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(71) Applicant: **Otsuka Pharmaceutical Co., Ltd.**
Tokyo 101-8535 (JP)

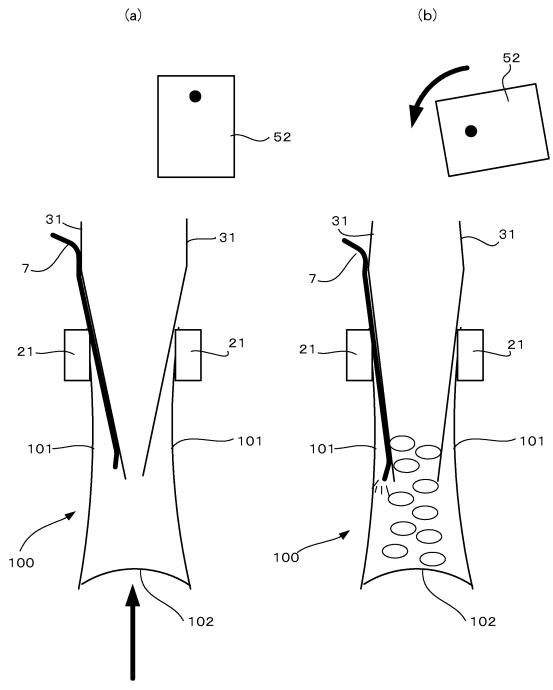
(72) Inventors:
- **HARASHIMA, Takashi**
  Osaka-shi
  Osaka 541-0045 (JP)
- **ASAI, Yoshihiko**
  Osaka-shi
  Osaka 541-0045 (JP)

(74) Representative: **Webster, Jeremy Mark et al**
Mewburn Ellis LLP
33 Gutter Lane
London
EC2V 8AS (GB)

(54) SEALING DEVICE AND SEALING METHOD

(57) An object of the present invention is to provide a sealing device and a sealing method with which oxygen substitution can be sufficiently carried out even in a bag-like container. The present invention is a sealing device for putting a content into a bag-like container and sealing the container, and includes a content supply portion that supplies the content to the container having an opening in an open state, an inert gas supply portion that supplies inert gas to the container, a liquefied inert gas supply portion that supplies liquefied inert gas to the container, and a sealing portion that seals the opening of the container after the liquefied inert gas is supplied.

Fig. 6



EP 2 837 570 A1

Description

Technical Field

[0001] The present invention relates to a sealing device and a sealing method.

Background Art

[0002] If a container is filled with a content such as a food product and is then sealed, there is a possibility that oxygen existing in the container oxidizes the content. For this reason, conventionally, before the container filled with the content is sealed, inert gas is injected to substitute the inert gas for the oxygen. However, if inert gas is used, a problem arises in that the gas exchange takes time. For example, Patent Literature 1 discloses a technique of using liquefied inert gas, in place of inert gas. That is to say, liquefied inert gas is injected into the container and is evaporated within the container, thereby carrying out oxygen substitution.

Citation List

Patent Literature

[0003] Patent Literature 1: JPS62-158626 A

Summary of Invention

Technical Problem

[0004] As described above, in Patent Literature 1, oxygen substitution is carried out by injecting liquefied inert gas. However, with a bag-like container, if the liquefied inert gas is evaporated and permeates the container, a problem arises in that it becomes difficult to close an opening of the container, or in that it is difficult to control the amount of gas in the container, that is, the volume of the container. For this reason, the opening of the container needs to be closed as soon as possible after injecting the liquefied inert gas. However, if the opening of the container is thus closed at a short time after injection of the liquefied inert gas, another problem arises in that oxygen substitution cannot be sufficiently carried out.

[0005] The present invention has been made in order to solve the foregoing problems, and it is an object of the present invention to provide a sealing device and a sealing method with which oxygen substitution can be sufficiently carried out even in a bag-like container.

Solution to Problem

[0006] The present invention is a sealing device for putting a content into a bag-like container and sealing the container, including: a content supply portion configured to supply the content to the container having an opening in an open state; an inert gas supply portion configured to supply inert gas to the container; a liquefied inert gas supply portion configured to supply liquefied inert gas to the container; and a sealing portion configured to seal the opening of the container after the liquefied inert gas is supplied.

[0007] With this configuration, the following effect can be achieved. With a bag-like container, if the liquefied inert gas is evaporated within the container, it becomes difficult to close the opening of the container, or it becomes difficult to adjust the amount of gas in the container. On the other hand, if the opening of the container is closed at a short time after injection of the liquefied inert gas, there is a possibility that oxygen substitution cannot be sufficiently carried out. For this reason, by supplying the inert gas before supplying the liquefied inert gas as described above, oxygen substitution within the container can be sufficiently carried out. Consequently, the amount of oxygen remaining in the container can be reduced.

[0008] In the above-described device, it is possible that the inert gas supply portion supplies the inert gas to the container while the content is being supplied. With this configuration, the time taken until the opening of the container is sealed can be shortened.

[0009] In the above-described device, it is possible that the content supply portion includes at least one guide member that is inserted into the container from the opening thereof and guides the supply of the content. As a result of providing this guide member, supply of the content is facilitated even in the case of a soft container having a low rigidity, such as a bag-like container.

[0010] In the above-described device, it is possible that two of the guide members are provided, at least end portions of the two guide members on a side of being inserted into the opening of the container are configured to approach and separate from each other, and the content is supplied into the container from a gap between the two guide members.

[0011] With this configuration, the end portions of both guide members on the container opening side are brought close to each other and the overall thickness of these guide members thereby becomes small, and accordingly the guide members can be easily inserted into the opening of the container. Then, if a gap is formed by separating the guide members from each other after the guide members are inserted, this gap can be used as a passage for the content, and accordingly the content can be easily supplied.

[0012] In the above-described device, it is possible that the inert gas supply portion includes a gas supply pipe that is attached to the guide member. With this configuration, the gas supply pipe can be inserted together with the guide member into the container, and accordingly, even if the gas supply pipe has a low rigidity and is soft, for example, the gas supply pipe can be reliably inserted into the container. Furthermore, since the gas supply pipe can be inserted up to a deep position within the container, oxygen substitution at the deep position within the con-

tainer can be reliably carried out, and the residual ratio of oxygen can be further reduced.

[0013] A sealing method according to the present invention is a method for supplying a content into a bag-like container and sealing the container, the method including: a step of supplying the content to the container having an opening in an open state; a step of supplying inert gas to the container; a step of supplying liquefied inert gas to the container after the inert gas is supplied; and a step of sealing the opening of the container after the liquefied inert gas is supplied.

[0014] It is possible that the step of supplying the inert gas is performed during the step of supplying the content.

[0015] It is possible that the step of supplying the inert gas includes: a sub-step of inserting a gas supply pipe for supplying the inert gas into the container; and a sub-step of discharging the inert gas from the gas supply pipe.

Advantageous Effects of Invention

[0016] According to the present invention, oxygen substitution can be sufficiently carried out even in a bag-like container.

Brief Description of Drawings

[0017]

FIG. 1 shows a front view, a side view, and a plan view according to an embodiment of a container used with a sealing device according to the present invention.

FIG. 2 is a plan view showing a schematic configuration of an embodiment of the sealing device according to the present invention.

FIG. 3 shows a cross-sectional view of a container holder and a filling auxiliary device.

FIG. 4 shows a plan view (a) and a cross-sectional view (b) of the filling auxiliary device.

FIG. 5 shows perspective views of a containing device.

FIG. 6 shows cross-sectional views illustrating a sealing process.

FIG. 7 shows a cross-sectional view illustrating the sealing process.

FIG. 8 shows cross-sectional views illustrating the sealing process.

Description of Embodiments

[0018] An embodiment of a sealing device according to the present invention will be hereinafter described with reference to the drawings. FIG. 1 shows a front view, a side view, and a plan view of a container used with this device. FIG. 2 is a plan view showing a schematic configuration of this sealing device.

[0019] As shown in FIG. 1, this sealing device is an device for putting a content such as a food product into a bag-like container and sealing the container. With this device, processes of opening an upper opening of the container, injecting the content and inert gas through this opening, further injecting liquefied inert gas through the opening, and thereafter closing the opening are performed. The container used with this device is configured as shown in FIG. 1, for example. As shown in FIG. 1, a container 100 is a so-called stand-up pouch that is made of sheet material such as plastic, and has a pair of side face portions 101 constituting side faces of the container 100, and a bottom face portion 102 constituting a bottom face thereof. The side face portions 101 are formed by overlaying a pair of pieces of side-face sheet material, and both side ends of the pieces of side-face sheet material are heat-sealed together so as to form an opening in the upper part thereof. A piece of bottom-face sheet material is heat-sealed to the pieces of side-face sheet material so as to close a lower opening formed by both pieces of side-face sheet material, thereby constituting the bottom face portion 102. As described later, the container 100 is conveyed to the aforementioned sealing device with the upper opening of the container 100 open, and the upper opening is closed by this device.

1. Schematic configuration of sealing device

[0020] Next, a schematic configuration of the sealing device will be described. As shown in FIG. 2, this sealing device includes a rotatable support 1 having a ring shape when seen in a plan view. A plurality of container holders 2 are attached at predetermined intervals to the support 1, and these container holders 2 rotate with the support 1. Filling auxiliary devices 3 supported by the support 1 are provide above the respective container holders 2. Each filling auxiliary device 3 assists in filling the container 100 with the content.

[0021] A container supply unit 4, a content conveyance unit 5, and a conveyance unit for sealing 6 are adjacent to the support 1. The container supply unit 4 is configured to supply the container 100 to each container holder 2 on the support 1 at a receiving position in a peripheral portion of the support 1. That is to say, since the support 1 rotates, the container supply unit 4 supplies the container 100 to each of the container holders 2 that sequentially pass through the receiving position. The container 100 held by each container holder 2 is filled with the content and inert gas as described later, thereafter separates from the container holder 2 at a separation position, and is delivered to the conveyance unit for sealing 6. The separation position is provided on the side opposite to the receiving position across the support 1. That is to say, the container 100 delivered to each container holder 2 at the receiving position rotates with the support 1 by about 180 degrees, and is thereafter delivered from the container holder 2 to the conveyance unit for sealing 6 at the separation position.

[0022] The content conveyance unit 5 is for conveying a plurality of content supply devices 51, and has a con-

veyance path 52 that approaches the support 1 from a position separated from the support 1, extends along the circumference of the support 1, and thereafter separates from the support 1. The content supply devices 51 are conveyed along the conveyance path 52 at predetermined intervals. Each content supply device 51 faces a corresponding filling auxiliary device 3 on the support 1, and is conveyed along the support 1 so as to maintain this facing state. That is to say, the content conveyance unit 5 conveys the content supply devices 51 in synchronization with the filling auxiliary devices 3.

[0023] The conveyance unit for sealing 6 has a conveyance path 61 extending from the aforementioned separation position, and a plurality of container support devices 62 move at predetermined intervals on this conveyance path 61. Each container support device 62 conveys the container 100 delivered from the support 1 at the separation position while holding the container 100. Furthermore, a liquefied inert gas supply portion 63 that injects liquefied inert gas into the container 100, and a sealing portion 64 that seals the upper opening of the container are provided on the conveyance path 61 of the conveyance unit for sealing 6.

2. Support

[0024] Next, the support 1 will be described in detail with reference to FIGS. 3 and 4. FIG. 3 shows a cross-sectional view of the container holder and the filling auxiliary device, and FIG. 4 shows a plan view (a) and a cross-sectional view (b) of the filling auxiliary device. As mentioned above, the container holders 2 are arranged at predetermined intervals at the peripheral edge of the support 1, and the filling auxiliary devices 3 are arranged above the respective container holders 2. Note that although eight container holders 2 and filling auxiliary devices 3 are shown in FIG. 2, the number thereof is not particularly limited. As shown in FIG. 3, each container holder 2 can move up and down with respect to the corresponding filling auxiliary device 3, and has a pair of fixation members 21 that are fixed to the respective side face portions 101 of the container 100. As described later, the fixation members 21 are fixed to the respective side face portions 101 of the container 100 that is conveyed in a state where its upper opening is open, and maintains the state where the upper opening of the container 100 is open. Each container 100 rotates, in the state where its upper opening is open, with the support 1.

[0025] As shown in FIG. 4, each filling auxiliary device 3 includes two guide members 31 that are arranged so as to face each other. Both guide members 31 are made of plate material extending in a vertical direction, and are supported so as to be able to pivot around their upper end portions. As a result of the guide members 31 facing each other, their upper portions form a rectangular opening, and their lower portions forms a beak-like shape. The guide members 31 are configured such that a space therebetween expands and narrows as a result of the guide members 31 pivoting around their upper end portions and their lower portions approaching and separating from each other.

[0026] A gas supply pipe 7 that supplies inert gas is attached to each filling auxiliary device 3. Inert gas such as nitrogen is supplied to this gas supply pipe 7 from a gas supply source (not shown). Each gas supply pipe 7 is attached to the outer face of one of the guide members 31, and extends from the upper part toward the lower part of the guide member 31. The gas supply pipe 7 is open near the lower part of the guide member 31, and ejects the inert gas.

3. Container supply unit

[0027] Next, the container supply unit 4 will be described. The container supply unit 4 has a conveyance path 41 extending up to the aforementioned receiving position, and is provided with a pair of suction members 42 that open the upper opening of the container 100, near the receiving position. The suction members 42 are configured to approach and separate from each other, and expand the upper opening of the container 100 by suctioning the respective side face portions of the conveyed container 100 and thereafter separating from each other. The attachment members 42 are configured to then deliver the container 100 to the container holder 2 of the support 1, in the state where the upper opening of the container 100 is expanded.

4. Content conveyance unit

[0028] Next, the content conveyance unit 5 will be described in detail with reference also to FIG. 5. FIG. 5 shows perspective views of a containing device. As shown in FIG. 2, the content conveyance unit 5 is provided with content supply devices 51 that move along the conveyance path 52, and as shown in FIG. 5, each content supply device 51 is provided with a cup-like containing device 52 in which the content is put. Each containing device 52 is filled with the content at a content supply portion (not shown), and this content is supplied to each container 100. That is to say, the volume of each containing device 52 corresponds to the amount of the content to be put in the container 100. Each containing device 52 is pivotably supported by the corresponding content supply device 51, and as shown in FIG. 5(b), the containing device 52 inclines as a result of pivoting, and thus causes the content that is put therein to fall. As mentioned above, each content supply device 51 is arranged so as to face the corresponding filling auxiliary device 3, and the containing device 52 is arranged at a position at which the content falls toward the upper opening of the aforementioned two guide members 31 when the containing device 52 inclines. Note that the containing device 51 does not cause the content to fall at a time, but causes the content to fall while gradually inclining, and accordingly, the impact received by the content due to the falling

can be reduced.

5. Conveyance unit for sealing

[0029] Subsequently, the conveyance unit for sealing 6 will be described in detail. As shown in FIG. 2, the conveyance unit for sealing 6 is provided with a plurality of container support devices 62 that support the container 100. Each container support device 62 has a pair of fixation members 60 (see FIG. 8), and can hold, with these fixation members 60, the container 100 received from each container holder 2 on the support 1, in the state where the upper part of the container 100 is open. The liquefied inert gas supply portion 63 provided in the conveyance unit for sealing 6 is provided with a nozzle 631 for discharging the liquefied inert gas (see FIG. 8), and this nozzle 631 is arranged above the conveyance path 61. With this configuration, the liquefied inert gas is injected from the nozzle 631 to the container 100 that passes through the conveyance path 61 in the state where the upper opening of the container 100 is open. More specifically, an on-off valve is contained in the nozzle 63, and the liquefied inert gas intermittently drips down from the nozzle 63 and is supplied into the container 100, as a result of this on-off valve being opened and closed every predetermined time period. In the conveyance path 61, the sealing portion 64 is provided on the downstream side of the liquefied inert gas supply portion 63, and the upper opening of the container 100 in an open state is closed by pressing the upper opening from both sides, and the container 100 is sealed by means of heat-sealing.

6. Process of sealing by sealing device

[0030] Subsequently, a sealing process in the sealing device configured as described above will be described with reference also to FIGS. 6 to 8. FIGS. 6 to 8 are cross-sectional views for illustrating the sealing process. The following is a description of sealing in the case of putting a number of ball-shaped food products. Initially, by rotating the support 1, the container holders 2 and the filling auxiliary devices 3 rotate therewith. Each container 100 is supplied one-by-one from the container supply unit 4 to the rotating support 1. In the container supply unit 4, the upper opening of each container 100 is opened immediately before the receiving position, and the container 100 in this open state is delivered from the container supply unit 4 to each container holder 2. The container holder 100 holds the state where the opening of the container 100 is open, using the fixation members 21. In this state, as shown in FIG. 6(a), the container holder 2 is raised, and the guide members 31 of the corresponding filling auxiliary device 3 are thereby inserted into the opening of the container 100. At this time, the lower end portions of both guide members 31 approach each other, making the overall thickness small, and accordingly the guide members 31 are easily inserted into the opening of the container 100. Upon the lower end portions of both guide members 31 being inserted into the container 100, the lower end portions of these guide members 31 pivot so as to separate from each other, as shown in FIG 6(b). Thus, the opening of the container 100 can be widely expanded, and a gap through which the content passes is formed between the guide members 31. At this time, the distance between the lower end portions of the guide members 31 may be gradually expanded as the lower end portions of the guide members 31 proceed through the inside of the container 100 after being inserted into the opening of the container 100.

[0031] The corresponding containing device 52 filled with the content is also conveyed in parallel therewith, by the content conveyance unit 5. The containing device 52 is conveyed along the circumference of the support 1 so as to face the corresponding filling auxiliary device 3. While the container 100 moves from the receiving position to the separation position, the containing device 52 inclines, and causes the content to fall as shown in FIG. 6(b). The content falls toward the upper opening of the guide members 31 of the filling auxiliary device 3, passes through the gap between the guide members 31, and is put into the container 100. At this time, the inert gas is discharged from the gas supply pipe 7 that is inserted together with the guide members 31 into the container 100. Since the guide members 31 are inserted up to the intermediate part to the vicinity of the bottom part of the container 100, the inert gas is discharged from the intermediate part up to the vicinity of the bottom part of the container 100. As a result, oxygen substitution is carried out in the intermediate part to the vicinity of the bottom part of the container 100. Note that the guide members 31 can also be caused to proceed to the inside of the container 100 more deeply than in the example in FIG. 6. That is to say, if the lower end portions of the guide members 31 are caused to reach the vicinity of the bottom face portion of the container 100, the content can be reliably put up to the vicinity of the bottom face portion 102 of the container 100. At this time, since the gas supply pipe 7 also reaches the vicinity of the bottom face portion 102 of the container 100, oxygen substitution can be carried out with the inert gas, from the bottom face portion 102 up to the vicinity of the opening of the container 100. Consequently, the substitution rate can be improved.

[0032] Upon the content being thus put in the container 100, as shown in FIG. 7, the container holder 2 is lowered, and the guide members 31 are withdrawn from the container 100. The container holder 2, upon arriving at the separation position, delivers the container 100 to the corresponding container support device 62 of the conveyance unit for sealing 6, in the state where the upper opening of the container 100 is open. The container support device 62 fixes the fixation members 60 to the container 100, and conveys the container 100 along the conveyance path 61 while maintaining the state where the upper opening of the container 100 is open. Then, as shown in FIG. 8, when the container 100 passes below the nozzle 631 of the liquefied inert gas supply portion 63, the liq-

uefied inert gas drips down from the nozzle 631 and falls into the container 100 from the upper opening thereof. The liquefied inert gas begins to be evaporated within the container 100, and oxygen substitution is thereby carried out within the container 100. Subsequently, upon the container 100 passing through the sealing portion 64, the upper opening is sealed. Thereafter, the liquefied inert gas is completely evaporated within the container, thus bulging the container 100 to a predetermined size. By thus bulging the container 100, the content can be prevented from being broken when an external force is exerted on the container 100. Accordingly, the present invention is particularly advantageous for containing soft and fragile food products or the like.

[0033] In a specific example of the above process, for example, assuming that the amount of injected inert gas is about 200 to 250 mL, the amount of injected liquefied inert gas is about 1 to 2 g, and the time taken from injection of the liquefied inert gas until sealing of the container opening is about 0.3 to 3 seconds when the volume of the container is 1000 mL and the amount of the content is about 200 to 250 mL in terms of volume, the residual ratio of oxygen can be 8% or smaller. Furthermore, the container can be bulged to the extent that, even if the container is pressed from the outside, the force is not exerted on the content. However, the above is only an example, and the present invention is not limited thereto.

7. Features

[0034] As described above, according to the present embodiment, the inert gas is supplied, in addition to the liquefied inert gas, into the container 100, and accordingly oxygen substitution within the container 100 can be sufficiently carried out. Consequently, the amount of oxygen remaining in the container 100 can be reduced. In particular, as a result of injecting the inert gas, control of the amount of oxygen substitution does not need to be adjusted only at the time of the injection of the liquefied inert gas, and accordingly, the time taken from the injection of the liquefied inert gas until sealing and the dripping amount of the liquefied inert gas can be adjusted with a weight on the adjustment of the container volume. Accordingly, the amount of oxygen substitution and the container volume can be controlled with accuracy.

8. Modifications

[0035] Although an embodiment of the present invention has been described above, the present invention is not limited to the above embodiment, and may be modified in various manners within the gist of the present invention. For example, although the filling of the container with the content and the inert gas is performed while rotating the container holders with the support in the above embodiment, the conveyance path used in the sealing process is not limited thereto, and for example, a linear conveyance path may be used.

[0036] The container supply unit 4, the content conveyance unit 5, and the conveyance unit for sealing 6 do not need to be provided individually, and there is no particular limitation as long as the sealing device is an device with which, during a series of processes, the upper opening of the container is brought into an open state, the content and the inert gas are injected, the liquefied inert gas is thereafter injected, and the opening is sealed.

[0037] Although the container is a stand-up pouch in the above embodiment, the present invention is also applicable to a container having an opening in a horizontal direction. The content to be put in the container may be a food product in grain, chip, or bean form, or a solid food product, or may also be a fragile content.

[0038] In the above embodiment, regarding the gas supply pipe 7 attached to the guide members 31, the position of an outlet port of the gas supply pipe 7 does not have to be in the lower part of the guide members 31, and may be changed as appropriate depending on the amount of the content, the form of the container, or the like. Furthermore, it is also possible that the gas supply pipe is not attached to the guide members but is inserted individually into the container. Note that the form of the guide members is not particularly limited either, and is not particularly limited as long as the guide members can guide the supply of the content. For example, although both guide members 31 are pivotably supported and the lower end portions thereof approach and separate from each other in the above embodiment, the guide members 31 can be configured such that the entire faces thereof approach and separate from each other.

[0039] The form of the container is not limited to the above-described one either, and the device according to the present invention is applicable to any bag-like container having an opening in the upper part thereof.

Reference Signs List

[0040]

31: Guide members (content supply portion)
5: Content conveyance portion (content supply portion)
63: Liquefied inert gas supply portion
64: Sealing portion
7: Gas supply pipe (inert gas supply portion)

Claims

1. A sealing device for putting a content into a bag-like container and sealing the container, comprising:

a content supply portion configured to supply the content to the container having an opening in an open state;
an inert gas supply portion configured to supply inert gas to the container;

a liquefied inert gas supply portion configured to supply liquefied inert gas to the container; and
a sealing portion configured to seal the opening of the container after the liquefied inert gas is supplied.

2. The sealing device according to claim 1, wherein the inert gas supply portion supplies the inert gas to the container while the content is being supplied.

3. The sealing device according to claim 1 or 2, wherein the content supply portion includes at least one guide member that is inserted into the container from the opening thereof and guides the supply of the content.

4. The sealing device according to claim 3, wherein two of the guide members are provided, at least end portions of the two guide members on a side of being inserted into the opening of the container are configured to approach and separate from each other, and
the content is supplied into the container from a gap between the two guide members.

5. The sealing device according to claim 3 or 4, wherein the inert gas supply portion includes a gas supply pipe that is attached to the guide member.

6. A method for supplying a content into a bag-like container and sealing the container, the method comprising:

a step of supplying the content to the container having an opening in an open state;
a step of supplying inert gas to the container;
a step of supplying liquefied inert gas to the container after the inert gas is supplied; and
a step of sealing the opening of the container after the liquefied inert gas is supplied.

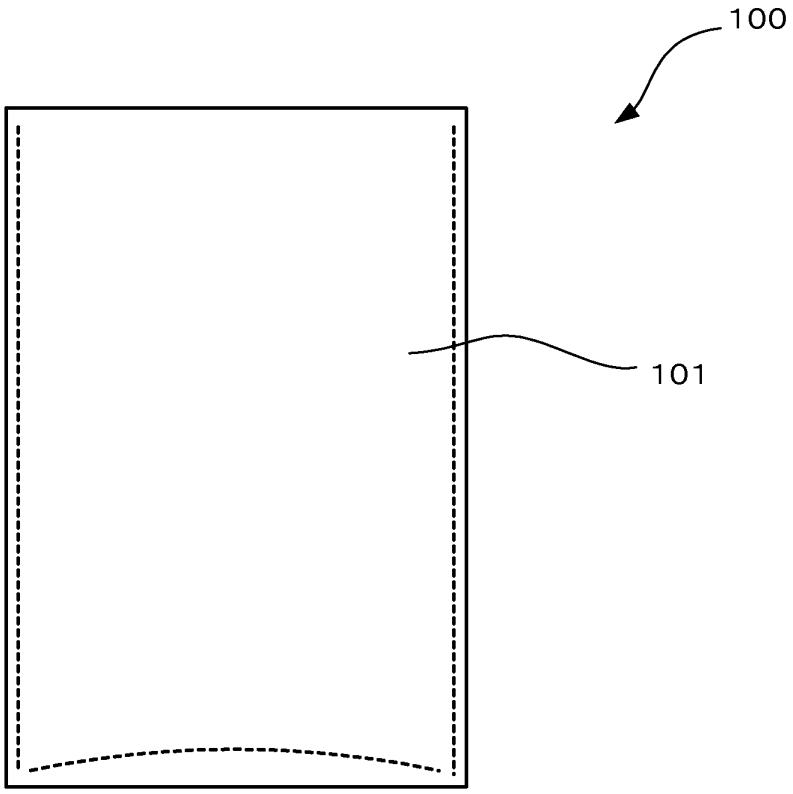
7. The sealing method according to claim 6, wherein the step of supplying the inert gas is performed during the step of supplying the content.

8. The sealing method according to claim 6 or 7, wherein the step of supplying the inert gas comprising:

a sub-step of inserting a gas supply pipe for injecting the inert gas into the container; and
a sub-step of discharging the inert gas from the gas supply pipe.

Fig. 1

(a)



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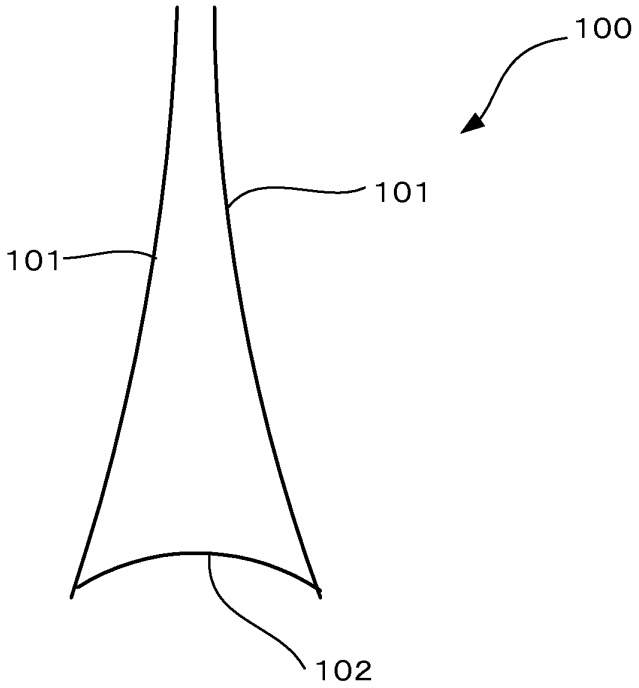
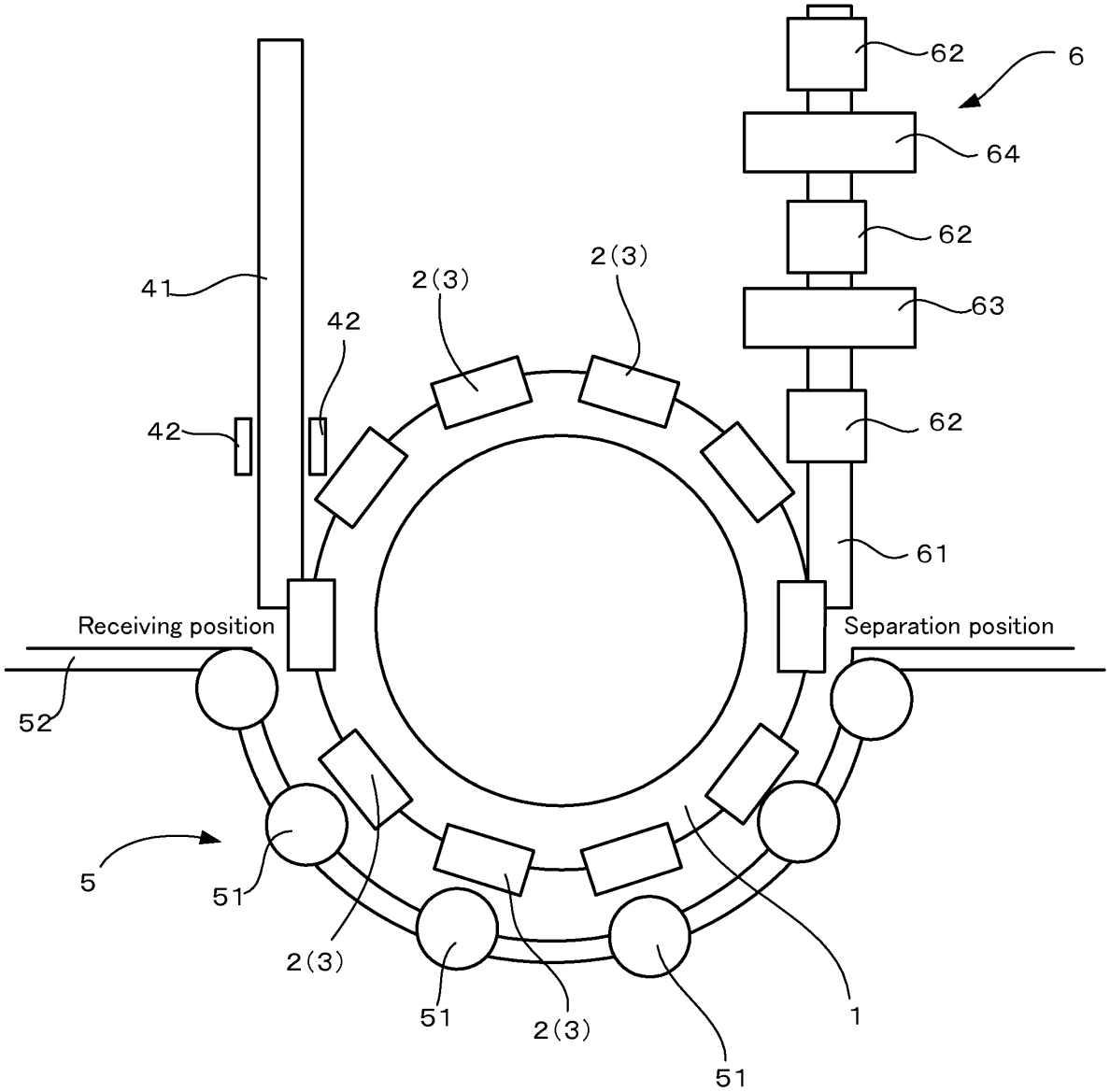


Fig. 2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41
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Fig. 3

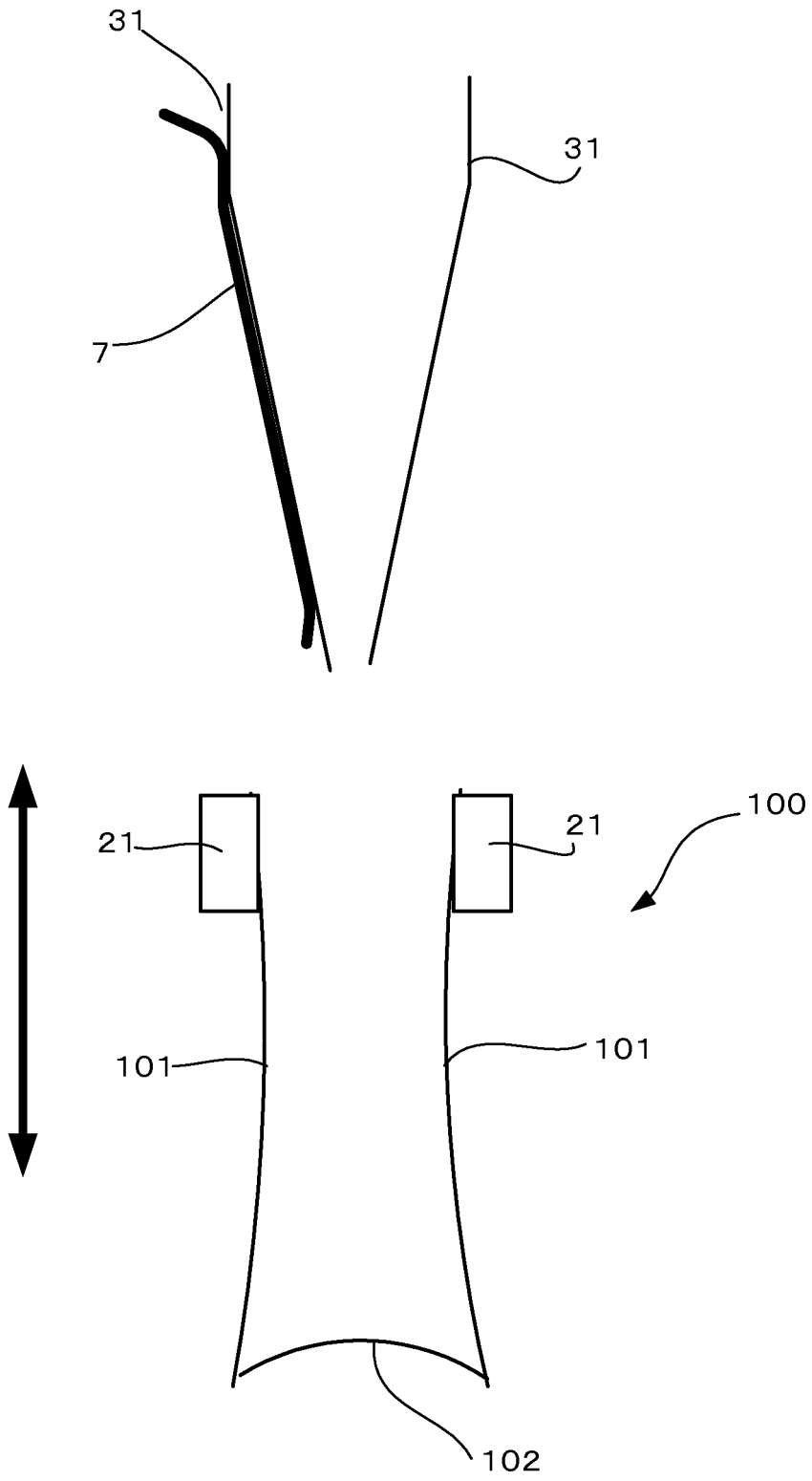


Fig. 4

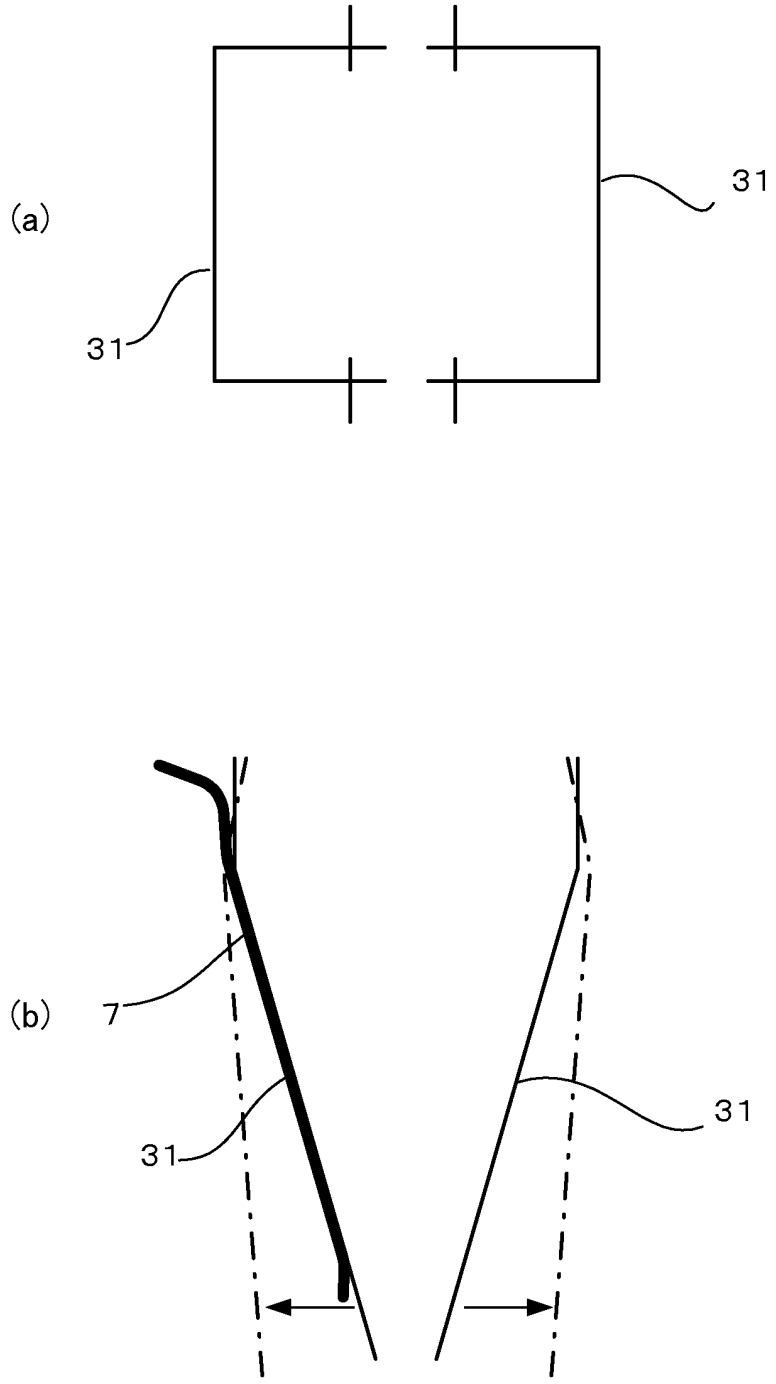
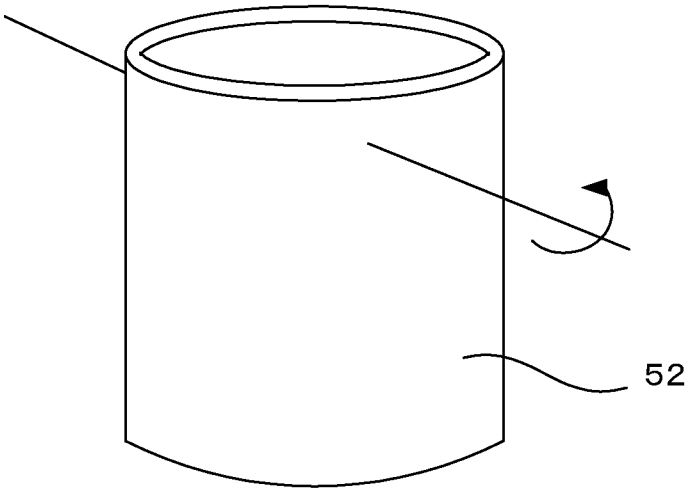


Fig. 5

(a)



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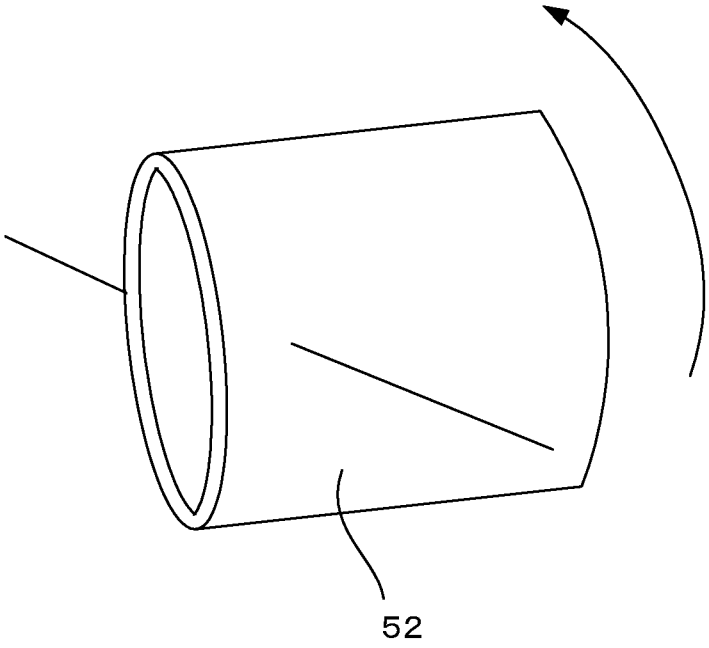


Fig. 6

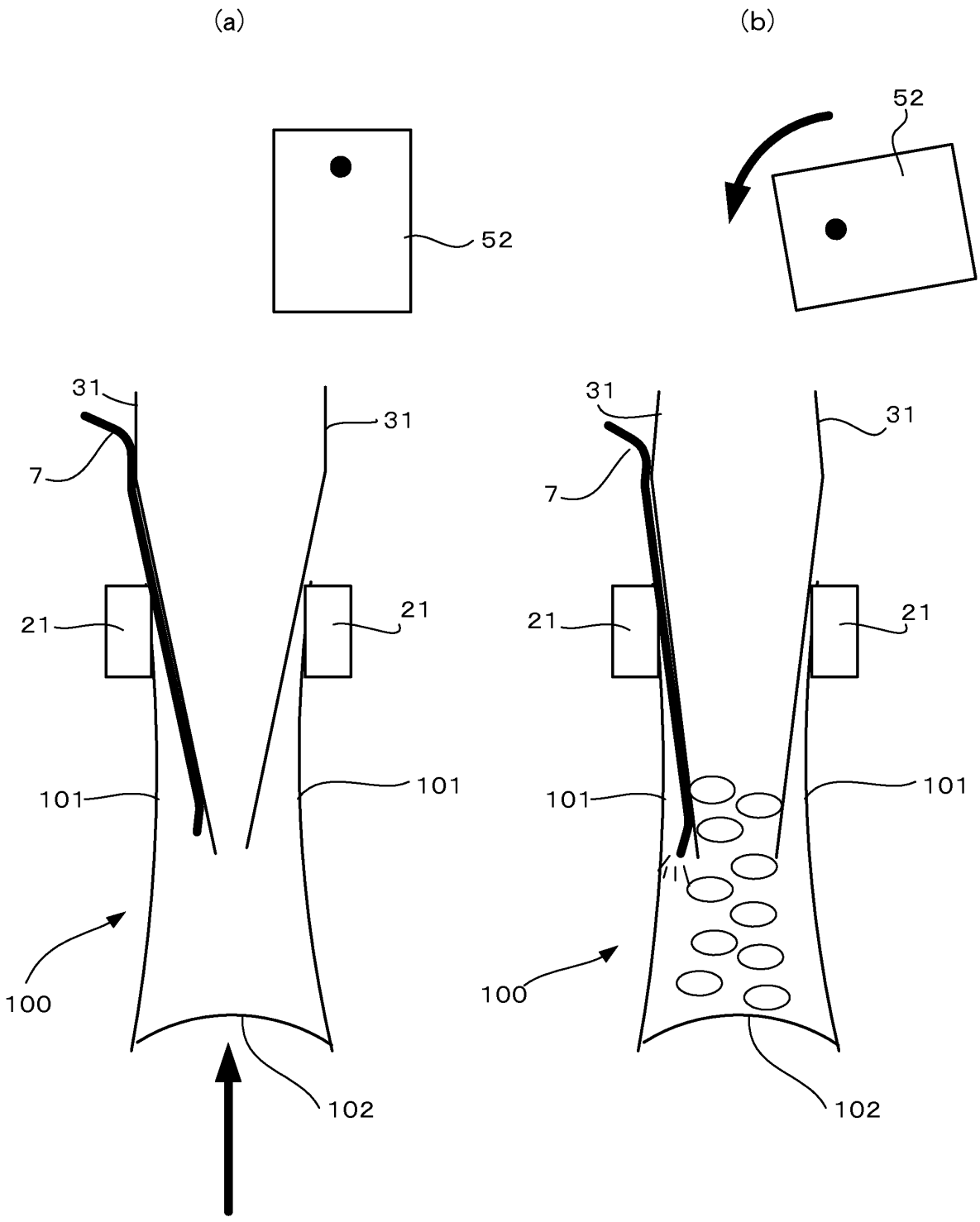


Fig. 7

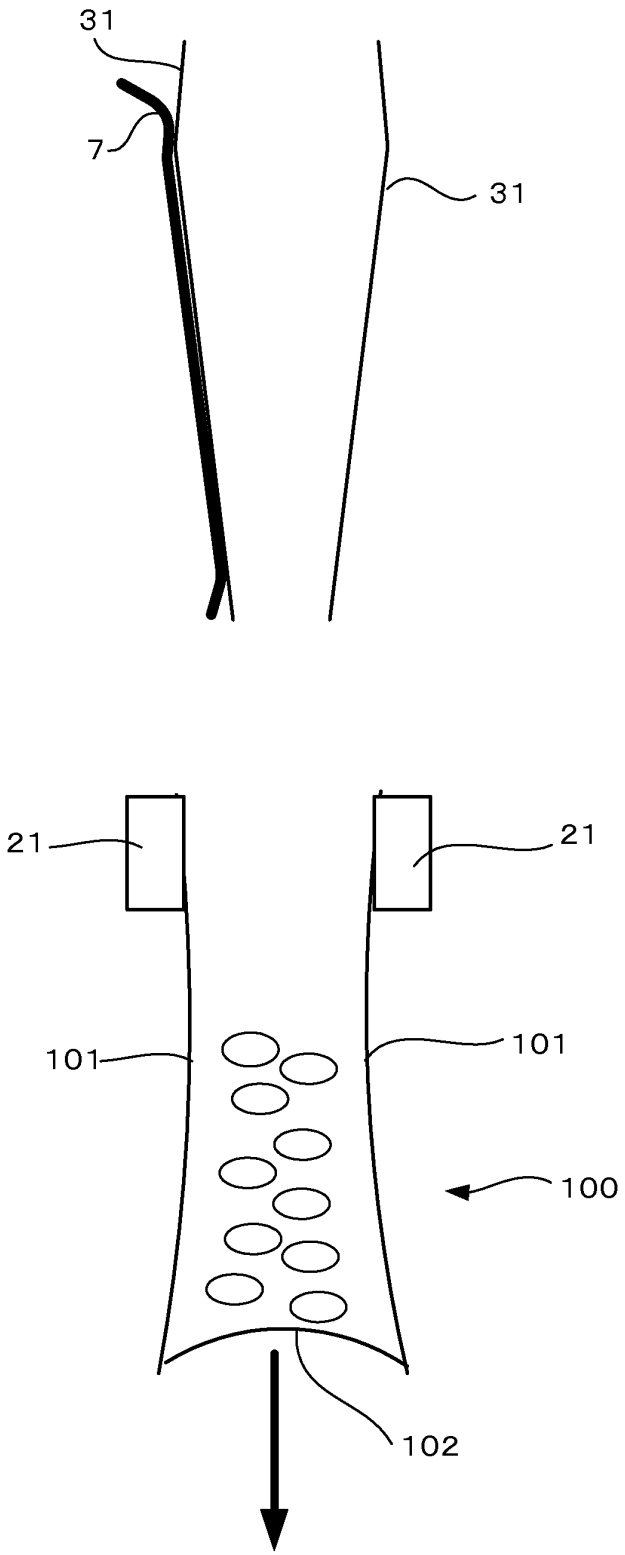
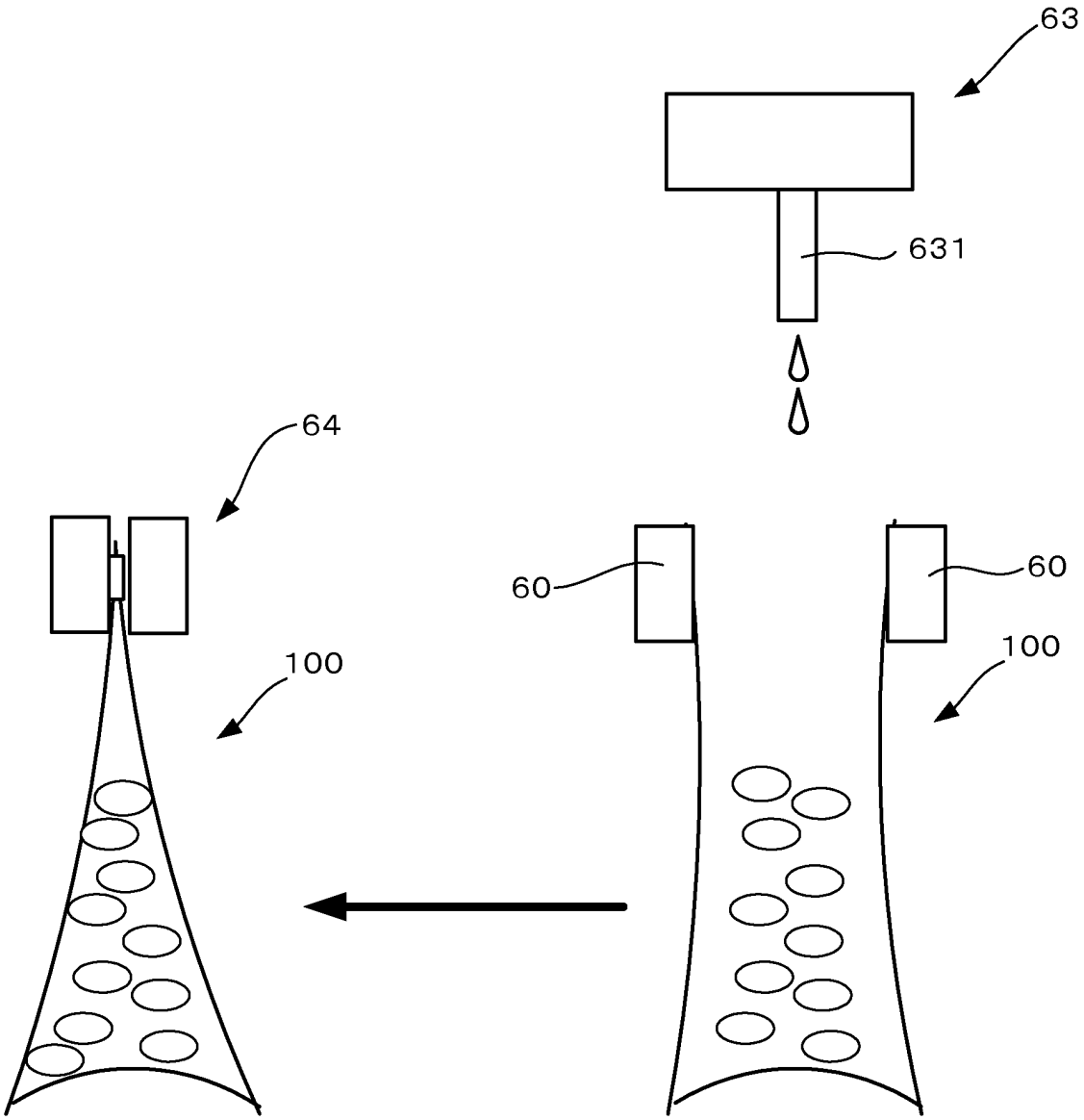


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/058040

A. CLASSIFICATION OF SUBJECT MATTER
B65B31/00(2006.01)i, *B65B31/04*(2006.01)i, *B65B39/12*(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)
B65B31/00, B65B31/04, B65B39/00, B65B39/12

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	1996-2013
Kokai Jitsuyo Shinan Koho	1971-2013	Toroku Jitsuyo Shinan Koho	1994-2013

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 1-182219 A (Osaka Gas Co., Ltd.), 20 July 1989 (20.07.1989), page 2, upper left column, line 13 to lower left column, line 13; fig. 1 to 3 (Family: none)	1,6,8 2-5,7
Y	JP 2004-67224 A (General Packer Co., Ltd.), 04 March 2004 (04.03.2004), paragraphs [0011] to [0021]; fig. 3 to 4 (Family: none)	2-3,5,7
Y	US 3949536 A (ETABLISSEMENTS M. CHAPUIS), 13 April 1976 (13.04.1976), column 3, line 11 to column 4, line 8; fig. 1 to 2, 4 (Family: none)	3-4

☒ 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 24 April, 2013 (24.04.13)	Date of mailing of the international search report 14 May, 2013 (14.05.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/058040

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2006-347569 A (Daiwa Can Co.), 28 December 2006 (28.12.2006), claims 1, 6; paragraphs [0027] to [0028] (Family: none)	6,8
A	DE 4036421 A1 (AIR PRODUCTS GMBH), 21 May 1992 (21.05.1992), column 2, lines 19 to 27; fig. 1 (Family: none)	1,6
A	JP 2569446 Y2 (Kitashiba Electric Co., Ltd.), 22 April 1998 (22.04.1998), paragraphs [0023] to [0025]; fig. 4 to 5 (Family: none)	3-5

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP S62158626 A **[0003]**