 82 has a curved region side of second straight region 82C as a starting end of second straight region 82C and a side opposite thereto as a terminal end of second straight region 82C.

[0107] First and second transmission members 84, 86 are chains to which dogs 88, 89 engaged with container T are attached at prescribed intervals, and first transmission member 84 is formed as a third endless track structure, with sprockets (not shown) provided at the starting end of the first straight region and the terminal end of the second straight region being interposed. In addition, second transmission member 86 is formed as a fourth endless track structure, with sprockets (not shown) provided at a starting end portion of second straight region 82C and a terminal end portion of second straight region 82C being interposed.

[0108] First transmission member 84 is provided in curved region 82B on one side which is the inner side. First transmission member 84 includes what is called a curved chain constructed to be able to curve at a prescribed curvature of the curved region and dog 88 attached to the curved chain. It is noted that the first transmission member may be of another structure, so long as it can transport container T at a prescribed curvature in curved region 82B. For example, a structure such as a linear guide in which a transportation path is formed as a rail and a dog slides over the rail so that a container engaged with the dog is transported may be applicable.

[0109] In addition, second transmission member 86 includes a general chain which cannot be curved and dog 89 attached to the chain. Second transmission member 86 is provided in parallel to a straight portion of first transmission member 84 in second straight region 82C, on a side opposite to first transmission member 84 in transportation path 82.

[0110] First and second transmission members 84, 86 transport container T as dogs 88, 89 engaged with transported container T are attached in a fixed manner and engaged with container T. The dogs are provided at prescribed intervals in conformity with a pitch of transportation of containers T. Each dog is formed like a projection, and it is engaged with container T as it is fitted to a projection portion of container T. The dog has a shape adapted to a projection portion of container T.

[0111] Dogs 88, 89 attached to first and second transmission member 84, 86 are engaged with container T. As first and second transmission members 84, 86 carry out circulating motion, dogs 88, 89 move and container T engaged therewith is transported. Here, the transmission member being engaged with the container means such a state that the transmission member is caught by the container and the container moves with operation of the transmission member.

[0112] In the present embodiment, in first transmission member 84, two adjacent dogs 88 engage one container T, and in second transmission member 86, one dog 89 engages one container T. Thus, in first straight region 82A and curved region 82B, container T is engaged with two dogs 88 of first transmission member 84 and transported. In contrast, in second straight region 82C, one container T is engaged with three dogs 88, 89 and transported. The container which moves over a plane is transported with its position on the plane being stabilized, if it is engaged with the transmission member at two or more points.

[0113] Tray transportation apparatus 80 according to the present embodiment transports container T with the use of the first transmission member with the inner side in a direction of transportation of container T being engaged with first transmission member 84 from first straight region 82A to curved region 82B. Then, tray transportation apparatus 80 transports container T with the use of first and second transmission members 84, 86, with the other side serving as the outer side of container T which has reached second straight region 82C being engaged with second transmission member 86.

[0114] Container T is received from tray supply apparatus 90 in first straight region 82A and transported to second straight region 82C through curved region 82B. Drop assistance apparatus 50 of filler system S1 is provided above second straight region 82C of transportation path 82, and container T is transported to a prescribed position by tray transportation apparatus 80 such that a

foremost row in a direction of transportation is arranged at a position of drop of chicken eggs E, that is, a position corresponding to the lower portions of 6 sliders 52 of drop assistance apparatus 50.

[0115] Drop assistance apparatus 50 slowly drops chicken eggs E while 6 accommodation spaces in the foremost row of container T are located below 6 sliders 52 of drop assistance apparatus 50. Namely, drop assistance apparatus 50 and orientator 10 are in synchronization with tray transportation apparatus 80. Six accommodation spaces Tz in the foremost row of container T are filled with 6 chicken eggs E which dropped from drop assistance apparatus 50.

[0116] As the foremost row of container T is filled with chicken eggs E, tray transportation apparatus 80 transports container T by one row of the accommodation spaces through tact transportation. Thus, 6 accommodation spaces Tz in a next row of container T are located below 6 sliders 52 of the drop assistance apparatus. In this state, drop assistance apparatus 50 slowly drops chicken eggs E. In succession, tray transportation apparatus 80 transports container T by one row of accommodation spaces Tz through tact transportation and drop assistance apparatus 50 slowly drops chicken eggs E.

[0117] This process is repeated for one container T, that is, for 5 rows of accommodation spaces Tz, and accommodation spaces Tz in the foremost row of a next container (a second container) T is tact-transported by tray transportation apparatus 80 to a position corresponding to the lower portions of 6 sliders 52 of drop assistance apparatus 50 while all rows of accommodation spaces Tz of container T are filled with chicken eggs E.

[0118] Then, in second container T, tact transportation for one column of accommodation spaces Tz is repeated five times, tact transportation for one container is again carried out, and accommodation spaces Tz in the foremost row of a next container (a third container) T is tact-transported by tray transportation apparatus 80 to a position corresponding to the lower portions of 6 sliders 52 of drop assistance apparatus 50. By repeating this process, a number of containers T are successively filled with chicken eggs E.

[0119] In the present embodiment, since container T is filled with chicken eggs E in second straight region 82C, load of transportation of container T is low until curved region 82B, and load increases in second straight region 82C. Here, since container T is transported from second straight region 82C by using first and second transmission members 84, 86, container T can be transported in a stable manner in spite of increase in load. In particular, since first and second transmission members 84, 86 are engaged with one end and the other end of a side with respect to the direction of transportation of container T, respectively, container T can be transported in a stable manner with even force from opposing sides.

[0120] Tray transportation apparatus 80 includes a third drive source (not shown), and the third drive source causes first and second transmission members 84, 86 implemented by endless track structures to carry out circulating motion. Namely, first and second transmission members 84, 86 carry out circulating motion in synchronization with each other. It is noted that a drive source corresponding to each transmission member may be provided and each transmission member may independently carry out circulating motion.

[0121] Though two transmission members of first and second transmission members 84, 86 transport the container in the present embodiment, only a single transmission member may transport the container. In addition, though the first transmission member is arranged on the inner side of the transportation pathway in the present embodiment, it may be arranged either on the outer side or the inner side of the transportation pathway. It is noted that, as the first transmission member is arranged on the inner side, a pitch of transportation between containers can be decreased. By arranging the first transmission member on the inner side relative to the center of the transportation pathway, the containers can be transported without an interval between the containers.

[0122] The fact that a pitch of transportation of the containers can be decreased as the first transmission member is arranged on the inner side will be described with reference to Fig. 20. First transmission member 84 in Figs. 20 (A) and 20 (B) is curved at the same curvature. Fig. 20 (A) shows a case that dog 88 is engaged with the center of container T and the container is transported. In contrast, Fig. 20 (B) shows a case that dog 88 is engaged with the inner side of container T and the container is transported.

[0123] As a position where dog 88 of first transmission means 84 is engaged with container T is inner, a radius of rotation of container T is greater and hence a track of rotation of a forward end portion on the inner side of container T is also greater. Thus, even when a plurality of containers are successively transported, the track of rotation of the forward end portion on the inner side of the container is great, and therefore a rear end portion on the inner side of a container ahead and a forward end portion on the inner side of a subsequent container can be prevented from coming in contact with each other.

[0124] In addition, since container T is transported as being engaged with two dogs 88, a position thereof on a plane is stabilized even in curved region 82B and container T is transported along the transportation path without rotating on the plane.

[0125] In the present embodiment, the first transmission member is provided from the first straight region through the curved region to the second straight region. It is noted that the first transmission member should only be provided at least in the curved region. For example, in the first and second straight regions, the transportation path may be formed by a belt conveyor without using the transmission member and transportation through each straight region and the curved region may be achieved with different transmission means. In addition, though

the transmission member is implemented by a chain provided with a dog in the present embodiment, it may be of another structure so long as it is engaged with the container so that the container can be transported.

[0126] Filler system S 1 according to the present embodiment can be manufactured with an accommodation space being saved, by transporting containers with tray transportation apparatus 80 having a two-dimensionally L shape. In addition, since the container is transported over the transportation path as being engaged with the first transmission means, the container does not slip over the transportation path and synchronization with transportation of chicken eggs can readily be achieved.

[0127] The transportation apparatus according to the present embodiment includes the transportation path including the curved region curved at a prescribed curvature and transports the containers along the transportation path. The transportation path includes the first transmission means engaged with the container and transporting the container, and the first transmission means can be curved at the prescribed curvature in order to transport the containers along the transportation path.

[0128] According to the transportation apparatus of the present invention, the first transmission means is engaged with the container, so that the container can be transported in a stable manner. In addition, since the first transmission means can be curved, the curved region can be formed in the transportation path for the containers. Therefore, since single transmission means can form the curved region, the transportation pathway can readily be changed.

[0129] The first transmission means may be engaged with one side of the container which is the inner side at the time when the container is transported through the curved region. By doing so, since a radius of rotation of the container is greater, in a case of successive transportation of the containers, contact between adjacent containers in the curved region can be prevented and a pitch between adjacent containers can be decreased.

[0130] In addition, the transportation path includes at least one straight region continuing to one side of the curved region, and it may include in the straight region, second transmission means engaged with the other side of the container which is on the outer side at the time when the container is transported through the curved region and moving the container. In the straight region continuing to the curved region, since the first and second transmission means transport the container, the container can be transported in a stable manner even though load of the container increases in the straight region.

[0131] The first and second transmission means may be engaged with one end and the other end of the container, respectively, and the container may have a rectangular two-dimensional shape.

[0132] The container is a tray accommodating chicken eggs, and the first transmission means may be engaged with the tray at least at two points. This transportation apparatus can be employed in a chicken egg filler system for filling with chicken eggs.

[0133] The filler system according to the present invention may include the transportation apparatus described previously. According to this filler system, since the container can be transported with a simplified transportation apparatus, filling with objects to be filled in a container and the transportation apparatus can readily be in synchronization with each other.

[0134] A transportation method according to the present invention in a transportation apparatus including the transmission means transporting the container as being engaged with the container, which can be curved at the prescribed curvature in order to transport the containers along the transportation path having the curved region curved at the prescribed curvature, includes arrangement of the container on the transportation path for engagement of the container with transmission means and operation of the transmission means for transportation of the container.

[0135] With this transportation method, since the transmission means is engaged with the container, the container can be transported in a stable manner. Since the transmission means can be curved, the curved region can be formed in the transportation path for the container. Since single transmission means can form the curved region, the transportation pathway can readily be changed.

[Operation of Filler System]

[0136] Filler system S 1 successively receives a number of chicken eggs E from distribution system S2. Distribution system S2 distributes chicken eggs E in 6 columns in correspondence with orientator 10 of filler system S1, and supplies chicken eggs E to each transportation portion 12 of orientator 10. Chicken eggs E are passed from distribution system S2 to orientator 10 while the long axis thereof extends along the left-right direction. Though distribution system S2 and filler system S1 transport chicken eggs E in 6 columns in the present embodiment, they may transport chicken eggs E, for example, in 12 columns.

[0137] Orientator 10 rotates first endless track structure 19 by one roller while the pair of rollers 20 aligned in the direction of transportation of each transportation line receives chicken egg E and the pairs of rollers 20 aligned in 6 columns in the left-right direction receive chicken eggs E. Namely, orientator 10 tact-transports chicken eggs E such that chicken eggs E advance by one roller when 6 chicken eggs are aligned in the left-right direction. It is noted that orientator 10 may continuously operate. For example, if distribution system S2 can reliably supply chicken eggs E to each column, all accommodation spaces in container T can be filled with chicken eggs E even when orientator 10 carries out continuous transportation.

[0138] Orientator 10 successively transports chicken eggs E through tact transportation while chicken eggs E

are aligned in 6 columns in the left-right direction. Since roller 20 rotates during tact transportation, each chicken egg E moves in the long axix direction from the obtuse end toward the acute end through rotation of roller 20, and it is transported while the acute end thereof rides on disk-shaped member 28 of roller 20. By extending a transportation pathway of transportation portion 12, the acute end of chicken egg E can reliably be brought closer to one side of roller 20 and can be caused to ride on the disk-shaped member of roller 20.

[0139] As shown in Fig. 8, when each chicken egg E reaches a portion around the terminal end of each transportation line 18, a position thereof is inclined by push-up member 30 such that the acute end side is oriented downward. Chicken egg E of which position has been inclined drops with the acute end side abutting to one guide plate 40 of guide structure 34 while the position thereof is inclined. Thus, guide structure 34 and push-up member 30 pass chicken egg E to drop assistance apparatus 50 with the acute end being oriented downward. Push-up member 30 rotates in a tact operation in accordance with tact movement of first endless track structure 19 and the roller.

[0140] Though a container is filled with chicken eggs which are objects from the orientator by means of the drop assistance apparatus in the present embodiment, the container may be filled with objects from the orientator with other means, not with the drop assistance apparatus (for example, a filling portion described in Japanese Patent No. 5036912 is available).

[0141] Drop assistance apparatus 50 receives at the upper portion of slider 52, chicken eggs E which drop from transportation portion 12 of orientator 10 with the acute end thereof being oriented downward. Accordingly, one catch and hold assembly 54 of drop assistance apparatus 50 catches and holds chicken egg E in cooperation with the upper portion of slider 52. Chicken egg E is caught and held between catch and hold assembly 54 and slider 52 as it is supported from below. In addition, catch and hold assembly 54 of drop assistance apparatus 50 carries out circulating motion in synchronization with tact transportation of transportation line 18 of orientator 10.

[0142] When chicken egg E is received, support member 58 of catch and hold assembly 54 is about to reach the terminal end of the fourth turn-around portion (a base end of the first straight portion), and through hole 72 of support 70 of support member 58 and coupling position 73 carry out circulating motion with different radii so that catch and hold assembly 54 accelerates when it moves from the eighth track to the first track. Therefore, catch and hold assembly 54 receives drop of chicken egg E while it accelerates at a position corresponding to fourth turn-around portion 55h. Thus, impact on chicken egg E can be suppressed.

[0143] Catch and hold member 56 of catch and hold assembly 54 moves in parallel to slider 52 while it maintains a position catching and holding chicken egg E at the slide down portion of slider 52. Thus, chicken egg E caught and held between catch and hold member 56 and the slider slides down over slider 52 with movement of catch and hold assembly 54. Here, support member 58 of catch and hold assembly 54 moves along the first straight portion at a constant speed. In addition, the stopper of catch and hold assembly 54 is engaged with guide 76 and catch and hold assembly 54 moves as being guided by guide 76.

[0144] Catch and hold member 56 of catch and hold assembly 54 moves in a direction away from the slider, in the lower portion of slider 52. Thus, chicken egg E which has been caught and held starts to drop toward container T. Here, as rotational force biasing toward the slider is applied to catch and hold member 56 by force application member 62, catch and hold member 56 continues to come in contact with chicken egg E owing to rotational force from force application member 62 even though it moves away from slider 52 and catch and hold member 56 gradually releases chicken egg E. Thus, chicken egg E slowly drops onto container T.

[0145] When chicken egg E drops onto container T, support member 58 of catch and hold assembly 54 is about to reach first turn-around portion 55b, and as through hole 72 of support 70 of support member 58 and coupling position 73 carry out circulating motion with different radii, catch and hold assembly 54 decelerates. Thus, chicken egg E is gently released and chicken egg E further slowly drops.

[0146] Catch and hold assembly 54 which has released chicken egg E moves from first turn-around portion 55b to the second straight portion, and further moves again to a position at which it receives chicken egg E which drops from a transportation mechanism, along circulating motion of second endless track structure 55. Here, since catch and hold assembly 54 is rotatably coupled to second endless track structure 55, it carries out circulating motion in substantially the same position.

[0147] In parallel to movement of chicken egg E through orientator 10 and drop assistance apparatus 50, container T is transported by tray transportation apparatus 80. Tray transportation apparatus 80 receives container T from tray supply apparatus 90 and transports container T to a position where drop assistance apparatus 50 drops chicken egg E. Tray supply apparatus 90 is in synchronization with tray transportation apparatus 80, and when dog 88 comes to a prescribed position, it drops container T. Thus, dog 88 is fitted to a projection portion of container T.

[0148] Container T is transported to a prescribed position by tray transportation apparatus 80 such that the foremost row in the direction of transportation is arranged at the position of drop of chicken egg E, that is, the position corresponding to the lower portions of 6 sliders 52 of drop assistance apparatus 50. Since container T is transported as being engaged with dog 88, it is reliably placed at the prescribed position without sliding over the transportation pathway.

[0149] While 6 accommodation spaces Tz in the foremost row of container T are located below the 6 sliders of drop assistance apparatus 50, drop assistance apparatus 50 slowly drops chicken eggs E. Namely, drop assistance apparatus 50 and orientator 10 are in synchronization with motion of tray transportation apparatus 80. Six accommodation spaces Tz in the foremost row of container T are filled with 6 chicken eggs E which dropped from drop assistance apparatus 50.

[0150] As the foremost row of container T is filled with chicken eggs E, tray transportation apparatus 80 transports container T by one column of the accommodation spaces through tact transportation. Thus, 6 accommodation spaces in a next row of container T are located below 6 sliders 52 of drop assistance apparatus 50. In this state, drop assistance apparatus 50 slowly drops chicken eggs E. Furthermore, in succession, tray transportation apparatus 80 transports container T by one column of accommodation spaces Tz through tact transportation, and in that state, drop assistance apparatus 50 slowly drops chicken eggs E.

[0151] This process is repeated for one container, that is, 5 rows of the accommodation spaces, and while all accommodation spaces Tz of container T are filled with chicken eggs E, accommodation spaces Tz in the foremost row of next container T are tact-transported by tray transportation apparatus 80 to the position corresponding to the lower portions of 6 sliders 52 of drop assistance apparatus 50. Then, until all accommodation spaces Tz in next container T are filled with chicken eggs E, tact transportation for one row of accommodation spaces is repeated, and thereafter tact transportation for one container is again carried out. Such tact transportation is repeated until a number of chicken eggs E are processed.

[0152] The transportation path of tray transportation apparatus 80 continues to a step subsequent to filler system S1, and container T filled with chicken eggs E is transported to the next step.

[0153] Filler system S 1 for chicken eggs E has been described in the present embodiment. Orientator 10 can be used for orientation of eggs other than chicken eggs E, the drop assistance apparatus can be used for assisting drop of an object other than chicken eggs E, and tray transportation apparatus 80 can be used for a container other than a tray, such as a chicken egg box. In addition, the transportation apparatus may transport a cubic box as a container.

[0154] The present invention can be made use for transportation of a container.

[0155] Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the scope of the present invention being interpreted by the terms of the appended claims.

Claims

1. A drop assistance apparatus, comprising:

at least one slider having an inclined surface over which an object slides down and passing the sliding down object to a next step; and
at least one catch and hold assembly moving along a direction of extension of said inclined surface while it catches and holds the object sliding down over said inclined surface in cooperation with said inclined surface and allowing the caught and held object to drop,
said catch and hold assembly including
a catch and hold member having a catch and hold surface opposed to said inclined surface and catching and holding the object sliding down over said inclined surface such that said inclined surface and said catch and hold surface support the object from below,
a support member supporting said catch and hold surface and moving in a direction away from said slider so as to release the caught and held object in a lower portion of said inclined surface, and
a force application member applying rotational force biasing said catch and hold member toward said slider,
said catch and hold surface of said catch and hold member being arranged as being inclined with respect to said inclined surface such that a distance between said inclined surface and said catch and hold surface gradually decreases downward, and
said catch and hold member being pivotably supported by said support member such that inclination is variable.

2. The drop assistance apparatus according to claim 1, wherein
said force application member is a weight.

3. The drop assistance apparatus according to claim 2, wherein
said weight is arranged such that a center of gravity of said weight is located on a side opposite to a side where a center of gravity of said catch and hold member is located, with a virtual vertical surface including a rotation axis of said catch and hold member lying therebetween.

4. The drop assistance apparatus according to any one of claims 1 to 3,
wherein
said slider has

an upper portion receiving the object,
a slide down portion over which the received ob-

ject slides down, and
a lower portion passing the sliding down object to the next step, and

said support member moves so as to draw a trace of movement including a first trace of movement along said slide down portion and a second trace of movement in a direction away from said slider at a position corresponding to said lower portion.

5. The drop assistance apparatus according to claim 1, comprising a guide extending along said slider, wherein
said catch and hold assembly includes a stopper engaged with said guide, for preventing rotation reverse to rotation of said rotational force, and
said stopper is coupled to said support member.

6. The drop assistance apparatus according to claim 1, wherein
said inclined surface is curved in a U-shape when viewed in a direction of slide down of a chicken egg.

7. The drop assistance apparatus according to claim 5, further comprising:

a plurality of said catch and hold assemblies; and
an endless track structure forming said trace of movement of said plurality of catch and hold assemblies, wherein
said support member of each of said plurality of catch and hold assemblies is coupled to said endless track structure, and
said stopper of each of said plurality of catch and hold assemblies is guided by said guide.

8. A filler system for filling a tray with chicken eggs, provided with the drop assistance apparatus according to any one of claims 1 to 7, comprising:

an orientator allowing a chicken egg being transported to drop onto said drop assistance apparatus while an orientation of a long axis of the chicken egg is varied; and
a tray transportation apparatus supplying a container receiving the chicken egg from said drop assistance apparatus and filled therewith.

9. A filling assistance method in a drop assistance apparatus including a slider allowing an object to slide down and passing the object to a next step, a catch and hold member catching and holding the object sliding down over said slider in cooperation with said slider, and a force application member applying rotational force biasing toward said slider to said catch and hold member such that said catch and hold member catches and holds the object from below, comprising the steps of:

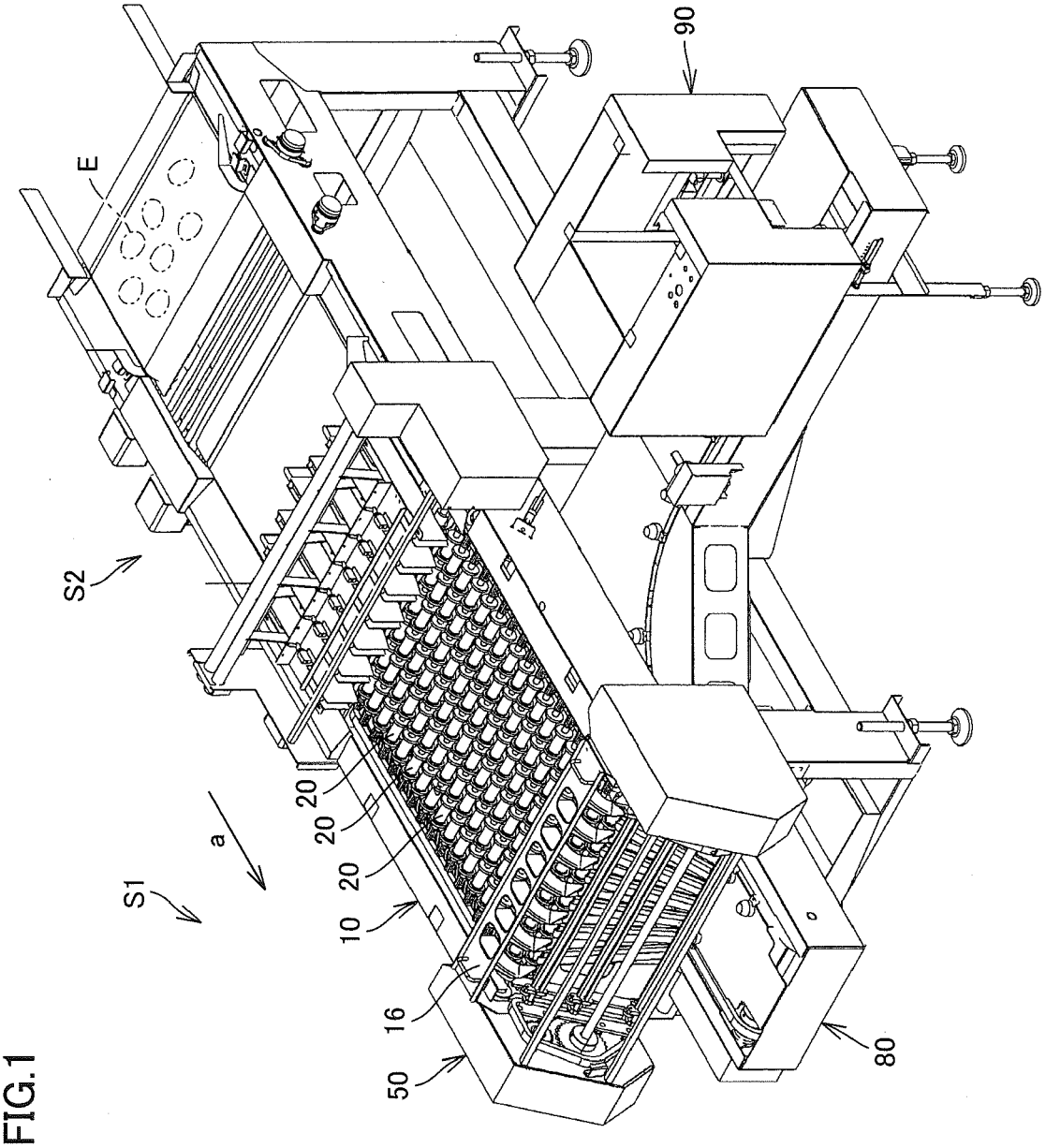
catching and holding the object between said slider and the catch and hold member; and
moving said catch and hold member in a direction away from said slider.

10. A drop assistance apparatus, comprising:

at least one slider over which an object slides down, for passing the object to a next step; and
at least one catch and hold assembly catching and holding the object sliding down over said slider in cooperation with said slider,
said catch and hold assembly including

a catch and hold member catching and holding the object so as to support the object from below in cooperation with said slider,
a support member rotatably supporting said catch and hold member toward said slider such that said catch and hold member supports the object from below and moving in a direction away from said slider from a state that said catch and hold member catches and holds the object, and
a force application member applying rotational force biasing said catch and hold member toward said slider.

FIG.1



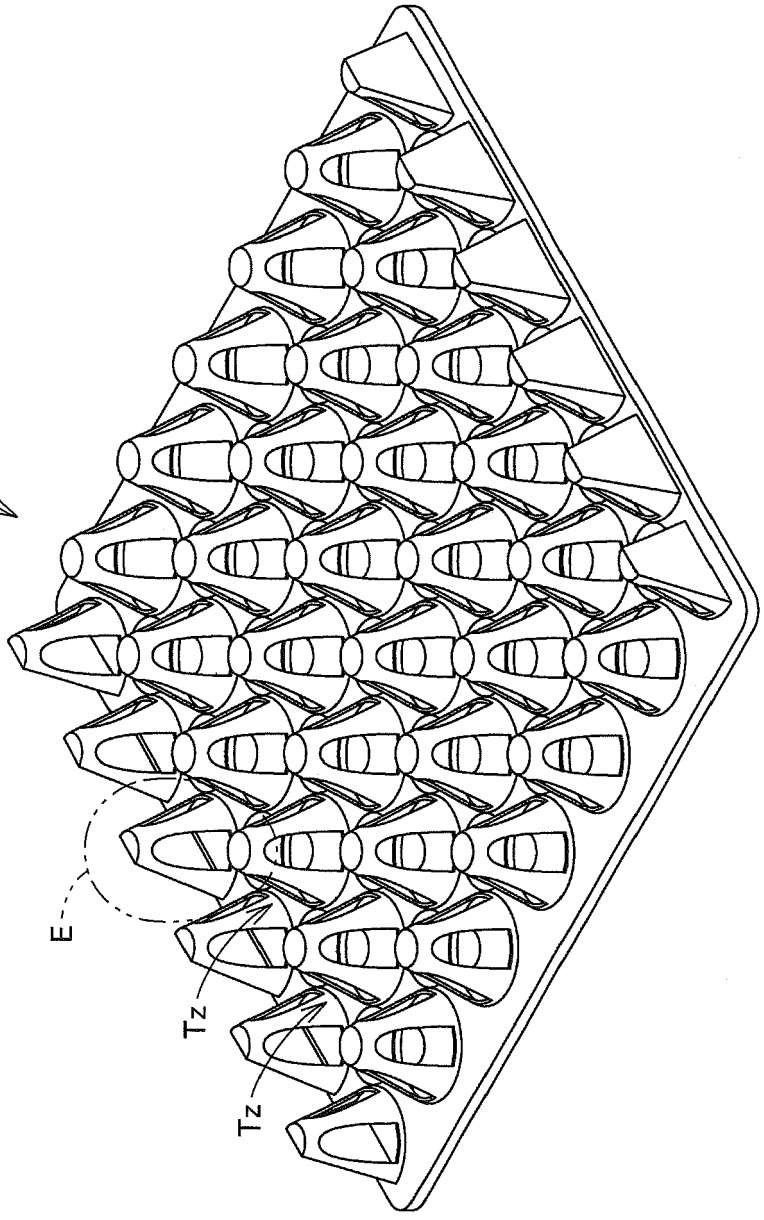
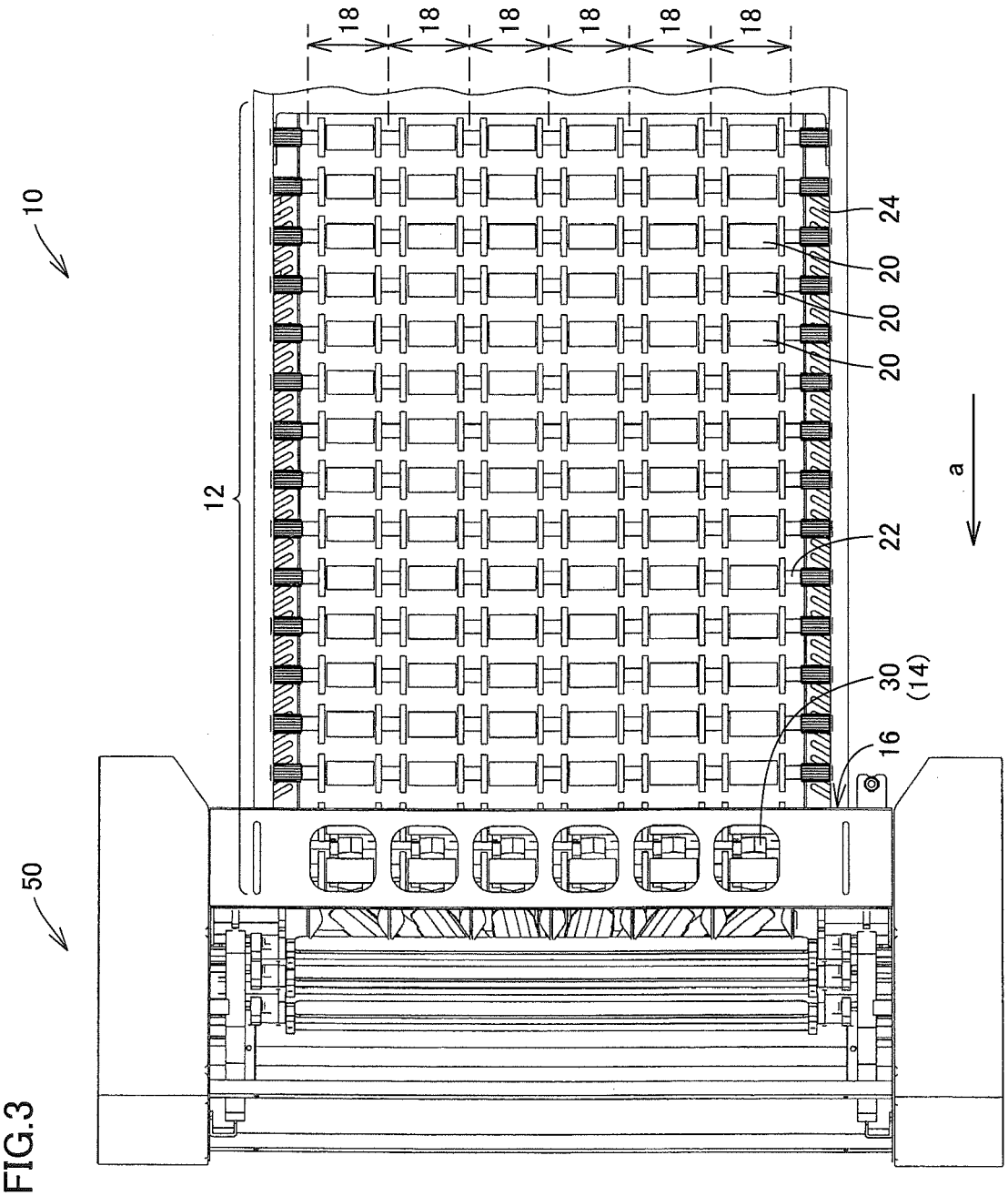


FIG.2

FIG.3



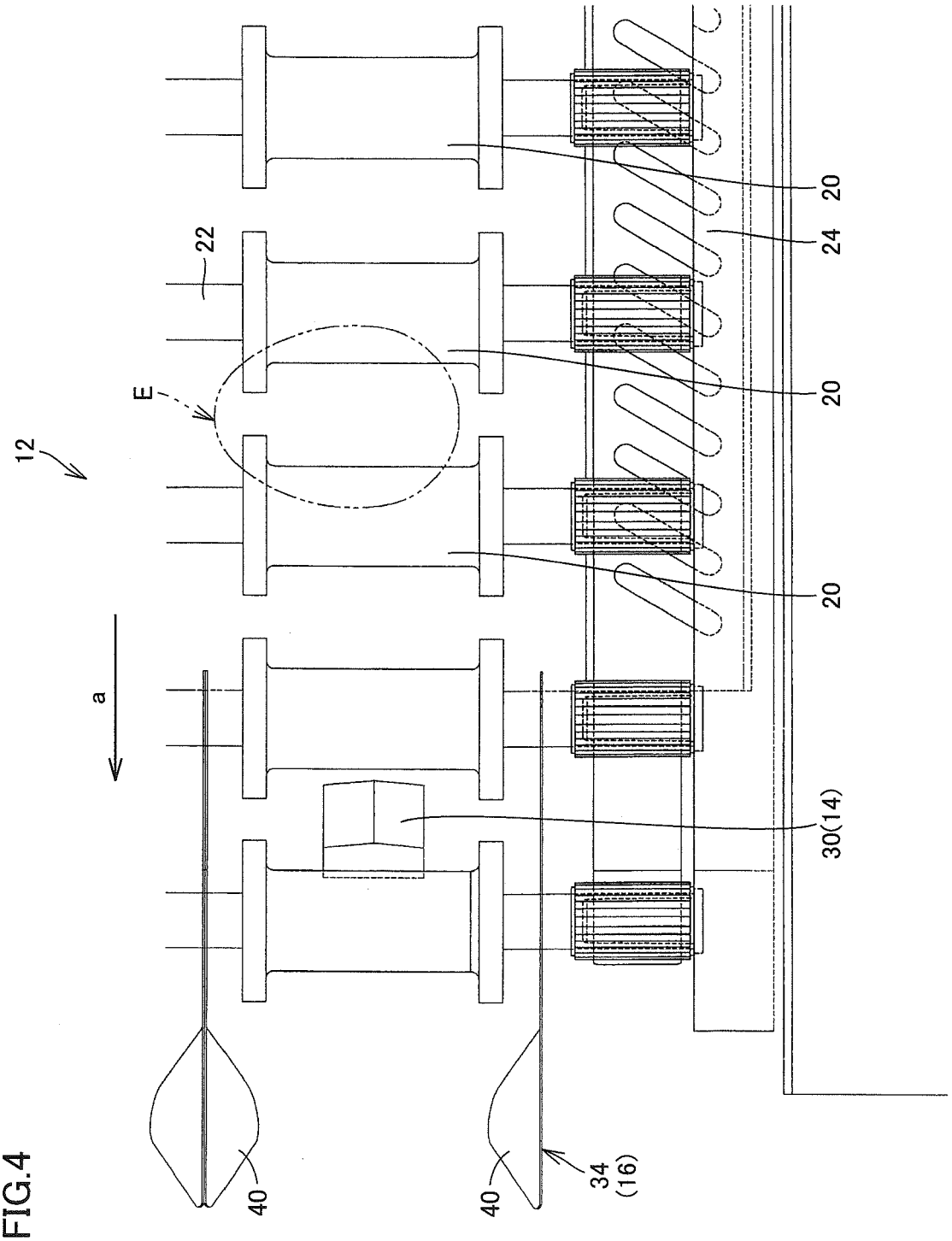


FIG.4

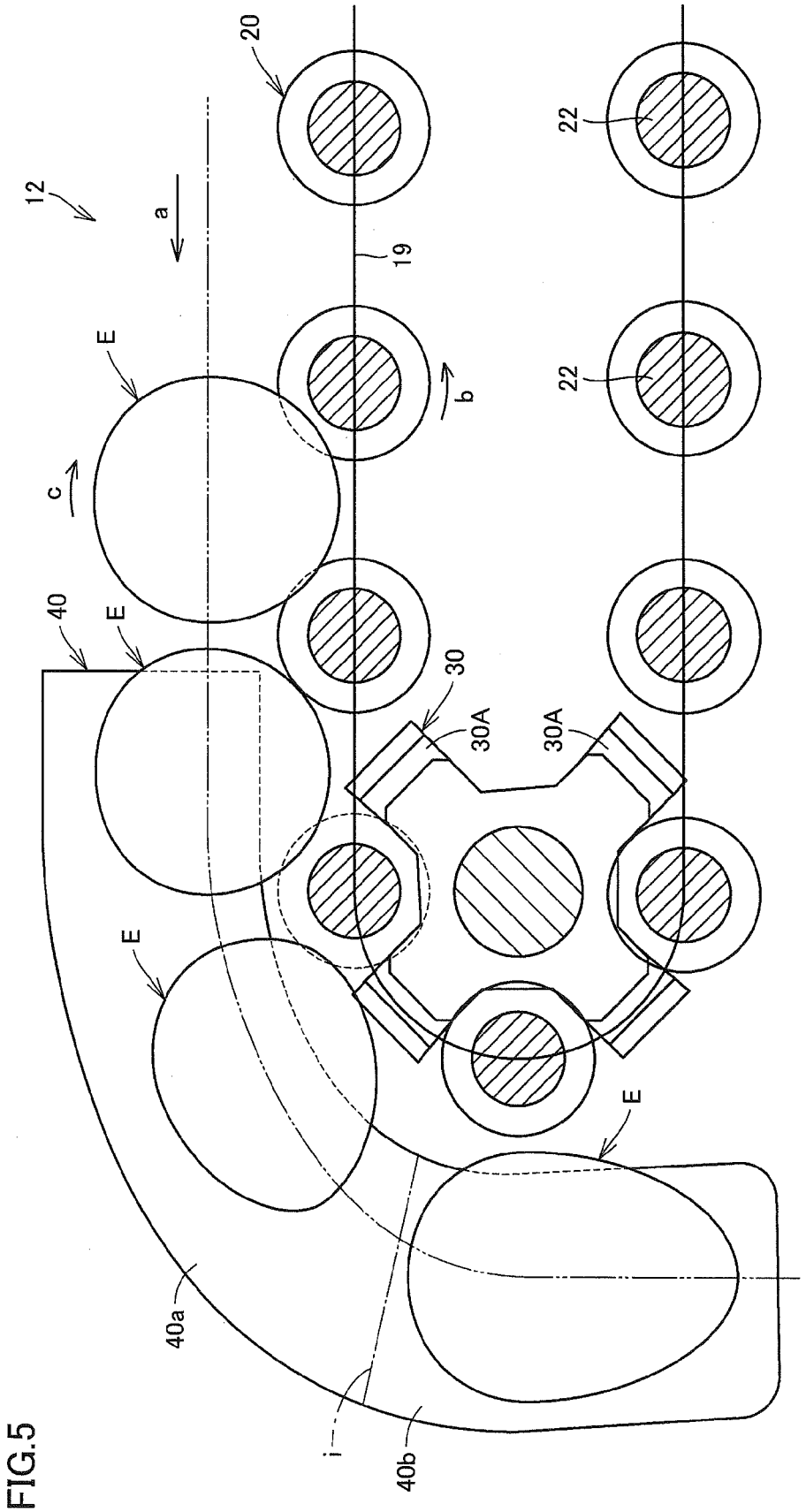


FIG.5

FIG.6

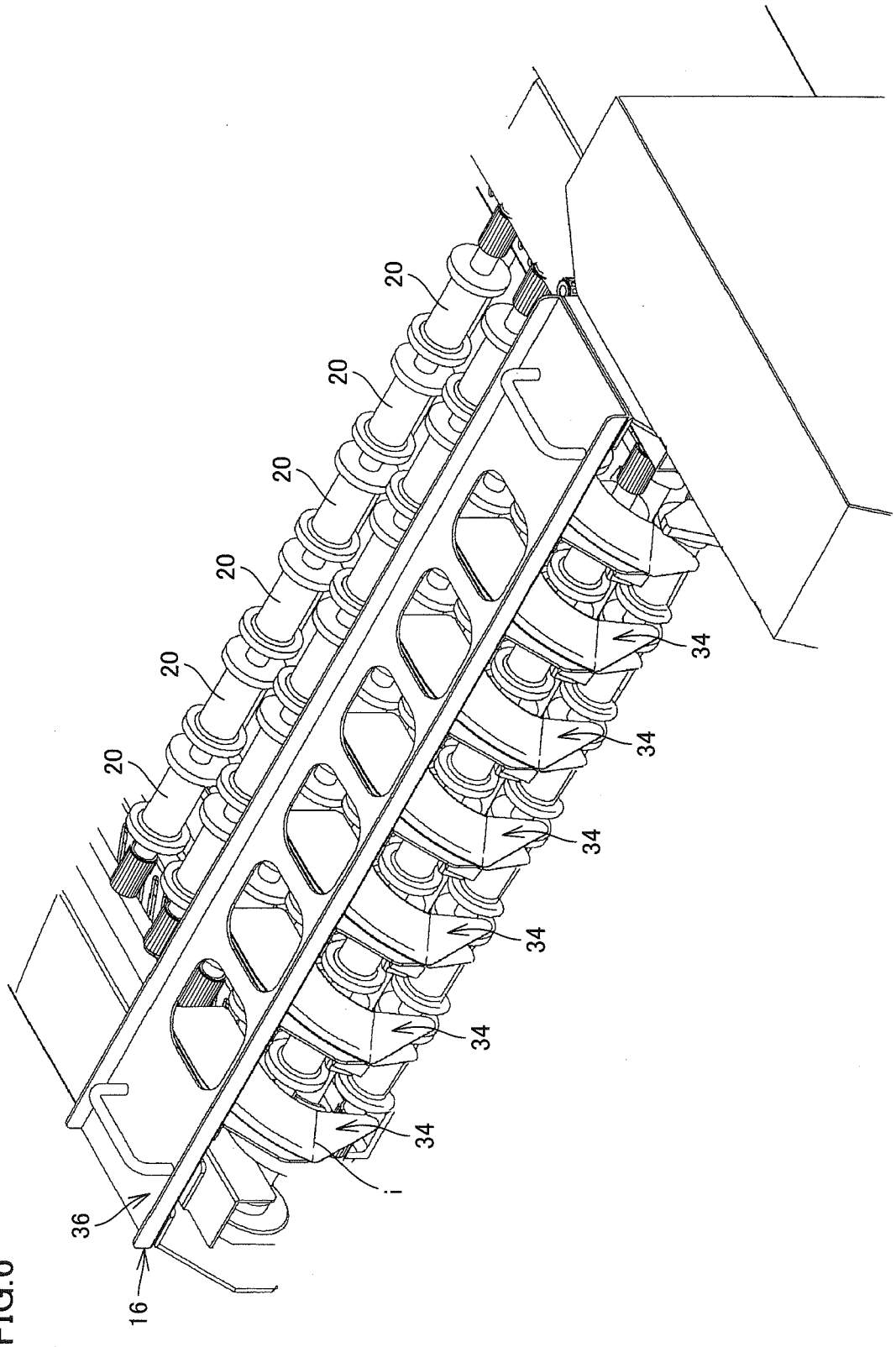


FIG.7

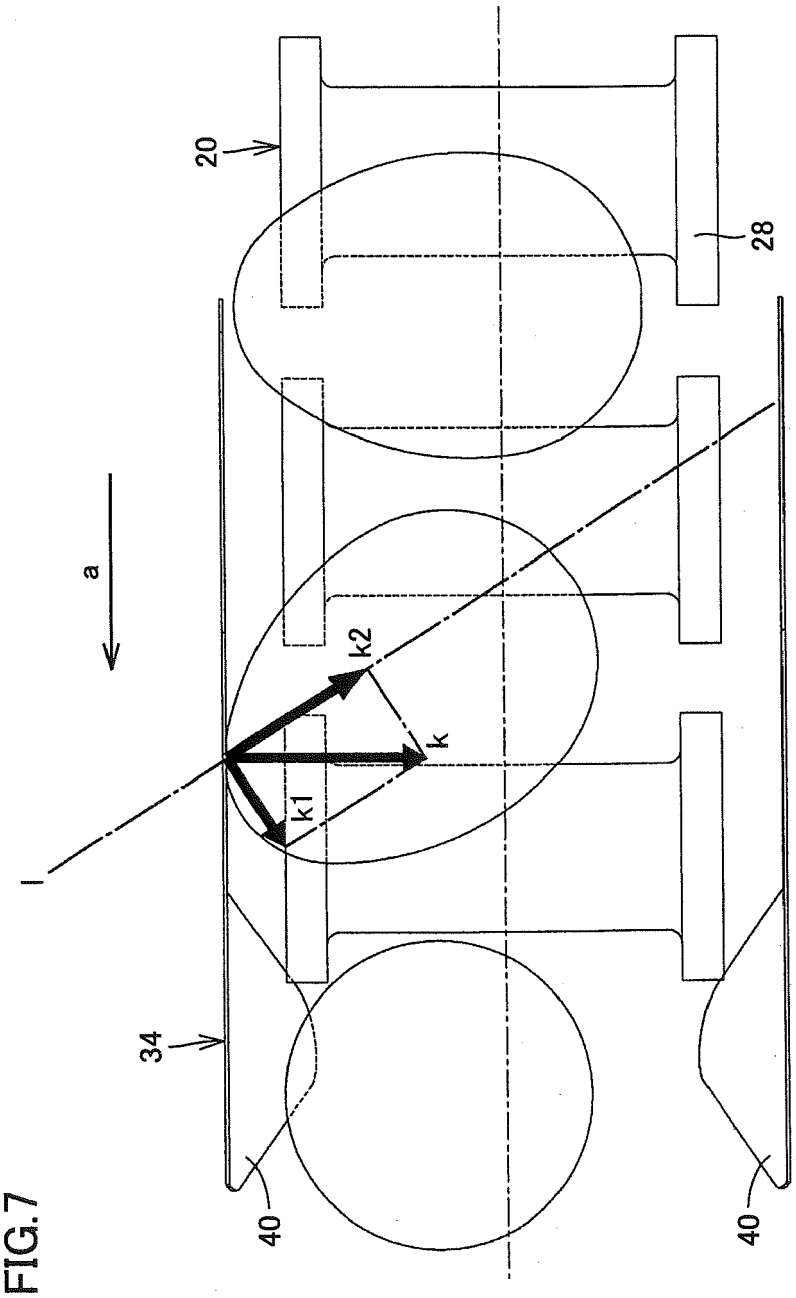


FIG.8

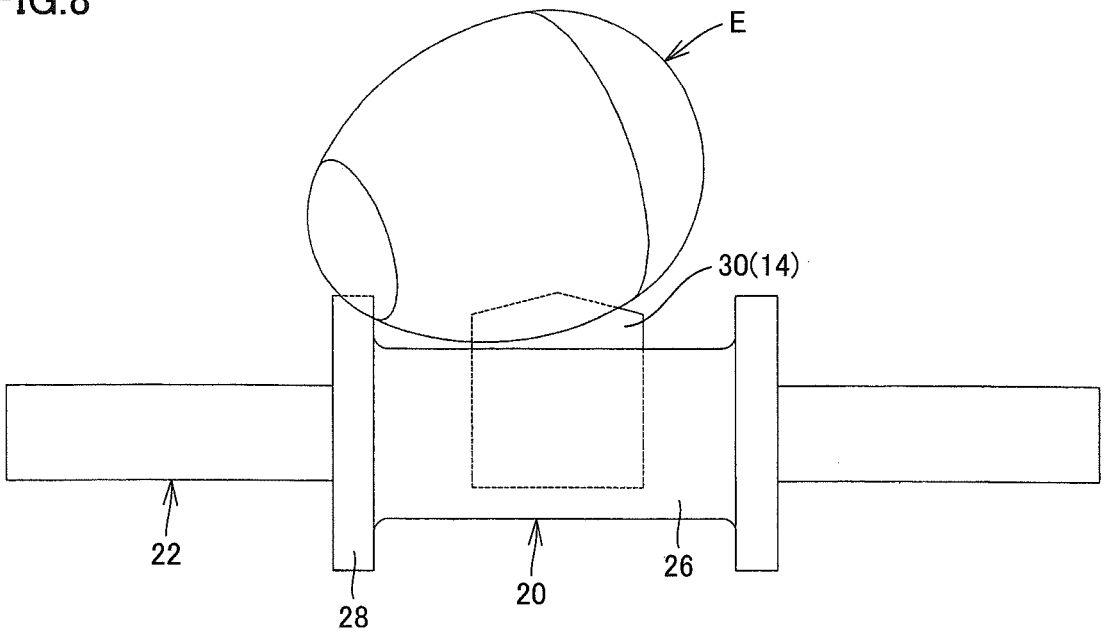


FIG.9

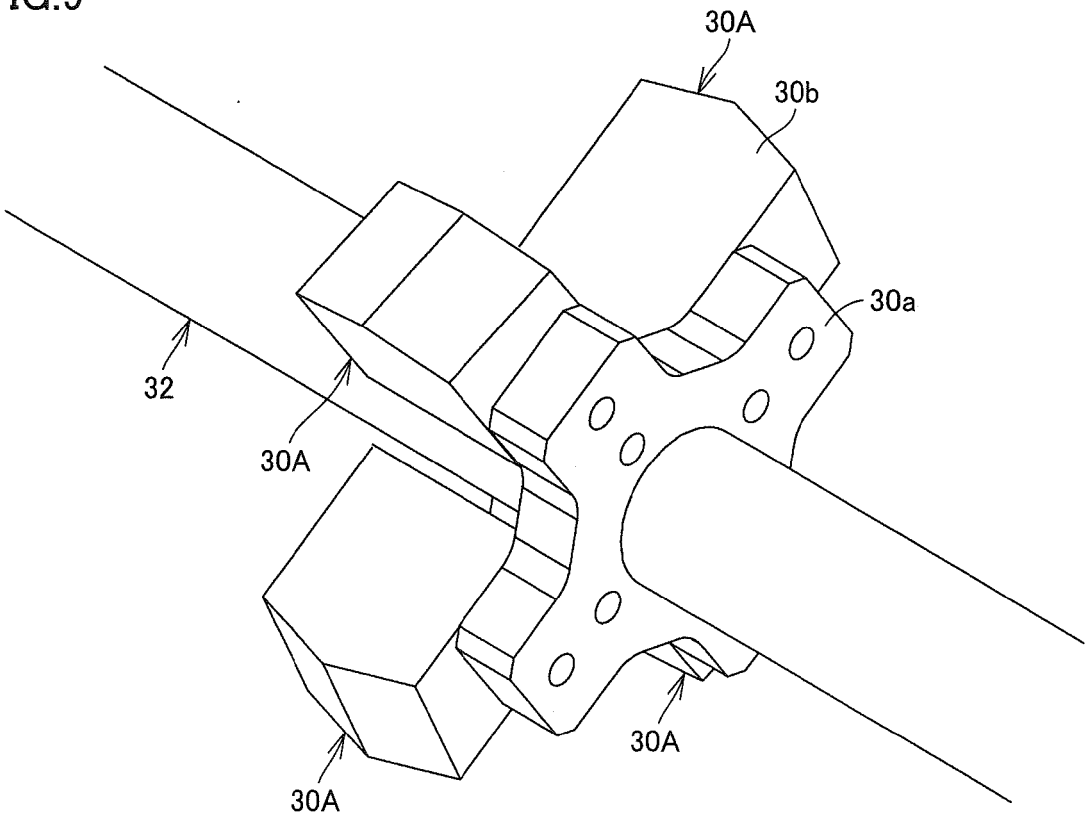


FIG.10

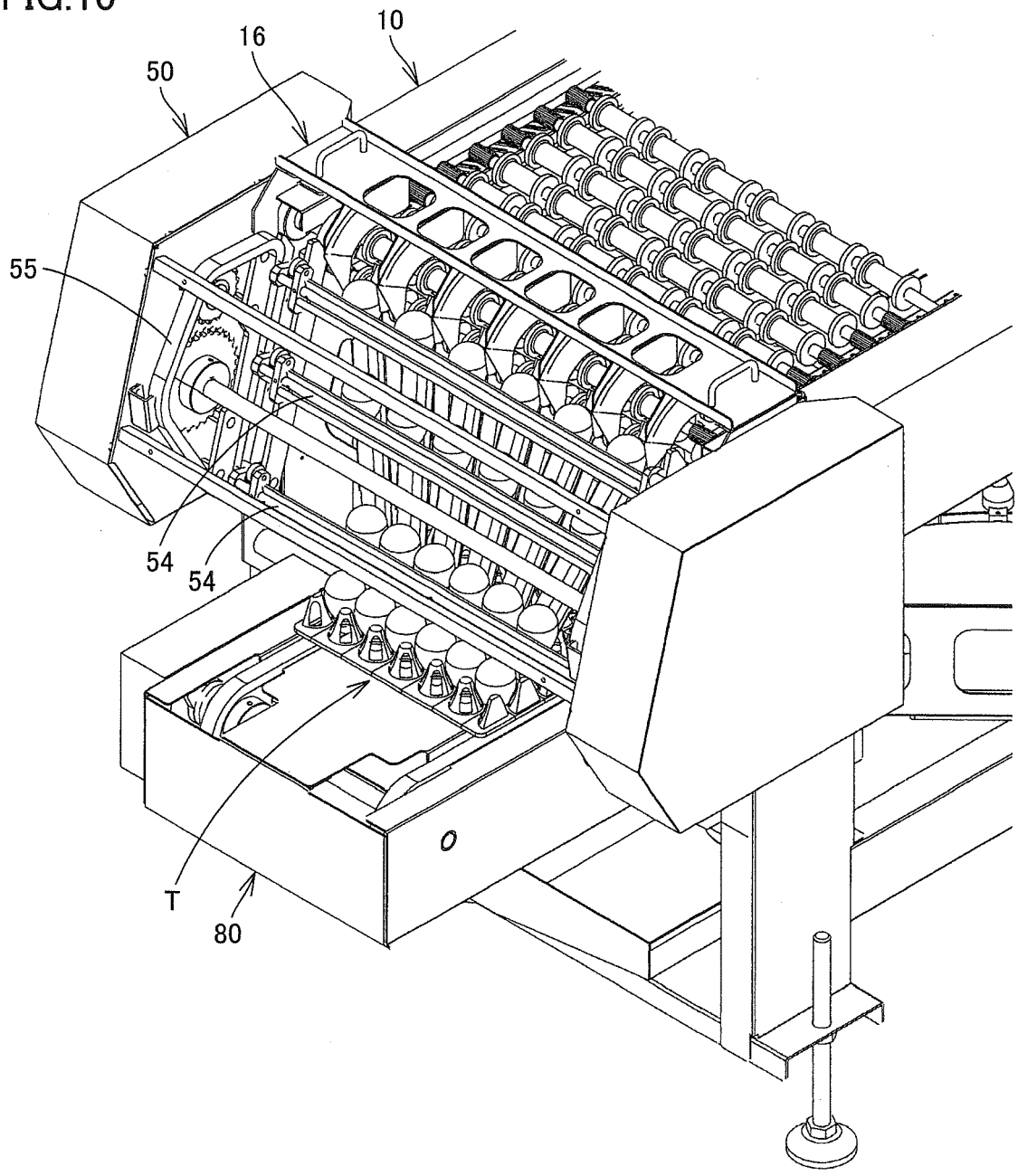


FIG.11

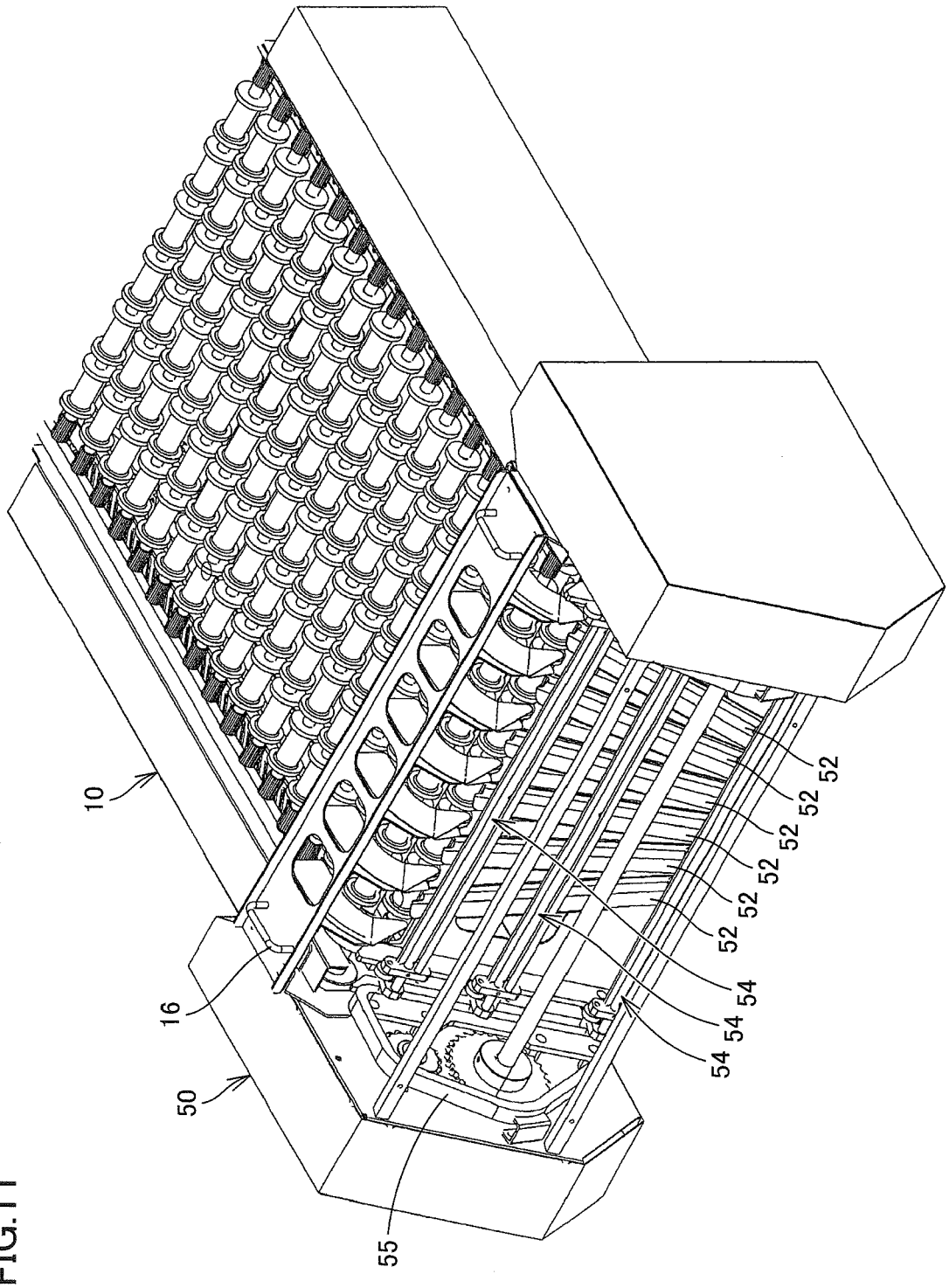


FIG.12

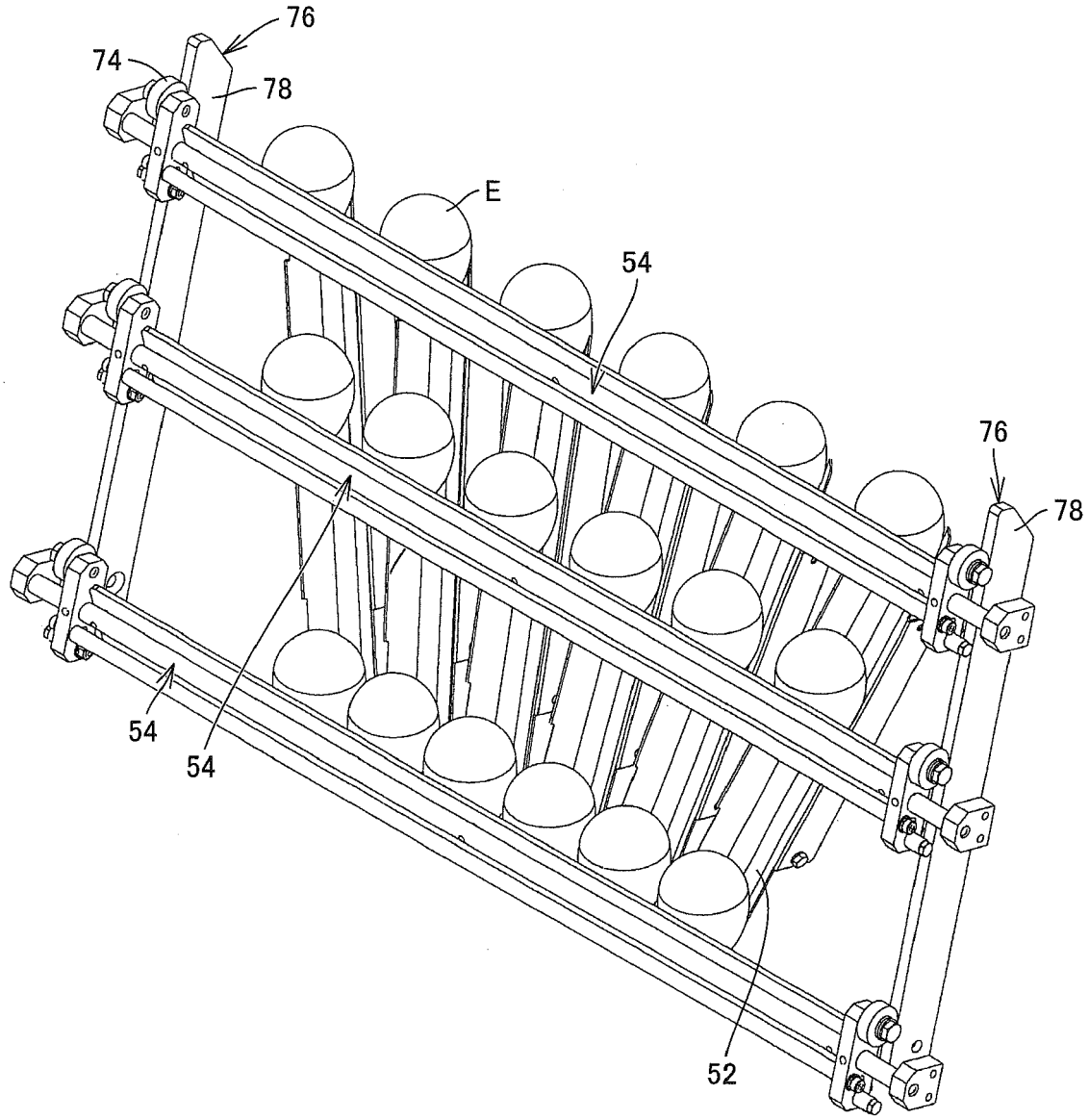


FIG.13

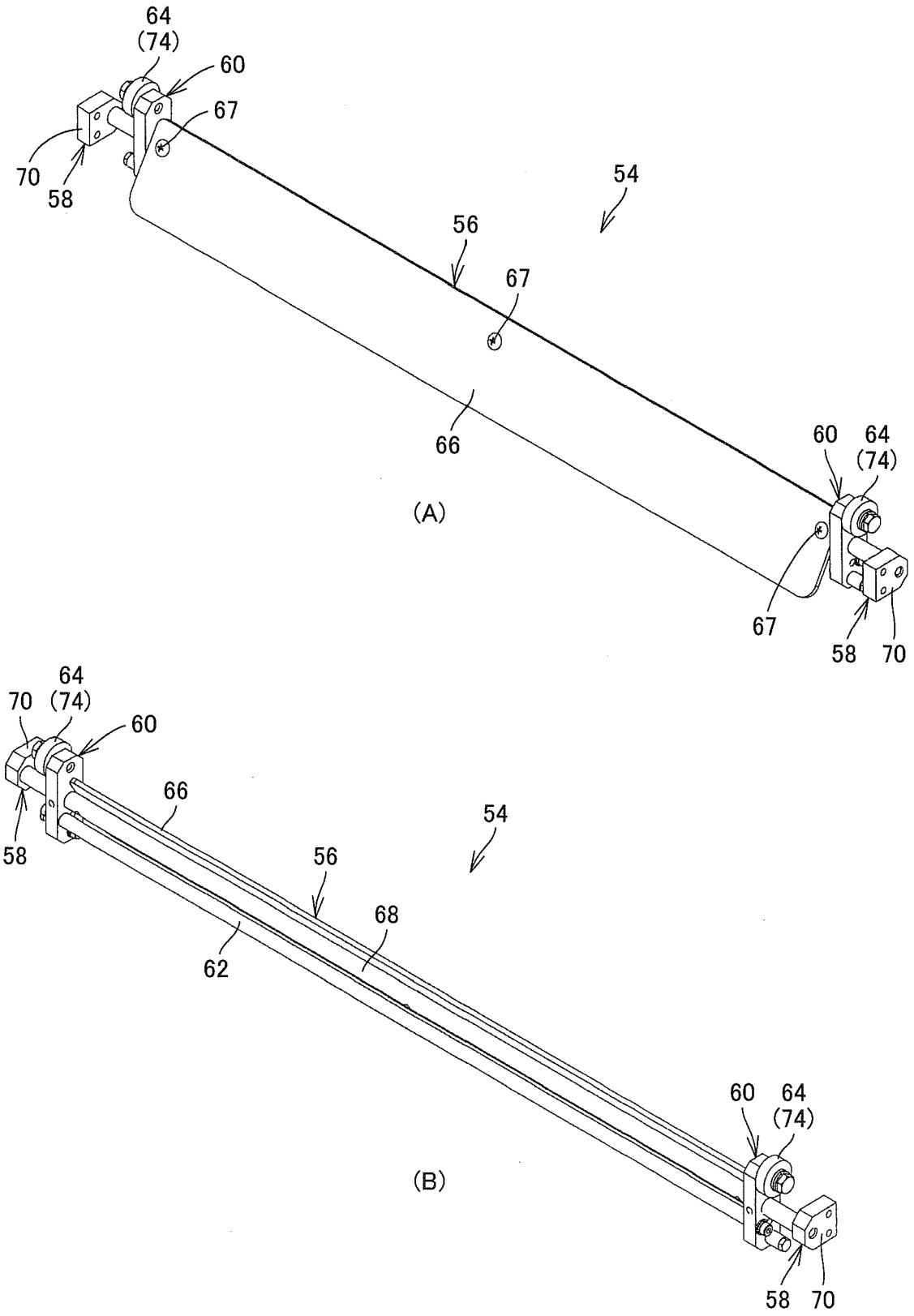

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FIG.14

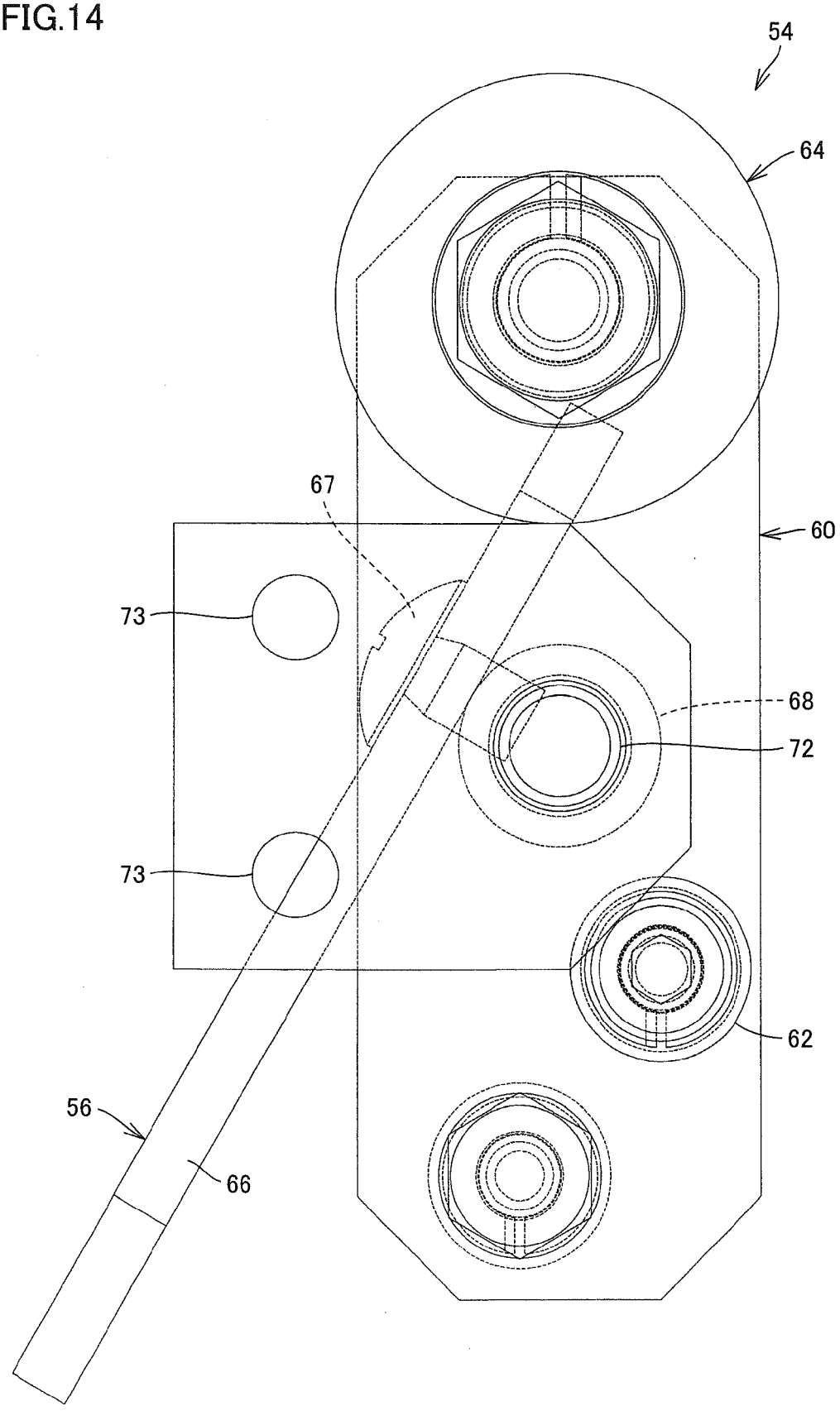

FIG.15

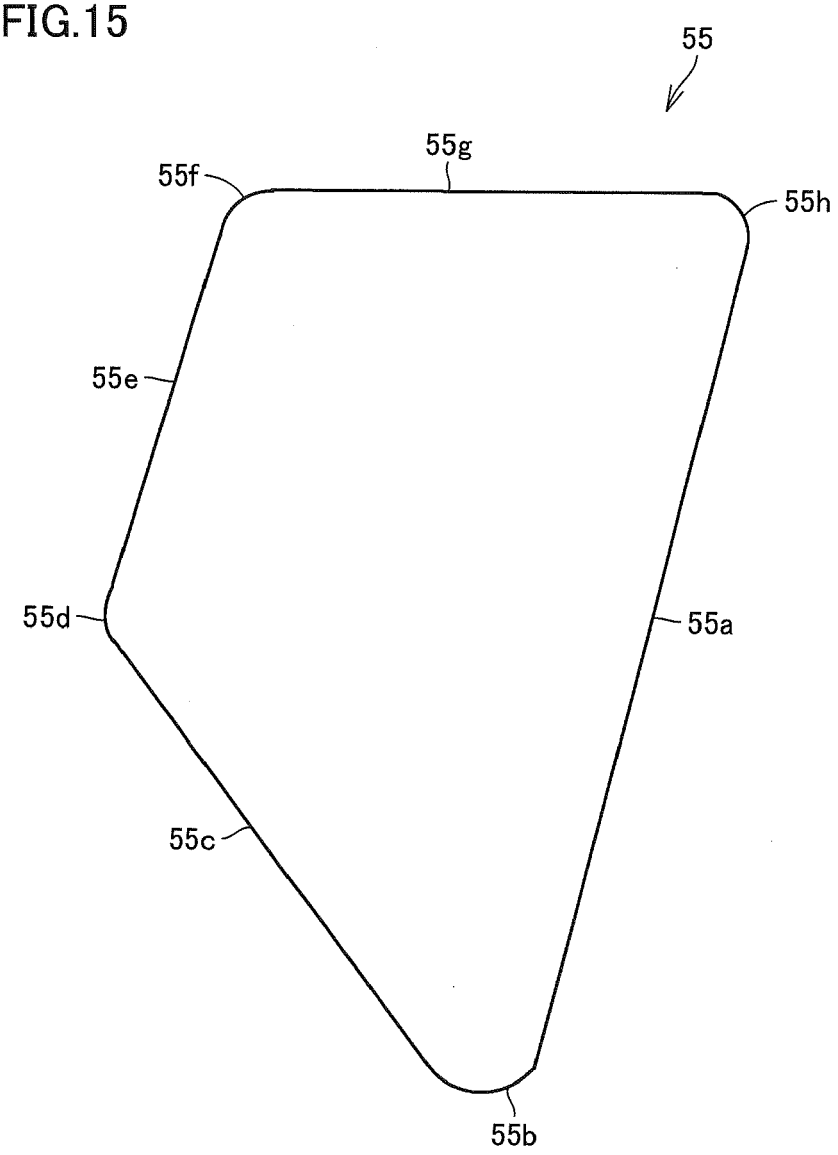

FIG.16

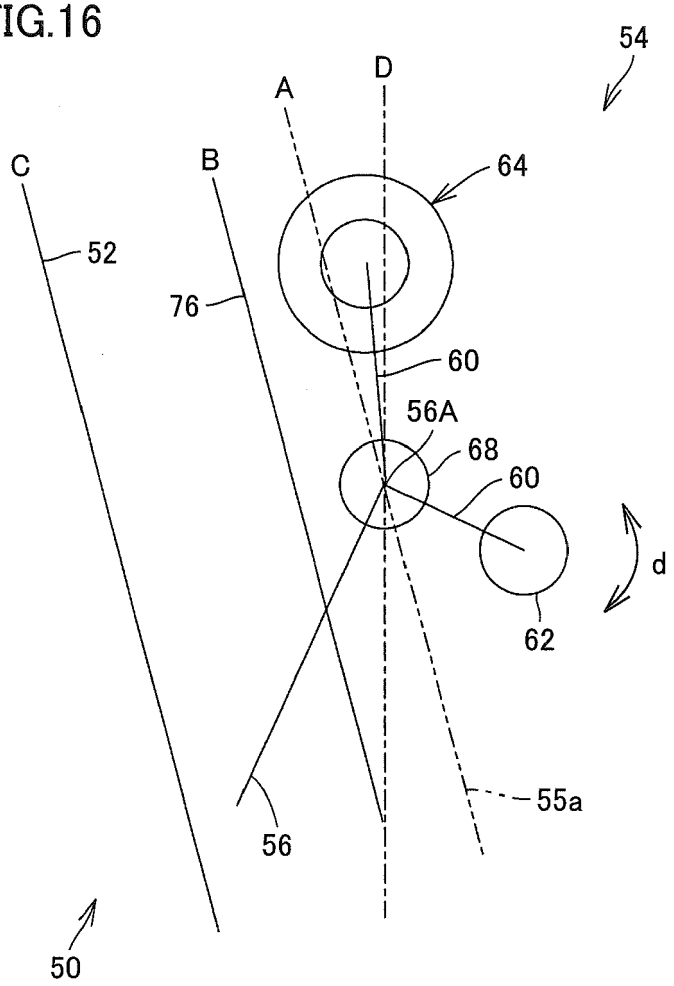

FIG.17

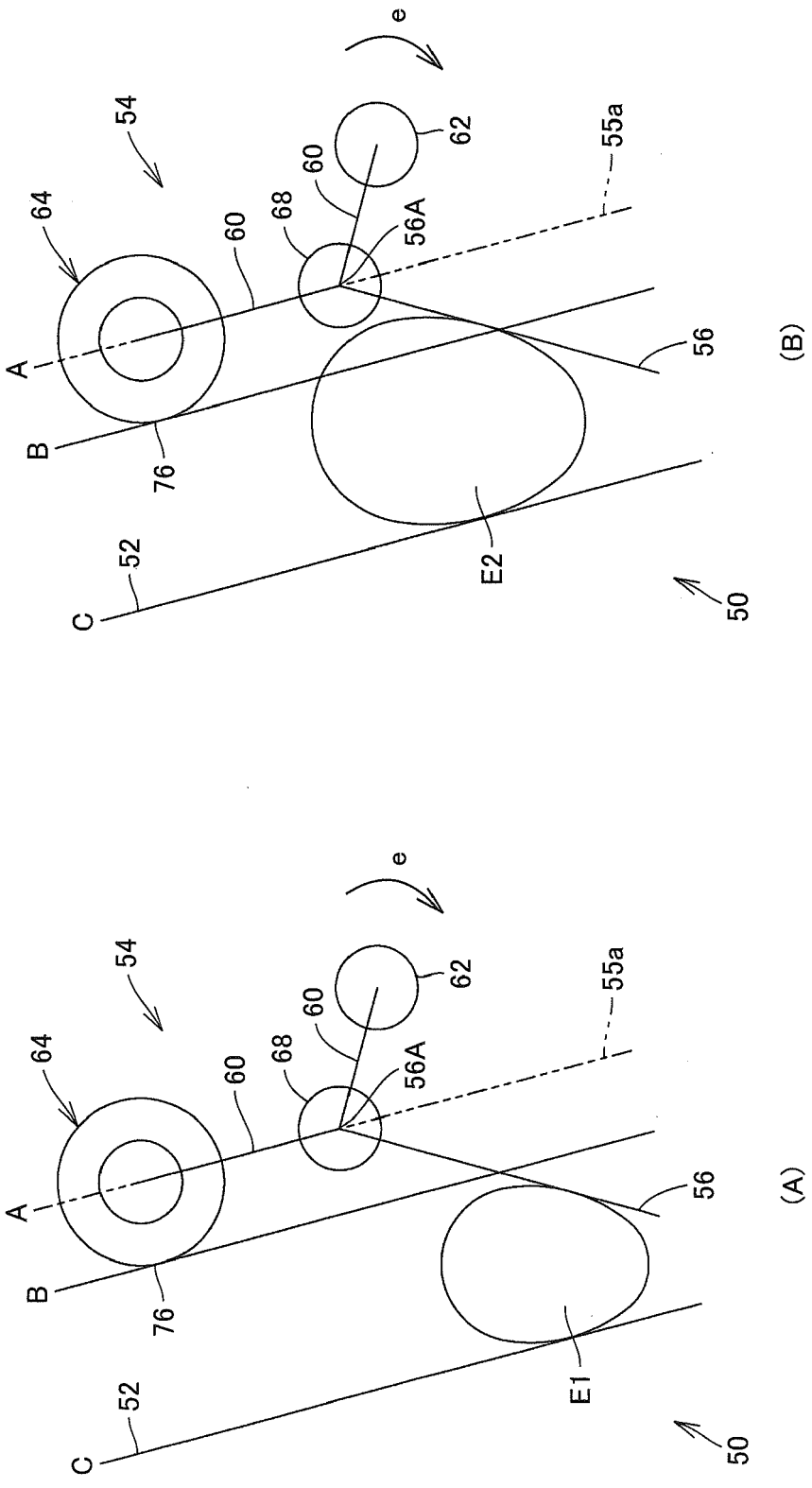
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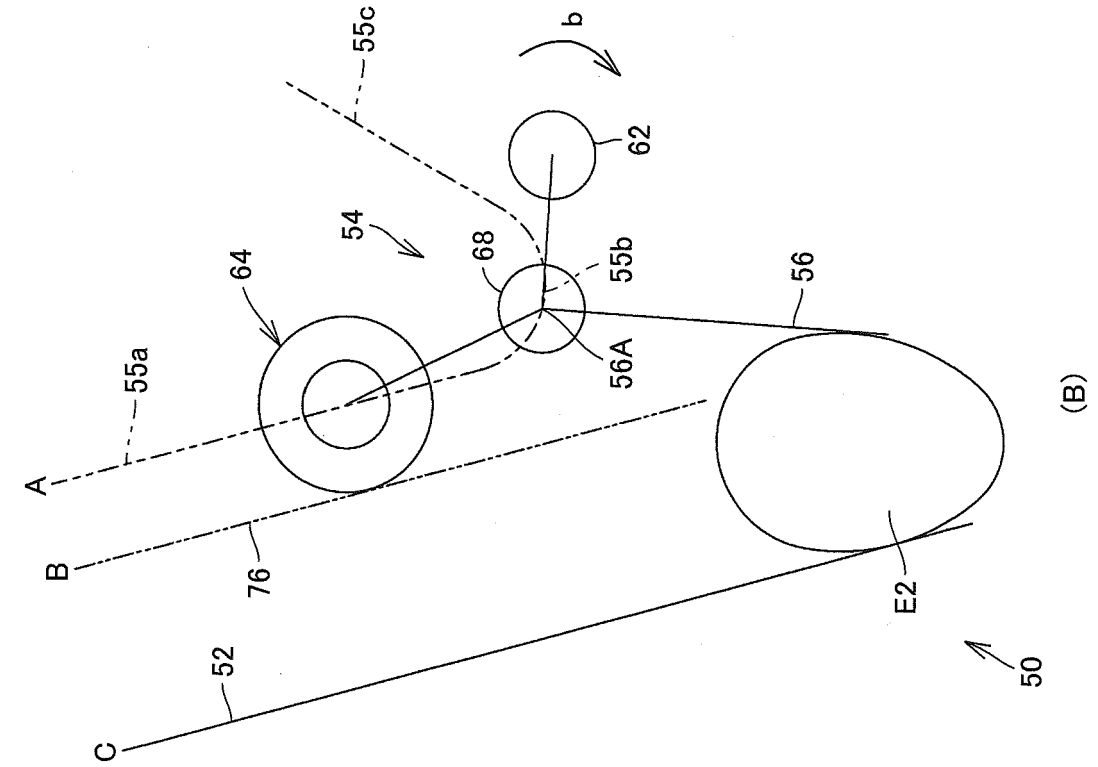
FIG.18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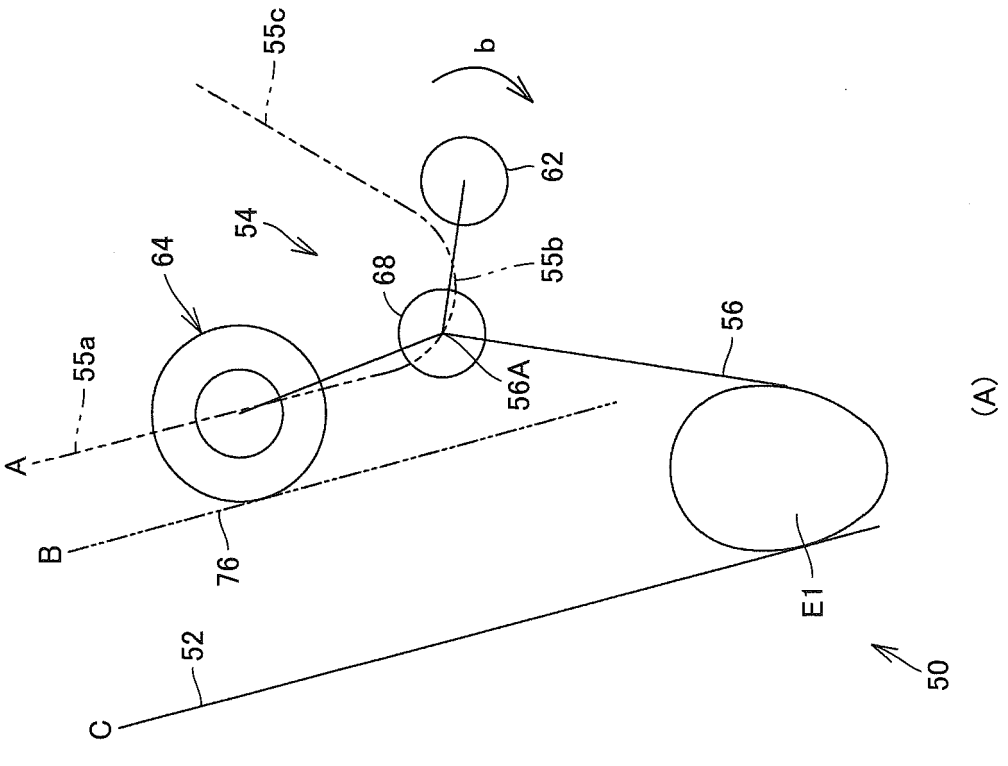
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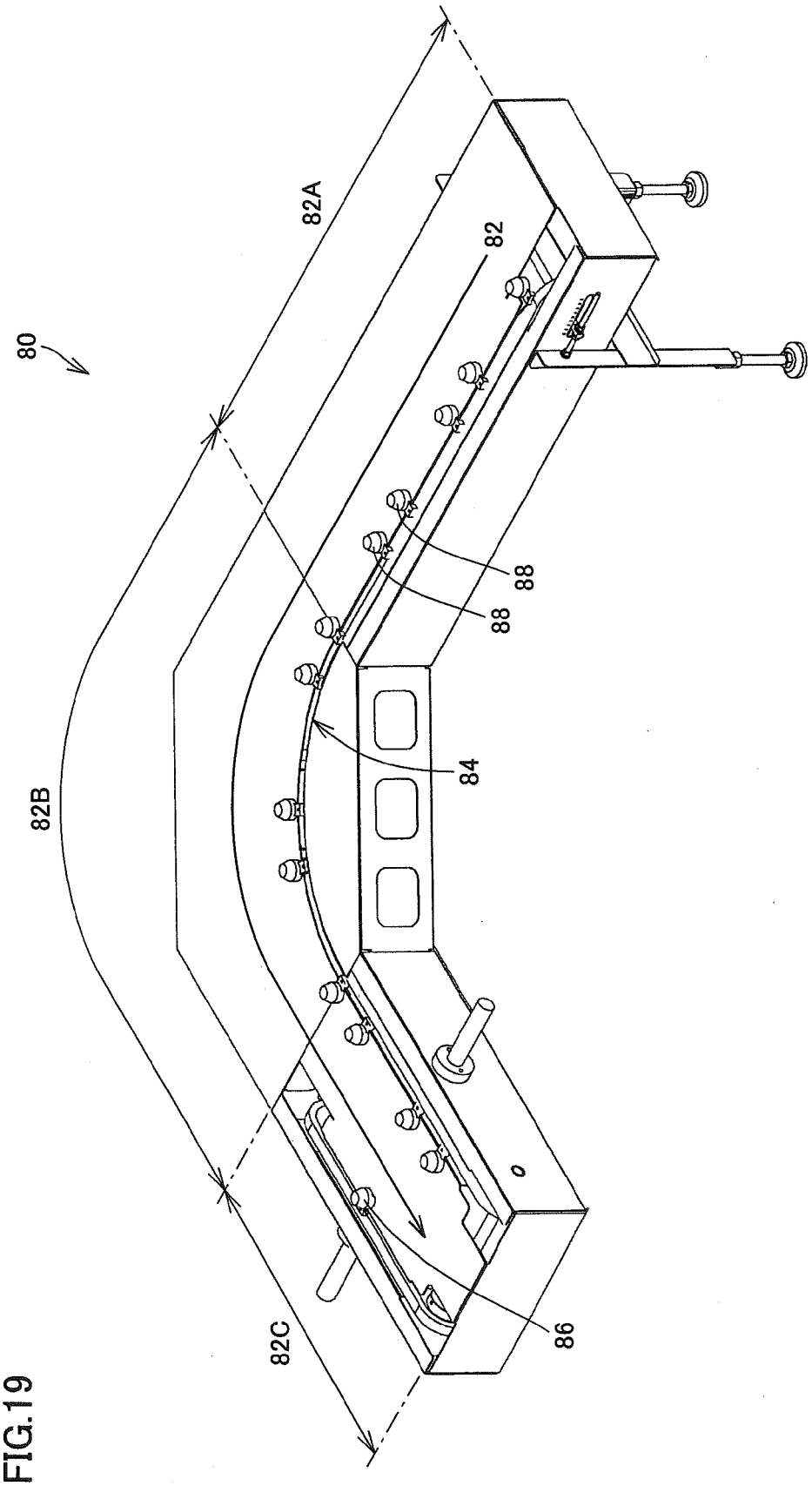
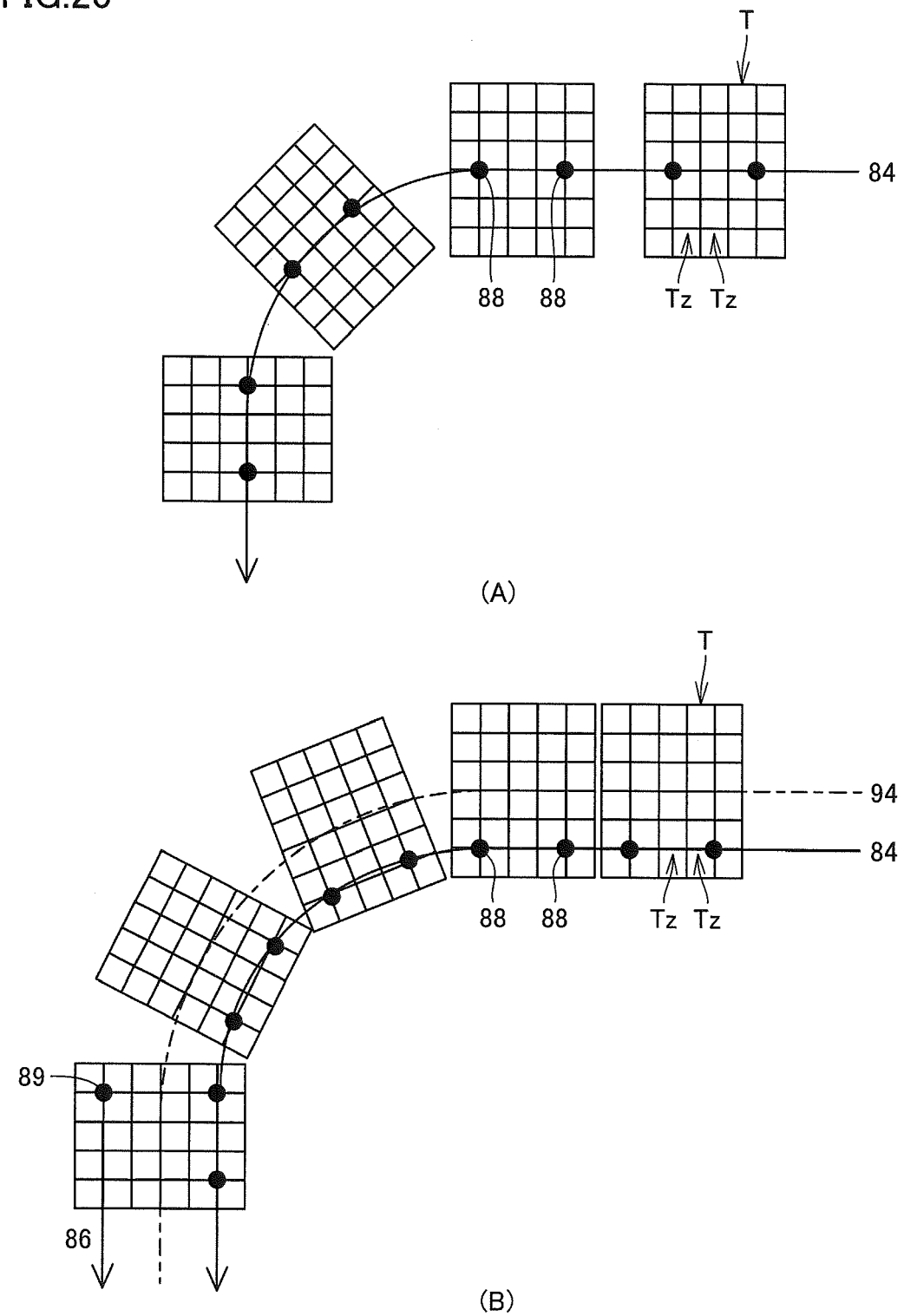


FIG.19

FIG.20



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EUROPEAN SEARCH REPORT

Application Number
EP 14 15 1916

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 5 240 100 A (ELFERINK HENDRIK [NL] ET AL) 31 August 1993 (1993-08-31) * column 3, line 19 - column 4, line 27; figures * -----	1,4-10 2,3	INV. B65B23/06
A	WO 2011/129698 A1 (FOOD PROCESSING SYSTEMS [NL]; GROOTHERDER BEREND DERK [NL]; DE VLAAM H) 20 October 2011 (2011-10-20) * figures 1-3 * -----	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

B65B
B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	23 April 2014	Lawder, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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23-04-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5240100 A	31-08-1993	DE 69204352 D1	05-10-1995
		EP 0512651 A1	11-11-1992
		JP H0764417 B2	12-07-1995
		JP H05193732 A	03-08-1993
		NL 9100785 A	01-12-1992
		US 5240100 A	31-08-1993
WO 2011129698 A1	20-10-2011	CA 2799672 A1	20-10-2011
		CN 102939246 A	20-02-2013
		EP 2560882 A1	27-02-2013
		JP 2013527824 A	04-07-2013
		WO 2011129698 A1	20-10-2011

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Patent documents cited in the description

- JP 5193732 A **[0004]**
- JP 5008851 A **[0019] [0058] [0062]**
- JP 2003276779 A **[0021]**
- JP 5055483 B **[0022]**
- JP 5036912 B **[0140]**