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• **NISHIMURA Noboru**
Kanazawa-shi
Ishikawa 920-0022 (JP)

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(71) Applicant: **Shibuya Machinery Co. Ltd.**
Ishikawa 920-0022 (JP)

(74) Representative: **Hodsdon, Stephen James**
Mewburn Ellis LLP
33 Gutter Lane
London
EC2V 8AS (GB)

(72) Inventors:
• **HASHIMOTO Mitsuo**
Kanazawa-shi
Ishikawa 920-0022 (JP)

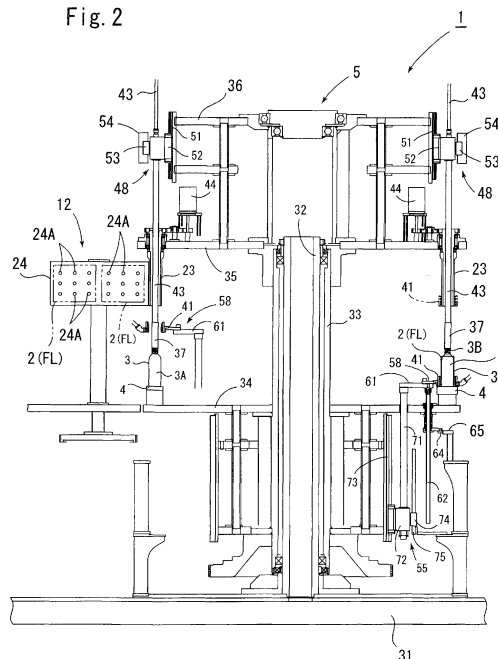
(54) **FILM LABEL-FITTING DEVICE**

(57) A film label 2 shaped into a cylindrical shape by a mandrel 23 is held by a picker 41 at an outer periphery of a lower end part thereof and is then fitted around a barrel 3A of a container 3.

In a fitting section E where the picker 41 fits the film label 2 around the container 3, the amount of vertical movement of the picker 41 can be changed depending on whether the picker 41 fits a full label FL around the container 3 or fits a half label HL around the container 3. Therefore, a single film label fitting apparatus 1 suffices for fitting both the full label FL and the half label HL around containers 3 having the same outer diameter.

The film label fitting apparatus 1 provided is highly versatile.

Fig. 2



Description

Technical Field

[0001] The present invention relates to a film label fitting apparatus. In particular, it relates to a film label fitting apparatus configured to shape a film label into a cylindrical shape before fitting the film label around the barrel of a container.

Background Art

[0002] Film label fitting apparatuses configured to fit a film label in a cylindrical shape around the barrel of a container are well known (see Patent Documents 1 and 2, for example).

[0003] The apparatus according to Patent Document 1 is configured to cut a film label in a band shape to a predetermined length, shaping the resulting film label into a cylindrical shape by wrapping the film label around a mandrel and fusing the opposite ends with each other, and then holding the film label in the cylindrical shape with a picker and lowering the film label to fit the film label around the outer periphery of a container. The apparatus according to Patent Document 1 is configured so that two, upper and lower, contact parts 36 of a pick-up device 33 hold a label 11 in the cylindrical shape at only two points vertically spaced apart from each other.

[0004] The apparatus according to Patent Document 2 can fit film labels in a cylindrical shape having different outer diameters (spread widths) around containers having different outer diameters.

Prior Art Documents

Patent Document

[0005]

Patent Document 1: National Publication of International Patent Application No. 2009-509871

Patent Document 2: Japanese Patent Laid-Open No. 2008-50018

Summary of Invention

Problems to be Solved by the Invention

[0006] The apparatus according to Patent Document 1 has a problem that the pick-up device 33 holds the film label 11 in the cylindrical shape with low stability, since the pick-up device 33 is configured to hold the film label 11 in the cylindrical shape at only two points vertically spaced apart from each other. In addition, when the apparatus according to Patent Document 1 is to handle a film label in the cylindrical shape having a shorter vertical dimension (length), the pick-up device 33 needs to be replaced with another pick-up device 33 suitable for the

length.

[0007] According to Patent Document 2, film labels in the cylindrical shape having different outer diameters (spread widths) can be fitted around containers. However, handling of film labels having different vertical dimensions is not taken into consideration.

Means for Solving the Problems

[0008] In view of the circumstances described above, the present invention provides a film label fitting apparatus comprising: a rotator that is rotatably provided; a plurality of mounts provided on the rotator on which containers are mounted; supporting members that are provided above the respective mounts so as to be capable of being raised and lowered with respect to the mounts and support mouths of the containers to hold the containers between the supporting members and the mounts; mandrels that are provided for the respective mounts on the rotator to hold and shape film labels into a cylindrical shape; pickers that are disposed on the respective mandrels and hold, from outside, the film labels shaped into the cylindrical shape by the mandrels; and raising and lowering mechanisms that raise and lower the pickers between the level of the mandrels and the level of the containers on the mounts when the rotator rotates, the containers mounted on the mounts being conveyed as the rotator rotates, and the film labels shaped into the cylindrical shape by the mandrels being held by the pickers and fitted around barrels of the containers placed below, characterized in that the pickers are configured to hold outer peripheries of the film labels shaped into the cylindrical shape by the mandrels and fit the film labels around the barrels of the containers, an adjustment mechanism that changes the amount of movement of the pickers is provided in a fitting section where the pickers fit the film labels in the cylindrical shape around the barrels of the containers, and the adjustment mechanism is capable of changing the level at which fitting of the film labels by the pickers occurs in the fitting section to accommodate a difference in vertical dimension of the film labels in the cylindrical shape.

Advantageous Effects of Invention

[0009] With the configuration described above, when the film labels shaped into the cylindrical shape have different vertical dimensions, the adjustment mechanism can change the level at which fitting of the film labels by the pickers occur, so that the film labels having different vertical dimension can be fitted around the containers. Thus, the present invention can provide a highly versatile film label fitting apparatus.

Brief Description of the Drawings

[0010]

[Figure 1] Figure 1 is a schematic plan view showing an embodiment of the present invention.

[Figure 2] Figure 2 is a cross-sectional view of essential parts taken along the line II-II in Figure 1.

[Figure 3] Figures 3 show relative positions of film labels and containers to be handled by a label fitting apparatus shown in Figure 1, Figure 3(a) showing a case where a full label FL is fitted around a container, and

Figure 3(b) showing a case where a half label HL is fitted around a container.

[Figure 4] Figure 4 is an enlarged view of essential parts shown in Figure 1.

[Figure 5] Figure 5 is an enlarged view of essential parts shown in Figure 1.

[Figure 6] Figure 6 is an enlarged view of a picker shown in Figure 1.

[Figure 7] Figure 7 is a front view of essential parts shown in Figure 1.

[Figure 8] Figures 8 are diagrams for illustrating an operation of the label fitting apparatus shown in Figure 1 fitting the full label FL around the container.

[Figure 9] Figures 9 are diagrams for illustrating an operation of the label fitting apparatus shown in Figure 1 fitting the half label HL around the container.

[Figure 10] Figure 10 is a cross-sectional view of essential parts according to another embodiment of the present invention.

Mode for Carrying out the Invention

[0011] In the following, the present invention will be described with regard to embodiments shown in the drawings. In Figures 1 and 2, a film label fitting apparatus 1 is configured to cut a roll-fed film label 2 to a predetermined length, shape the cut film label 2 into a cylindrical shape and fit the film label 2 in the cylindrical shape around a barrel 3A of a container 3 having a circular cross section. The film label 2 is referred to also as a shrink label and is placed around the barrel 3A of the container 3, which is a plastic bottle, and then is heated to shrink and be tightly fitted on the outer periphery of the barrel 3A.

[0012] The film label fitting apparatus 1 according to an embodiment comprises a labeler main unit 5 that rotates clockwise to convey containers 3 supported on respective mounts 4 and fits a film label 2 in a cylindrical shape around the barrel 3A of each container 3, a feeding star wheel 11 that feeds the containers 3 onto the respective mounts 4 in the labeler main unit 5 at a feed position A, label feeding means 12 that cuts the roll-fed film label 2 to a predetermined length and feeds the cut film label 2 to the labeler main unit 5, and a discharging star wheel 13 that discharges the containers 3 off the respective mounts 4 at a discharge position B.

[0013] The film label fitting apparatus 1 performs a process that begins with shaping the film label 2 cut to a predetermined length into a cylindrical shape and ends with fitting the film label 2 around the barrel 3A of the

container 3 placed below the film label 2. The container 3 discharged off the mount 4 in the labeler main unit 5 by the discharging star wheel 13 is then conveyed to a subsequent process (not shown), in which the film label 2 in the cylindrical shape fitted around the barrel 3A of the container 3 is heated to shrink and be tightly fitted on the outer periphery of the barrel 3A.

[0014] As described in detail later, the film label fitting apparatus 1 according to this embodiment is characterized by the capability of switching between fitting the film label 2 having a longer vertical dimension (a full label FL) around substantially the whole of the barrel 3A of the container 3 and fitting the film label 2 having a shorter vertical dimension (a half label HL) around only an upper part of the barrel 3A of the container 3 (see Figures 3(a) and 3(b)).

[0015] On the upstream side of the feeding star wheel 11, a feeding conveyer 14 that conveys a row of containers 3 in the standing position is disposed, and a timing screw 15 that spaces each container 3 on the feeding conveyer 14 away from the preceding and following containers 3 is provided.

[0016] On the downstream side of the discharging star wheel 13, a discharging conveyer 16 that receives the containers 3 from the discharging star wheel 13 and conveys the containers 3 to a subsequent process on the downstream side is provided.

[0017] Although not shown, the feeding star wheel 11 and the discharging star wheel 13 are each provided, on the outer periphery thereof, with a plurality of pockets that house and hold the containers 3. The feeding star wheel 11 is configured to successively feed the containers 3 spaced apart from each other by the timing screw 15 from the feeding conveyer 14 onto the mounts 4 at the feed position A. The discharging star wheel 13 is configured to discharge the containers 3 with the film label 2 fitted around the barrel 3A thereof off the mounts 4 and pass the containers 3 to the discharging conveyer 16 at the discharge position B.

[0018] The labeler main unit 5 is configured to rotate clockwise in Figure 1 and convey the containers 3 on the respective mounts 4 from the feed position A to the discharge position B, and the label feeding means 12 is disposed at a position outside of a label feed position C in the conveyance path of the containers 3.

[0019] The label feeding means 12 comprises a feed roller 21 that unrolls a length of film label 2 and feeds the film label 2, a rotary cutter 22 that successively cuts the roll-fed film label 2 to a predetermined length, and a feeding drum 24 that passes the film labels 2 having the predetermined length to respective mandrel 23 in the labeler main unit 5 at the label feed position C. The feed roller 21, the rotary cutter 22 and the feeding drum 24 are configured to rotate in synchronization with each other.

[0020] The label feeding means 12 further comprises an applying roller 25 that applies an UV curing adhesive to each film label 2 having the predetermined length cut by the rotary cutter 22. The applying roller 25 is disposed

adjacent to the outer periphery of the feeding drum 24. The applying roller 25 can be moved by a drive mechanism (not shown) between an advanced position and a retracted position. The applying roller 25 is in the advanced position when in operation and in the retracted position when not in operation.

[0021] As shown in Figure 2, a large number of suction holes 24A is formed in the outer surface of the feeding drum 24, and a suction is exerted on all the suction holes 24A through a negative pressure channel inside of the feeding drum 24. As a result, the film labels 2 cut to the predetermined length by the rotary cutter 22 are sucked and held to the outer surface of the rotating feeding drum 24. In this process, each film label 2 is sucked and held to the outer surface of the feeding drum 24 in a reverse state, in which the back surface of the film label 2 faces up.

[0022] As the feeding drum 24 rotates, the applying roller 25 is advanced at a predetermined time to apply the UV curing adhesive to the film label 2 sucked and held to the feeding drum 24. This process is designed so that the UV curing adhesive is applied to a rear end of each film label 2 held on the outer surface of the feeding drum 24.

[0023] The film labels 2 with the UV curing adhesive applied thereto are then passed from the feeding drum 24 to the respective mandrels 23 in the labeler main unit 5 at the label feed position C. In this embodiment, both the film label 2 having a longer vertical dimension (full label FL) and the film label 2 having a shorter vertical dimension (half label HL) are passed from the feeding drum 24 to the mandrel 23 with the lower end of the film label 2 being at substantially the same level as the lower end of the mandrel 23.

[0024] As described in detail later, each film label 2 passed to the mandrel 23 is held to wrap around the outer surface of the mandrel 23 and thereby shaped into a cylindrical shape with the front surface facing up and the rear end with the UV curing adhesive and the front end being overlaid one on another.

[0025] To harden the UV curing adhesive on the film label 2 in this state, UV irradiating means 26 is disposed at a hardening position D in the conveyance path of the mandrel 23. When the film label 2 in the cylindrical shape held on each mandrel 23 is conveyed to the hardening position D from the label feed position C, the UV irradiating means 26 emits UV rays to the overlaid parts (the UV curing adhesive) of the front end and the rear end of the film label 2 held on the mandrel 23. The UV curing adhesive between the front end and the rear end of the film label 2 in the cylindrical shape held on the mandrel 23 is then hardened, and the front end and the rear end overlaid one on another is firmly bonded to each other.

[0026] The label feeding means 12 is configured as described above, and the film labels 2 cut to the predetermined length to which the UV curing adhesive is applied successively are passed to the respective mandrels 23 in the rotating labeler main unit 5 at the label feed

position C.

[0027] Next, a configuration of the labeler main unit 5 will be described. The labeler main unit 5 comprises a central shaft 32 provided on a base 31 to stand in the vertical direction, a cylindrical member 33 rotatably provided on the central shaft 32 with a plurality of bearings interposed therebetween, three plates 34 to 36 fitted to the cylindrical member 33 in the horizontal position, a large number of mounts 4 provided on the outer periphery of the lowest plate 34 at regular intervals on which the containers 3 are to be mounted, mandrels 23 provided above the respective mounts 4 to shape the film label 2 into a cylindrical shape, supporting members 37 that are provided above the respective mounts 4 so as to be capable of being raised and lowered and each of which is to be fitted onto an upper end mouth 3B of the container 3, and pickers 41 that are provided on the respective mandrels 23 and each of which sucks and holds the outer periphery of a lower part of the film label 2 in the cylindrical shape formed around the mandrel 23 and fits the film label 2 around the barrel 3A of the container 3.

[0028] The plates 34 to 36 are integrated with each other by the cylindrical member 33 and can integrally rotate about the central shaft 32. Sets of the mount 4, the mandrel 23, the supporting member 37 and the picker 41 are provided at regular intervals along the circumference of the outer periphery of the plates 34 to 36.

[0029] The plates 34 to 36 rotate clockwise in Figure 1 at a constant speed by the action of a driving force of a motor (not shown), and the feeding star wheel 11 and the discharging star wheel 13 rotate in synchronization with the plates 34 to 36 by the action of transmission means (not shown).

[0030] The mounts 4 are fixed to the lowest plate 34, and mounting surfaces of the mounts 4, which are the upper surfaces thereof, are flat surfaces and are all kept at the same level.

[0031] As shown in Figures 2 to 4, a cylindrical member 42 is disposed above each mount 4 to vertically penetrate the outer periphery of the middle plate 35, which is located above the mounts 4, and the cylindrical member 42 is rotatably supported by a bearing. The mandrel 23 is hollow and cylindrical and is fitted around the outer periphery of the lower end of the cylindrical member 42.

[0032] A straight negative pressure pipe 43 is slidably passed through the cylindrical member 42, and the supporting member 37 is coupled to the lower end of the cylindrical member 42 passed through the cylindrical member 42 and the mandrel 23. The inside of the negative pressure pipe 43 constitutes a negative pressure channel 43A, and the negative pressure channel 43A is connected to a suction means (not shown) at the upper end thereof.

[0033] The mandrel 23 is manufactured to have a length conforming to the vertical length of the film label 2 to be treated. In this embodiment, in order that the mandrel 23 can be used with both the film label 2 having the longer vertical dimension (full label FL) shown in Figure

3(a) and the film label 2 having the shorter vertical dimension (half label HL) shown in Figure 3(b), the mandrel 23 has a length conforming to the vertical dimension of the film label 2 shown in Figure 3(a) (full label FL). In addition, the mandrel 23 is manufactured to have a slightly larger outer diameter than the barrel 3A of the container 3, so that the film label 2 shaped into a cylindrical shape by the mandrel 23 can be fitted around the barrel 3A of the container 3 with a slight clearance.

[0034] As shown in Figure 4, a large number of radial suction holes 23A is formed in the outer surface of the mandrel 23 at positions below the cylindrical member 42. The suction holes 23A are always in communication with a space S between the lower part of the inner surface of the mandrel 23 and the outer surface of the negative pressure pipe 43.

[0035] On the other hand, communication holes 43B in communication with the suction holes 23A via the space S are formed in the negative pressure pipe 43 at predetermined positions. When the suction means (not shown) is activated, a negative pressure is exerted on each suction hole 23A via the negative pressure channel 43A, the communication holes 43B and the space S, so that the film label 2 in the cylindrical shape can be sucked and held to the outer surface of the mandrel 23 in this state. In this embodiment, the outer surface of the mandrel 23 and the suction holes 23A formed therein constitute a holding section that holds the film label 2.

[0036] A servo motor 44 is provided on the middle plate 35 for each mandrel 23. The servo motor 44 is configured to rotate the cylindrical member 42 and the mandrel 23 via three gears 45 to 47.

[0037] The gear 47 is fitted on the upper end part of the cylindrical member 42, and the gear 45 is provided on a drive shaft of the servo motor 44. The gears 47 and 45 are engaged with the gear 46, which is rotatably provided on the middle plate 35.

[0038] With such a configuration, when the drive shaft of the servo motor 44 rotates, the gears 45 to 47 also rotate in association to make the cylindrical member 42 and the mandrel 23 rotate (revolve). The servo motor 44 makes the mandrel 23 rotate when the film label 2 is to be passed from the feeding drum 24 at the label feed position C.

[0039] Next, the supporting member 37 that holds the upper end mouth 3B of the container 3 will be described. As shown in Figure 4, the supporting member 37 has a cylindrical shape and substantially the same outer diameter as the negative pressure pipe 43 and is coupled to the lower end of the negative pressure pipe 43 and raised and lowered by a raising and lowering mechanism 48.

[0040] As shown in Figure 2, a sliding member 52 that is raised and lowered along a slide rail 51, which is fixed to the plate 36, is coupled to an upper part of the negative pressure pipe 43. The sliding member 52 is provided with a first cam follower 53.

[0041] A first cam 54 is disposed outside of and adjacent to the plate 36 so as to surround the labeler main

unit 5. The first cam follower 53 is engaged with the first cam 54. As a result, as the labeler main unit 5 rotates clockwise, the negative pressure pipe 43 and the supporting member 37 coupled to the lower end of the negative pressure pipe 43 is raised and lowered along a cam groove of the first cam 54. As a result, as the labeler main unit 5 rotates to convey the mounts 4 on which the containers 3 are mounted, the supporting member 37 can be fitted onto the upper end mouth 3B of the container 3 on the mount 4 in a predetermined region in the conveyance path and can be moved to an upward position so as to be spaced apart from the upper end mouth of the container 3 at the feed position A and the discharge position B. Once the supporting member 37 is fitted onto the mouth 3B of the container 3, the container 3 is held between the mount 4 and the supporting member 37. The raising and lowering mechanism 48 is configured as described above.

[0042] In this embodiment, the mount 4 is fixed, and the supporting member 37 is raised and lowered. As an alternative, however, the supporting member 37 may be fixed, and the mount 4 may be raised and lowered.

[0043] Next, the picker 41 that holds the film label 2 in the cylindrical shape held on the mandrel 23 and fits the film label 2 around the container 23, a raising and lowering mechanism 55 that raises and lowers the picker 41, and an adjustment mechanism 56 that changes the amount of raising or lowering of the picker 41 at a fitting position E will be described.

[0044] Specifically, as shown in Figures 2 and 5 to 6, the picker 41 comprises a pair of left and right arms 57 each having a semicircular holding part 57A at a tip end thereof, and the pair of arms 57 are opened and closed by an open/close mechanism 58.

[0045] The holding parts 57A of the arms 57 are dimensioned so that the inner diameter of the circle formed by the holding parts 57A closed together is slightly larger than the outer diameter of the barrel 3A of the container 3. The arms 57 are opened and closed by the open/close mechanism 58 and raised and lowered by the raising and lowering mechanism 55 between a position where the lower ends of the holding parts 57A is located at substantially the same level as the lower end of the mandrel 23 (a raising limit position, see the imaginary line in Figure 4) and a position where the lower ends of the holding parts 57A is located at a level higher than and close to the mounting surface of the mount 4 (a lower limit position, see Figure 5).

[0046] The vertical dimension of the holding parts 57A is shorter than the vertical dimensions of the full label FL and the half label HL as shown in Figures 8 and 9. Therefore, when the outer periphery of the lower end of the full label FL or the half label HL is held by the holding parts 57A of the picker 41, a part of the label extends off the upper edge of the holding parts 57A, whether the label is the full label FL or the half label

FL.

[0047] As shown in Figure 6, a plurality of suction holes 57B are formed in the inner surface of the holding parts 57A of the picker 41 and are in communication with suction means (not shown) via a tube (not shown) connected to the outside of the arms 57. If the suction means is activated in the state where the picker 41 is closed, and the film label 2 in the cylindrical shape on the mandrel 23 is surrounded by the holding parts 57A located outside of and close to the film label 2, a negative pressure is exerted on the suction holes 57B in the holding parts 57A. Because of the negative pressure, the film label 2 in the cylindrical shape are sucked and held to the holding parts 57A of the picker 41.

[0048] Next, the open/close mechanism 58 that opens and closes the arms 57 of the picker 41 will be described. The open/close mechanism 58 comprises a supporting plate 61 that is provided with the arms 57 and is raised and lowered by the raising and lowering mechanism 55, an open/close rod 62 that is disposed to vertically penetrate the lowest plate 34 and is coupled to a base part of one of the arms 57 at the upper end part thereof, a lever 63 that rotates the open/close rod 62, a second cam follower 64 provided on a tip end of the lever 63, and a second cam 65 that is fixed to the base 31 and engaged with the second cam follower 64.

[0049] The two arms 57 each have a gear 57C in a base part thereof, and the gears 57C are engaged with each other (see Figure 6). Therefore, when one of the arms 57 rotates by the action of the open/close rod 62, the other arm 57 also rotates in association with the arm 57, and the holding parts 57A are opened and closed, that is, the picker 41 is opened and closed.

[0050] As shown in Figure 5, a stepped cylindrical sleeve 67 is rotatably fitted in a through-hole in the plate 34 with a bearing 66 interposed therebetween. The outer periphery of the open/close rod 62 is fitted into a spline groove in the inner surface of the sleeve 67. As a result, the open/close rod 62 can be raised and lowered with respect to the sleeve 67 but cannot rotate with respect to the sleeve 67. That is, the open/close rod 62 and the sleeve 67 integrally rotate by the action of the bearing 66. The lever 63 is coupled to the lower end of the sleeve 67, and the second cam follower 64 is attached to the tip end of the lever 63.

[0051] The open/close mechanism 58 is configured as described above. As the labeler main unit 5 rotates, when the second cam follower 64 is engaged with the second cam 65, the lever 63 swings to rotate the open/close rod 62 along with the sleeve 67. By this rotation, the pair of arms 57 and the holding parts 57A are opened and closed by the action of the two gears 57C. In this way, as the labeler main unit 5 rotates, the picker 41 is opened and closed by the open/close mechanism 58 in a predetermined region of the conveyance path of the container 3.

[0052] Next, the raising and lowering mechanism 55 that raises and lowers the picker 41 will be described. As

shown in Figures 2 to 5, the raising and lowering mechanism 55 comprises a raising and lowering rod 71 that is disposed to vertically penetrate the lowest plate 34 and coupled to the supporting plate 61 at the upper end part thereof, a sliding member 72 coupled to the lower end of the raising and lowering rod 71, a slide rail 73 that is fixed to the plate 34 and guides raising and lowering of the sliding member 72, a third cam follower 74 provided on the sliding member 72, and a third cam 75 that is disposed to surround the central shaft 32 and engaged with the third cam follower 74.

[0053] As the labeler main unit 5 rotates clockwise, the third cam follower 74 and the sliding member 72 are raised and lowered along a cam groove of the third cam 75, and therefore, the picker 41 is also raised and lowered between the lower limit position at which the picker 41 surrounds the barrel 3A of the container 3 on the mount 4 and the raising limit position at which the picker 41 surrounds the outer periphery of the lower end of the mandrel 23 as shown by the imaginary line in Figures 2 and 4.

[0054] In this embodiment, the film label 2 cut to a predetermined length is shaped into a cylindrical shape to surround the outer periphery of the mandrel 23, the picker 41 then holds the film label 2 in the cylindrical shape and fits the film label 2 around the barrel 3A of the container 3. In this respect, it is convenient that the picker 41 can be used to fit both the film label 2 having the longer vertical dimension (full label FL) and the film label 2 having the shorter vertical dimension (half label HL) around the container 3, even if the barrels 3A of the containers 3 have the same outer diameter.

[0055] To this end, in this embodiment, in the fitting section E in which the pickers 41 sucks and holds the outer peripheries of the lower ends of the film labels 2 in the cylindrical shape and fits the film labels 2 around the containers 3, the adjustment mechanism 56 is provided to change the level of the lowering limit of the picker 41 depending on whether the picker 41 is to fit the full label FL around the barrel 3A of the container 3 in such a manner that the lower end of the full label FL covers the lower end of the barrel 3A of the container 3 or the picker 41 is to fit the half label HL around the barrel 3A of the container 3 in such a manner that the lower end of the half label HL covers a part above the lower end of the barrel 3A of the container 3 (see Figures 1 and 7).

[0056] Figure 7 schematically shows the third cam 75 and the adjustment mechanism 56. The third cam 75 comprises a single cam groove as a movement path in the other region than the fitting section E.

[0057] On the other hand, in the fitting section E, the third cam 75 comprises a lower first cam groove 82A that constitutes a path for the full label FL and a lower second cam groove 82B that constitutes a path for the half label HL, which are switchable.

[0058] The adjustment mechanism 56 comprises a cam plate 82 in which the two different cam grooves described above are formed, and an air cylinder 83 that

raises the cam plate 82 to the upper position for the full label FL and lowers the cam plate 82 to the lower position for the half label HL in an alternate manner.

[0059] When the air cylinder 83 positions the cam plate 82 at the upper position, the third cam follower 74 is raised and lowered along the first cam groove 82A in the fitting section E. Therefore, the amount of vertical movement of the picker 41 in the fitting section E is at the maximum. More specifically, the picker 41 moves between the raising limit position and the position of the lower end of the outer periphery of the barrel 3A of the container 3 on the mount 4 (the lower limit position).

[0060] On the other hand, when the air cylinder 83 positions the cam plate 82 at the lower position as shown in Figure 7, the third cam follower 74 is raised and lowered along the second cam groove 82B. Therefore, the amount of vertical movement of the picker 41 in the fitting section E is smaller. More specifically, the picker 41 moves between the raising limit position and the lowering limit position, which is at the level of the middle of the barrel 3A of the container 3 on the mount 4 (see Figure 9(e)).

[0061] At the raised position shown in Figure 7, the picker 41 is only lowered to the middle of the barrel 3A of the container 3 when the picker 41 is to hold the film label in the cylindrical shape and fit the film label around the barrel 3A (see Figure 9(e)). Therefore, in this case, the half label HL is fitted around the part of the barrel 3A of the container higher than the middle thereof. That is, the lower end of the half label HL is located above the lower end of the barrel 3A of the container 3.

[0062] In this state where the half label HL covers the part of the barrel 3A of the container 3 higher than the middle thereof, if the introduction of the negative pressure to the picker 41 is stopped to release the half label HL, the half label HL may fall to the lower end of the outer periphery of the barrel 3A of the container 3 or may be tilted even if it does not fall.

[0063] To avoid this, in this embodiment, a hot air blower nozzle 84 is provided to temporarily secure the half label HL once fitted around the barrel 3A of the container 3 to the barrel 3A when the picker 41 fits the half label HL around the barrel 3A. That is, as temporarily securing means, the hot air blower nozzle 84 facing to the container 3 on the mount 4 is disposed on the outer side of the fitting section E of the labeler main unit 5. When the picker 41 fits the film label 2 (half label HL) in the cylindrical shape around the upper part of the barrel 3A of the container 3, the hot air blower nozzle 84 blows hot air to a part of the half label HL on the container 3 higher than the part held by the picker 41. This causes the upper part of the half label HL to shrink and be temporarily secured to the upper part of the barrel 3A of the container 3. The half label HL temporarily secured in this way does not fall along the barrel 3A or is not tilted even if the picker 41 releases the half label HL.

[0064] When the film label 2 to be fitted around the barrel 3A of the container 3 is the full label FL, the full

label FL is fitted around substantially the whole of the barrel 3A of the container 3, and the lower end of the full label FL abuts against the mounting surface of the mount 4 (see Figure 5). Therefore, when the picker 41 fits the full label FL around the container 3, the hot air blower nozzle 84 as the temporarily securing means is not activated.

[0065] As an alternative to the heating means as the temporarily securing means, such as the hot air blower nozzle 84, a fine spray of water may be ejected to temporarily secure the half label HL by the action of the surface tension of the water. That is, any means that can temporarily secure the half label HL to the barrel 3A of the container 3 can be used.

[0066] In the following, an operation of the film label fitting apparatus 1 configured as described above fitting the film label 2 around the barrel 3A of the container 3 will be described. As described above, according to this embodiment, the film label 2 having the longer vertical dimension (full label FL) and the film label 2 having the shorter vertical dimension (half label HL) can be fitted around the containers 3 having the same outer diameter. In this respect, an operation of fitting the full label FL around the container 3 will be first described, and an operation of fitting the half label HL around the container 3 will be then described.

[0067] First, in the raising and lowering mechanism 55 that raises and lowers the picker 41, the adjustment mechanism 56 shown in Figure 7 raises the cam plate 82 so that the third cam follower 74 is engaged with the second cam groove 82A of the cam plate 82.

[0068] Next, in the state where the labeler main unit 5 is rotating clockwise, the feeding star wheel 11 feeds the containers 3 onto the mounts 4 in the feed position A in Figure 1 (see Figures 1 and 8(a)).

[0069] At this point, the supporting member 37 is retracted above the container 3 by the action of the first cam 54, and the picker 41 is also retracted to the level of the lower end of the outer periphery of the mandrel 23 by the action of the third cam 75 and is in the open state.

[0070] After that, the container 3 passes through the feed position A as the labeler main unit 5 rotates, and then, the supporting member 37 is lowered by the action of the first cam 54 and is fitted onto the mouth 3B of the container 3, and the container 3 is vertically held between the mount 4 and the supporting member 37 (see Figure 8(b)).

[0071] As the container 3 then moves to an upstream position close to the label feed position C, the picker 41 is lowered to the level of the mouth 3B of the container 3 by the action of the third cam 75 (see Figure 8(c)).

[0072] At this point, the second cam 65 of the open/close mechanism 58 that opens and closes the picker 41 maintains the picker 41 in the open state, and therefore, there is a clearance between the container 3 and the picker 41.

[0073] On the other hand, the label feeding means 12 is in the waiting state after the rotary cutter 22 cuts the

film label 2 fed by the feed roller 21 to a predetermined length, the film labels 2 having the predetermined length (full label FL) are held on the outer surface of the feeding drum 24, and the applying roller 25 applies the UV curing adhesive to the rear end of each full label FL (see Figure 2).

[0074] The container 3 and the mandrel 23 above the container 3 then reach the label feed position C, the servo motor 44 makes the mandrel 23 rotate. At this point, the suction holes 23A of the mandrel 23 are in communication with the operating suction means via the negative pressure pipe 43, so that the feeding drum 24 releases the full label FL and passes the full label FL to the mandrel 23 in such a manner that the lower end of the full label FL is located at substantially the same level as the lower end of the mandrel 23. Since the mandrel 23 is revolving, the full label FL passed to the mandrel 23 wraps around the outer surface of the mandrel 23 and is sucked and held thereto (see Figure 8(c)). Furthermore, the front end and the rear end of the full label FL are overlaid one on another, and the UV curing adhesive bonds the front end and the rear end overlaid one on another. That is, the film label 2 held on the outer surface of the mandrel 23 has a cylindrical shape.

[0075] The container 3 then moves to the hardening position D as the labeler main unit 5 rotates, the UV irradiating means 26 emits UV rays to the overlaid front and rear ends (UV curing adhesive) of the full label FL in the cylindrical shape held on the mandrel 23 (see Figures 1 and 8(c)). Then, the front and rear ends of the full label FL are firmly bonded to each other by the hardened UV curing adhesive, and the full label FL in the cylindrical shape is held on the outer surface of the mandrel 23.

[0076] As the container 3 passes through the hardening position D, the picker 41 is raised by the action of the third cam 75 until the lower end of the picker 41 is at substantially the same level as the lower end of the full label FL held on the mandrel 23 (the raising limit position), and the picker 41, which has been open, is closed by the action of the open/close mechanism 58 (see Figure 8(d)).

[0077] Once the picker 41 is closed, the suction holes 57B of the picker 41 come into communication with the operating suction means, so that the picker 41 sucks the full label FL, and the communication between the suction holes 23A of the mandrel 23 and the suction means is cut off. As a result, the full label FL is released from the mandrel 23, and the outer periphery of the lower end of the full label FL is sucked and held to the holding parts 57A of the picker 41 (see Figure 8(d)).

[0078] As the container 3 then moves to the fitting section E, the third cam follower 74 moves along the first cam groove 82A of the cam plate 82, so that the picker 41 holding the full label FL is lowered to the lower limit position on the mount 4, and thus the lower end of the full label FL is lowered to the lower end of the barrel 3A of the container 3 (see Figures 1 and 8(e)). As a result, the full label FL in the cylindrical shape held by the picker 41 is fitted around the whole of the barrel 3A of the con-

tainer 3.

[0079] In the case where the full label FL is fitted around the barrel 3A of the container 3 as described above, the lower end of the full label FL abuts against the mounting surface of the mount 4. Therefore, in the case where the full label FL is fitted around the container 3, the hot air blower nozzle 84 is not activated.

[0080] As the container then passes through the fitting section E, the communication between the suction holes 57B of the picker 41 and the suction means is cut off, and the picker 41 is opened by the open/close mechanism 58. Once the picker 41 releases the full label FL in this way, the picker 41 is then raised by the action of the third cam 75 until the lower end of the picker 41 is substantially at the level of the lower end of the mandrel 23 (the raising limit position), and is retracted above the container 3 (see Figure 8(f)).

[0081] When the container 3 around which the full label FL in the cylindrical shape is fitted then reaches the discharge position B, the supporting member 37 is raised by the action of the first cam 54 and is separated from the mouth 3B of the container 3, and the container 3 is discharged off the mount 4 and passed to the discharging conveyer 16 by the discharging star wheel 13 (see Figures 1 and 8(g)).

[0082] In this way, the film label 2 having the longer vertical dimension (full label FL) is shaped into the cylindrical shape and then fitted around the barrel 3A of the container 3.

[0083] The container 3 around which the full label FL is fitted is then fed to a shrink tunnel (not shown) by the discharging conveyer 16, where the full label FL is heated to shrink and be tightly fitted on the barrel 3A of the container 3 (see Figure 1).

[0084] Next, an operation of the film label fitting apparatus 1 fitting the film label 2 having the shorter vertical dimension (half label HL) around the upper part of the barrel 3A of the container 3 will be described.

[0085] In this case, first, the film label 2 in the label feeding means 12 is replaced with the half label HL. At the same time, the adjustment mechanism 56 in the fitting section E lowers the cam plate 82 so that the second cam groove 82B is engaged with the third cam follower 74 (see Figure 7). As a result, in the fitting section E, the picker 41 holding the lower end of the outer periphery of the half label HL fits the half label HL around the barrel 3A of the container 3 on the mount 4 with the lower end of the half label HL lowered to the level close to the middle of the barrel 3A, which is higher than the lower end of the barrel 3A (see figs. 9(d) and 9(f)).

[0086] In addition, in the fitting section E, the hot air blower nozzle 84 blows hot air to an upper part of the half label HL fitted around the barrel 3A of the container 3 (see Figure 9(e)). As a result, the upper part of the half label HL fitted around the barrel 3A of the container 3 shrinks and is temporarily secured to the upper end of the barrel 3A of the container 3.

[0087] The raising and lowering operation and the

opening and closing operation of the picker 41, the operation of the mandrel 23 and the raising and lowering operation of the supporting member 37 in the region other than the fitting section E are the same as those in the above-described case where the full label FL is fitted around the container 3, and detailed descriptions of those operations will be omitted (see Figures 9(a) to 9(g)).

[0088] In the case where the half label HL is fitted around the container 3, as in the case of the full label FL, the half label HL is sucked and held to the outer periphery of the lower end of the mandrel 23 with the lower end of the half label HL being at substantially the same level as the lower end of the mandrel 23 and thereby shaped into a cylindrical shape (see Figure 9(d)). The picker 41 then sucks and holds the outer periphery of the lower end of the half label HL in the cylindrical shape on the mandrel 23 (see Figure 9(d)) and is lowered along the second cam groove 82B of the cam plate 82, thereby fitting the half label HL around the part of the barrel 3A of the container 3 higher than the middle thereof (see Figures 9(d) to 9(f)).

[0089] In the case where the picker 41 fits the half label HL around the container 3 as described above, since the vertical dimension of the half label HL is approximately a half of the vertical dimension of the full label FL described earlier, so that a negative pressure leakage occurs through the suction holes 24A in the upper part of the feeding drum 24 holding the half label HL and through the section holes 23A in the upper part of the mandrel 23 holding the half label HL. However, according to this embodiment, the half label HL is held on the outer periphery of the feeding drum 24 and the mandrel 23 while allowing for the negative pressure leakage through the suction holes 24A in the upper part of the feeding drum 24 and the suction holes 23A in the upper part of the mandrel 23.

[0090] In handling of the half label HL, the negative pressure leakage through the suction holes 24A in the upper part of the feeding drum 24 and the suction holes 23A in the upper part of the mandrel 23 may be prevented. In that case, for example, the communication state of the negative pressure channel (not shown) that connects the suction holes 24A in the upper part of the feeding drum 24 and the suction holes 23A in the upper part of the mandrel 23 to the suction means can be switched by an electromagnetic switching valve depending on the dimension of the half label HL.

[0091] According to this embodiment described above, the raised position of the picker 41 does not change, whether the picker 41 is to fit the full label FL and the half label HL around the container 3, and the lowered position (fitting level) of the picker 41 can be changed by the adjustment mechanism 56 switching the level of the cam plate 82 between the raised position and the lowered position, whether the picker 41 is holding the outer periphery of the lower end of the full label FL or the half label HL. Thus, the single apparatus can handle both the full label FL and the half label HL and fit the labels around

the containers 3 having the same outer diameter.

[0092] Therefore, the film label fitting apparatus 1 provided according to this embodiment is highly versatile.

[0093] Although the picker 41 holds the outer periphery of the lower end of the full label FL and the half label HL in this embodiment, the present invention is not limited thereto, and the picker 41 may hold the outer periphery of a part of the film label slightly above the lower end thereof to fit the film label around the container 3. However, the picker 41 preferably holds the outer periphery of the lower end of the full label FL and the half label HL, because the possibility of failures, such as the film label 2 being caught on the container 3 and curling up during fitting, can be minimized.

[0094] Furthermore, although the mandrel 23 is disposed above the mount 4, and the picker 41 carries the film label 2 in the cylindrical shape downward and fits the film label 2 around the container 3 from above in this embodiment, the present invention is not limited to this arrangement, and the mandrel 23 and the picker 41 may be disposed below the mount 4, and the picker 41 may carry the film label 2 in the cylindrical shape upward and fit the film label 2 around the container 3 from below. In that case, the picker 41 sucks and holds the outer periphery of the upper end of the film label 2 in the cylindrical shape on the mandrel 23, and the diameters of the mount 4 and the mandrel 23 are slightly larger than the diameter of the container 3 to be handled.

[0095] In the first embodiment described above, a cam mechanism is used as the raising and lowering mechanism 55 for raising and lowering the picker 41. However, the raising and lowering mechanism 55 for raising and lowering the picker 41 may be a servo motor-driven mechanism or a linear drive mechanism such as one shown in Figure 10. More specifically, as shown in Figure 10, a vertical raising and lowering guide 107 is disposed so as to extend from a mount 104 to the level of a mandrel 123, and a supporting member 108 is attached to the raising and lowering guide 107 in such a manner that the supporting member 108 can be raised and lowered. Furthermore, a picker 141 having a pair of left and right arms 157 is attached to the supporting member 108 in such a manner that the picker 141 can be opened and closed. In this embodiment, the picker 141 can be raised and lowered by a linear drive source 109 raising and lowering the supporting member 108, and the level of the lowering limit of the picker 141 can be switched depending on whether the full label FL or the half label HL is handled in the fitting section E described above.

[0096] In the embodiment shown in Figure 10, a rotary actuator 128 and a pair of gears 129 provided on base parts of the arms 157 are used to open and close the arms 157 of the picker 141. The picker 141 can be opened and closed at a desired position by the rotary actuator 128 rotating the gears 129. In the embodiment shown in Figure 10, components corresponding to those in the first embodiment described earlier are denoted by the same reference numerals plus 100. The embodiment shown in

Figure 10 can provide the same effects and advantages as those of the first embodiment described earlier.

[0097] In the embodiments described above, the UV curing adhesive is used to bond the front and rear ends of the film label 2. As an alternative, however, the front and rear ends of the film label 2 may be bonded to each other with a hot melt adhesive or laser.

Reference Signs List

[0098]

- 1 film label fitting apparatus
- 2 film label
- FL full label
- HL half label
- 3 container
- 3A barrel
- 4 mount
- 5 labeler main unit (rotator)
- 23 mandrel
- 37 supporting member
- 41 picker

Claims

1. A film label fitting apparatus, comprising:

a rotator that is rotatably provided;
 a plurality of mounts provided on the rotator on which containers are mounted;
 supporting members that are provided above the respective mounts so as to be capable of being raised and lowered with respect to the mounts and support mouths of the containers to hold the containers between the supporting members and the mounts;
 mandrels that are provided for the respective mounts on the rotator to hold and shape film labels into a cylindrical shape;
 pickers that are disposed on the respective mandrels and hold, from outside, the film labels shaped into the cylindrical shape by the mandrels; and
 raising and lowering mechanisms that raise and lower the pickers between the level of the mandrels and the level of the containers on the mounts when the rotator rotates,
 the containers mounted on the mounts being conveyed as the rotator rotates, and the film labels shaped into the cylindrical shape by the mandrels being held by the pickers and fitted around barrels of the containers placed below,
characterized in that the pickers are configured to hold outer peripheries of the film labels shaped into the cylindrical shape by the mandrels and fit the film labels around the barrels of

the containers, and

an adjustment mechanism that changes the amount of movement of the pickers is provided in a fitting section where the pickers fit the film labels in the cylindrical shape around the barrels of the containers, and the adjustment mechanism is capable of changing the level at which fitting of the film labels by the pickers occurs in the fitting section to accommodate a difference in vertical dimension of the film labels in the cylindrical shape.

- 2. The film label fitting apparatus according to claim 1, **characterized in that** temporarily securing means that temporarily secure the film labels in the cylindrical shape fitted around the containers to the containers are provided at positions outside the fitting section, and
 when the picker fits a film label in the cylindrical shape having a shorter vertical dimension around a part of the barrel of the container higher than a lower end thereof, the temporarily securing means temporarily secures the film label with an outer periphery of a lower end of the film label being located above the lower end of the barrel of the container.
- 3. The film label fitting apparatus according to claim 1 or 2, **characterized in that** the raising and lowering mechanism comprises a cam disposed in the circumferential direction of the rotator and a cam follower that is provided on each picker and is engaged with a cam groove of the cam, and
 the adjustment mechanism comprises a cam plate disposed on the cam in the fitting section and having at least two different kinds of cam grooves, and an air cylinder that raises and lowers the cam plate.

Fig. 1

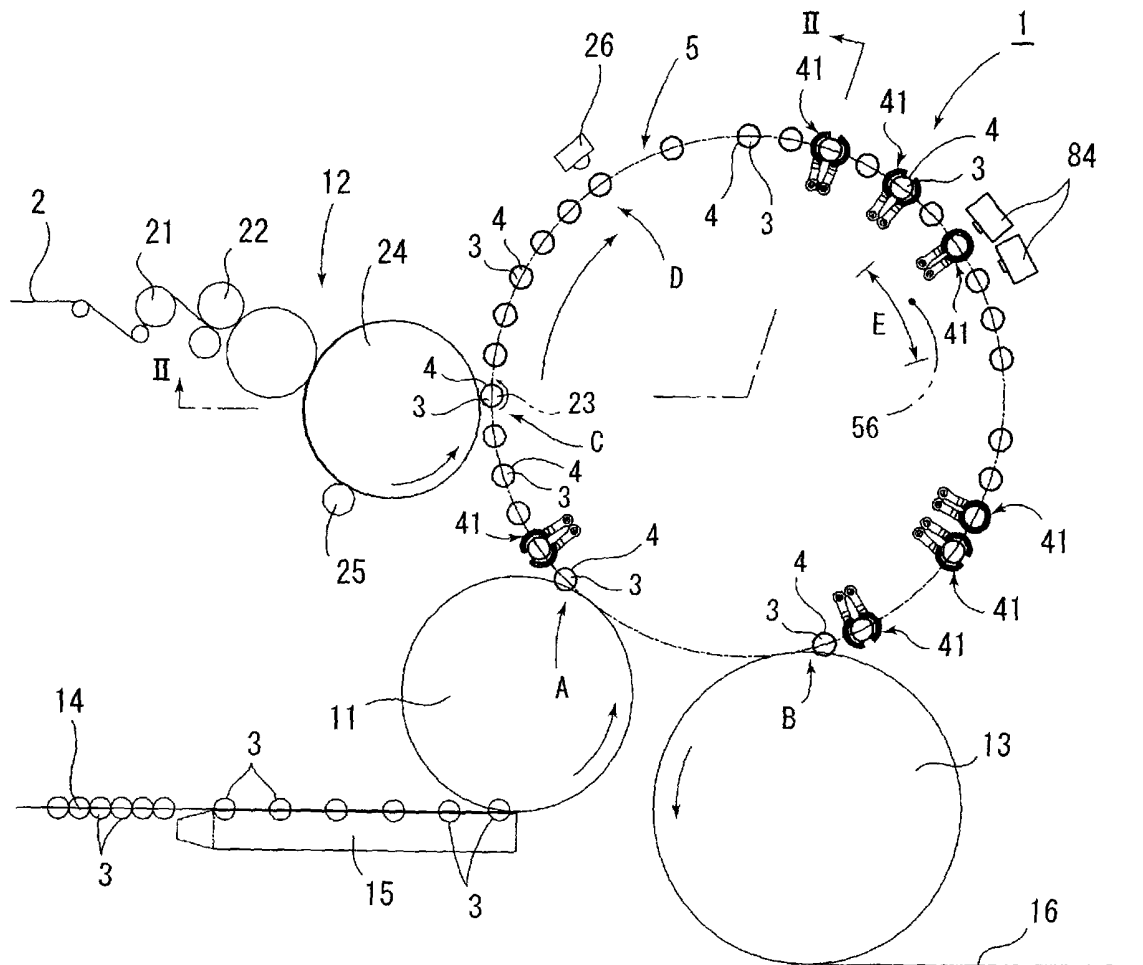


Fig. 2

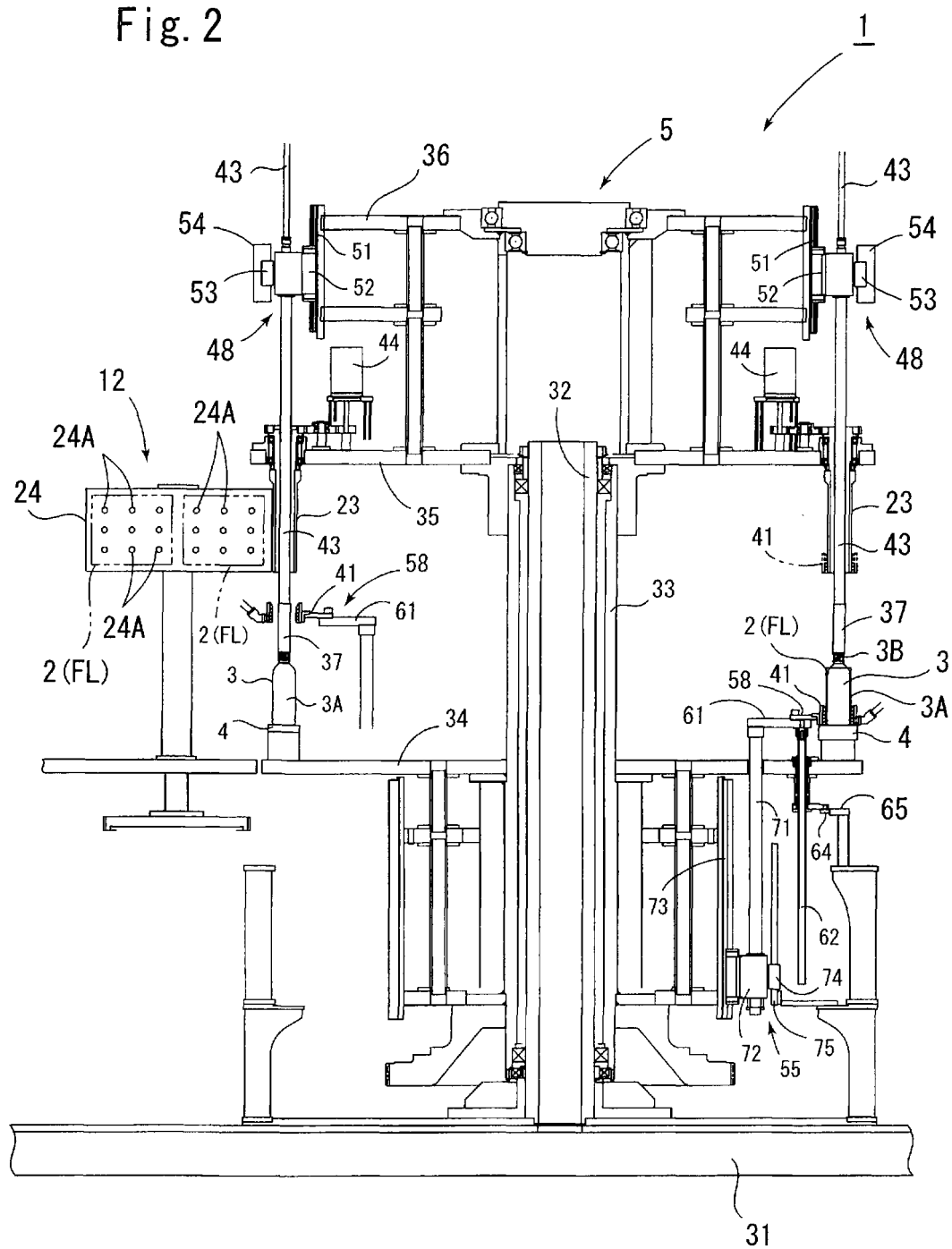


Fig. 3

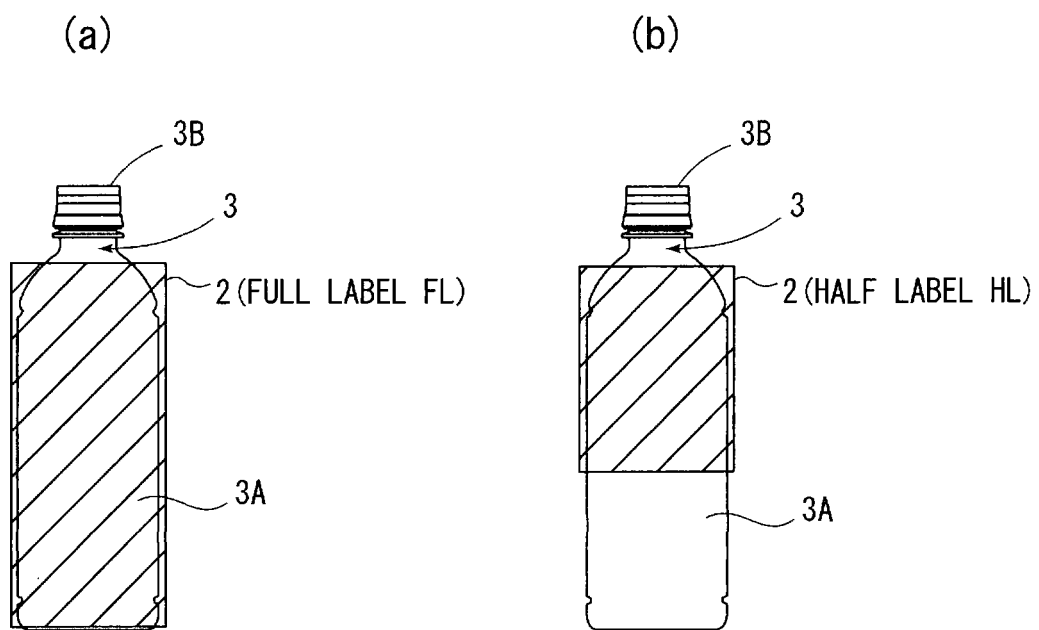


Fig. 4

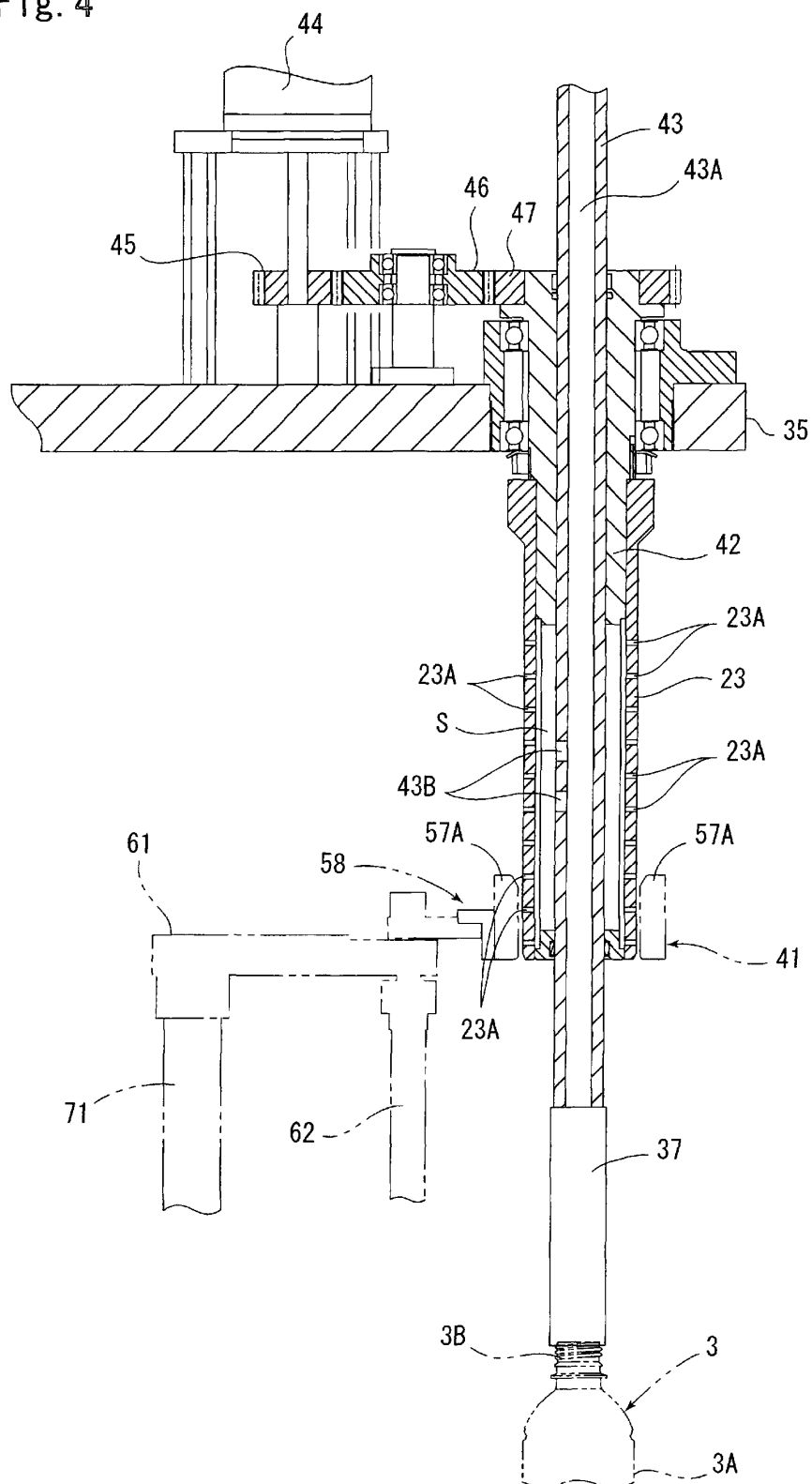


Fig. 5

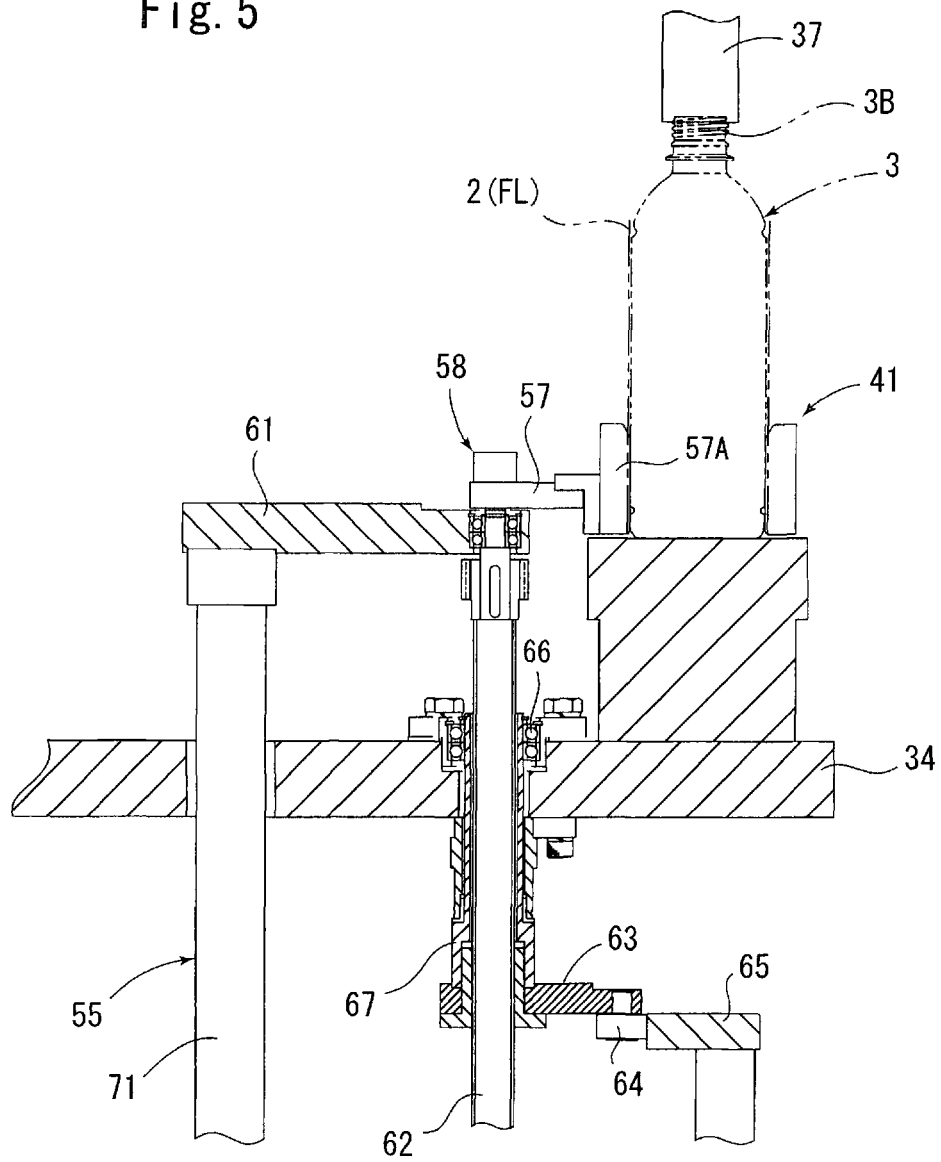


Fig. 6

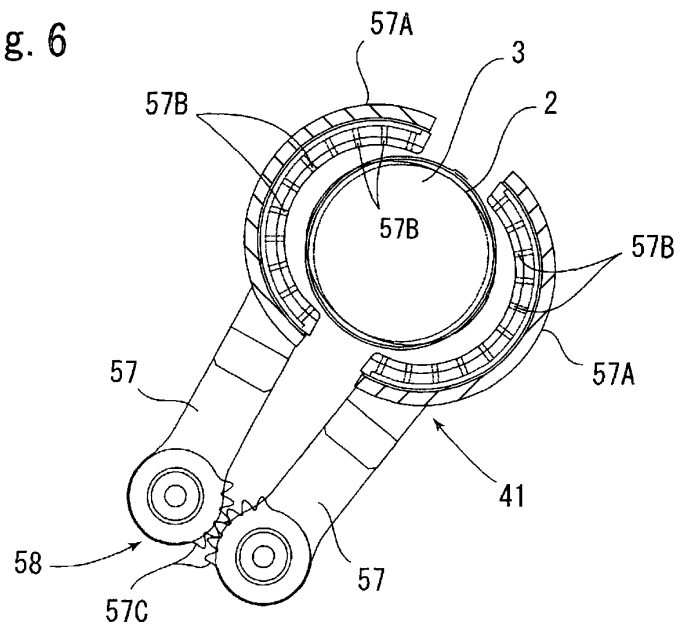


Fig. 7

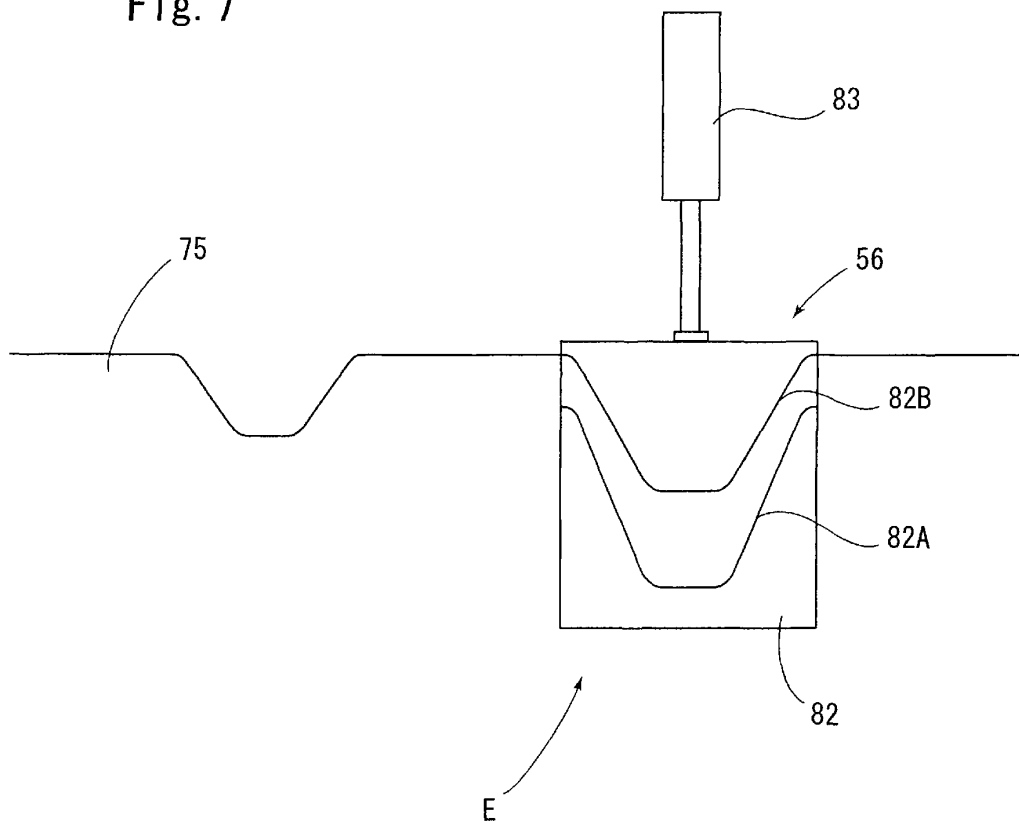


Fig. 8

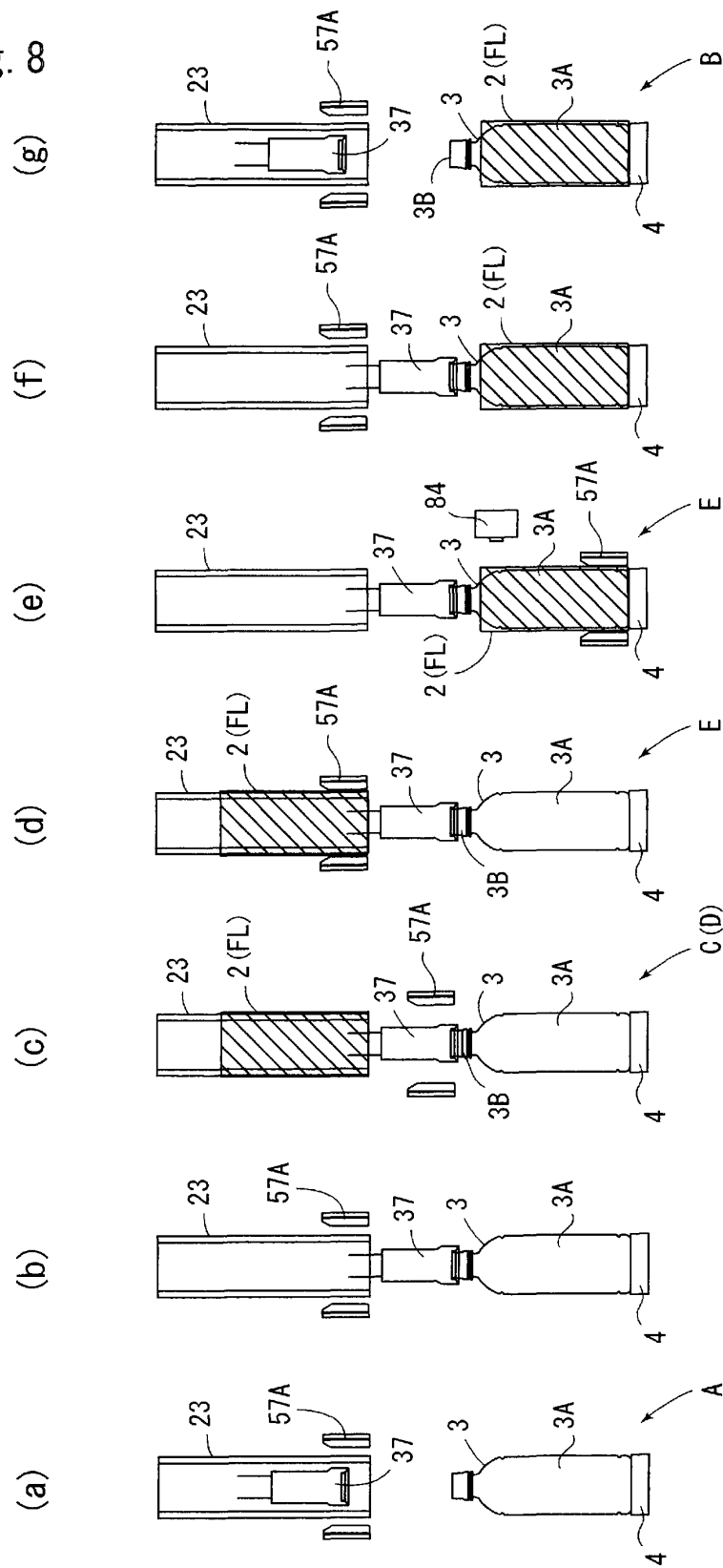


Fig. 9

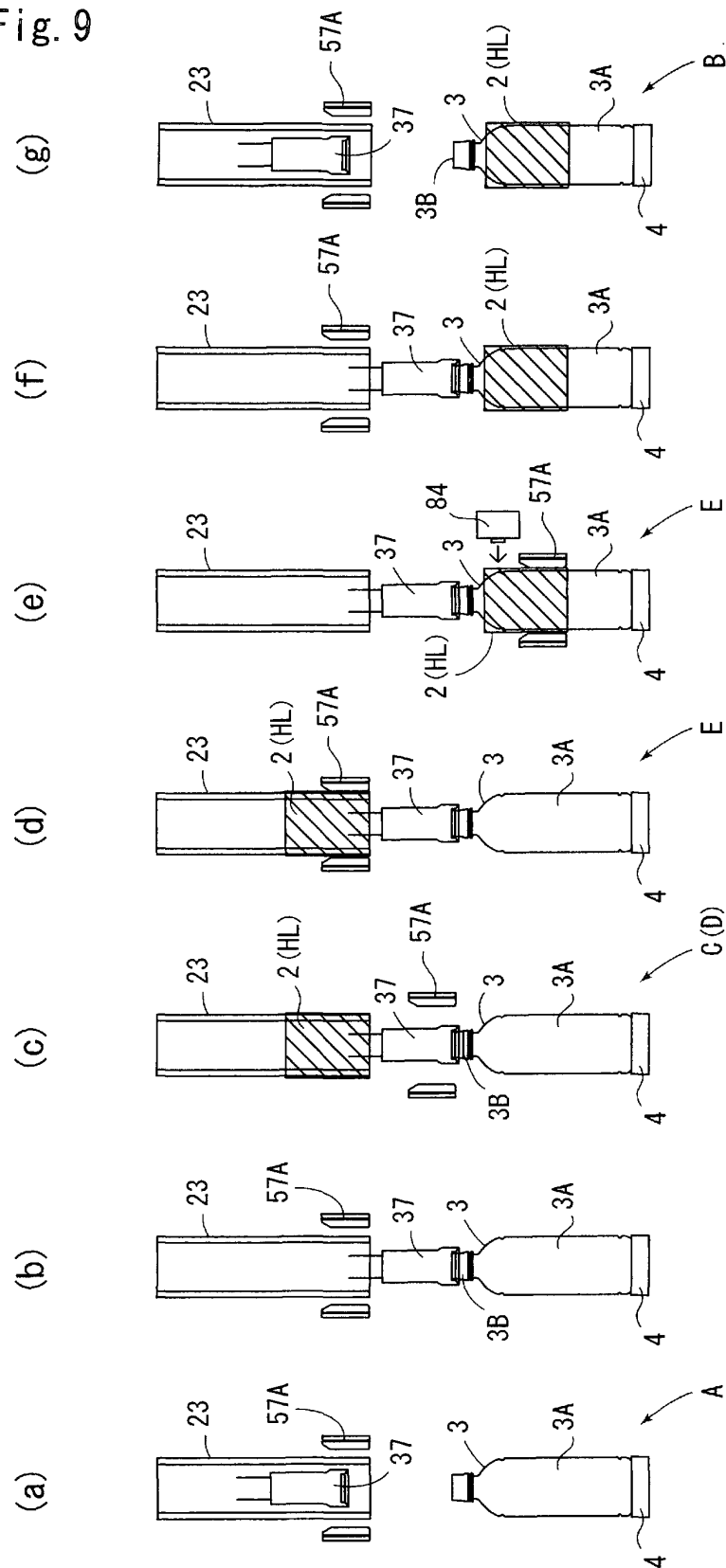
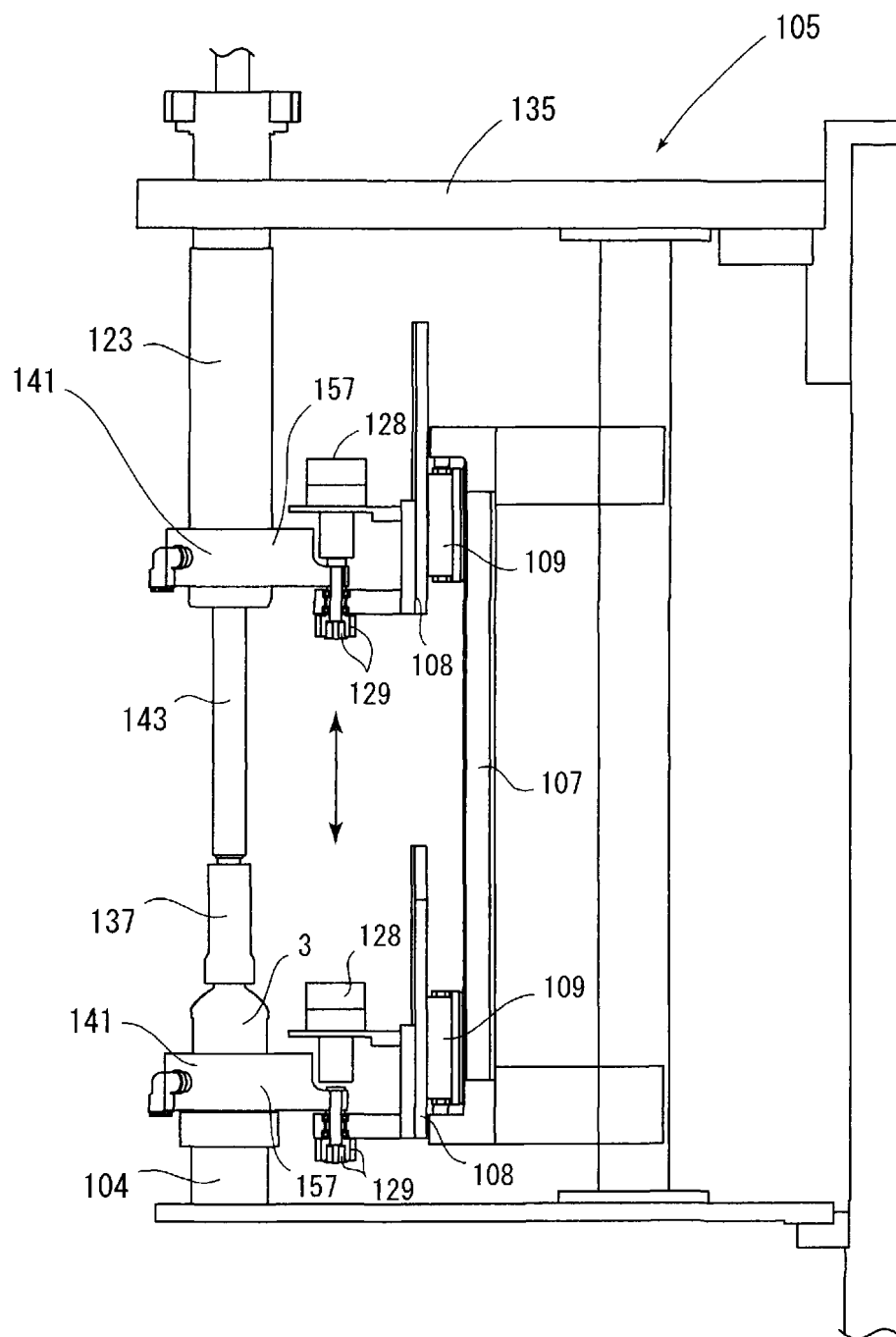


Fig. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/056973

| A. CLASSIFICATION OF SUBJECT MATTER B65B53/00(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) B65B53/00, B65C3/14 | | |
| 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 1996-2012 Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012 | | |
| 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 2004-161281 A (Tahara Machinery Ltd.), 10 June 2004 (10.06.2004), paragraphs [0037], [0071]; all drawings (Family: none) | 1-3 |
| A | JP 2007-314234 A (Shibuya Kogyo Co., Ltd.), 06 December 2007 (06.12.2007), claims; paragraph [0017]; all drawings (Family: none) | 1-3 |
| A | JP 4307064 B2 (Fuji Seal International, Inc.), 05 August 2009 (05.08.2009), entire text; all drawings (Family: none) | 1-3 |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex. | | |
| * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "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 18 June, 2012 (18.06.12) | | Date of mailing of the international search report 03 July, 2012 (03.07.12) |
| 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.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | JP 10-278909 A (Kabushiki Kaisha Sumiju Tekku), 20 October 1998 (20.10.1998), claims; fig. 1 to 2 (Family: none) | 1-3 |

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REFERENCES CITED IN THE DESCRIPTION

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