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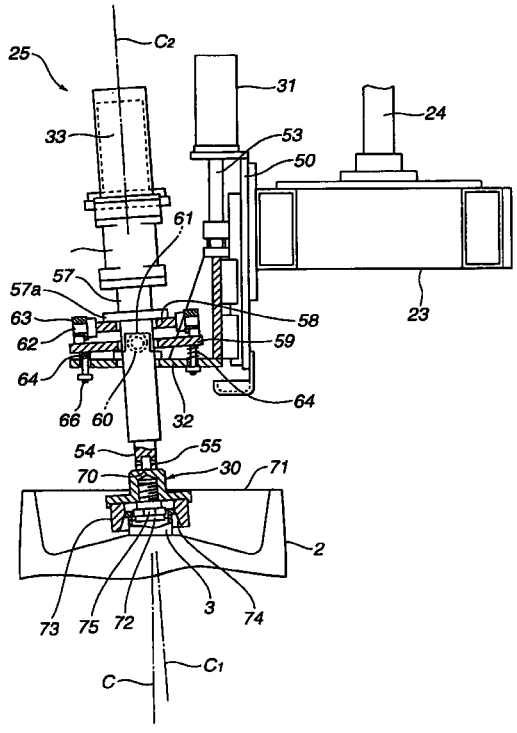
(54) FITTING CLAMPING DEVICE FOR PRESSURE VESSEL

(57) A filling fastening apparatus for fastening a filling mounted to a mouth piece 3 of a pressurized container 2 such as a beer barrel includes a fastening-torque generating apparatus constructed such that a base 32 is vertically movable to the pressurized container 2 by an up-and-down drive source 31 supported by an up-and-down frame 23, swing stands 58, 59 being mounted and fixed thereto to be swingable in the cross and longitudinal directions, a rotary drive source 33 being mounted to the swing stand 58, a fastening head 30 being detachably connected to a fastening output shaft 54 of the rotary drive source 33 extending under the base 32, a skirt 73 with a taper surface 74 drawing in the mouth piece 3 to engage a wrench 72 with a ratchet of the fitting.

Therefore, even when the axis of the fastening head does not coincide with the axis of a mouth piece of a beer barrel, the fastening head absorbs an inclination thereof, enabling fastening of a fitting.

FIG.4



EP 1 036 755 A1

Description

TECHNICAL FIELD

[0001] This invention relates to a fitting fastening apparatus for containers such as a beer barrel, and more particularly, to the apparatus that allows fastening of a fitting of the beer barrel in absorbing an inclination of a mouth piece thereof produced in the distribution process.

BACKGROUND ART

[0002] It is known that recycled barrels are mainly used in the barreling process of beer barrels, and that in view of a possibility of lowering the sealing performance of fittings of the beer barrels as pressurized containers in the distribution process, the fitting fastening (further fastening) process is needed in the barreling process to secure the container (product) quality. A fitting 1 is in the form of a pipe fitted in a mouth piece 3 of a beer barrel 2 as a pressurized container as shown, for example, in FIG. 8. It comprises, as shown in detail in FIG. 9, a bush 4 engaged with the mouth piece 3 through threaded portions 3a, 4a to be detachably mounted thereto, a gas valve 13 for opening/closing a passage of carbon dioxide in the bush 4, a down tube 5 biased by a coil spring 6 and having an upper end (flange portion 11) abutting on a gas valve 13, and a beer valve 14 biased by a coil spring 15 in the down tube 5 and abutting on a valve seat of the gas valve 13 formed at the inner edge of the lower end to define a beer passage.

[0003] The bush 4 is a cylindrical body wherein ratchets 4b, 4b having an upper opening edge engaged with a dispense head or a mounting jig are circumferentially formed at predetermined intervals. It has an inner stepped portion 7 formed in the vicinity of the upper opening, an outer stepped portion 8 formed substantially in the middle, a seal ring 9 interposed between the inner bottom faces of the mouth piece 3, and a hole 4d formed in the peripheral wall and for serving as a passage of carbon dioxide (upon injection). The down tube 5 is fitted in a lower hole 10. The bottom of the bush 4 has three bayonets 4e circumferentially equidistantly arranged at the inner peripheral edge. A retaining disk 12 is engagedly mounted to the bayonets 4e.

[0004] Thus, in order to automate the fitting fastening process, it can be assumed that the bush 4 is rotated by a rotatable fastening head with a wrench that is vertically movable to each of the mouth pieces 3 of the beer barrels carried by a conveyer equipment, and is inserted therein to be engaged with the ratchet 4b.

[0005] However, in that case, if the axis of the fastening head does not wholly coincide with the axis of the mouth piece 3 of the beer barrel 2, fastening of the bush 4 of the fitting 1 cannot be carried out. That is, as shown in FIG. 10, if the mouth piece 3 of the beer barrel 2 as recycled is inclined so that an axis C of the beer barrel 2 does not coincide with an axis C1 of the mouth piece 3 anywhere, and when said fastening head is moved up and down along the axis of the beer barrel 2, the axis C1 of the mouth piece 3 cannot coincide with the axis of the fastening head. Therefore, the fastening head cannot engage with the mouth piece 3, and the wrench of the fastening head cannot contact the ratchets 4b, 4b and thus cannot rotate them, resulting in possible occurrence of free turning.

[0006] Therefore, the mouth pieces 3 of the beer barrels 2 are visually observed by an operator, etc. for inspection of each. However, even when judging that it is normal by visual inspection, The situation is often found that the axis C1 of the mouth piece 3 is inclined at a small angle in actuality to be capable of coinciding with the axis of the fastening head. If such beer barrels are carried to a filter (barreling apparatus), the fraction defective will be increased in the leakage inspection after barreling.

[0007] Therefore, this invention is devised in view of the above situation, and provides a fitting fastening apparatus wherein even if the axis of a fastening head does not coincide with the axis of a mouth piece of a pressurized container, the fastening head absorbs an inclination thereof to allow fastening of a fitting.

DISCLOSURE OF THE INVENTION

[0008] The fitting fastening apparatus for a pressurized container according to this invention is a fitting fastening apparatus for fastening a fitting mounted to a mouth piece of a pressurized container such as a beer barrel, characterized in that it comprises a conveyer equipment for carrying the pressurized container, a fastening-torque generating apparatus arranged above the conveyer equipment and having a rotatable fastening head that is vertically movable to the mouth piece of the pressurized container, an aligning device arranged below the fastening head and for aligning the pressurized container carried on the conveyer equipment, and a stopping device for stopping the pressurized container when the fastening head is moved up and down.

[0009] Further, it is characterized in that said fastening-torque generating apparatus is such that a base is supported to be vertically movable to said pressurized container, swing stands being mounted and fixed thereto to be swingable in all directions including forward/backward and right/left directions, a rotary drive source being mounted to the swing stand, a fastening head being detachably connected to a fastening output shaft of the rotary drive source extending under said base.

[0010] Furthermore, it is characterized in that said swing stands are such that a first swing stand for perpendicularly supporting said rotary drive source is supported by a second swing stand to be swingable in the cross direction, the second swing stand being supported by the base to be swingable in the longitudinal

direction, the fastening output shaft of said rotary drive source being swingably arranged through the second swing stand and said base. And it is characterized in that said swing stands are such that shafts protruding from the right/left or front/rear side faces are engaged with brackets, resilient devices being disposed on the lower side in the forward/backward or right/left disposition perpendicular to the shafts, the resilient devices and said shafts maintaining the swing stands to be parallel to said base.

[0011] It is characterized in that said fastening head comprises a wrench engaged with a ratchet formed on an inner peripheral surface of a bush of the fitting of the pressurized container and a skirt having an inner peripheral surface formed with a taper surface surrounding the wrench and engaged with the mouth piece.

[0012] Therefore, since the fastening-torque generating apparatus can swing in the 360° directions such as forward/backward and right/left directions with respect to the base, the fastening output shaft can swing in the 360° directions in accordance with this. Even if a mouth piece of a recycled beer barrel carried by the conveyer equipment is inclined in any directions, the axis of the fastening output shaft can be inclined to coincide with the axis of the mouth piece, enabling engagement therewith.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a front view of a fastening-torque generating apparatus showing an embodiment of this invention. FIG. 2 is a side view, partly section, of the fastening-torque generating apparatus as shown in FIG. 1. FIG. 3 is a plan view of the fastening-torque generating apparatus as shown in FIG. 1. FIG. 4 is an operation explanation view. FIG. 5 is a front view of a fitting fastening apparatus. FIG. 6 is a plan view of the fitting as shown in FIG. 5. FIG. 7 is a side view of the fitting fastening apparatus as shown in FIG. 5. FIG. 8 is a perspective view of a beer barrel and the fitting thereof. FIG. 9 is a detailed longitudinal section of the fitting. FIG. 10 is an explanation view showing the state that the axis of the beer barrel does not coincide with the axis of a mouth piece.

BEST MODE FOR CARRYING OUT THE INVENTION

[0014] An embodiment of this invention will be described hereafter based on FIGS. 1-7. A fitting fastening apparatus includes, as shown in FIGS. 5-7, a rectangular support frame 18 fixed on the ground or a floor E, and an electric motor 19 (see FIGS. 6 and 7) fixed to the top of the support frame 18. Output of the electric motor 19 is transmitted to separated right and left pinions 21, 21 via a speed reducing mechanism 20. An up-and-down frame 23, which is movable up and down through racks 22, 22, is suspended by four guide rods 24. Four fastening-torque generating apparatus 25, for example, are fixed to the up-and-down frame 23 at predetermined intervals. Below the up-and-down frame 23, a conveyer equipment 26 is supported by a support pillar 27 at a predetermined height. One aligning device 28 and four stopping devices 29 are arranged with the support frame 18 for interval setting and alignment of the beer barrels 2 carried by the conveyer equipment 26 in the direction shown by the arrow.

[0015] The fastening-torque generating apparatus 25 is mounted to a vertically movable base 32 through an up-and-down drive source 31 such as an air cylinder fixed to a guide frame 50 supported by the up-and-down frame 23. A fastening head 30, which is vertically movable to the mouth piece 3 of the beer barrel 2, protrudes downward from the base 32. The fastening head 30 generates torque necessary for fastening of the fitting by a rotary drive source 33 such as a servo motor.

[0016] The aligning device 28 includes an arm 35 having rollers 34 arranged on right and left sides of the conveyer equipment 26 and rotatably supported by a shaft 36 as shown in FIG. 6, and an air cylinder 38 connected to the lower end of the shaft 36 through a lever 37 as shown in FIG. 5. The air cylinder 38 is fixed appropriately to a sub frame 40 for supporting the aligning device 28. Numeral 39 in FIG. 7 is a connecting rod for rotating together the right and left shafts 36, 36. Therefore, the device is constructed that equidistant rotation of the two rollers 34, 34 with respect to the center line of a conveyer plate 41 stops the beer barrel 2 carried on the conveyer equipment 26, and that when the rollers 34, 34 make the center of the beer barrel 2 coincide with the center of the conveyer plate 41, the arm 35 is rotated by driving of the air cylinder 38 to open the rollers 34, 34, moving forward the beer barrel 2 just under the fastening-torque generating apparatus 25 by the conveyer equipment 26.

[0017] The stopping devices 29 are of the same structure as the aligning device 28, and are disposed in a pair just under the fastening-torque generating apparatus 25 and in front and in the rear. When four beer barrels 2 pass the aligning device 28, the four rollers 34 successively surround and stop the beer barrels 2 from the first one so as to hold their mouth pieces 3 to be located just under the fastening heads 30. Then, the four fastening heads 30 are simultaneously moved downward to the four beer barrels 2 as aligned, and are engaged with the mouth pieces 3 for rotation, which rotate the bushes 4 to carry out fastening of the fittings 1.

[0018] The fastening-torque generating apparatus 25 will be described in detail. As shown in FIGS. 1-3, the guide frame 50 is fixed to the side face of the up-and-down frame 23, and the base 32 is vertically movably supported by the guide frame 50 through rails 51 and sliders 52 (see FIG. 3). The up-and-down drive source 31 such as an air cylinder is fixed to the top of the guide frame 50, a piston rod 53 of which has a lower end con-

nected to the base 32. A fastening output shaft 54 of the rotary drive source 33 is arranged through the base 32 to extend downward, and has a lower end to which the fastening head 30 is detachably mounted by a pin 55.

[0019] The rotary drive source 33 includes a servo motor, etc. and a speed reducing mechanism 56 thereof mounted coaxially, and the fastening output shaft 54 arranged through a cylindrical body 57 connected to the lower portion of the speed reducing mechanism 56. As shown in FIG. 4, a flange 57a of the cylindrical body 57 is fixed appropriately to a first swing stand 58 by a bolt, etc. to be perpendicular thereto. The first swing stand 58 is supported by a second swing stand 59, while the second swing stand 59 is supported by the base 32. The cylindrical body 57 is loosely fitted in shaft holes formed in the centers of the second swing stand 59 and the base 32, respectively. That is, the second swing stand 59 includes shafts 60, 60 protrusively integrated with two opposite front/rear sides and rotatably supported by brackets 61, 61 fixed on the base 32 to allow swing motion in the longitudinal direction. Moreover, the first swing stand 58 includes shafts 62, 62 (see FIG. 2) protrusively integrated with two opposite right and left sides and rotatably supported by brackets 63, 63 fixed on the second swing stand 59 to allow swing motion in the cross direction.

[0020] And resilient devices 64, 65 such as coil springs are disposed between the second swing stand 59 and the base 32 and between the second swing stand 59 and the first swing stand 58 to be opposite to the sides without the shafts 60, 62, respectively. That is, bolts 66 are implanted downward in the lower sides of the second swing stand 59 and the first swing stand 58 to loosely be arranged through the second swing stand 59 and the base 32 (see FIG. 4), and the resilient devices 64, 65 are engaged with the bolts 66. By this, the first and second swing stands 58, 59 are held horizontally so that the fastening output shaft 54 can be perpendicular to the base 32 and the first and second swing stands 58, 59. On the other hand, said fastening output shaft 54, which is held by the cylindrical body 57, extends downward through the first swing stand 58, and extends downward through the second swing stand 59 and the base 32.

[0021] The fastening head 30 detachably mounted to the lower end of the fastening output shaft 54 includes, as shown in FIG. 2, a shaft bar 70 inserted in a shaft hole formed in the center of the fastening output shaft 54 and integrally connected thereto by the pin 55, and a wrench 72 screwed and held to the center of a holder 71 integrated with the shaft bar 70 by an inverse screw, etc. Moreover, the holder 71 is formed with a skirt 73 engaged with the mouth piece 3 of the beer barrel 2. The inner peripheral surface of the skirt 73 is formed with a taper surface 74. The wrench 72 has on the lower end face protrusions 75, 75 formed diametrally oppositely. The side face of an end of the protrusion 75 can contact the ratchets 4b, 4b formed diametrally oppositely at the inner peripheral edge of the bush 4 engaged with the mouth piece 3 of the beer barrel.

[0022] If four protrusions 75 are formed in the cross-shaped disposition, the angle of rotation required until they contact the ratchet 4b can be reduced.

[0023] Next, the operation of said mode will be described. As shown in FIG. 2, when the axis C of the beer barrel 2, the axis C1 of the mouth piece 3, and an axis C2 of the fastening output shaft 54 coincide with each other, only upward and downward motions of the base 32 enable engagement or disengagement of the fastening head 30 with or from the mouth piece 3. And driving of the rotary drive source 33 enables smooth fitting fastening.

[0024] However, in the case of the beer barrel 2 as shown in FIG. 10, the up-and-down drive source 31 is operated to move the base 32 downward, and the fastening head 30 comes to engage with the mouth piece 3. Since the mouth piece 3 is inclined, the fastening head 30 does not engage with the mouth piece 3 immediately, and downward force is applied with the taper surface 74 of the skirt 73 being in slide contact with the outer edge of the upper end of the mouth piece 3. As a result, as far as the upper end of the mouth piece 3 is located within the range that the taper surface 74 can cover, namely, if the mouth piece 3 is inclined, the skirt 73 can surely be engaged with the mouth piece 3. That is, even if the mouth piece 3 is damaged to incline in any directions, the fastening head 30 can be applied.

[0025] Therefore, since the skirt 73 is being rotated through the fastening output shaft 54 rotated by driving of the rotary drive source 33 to draw in the mouth piece 3 through the taper surface 74 for engagement, the first swing stand 58 is swung on the second swing stand 59, and the second swing stand 59 is swung on the base 32 through the fastening output shaft 54 and the cylindrical body 57 to absorb the inclinations thereof. Thus, as shown in FIG. 4, the axis C1 of the mouth piece coincides with the axis C2 of the fastening output shaft 54. When the axes C1, C2 of the two coincide with each other, the skirt 73 of the fastening head 30 is engaged with the mouth piece 3, and the wrench 72 is fitted in the mouth piece 3, allowing the protrusions 75, 75 to face the ratchets 4b, 4b of the bush 4. In this state, driving of the up-and-down drive source 31 is stopped to halt downward motion of the base 32.

[0026] Then, detection of the fastening head 30 mounted to the mouth piece 3 produces operation of the rotary drive source 33. First, it turns the fastening output shaft 54 free at low speed until the protrusions 75, 75 contact the ratchets 4b, 4b. Then, when detecting the protrusions 75, 75 contacting the ratchets 4b, 4b, torque necessary for the rotary drive source 33 is loaded on the fastening output shaft 54 to rotate the fastening head 30. This turns the bush 4 in the mouth piece 3 through the thread screws 3a, 4a, thus obtaining fitting fastening. After obtaining torque necessary for fastening, the bush 4 is stopped to rotate in The mouth piece

3, and the base 32 is moved upward by the up-and-down drive source 31, obtaining the fastening head 30 removed from the mouth piece 3. After upward motion of the fastening head 30, the stopping device 29 is separated from the barrel 2, which is carried by the conveyer equipment 26 in the direction as shown by the arrow.

[0027] According to this invention, even when a mouth piece is slightly inclined due to impact, etc. in the distribution process, etc. of a beer barrel, and thus axes of a fastening head of a fitting fastening apparatus and the mouth piece do not coincide with each other, a fastening-torque generating apparatus is inclined through first and second swing stands in the 360° directions such as forward/backward and right/left directions with respect to a base to enable coincidence of the axes of the two, resulting in lowered possibility of occurrence of bad fitting fastening.

Claims

1. A fitting fastening apparatus for fastening a fitting mounted to a mouth piece of a pressurized container such as a beer barrel, characterized in that it comprises a conveyer equipment for carrying the pressurized container, a fastening-torque generating apparatus arranged above the conveyer equipment and having a rotatable fastening head that is vertically movable to the mouth piece of the pressurized container, an aligning device arranged below the fastening head and for aligning the pressurized container carried on the conveyer equipment, and a stopping device for stopping the pressurized container when the fastening head is moved up and down.

2. A fitting fastening apparatus for a pressurized container as specified in claim 1, characterized in that said fastening-torque generating apparatus is such that a base is supported to be vertically movable to said pressurized container, swing stands being mounted and fixed thereto to be swingable in all directions including forward/backward and right/left directions, a rotary drive source being mounted to the swing stand, a fastening head being detachably connected to a fastening output shaft of the rotary drive source extending under said base.

3. A fitting fastening apparatus for a pressurized container as specified in claim 2, characterized in that said swing stands are such that a first swing stand for perpendicularly supporting said rotary drive source is supported by a second swing stand to be swingable in the cross direction, the second swing stand being supported by the base to be swingable in the longitudinal direction, the fastening output shaft of said rotary drive source being swingably arranged through the second swing stand and said base.

4. A fitting fastening apparatus for a pressurized container as specified in claim 2 or 3, characterized in that said swing stands are such that shafts protruding from the right/left or front/rear side faces are engaged with brackets, resilient devices being disposed on the lower side in the forward/backward or right/left disposition perpendicular to the shafts, the resilient devices and said shafts maintaining the swing stands to be parallel to said base.

5. A fitting fastening apparatus for a pressurized container as specified in any of claims 1-4, characterized in that said fastening head comprises a wrench engaged with a ratchet formed on an inner peripheral surface of a bush of the fitting of the pressurized container and a skirt having an inner peripheral surface formed with a taper surface surrounding the wrench and engaged with the mouth piece.

FIG.1

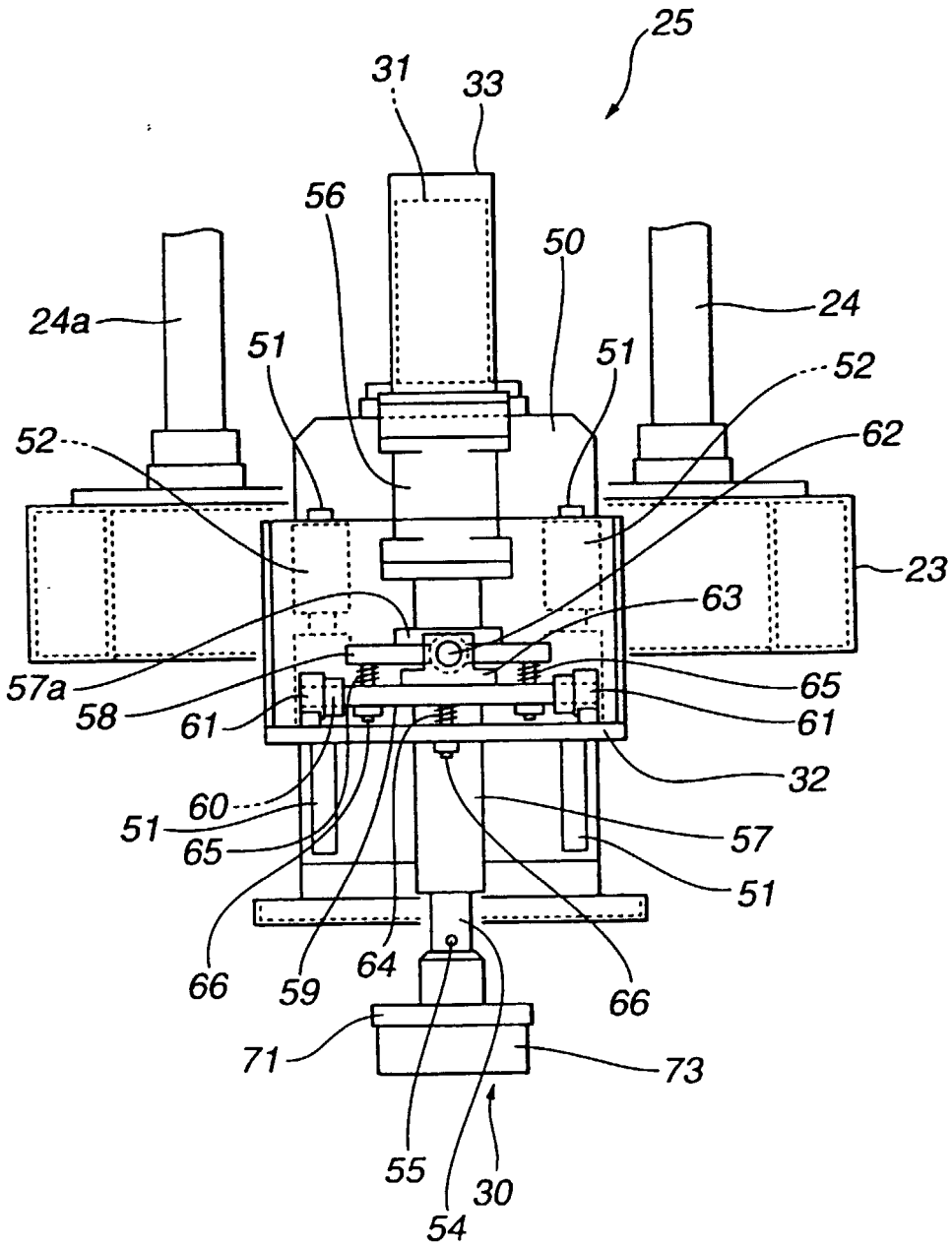

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FIG.2

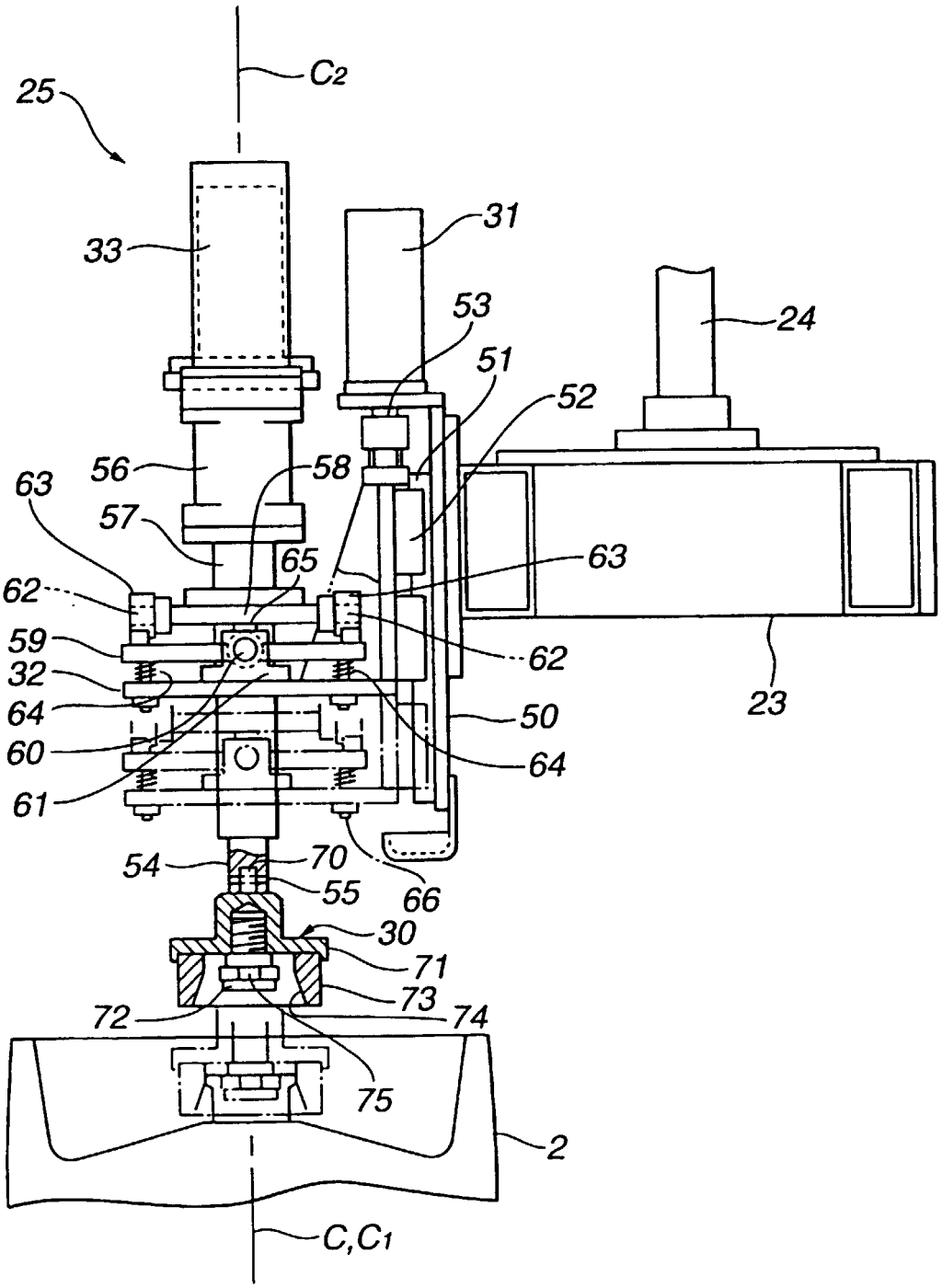
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FIG.3

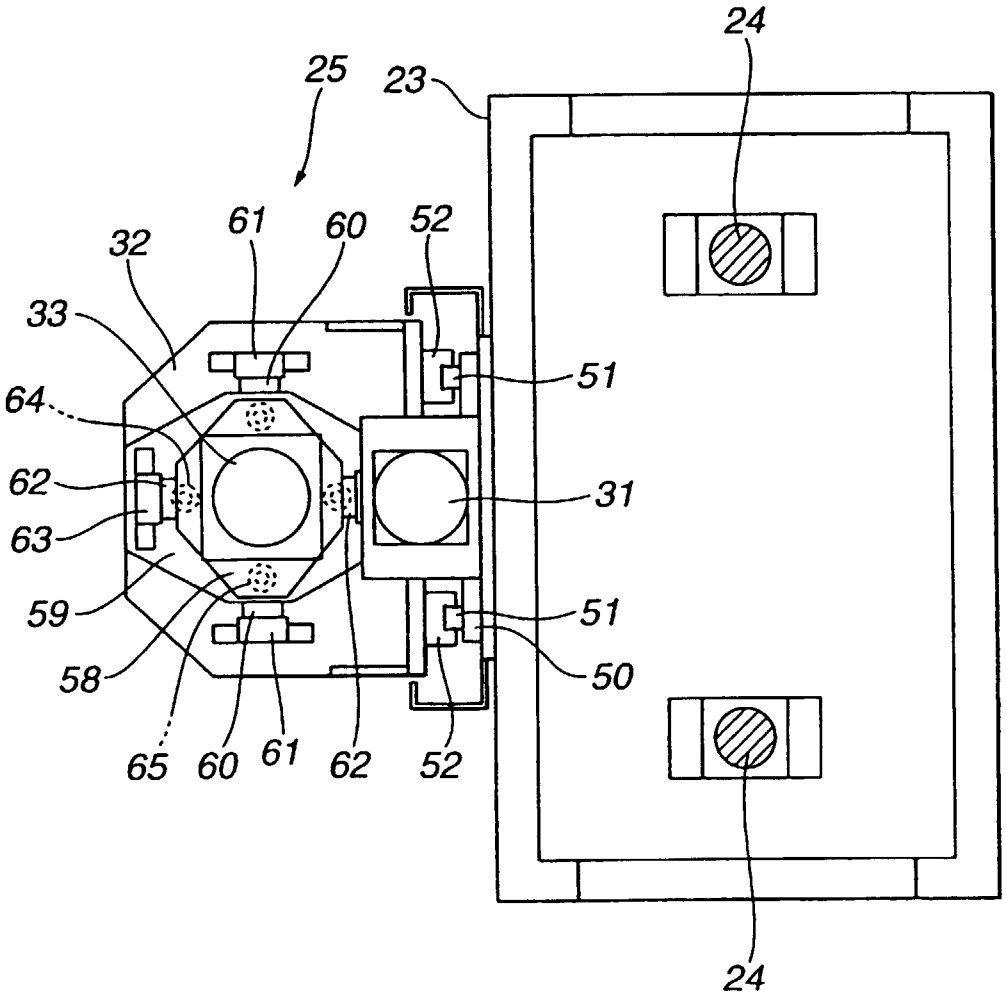
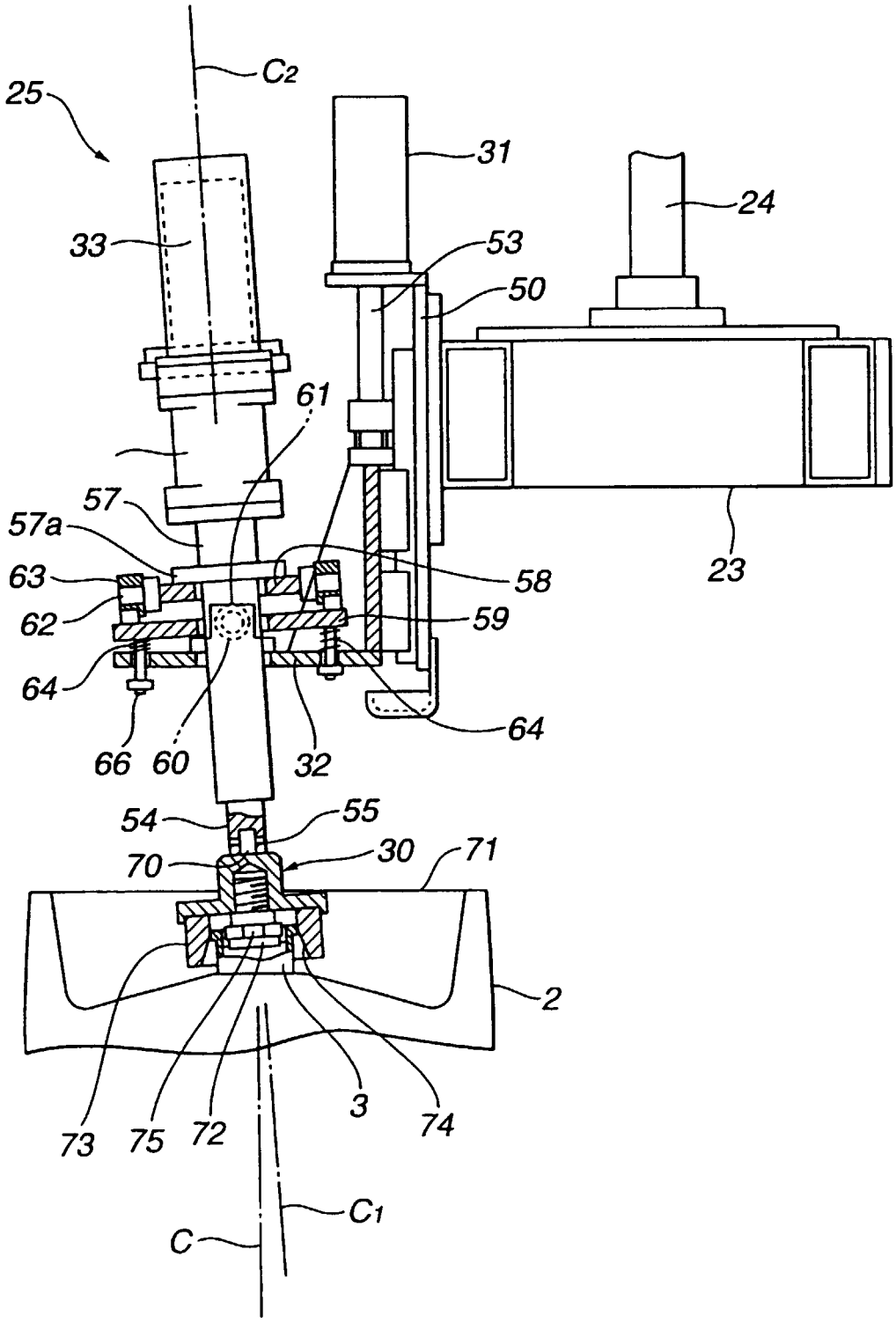


FIG.4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C1
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FIG.5

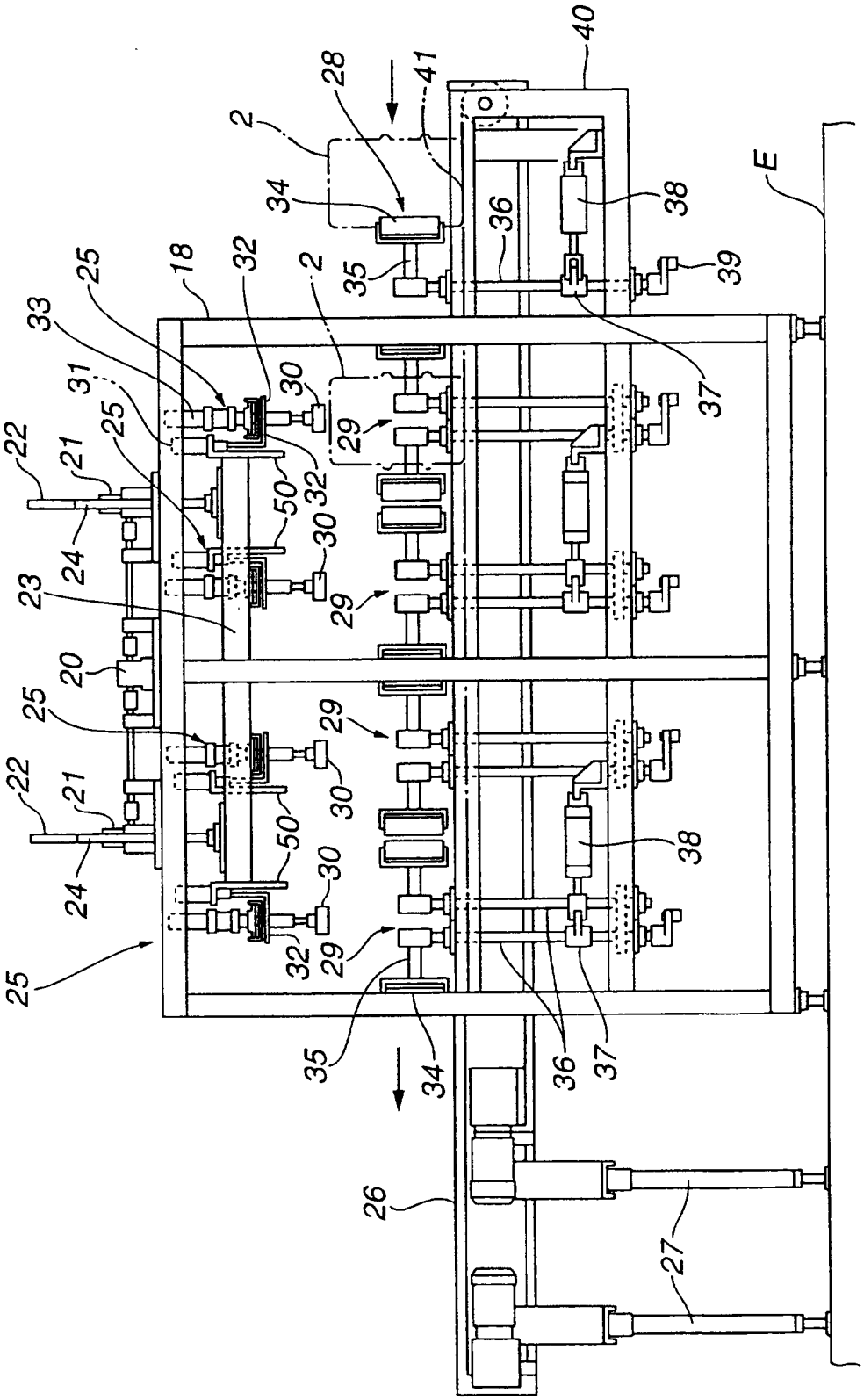
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FIG.6

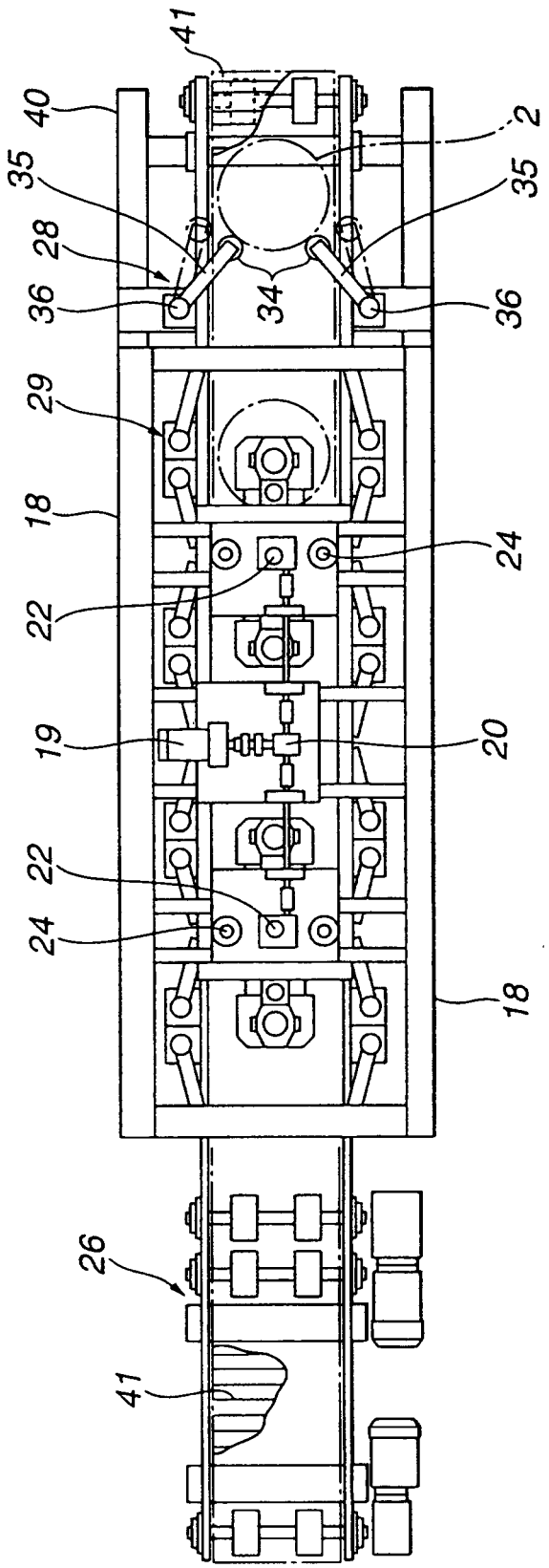


FIG.7

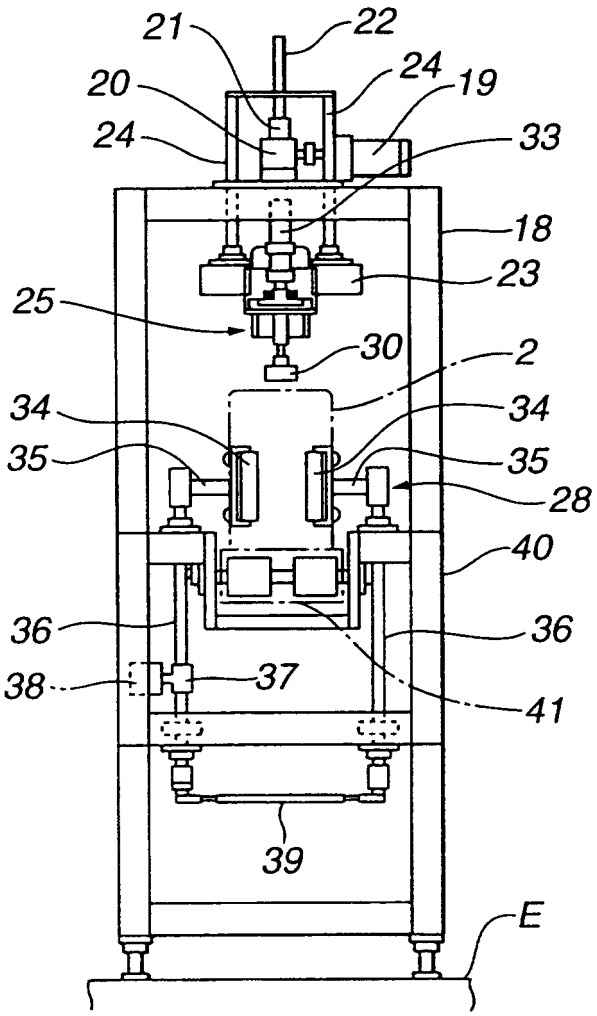


FIG.8

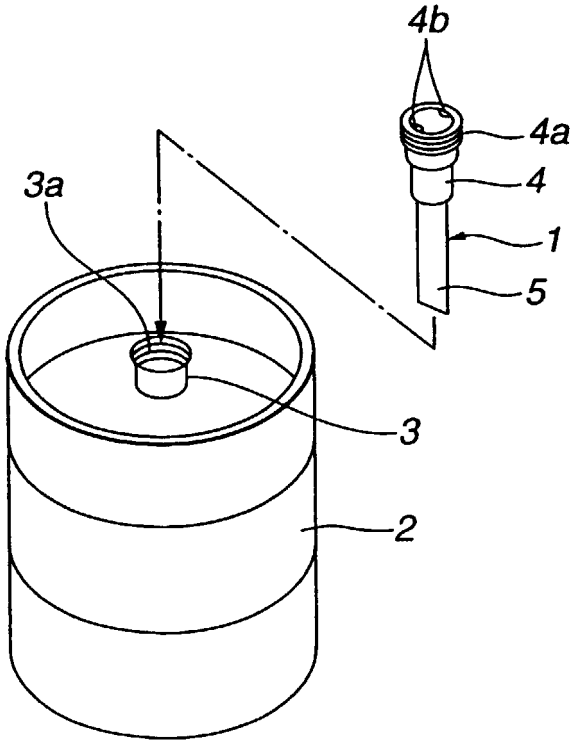


FIG.9

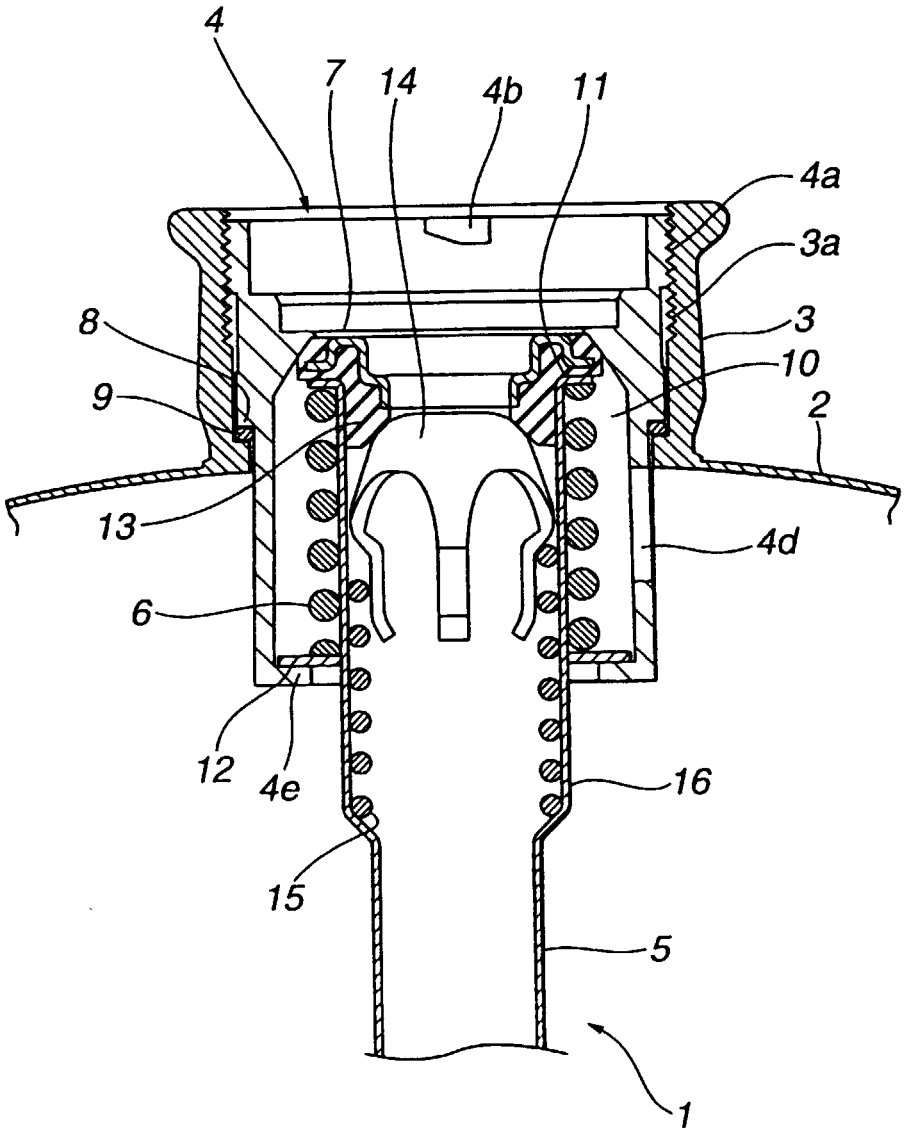
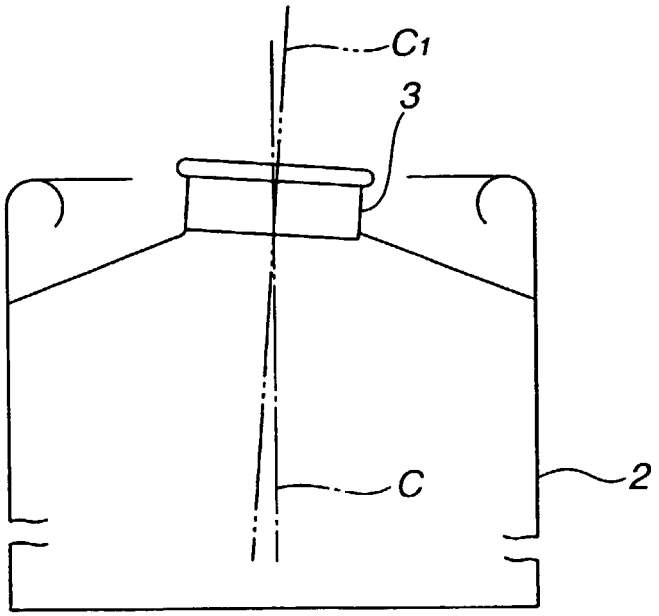


FIG.10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP98/02670

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[6] B67B1/06

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)
Int.Cl[6] B67B1/00-5/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926-1998 Toroku Jitsuyo Shinan Koho 1994-1998
Kokai Jitsuyo Shinan Koho 1971-1998

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.
X Y	JP, 03-000686, A (K.K. Hatakeyama Seikosho), 7 January, 1991 (07. 01. 91) (Family: none)	1, 5 2-4
Y	JP, 07-242299, A (Asahi Breweries, Ltd.), 19 September, 1995 (19. 09. 95) (Family: none)	1-5
Y	JP, 07-132992, A (Nittou Giken Kogyo K.K.), 23 May, 1995 (23. 05. 95) (Family: none)	1, 5
Y	JP, 59-142993, A (Kubota, Ltd.), 16 August, 1984 (16. 08. 84) (Family: none)	2-4
P	JP, 09-295693, A (Niigata Engineering Co., Ltd., et al.), 18 November, 1997 (18. 11. 97) (Family: none)	1-4

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

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Date of the actual completion of the international search	Date of mailing of the international search report
5 October, 1998 (05. 10. 98)	13 October, 1998 (13. 10. 98)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)