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(54) Device for filling containers and relative method of washing

Vorrichtung zum Befüllen eines Behälters und zugehöriges Verfahren zum Waschen

Dispositif pour remplir des récipients et procédé de lavage associé

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Description

[0001] The present invention relates to a filling device adapted to fill containers with a pourable product, for example of food type.

[0002] The present invention also relates to a method of washing said filling device.

[0003] There are known filling devices comprising a filling station fed, at the inlet, with empty containers and adapted to supply, at the outlet, containers filled with a pourable food product.

[0004] The filling station essentially comprises a carousel rotating about a rotation axis, a reservoir containing the pourable food product, and a plurality of filling valves supported by the carousel in radially external position with respect to the rotation axis of this carousel.

[0005] In greater detail, the carousel is provided with a plurality of elements to support the containers provided to arrange mouths of these containers in a position lower than the respective valves and to move the containers along a circular arc trajectory around said rotation axis together with the respective valves.

[0006] Each filling valve essentially comprises a fixed body connected to the carousel and a plunger sliding with respect to the fixed body between a open position and a closed position.

[0007] In greater detail, when the plunger is arranged in the open position, it defines with the fixed body a through port. The pourable product flows, in this way, from the reservoir to a mouth for filling the container, passing through the through port.

[0008] Differently, when the plunger is arranged in the closed position, it cooperates with seal with an abutment surface defined by the fixed body, preventing the pourable product from flowing from the reservoir toward the mouth of the container.

[0009] Filling machines of the type described above are commonly used to fill containers with food products, such as beer or water.

[0010] When these are made of a fragile material, such as glass, the containers can explode during the step to fill them.

[0011] More precisely, explosion can occur while filling containers with carbonated products. In fact, in this case the container is subjected to a pressurization process.

[0012] In this circumstance, it is necessary to eliminate any fragments of glass which could collect in the body of the filling valve, in order to prevent these fragments of glass from being entrained by the product inside a new container, during a subsequent filling of this new container.

[0013] In order to eliminate the aforesaid fragments of glass, the filling valves involved by explosion of containers partially fill new containers with the pourable product.

[0014] These new containers are subsequently discarded.

[0015] However, the container subsequently discarded and the pourable product with which it is filled are inevitably lost.

[0016] In the sector, there is the need to wash the filling valves involved by explosion, without causing a waste of pourable product and containers.

[0017] The filling stations of prior art machines also comprise:

- a vacuum source which can be placed selectively in fluid communication with the mouth of the container, in such a manner as to depressurize the containers before they are filled; and
- a further reservoir of a fluid at atmospheric pressure which can be placed selectively in fluid communication with the mouth of the container, in such a manner as to reduce the pressure inside the containers after they have been filled.

[0018] The Applicant has observed that, in the case of explosion of the container, this vacuum source sucks up the fragments of glass into a duct which connects the further reservoir to a regulating valve.

[0019] Consequently, in the sector there is the need to ensure that this duct is not obstructed by fragments of glass, in the case of explosion of the container.

[0020] US-A-4298039 discloses a filling device according to the preamble of claim 1, and a method according to the preamble of claim 11.

[0021] The object of the present invention is to produce a filling device, which allows at least one of the aforesaid needs to be satisfied in a simple and inexpensive manner.

[0022] The aforesaid object is achieved by the present invention, as it relates to a filling device, as defined by claim 1.

[0023] The present invention also relates to a method for washing a filling device, as defined by claim 11.

[0024] For better understanding of the present invention, there are described hereunder two preferred embodiments, by way of non limiting example and with reference to the accompanying drawings, wherein Figs. 1 and 2 show a filling device produced according to the present invention in two different operating positions.

[0025] With reference to Figs. 1 and 2, the numeral 1 indicates a filling machine limited to a station for filling containers 4 with a pourable food product.

[0026] In greater detail, the filling station is supplied with empty containers 4 and fills the containers 4 with the pourable product, in particular a carbonated food product, such as beer or mineral water.

[0027] The container 4 is produced in a material susceptible to explode, such as glass. More in particular, explosion is caused by pressurization of the container 4.

[0028] The filling station comprises:

- a reservoir 2 containing a food product;
- a carousel rotating about a vertical axis and carrying in a cantilever fashion a plurality of holding elements 3 (only one of which is shown), such as arms, of respecting containers 4; and

- a plurality of filling devices 10 adapted to fill respective containers 4 with the pourable food product and driven in rotation by the carousel.

[0029] The reservoir 2 extends annularly around the rotation axis of the carousel and is delimited by a pair of upper and lower walls 9a, 9b and a pair of cylindrical walls 9c coaxial and interposed axially between the walls 9a, 9b.

[0030] In particular, each container 4 comprises:

- a mouth 5 adapted to allow filling of the container 4 by means of the filling machine and subsequent pouring of the food product from this container 4;
- a bottom wall (not shown) opposite the mouth 5; and
- a portion of neck 6 supported by a relative holding element 3.

[0031] In the description that follows reference will be made, for the sake of simplicity, to a single device 10 and to the relative container 4, as the devices 10 are identical to one another.

[0032] The device 10 comprises a filling valve 11 passing through the reservoir 2 and formed essentially by:

- a body 12 secured in a manner not shown to the wall 9b of the reservoir 2; and
- a plunger 13 sliding with respect to the body 12 along an axis A parallel to the rotation axis of the carousel and connected elastically to the body 12 by means of a spring 14, in the specific case illustrated a helical spring with axis A.

[0033] In particular, the body 12 comprises, coaxial to the axis A:

- a bore 21, placed in fluid communication in a manner not shown with the reservoir 2;
- a cavity or bore 20 of smaller diameter to the bore 21 and open toward the mouth 5 of the container 4.

[0034] The body 12 also comprises, coaxial to the axis A:

- a ring 22 of intermediate diameter between the diameters of the bores 20, 21, projecting inside the bore 21 and delimiting, in radially external position, the bore 20; and
- a disk-shaped surface 23, orthogonal to the axis A and interposed between the edge of the bore 20 and the ring 22.

[0035] The plunger 13 slides along the axis A with respect to the body 12 between:

- an open position, in which it defines with the body 12 a through port 30 placed in fluid communication with the reservoir 2 and the mouth 5 of the container 4 (Fig. 2); and
- a closed position, in which it cooperates with fluid seal with the body 12 in such a manner as to prevent the pourable product from flowing from the reservoir 2 to the mouth 5.

[0036] The port 30 is in particular defined by a siphon, which is open when the plunger 13 is in the open position.

[0037] Moreover, passing coaxially through the plunger 13 is a bore 15, provided to allow outflow of air from the container 4 during the filling step thereof. The bore 15 is open toward the mouth 5 and is connected to a reservoir (not shown) for collection of the air flowing out of this container 4.

[0038] In detail, the plunger 13 comprises:

- an end portion 17, arranged in use in the upper part, and to which the spring 14 is secured;
- an end portion 18, arranged in use in the lower part, opposite the end portion 17, and adapted to be housed inside the container 4 during a filling step thereof; and
- an intermediate portion 19 adapted to abut against the body 12 and housed with radial clearance inside the bore 20.

[0039] More in detail, the end portion 18 is housed with radial clearance inside the bore 21 and projects in a cantilevered fashion from the body 12 inside the mouth 5 of the container 4 to be filled.

[0040] The intermediate portion 19 comprises a truncated cone shaped element 29 tapered toward the end portion 17.

[0041] The element 29 is delimited, on the side of the end portion 18, by a surface 25 configured as a circular crown and orthogonal to the axis A, and by a ring 26 with axis A.

[0042] In detail, the ring 26 projects axially from the surface 25 toward the end portion 18 and is radially spaced from the intermediate portion 17.

[0043] More in particular, the ring 26 projects from a radially external circumferential edge of the surface 25.

[0044] When the filling valve 11 is in the open position, the ring 26 is axially spaced from the surface 23 and the surface 25 is axially spaced from the ring 22 (Fig. 2).

[0045] In this circumstance, the bore 20, and consequently the reservoir 2, are in fluid communication with the bore 21 by means of the port 30.

[0046] Differently, when the filling valve is in closed position, the ring 26 cooperates, with fluid seal, with the surface 23 and the surface 25 cooperates, by means of interposing of a gasket 31, with fluid seal, with the ring 22 (Fig. 1).

[0047] In particular, the gasket 31 is annular and is carried by the ring 22.

[0048] Advantageously, the device 10 comprises:

- a reservoir 40 filled with a wash fluid and placed se-

lectively in fluid communication with the bore 20; and
- a regulating valve 45 movable between an open position in which it allows the wash fluid to reach the bore 20, and a closed position in which it prevents the wash fluid from reaching the bore 20.

[0049] In particular, the filling station comprises a single reservoir 40, which is connected selectively to the bores 20 of all the devices 10.
[0050] In the specific case illustrated, the wash fluid is pressurized water.
[0051] In particular, the regulating valve 45 is arranged below the wall 9a of the reservoir 2 and, more precisely, interposed between the wall 9a and the bore 20.
[0052] Moreover, the reservoir 40 is arranged above the reservoir 2.
[0053] The regulating valve 45 comprises:

- a body 60 secured to the wall 9c, elongated along an axis B orthogonal to the axis A, and defining a cavity 61;
- a plunger or stem 62 movable along the axis B between the open position and closed position; and
- a spring 63, in the specific case illustrated of helical type, interposed between a surface 67 of the body 60 and the stem 62.

[0054] The body 60 also comprises:

- an opening 64, which places the reservoir 40 and the cavity 61 in fluid communication;
- an opening 65 housed inside the cavity 61 and delimited by a truncated cone shape abutment surface 67 with axis B.

[0055] In detail, when the regulating valve 45 is in the open position, the stem 62 is distanced along the axis B by the surface 67. In this way, a port 66 remains open between the openings 64, 65.
[0056] Differently, when the regulating valve 45 is in closed position, a truncated cone shaped end of the stem 62 cooperates with fluid seal with the surface 65, fluidly isolating the openings 62, 64.
[0057] The spring 63 loads the stem 62 toward the closed position and the stem 62 is movable, against the action of the spring 63, from the closed position toward the open position by means of a drive of pneumatic type.
[0058] The filling station also comprises:

- a vacuum source 47; and
- a reservoir 49 filled with a fluid at ambient pressure.

[0059] The device 10 also comprises:

- a regulating valve 50 housed in the body 12, and movable between an open position in which it places the vacuum source 47 and the bore 20 in fluid communication, and a closed position in which it prevents fluid communication between the vacuum source 47 and the bore 20; and
- a regulating valve 48 housed in the body 12 and movable between an open position in which it places the reservoir 49 and the bore 20 in communication, and a closed position in which it prevents fluid communication between the reservoir 49 and the bore 20.

[0060] The body 12 also defines a cavity 80 for housing the regulating valves 48, 50.
[0061] The cavity 80 also comprises a pair of openings 81, 82, opposite and in fluid communication with each other.
[0062] More in detail, the device 10 comprises a duct 46 having an end mouth 52 open inside the vacuum source 47 and a mouth 53, opposite the mouth 52.
[0063] Similarly, the device 10 comprises a duct 51 having an end mouth 54 open inside the reservoir 49 and a mouth 55, opposite the mouth 54.
[0064] The duct 51 comprises, in particular, a segment 58 of greater diameter and a segment 59 of lesser diameter.
[0065] The segment 58 defines the mouth 54, the segment 59 defines the mouth 55 and the segment 58 is interposed between the mouth 54 and the segment 59.
[0066] Each regulating valve 48, resp. 50 essentially comprises:

- a fixed body 75 defining the opening 81, resp. 82 and connected in a manner not shown to the body 12;
- a stem 76 sliding orthogonally to the axis A between a closed position in which it abuts with fluid seal against the mouth 55, resp. 53, and an open position in which it is spaced from the mouth 55, resp. 53; and
- a spring 77 interposed between the fixed body 75 and the stem 76 and adapted to load the stem 76 toward the closed position.

[0067] The fixed body 75 of the regulating valve 48 also defines an opening 83 opposite the opening 81 and in fluid communication with this opening 81.
[0068] The fixed body 75 of the regulating valve 50 also defines an opening 84 opposite the opening 82 and in fluid communication with the opening 83.
[0069] In other words, when the regulating valve 48 is in the open position, the wash fluid passes sequentially through the openings 81, 83, 84, 82.
[0070] The device 10 also comprises a duct 79 extending between the reservoir 40 and the bore 20.
[0071] In greater detail, the duct 79 comprises:

- a segment 90 extending between the reservoir 40 and the opening 64;
- a segment 91 extending between the opening 65 and the opening 81; and
- a segment 92 inclined with respect to the axis A and extending between the opening 82 and the bore 20.

[0072] In detail, the segment 92 comprises an end 93, opposite the segment 91, and open inside the bore 20, downstream of the gasket 31 and of the port 30.

[0073] The device 10 also comprises a pressure measuring device 100 adapted to detect the difference in pressure between the inside of the container 4 and the external environment.

[0074] In particular, the pressure measuring device 100 detects explosion of the container 4 when this difference in pressure is below a given threshold value.

[0075] Differently, when this difference is above the threshold value, the pressure measuring device 100 detects that the container 4 has not exploded.

[0076] Operation of the device 10, is shown starting from a step to fill the container 4 (Fig. 2).

[0077] In this situation, the regulating valve 45 is in the closed position and the filling valve 11 is in the open position.

[0078] The ring 26 of the plunger 13 is spaced from the surface 23 parallel to the axis A and the surface 25 is spaced from the ring 22 parallel to the axis A.

[0079] In this way, the port 30, through which the pourable product can flow from the reservoir 2 to the bore 20 and, from this latter, inside the mouth 5 of the container 4, remains open.

[0080] At the end of the filling step, the valve 11 is moved into the closed position (Fig. 1), in which the ring 26 of the plunger 13 cooperates with fluid seal with the surface 23 and the surface 25 cooperates with the gasket 31.

[0081] In the case in which it is necessary to depressurized the container 4 after filling, the regulating valve 48 is moved to the open position in such a manner as to place the mouth 5 in communication with the reservoir 49.

[0082] At the end of the depressurization step, the regulating valve 48 is moved to the closed position.

[0083] In the case in which it is necessary to create the vacuum before filling the container 4, the regulating valve 50 is moved to the open position so as to place the mouth 5 in communication with the vacuum source 47.

[0084] If the pressure measuring device 100 detects explosion of the container 4, the device 10 is washed by means of jets of water delivered externally to the device 10.

[0085] Simultaneously, the regulating valve 45 is moved to the open position.

[0086] In this way, the wash fluid flows from the reservoir 40 to the bore 20, passing in succession through the segments 90, 91, 92 and the bore 20.

[0087] More in detail, while the wash fluid flows through the segment 92, it passes in sequence through the openings 81, 83, 84, 82 and removes any fragments of glass trapped in the bodies 75 of the regulating valves 48, 50. In this way, the wash fluid prevents any fragments of glass sucked up by the vacuum source 47 inside the body 75 of the regulating valve 48 from subsequently remaining trapped inside the segment 59 of the duct 51.

[0088] Moreover, the wash fluid removes any fragments of glass remained trapped in the bore 20, preventing them from being introduced into the mouth 5 of a new container 4 during a subsequent step to fill this new container 4.

[0089] After the wash step has finished, the regulating valve 45 is moved to the closed position.

[0090] Subsequently, a new container 4 can be filled.

[0091] From examining the characteristics of the device 10 and of the method of washing produced according to the present invention, the advantages it achieves are evident.

[0092] In particular, the device 10 comprises a regulating valve 45 connected to the reservoir 40 filled with a wash fluid.

[0093] In this way, when explosion of the container 4 is detected, the regulating valve 45 is moved to the open position and the wash liquid, through the duct 79, reaches the bore 20.

[0094] The wash liquid can thus remove any fragments of glass from the bore, thereby preventing these fragments from being introduced into the container 4 during the subsequent filling step.

[0095] It is important to point out that the device 10 and the method of washing according to the present invention do not require any container 4 to be discarded in order to ensure that there are no fragments of glass inside the subsequent containers 4.

[0096] Moreover, the wash liquid passes through the fixed bodies 75 of the regulating valves 48, 50.

[0097] In this way, the wash liquid prevents fragments of glass sucked up by the vacuum source 47 from remaining inside these fixed bodies 75. In particular, the wash liquid prevents these fragments of glass from obstructing the segment 59 of the duct 51, preventing depressurization of the container 4, after filling of this container 4.

[0098] The pressure measuring device 100 is particularly advantageous, as it allows explosion of the container 4 to be detected even when this container 4 remains in contact with the holding element 3 after exploding.

Claims

1. A filling device (10) for filling a container (4) with a pourable product, comprising:

- a first reservoir (2) which can be filled with said pourable product and placed selectively in fluid communication with a first mouth (5) of said container (4);
- a filling valve (11) comprising, in turn, a fixed body (12) and a first plunger (13) sliding with respect to said fixed body (12);

said first plunger (13) being movable between a first open position and a first closed position;
said first plunger (13), when arranged in said first

open position, defining with said body (12) a port (30) through which said pourable product can flow and which can be placed in fluid communication with said first mouth (5);
said port (30) being placed in fluid communication with said first reservoir (2), when said plunger (13) is arranged in said first open position, and being open, in use, toward said first mouth (5) of said container (4);
said plunger (13), when arranged in said first closed position, cooperating with a seal (31) with said fixed body (12), in such a manner as to prevent said pourable product from reaching said first mouth (5);
said filling device (10) further comprising:

- a second reservoir (40) which can be filled with a wash fluid and placed selectively in fluid communication with a cavity (20) of said fixed body (12) open toward said first mouth (5) of said container (4); and
- a regulating valve (45) movable selectively between a second open position in which it allows said wash fluid to reach said cavity (20), and a second closed position in which it prevents said wash fluid from reaching said cavity (20);

characterised in that it comprises a device (100) to detect explosion of said container (4); said detection device (100) comprising a pressure measuring device (100) detecting the difference in pressure between the inside of said container (4) and the external environment.

2. The device according to claim 1, **characterised in that** said first reservoir (2) is arranged, in use, below said second reservoir (40).

3. The device according to claim 1 or 2, **characterised in that** it comprises a wall (9a) delimiting at the top, in use, said first reservoir (2) and **in that** said regulating valve (45) is interposed between said wall (9a) and said cavity (20).

4. The device according to any one of the preceding claims, **characterised in that** said regulating valve (45) comprises:

- a second body (60);
- a second plunger (62) movable between a third open position in which it defines a second port (66) with said second body (60), and a third closed position in which it cooperates with seal with said second body (60) and prevents said wash fluid from reaching said cavity (20); and
- elastic means (63) adapted to load said second plunger (62) toward said second closed position.

5. The device according to claim 4, **characterised in that** said second plunger (62) is movable from said third closed position to said third open position, by means of a pneumatic drive.

6. The device according to any one of the preceding claims, **characterised in that** it comprises a fluid line (79) adapted to place in fluid communication said second reservoir (40) and said cavity (20) and along which said regulating valve (45) is interposed.

7. The device according to claim 6, **characterised in that** it comprises:

- a first duct (46) connected to a vacuum source (47) and having a second mouth (53) which can be placed selectively in fluid communication with said cavity (20); and
- a second duct (51) connected to a third reservoir (49) comprising a fluid and having a third mouth (55) which can be placed selectively in fluid communication with said cavity (20), during a depressurization step of said container (4) subsequent to filling of this container (4);

and:

- a second regulating valve (50) adapted to place selectively in fluid communication said cavity (20) and said second mouth (53); and
- a third regulating valve (48) adapted to place selectively in fluid communication said cavity (20) and said third mouth (55);

said second and third mouth (53, 55) being interposed along said fluid line (79).

8. The device according to claim 7, **characterised in that** said first regulating valve (45) is interposed along said fluid line (79) between said second reservoir (40) and said second and/or third regulating valve (48, 50).

9. The device according to any one of claims 6 to 8, **characterised in that** said fluid line (79) comprises an end segment (92) having an end (93) open in said cavity (20) in a position arranged downstream of said port (30), with reference to the direction of feed of said pourable product from said first reservoir (2) toward said first mouth (5).

10. The device according to any one of claims 6 to 9, **characterised in that** said fixed body (12) comprises a gasket (31) adapted to provide said seal against said fixed body (12) when said first plunger (13) is in the closed position; said end (93) being open inside said cavity (20) in a position arranged downstream of said gasket (31), with reference to said direction of feed of said pourable product.

11. A method of washing a filling device (10) adapted to fill a container (4) destined to be filled with a pourable product; said device (10) comprising:

- a first reservoir (2) which can be filled with said pourable product and placed selectively in communication with a first mouth (5) of said container (4);
- a filling valve (11) comprising, in turn, a fixed body (12) and a plunger (13) sliding with respect to said fixed body (12);

said plunger (13) being movable between an open position in which it defines with said body (12) a port (30) through which said pourable product can flow and which can be placed in fluid communication with said first mouth (5), and a closed position in which it cooperates with a seal (31) with said fixed body (12), so as to obstruct said port (30) and prevent said pourable product from reaching said first mouth (5); said method comprising the step of detecting breakage of said container (4);
said method further comprising the step of placing in fluid communication a second reservoir (40) filled with a wash fluid with a cavity (20) of said fixed body (12) facing said first mouth (5) and placed in fluid communication with said port (30);
characterised in that said step of detecting comprises the step of measuring the pressure difference between the inside of said container (4) and the outside and of detecting explosion, when said pressure difference is below a threshold value.

12. The method according to claim 11, **characterised in that** it comprises the step of directing wash jets onto said fixed body (12).

13. The method according to any one of claims 11 or 12, **characterised in that** said step of placing in communication said second reservoir (40) with said cavity (20) comprises the step of making said wash fluid flow through at least one of:

- a second mouth (53) of a first duct (46) connected to a vacuum source (47); said first duct (46) which can be placed selectively in fluid communication with said cavity (20) by means of a second regulating valve (50); and
- a third mouth (55) of a second duct (51) connected to a third low pressure reservoir (49); said second duct (51) which can be placed selectively in fluid communication with said cavity (20) by means of a third regulating valve (48).

Patentansprüche

1. Eine Füllvorrichtung (10) zum Befüllen eines Behälters (4) mit einem fließfähigen Produkt, umfassend

- einen ersten Speicher (2), der mit dem fließfähigen Produkt befüllt und wahlweise in Fluidverbindung mit einer ersten Mündung (5) des Behälters (4) gebracht werden kann,
- ein Füllventil (11), welches wiederum einen feststehenden Körper (12) sowie einen ersten Kolben (13) umfasst, der relativ zu dem feststehenden Körper (12) gleitet,

wobei der erste Kolben (13) zwischen einer ersten geöffneten Position und einer ersten geschlossenen Position beweglich ist,
wobei der erste Kolben (13), wenn er in der ersten geöffneten Position angeordnet ist, zusammen mit dem Körper (12) einen Öffnung (30) begrenzt, durch die das fließfähige Produkt strömen kann, und die in Fluidverbindung mit der ersten Mündung (5) gebracht werden kann,
wobei die Öffnung (30) in Fluidverbindung mit dem ersten Speicher (2) steht, wenn der Kolben (13) in der ersten geöffneten Position angeordnet ist, und während der Anwendung in Richtung der ersten Mündung (5) des Behälters (4) offen ist,
wobei der Kolben (13), wenn er in der ersten geschlossenen Position angeordnet ist, dichtend (31) mit dem feststehenden Körper (12) so zusammenwirkt, dass das fließfähige Produkt nicht zur ersten Mündung (5) gelangen kann,
wobei die Füllvorrichtung (10) ferner umfasst:

- einen zweiten Speicher (40), der mit einem Waschfluid befüllt werden kann und wahlweise in Fluidverbindung mit einer Ausnehmung (20) in dem feststehenden Körper (12) gebracht werden kann, die in Richtung der ersten Mündung (5) des Behälters (4) offen ist, und
- ein Regelventil (45), das wahlweise zwischen einer zweiten geöffneten Position, in der es dem Waschfluid möglich ist, zu der Ausnehmung (20) zu gelangen, und einer zweiten geschlossenen Position, in der das Waschfluid nicht zu der Ausnehmung (20) gelangen kann, beweglich ist,

dadurch gekennzeichnet, dass sie eine Vorrichtung (100) zur Erfassung einer Explosion des Behälters (4) umfasst, wobei diese Erfassungsvorrichtung (100) eine Druckmessvorrichtung (100) zur Erfassung des Druckunterschieds zwischen dem Inneren des Behälters (4) und der Umgebung umfasst.

2. Die Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der erste Speicher (2) während der Anwendung unterhalb des zweiten Speichers (40) angeordnet ist.

3. Die Vorrichtung gemäß Anspruch 1 oder 2, **dadurch**

gekennzeichnet, dass sie eine Wand (9a) umfasst, die während der Anwendung den ersten Speicher (2) nach oben begrenzt, und dass das Regelventil (45) zwischen die Wand (9a) und die Ausnehmung (20) geschaltet ist.

4. Die Vorrichtung gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Regelventil (45) umfasst:

- einen zweiten Körper (60),
- einen zweiten Kolben (62), der zwischen einer dritten geöffneten Position, in der er zusammen mit dem zweiten Körper (60) eine zweite Öffnung (66) begrenzt, und einer dritten geschlossenen Position, in der er dichtend mit dem zweiten Körper (60) zusammenwirkt, beweglich ist, so dass das Waschfluid nicht zu der Ausnehmung (20) gelangen kann, und
- elastische Mittel (63) zum Vorspannen des zweiten Kolbens (62) in die zweite geschlossene Position.

5. Die Vorrichtung gemäß Anspruch 4, **dadurch gekennzeichnet, dass** der zweite Kolben (62) mit Hilfe von einem pneumatischen Antrieb von der dritten geschlossenen Position in die dritte geöffnete Position beweglich ist.

6. Die Vorrichtung gemäß einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** sie eine Fluidleitung (79) umfasst, über die der zweite Speicher (40) mit der Ausnehmung (20) in Fluidverbindung bringbar ist, und entlang der das Regelventil (45) geschaltet ist.

7. Die Vorrichtung gemäß Anspruch 6, **dadurch gekennzeichnet, dass** sie umfasst:

- eine erste Leitung (46), die mit einer Vakuumquelle (47) verbunden ist und eine zweite Mündung (53) aufweist, die wahlweise mit der Ausnehmung (20) in Fluidverbindung gebracht werden kann, und
- eine zweite Leitung (51), die mit einem dritten Speicher (49) verbunden ist, der ein Fluid umfasst und eine dritte Mündung (55) aufweist, die während einer nach dem Befüllen des Behälters (4) durchgeführten Druckentlastung dieses Behälters (4) wahlweise in Fluidverbindung mit der Ausnehmung (20) gebracht werden kann, und
- ein zweites Regelventil (50) zur wahlweisen Herstellung einer Fluidverbindung zwischen der Ausnehmung (20) und der zweiten Mündung (53),
- ein drittes Regelventil (48) zur wahlweisen Herstellung einer Fluidverbindung zwischen der Ausnehmung (20) und der dritten Mündung (55),

wobei die zweite und dritte Mündung (53, 55) entlang der Fluidleitung (79) zwischengeschaltet sind.

8. Die Vorrichtung gemäß Anspruch 7, **dadurch gekennzeichnet, dass** das erste Regelventil (45) entlang der Fluidleitung (79) zwischen den zweiten Behälter (40) und das zweite und/oder dritte Regelventil (48, 50) geschaltet ist.

9. Die Vorrichtung gemäß einem der Ansprüche 6 bis 8, **dadurch gekennzeichnet, dass** die Fluidleitung (79) einen Endabschnitt (92) umfasst, der in einer relativ zu der Zuführrichtung des fließfähigen Produktes von dem ersten Speicher (2) zur ersten Mündung (5) stromabwärts zu der Öffnung (30) angeordneten Position in der Ausnehmung (20) ein geöffnetes Ende (93) aufweist.

10. Die Vorrichtung gemäß einem der Ansprüche 6 bis 9, **dadurch gekennzeichnet, dass** der feststehende Körper (12) eine Dichtung (31) umfasst, die gegen den feststehenden Körper (12) abdichtet, wenn sich der erste Kolben (13) in der geschlossenen Position befindet, wobei das Ende (93) in der Ausnehmung (20) in einer Position geöffnet ist, die in Bezug auf die Zuführrichtung des fließfähigen Produkts stromabwärts zu der Dichtung (31) angeordnet ist.

11. Ein Verfahren zum Waschen einer Füllvorrichtung (10) zum Befüllen eines Behälters (4), der mit einem fließfähigen Produkt zu befüllen ist, wobei die Vorrichtung (10) umfasst:

- einen ersten Speicher (2), der mit dem fließfähigen Produkt befüllt und wahlweise in Verbindung mit einer ersten Mündung (5) des Behälters (4) gebracht werden kann,
- ein Füllventil (11), welches wiederum einen feststehenden Körper (12) sowie einen Kolben (13) umfasst, der relativ zu dem feststehenden Körper (12) gleitet,

wobei der Kolben (13) zwischen einer geöffneten Position, in der er zusammen mit dem Körper (12) eine Öffnung (30) begrenzt, durch die das fließfähige Produkt fließen kann und die in Fluidverbindung mit der ersten Mündung (5) gebracht werden kann, und einer geschlossenen Position beweglich ist, in der er dichtend (31) mit dem feststehenden Körper (12) zusammenwirkt, um die Öffnung (30) zu verschließen, so dass das fließfähige Produkt nicht zu der ersten Mündung (5) gelangen kann, wobei dieses Verfahren den Schritt einer Brucherkennung des Behälters (4) umfasst,
wobei dieses Verfahren ferner den Schritt umfasst, einen zweiten mit einem Waschfluid gefüllten Speicher (40) mit einer Ausnehmung (20) des feststehenden Körpers (12) in Fluidverbindung zu bringen,

wobei der feststehende Körper (12) der ersten Mündung (5) zugewandt ist und in Fluidverbindung mit der Öffnung (30) steht,
dadurch gekennzeichnet, dass der Erfassungsschritt den Schritt umfasst, den Druckunterschied zwischen dem Inneren des Behälters (4) und der Umgebung zu messen, sowie eine Explosion zu erfassen, wenn sich der Druckunterschied unter einem Grenzwert befindet.

12. Das Verfahren gemäß Anspruch 11, **dadurch gekennzeichnet, dass** es den Schritt umfasst, Waschstrahlen auf den feststehenden Körper (12) zu richten.

13. Das Verfahren gemäß einem der Ansprüche 11 oder 12, **dadurch gekennzeichnet, dass** der Schritt, den zweiten Speicher (40) mit der Ausnehmung (20) in Verbindung zu bringen, den Schritt umfasst, das Waschfluid durch zumindest eine aus

- einer zweiten Mündung (53) einer ersten Leitung (46), die mit einer Vakuumquelle (47) verbunden ist, wobei die erste Leitung (46) wahlweise mit Hilfe eines zweiten Regelventils (50) in Fluidverbindung mit der Ausnehmung (20) gebracht werden kann, und
- einer dritten Mündung (55) einer zweiten Leitung (51), die mit einem dritten Unterdruckspeicher (49) verbunden ist, wobei die zweite Leitung (51) wahlweise mit Hilfe eines dritten Regelventils (48) in Fluidverbindung mit der Ausnehmung (20) gebracht werden kann,

zu leiten.

Revendications

1. Dispositif de remplissage (10) destiné à remplir un récipient (4) avec un produit pouvant être versé, comprenant :

- un premier réservoir (2) qui peut être rempli dudit produit pouvant être versé et placé sélectivement en communication fluidique avec un premier bec (5) dudit récipient (4) ;
- une soupape de remplissage (11) comprenant quant à elle un corps fixe (12) et un premier plongeur (13) coulissant par rapport audit corps fixe (12) ;

ledit premier plongeur (13) étant mobile entre une première position ouverte et une première position fermée ;
ledit premier plongeur (13), lorsqu'il est agencé dans ladite première position ouverte, définissant avec ledit corps (12) un orifice (30) par lequel ledit produit pouvant être versé peut s'écouler et qui peut être placé en communication fluidique avec ledit premier bec (5) ;
ledit orifice (30) étant placé en communication fluidique avec ledit premier réservoir (2), lorsque ledit plongeur (13) est agencé dans ladite première position ouverte, et étant ouvert en utilisation vers ledit premier bec(5) dudit récipient (4) ;
ledit plongeur (13) lorsqu'il est agencé dans ladite première position fermée coopérant par une garniture (31) avec ledit corps fixe (12) de manière à éviter que ledit produit pouvant être versé n'atteigne ledit premier bec(5) ;
ledit dispositif de remplissage (10) comprenant en outre :

- un deuxième réservoir (40) qui peut être rempli d'un fluide de lavage et placé sélectivement en communication fluidique avec une cavité (20) dudit corps fixe (12) ouverte vers ledit premier bec (5) dudit récipient (4) ; et
- une soupape de régulation (45) mobile sélectivement entre une seconde position ouverte, dans laquelle elle permet que ledit fluide de lavage atteigne ladite cavité (20) et une seconde position fermée, dans laquelle elle évite que ledit fluide de lavage n'atteigne ladite cavité (20) ;

caractérisé en ce qu'il comprend un dispositif (100) pour détecter une explosion dudit récipient (4) ; ledit dispositif de détection (100) comprenant un dispositif de mesure de pression (100) détectant la différence de pression entre l'intérieur dudit récipient (4) et l'environnement externe.

2. Dispositif selon la revendication 1, **caractérisé en ce que** ledit premier réservoir (2) est agencé, en utilisation, sous ledit deuxième réservoir (40).

3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce qu'**il comprend une paroi (9a) délimitant sur le dessus, en utilisation, ledit premier réservoir (2) et **en ce que** ladite soupape de régulation (45) est interposée entre ladite paroi (9a) et ladite cavité (20).

4. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite soupape de régulation (45) comprend :

- un second corps (60) ;
- un second plongeur (62) mobile entre une troisième position ouverte, dans laquelle il définit un second orifice (66) avec ledit second corps (60), et une troisième position fermée, dans laquelle il coopère par la garniture avec ledit second corps (60) et évite que ledit fluide de lavage n'atteigne ladite cavité (20) ; et
- des moyens élastiques (63) adaptés pour char-

ger ledit second plongeur (62) vers ladite seconde position fermée.

5. Dispositif selon la revendication 4, **caractérisé en ce que** ledit second plongeur (62) est mobile de ladite troisième position fermée à ladite troisième position ouverte à l'aide d'un entraînement pneumatique.

6. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend une ligne fluidique (79) adaptée pour placer en communication fluidique ledit deuxième réservoir (40) et ladite cavité (20) et le long de laquelle ladite soupape de régulation (45) est interposée.

7. Dispositif selon la revendication 6, **caractérisé en ce qu'**il comprend :

- un premier conduit (46) relié à une source de vide (47) et possédant un deuxième bec (53) qui peut être placé sélectivement en communication avec ladite cavité (20) ; et
- un second conduit (51) relié à un troisième réservoir (49) comprenant un fluide et possédant un troisième bec (55) qui peut être placé sélectivement en communication fluidique avec ladite cavité (20), pendant une étape de dépressurisation dudit récipient (4) consécutive au remplissage de ce récipient (4) ;

et

- une deuxième soupape de régulation (50) adaptée pour placer sélectivement en communication fluidique ladite cavité (20) et ledit deuxième bec (53) ;

et

- une troisième soupape de régulation (48) adaptée pour placer sélectivement en communication fluidique ladite cavité (20) et ledit troisième bec (55) ;

lesdits deuxième et troisième becs (53, 55) étant interposés le long de ladite ligne fluidique (79).

8. Dispositif selon la revendication 7, **caractérisé en ce que** ladite première soupape de régulation (45) est interposée le long de ladite ligne fluidique (79) entre ledit second réservoir (40) et ladite deuxième et/ou troisième soupape de régulation (48, 50).

9. Dispositif selon l'une quelconque des revendications 6 à 8, **caractérisé en ce que** ladite ligne fluidique (79) comprend un segment d'extrémité (92) présentant une extrémité (93) ouverte dans ladite cavité (20) dans une position agencée en aval dudit orifice (30), en référence à la direction d'alimentation dudit produit pouvant être versé dudit premier réservoir (2) vers ledit premier bec(5).

10. Dispositif selon l'une quelconque des revendications 6 à 9, **caractérisé en ce que** ledit corps fixe (12) comprend un joint (31) adapté pour fournir ladite garniture contre ledit corps fixe (12) lorsque ledit premier plongeur (13) est dans la position fermée ; ladite extrémité (93) étant ouverte à l'intérieur de ladite cavité (20) dans une position agencée en aval dudit joint (31), en référence à ladite direction d'alimentation dudit produit pouvant être versé.

11. Procédé de lavage d'un dispositif de remplissage (10) adapté pour remplir un récipient (4) destiné à être rempli d'un produit pouvant être versé ; ledit dispositif (10) comprenant :

- un premier réservoir (2) qui peut être rempli dudit produit pouvant être versé et placé sélectivement en communication avec un premier bec (5) dudit récipient (4) ;
- une soupape de remplissage (11) comprenant quant à elle un corps fixe (12) et un plongeur (13) coulissant par rapport audit corps fixe (12) ;

ledit plongeur (13) étant mobile entre une position ouverte, dans laquelle il définit avec ledit corps (12) un orifice (30) par lequel ledit produit pouvant être versé peut s'écouler et qui peut être placé en communication fluidique avec ledit premier bec (5), et une position fermée, dans laquelle il coopère par une garniture (31) avec ledit corps fixe (12) de sorte à obstruer ledit orifice (30) et éviter que ledit produit pouvant être versé n'atteigne ledit premier bec (5) ; ledit procédé comprenant l'étape de détection de rupture dudit récipient (4) ;
ledit procédé comprenant en outre l'étape de placement en communication fluidique d'un second réservoir (40) rempli d'un fluide de lavage avec une cavité (20) dudit corps fixe (12) faisant face audit premier bec(5) et placée en communication fluidique avec ledit orifice (30) ;
caractérisé en ce que ladite étape de détection comprend l'étape de mesure de la différence de pression entre l'intérieur dudit récipient (4) et l'extérieur et l'étape de détection d'explosion, lorsque ladite différence de pression est inférieure à une valeur seuil.

12. Procédé selon la revendication 11, **caractérisé en ce qu'**il comprend l'étape d'orientation de jets de lavage sur ledit corps fixe (12).

13. Procédé selon l'une quelconque des revendications 11 ou 12, **caractérisé en ce que** ladite étape de

placement en communication dudit second réservoir (40) avec ladite cavité (20) comprend l'étape consistant à faire passer ledit fluide de lavage par au moins un parmi :

- un deuxième bec (53) d'un premier conduit (46) relié à une source de vide (47) ; ledit premier conduit (46) qui peut être placé sélectivement en communication fluidique avec ladite cavité (20) à l'aide d'une deuxième soupape de régulation (50) ; et
- un troisième bec (55) d'un second conduit (51) relié à un troisième réservoir de basse pression (49) ; ledit second conduit (51) qui peut être placé sélectivement en communication fluidique avec ladite cavité (20) à l'aide d'une troisième soupape de régulation (48).

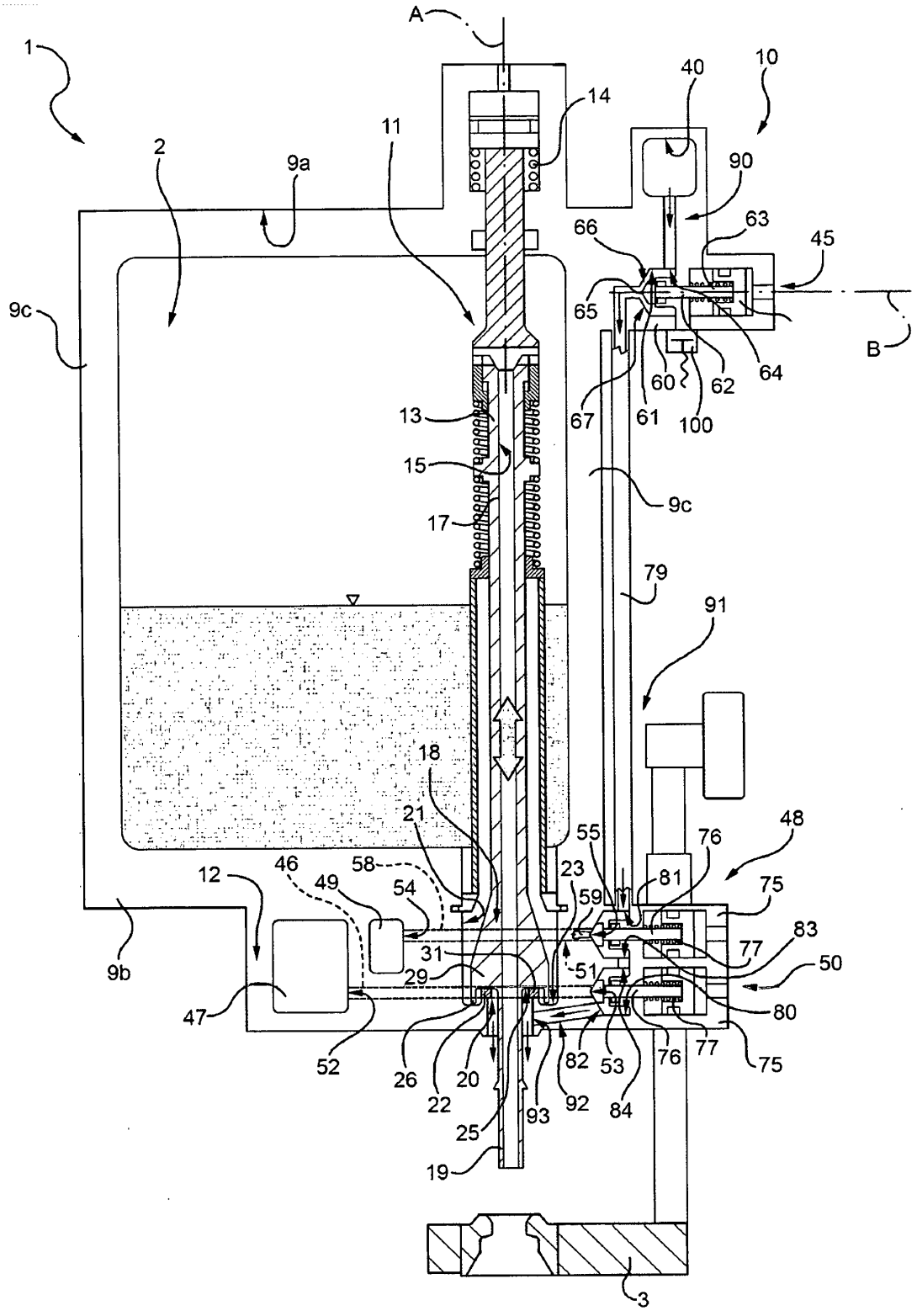

A
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66
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9c
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60
61
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67
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15
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FIG. 1

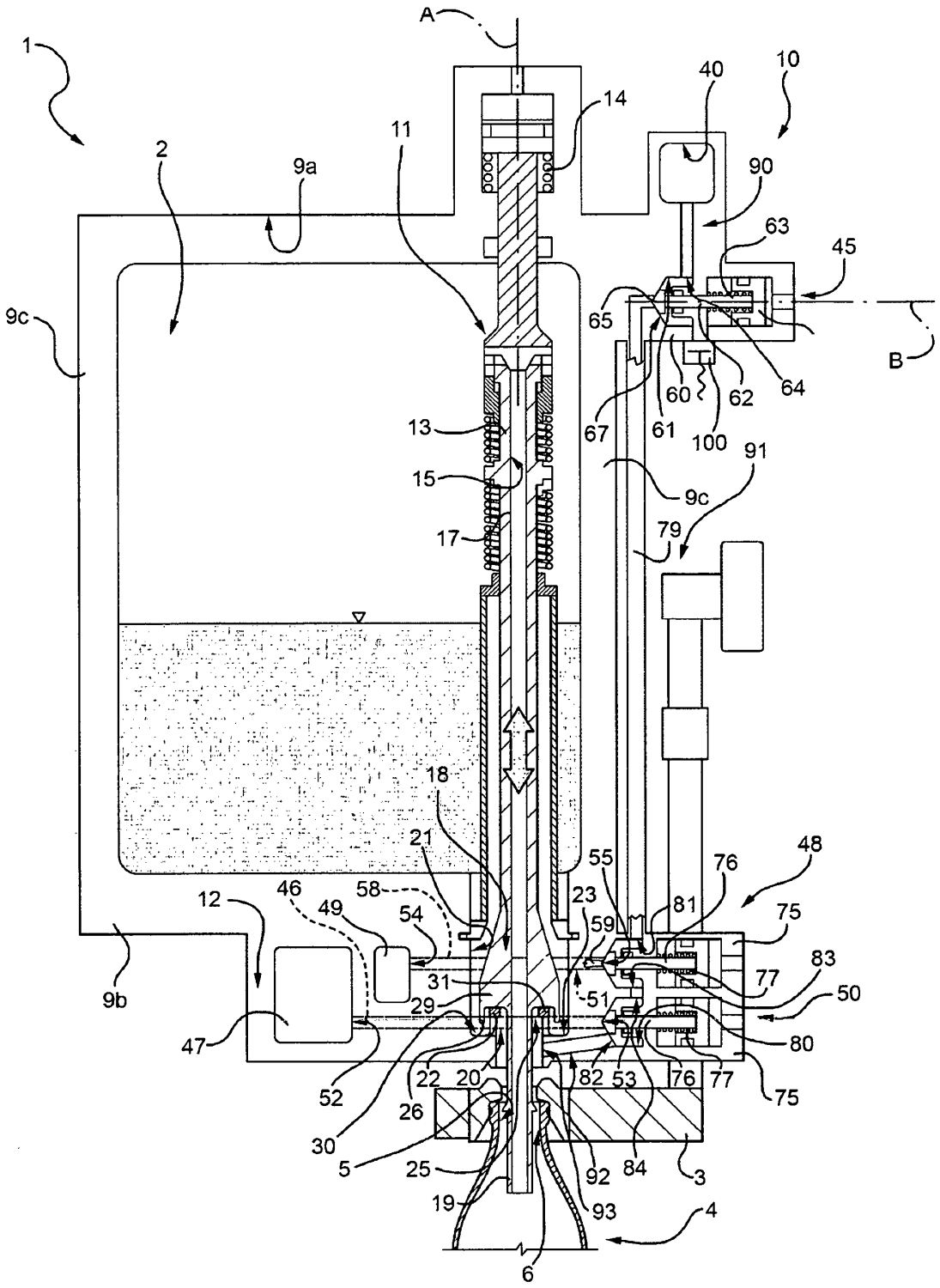

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FIG. 2

REFERENCES CITED IN THE DESCRIPTION

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