



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.06.2008 Bulletin 2008/25

(51) Int Cl.:
B65B 31/06 (2006.01)

(21) Application number: **07022569.3**

(22) Date of filing: **21.11.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

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(30) Priority: **12.12.2006 JP 2006334028**

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(54) **Air-by-steam-replacement deaeration method for use in bag packaging and nozzle for use in said method**

(57) A steam-replacement deaeration method uses a nozzle (1) having a double-tube structure of an inner first nozzle member (3) and an outer second nozzle member (23). An insert part (9) of the first nozzle member that is to be inserted into a bag has a flat cross-sectional configuration. The body of the second nozzle member (23) has a circular cross-section and surrounds the insert part (9) of the first nozzle member (3). At a first stage of steam injection, both the first and second nozzle members are inserted into the bag, and steam is injected from the spouts of both of them. Next, only the second nozzle member (23) is removed from the bag, and the steam injection therefrom is stopped. While the steam injection from the first nozzle member (3) being continued, the bag mouth is brought into a tensed state. Next, the first nozzle member (3) is removed from the bag, and the bag is moved to the subsequent step with the bag mouth kept in the tensed state.

Fig. 1a

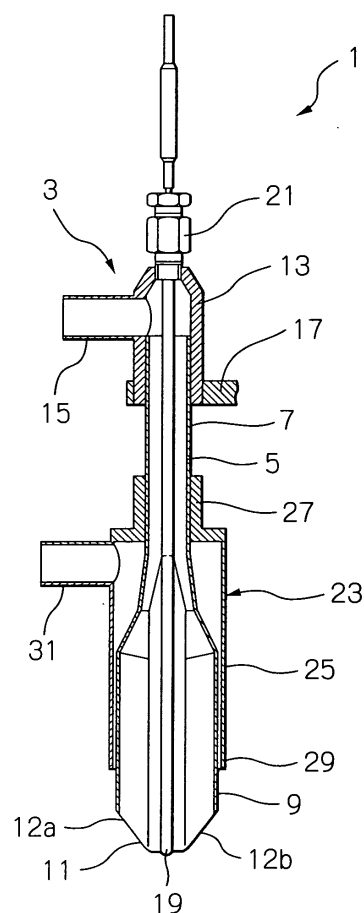
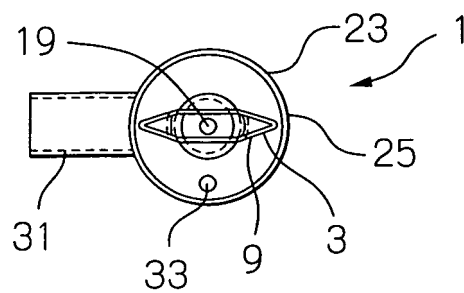


Fig. 1b



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a steam-replacement deaeration method for use in bag packaging in which after a bag has been filled with an article to be packaged, steam is blown into the bag to replace the air in the bag therewith to effect deaeration. The present invention also relates to a nozzle for use in the steam-replacement deaeration method.

2. Discussion of Related Art

[0002] In automatic packaging of food products or the like, steam-replacement deaeration is performed in which steam is blown into a bag to replace the air in the bag therewith to effect deaeration. Such a steam-replacement deaeration method and an example of a nozzle for use in the method are disclosed, for example, in Japanese Patent Application Publication No. Hei 9-95311. In the nozzle disclosed in the JP Publication, an insert part thereof that is inserted into a bag, i.e. a part close to the spout of the nozzle, is formed in a flat cross-sectional configuration. With this nozzle, steam-replacement deaeration is performed according to the following procedure. (1) The insert part of the nozzle is inserted into the bag from the mouth portion thereof that has been opened. (2) Steam is injected into the bag from the nozzle. (3) While steam is being injected into the bag, a pair of grippers gripping the laterally opposite side edges of the bag are moved away from each other to bring the bag mouth into a tensed state. (4) With the bag mouth kept in the tensed state, the nozzle is removed from the bag, and the injection of steam is stopped. (5) While being kept in the tensed state, the bag mouth is sealed to seal the bag.

[0003] In the above-described step (3), because the insert part of the nozzle, which is inserted into the bag, has a flat cross-sectional configuration, the gap formed between the nozzle and the bag mouth when the bag mouth is tensed is small. Accordingly, the entry of air into the bag can be suppressed. In the step (4) also, because the bag mouth is kept tensed, the entry of air can be prevented, advantageously.

[0004] In the above-described related art, however, because the insert part of the nozzle is formed in a flat cross-sectional configuration, the cross-sectional area, i.e. the effective sectional area, of the spout of the nozzle is small for the longitudinal length of the spout. Therefore, the amount of steam that can be injected per unit time is small, so that it takes a time to inject a sufficient amount of steam into the bag, i.e. to reach a deaerated state of a desired replacement rate. Accordingly, it is necessary to increase the number of steam injection steps in order to ensure a capacity that matches the productivity of the

other steps of automatic packaging to obtain a desired deaerated state without degrading the overall productivity of the packaging machine. Consequently, the machine unavoidably becomes large in size.

SUMMARY OF THE INVENTION

[0005] The present invention has been made in view of the above-described problems associated with the related art.

[0006] Accordingly, an object of the present invention is to provide a steam-replacement deaeration method capable of stably obtaining a deaerated state of a high replacement rate in a reduced period of time without degrading the productivity or causing the machine to become large in size.

[0007] Another object of the present invention is to provide a nozzle for use in the steam-replacement deaeration method.

[0008] The present invention provides a nozzle for use in steam-replacement deaeration that has a first nozzle member and a second nozzle member. The first nozzle member has an insert part adapted to be inserted into a bag. The insert part has a flat cross-section. The first nozzle member has its interior connected to a first steam supply path. The second nozzle member has an insert part adapted to be inserted into the bag. The insert part has a cross-section that at least partially occupies the area around the insert part of the first nozzle member. The second nozzle member has its interior connected to a second steam supply path.

[0009] In one embodiment, the insert part of the second nozzle member surrounds the insert part of the first nozzle member. In a more specific embodiment, the cross-section of the insert part of the second nozzle member is substantially circular.

[0010] In one embodiment, the insert part of the second nozzle member has two insert part portions located at the laterally opposite sides of the flat cross-section of the insert part of the first nozzle member and having bow-shaped cross-sections, respectively. The straight-line portions of the bow-shaped cross-sections of the two insert part portions of the second nozzle member face each other and extend in the longitudinal direction of the flat cross-section of the insert part of the first nozzle member.

[0011] In one embodiment, the first nozzle member and the second nozzle member are integrally constructed. The second nozzle member is positioned so that the distal end of a spout thereof is axially rearward of the distal end of a spout of the first nozzle member.

[0012] In another embodiment, the second nozzle member is axially movable relative to the first nozzle member.

[0013] In addition, the present invention provides a steam-replacement deaeration method for use in bag packaging. The method uses a nozzle having a first nozzle member and a second nozzle member. The first nozzle member has an insert part adapted to be inserted into

a bag. The insert part has a flat cross-section. The first nozzle member has its interior connected to a first steam supply path. The second nozzle member has an insert part adapted to be inserted into the bag. The insert part has a cross-section that at least partially occupies the area around the insert part of the first nozzle member. The second nozzle member has its interior connected to a second steam supply path. The method includes the steps of: inserting the nozzle into the bag whose mouth is open; injecting steam from the first nozzle member and the second nozzle member; removing the second nozzle member from the bag, stopping the injection of steam from the second nozzle member, and bringing the mouth of the bag into a tensed state; and removing the first nozzle member from the bag, and stopping the injection of steam from the first nozzle member. Thereafter, the bag is moved to a subsequent step with the mouth of the bag kept in the tensed state.

[0014] In one embodiment, the first nozzle member and the second nozzle member are integrally constructed. The second nozzle member is positioned so that the distal end of a spout thereof is axially rearward of the distal end of a spout of the first nozzle member.

[0015] In another embodiment, the second nozzle member is axially movable relative to the first nozzle member.

[0016] In the present invention arranged as stated above, a nozzle that injects steam comprises a flat first nozzle member and a second nozzle member surrounding the first nozzle member and having a large spout area. At the first stage of steam injection, steam is injected from both the first and second nozzle members. Therefore, an amount of steam necessary for replacing the air in the bag to a satisfactory replacement rate can be injected within a reduced period of time. At the second stage of steam injection also, the injection of steam from the first nozzle member is continued with the bag mouth kept in the tensed state. Therefore, the entry of external air into the bag at this stage can be surely prevented. Thus, a deaerated state of a high replacement rate can be obtained efficiently and stably within a shorter time than the conventional system and method without causing degradation of the productivity and without inviting an increase in size of the machine due to an increase in the number of steps for deaeration.

[0017] Other objects and advantages of the present invention will become apparent from the following detailed description of illustrated embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Figs. 1a and 1b are a sectional side view and a bottom view, respectively, showing a nozzle according to a first embodiment of the present invention.

Figs. 2Aa and 2Ab to 2Fa and 2Fb illustrate a steam-

replacement deaeration operation using the nozzle shown in Figs. 1a and 1b, in which: Figs. 2Aa and 2Ab are a plan view and a side view, respectively, showing a state where the nozzle is in a standby position; Figs. 2Ba and 2Bb are a plan view and a side view, respectively, showing a state where steam is being injected from the nozzle inserted into a bag; Figs. 2Ca and 2Cb are a plan view and a side view, respectively, showing a state where a second nozzle member has been removed from the bag; Figs. 2Da and 2Db are a plan view and a side view, respectively, showing a state where the bag mouth is in a tensed state; Figs. 2Ea and 2Eb are a plan view and a side view, respectively, showing a state where a first nozzle member has also been removed from the bag; and Figs. 2Fa and 2Fb are a plan view and a side view, respectively, showing a state where the bag has been moved to a sealing step.

Figs. 3a and 3b are a sectional side view and a bottom view, respectively, showing a nozzle according to a second embodiment of the present invention.

Figs. 4a and 4b are a sectional side view and a bottom view, respectively, showing a nozzle according to a third embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] Embodiments of the present invention will be described below with reference to the accompanying drawings. It should be noted that the following embodiments are for illustrative purposes only, and that the scope of the present invention is not limited to these embodiments.

[0020] Figs. 1a and 1b are a sectional side view and a bottom view, respectively, showing a nozzle 1 according to a first embodiment of the present invention. The nozzle 1 has a double-tube structure formed from an inner first nozzle member 3 and an outer second nozzle member 23. The first nozzle member 3 has a nozzle body 5 extending vertically in Fig. 1a. The nozzle body 5 has a substantially cylindrical upper tubular part 7 and an insert part 9 below the upper tubular part 7. At least a lower end portion of the insert part 9 is adapted to be inserted into a packaging bag (not shown). As will be clear from Fig. 1b, the insert part 9 has a flat cross-sectional configuration. The first nozzle member 3 has a spout 11 at the lower end, i.e. distal end, of the insert part 9. The spout 11 has been obliquely cut at longitudinally opposite ends thereof to form slant portions 12a and 12b. The cross-sectional configuration of the insert part 9 is not necessarily limited to that shown in Fig. 1b but may be any flat shape.

[0021] The upper end of the nozzle body 5 is secured to a hollow holder 13. The holder 13 has a steam inlet 15 provided on a side thereof. The steam inlet 15 is connected to a first steam supply path (not shown). The steam supply path is connected to a steam supply source

through a valve (not shown). The holder 13 has a hole formed in the upper end thereof. An adapter 21 is fitted into the hole to support a temperature sensor 19 extending downward through the nozzle body 5 as far as the spout 11. The temperature sensor 19 measures the temperature of steam at the spout 11 of the first nozzle member 3 and is connected to a controller (not shown). The first nozzle member 3 is fixedly secured to an elevating shaft (not shown) through a mounting bracket 17 so as to move up and down together with the elevating shaft.

[0022] The second nozzle member 23 is a substantially cylindrical member and has a cylindrical nozzle body 25 with a spout 29 at the lower end, i.e. distal end, thereof. The nozzle body 25 surrounds a lower portion of the upper tubular part 7 and the insert part 9 of the first nozzle member 3. The second nozzle member 23 is secured to the upper tubular part 7 of the first nozzle member 3 at a mounting portion 27 formed on the upper side of the nozzle body 25. The second nozzle member 23 moves up and down together with the first nozzle member 3 as one unit so that a lower end portion of the nozzle body 25 is inserted into the bag. The nozzle body 25 has a steam inlet 31 provided at an upper side portion thereof. The steam inlet 31 is connected to a second steam supply path (not shown). The second steam supply path is also connected to the steam supply source through a valve (not shown). As will be clear from Fig. 1a, the end of the spout 29 of the second nozzle member 23 is axially rearward of the end of the spout 11 of the first nozzle member 3. That is, the end of the spout 29 is located above the end of the spout 11 as viewed in Fig. 1a. A second temperature sensor 33 is disposed in the second nozzle member 23 so that the distal end thereof is positioned near the distal end of the spout 29 of the second nozzle member 23. The temperature sensor 33 is secured to the second nozzle member 23 by an appropriate device and delivers a signal to the controller (not shown).

[0023] The following is an explanation of a steam-replacement deaeration operation wherein the air in a bag filled with an article to be packaged is replaced with steam by using the nozzle 1 shown in Figs. 1a and 1b. The steam-replacement deaeration operation will be explained with reference to Figs. 2Aa to 2Fb. Figs. 2Aa and 2Ab show a state where a bag B filled with an article C to be packaged has been moved to a deaeration step and stopped. The bag B is gripped at both side edge portions thereof by a pair of grippers G and moved to the deaeration step with the bag mouth maintained in the state of having been opened at the preceding step. The nozzle 1 is standing by directly above the bag B having been moved there. Fig. 2Aa is a plan view, and Fig. 2Ab is a side view.

[0024] Figs. 2Ba and 2Bb show a state where the nozzle 1 has moved downward from the position shown in Figs. 2Aa and 2Ab until the spouts 11 and 29 of the first and second nozzle members 3 and 23 are inserted into the bag B as far as respective predetermined positions, and steam is being injected from the spouts 11 and 29.

It should be noted that the injection of steam may be started at any of the following timings: the same time as the downward movement of the nozzle 1 is started; when the nozzle 1 has lowered to a predetermined position; and when both the spouts 11 and 29 have completely entered the bag B. In the illustrated state, steam is injected into the bag B from the first and second nozzle members 3 and 23 for a predetermined period of time.

[0025] Figs. 2Ca and 2Cb show a state where after steam has been injected from the first and second nozzle members 3 and 23 for a predetermined period of time, the nozzle 1 has been moved upward by a predetermined distance to an intermediate position to remove the spout 29 of the second nozzle member 23 from the bag B, and where the steam injection from the second nozzle member 23 has been stopped. In this state, the spout 11 of the first nozzle member 3 is located in the bag B, and the steam injection therefrom is continuing. At this time, because the distal end portion of the spout 11 of the first nozzle member 3 has been obliquely cut at longitudinally opposite ends thereof to form slant openings, as has been stated above, steam is injected from the spout 11 not only directly downward but also obliquely downward. Accordingly, steam can be injected uniformly throughout the bag B. It should be noted that the injection of steam from the second nozzle member 23 may be stopped at any of the following timings: the same time as the upward movement of the nozzle 1 is started; when the nozzle 1 has moved upward by a predetermined distance; and when the nozzle 1 is stopped at an intermediate position.

[0026] In Figs. 2Da and 2Db, the nozzle 1 remains in the position shown in Figs. 2Ca and 2Cb. That is, the nozzle 1 is at rest at the intermediate position. Steam is being injected from the first nozzle member 3. The injection of steam from the second nozzle member 23 is kept stopped. In this state, the grippers G are moved away from each other by a predetermined distance to bring the bag mouth into a tensed state where the bag mouth is in close contact with the periphery of the insert part 9 of the first nozzle member 3. In this case, because the insert part 9 has a flat cross-sectional configuration, it is possible to minimize the gap between the insert part 9 of the first nozzle member 3 and the bag mouth. In this state, steam is continuously injected from the first nozzle member 3 for a predetermined period of time.

[0027] Figs. 2Ea and 2Eb show a state where the nozzle 1 has been moved upward by a predetermined distance from the position shown in Figs. 2Da and 2Db to the standby position shown in Figs. 2Aa and 2Ab to remove the spout 11 of the first nozzle member 3 from the bag B, and where the injection of steam from the first nozzle member 3 has been stopped. The grippers G remain at the same positions as the above, so that the mouth of the bag B is kept closed in the tensed state. In this state, the bag B is moved to the sealing step shown in Fig. 2Fa and 2Fb. At the sealing step, the bag mouth is sealed by using a pair of publicly known hot plates H.

[0028] As will be clear from the foregoing description,

in the present invention, a nozzle that injects steam comprises a flat first nozzle member and a second nozzle member that surrounds the first nozzle member and that has a large spout area. At the first stage of steam injection, steam is injected from both the nozzle members. Therefore, an amount of steam necessary for replacing the air in the bag to a satisfactory replacement rate can be injected within a reduced period of time. At the second stage of steam injection also, the injection of steam from the first nozzle member is continued with the bag mouth kept in the tensed state. Therefore, the entry of external air into the bag at this stage can be surely prevented. Thus, a deaerated state of a high replacement rate can be obtained efficiently and stably within a shorter time than the conventional system and method without causing degradation of the productivity and without inviting an increase in size of the machine due to an increase in the number of steps for deaeration.

[0029] Next, a nozzle 51 according to a second embodiment of the present invention will be explained with reference to Figs. 3a and 3b. The nozzle 51 in this embodiment also has a double-tube structure but differs from the nozzle 1 in the first embodiment in that a first nozzle member 53 and a second nozzle member 73 can move up and down independently of each other. The first nozzle member 53 that is provided inside the second nozzle member 73 has substantially the same structure as that of the first nozzle member 3 in the first embodiment. The nozzle body 55 of the first nozzle member 53 has a substantially cylindrical upper tubular part 57 and an insert part 59. The insert part 59 also has a flat cross-sectional configuration. The insert part 59 has a spout 61 at the lower end thereof. The spout 61 has been obliquely cut at longitudinally opposite ends thereof to form slant portions 62a and 62b. The upper end of the nozzle body 55 is secured to a holder 63. The holder 63 has a steam inlet 65 provided on a side thereof. The steam inlet 65 is connected to a first steam supply path (not shown). The holder 63 has a hole formed in the upper end thereof. An adapter 71 is fitted into the hole. A temperature sensor 69 is supported by the adapter 71. The first nozzle member 53 is fixedly secured to an elevating shaft (not shown) through a mounting bracket 67 so as to move up and down together with the elevating shaft.

[0030] The second nozzle member 73 is also a substantially cylindrical member similar to the second nozzle member 23 in the first embodiment. The second nozzle member 73 has a cylindrical nozzle body 75 having a spout 79 at the lower end thereof. The nozzle body 75 surrounds a lower portion of the upper tubular part 57 and the insert part 59. The second nozzle member 73 has a fitting portion 77 provided on the upper side of the nozzle body 75. The second embodiment differs from the first embodiment in that the nozzle body 75 is slidably fitted on the upper tubular part 57 of the first nozzle member 53 at the fitting portion 77 as shown by the two-dot chain line in Fig. 3a. Reference numeral 78 denotes an O-ring for sealing. A mounting bracket 85 that is secured

to an elevating shaft (not shown) is secured to the fitting portion 77. Unlike in the first embodiment, the second nozzle member 73 can move up and down independently of the first nozzle member 53. The second embodiment is similar to the first embodiment in that the nozzle body 75 has a steam inlet 81 provided at an upper side portion thereof, and the steam inlet 81 is connected to a second steam supply path (not shown), and that the second nozzle member 73 has a second temperature sensor 83.

[0031] The following is an explanation of a steam-replacement deaeration operation using the nozzle 51 according to the second embodiment. The nozzle 51 is standing by in the position shown by the solid lines in Fig. 3a for a bag that is to be moved to the deaeration step (see Figs. 2Aa and 2Ab). In this state, the distal end of the spout 61 of the first nozzle member 53 is at a slightly lower position than the spout 79 of the second nozzle member 73. This is, however, not always essential. With the first and second nozzle members 53 and 73 kept in the above-described positional relation, they are moved downward simultaneously by a predetermined distance, so that both the spouts 61 and 79 are inserted into the bag to inject steam (see Figs. 2Ba and 2Bb). Next, only the second nozzle member 73 is moved upward, so that the spout 79 thereof is removed from the bag (see Figs. 2Ca and 2Cb). Next, while steam is being injected from the first nozzle member 53, the bag mouth is brought into a tensed state (see Figs. 2Da and 2Db). Next, the first nozzle member 53 is moved upward by a predetermined distance, so that the spout 61 thereof is removed from the bag mouth (see Figs. 2Ea and 2Eb). Thus, the nozzle 51 returns to the standby position, and the bag in which the air has been replaced with steam is moved to the sealing step (see Figs. 2Fa and 2Fb).

[0032] Next, a nozzle 91 according to a third embodiment of the present invention will be explained with reference to Figs. 4a and 4b. The third embodiment differs from the second embodiment in that the nozzle body of a second nozzle member is split into two parts facing each other across a first nozzle member. More specifically, a first nozzle member 93 that is provided inside a second nozzle member 113 also has substantially the same structure as that of the first nozzle member 3 in the first embodiment. The nozzle body 95 of the first nozzle member 93 has a substantially cylindrical upper tubular part 97 and an insert part 99 below the upper tubular part 97. The insert part 99 also has a flat cross-sectional configuration. The first nozzle member 93 has a spout 101 at the lower end of the insert part 99. The spout 101 has been obliquely cut at longitudinally opposite ends thereof to form slant portions 102a and 102b. The upper end of the nozzle body 95 is secured to a holder 103. The holder 103 has a steam inlet 105 provided on a side thereof. The steam inlet 105 is connected to a first steam supply path (not shown). The holder 103 has a hole formed in the upper end thereof. An adapter 111 is fitted into the hole to support a temperature sensor 19. The first nozzle member 93 is fixedly secured to an elevating shaft (not

shown) through a mounting bracket 107.

[0033] The second nozzle member 113 differs from that in the second embodiment in that the nozzle body thereof is split into two parts, i.e. left and right nozzle body members 115a and 115b each having a bow-shaped cross-sectional configuration close to a semicircular shape. The nozzle body members 115a and 115b are arranged so that their straight-line portions, i.e. bow string portions, face each other and extend in the longitudinal direction of the flat cross-section of the insert part 99 of the first nozzle member 93. In other words, the cross-sections of the nozzle body members 115a and 115b respectively occupy predetermined areas, i.e. bow-shaped areas, at the laterally opposite sides of the cross-section of the insert part 99 of the first nozzle member 93. A fitting portion 117 is provided on the upper sides of the nozzle body members 115a and 115b. The second nozzle member 113 is slidably fitted on the upper tubular part 97 of the first nozzle member 93 at the fitting portion 117 as shown by the two-dot chain line in Fig. 4a. The fitting portion 117 is provided with an O-ring for sealing (not shown). A mounting bracket 125 that is secured to an elevating shaft (not shown) is secured to the fitting portion 117. The second nozzle member 113 can move up and down independently of the first nozzle member 93. The nozzle body members 115a and 115b have respective steam inlets 121a and 121b provided at upper side portions thereof. The steam inlets 121a and 121b are connected to a second steam supply path (not shown). A second temperature sensor 123 is attached only to the left nozzle body member 115a. The steam-replacement deaeration operation using the nozzle 91 according to the third embodiment will be clear from the explanation of the second embodiment. Therefore, a description thereof is omitted. It should be noted that the nozzle 91 may be arranged so that the first and second nozzle members 93 and 113 are integrally constructed in the same way as in the first embodiment and operated for deaeration according to the same procedure as in the first embodiment.

[0034] It should be noted that the present invention is not limited to the foregoing embodiments but can be modified in a variety of ways.

Claims

1. A nozzle (1,51,91) for use in steam-replacement deaeration in bag packaging, **characterized in that** a first nozzle member (3,53,93) having an insert part (9,59,99) adapted to be inserted into a bag (B), said insert part (9,59,99) having a flat cross-section, said first nozzle member (3,53,93) having an interior connected to a first steam supply path (P1); and a second nozzle member (23,73,113) having an insert part (25, 75, 115a, 115b) adapted to be inserted into the bag (B), said insert part (25, 75, 115a, 115b) having a cross-section that at least partially occupies

an area around the insert part (9,59,99) of said first nozzle member (3,53,93), said second nozzle member (23,73,113) having an interior connected to a second steam supply path (P2).

2. The nozzle (1,51,91) of claim 1, **characterized in that** the insert part (25, 75, 115a, 115b) of said second nozzle member (23,73,113) surrounds said insert part (9,59,99) of said first nozzle member (3, 53, 93).
3. The nozzle (1,51) of claim 2, **characterized in that** said cross-section of said insert part (25,75) of said second nozzle member (23,73) is substantially circular.
4. The nozzle (91) of claim 1, **characterized in that** said insert part (115a, 115b) of said second nozzle member (113) has two insert part portions located at laterally opposite sides of the flat cross-section of the insert part (99) of said first nozzle member (93) and having bow-shaped cross-sections, respectively, wherein straight-line portions of the bow-shaped cross-sections of said two insert part portions (115a, 115b) face each other and extend in a longitudinal direction of the flat cross-section of the insert part (99) of said first nozzle member (93).
5. The nozzle (1) of any of claims 1 to 4, **characterized in that** said first nozzle member (3) and second nozzle member (23) are integrally constructed, said second nozzle member (23) being positioned so that a distal end of a spout thereof (29) is axially rearward of a distal end of a spout (11) of said first nozzle member (3).
6. The nozzle (51,91) of any of claims 1 to 4, **characterized in that** wherein said second nozzle member (73,113) is axially movable relative to said first nozzle member (53,93).
7. A steam-replacement deaeration method for use in bag packaging, **characterized by** the steps of:

preparing a nozzle (1,51,91) having a first nozzle member and a second nozzle member, said first nozzle member (3,53,93) having an insert part adapted to be inserted into a bag (B), said insert part (9,59,99) having a flat cross-section, said first nozzle member (3,53,93) having an interior connected to a first steam supply path (P1), said second nozzle member (23,73,113) having an insert part adapted to be inserted into the bag (B), said insert part (25,75,115a,115b) having a cross-section that at least partially occupies an area around the insert part (9,59,99) of said first nozzle member (3,53,93), said second nozzle member (23,73,113) having an interior connect-

ed to a second steam supply path (P2);
inserting said nozzle (1,51,91) into the bag (B)
whose mouth is open;
injecting steam from said first nozzle member
(3,53,93) and second nozzle member; 5
removing said second nozzle member from the
bag (B), stopping injection of steam from said
second nozzle member (23,73,113), and bring-
ing the mouth of said bag (B) into a tensed state;
and 10
removing said first nozzle member (3,53,93)
from the bag (B), and stopping injection of steam
from said first nozzle member (3,53,93), said
bag (B) being thereafter moved to a subsequent
step with the mouth of said bag (B) kept in the 15
tensed state.

8. The method of claim 7, **characterized in that** said
first nozzle member (3) and second nozzle member
(23) are integrally constructed, said second nozzle 20
member (23) being positioned so that a distal end of
a spout thereof (29) is axially rearward of a distal end
of a spout (11) of said first nozzle member (3).
9. The method of claim 7, **characterized in that** said 25
second nozzle member (73,113) is axially movable
relative to said first nozzle member (53,93).

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Fig. 1a

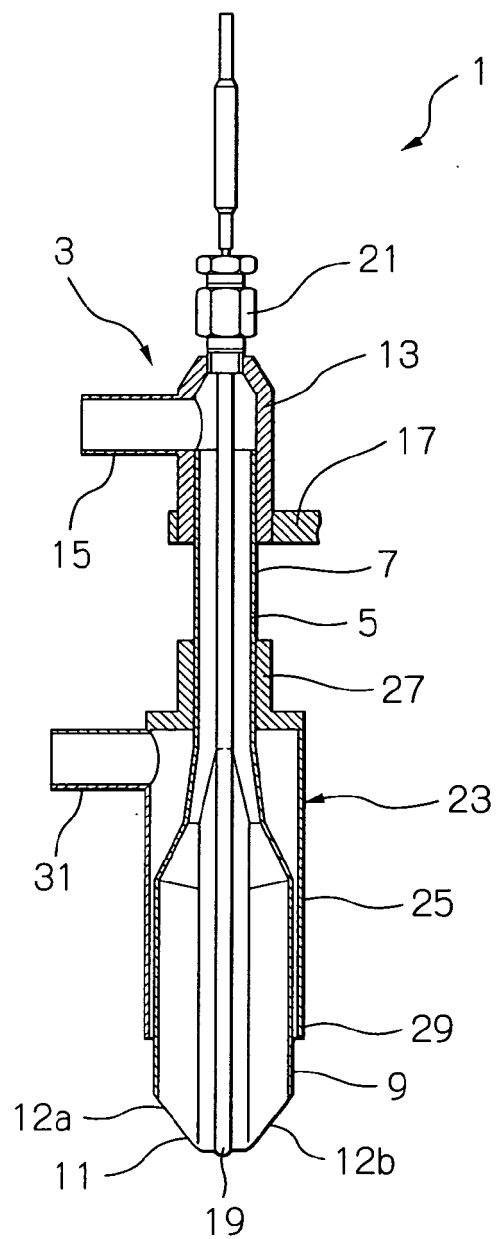


Fig. 1b

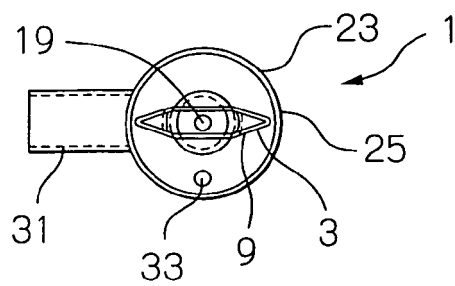


Fig. 2Aa

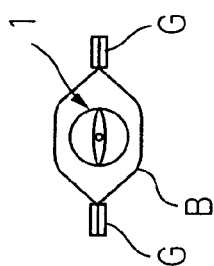


Fig. 2Ab

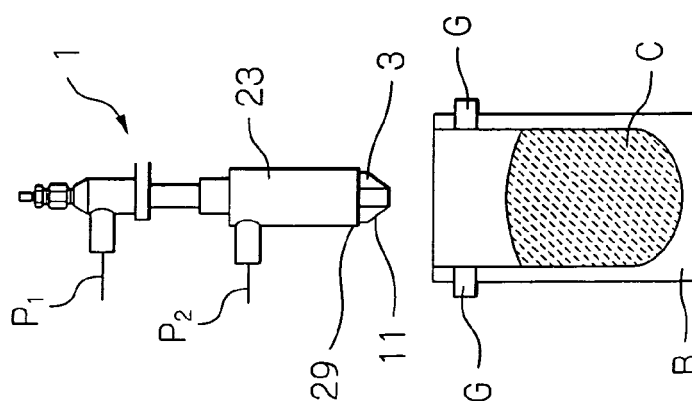


Fig. 2Ba

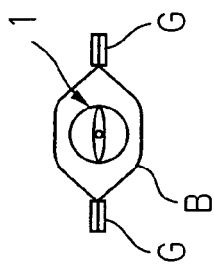


Fig. 2Bb

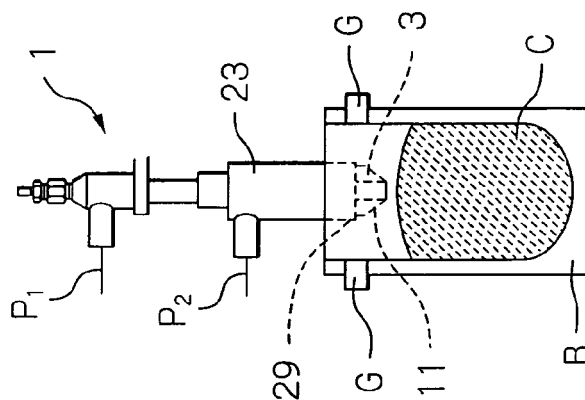


Fig. 2Ca

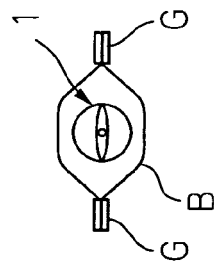


Fig. 2Cb

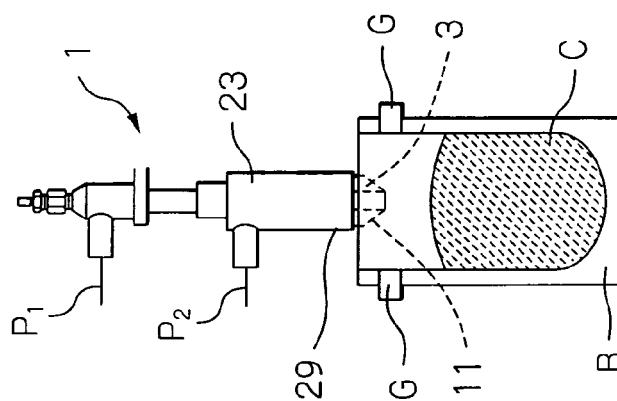


Fig. 2Da

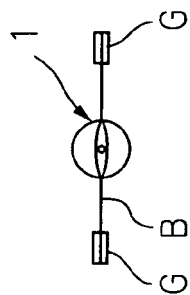


Fig. 2Ea

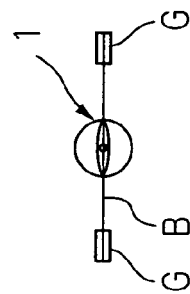


Fig. 2Eb

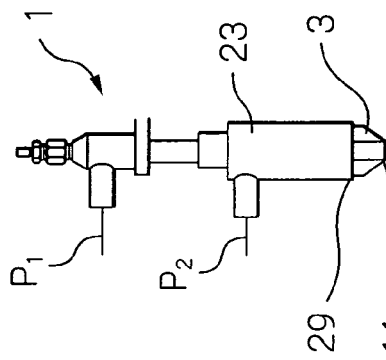


Fig. 2Db

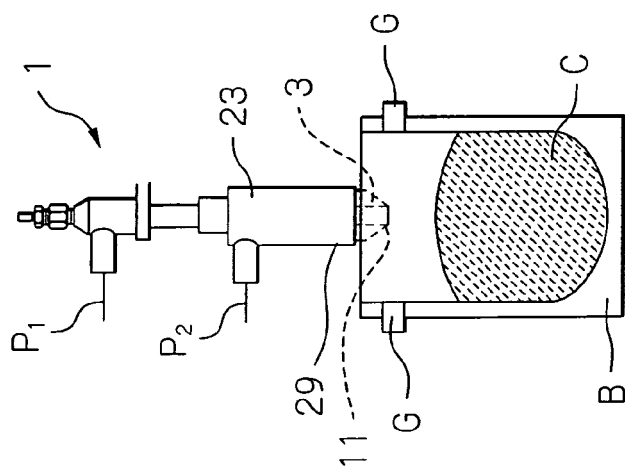


Fig. 2Fa

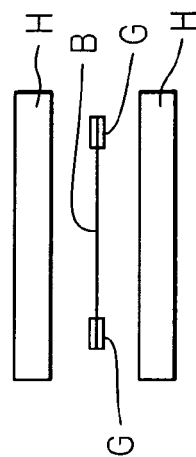


Fig. 2Fb

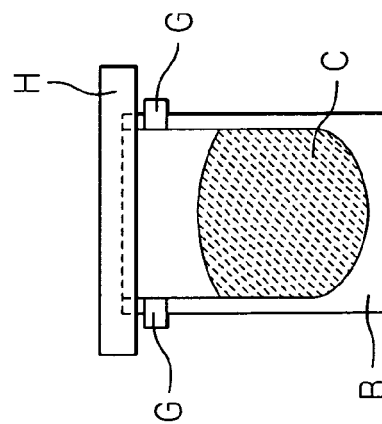


Fig. 3a

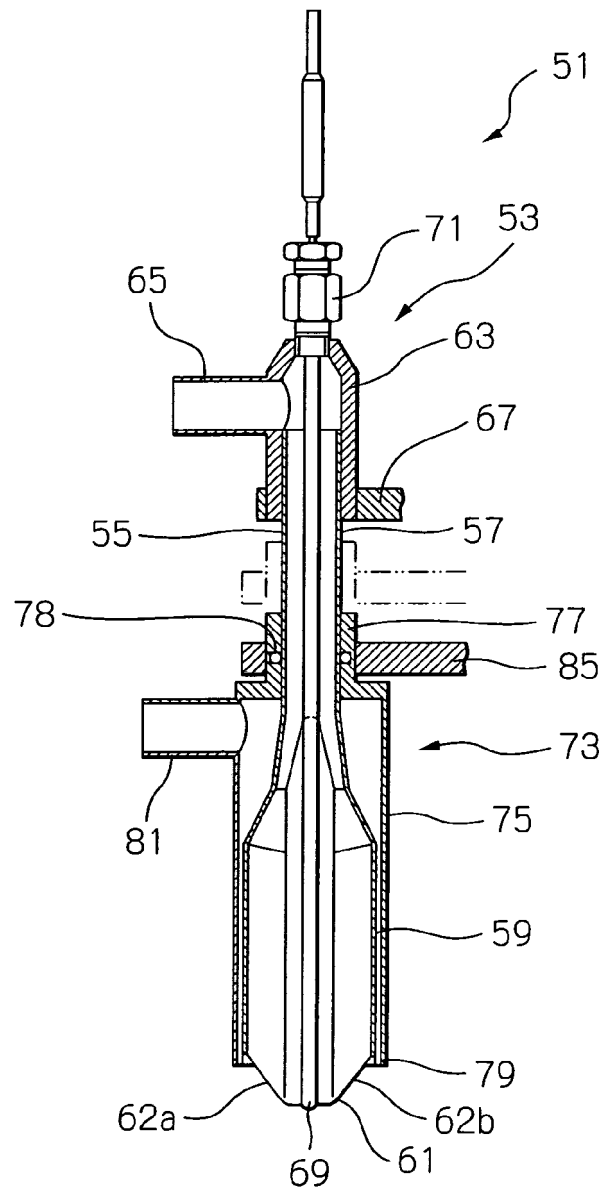


Fig. 3b

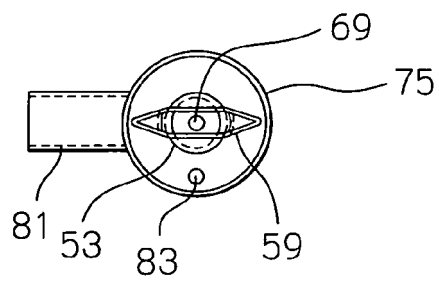


Fig. 4a

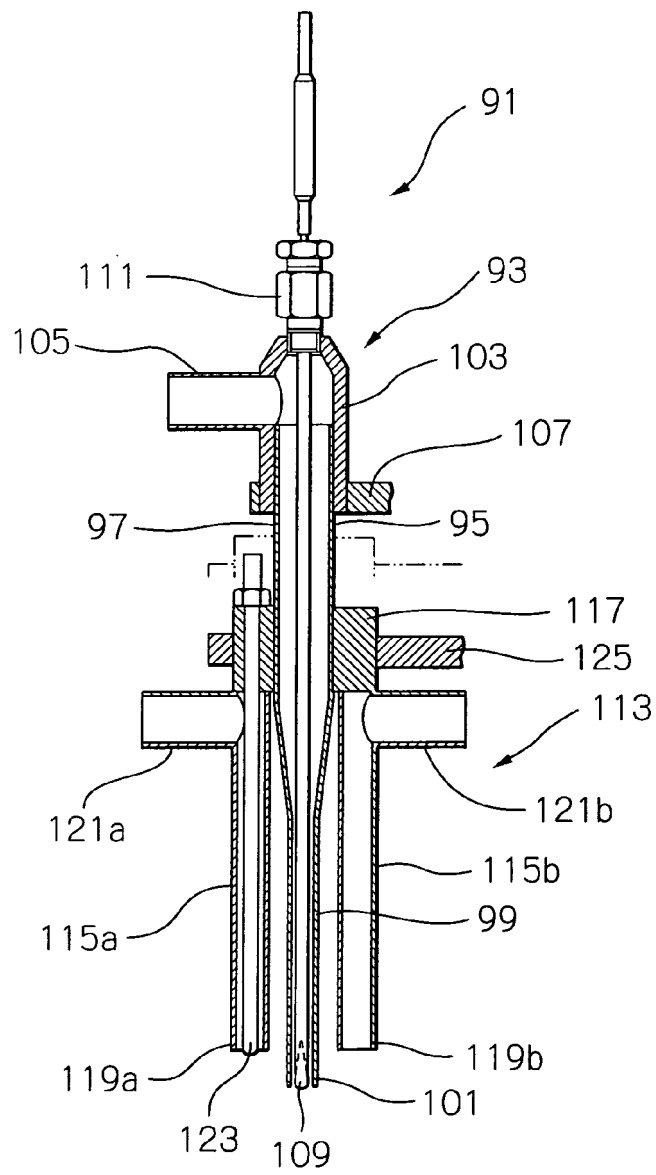
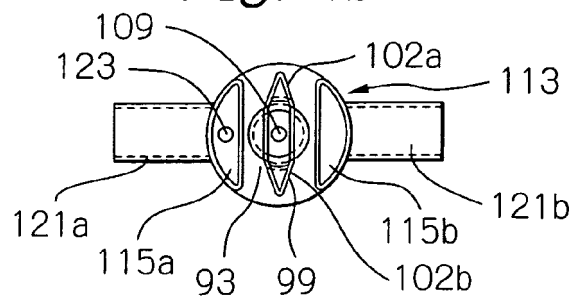


Fig. 4b





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EUROPEAN SEARCH REPORT

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