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(54) PACKING METHOD AND PACKAGING DEVICE FOR IMPLEMENTING PACKING METHOD

(57) There is proposed a new packing method where it is possible to prevent a bridge being generated inside a chute which supplies goods into a bag with a tube shape and a packaging device for implementing this method. In the packing method, goods (M) dropped from above are accommodated in a chute (103) with a funnel shape, the chute is then lowered while accelerating in a state where a discharge opening of the chute is open, and subsequently the movement of the chute is suddenly reversed and the chute is raised so that the goods collected in the chute is discharged into a bag (TB) with a tube shape while being accelerated. A packaging device (B) is provided with a cylinder (7) which packs dropped goods into the bag with a tube shape, and the chute is raised and lowered in the cylinder.

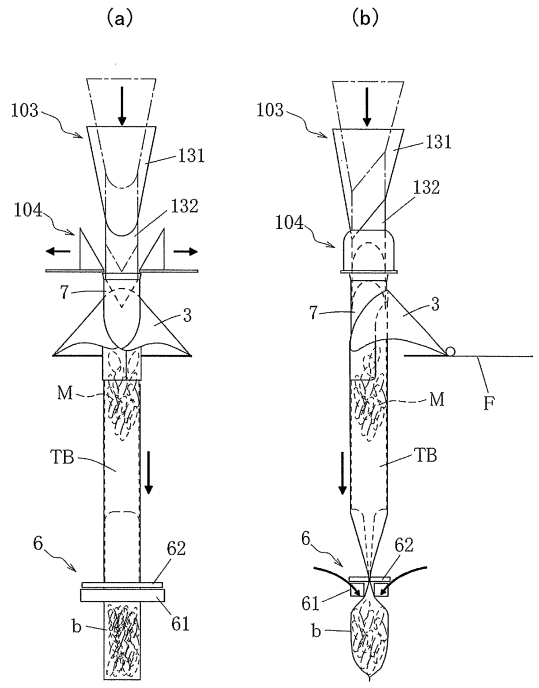

FIG. 4

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Description

TECHNICAL FIELD

[0001] The present invention relates to a packing method for packing snack food such as potato chips with low bulk density (this is referred to below as goods) being collected in a chute with a funnel shape into a bag with a tube shape and a packaging device for implementing this method.

BACKGROUND ART

[0002] Bag manufacturing and packaging devices, which pack goods from above into a bag which is formed in a tube shape using a former and form a sealed bag by laterally sealing an upper sealing portion (top portion) of the bag and a lower sealing portion (base portion) of a continuous bag which is continuous with the upper sealing portion of the bag at the same time and vertically separating the border of the sealing portions, is widely used in various food product fields.

[0003] In a case when goods, such as with potato chip, which have low bulk density and in which there is a mixture from large sizes to small size are packed in these devices, there are cases when a bridge is generated in a chute with a funnel shape for collecting the goods and the chute is clogged. For this reason, various clogging prevention devices as disclosed in PTL 1 (Japanese Unexamined Patent Application Publication No. 2013-103753), PTL 2 (Japanese Unexamined Patent Application Publication No. 2012-140243), PTL 3 (Japanese Unexamined Patent Application Publication No. 2009-040488), and PTL 4 (Japanese Unexamined Patent Application Publication No. 2003-081222) are mounted in this type of packaging devices.

SUMMARY OF THE INVENTION

<Problems to be Solved by the Invention>

[0004] However, these clogging prevention devices have a problem that the commercial value of the goods is reduced because the goods are hit by a poker or a rotating plate coming into the funnel-shaped chute and thereby broken into small pieces. In addition, since broken pieces of goods drop in the bag with a delay, there is also a problem that sealing defects are caused by these broken pieces of goods being captured in the sealing portions of the bag.

[0005] The problem of the present invention is to propose a new packing method where high speed operation is possible without above mentioned problems occurring and a packaging device for implementing this method.

<Means to Solve the Problems>

[0006] A packing method according to the present invention is a packing method where goods which are dropped from above are accommodated in a chute with a funnel shape and then packed into a bag with a tube shape and includes collecting the goods inside the chute, lowering the chute while accelerating in a state where a discharge opening of the chute is open, and reversing direction of movement of the chute thereby raising the chute which is lowered, wherein the goods collected in the chute are discharged into the bag while being accelerated.

[0007] In the process of collecting the goods in the chute, the goods which are dropped from above with a time lag are received and compactly accommodated in the chute with the funnel shape.

[0008] Preferably, the chute is provided with a funnel section at an upper part and a cylindrical section at a lower part which is continuous with the funnel section, and the funnel section at the upper part has a function of guiding the goods which fall on every side from above to the inside of the cylindrical section at the lower part. In addition, the cylindrical section at the lower part has a function to compactly accommodate the goods which fall from the funnel section. When the goods have a sliced shape, a lower end discharge opening in the cylindrical section may be cut diagonally in order for the goods to be accommodated with an erect posture as much as possible and the cut surface is opened and closed using a gate. Alternatively, the lower end discharge opening may be cut with a V shape and the cut surface is open and closed using a pair of gates which come into contact with and separate from each other. Due to this, a diagonal surface is formed in the lower end discharge opening which is closed using the gate and the goods with a sliced shape are filled along the diagonal surface.

[0009] When the goods are accommodated in the chute, the chute is lowered while accelerating and the gate is opened at the same time. Then, when the chute reaches the bottom dead point, the direction of movement of chute is immediately reversed and thereby the chute is raised. Consequently, the goods inside the chute is accelerated downwards due to the lowering action of the chute, and by the sudden reversing direction of movement of the chute and raising of the chute following this the falling goods go through the chute and drop due to the inertia of the goods. Due to this, the goods which are compactly collected in the chute are vigorously discharged into the bag with a tube shape as one batch. For this reason, clogging inside the chute can be prevented. Further, it is also possible to increase the packing density in the bag and suppress the goods being captured in sealing portions because the goods inside the chute are discharged as one batch.

[0010] In a case where the chute is provided with the funnel section at the upper part and the cylindrical section at the lower part which is continuous with the function section at the upper part, the goods tend to incline so that the longitudinal directions of the goods extend in vertical direction in a process where the goods slide down

the funnel section and led to the inside of the cylindrical section even if there is a mixture with the goods with a relatively large size. For this reason, even if the funnel section is clogged, the goods which are large in size and the surrounding goods drop through the inside of the chute due to the downward inertia which is applied by the lowering chute and the following sudden reversing direction of movement of the chute and raising of the chute. Even if the goods remain inside the chute after this, the remaining goods drop through the chute with a delay since the remaining goods float up and then drop while being broken up when the chute which suddenly reversed direction of movement so as to be raised stops at the top dead point. Accordingly, there is no circumstance where the packaging device is stopped since clogging inside the chute is eliminated when the next batch of goods drops in the chute.

[0011] A packaging device for implementing this packing method is a packaging device which bends packaging material with a sheet shape with a former into a cylindrical shape, then winds it around a cylinder extending in vertical direction and thereby forms it into a tube shape and forms a bag with a tube shape by laterally sealing a lower end section of the packaging material with a tube shape using a pair of lateral sealing means. The packaging device is a packaging device which packs goods from the cylinder into the bag formed in a tube shape using the former, laterally seals an upper sealing portion of the bag in which the goods is packed and a lower sealing portion of a continuous bag which is continuous with the upper sealing portion at the same time using the lateral sealing means, and forms a sealed bag which is packed with the goods by separating the border of the sealing portions. The packaging device is provided with a chute with a funnel shape, a gate, a raising and lowering mechanism, and a control section. Above the cylinder, the chute collects the goods which are dropped from above. The gate is positioned at an upper end of the cylinder and opens and closes a lower end discharge opening in the chute. The raising and lowering mechanism raises and lowers the chute in the vertical direction. The control section controls the opening and closing of the gate and the raising and lowering of the raising and lowering mechanism. In the packaging device, the control section inserts the chute in which the goods are accommodated into the cylinder while accelerating the chute downward in a state where the gate is open, and then immediately reverses the direction of movement of the chute and raises the chute.

< Effects of the Invention>

[0012] According to the present invention, it is possible to eliminate clogging of goods in the chute since the goods which drops in pieces from above are gathered in the chute and then vigorously discharged into the bag with the tube shape. In addition, it is possible for the goods to be compactly packed in the bag without being broken since the goods in the chute are discharged as one batch of goods. Accordingly, the goods are prevented from being captured in the sealing portions of the bag. Furthermore, it is possible for a sequence of batches of goods to be distinctly packed into the bag, even when there is little time between the packings of the previous batch of goods and the subsequent batch of goods, since the goods which drops in pieces from above are discharged as one batch of goods in a state of being gathered in the chute while being accelerated. Accordingly, high speed operation of the packaging device is possible. Further, continuous driving is possible since clogging is not generated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 is a schematic configuration diagram of the main sections of a packing device in a packaging device according to one embodiment of the present invention.

Fig. 2 is a schematic configuration diagram of the main sections of a packaging device according to one embodiment of the present invention.

Fig. 3(a) is a schematic front view of the packaging device for explaining a collecting step of goods in the packaging device in Fig. 2.

Fig. 3(b) is a schematic side view of the packaging device for explaining a collecting step of goods in the packaging device in Fig. 2.

Fig. 4(a) is a schematic front view of the packaging device for explaining a discharging step of goods in the packaging device in Fig. 2.

Fig. 4(b) is a schematic side view of the packaging device for explaining a discharging step of goods in the packaging device in Fig. 2.

Fig. 5 is a perspective diagram of the outer appearance of the front side of one embodiment of the packing device in the packaging device according the present invention.

Fig. 6 is a perspective diagram of the outer appearance of the rear side of one embodiment of the packing device in the packaging device according the present invention and is particularly a perspective diagram of a state where a chute is positioned at the top dead position.

Fig. 7 is a perspective diagram of the outer appearance of the rear side of one embodiment of the packing device in the packaging device according the present invention and is particularly a perspective diagram of a state where a chute is positioned at the bottom dead position.

Fig. 8 is a perspective diagram of the outer appearance of a weighing and packaging integral device which includes a packaging device according to one embodiment of the present invention.

Fig. 9 is a perspective diagram of the outer appear-

ance of a former and a cylinder as one embodiment.

Fig. 10 is a perspective diagram of the outer appearance of a cylinder on which a packing device as one embodiment is mounted.

Fig. 11 is a partial cross sectional diagram of a cylinder as one embodiment.

Fig. 12 is a configurational block diagram of a gas supplying means as one embodiment which is mounted in a cylinder.

Fig. 13 is a configurational block diagram of a weighing and packaging integral device as one embodiment.

Fig. 14 is an operation timing chart of the weighing and packaging integral device in Fig. 13.

DESCRIPTION OF EMBODIMENTS

<Overall Outline>

[0014] An outline of a packing method and a packaging device B according to one embodiment of the present invention will be described.

[0015] Fig. 1 shows a schematic configuration diagram of the main sections of a packing device 100 which is provided in the packaging device B according to one embodiment of the present invention. Fig. 2 shows a schematic configuration diagram of the main sections of the packaging device B which is mounted with the packing device 100. In these diagrams, a packaging material F with a sheet shape is bent into a cylindrical shape using a former 3, then wound around a cylinder 7 and thereby formed in a tube shape, and a lower end section of the packaging material F is laterally sealed using a pair of lateral sealing means 6, which come into contact with and separate from each other, to form a top portion (an upper sealing portion) of a bag TB with a tube shape and a base portion (a lower sealing portion) of a continuous bag. The cylinder 7 penetrates through a central portion of the former 3 in vertical direction and is inserted into an upper end section of the bag TB with a tube shape. Goods M which are dropped through a metal detector MD which is arranged above a chute 103 are discharged into the cylinder 7 via the chute 103 with a funnel shape.

[0016] Here, the bag TB with a tube shape which is wound around the cylinder 7 is lowered continuously or intermittently by a pair of pull-down belts 4, 4 which are arranged on both sides of the bag TB. In addition, joints T1, which are shaped by the both side edge portions of the packaging material F formed in a tube shape by being wound around the cylinder 7, are vertically sealed using a vertical sealing means 5.

[0017] The chute 103 with the funnel shape is formed with a funnel section 131 at an upper part and a cylindrical section 132 at a lower part, and a lower end of the funnel section 131 and an upper end of the cylindrical section 132 are connected vertically via opening sections with an elliptical shape which are cut diagonally to each other. The outer diameter of the cylindrical section 132 is formed to be smaller than the inner diameter of the cylinder 7. The cylindrical section 132 is lowered by predetermined strokes in the cylinder 7 while accelerating and then is returned to an initial position by immediately reversing direction of its movement so as to be raised once it reaches a bottom dead point, using a raising and lowering mechanism 300 which will be described later. In addition, a lower end discharge opening in the cylindrical section 132 is cut in a V shape and a gate 104 opens and closes the cut surface from both sides.

[0018] The gate 104 includes opening and closing gates 141, 141 which open and close an upper end section of the cylinder 7 and diagonal gates 142a, 142a, each of which extends diagonally backward from an abutting section of each of the opening and closing gates 141, 141. Each of the diagonal gates 142a, 142a is configured so that a lower end section of the cylindrical section 132 which is cut in a V shape is opened and closed from both sides. The gates 141 and 142a are configured so as to come into contact and separate in the direction of the arrows using opening and closing mechanisms 144 which will be described later, and an upper end opening section 706 in the cylinder 7 and the lower end discharge opening in the cylindrical section 132 are opened and closed at the same time by the opening and closing action of the opening and closing mechanisms 144.

[0019] Here, the opening and closing gates 141, 141 which open and close the upper end opening section in the cylinder 7 are necessary when filling an inert gas in the cylinder 7 and may be omitted when the gas is not filled. In addition, a lower end section of the cylindrical section 132 may be cut diagonally instead of being cut with a V shape and only one of the diagonal gates may be used as the diagonal gate 142a.

[0020] Figs. 3(a), 3(b), 4(a) and 4(b) show schematics of the operations of the packaging device B. Figs. 3(a), 4(a) show front views, and Fig. 3(b), 4(b) show side views. In these diagrams, the goods M which are dropped are led to vertical postures while slide down in the chute 103 and filled in the cylindrical section 132. This is assisted by diagonal elliptical shapes of the connection portions of the funnel section 131 and the cylindrical section 132 and the diagonal closure of the lower end discharge opening in the cylindrical section 132 with the gate 104. When the connection portion of the funnel section 131 and the cylindrical section 132 is a diagonal elliptical shape, the goods M slide down the connection portion while being tilted in a direction where there is less contact resistance and thereby being led to a vertical orientation. In addition, the gate 104 in a state of being closed has a V shape in front view and the goods M which drop with a vertical orientation are filled into the trough in the V shape.

[0021] Then, when the rearmost goods M which are dropped are accommodated in the chute 103, the gate 104 is opened and, at the same time, the chute 103 in which the goods M are accommodated is lowered while accelerating (refer to Figs. 4(a) and 4(b)). Then, when

the chute 103 reaches the bottom dead point, the chute 103 is returned to its initial position by having its direction of movement immediately reversed and raised while accelerating. During this, the goods M in the chute 103 are accelerated downwards due to the lowering action of the chute 103 and then the goods which are falling go through the inside of the chute 103 by the inertia of the goods M due to the subsequent reversing direction of movement of the chute 103 and raising of the chute 103. For this reason, even if there is a mixture with the goods M which are large enough to be stuck in the chute 103, these goods M are vigorously discharged from the chute 103 together with the other goods M. Even if the goods M remain inside the funnel section 131, the remaining goods M float up and then drop while being broken up in the air as the chute 103 suddenly stops at the top dead point. For this reason, even a severe clogging is eliminated and the goods M go through the chute 103. Accordingly, it is normally possible to discharge the goods M into the bag without any clogging due to the vertical movement of the chute 103 even if the goods M which are large enough to make a bridge drop.

<Details>

[0022] The packing method and the packaging device B for implementing the packing method will be described in detail.

[0023] Fig. 8 shows a perspective diagram of the outer appearance of a weighing and packaging integral device 200 which includes the packaging device B which is one embodiment of the packaging device according to the present invention. In this diagram, the weighing and packaging integral device 200 has a configuration where the packaging device B is arranged at a lower part and a weighing machine W is arranged at an upper part and is provided with a touch panel 2, by which it is possible to integrally operate the packaging device B and the weighing machine W, at the front.

[0024] The weighing machine W is configured using a combination weighing machine with a well-known configuration. The goods M are snack food such as potato chips and are supplied to a central upper section of the weighing machine W. The goods M which are supplied to the central upper section are dispersed on a plurality of radial pathways and are then supplied to corresponding weighing hoppers WH in a lower part via a plurality of pool hoppers PH which are arranged at the terminal ends of the respective pathways. The weights of the goods M which are being weighed using the respective weighing hoppers WH are combined and the weighing hoppers WH which make an optimal combination forming a certain quantity of the goods M are selected. The selected weighing hoppers WH discharge the goods M into a collection chute C based on a discharge request signal from the packaging device B. The discharged goods M go through the inside of the metal detector MD (refer to Fig. 2) while stretching out lengthwise in a longitudinally arrayed state when it slides down the collection chute C. The discharged goods M are then supplied to the packaging device B via the chute 103 of the packing device 100. The packaging device B performs bag packaging by accommodating the goods M in a bag b with a tube shape and then laterally sealing the top portion of the bag b and the base portion of the continuous bag at the same time (refer to Fig. 2).

<Overall Configuration of Packaging Device>

[0025] The packaging device B which performs such operations is configured from a packaging unit BU which produces bagged products from bags with a tube shape, a packaging material supplying unit FU which supplies the packaging material F to the packaging unit BU, and a control section 10 (refer to Fig. 13) which controls the movements of driving sections of each of the packaging unit BU and the packaging material supplying unit FU. The packaging material supplying unit FU supplies the packaging material F with a sheet shape to the former 3 in the packaging unit BU and is provided to be adjacent to a rear section of the packaging unit BU.

[0026] The packaging unit BU will be explained in reference to the schematic diagram of the packaging device B in Fig. 2. The packaging unit BU is provided with the former 3, the pull-down belts 4, the vertical sealing means 5, and a lateral sealing means 6. The former 3 forms the packaging material F with a sheet shape into a tube shape. The pull-down belts 4 convey the packaging material F, which is formed in a tube shape, downward. The vertical sealing means 5 vertically seals the joint T1 which is a portion where both ends of the packaging material TB with a tube shape overlap at the front side. The lateral sealing means 6 heat seals the top portion of the bag b and the base portion of the continuous bag at the same time by laterally sealing the bag b which is formed at a lower end section of the packaging material TB with a tube shape. In addition, the packaging unit BU has the cylinder 7 which guides the goods M to the inside of the bag b and around the outer circumference of which the packaging material F with a tube shape is wound. Here, both of the packaging material F which is formed in a tube shape and the bag b which is formed at the lower end section of the packaging material F may be referred to the bag TB with a tube shape in the following description.

[0027] The packaging unit BU also has the packing device 100 (refer to Fig. 2). The packing device 100 accommodates the goods M, which are dropped from the weighing machine W at the upper side through the inside of the metal detector MD, in the chute 103 with a funnel section and discharges the goods M into the bag TB with a tube shape via the cylinder 7. The packaging unit BU also has a gas supplying means 9 (refer to Fig. 13). The gas supplying means 9 fills inert gas into the cylinder 7.

(1) Packaging Unit

[0028] The packing device 100, the former 3, the cylinder 7, the pull-down belts 4, the vertical sealing means 5, the lateral sealing means 6, and the gas supplying means 9 of the packaging unit BU will be described below in detail.

(1-1) Packing Device

[0029] The packing device 100 in the packaging device B will be described. The packing device 100 accommodates the goods M which are dropped from above in the chute 103 with a funnel shape and discharges the goods M into the bag TB with a tube shape.

<Overall Configuration of Packing Device>

[0030] Fig. 5 shows a perspective diagram of the outer appearance of the front side of the packing device 100 which is one embodiment of the packing device in the packaging device B according the present invention. Fig. 6 and Fig. 7 show perspective diagrams of the outer appearance of the rear side of the packing device 100. In these diagrams, the packing device 100 is provided with the chute 103, the gate 104 which opens and closes the lower end discharge opening in the chute 103, and the raising and lowering mechanism 300 which raises and lowers the chute 103. Here, Fig. 5 and Fig. 6 show a state where the chute 103 is positioned at the top dead point. Furthermore, Fig. 5 shows a state where the gate 104 is closed and Fig. 6 shows a state where the gate 104 is open. In addition, Fig. 7 shows a state where the gate 104 is open and the chute 103 is lowered to the lower dead point.

<Configuration of Chute>

[0031] The chute 103 is provided with the funnel section 131 at the upper part and the cylindrical section 132 at the lower part. The lower end discharge opening in the cylindrical section 132 at the lower part is cut with a V shape and the gate 104 is configured to open and close the cut surface from both sides. In addition, a bracket 133 is attached to the outer side of the rear surface of the cylindrical section 132. The bracket 133 is attached to a raising and lowering arm 301 of the raising and lowering mechanism 300 and is configured so that the entirety of the chute 103 is raised and lowered in the vertical direction.

[0032] Here, the chute 103 is made of resin. The material for the chute 103 is not limited to resin and the chute 103 may be made of metal. However, the following effects are obtained by making the chute 103 with resin.

[0033] The metal detector MD for detecting metal being mixed in with the goods M is arranged above the packing device 100, in other words, above the chute 103 as shown in Fig. 2. It is desirable for the metal detector MD that a metal-free zone of approximately 50 to 100 mm is provided above and below the metal detector MD in order to prevent erroneous detecting.

[0034] In a case where the chute 103 is made of metal, it would be necessary to keep a distance between the metal detector MD and the chute 103 in order to provide the metal-free zone and this tends to lower performance such as an increase in the dropping distance of the goods M.

[0035] In contrast to this, if the material for the chute 103 is resin, it is not necessary to keep a distance between the metal detector MD and the chute 103 and it is possible to reduce the dropping distance of the goods M and to easily prevent the erroneous detection by the metal detector MD. In particular, if the chute 103 is formed using transparent resin, it is possible to easily adjust the drop timing of the goods M since the dropping of the goods M is visible. Further, when the chute 103 is formed using a transparent resin, even if a bridge of the goods M (a state where the goods M are stuck in the chute 103) is created in the chute 103, it is possible to easily discover the bridge.

<Configuration of Gate>

[0036] The gate 104 has the opening and closing gates 141, 141 which open and close the upper end opening section 706 of the cylinder 7 (refer to Fig. 9) and the diagonal gates 142a, 142a which extend diagonally backward from abutting sections of the respective opening and closing gates 141, 141. The diagonal gates 142a, 142a are resin members with a triangular prism shape and are fixed to the opening and closing gates 141, 141 (refer to Fig. 5). Here, the diagonal gates 142a, 142a are not limited to resin members with a triangular prism shape. The diagonal gates 142a, 142a may be, for example, metal plates which respectively extend diagonally backward from abutting sections of the opening and closing gates 141, 141. The diagonal gates 142a, 142a open and close the lower end discharge opening in the cylindrical section 132, which is cut in a V shape, from both sides. In addition, the opening and closing gates 141, 141 are guided to the troughs of a pair of guide rails 143, 143 which extend in the horizontal direction and are configured so as to come into contact with and separate from each other along with the respective diagonal gates 142a, 142a by the opening and closing mechanisms 144, 144. Due to this, the lower end discharge opening in the cylindrical section 132 and the upper end opening section 706 of the cylinder 7 are opened and closed at the same time.

[0037] At respective rear sections of the opening and closing gates 141, 141 (in the vicinity of edge section of the opening and closing gate 141 on the side opposite to the side where the other opening and closing gates 141 is arranged), slots 145, 145, which extend in a direction which is orthogonal to the movement direction of the opening and closing gates 141, 141, are formed. Sliders

146, 146, which slide along the slots 145, 145, are inserted in the slots 145, 145 (refer to Fig. 5). The opening and closing mechanisms 144, 144 are configured by the sliders 146, 146, rotation arms 147, 147 at a tip end section of which the sliders 146, 146 are attached, and servo motors 148a, 148a which rotate the sliders 146, 146 over a range of 180 degrees by rotating the rotation arms 147, 147 by 180 degrees. Servo motors are used here in driving of the opening and closing mechanisms 144, 144, but vane type actuators which rotate at high speed using air pressure may be used alternatively. When the rotation arms 147, 147 are moved back and forth by 180 degrees using the servo motors 148a, 148a, the pair of opening and closing gates 141, 141 and the respective diagonal gates 142a, 142a come into contact with or separate from each other in opposite directions and thereby open and close the lower end discharge opening in the cylindrical section 132 and the upper end opening section 706 in the cylinder 7.

[0038] The pair of guide rails 143, 143 which extend in the horizontal direction are fixed to a base frame 101 and support legs 102 to 102 are fixed to the four corners of the base frame 101. In addition, coil springs 21 to 21 and toroidal shaped pressing plates 22 to 22 cover support shafts between the respective support legs 102 to 102 and the base frame 101. Furthermore, half-screw bolts, which are covered by the coil springs 21 and the toroidal shaped pressing plates 22 in the same manner, are fixed with an upward orientation from a lower side at two locations on the front side of the base frame 101. Plates 23, 23 are detachably inserted between the toroidal shaped pressing plates 22 to 22 and the support legs 102 and between the toroidal shaped pressing plates 22, 22 and the head sections of the half-screw bolts. For this reason, notches into which fit the support shafts of the support legs 102 and the shaft of the half-screw bolts are provided in the plates 23, 23.

[0039] In addition, the servo motors 148a, 148a are attached to the plates 23, 23. When the plates 23 are inclined with regard to the base frame 101 while the coil springs 21, 21 being compressed, it is possible for the sliders 146 to be released from the slots 145 due to the servo motors 148a being inclined and it is possible for the opening and closing gates 141 to be pulled out from the guide rails 143 when the sliders 146 are released. Due to this, disassembling and cleaning of the gates 104 are possible. In addition, the packing device 100 is connected with the cylinder 7 via a coupling tool which is not shown in the drawings. When the connection of the packing device 100 with the cylinder 7 is released and the base frame 101 is lifted up, the entirety of the packing device 100 can be separated from the cylinder 7.

[0040] Here, the lengths of four support legs 102 to 102 which are attached to the base frame 101 are set so that the chute 103 is not in contact with the floor even at its lowest position and the servo motors 148a, 148a are suspended above the floor even if the packing device 100 detached from the cylinder 7 is placed directly on the floor.

<Raising and Lowering Mechanism>

[0041] The raising and lowering mechanism 300 is a mechanism which moves the raising and lowering arm 301 vertically (refer to Fig. 5) using a servo motor which is not shown in the drawings. An upper section of the raising and lowering mechanism 300 is supported by a body frame (which is not shown in the drawings) of the packaging device B.

[0042] The raising and lowering arm 301 is connected with the chute 103 via a bracket 133. The raising and lowering mechanism 300 raises the raising and lowering arm 301 by driving the servo motor and raises the chute 103 to the top dead point. In addition, the raising and lowering mechanism 300 lowers the raising and lowering arm 301 by driving the servo motor and lowers the chute 103 to the bottom dead point. For example, the chute 103 is driven by the raising and lowering mechanism 300 so that the tip end of the chute 103 (the tip end of the cylindrical section 132) reaches to below a diagonal section 701 inside the cylinder 7 where the inner diameter of the cylinder 7 becomes narrower. The diagonal section 701 will be described later.

[0043] Here, in the present embodiment, the raising and lowering mechanism 300 moves the raising and lowering arm 301 up and down by converting the rotational action of the servo motor as a drive source into a linear action using a rack and pinion mechanism or a crank mechanism but the raising and lowering mechanism 300 is not limited to this. For example, an air cylinder may be used as the drive source for the raising and lowering mechanism 300 which moves the raising and lowering arm 301 up and down. In addition, for example, a linear motor which carries out linear actions may be used as the drive source for the raising and lowering mechanism 300 which moves the raising and lowering arm 301 up and down.

(1-2) Former

[0044] Fig. 9 shows a perspective diagram of the outer appearance of the former 3 and the cylinder 7. Fig. 10 shows a perspective diagram of the outer appearance of the cylinder 7 in a state where the packing device 100 is mounted on an upper end section of the cylinder 7. In these diagrams, the former 3 is provided with a sailor section 30 where the packaging material F with a sheet shape is bent in a tube shape and a collar section 31 which is formed around the cylinder 7. Then, the former 3 and the cylinder 7 which penetrates through the collar section 31 vertically are attached to a base member 32.

[0045] The base member 32 is detachably attached to the base frame (which is not shown in the drawing) of the packaging device B and sliders 33, 33, which are fixed to and supported by being inserted into rails (which is not shown in the drawings) of the base frame, are

formed on both sides of the base member 32. In addition, grips 34, 34 with a circular column shape are attached to both sides on the front side of the base member 32. A lateral bar 35, which bridges between the grips 34 in the horizontal direction (refer to Fig. 10), is attached to the grips 34. A rod 36 is attached to a central section of the lateral bar 35 in the front and back direction and the cylinder 7 is supported by the grips 34, 34 via the rod 36 and the lateral bar 35. In addition, horizontal brackets 37, 37 with a V shape are fixed to an upper section of the cylinder 7 and end sections of the horizontal brackets 37, 37 are respectively attached to upper end sections of the grips 34, 34. The cylinder 7 is supported by the grips 34, 34 via the horizontal brackets 37, 37, the lateral bar 35, and the rod 36.

[0046] The collar section 31 of the sailor section 30 is formed in a cylindrical shape so as to surround the outer circumference of the cylinder 7 and the collar section 31 is overlapped at the front with a slight gap like the collar on a kimono. In other words, the collar section 31 of the sailor section 30 is formed in a cylindrical shape so as to surround the outer circumference of the cylinder 7 and one of the end sections of the collar section 31 is arranged in front of the other end section of the collar section 31 with a slight gap at the front. When the packaging material F is set, the packaging material F is bent so as to follow the surface of the sailor section 30, is further bent in a tube shape at the collar section 31, and is wrapped around the outer circumference of the cylinder 7 via a slit between the inner side of the collar section 31 and the outer side of the cylinder 7.

(1-3) Cylinder

[0047] Fig. 11 shows a partial cross sectional diagram of the cylinder 7. In this diagram, the diagonal section 701 with a funnel shape is formed on an upper section of the cylinder 7 and a flange 702 is attached to an upper end edge of the diagonal section 701. Vertical through holes are provided at two opposing locations on the flange 702 (at the front and rear of the cylinder 7) and one-touch couplings 703, through which inert gas is injected, are attached at the through holes. In addition, a cap 704 in a hollow toroidal shape with an open bottom surface covers the flange 702 so as to interpose packing therebetween and an inert gas pathway 705 is formed by the cap 704 and the flange 702. The upper end opening section 706 with a funnel shape is formed in a central section of the cap 704 with the toroidal shape, and a downwardly diagonal slit with a ring shape, which is formed between the inner wall of the upper end opening section 706 and the diagonal section 701, becomes a gas outlet 707 for inert gas. In addition, the inner diameter of the lower end section of the upper end opening section 706 is designed substantially the same with the inner diameter of the cylinder 7 and the upper end opening section 706 does not come into contact with the cylindrical section 132 of the chute 103 which is raised and lowered.

[0048] The cap 704 with the toroidal shape is detachable to the flange 702. In detail, an L-shaped hook 708 which is shown in Fig. 9 is attached on the outer wall of the cylinder 7 and it is possible to move up and down the L-shaped hook 708 by unfolding a foldable butterfly knob 709 and turning it. Accordingly, the flange of the cap 704 and the flange 702 of the cylinder 7 are sandwiched from above and below and thereby locked when the L-shaped hook 708 is lowered by turning the butterfly knob 709 in a state where the cap 704 covers the flange 702. In addition, it is possible to take out the cap 704 from the cylinder 7 when the L-shaped hook 708 is lifted up by turning the butterfly knob 709. Due to this, cleaning of the gas outlet 707 is enabled.

[0049] In addition, the base frame 101 of the packing device 100 is mounted on the upper surface of the cap 704 and the cap 704 and the base frame 101 are connected together using a connector tool which is not shown in the drawings. In addition, the opening and closing gates 141, 141 open and close the upper end opening section 706 which is described above. Then, inert gas is injected so as to blow batch of the goods M discharged from the chute 103 downward and to be supplied in the bag TB with a tube shape while the chute 103 is being moved up and down.

[0050] In Fig. 9 to Fig. 11, a socket 710 through which inert gas is injected into the cylinder 7 is attached to the front side of an upper section of the cylinder 7 and a one-touch coupling which is not shown in the drawings is attached to the socket 710. In addition, a duct 711, which guides inert gas injected from the socket 710 to a lower end section of the cylinder 7, is formed on an inner wall of the cylinder 7 which continues to the socket 710. Then, at a driving preparation stage, oxygen inside the bag TB with a tube shape is replaced with inert gas by vigorously injecting inert gas into the bag TB with a tube shape from a lower end discharge opening 712 of the duct 711.

[0051] A spreader 713, which widens the bag TB with a tube shape from an inner side, is provided at a lower end section of the cylinder 7.

(1-4) Pull-down Belts

[0052] The pull-down belts 4, 4 which are arranged on both sides of the cylinder 7 are configured by suction chambers 41, 41 and belts 42, 42 with holes which run around the suction chambers 41, 41 while facing inwardly with each other. The bag TB with a tube shape is transported downward while being suctioned and held by the belts 42, 42 (refer to Fig. 2). In addition, the pull-down belts 4, 4 are connected with a movement mechanism (which is not shown in the drawings) which makes the pull-down belts 4, 4 come into contact and separate with regard to the cylinder 7.

(1-5) Vertical Sealing Means

[0053] The vertical sealing means 5 heat seals the joint T1 of the packaging material F which is formed in a tube shape while pushing the joint T1 against the cylinder 7 with a certain pressure. The vertical sealing means 5 is configured by a heater block 51 and a metal belt 52 which runs around the heater block 51 at the same time with the packaging material F (refer to Fig. 2). In addition, the vertical sealing means 5 is connected with a movement mechanism (which is not shown in the drawings) which makes the vertical sealing means 5 come into contact and separate with regard to the cylinder 7 along with the pull-down belts 4, 4.

(1-6) Lateral sealing means

[0054] The lateral sealing means 6 is configured by a pair of sealing jaws 61, 61 in which a heater it built and a driving mechanism (which is not shown in the drawings) which makes the pair of sealing jaws 61, 61 come into contact with and separate from each other with regard to the TB in a tube shape. Clam shutters 62, 62 which sandwich the bag TB with a tube shape from the front and back is attached to an upper section of the sealing jaws 61, 61 so as to be able to progress and retreat in the horizontal direction. The clam shutters 62, 62 prevent small dropping fragments from being captured in the lateral sealing portion of the bag b by closing them prior to the sealing jaws 61, 61.

[0055] As the driving mechanism for the lateral sealing means 6, it is possible to use a mechanism which is disclosed in, for example, Japanese Unexamined Patent Application Publication No. 10-53206 by which the pair of sealing jaws 61, 61 are rotated while facing inwardly with each other so that each of the pair of sealing jaws 61, 61 traces out an action trajectory with a D shape (a so-called D motion). Alternatively, as the driving mechanism for the lateral sealing means 6, it is possible to use a mechanism which causes each of the sealing jaws 61, 61 to perform a so-called box motion.

[0056] Each of the sealing jaws 61, 61 laterally seals a top portion of a bottom end section of the bag b and a base portion of the continuous bag TB at the same time by sandwiching and pressing the bag TB with a tube shape each other. In addition, a cutter which is not shown in the drawings is built in one of the sealing jaws 61. The bag b which locates at a lower end section and the continuous bag TB are vertically separated by using the cutter.

(1-7) Gas Supplying Means

[0057] Fig. 12 is a configurational block diagram of the gas supplying means 9. The gas supplying means 9 is configured by a gas cylinder 91 which holds inert gas such as nitrogen gas or argon gas in a pressurized state, a pressure adjusting valve 92 which depressurizes inert gas supplied from the gas cylinder 91 and sends it to three pathways, a first solenoid valve 93 and a first flow amount adjusting valve 94 which are connected with a first pathway of the three pathways, a second solenoid valve 95 and a second flow amount adjusting valve 96 which are connected with a second pathway of the three pathways, and a third solenoid valve 97 and a third flow amount adjusting valve 98 which are connected with a third pathway of the three pathways.

[0058] In addition, the outlet sides of the first flow amount adjusting valve 94 and the second flow amount adjusting valve 96 are merged and connected to the one-touch couplings 703 which locates at an upper section of the cylinder 7. Accordingly, inert gas with a first flow amount is supplied from the first flow amount adjusting valve 94 when the first solenoid valve 93 is opened, and inert gas with a second flow amount is supplied from the second flow amount adjusting valve 96 when the second solenoid valve 95 is opened, to the inert gas pathway 705 which locates at the upper section of the cylinder 7 and ejected downward through the gas outlet 707 with a ring shape into the cylinder 7.

[0059] The outlet side of the third flow amount adjusting valve 98 is connected with a one-touch coupling (which is not shown in the drawings) which is attached to the socket 710 on the outer wall of the cylinder 7. Accordingly, inert gas with a third flow amount is ejected from the third flow amount adjusting valve 98 downward through the lower end discharge opening 712 in the duct 711 into the bag TB with a tube shape when the third solenoid valve 97 is opened. The third flow amount is set to a large flow amount which can instantly replace inside the bag with a tube shape with inert gas in order to replace inside the bag TB with a tube shape with the inert gas in a short period of time. After the inert gas replacement, the gas flow amount is reduced and the gas replacement rate inside the bag TB with a tube shape is maintained so as not to be reduced until the goods M are discharged.

[0060] The flow amount of inert gas which is supplied to the inside of the cylinder 7 differs depending on the bulk density and the content amount of the goods M, the size of the bag, the operation speed, and the like. For example, in a case where the bulk density of potato chips (the density of the goods M in a container in a case when gaps between the goods M are eliminated as much as possible by applying vibration) is 0.083 grams per cubic centimeter, the content amount is one ounce (28.35 grams), the bag size is a width of 133 mm and a height of 184 mm, and the operation speed is 150 bags per minute, the first flow amount is set at 220 liters per minute and the second flow amount is set at 300 liters per minute. But these are only one example and these flow amounts may be modified if the conditions differ.

(2) Control Section

[0061] The control section 10 which controls the packaging device B will be described below in detail.

[0062] Fig. 13 shows a configurational block diagram of a control system for the weighing and packaging integral device 200. In this diagram, the control section 10 controls the weighing machine W and the packaging device B individually or integrally. The control section 10 is configured by a computer. The control section 10 controls each driving section in the packaging unit BU and the packaging material supplying unit FU in accordance with parameters and driving conditions which are set using the touch panel 2 which is shown in Fig. 13. In addition, the control section 10 controls a feeder FD, the pool hoppers PH, the weighing hoppers WH, and the like in the weighing machine W. Furthermore, the control section 10 takes in necessary information from various types of sensors which are mounted in the weighing machine W and the packaging device B and performs various types of control based on this information.

[0063] With regard to the packaging unit BU, the control section 10 controls each of the pull-down belt 4, the vertical sealing means 5, the lateral sealing means 6, the gas supplying means 9, and the packing device 100, and controlling of each of these is related to each other. Here, the opening and closing of the weighing hoppers WH, an operation of packing by the packing device 100, and gas supply by the gas supplying means 9 will be focused on and described.

[0064] Here, the chute 103 in the packing device 100 is positioned at the top dead point and the opening and closing gates 141, 141 are closed in an initial state.

[0065] Firstly, as prior preparation, the packaging material F is formed in a tube shape by being set in the former 3. The goods M are supplied to a central upper section of the weighing machine W. Then, when an operator instructs to start the operation by operating the touch panel 2, the control section 10 firstly forms the bag TB with a tube shape by operating the pull-down belts 4, the vertical sealing means 5, and the lateral sealing means 6. When this is done, the control section 10 opens the third solenoid valve 97 for a set period of time in a state where the gate 104 is open. With this, inert gas replacement inside the bag TB with a tube shape is performed by vigorously ejecting inert gas with the third flow amount from the lower end discharge opening 712 of the duct 711 into the bag TB with a tube shape. When this is finished, the control section 10 closes the gate 104, throttles the third flow amount adjusting valve 98 to flow a small amount of inert gas and thereby sets the packaging device B in standby state.

[0066] During this, combined weighing is performed by the goods M being supplied from the pool hoppers PH to the weighing hoppers WH and the weighing machine W waits for a completion signal from the packaging device B after discharge preparations are ready. When the preparations in the weighing machine W and the packaging device B are complete, the control section 10 shuts the third solenoid valve 97 and causes the goods M with regard to the optimal combination to be discharged from the weighing machine W by transmitting a start signal to the weighing machine W. After this, the goods M are discharged from the weighing machine W to the packaging device B with a certain cycle of, for example, a cycle of 0.4 seconds.

[0067] Fig. 14 represents the operation timing of each of the weighing hoppers WH, the gate 104, the chute 103, and the gas supplying means 9 after discharging of the goods. When the weighing machine W discharges the goods M, the weighing machine W sends a discharge completion signal to the control section 10. Then, a timer is started from the point in time when the discharge completion signal is received and the period of time for the rearmost goods M to reach the chute 103 is measured since the head of the goods M which is discharged reaches the chute 103 after a predetermined time, for example after 0.8 seconds. Since the rearmost goods M reaches the chute 103 when time is up, the control section 10 performs opening of the gate 104, lowering of the chute 103, and opening of the first solenoid valve 93 at the same time and thereby chute 103 in which the goods M are accommodated is lowered while being accelerated and inert gas with the first flow amount is supplied to the inside of the cylinder 7 from the gas outlet 707 at an upper section of the cylinder 7.

[0068] That is, the goods M discharged from the weighing hoppers WH are put in the vertical column state during being dropped and sequentially reaches the inside of the chute 103 and accumulates inside the cylindrical section 132. When the rearmost goods M reach the chute 103, the chute 103 is lowered at the same time as the closed gate 104 is opened. Furthermore, inert gas is ejected to the inside of the cylinder 7 by ejecting inert gas with the first flow amount while the chute 103 is being lowered. At this time, the gate 104 is opened earlier than the chute 103 is lowered. Then, when the chute 103 reaches the bottom dead point, the control section 10 immediately reverses direction of movement of the chute and raises the chute 103. Due to this, the goods M which are compactly brought together in the chute 103 are instantly discharged into the bag TB with a tube shape from the chute 103 due to the chute 103 being lowered and then having its direction of movement reversed so as to be raised. Then, when the chute 103 is returned to the top dead point, the control section 10 closes off the gate 104 and stops supplying inert gas by closing the first solenoid valve 93 at the same time. Next, the control section 10 ejects inert gas with the second flow amount downward from the same gas outlet 707 by opening the second solenoid valve 95 which is closed and supplying inert gas with the second flow amount into the inert gas pathway 705.

[0069] Due to this, the chute 103 can be set in a state of readiness to receive the goods M which are to be dropped next. In addition, one batch of the goods M which are discharged to the inside of the cylinder 7 is accommodated inside the bag b which locates at a lower end section by being dropped into the bag TB with a tube shape while receiving a downward gas flow from behind.

At this time, the bag TB with a tube shape is gradually extended while being transported along the cylinder 7 and the capacity of the bag TB with a tube shape increases in company with the extending of the bag TB, and the inert gas with the second flow amount is filled.

[0070] Here, the first flow amount and the second flow amount in a case of continuous transporting are set to values which sufficiently compensate for increases in the capacity of the bag TB. In addition, since the inert gas rises up when the opening and closing gates 141 are closed off and then lateral sealing means 6 comes into contact with the bag TB with a tube shape and press the bag, it is preferable that the second flow amount is set to a flow amount which is slightly more than the first flow amount in order for the goods M to go downwards against the rising of inert gas.

[0071] Then, at a stage when one batch of the goods M which are discharged from inside of the cylinder 7 are substantially collected inside the bag b which locates at a lower end section, a process is performed where the pair of clam shutters 62, 62 which protrude from the sealing jaws 61, 61 press the bag TB with a tube shape from the front and back due to the lateral sealing means 6 coming into contact with the bag TB with a tube shape (refer to Fig. 4(b)). In accompaniment with this, there is a tendency for inert gas inside the bag TB to rise up, however inert gas inside the cylinder 7 does not rise up since the chute 103 is raised and the upper end opening section 706 in the cylinder 7 is closed off by the gate 104. Instead, the inert gas with the second flow amount lowers and sinks small fragments, which reach the inside of the bag b which locates at a lower end section with a delay, downward into the bag b. Then, the control section 10 stops supplying inert gas with the second flow amount by closing the second solenoid valve 95 at a timing when the clam shutters 62, 62 are closed.

[0072] In this manner, the clam shutters 62, 62 close off an upper end section of the bag b and lateral sealing is started, thereby the bag TB with a tube shape is newly formed above the bag b which locates at a lower end section. Since the capacity of this new bag TB increases in company with extending of the bag TB, the air pressure inside the new bag TB is reduced when supplying of inert gas with the second flow amount is stopped. However, since the last of the goods M, which are newly and subsequently discharged from the weighing machine W, reach the chute 103 as the lateral sealing is completed, the control section 10 repeats the processes described above by performing opening of the gate 104 which is closed up until this point, lowering of the chute 103, and opening of the first solenoid valve 93 at the point in time when the rearmost goods M reach the chute 103. Due to this, the air pressure inside the new bag TB which is reduced due to extending of the bag TB is returned to the original air pressure. Here, a new group of the goods M also drops into the bag TB with a tube shape due to being pressed by a downward gas flow since inert gas which is held in the chute 103 above the gate 104 is instantly pulled inside the cylinder 7 when the closed gate 104 is opened.

[0073] By repeating this cycle, it is possible to reduce small fragments being captured in the lateral sealing portion of the bag since one batch of the goods M is instantly discharged from the chute 103 and inert gas is intermittently supplied downward from an upper section of the cylinder 7.

[0074] In addition, here, it is possible to reduce the amount of inert gas used compared to a case where inert gas is continuously supplied since inert gas is intermittently supplied so as to correspond to volumetric variation in the bag TB with a tube shape. In addition, it is possible to prevent small fragments being captured in the lateral sealing portion by effectively preventing the small fragment from floating upward since inert gas is supplied downward from an upper end section of the cylinder 7 to the inside of the bag and gas flow inside the tube always flows downward even when the internal volume of the bag TB with a tube shape changes due to the approach of the lateral sealing means 6.

[0075] One embodiment of the present invention is described above, but the present invention is not limited to this and it is possible for other aspects to be adopted.

[0076] For example, the weighing and packaging integral device is described in this embodiment, but instead of this, it is possible for the present invention to be applied to a previous type where the weighing machine and the packaging device are operated while being linked with each other.

[0077] In addition, the bag with a tube shape is laterally sealed while being continuously transported in this embodiment, but instead of this, the bag with a tube shape may be laterally sealed while being intermittently transported.

[0078] Furthermore, raising and lowering of the chute 103 and opening and closing of the gate 104 are independent but the movements may be linked to each other by coupling them using a link.

[0079] Furthermore, the first solenoid valve 93 and the second solenoid valve 95 are alternately opened and closed in conjunction with opening and closing of the gate in this embodiment, but instead of this, inert gas may be supplied to the inside of the cylinder from both flow pathways by opening the first solenoid valve 93 while opening the second solenoid valve 95. In this case, adjustment is required so that the total of the amounts through the first flow amount adjusting valve 94 and the second flow amount adjusting valve 96 are adjusted to the original second flow amount by throttling the second flow amount adjusting valve 96.

REFERENCE SIGNS LIST

[0080]

3	FORMER
6	LATERAL SEALING MEANS

7	CYLINDER
9	GAS SUPPLYING MEANS
10	CONTROL SECTION
61	SEALING JAW
62	CLAM SHUTTER
100	PACKING DEVICE
103	CHUTE
104	GATE
141	OPENING AND CLOSING GATE
142a	DIAGONAL GATE
300	RAISING AND LOWERING MECHANISM
706	UPPER END OPENING SECTION
707	GAS OUTLET
TB	BAG WITH TUBE SHAPE
M	GOODS
B	PACKAGING DEVICE
F	PACKAGING MATERIAL

CITATION LIST

PATENT LITERATURE

[0081]

PTL 1: Japanese Unexamined Patent Application Publication No. 2013-103753
PTL 2: Japanese Unexamined Patent Application Publication No. 2012-140243
PTL 3: Japanese Unexamined Patent Application Publication No. 2009-040488
PTL 4: Japanese Unexamined Patent Application Publication No. 2003-081222

Claims

1. A packing method, where goods dropped from above are accommodated in a chute with a funnel shape and are then packed into a bag with a tube shape, comprising:

collecting the goods in the chute;
lowering and accelerating the chute while keeping a discharge opening of the chute open; and
reversing direction of movement of the chute and thereby raising the chute which is lowered, wherein
the goods collected in the chute are discharged into the bag with a tube shape while being accelerated.

2. A packaging device configured to pack goods from a cylinder into a bag formed in a tube shape using a former, to seal laterally an upper sealing portion of the bag in which the goods are packed and a lower sealing portion of a continuous bag which is continuous with the upper sealing portion of the bag at the same time using a lateral sealing means, and to form a sealed bag by separating the border of the sealing portions, comprising:

a chute with a funnel shape arranged above the cylinder and configured to accommodate the goods which are dropped from above;
a gate configured to open and close a lower end discharge opening in the chute;
a raising and lowering mechanism configured to raise and lower the chute vertically; and
a control section configured to control the opening and closing of the gate and the raising and lowering of the raising and lowering mechanism, wherein
the control section is configured to lower with acceleration into the cylinder, in a state where the gate is open, the chute in which the goods are accommodated, and to immediately reverse direction of movement of the chute and thereby to raise the chute.

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

a gas supplying means configured to supply inert gas into the bag which is formed in a tube shape at an upper section of the cylinder, wherein
the gate has an opening and closing gate which is configured to open and close an upper end opening section of the cylinder, and
the control section is configured to control the gas supplying means so that inert gas is injected from the gas supplying means into the bag which is formed in a tube shape while the opening and closing gate is open.

4. The packaging device according to claim 3, wherein a lower end section of the cylinder is positioned above a lateral sealing portion in a bag which is formed with a tube shape,
the gas supplying means is configured to supply inert gas into the cylinder from a gas outlet, which is arranged in an inner side of an upper section of the cylinder and faces downward,
the gate is arranged at an upper part of the gas outlet, and
the control section is configured to:

close the gate so as to accommodate the goods dropped inside the chute, open the gate and supply inert gas with a first flow amount from the gas outlet into the cylinder by controlling the gas supplying means immediately before the rearmost goods reach the chute,
close the gate and supply inert gas with a second flow amount instead of the first flow amount from the gas outlet into the cylinder after the rearmost

goods pass through the gate, and
stop supply of inert gas with the second flow amount when a process in which the lateral sealing means presses the bag which is formed in a tube shape is performed.

5. The packaging device according to claim 4, wherein the gas outlet is formed in a ring shape along an inner wall of the cylinder.

6. The packaging device according to any one of claims 2 to 5, wherein
the gate is detachably placed on an upper end section of the cylinder.

7. The packaging device according to any one of claims 2 to 6, wherein the chute is made of resin.

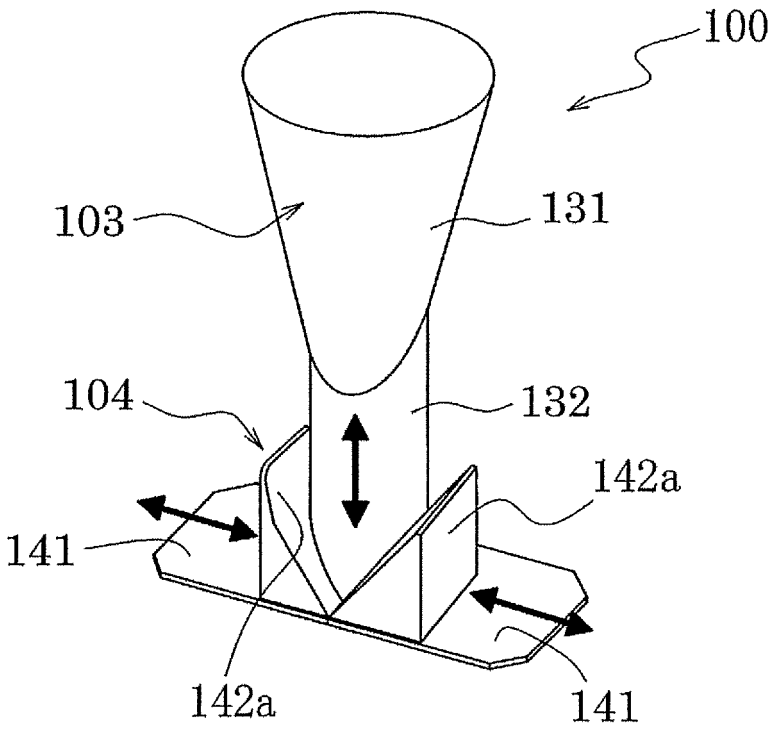

FIG. 1

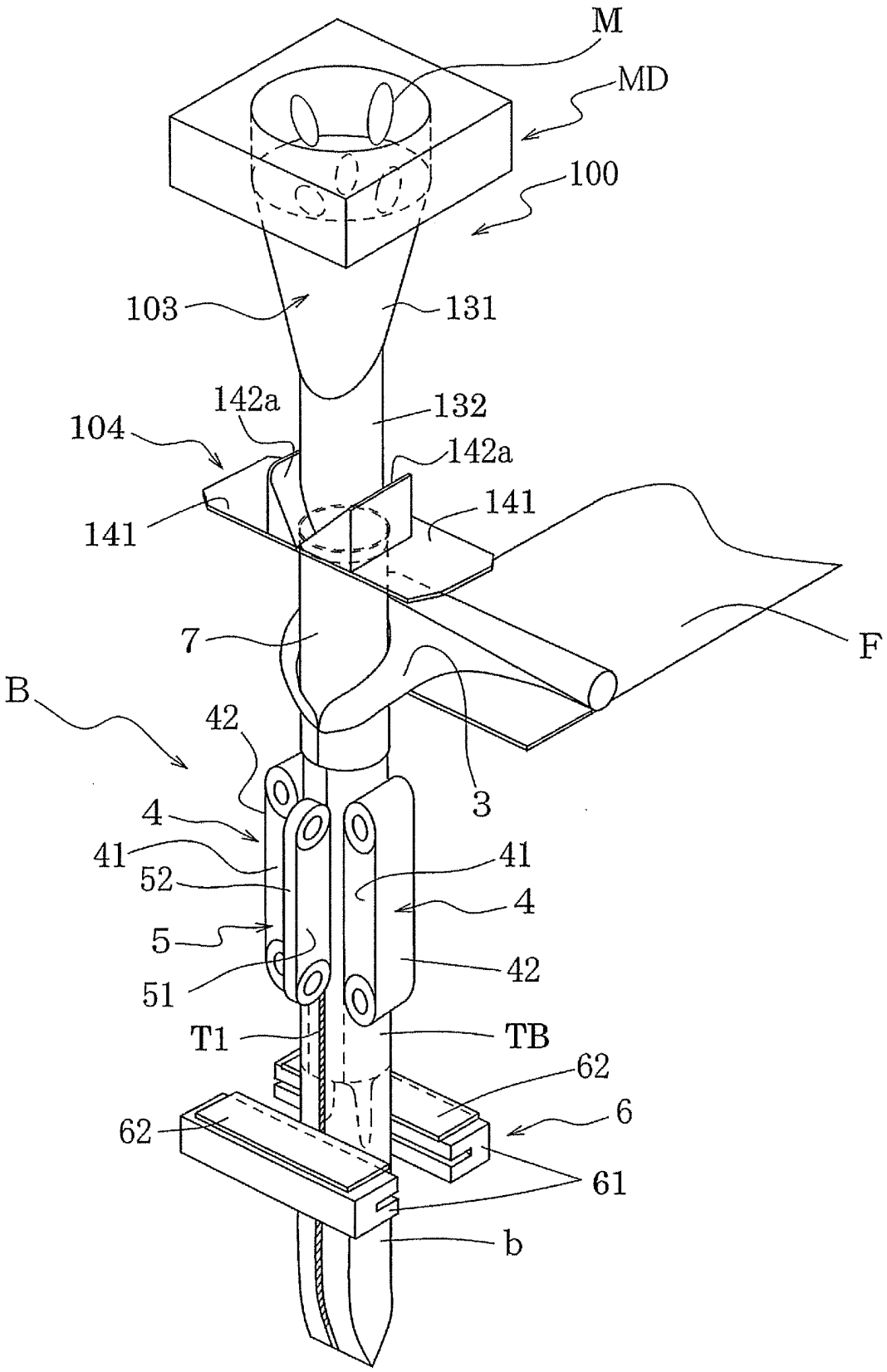
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FIG. 2

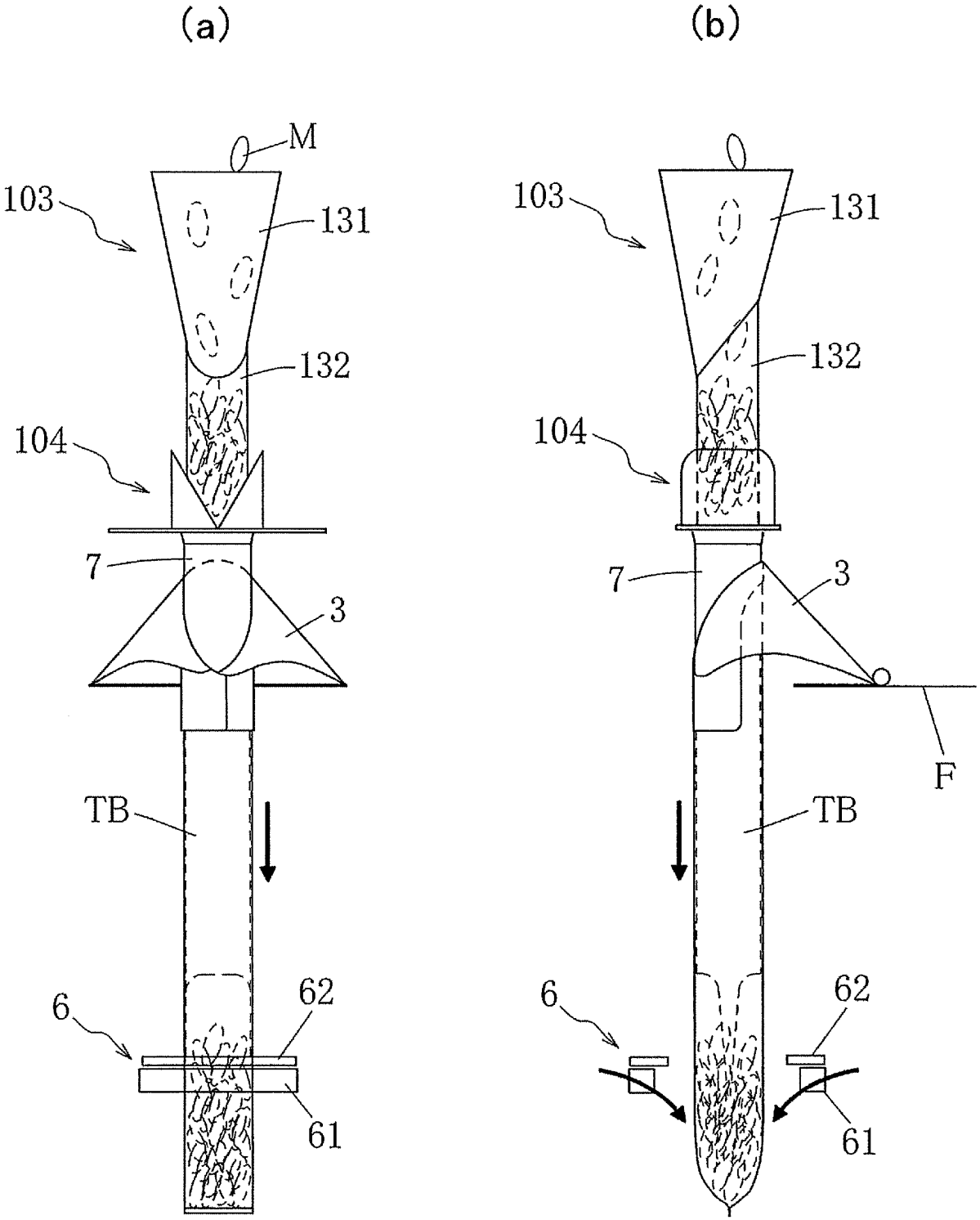

FIG. 3

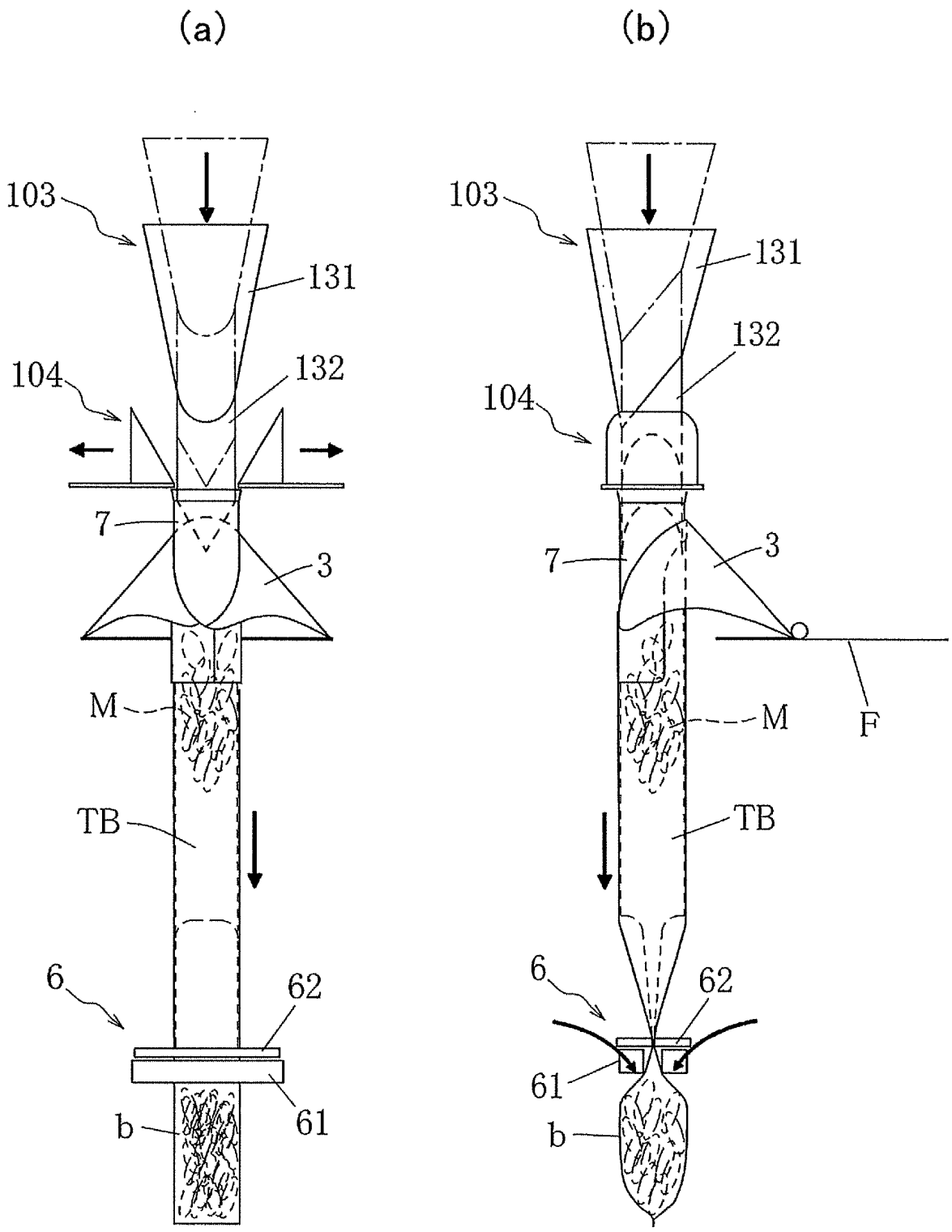

FIG. 4

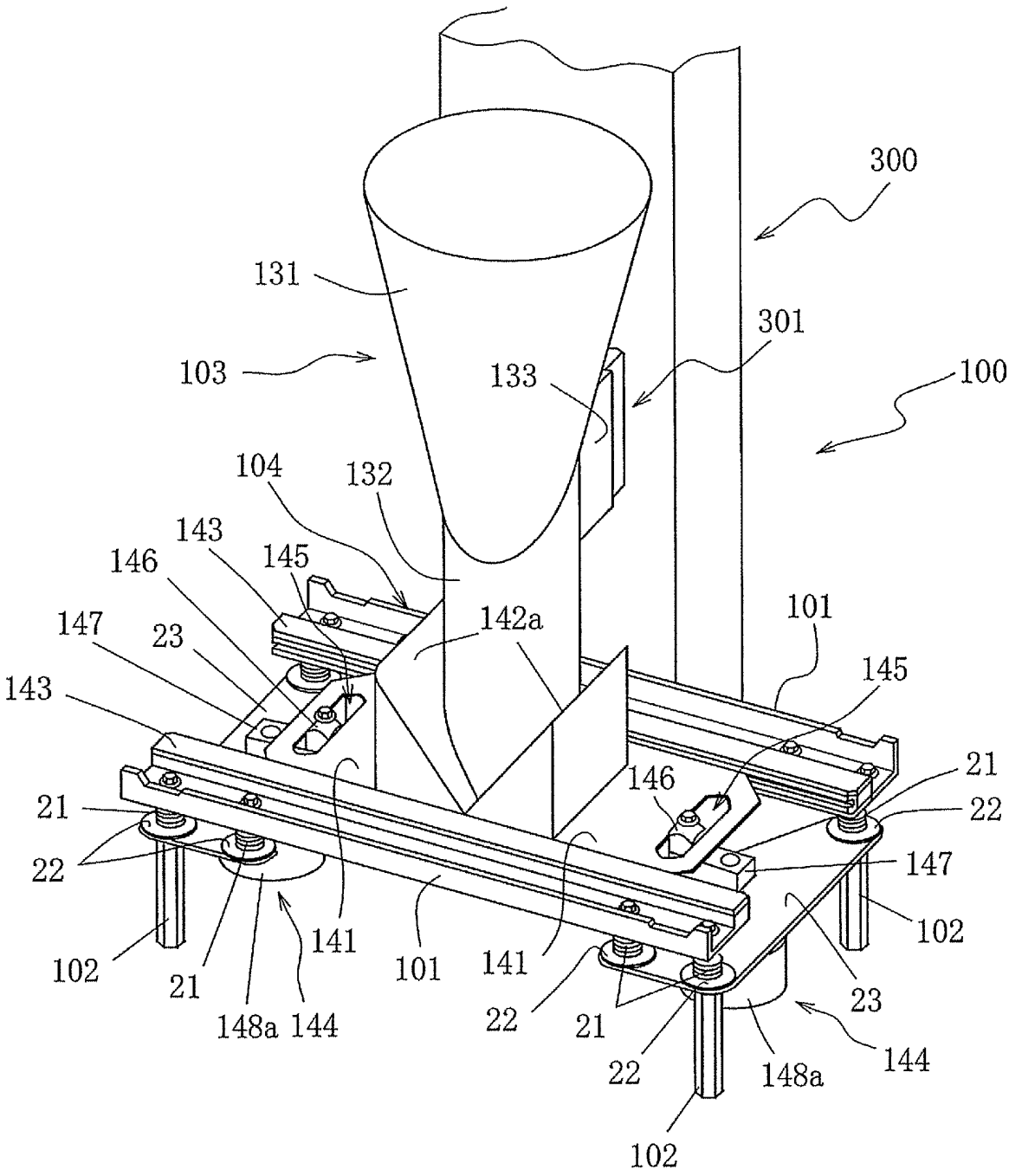
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FIG. 5

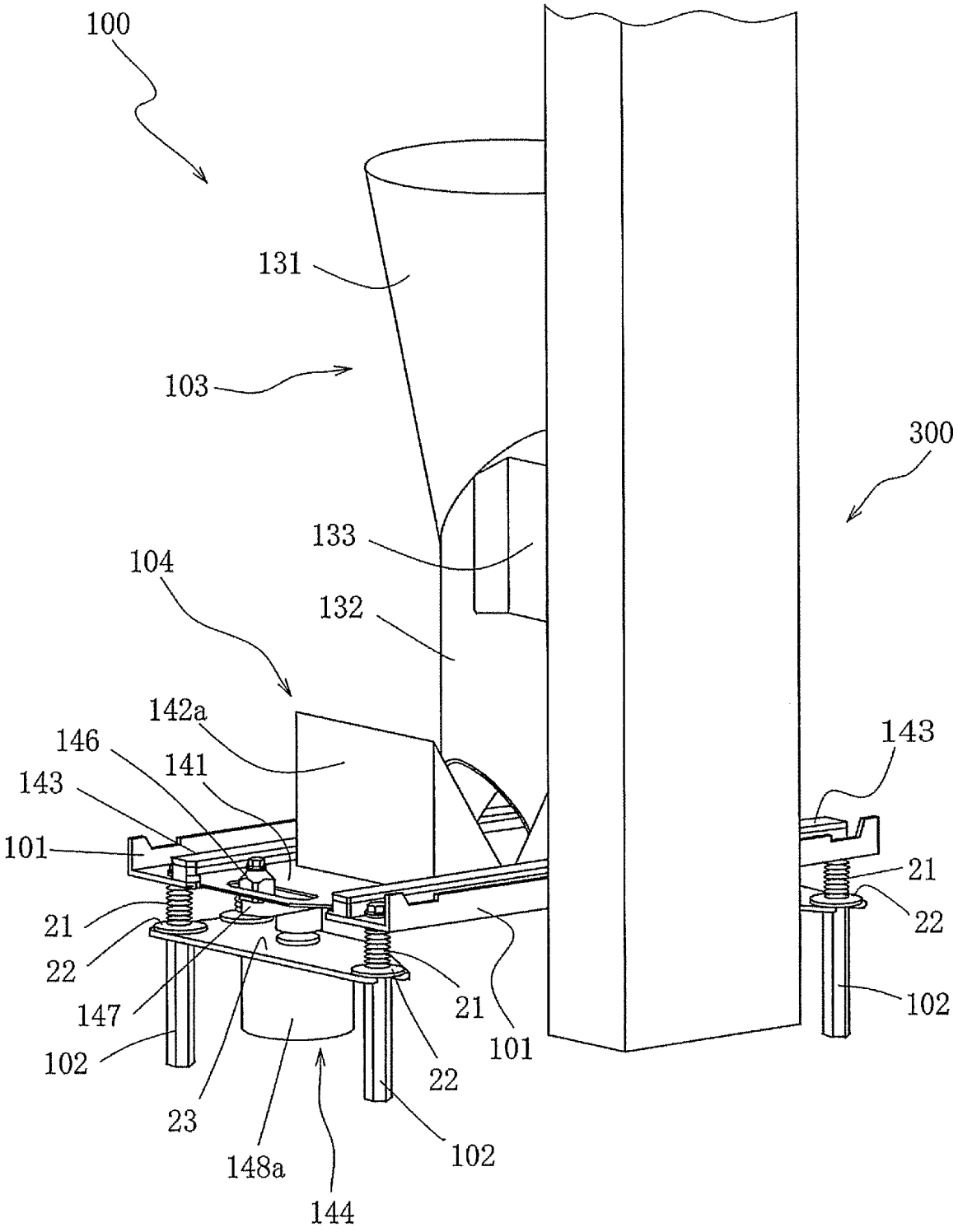
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FIG. 6

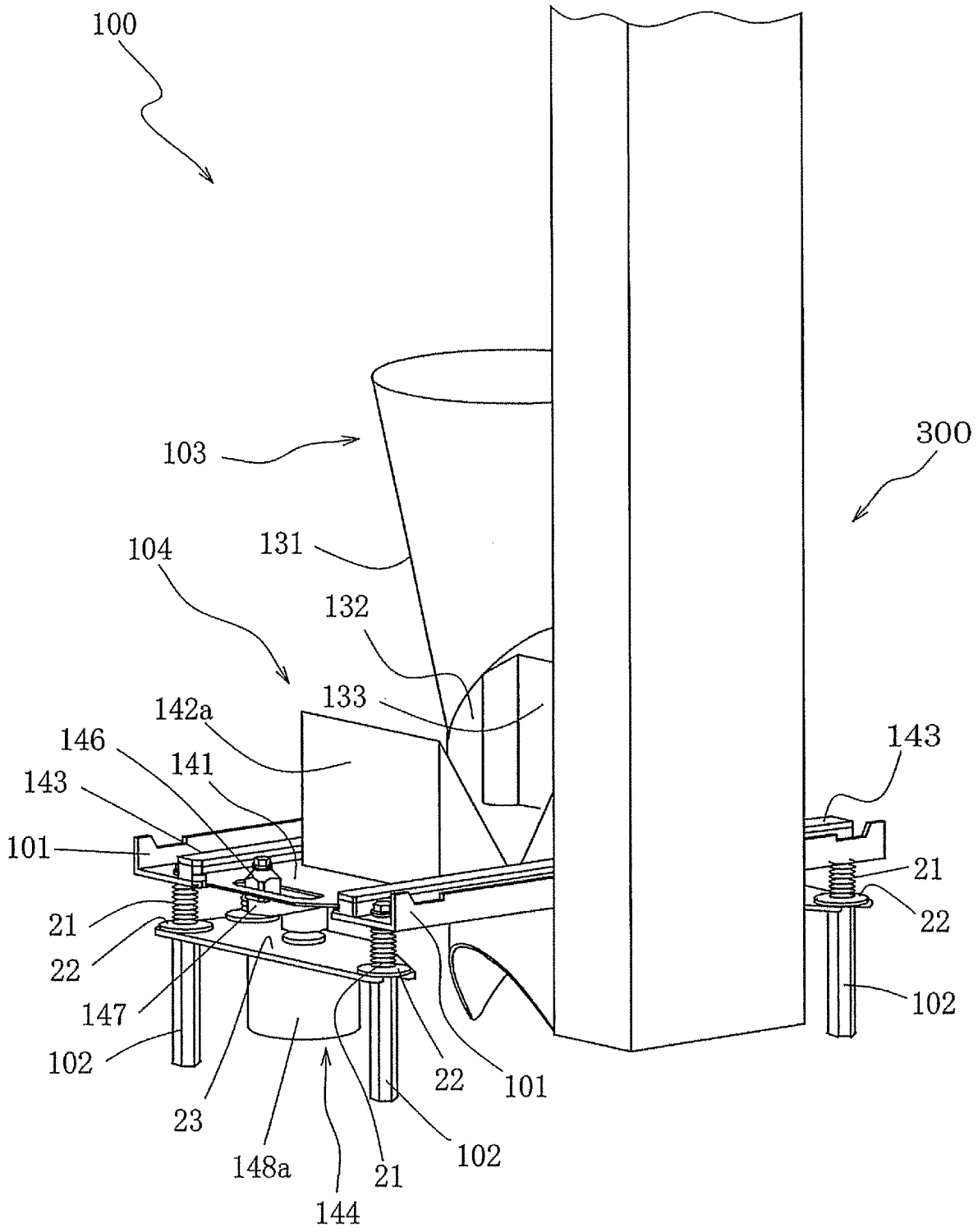
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FIG. 7

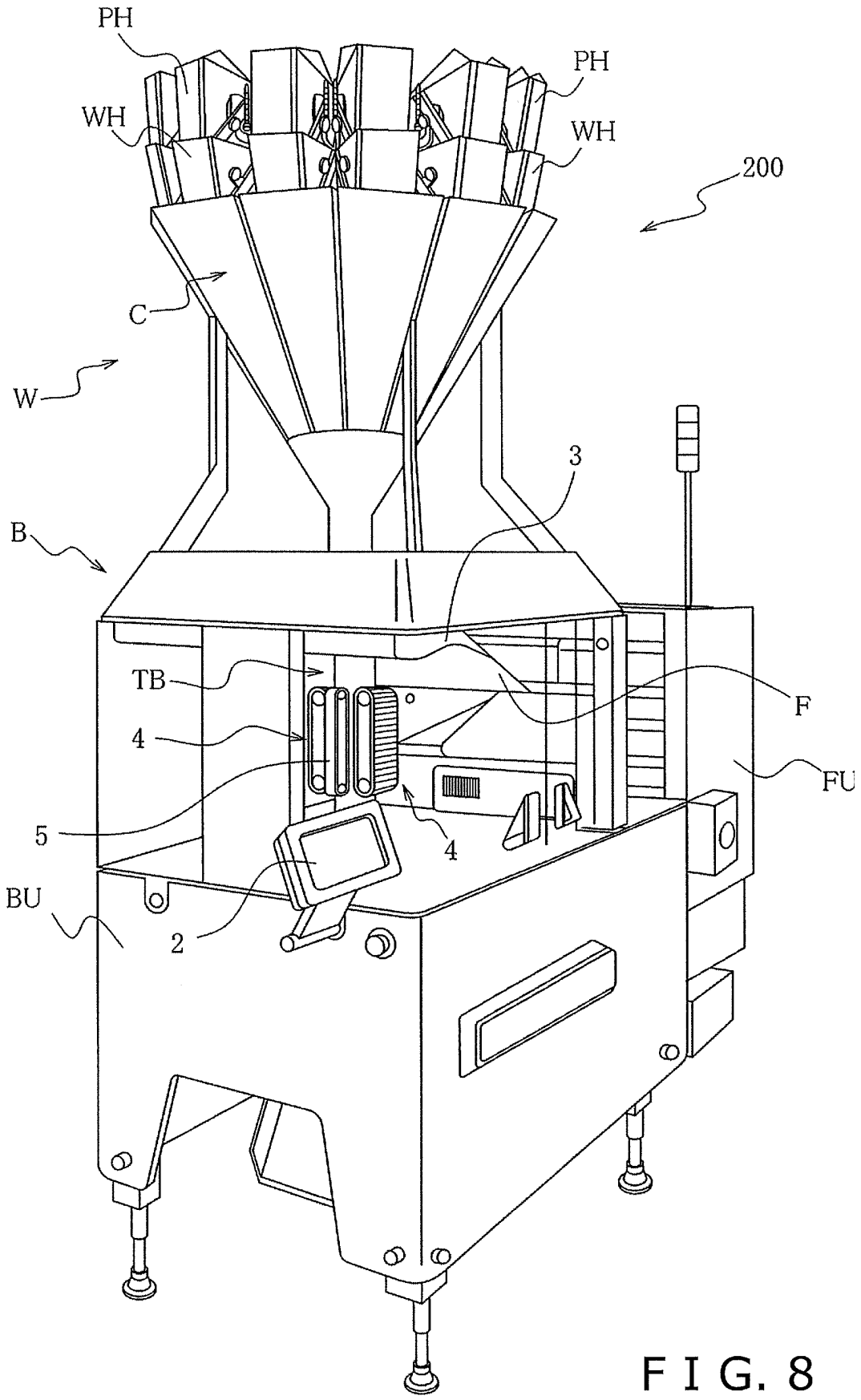

FIG. 8

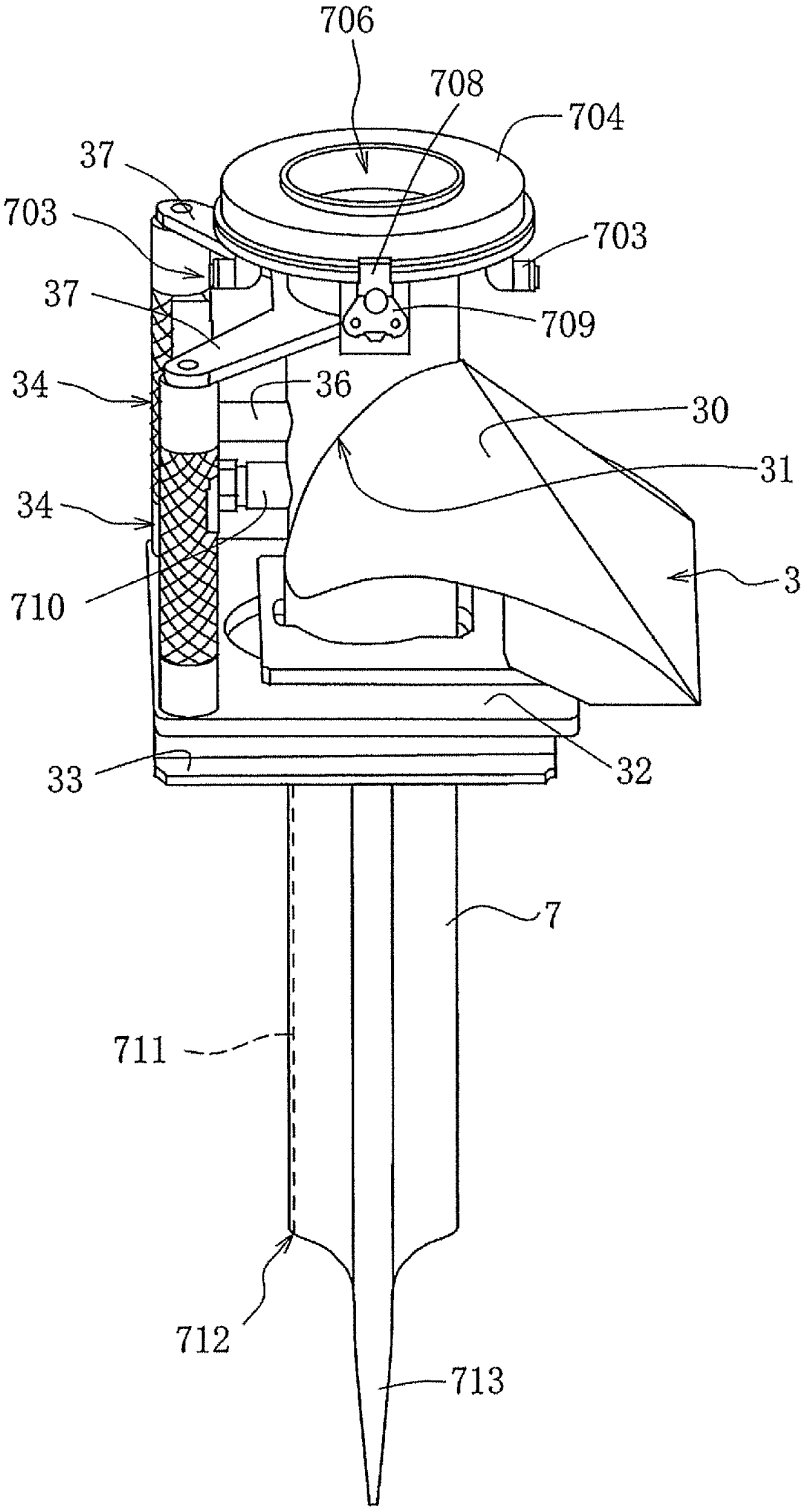
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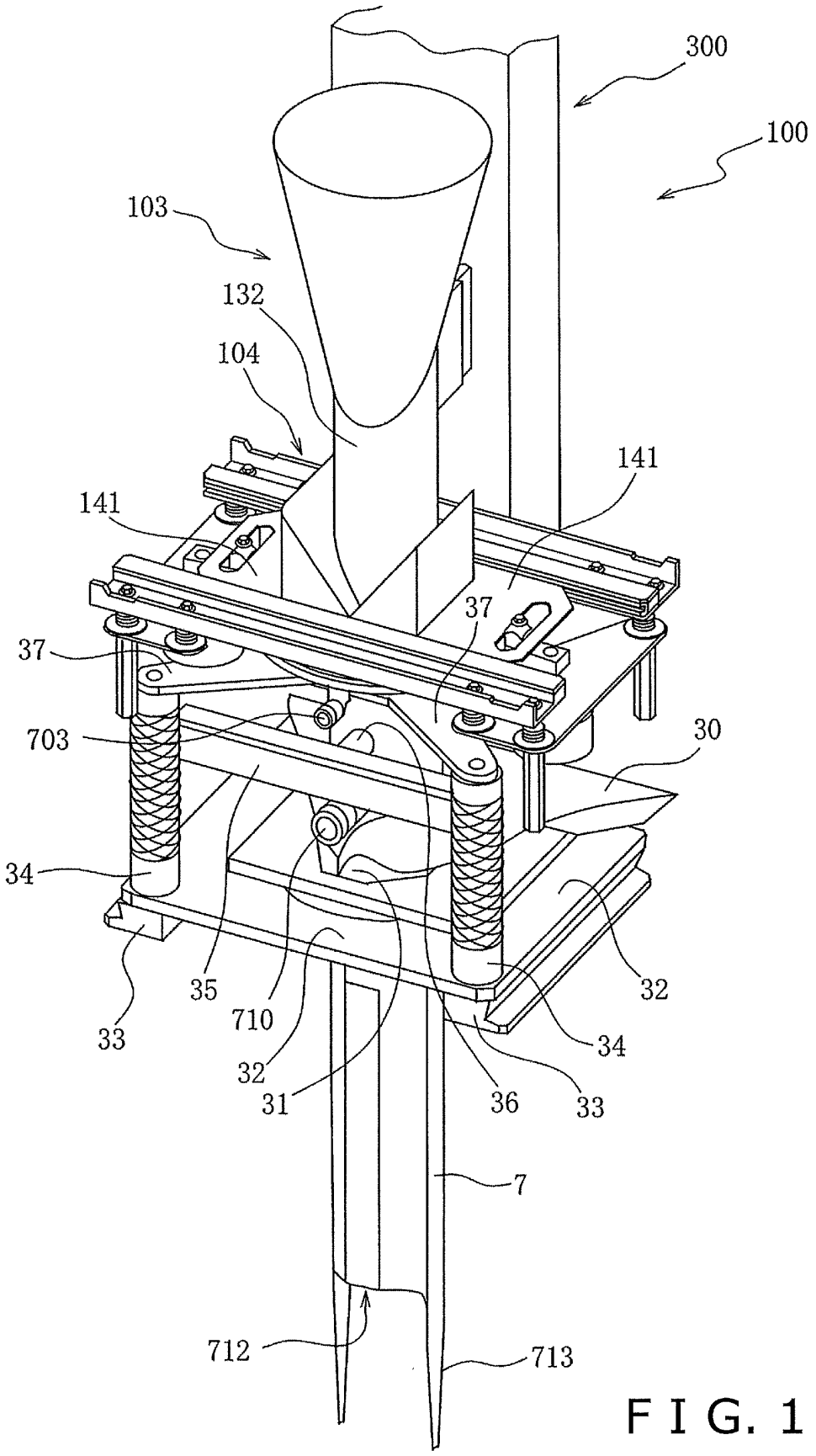
FIG. 9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34
35
710
32
33
32
31
36
33
34
7
712
713

FIG. 10

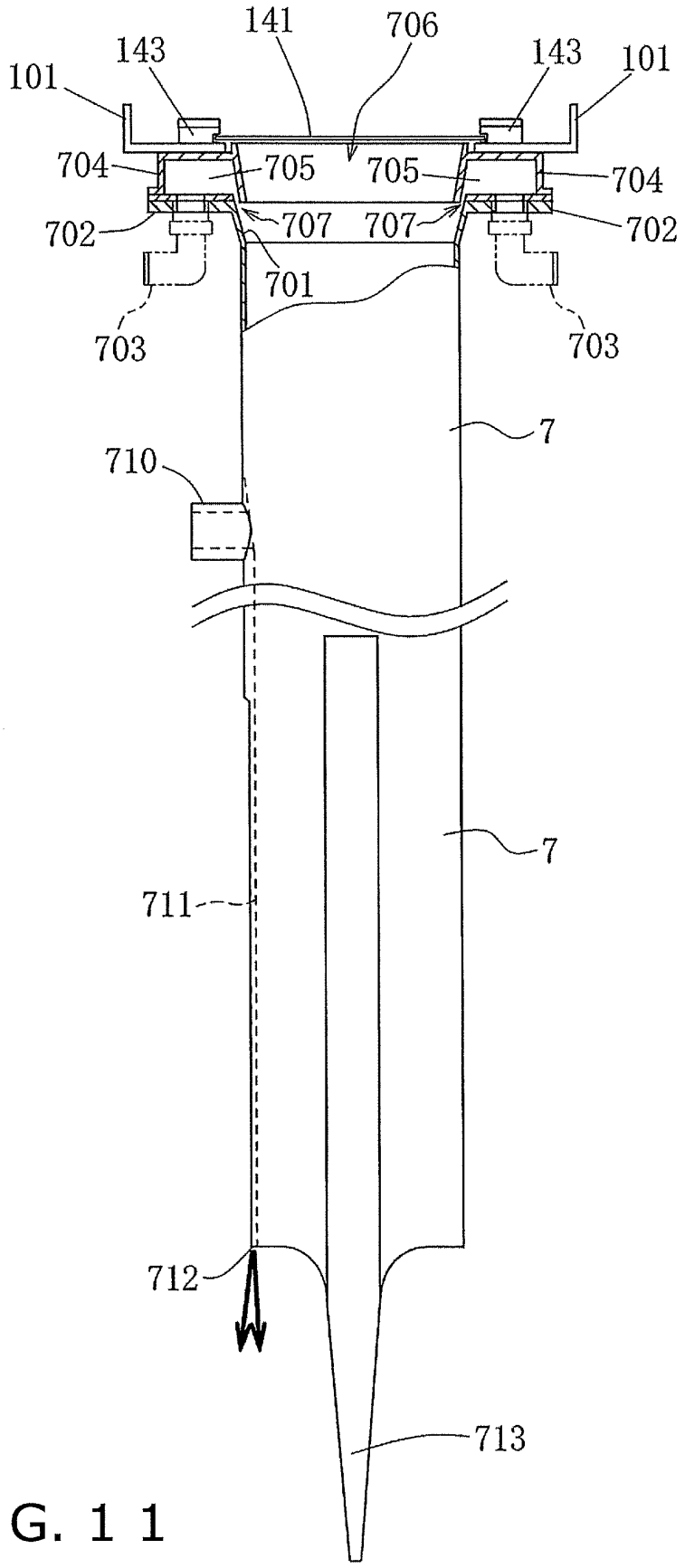
141
706
143
143
101
101
704
705
705
704
702
707
707
702
701
703
703
7
710
7
711
712
713

FIG. 11

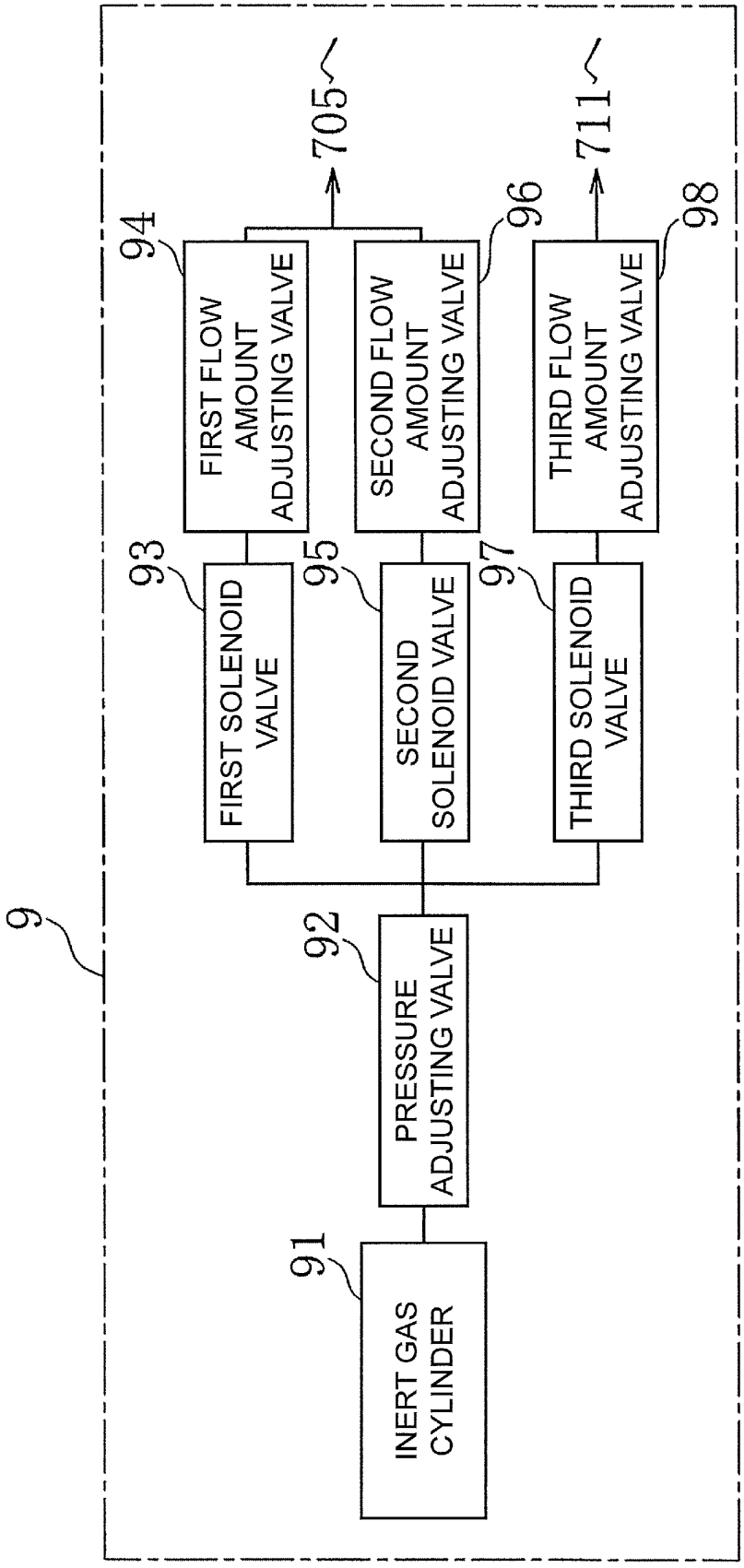
9
91
INERT GAS CYLINDER
92
PRESSURE ADJUSTING VALVE
93
FIRST SOLENOID VALVE
95
SECOND SOLENOID VALVE
97
THIRD SOLENOID VALVE
94
FIRST FLOW AMOUNT ADJUSTING VALVE
96
SECOND FLOW AMOUNT ADJUSTING VALVE
98
THIRD FLOW AMOUNT ADJUSTING VALVE
705
711

FIG. 12

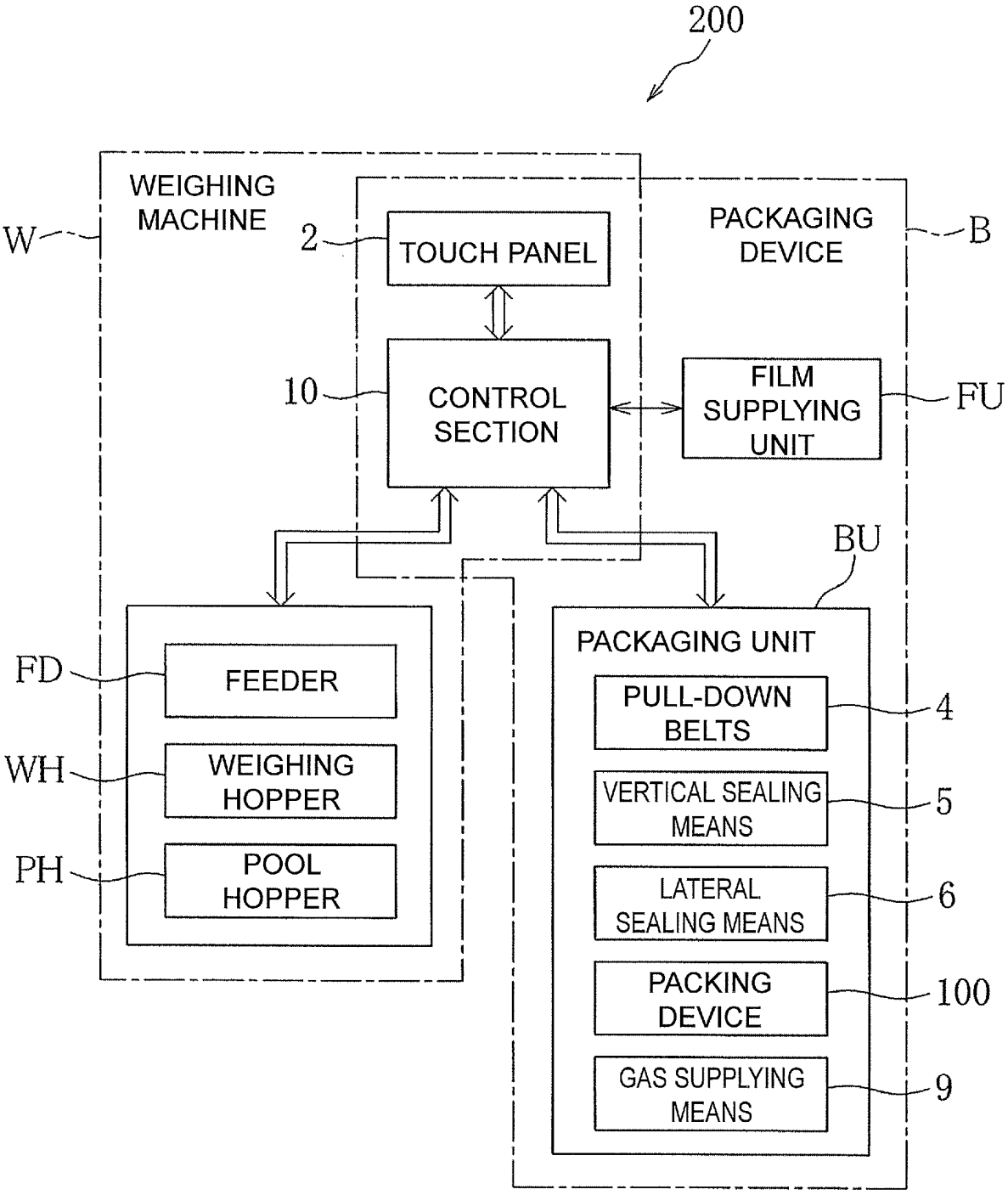
200
WEIGHING MACHINE
W
2
TOUCH PANEL
PACKAGING DEVICE
B
10
CONTROL SECTION
FILM SUPPLYING UNIT
FU
BU
PACKAGING UNIT
FD
FEEDER
PULL-DOWN BELTS
4
WH
WEIGHING HOPPER
VERTICAL SEALING MEANS
5
PH
POOL HOPPER
LATERAL SEALING MEANS
6
PACKING DEVICE
100
GAS SUPPLYING MEANS
9

FIG. 13

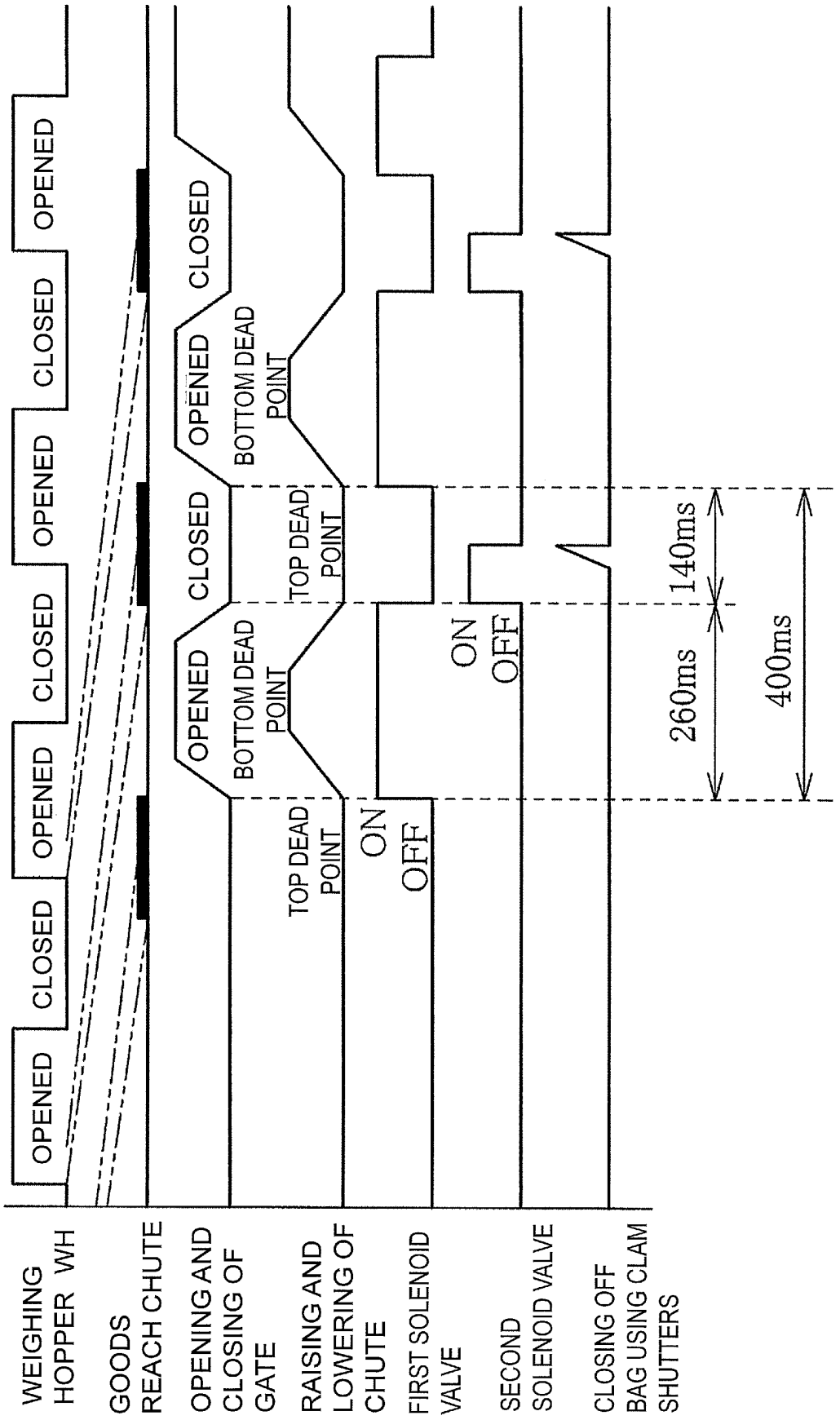
WEIGHING HOPPER WH
OPENED
CLOSED
OPENED
CLOSED
OPENED
CLOSED
OPENED
GOODS REACH CHUTE
OPENING AND CLOSING OF GATE
OPENED
BOTTOM DEAD POINT
CLOSED
OPENED
BOTTOM DEAD POINT
CLOSED
RAISING AND LOWERING OF CHUTE
TOP DEAD POINT
TOP DEAD POINT
FIRST SOLENOID VALVE
ON
OFF
ON
OFF
SECOND SOLENOID VALVE
CLOSING OFF BAG USING CLAM SHUTTERS
140ms
260ms
400ms

FIG. 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/064028

A. CLASSIFICATION OF SUBJECT MATTER
B65B39/14(2006.01)i, *B65B9/20*(2012.01)i, *B65B31/04*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65B37/00-39/14, B65B9/00-9/24, B65B31/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014
Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2012-236650 A (Sanko Machinery Co., Ltd.), 06 December 2012 (06.12.2012), entire text; all drawings (Family: none)	1-7
A	JP 38-023593 Y1 (Tokyo Automatic Machinery Works, Ltd.), 07 November 1963 (07.11.1963), entire text; all drawings (Family: none)	1-7
A	JP 59-134117 A (Sumitomo Electric Industries, Ltd.), 01 August 1984 (01.08.1984), entire text; all drawings (Family: none)	1-7

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

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 July, 2014 (30.07.14)	12 August, 2014 (12.08.14)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/064028

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 50-011837 B1 (Mira-Pak, Inc.), 07 May 1975 (07.05.1975), entire text; all drawings & US 3548563 A & GB 1243441 A & DE 6916834 U & DE 1921236 A1 & FR 2015486 A1 & CH 503615 A & SE 349533 B	1-7
A	US 5505040 A (ROBERT BOSCH GMBH), 09 April 1996 (09.04.1996), entire text; all drawings & EP 648673 A1 & DE 4335577 A1	1-7
A	JP 2007-290735 A (Orihiro Engineering Co., Ltd.), 08 November 2007 (08.11.2007), entire text; all drawings (Family: none)	1-7
A	JP 2013-039974 A (Ishida Co., Ltd.), 28 February 2013 (28.02.2013), entire text; all drawings & US 2012/0198799 A1 & EP 2484595 A1 & CN 202557820 U	1-7

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2013103753 A **[0003] [0081]**
- JP 2012140243 A **[0003] [0081]**
- JP 2009040488 A **[0003] [0081]**
- JP 2003081222 A **[0003] [0081]**
- JP 10053206 A **[0055]**