



(51) International Patent Classification:

B65B 9/12 (2006.01) *B65B 57/14* (2006.01)
B65B 39/12 (2006.01)

(21) International Application Number:

PCT/EP2018/053461

(22) International Filing Date:

12 February 2018 (12.02.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

17156096.4 14 February 2017 (14.02.2017) EP

(71) Applicant: **TETRA LAVAL HOLDINGS & FINANCE S.A.** [CH/CH]; 70, Avenue Général-Guisan, 1009 PULLY (CH).

(72) Inventor: **SAEIDIHAGHI, Arash**; Blåmesvägen 32, 247 35 SÖDRA SANDBY (SE).

(74) Agent: **TETRA PAK - PATENT ATTORNEYS SE**; AB Tetra Pak, Patent Department, Ruben Rausingsgata, 221 86 LUND (SE).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,

DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: FILLER PIPE

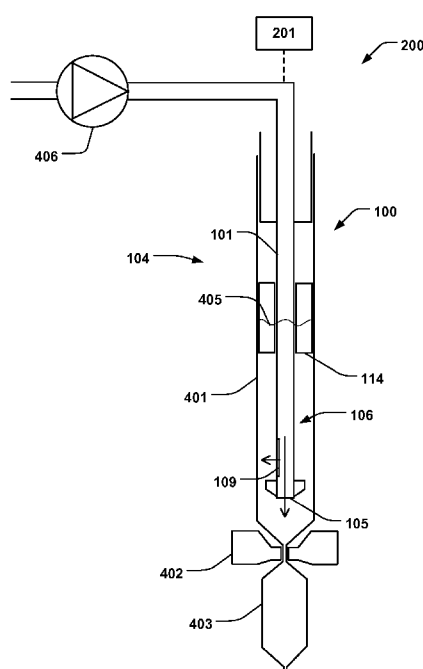


Fig. 1

(57) Abstract: A filler pipe for filling packaging containers with content is disclosed. The filler pipe comprises a pipe having a lumen extending in a longitudinal direction of the pipe between a proximal end and a distal opening thereof, wherein the distal opening is arranged at a distal portion of the pipe being configured to be inserted into the packaging containers and submerged into the content, wherein the lumen is surrounded by an annular wall in a radial direction being perpendicular to the longitudinal direction, wherein the wall comprises at least one opening for fluid communication of the content from the lumen through the wall, and wherein the at least one opening is arranged at the distal portion, proximally of the distal opening. A filler system and a method of filling containers with a filler pipe are also disclosed.



Filler pipe

Technical Field

5 The present invention generally relates to the field of filler pipes for conveying viscous liquids under pressure into containers. More particularly, the present invention relates to a filler pipe for filling packaging containers, in a packaging machine, a filler system and a method of filling packaging containers.

Background

10 Packaging containers with liquid content can be manufactured according to the principle by which a web of packaging material moves substantially downwards through the packing machine, where the web is converted to a tube of connected packing containers which are in communication with each other. The row of packing containers is formed around an elongated filler pipe and is filled continuously with the intended contents. At the bottom end of the row a gradual sealing off of filled packing containers from the connected row takes place with the help of sealing jaws and a cutting device. A distal end of the filler pipe is submersed into the liquid content in the tube of packaging containers, and a proximal end of the filler pipe is further connected to a product tank via a pump system.

20 A problem with previous filler pipes is the limited capabilities in handling higher viscous products. This limit the range of products that can be handled, or necessitate heating of the products in order to lower the viscosity thereof, which may not always be desired for certain food products, since the heating may have detrimental effects on the quality or intended consistency of the food.

30 Further problems arise when having filler pipes with float sensors, when handling products that are susceptible to stick onto the surfaces of the filler pipe and/or the float, which may typically be the case when handling higher viscous products. The float is movably arranged around the distal portion of the filler pipe to act as an indicator of the level of the product in the tube of packaging material. However, when the product eventually accumulate onto the surfaces, the float risk sticking onto the filler pipe and thereby give false readings of the product level. The production will also be interrupted, and time is lost on opening the tube of packaging material, cleaning the components and restarting

the process. Previous solutions on sensing the product level, without having a float, are typically more complex and may be less robust, or are simply too difficult to implement in certain applications.

Hence, an improved filler pipe would be advantageous and in particular allowing for avoiding more of the above mentioned problems and compromises, including increasing the range of viscosity of the product that can be handled, and minimizing maintenance when handling products that are prone to accumulate onto the surfaces of the filler pipe. An associated filler system and a method of filling packaging containers avoiding the mentioned problems would also be advantageous.

Summary

Accordingly, examples of the present invention preferably seeks to mitigate, alleviate or eliminate one or more deficiencies, disadvantages or issues in the art, such as the above-identified, singly or in any combination by providing a device according to the appended patent claims.

According to a first aspect a filler pipe for filling packaging containers with content is provided. The filler pipe comprises a pipe having a lumen extending in a longitudinal direction of the pipe between a proximal end and a distal opening thereof, wherein the distal opening is arranged at a distal portion of the pipe being configured to be inserted into the packaging containers and submerged into the content, wherein the lumen is surrounded by an annular wall in a radial direction being perpendicular to the longitudinal direction, wherein the wall comprises at least one opening for fluid communication of the content from the lumen through the wall, and wherein the at least one opening is arranged at the distal portion, proximally of the distal opening.

According to a second aspect, a filler system is provided comprising a filler pipe according to the first aspect and a control unit. The filler pipe comprises a pipe extending in a longitudinal direction, and a float having an interior channel arranged around the pipe and being movable in the longitudinal direction by a sliding motion relative to the pipe. The control unit is configured to, in use, raise or lower the pipe into a filling content in a sealed tube of packaging material according to a determined sequence, wherein the sequence is determined to provide a repeated motion of the float in the longitudinal direction of the pipe to at least partly overlap with at least one opening in an annular wall of the pipe according to a determined cycle over an interval of time, the at least one

opening extending in a longitudinal direction of the pipe, towards a proximal portion thereof.

According to a third aspect, a method of filling packaging containers with a filler pipe is provided. The filler pipe comprises a pipe having a lumen extending
5 in a longitudinal direction of the pipe between a proximal end and a distal opening thereof. The method comprises submerging a distal portion of the pipe into a filling content in a sealed tube of packaging material from which said containers are formed, and expelling filling content in a radial direction, substantially perpendicular to the longitudinal direction, from at least one
10 opening in an annular wall of the pipe, the at least one opening being arranged at the distal portion, proximally of the distal opening.

Further examples of the invention are defined in the dependent claims, wherein features for the second and third aspects of the disclosure are as for the first aspect *mutatis mutandis*.

15 Some examples of the disclosure provide for facilitating filling highly viscous content into packaging containers.

Some examples of the disclosure provide for increasing the range of products of varying viscosity that can be filled into packaging containers.

Some examples of the disclosure provide for avoiding accumulation of the
20 product to be filled onto the surfaces of the filler pipe.

Some examples of the disclosure provide for a more reliable determination of the level of the product in a tube of packaging material.

Some examples of the disclosure provide for a less complex, and easier to implement, system for determining the level of the product in a tube of
25 packaging material.

Some examples of the disclosure provide for reducing the maintenance of the filler pipe and associated level sensing floats.

Some examples of the disclosure provide for increasing the throughput of a filling system for packaging containers.

30 Some examples of the disclosure provide for reducing the pressure drop over the filler pipe.

It should be emphasized that the term “comprises/comprising” when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or
35 more other features, integers, steps, components or groups thereof.

Brief Description of the Drawings

These and other aspects, features and advantages of which examples of the invention are capable of will be apparent and elucidated from the following description of examples of the present invention, reference being made to the accompanying drawings, in which;

Fig. 1 is a schematic illustration of a filling machine for packaging containers having a filler system and components for providing the packaging material and forming packaging containers;

Fig. 2 is a schematic illustration of a filler pipe, in a cross-sectional view, according to one example;

Fig. 3a is a schematic illustration of a filler pipe, in a perspective view, according to one example;

Fig. 3b is a schematic illustration of a filler pipe, in a perspective view, provided with a float, according to one example;

Fig. 4 is a schematic illustration of a filler pipe, in a perspective view, according to one example;

Fig. 5 is a schematic illustration of a filler pipe, in a perspective view, according to one example;

Fig. 6a is a schematic illustration of a detail of a filler pipe, in a cross-sectional view, according to one example;

Fig. 6b is a schematic illustration of a detail of a filler pipe, in a cross-sectional view, according to one example;

Fig. 7a is a schematic illustration of a filler pipe, in a perspective view, according to one example;

Fig. 7b is a schematic illustration of a filler pipe, in a cross-sectional view, according to one example;

Fig. 8 is a schematic illustration of a detail of a filler pipe, in a cross-sectional view, provided with a float, according to one example; and

Fig. 9 is a flowchart of a method of filling packaging containers with a filler pipe according to one example.

Detailed Description

Specific examples of the invention will now be described with reference to the accompanying drawings. This invention may, however, be embodied in many different forms and should not be construed as limited to the examples

set forth herein; rather, these examples are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The terminology used in the detailed description of the examples illustrated in the accompanying drawings is not intended to be limiting
5 of the invention. In the drawings, like numbers refer to like elements.

Fig. 1 illustrates part of a filling machine for packaging containers. The packaging material is conveyed in a vertical direction in the filling machine, and is formed as a tube 401 of packaging material around a filler pipe 100. The content is filled into the tube 401 from a distal portion 106 of the filler pipe 100
10 that is submerged into the content. The level 405 of content in the tube 401 can be determined from the position of a float 114 that moves vertically around the filler pipe 100. The filler pipe 100 is connected to a pump system 406, that pump the content from a product tank (not shown) through the distal portion 106 and into the tube 401 of packaging material. A sealing unit 402 repeatedly seals
15 off the packaging material in the transversal direction of the tube 401 to form individual packages 403 filled with content.

Fig. 2 illustrates an enlarged view of the filler pipe 100, according to one example. The filler pipe 100 comprises a pipe 101 having a lumen 102 extending in a longitudinal direction 103 of the pipe 101, between a proximal
20 end 104 and a distal opening 105 thereof. The proximal end 104 is further connectable to the pump system 406, to allow content to be pumped into the lumen 102. The distal opening 105 is arranged at a distal portion 106 of the pipe 101 being configured to be inserted into the packaging containers and submerged into the content. The lumen 102 is surrounded by an annular wall
25 107 in a radial direction 108. The radial direction 108 is perpendicular to the longitudinal direction 103. I.e. the hollow pipe 101 is defined by the annular wall 107. The wall 107 comprises at least one opening 109, 109', 110, 110', 111, 111', 112, 113, for fluid communication of the content from the lumen 102 through the wall 107. The at least one opening 109, 109', 110, 110', 111, 111',
30 112, 113, is arranged at the distal portion 106, proximally of the distal opening 105. The denotation "proximally" should be construed in the normal sense, i.e. in this case, at a location which is closer to the proximal end 104 than the location of the distal opening 105, along the longitudinal direction 103. Having at least one opening 109, 109', 110, 110', 111, 111', 112, 113 (hereafter referred
35 to as opening 109 - 113, for short) in the wall 107 of the pipe 101, proximally of the distal opening 105 will lower the pressure drop across the distal portion 106 of the filler pipe 100, since content can escape through the opening 109 - 113.

The pressure after the pump 406 is high because of the pressure drop in the components is after this point. Calculation and measurements has shown that the highest pressure drop comes from the distal portion of the filler pipe 101. Such pressure drop can thus be avoided by letting the content ease out of the distal portion 106, through the opening 109 – 113. This is particularly advantageous when filling content of relatively high viscosity, that otherwise tend to slow down the filling process due to the high pressure drop across the distal portion 106. Having the opening 109 – 113 proximally of the distal opening 105 thus allows for maintaining a sufficiently high filling speed in the tube 401 of packaging material, to achieve a high throughput, even for content of higher viscosity. Undesired heating of the content or product to be filled can also be avoided, which has been done previously in order to lower the viscosity.

Fig. 9 illustrates a flowchart of a method 300 of filling packaging containers with a filler pipe 100 according to one example. As mentioned in relation to Fig. 1, the filler pipe 100 comprises a pipe 101 that has a lumen 102 extending in a longitudinal direction 103 of the pipe 101 between a proximal end 104 and a distal opening 105 thereof. The method 300 comprises submerging 301 a distal portion 106 of the pipe 101 into filling content in a sealed tube of packaging material 401 from which the packaging containers are formed. The method 300 further comprising expelling 302 filling content in a radial direction 108, substantially perpendicular to the longitudinal direction 103, from at least one opening 109, 109', 110, 110', 111, 111', 112, 113, in an annular wall 107 of the pipe 101. The at least one opening 109, 109', 110, 110', 111, 111', 112, 113, is arranged at the distal portion 106, proximally of the distal opening 105. The method 300 thus provides for the advantageous effects described above.

The at least one opening may be elongated in the longitudinal direction 103, as illustrated for example in Fig. 3a, with respect to opening 109. The cross-sectional view in Fig. 1 of the filler pipe 100 also illustrates opening 109 extending in the longitudinal direction 103. This example also shows a second elongated opening 109' at the radially opposite wall 107 of the distal portion 106. Having at least one opening 109, 109', being elongated and extending in the longitudinal direction 103, may further improve the flow of content through the distal portion 106, with a minimal pressure drop across the same, since the content can dissipate over a longer distance in the longitudinal direction 103.

The at least one opening may be elongated in the radial direction 108, as illustrated for example in Fig. 5, with respect to openings 112 and 113. Thus, the opening 112, 113, may extend over a determined angle or circle sector of

the annular pipe wall 107, which is further illustrated in Fig. 6b, showing a cross-section of the pipe 101 at the position of the opening 112, 113. In this example, the opening extends over approximately 90 degrees of the wall 107. The angle or circle sector may be varied depending on the particular application to
5 optimize the flow of fluid content across the pipe wall 107. Dynamic flow phenomena that occurs around the distal portion 106 of the filler pipe 101 may be controlled by varying the mentioned dimensions of the at least one opening 109, 109', 112, 113, to avoid undesired effects, such as flow vortexes that create certain turbulent flows that may affect the speed by which the fluid can
10 be delivered into the tube of packaging material. Other related phenomena, for example frothing of the fluid may also be controlled this way.

The at least one opening may comprise a plurality of apertures, as illustrated for example in Fig. 4, with respect to openings 110 and 111. The aforementioned elongated openings 112, 113, illustrated in Fig. 5 may
15 represent another example of having apertures in the distal portion 106. Having a plurality of apertures allows for further control of the dynamic pressure characteristics of the pipe 101 when used for delivering high viscosity content. The number of apertures 110, 111, 112, 113, and the location thereof may be varied to optimize these characteristics depending on the current application or
20 type of filling machine.

The apertures 110, 111, 112, 113, may be separated from each other in the longitudinal direction 103, as illustrated in the examples of Figs. 4 and 5. The separation distance between the individual apertures may also be varied depending on the application, e.g. depending on the viscosity of the fluid
25 content to be delivered. It is even conceivable to have an active control unit (not shown) that is configured to control the size and placement of the apertures or openings 109 – 113, by actuating an internal or external sheath (not shown) that is movable relative the pipe wall 107 to selectively cover or expose a desired number of apertures, depending on the application.

The openings or apertures 109, 110, 111, 109', 110', 111', may be arranged in radially opposite directions in the wall 107, as illustrated for example in Fig. 6a, or Fig. 1 with respect to openings 109 and 109'. It is also conceivable that the different illustrated types of openings or apertures can be combined. For example, an opening 112, 113, being elongated in the radial
30 direction 108 may be combined with a substantially circular aperture 110', 111', of the type illustrated in Fig. 4 in conjunction with Fig. 6a, in the radially opposite wall 107, i.e. at the right side of the wall 107 shown in Fig. 6b. Alternatively, or
35

in addition, the opening 112, 113, being elongated in the radial direction 108 may be combined the opening 109, 109', being elongated in the longitudinal direction 103.

5 The filler pipe may comprise a float 114, as illustrated in Figs. 2, 3b, 7a-b, and Fig. 8. The float 114 is buoyant in the content to be filled, and has an interior channel 115 arranged around the pipe 101. The float 114 is movable in the longitudinal direction 103 by a sliding motion relative to the pipe 101 or pipe wall 107, between the distal portion 106 at which the float overlaps with the at least one opening 109 - 113, and the proximal end 104. By having the float 114
10 configured to be movable over the pipe 101, over the distal portion 104, at which the opening 103 - 113 is provided, allows for exposing portions of the float 114 to the radial flow of content through the opening 109 - 113. This may provide for minimizing the accumulation of content on the float 114 over time, since the otherwise limited flow of the content along the interior channel 115 of
15 the float 114 is prevented and replaced by the directional flow through the opening 109 - 113. Accumulation in the interior channel 115 may cause the float to adhere to the pipe 101, and thereby give false readings of the content level in the tube of packaging material. It is thus possible to have a float sensor for accurate level sensing even in processes involving high viscosity or easily
20 adhering products. Moreover, having the openings 109 - 113 generally allows for using a float 114 when desired. Only increasing the diameter of the distal opening 105 to reduce the pressure drop across the distal portion 106 may not allow for sufficient space around the pipe 101 to have a float 114, since the dimension of the tube of packaging material is dictated by the dimensions of the
25 finished packaging containers. Other level sensing devices would then have to be incorporated, which may increase the complexity of the filling system, or be not as robust as having a float 114 which has a direct physical contact with the content level.

A filler system 200 is also provided according to the present disclosure.
30 The filler system 200 comprises a filler pipe 100 as described above, and a control unit 201, schematically illustrated in Fig. 1. As mentioned, the filler pipe 100 comprises a pipe 101 extending in a longitudinal direction 103, and a float 114 having an interior channel 115 arranged around the pipe 101 and being movable in the longitudinal direction 103 by a sliding motion relative to the pipe
35 101. The control unit 201 is configured to, in use, raise or lower the pipe 101 into filling content in a sealed tube of packaging material 401 according to a determined sequence. The sequence is determined to provide a repeated

motion of the float 114 in the longitudinal direction 103 of the pipe to at least partly overlap with at least one opening 109, 109', 110, 110', 111, 111', 112, 113, in an annular wall 107 of the pipe 101 according to a determined cycle over an interval of time. The at least one opening 109, 109', 110, 110', 111, 111', 112, 113, extends in the longitudinal direction 103 of the pipe 101, towards the proximal portion 104 thereof. Having such filler system 200 with a control unit 201 that control the position of the float 114 to repeatedly, at a determined frequency, overlap with the opening 109 – 113, i.e. thereby exposing the interior channel 115 to the radial flow expelled from the opening 109 – 113, provides for further minimizing accumulation of filling material on the float, and in particular in the channel 115, that may cause false level readings.

Thus the method 300 may also comprise raising 303 or lowering 304 the pipe 101 into the filling content the tube of packaging material according to a determined sequence, where the sequence is determined to provide a repeated motion of the float 114 in the longitudinal direction 103 of the pipe to at least partly overlap with the at least one opening 109 – 113 according to a determined cycle over an interval of time.

The opening 109 – 113 may have a length 117 that extends in the longitudinal direction 103 to overlap with substantially the entire length 119 of the float 114 in the longitudinal direction 103, as schematically illustrated in e.g. Fig. 3b. This may provide for ensuring that the entire float 114 is exposed to the flow from the opening 109 – 113.

The float 114 may comprise an annular helical-shaped groove 116 in the wall of the interior channel 115 that extends in the longitudinal direction 103. I.e. the float has a spiral-shaped groove 116, as illustrated in the perspective view of Fig. 7a. A corresponding cross-sectional view is shown in Fig. 7b, where the groove 116 is seen as a plurality of recesses 116 in the float 114. Fig. 8 shows another cross-sectional view with the section taken in a plane along the radial direction 108, in which one ring of the spiral of the groove 116 is seen. The helical-shaped groove 116 is configured to receive a flow of the content being expelled from the at least one opening 109 – 113, in use of the filler pipe 100, whereby the flow acts on the helical-shaped groove 116 with a rotational force to cause a rotational movement 127 on the float around the longitudinal direction 103, i.e. around a rotational axis being concentric with the longitudinal direction 103, as illustrated in Fig. 8. The helical groove 116 thus provides a rotational motion of the float 114. This may further minimize the risk of

accumulation of content on the float 114 over time, due to the increased movement of the float 114 relative the pipe wall 107.

The opening 109 – 113 may have a length 117 that extends in the longitudinal direction 103 to overlap with substantially the entire length 118 of the helical-shaped groove 116 in the longitudinal direction, as illustrated in Fig. 7b. This may provide for ensuring that the helical groove 116 is exposed to a sufficient amount of radial flow through the opening 109 – 113 in the longitudinal direction along the length 118 of the groove 116 to further increase the rotational force acting on the float 116. This may allow for achieving rotation of the float 116 even in highly viscous fluids. Any configuration of the at least one opening 109 – 113 as discussed above may be combined with the helical-shaped groove 116 of the float 114.

The pipe may 101 comprise an expanded diameter portion 120, arranged at a distal tip 121 of the distal portion 106, as illustrated in e.g. Figs. 2 and 3a-b. The expanded diameter portion 120 has a larger diameter in the radial direction 108 than an inner diameter 122 of the interior channel 115 of the float 114. The expanded diameter portion 120 thus acts as an end stop for the float 114 at the distal portion 106 of the pipe 101. The at least one opening 109 – 113 may extend from a distal position 123 adjacent the expanded diameter portion 120 to a proximal position 123' adjacent a proximal end 124 of the float 114 when the float 114 abuts the expanded diameter portion 120, as schematically illustrated in Fig. 7b. It should be noted that even though the illustration in Fig. 7b shows the helical groove 116, it is conceivable that the float 114 may not have the helical groove 116 in this example.

The float 114 may have an inner diameter 122 of the interior channel 115 dimensioned so that an annular space 125 extends in the longitudinal direction 103 and separates the inner channel 115 from an outer wall 126 of the pipe, as illustrated in Fig. 8. The annular space 125 allows fluid content to flow from the opening 109 - 113 and along the outer wall 126 of the pipe 101 in the longitudinal direction 103. Having an annular space 125 dimensioned so that the content may readily flow in the longitudinal direction 103, even though the float 114 may cover the opening 109 – 113 advantageously provides for avoiding accumulation of content between the outer wall 126 and the interior channel 115 of the float 114. The annular space 125 may be dimensioned depending on the particular viscosity of the content that is handled in the process, e.g. by increasing the radial extent thereof, i.e. increasing the

separation between the outer wall 126 and the inner diameter 122 of the float 114, when the viscosity is increased.

It should be readily understood that the general principle of the above description is applicable to a variety of pressurized filling applications into
5 confined-space containers, where the fluid content may be high viscous products, and where robust float detection of content level is desired.

The present invention has been described above with reference to specific examples. However, other examples than the above described are equally
10 possible within the scope of the invention. The different features and steps of the invention may be combined in other combinations than those described. The scope of the invention is only limited by the appended patent claims.

More generally, those skilled in the art will readily appreciate that all parameters, dimensions, materials, and configurations described herein are
15 meant to be exemplary and that the actual parameters, dimensions, materials, and/or configurations will depend upon the specific application or applications for which the teachings of the present invention is/are used.

Claims

1. A filler pipe (100) for filling packaging containers with content, comprising;

5 a pipe (101) having a lumen (102) extending in a longitudinal direction (103) of the pipe between a proximal end (104) and a distal opening (105) thereof, wherein the distal opening is arranged at a distal portion (106) of the pipe being configured to be inserted into the packaging containers and submerged into the content, wherein the lumen is surrounded by an annular
10 wall (107) in a radial direction (108) being perpendicular to the longitudinal direction, wherein the wall comprises at least one opening (109, 109', 110, 110', 111, 111', 112, 113) for fluid communication of the content from the lumen through the wall, and wherein the at least one opening is arranged at the distal portion, proximally of the distal opening.

15 2. Filler pipe according to claim 1, wherein the at least one opening is elongated in the longitudinal direction.

20 3. Filler pipe according to claim 1, wherein the at least one opening is elongated in the radial direction.

4. Filler pipe according to any of claims 1 - 3, wherein the at least one opening comprises a plurality of apertures.

25 5. Filler pipe according to claim 4, wherein the apertures (110, 111, 112, 113) are separated from each other in the longitudinal direction.

6. Filler pipe according to claim 4 or 5, wherein the apertures (109, 110, 111, 109', 110', 111') are arranged in radially opposite directions in the wall.

30 7. Filler pipe according to any of claims 1 - 6, comprising a float (114), being buoyant in the content, and having an interior channel (115) arranged around the pipe, the float being movable in the longitudinal direction by a sliding motion relative to the pipe wall, between the distal portion at which the float overlaps with the at least one opening, and the proximal end.
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8. Filler pipe according to claim 7, wherein the opening has a length (117) that extends in the longitudinal direction to overlap with substantially the entire length (119) of the float in the longitudinal direction.

5 9. Filler pipe according to claim 7 or 8, wherein the float comprises an annular helical-shaped groove (116) in the wall of the interior channel, extending in the longitudinal direction, wherein the helical-shaped groove is configured to receive a flow of the content being expelled from the at least one opening, in use of the filler pipe, whereby the flow acts on the helical-shaped
10 groove with a rotational force to cause a rotational movement on the float around the longitudinal direction.

10. Filler pipe according to claim 9, wherein the opening has a length (117) that extends in the longitudinal direction to overlap with substantially the
15 entire length (118) of the helical-shaped groove in the longitudinal direction

11. Filler pipe according to any of claims 7 - 10, wherein the pipe comprises an expanded diameter portion (120), arranged at a distal tip (121) of the distal portion and having a larger diameter in the radial direction than an
20 inner diameter (122) of the interior channel of the float, wherein the at least one opening extends from a distal position (123) adjacent the expanded diameter portion to a proximal position (123') adjacent a proximal end (124) of the float when the float abuts the expanded diameter portion.

12. Filler pipe according to any of claims 7 - 11, wherein float has an inner diameter (122) of the interior channel dimensioned so that an annular space (125) extends in the longitudinal direction and separates the inner channel from an outer wall (126) of the pipe, wherein the annular space allows content to flow from the opening and along the outer wall in the longitudinal direction.

13. Filler system (200) comprising a filler pipe (100) according to any of claims 1 - 12, and a control unit (201), the filler pipe comprising a pipe (101) extending in a longitudinal direction (103), and a float (114) having an interior channel (115) arranged around the pipe and being movable in the longitudinal
35 direction by a sliding motion relative to the pipe, wherein the control unit is configured to, in use, raise or lower the pipe into a filling content in a sealed tube of packaging material according to a determined sequence, wherein the

sequence is determined to provide a repeated motion of the float in the longitudinal direction of the pipe to at least partly overlap with at least one opening (109, 109', 110, 110', 111, 111', 112, 113) in an annular wall (107) of the pipe according to a determined cycle over an interval of time, the at least
5 one opening extending in a longitudinal direction of the pipe, towards a proximal portion (104) thereof.

14. Method (300) of filling packaging containers with a filler pipe (100), the filler pipe comprising a pipe (101) having a lumen (102) extending in a
10 longitudinal direction (103) of the pipe between a proximal end (104) and a distal opening (105) thereof, the method comprising;

submerging (301) a distal portion (106) of the pipe into a filling content in a sealed tube of packaging material from which said containers are formed, and
expelling (302) filling content in a radial direction (108), substantially
15 perpendicular to the longitudinal direction, from at least one opening (109, 109', 110, 110', 111, 111', 112, 113) in an annular wall (107) of the pipe, the at least one opening being arranged at the distal portion, proximally of the distal opening.

20 15. Method according to claim 14, comprising
raising (303) or lowering (304) the pipe into the filling content the tube of packaging material according to a determined sequence, wherein the sequence is determined to provide a repeated motion of the float in the longitudinal direction of the pipe to at least partly overlap with the at least one opening
25 according to a determined cycle over an interval of time.

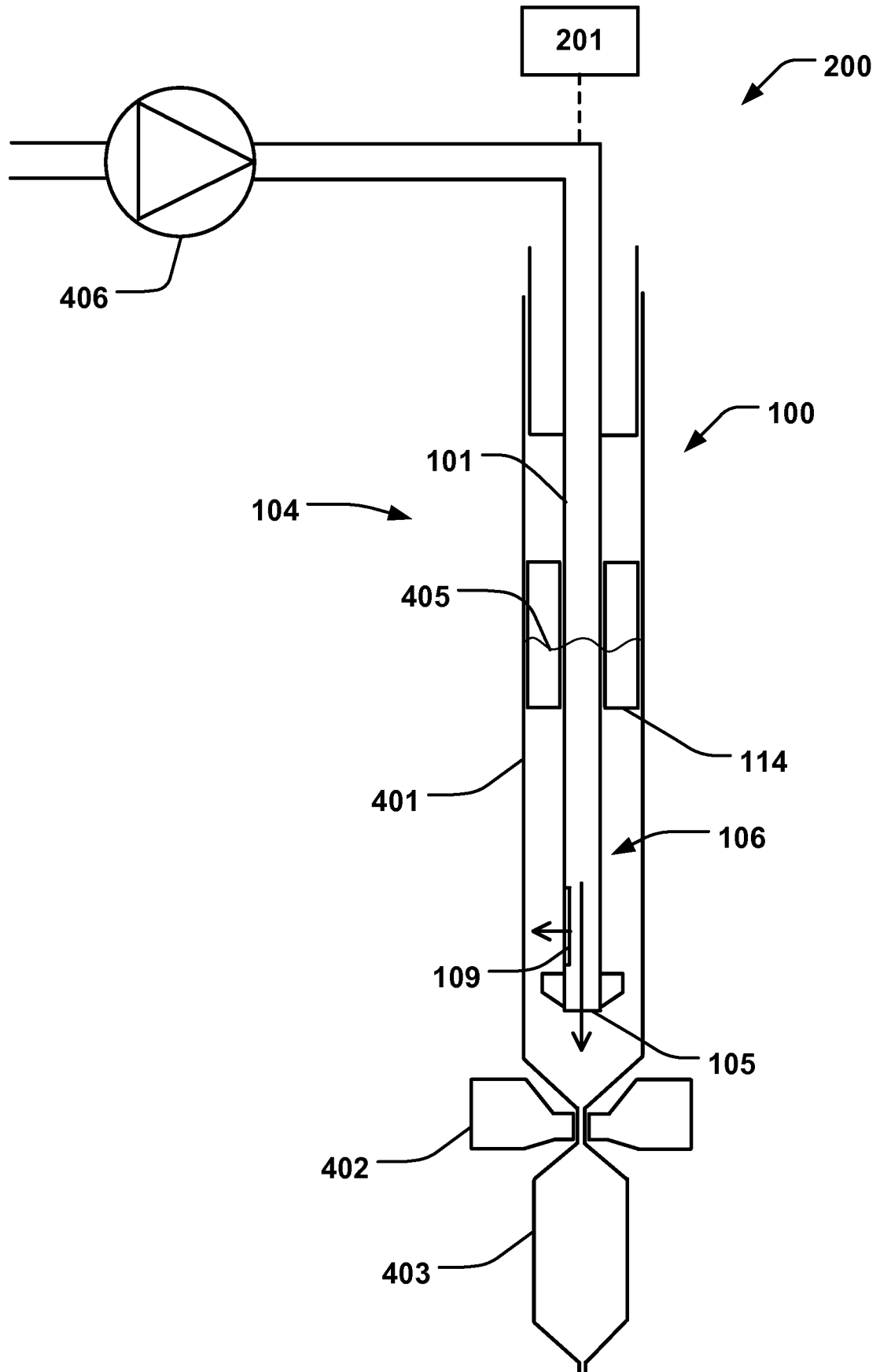


Fig. 1

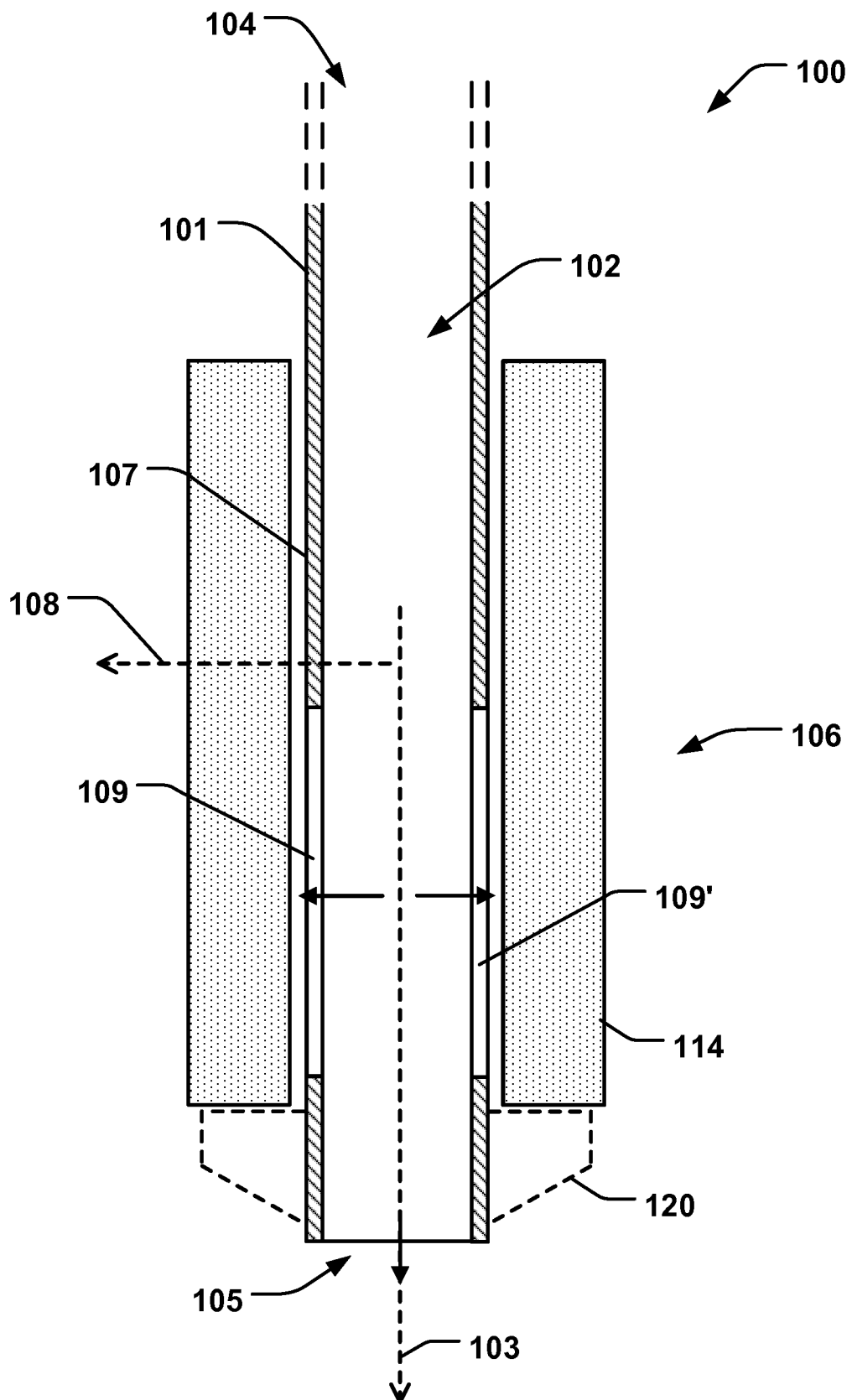
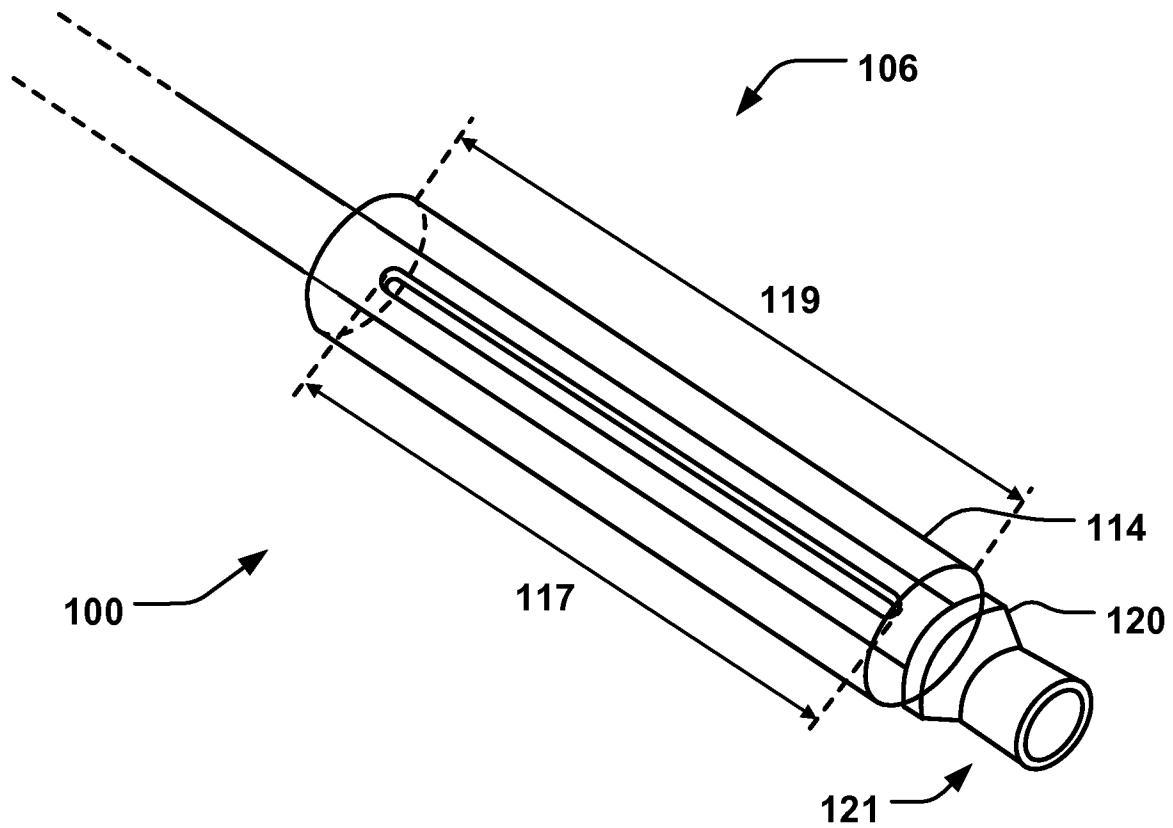
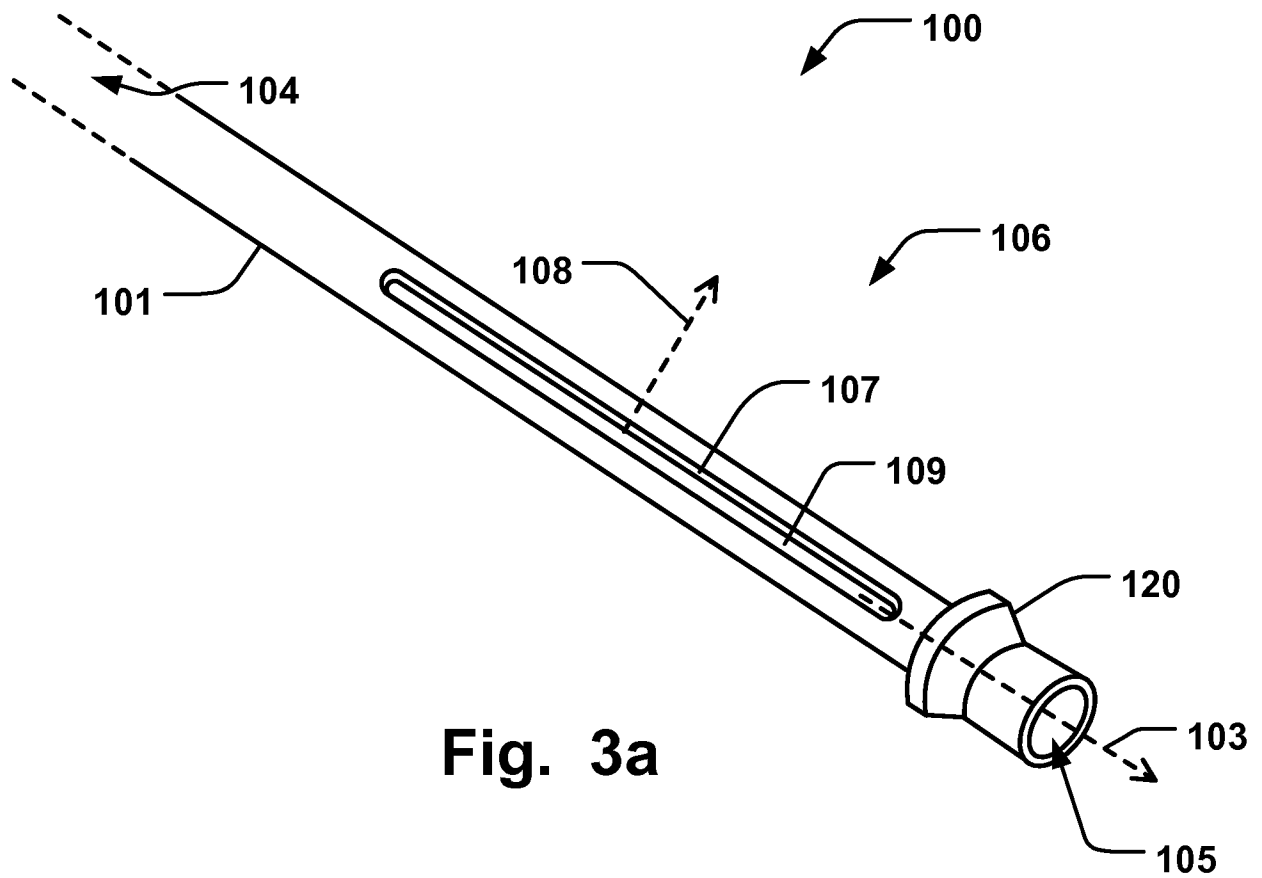


Fig. 2



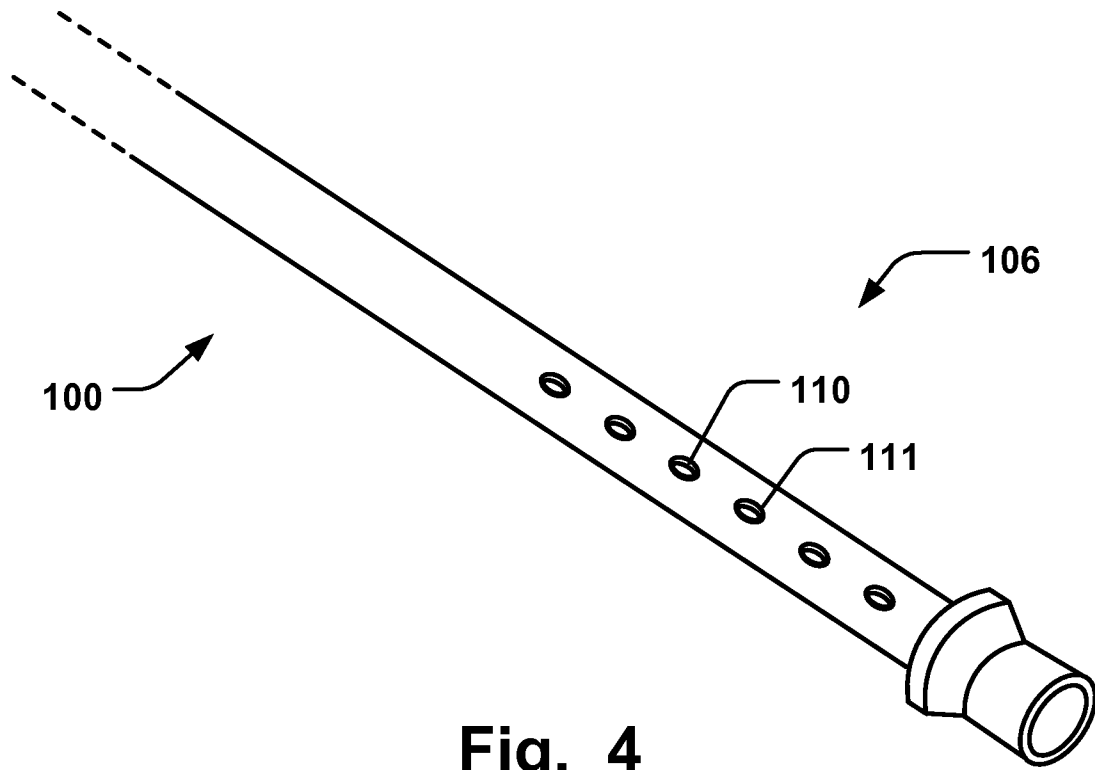


Fig. 4

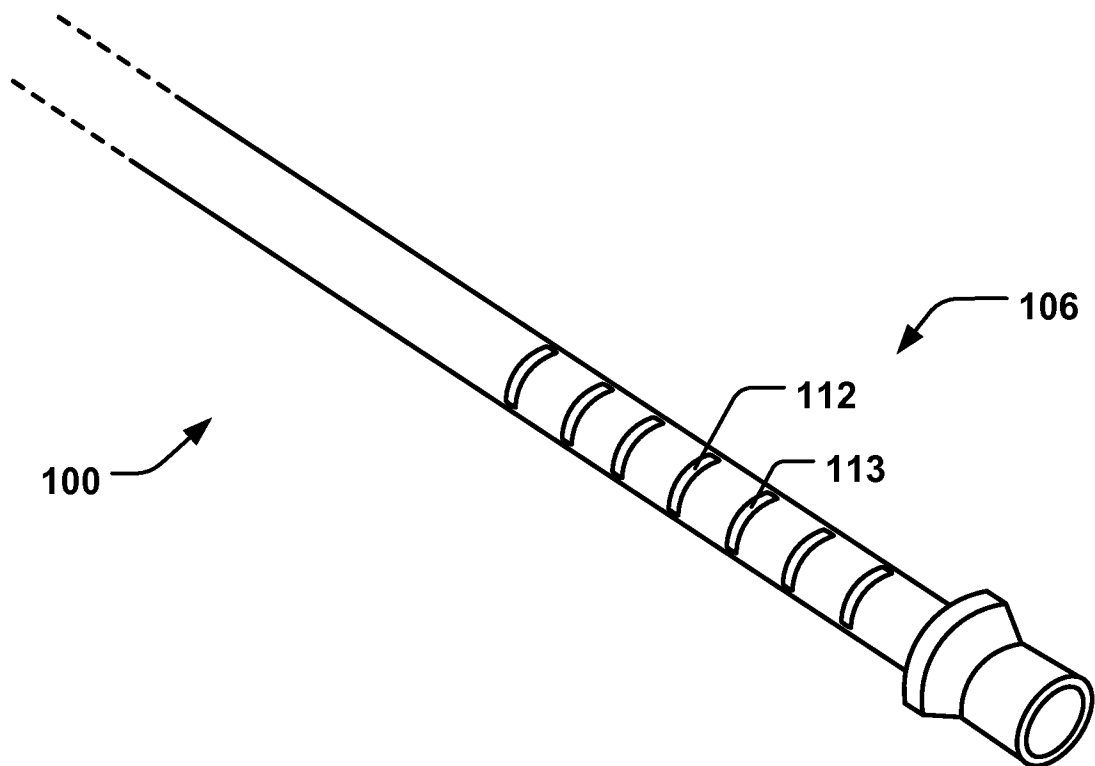


Fig. 5

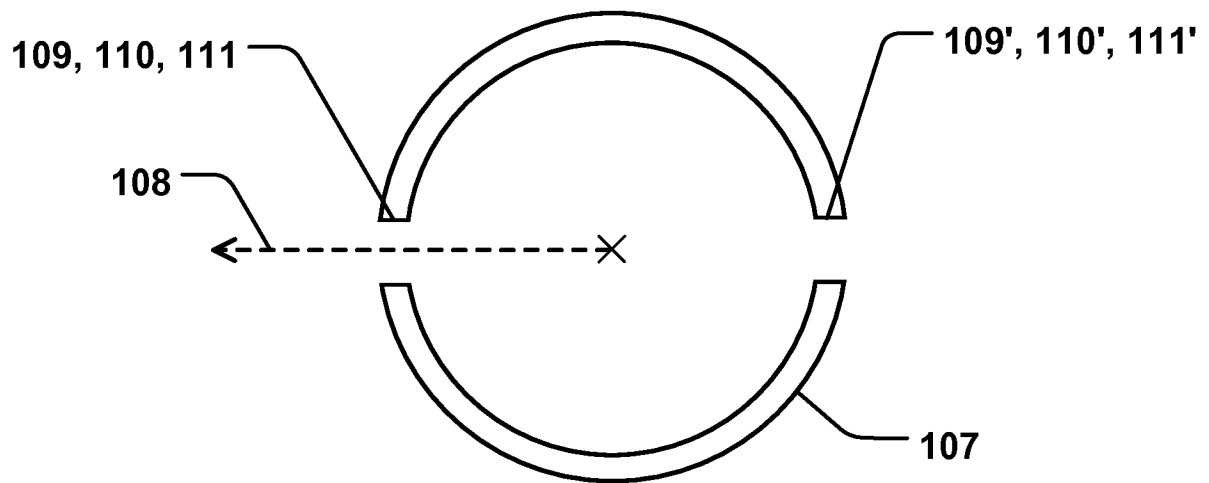


Fig. 6a

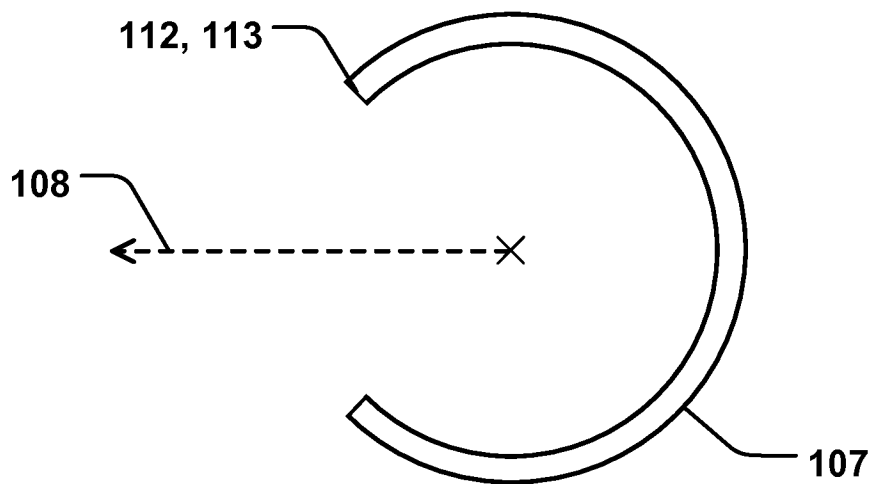


Fig. 6b

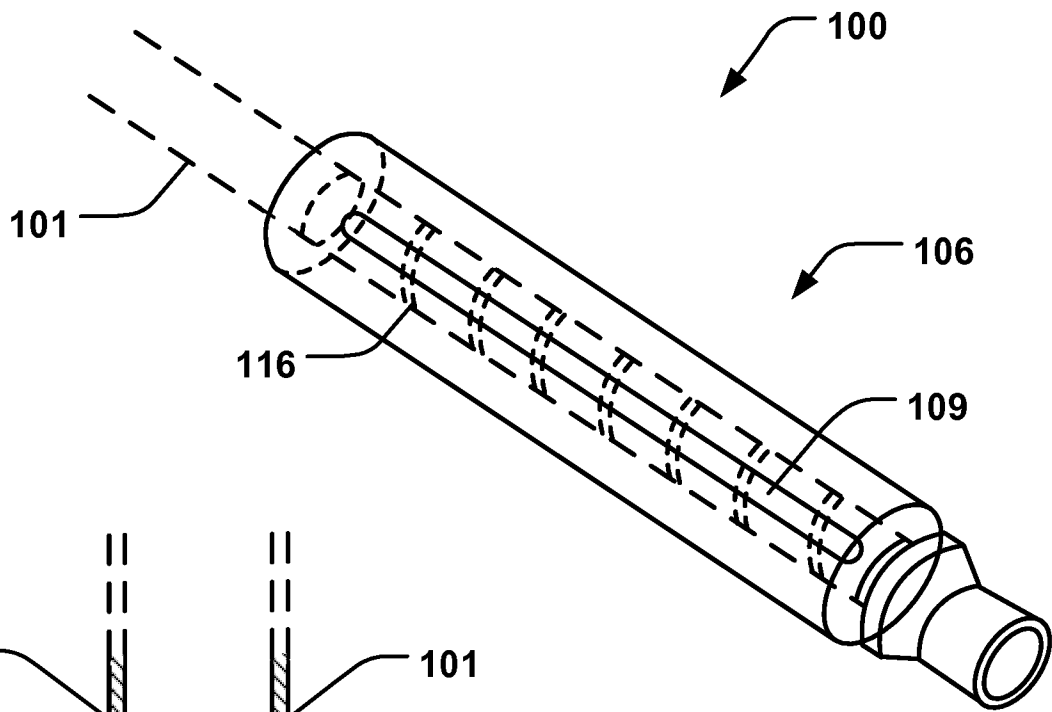


Fig. 7a

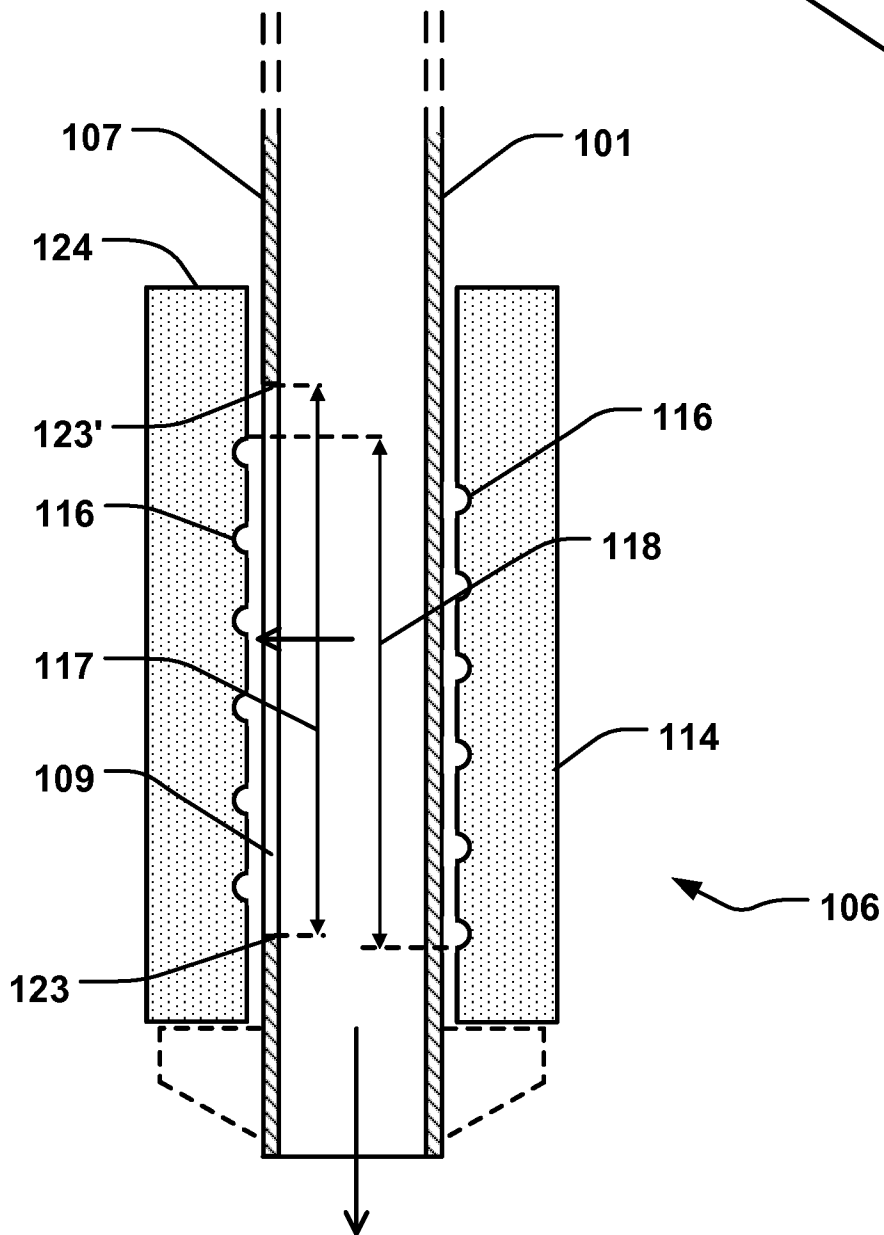


Fig. 7b

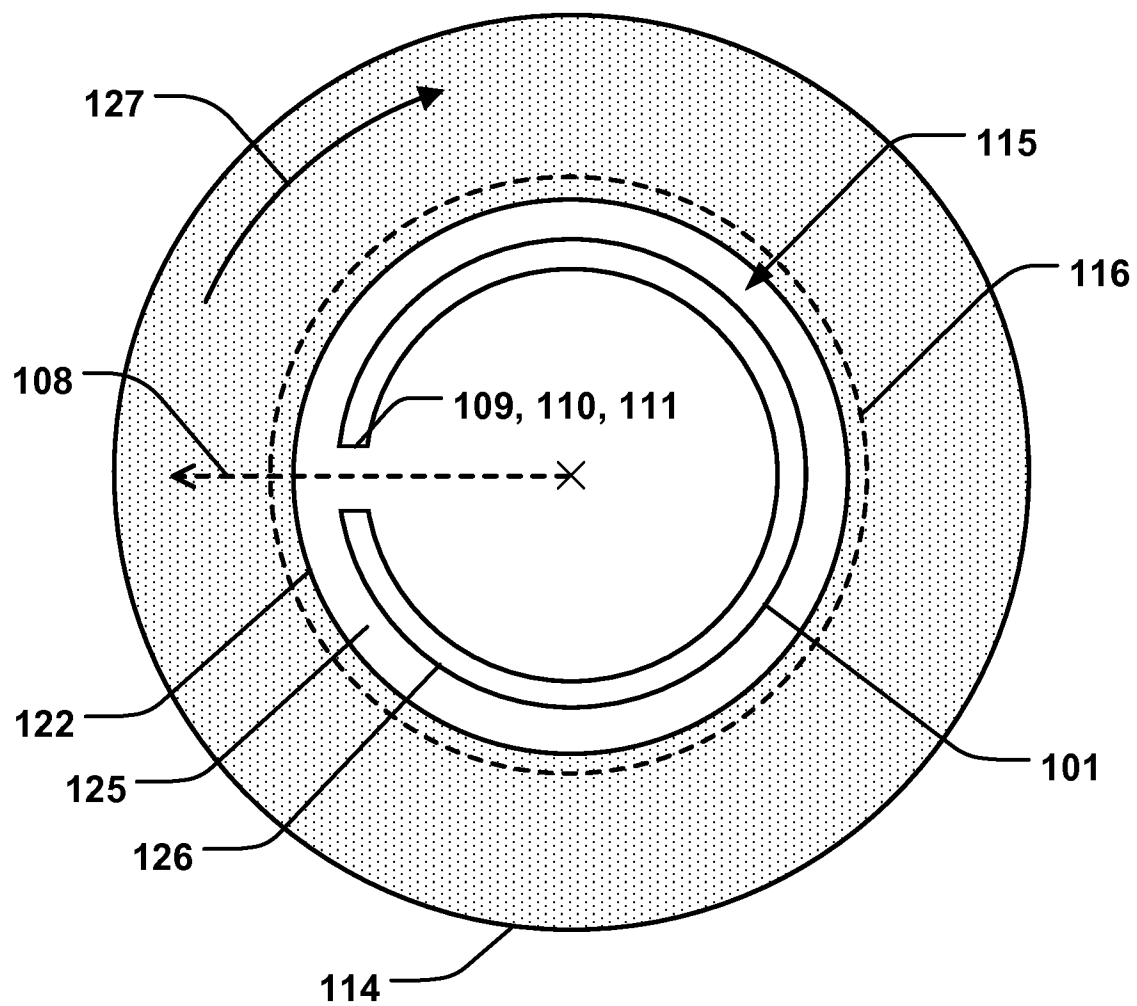
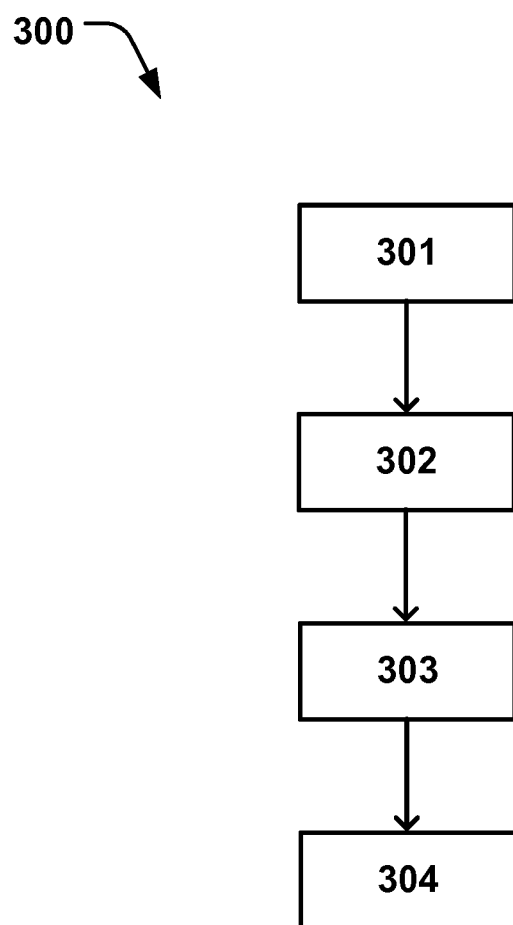


Fig. 8

**Fig. 9**

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/053461

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B9/12 B65B39/12 B65B57/14
ADD.

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)
B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	GB 712 230 A (OSWEGO FALLS CORP) 21 July 1954 (1954-07-21) figures 3,4,6-10 page 1, line 11 - page 1, line 18 page 3, line 13 - page 4, line 8 -----	1,3,4,6, 13,14 2,5, 7-12,15
A	EP 2 765 099 A1 (KAMAKURA ENGINEERING LTD [JP]; FURUKAWA SEISAKUSHO KK [JP]) 13 August 2014 (2014-08-13) the whole document -----	1-15
A	US 2006/213153 A1 (SANFILIPPO JAMES J [US] ET AL) 28 September 2006 (2006-09-28) the whole document -----	1-15



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Date of the actual completion of the international search

28 February 2018

Date of mailing of the international search report

09/03/2018

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Weyand, Tim

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2018/053461

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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			JP 6021570 B2 09-11-2016
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