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(54) **DEVICE AND APPARATUS FOR DISPENSING METERED QUANTITIES OF A LIQUID MATERIAL**

(57) The device for dispensing measured quantities of a liquid material comprises a hollow containment body (2), which defines inside thereof a chamber (3) suitable for receiving said liquid material, said containing body (2) having at one end at least one loading opening (8) and at least one discharge opening arranged to allow respectively the insertion of a predefined quantity of said liquid material in said chamber (3) and the dispensing of said predefined quantity of said liquid material. The device also comprises a piston (4), shiftable inside said chamber (3), along a longitudinal direction, which is parallel to a longitudinal axis (A) of said containment body (2). A valve (15) is associated with the containment body (2) and configured to allow said predefined quantity of said liquid material to be inserted in said chamber (3) and to be dispensed from said chamber (3) during respective loading and unloading steps of said liquid material.

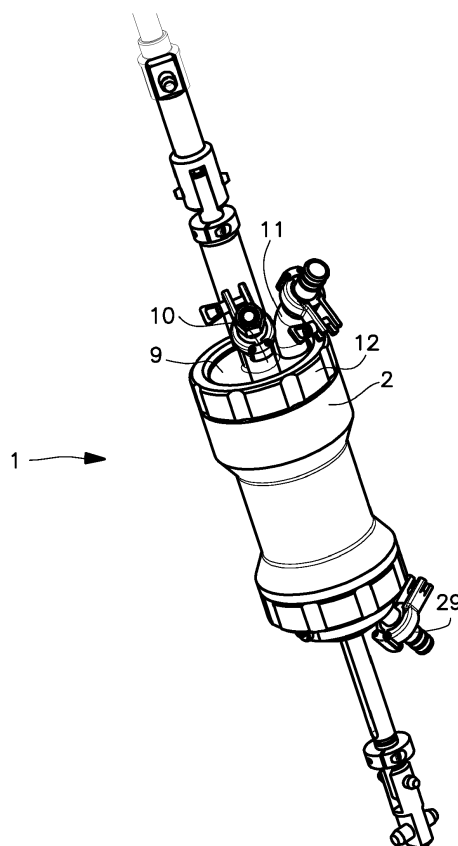


Fig.1

Description

Technical field

[0001] The present invention relates to a device and an apparatus for dispensing measured quantities of a liquid material, in particular for application in the pharmaceutical sector.

Prior art

[0002] The need for automatically dispensing measured quantities of a liquid material into one or more containers has long been known.

[0003] For example, a type of production processes in the pharmaceutical sector requires automatically filling the containers, which generally consist of bottles or capsules, with predefined quantities of a pharmaceutical product in liquid form. The quantities must be measured with precision and accuracy.

[0004] To meet this need, apparatuses for dispensing measured quantities of a liquid material have been developed.

[0005] EP 2 185 817 discloses a type of apparatus for dispensing measured quantities of a liquid material. The apparatus comprises a plurality of pistons inserted in a slidable way, for a part thereof, into respective cylinders housed in a containment body. The cylinders are suitable for receiving a liquid material and are connected to respective nozzles to dispense the liquid into special containers upon actuation of the relative pistons. Each piston has a distal portion, inserted into the cylinder, and a proximal portion coupled to an actuation system. The distal portion has a planar shaped region and a complementary curved shaped region. In a load configuration, the planar region defines a channel, which is adjacent to a liquid inlet opening. In a discharge configuration, each piston is rotated within the cylinder and the planar region defines a channel communicating with a discharge opening while the inlet opening is closed by the curved region of the distal portion.

[0006] A problem reported in the field concerns the fact that, in the case in which liquids having different physical characteristics are used, for example liquids characterised by different viscosity values, the dispensing of liquids can be difficult.

[0007] In fact, it has been observed experimentally that, in the case where viscous liquids are used, significant load losses occur in each cylinder. Moreover, this type of liquid tends to easily crystallise inside the cylinder with consequent problems of precision reduction when measuring the liquid material, as well as of greater difficulty when cleaning the apparatus between one measuring cycle and the other.

[0008] Appropriate apparatuses have therefore been developed for dispensing viscous liquids.

[0009] An example of such apparatus is described in US patent 6,494,687. The patent discloses an apparatus

comprising a series of measuring devices, each device comprising a piston slidable inside a respective cylinder. The measuring devices are supported by a first support member, which is parallel to a second support member in which a series of longitudinal measuring channels are made, each associable with a respective measuring device. The first support member has a plurality of outlet openings, on a surface facing the second support member, which may be associated with the openings of the measuring channels or with special conduits for supplying the liquid material. The first and the second support members are movable, one with respect to the other, between a configuration in which the outlet openings are aligned with those of the conduits for supplying the material and a configuration in which the alignment is reached between the outlet openings and the measuring channels. Each measuring channel is associated with a guide shaft, which develops longitudinally and constitutes an extension of the channel. At the end of each shaft a nozzle configured for dispensing the measured liquid material is connected.

[0010] Another example of apparatus of the aforesaid type is illustrated in US patent 4,667,709. The patent describes an apparatus comprising a casing, which defines a chamber inside thereof, which is capable of receiving a material to be dispensed, and having a pair of opposite side openings for the inlet and the outlet of the material. A piston is arranged in the chamber, which is shifted to enable the material inserted in the chamber to be dispensed. A valve is also mounted inside the chamber and is operated between a configuration in which it allows the entry of the material, and a configuration in which it allows the discharge of the material.

[0011] Although specific technical solutions have been developed for the management of high viscosity liquids, however, the problem of efficiently measuring different types of liquids, using the same apparatus, remains.

Disclosure

[0012] The present invention aims at solving the problems mentioned above, devising a device for dispensing measured quantities of a liquid material which allows the liquid materials having different physical characteristics to be dispensed in an efficient manner.

[0013] Within this aim, the present invention further aims at providing a device that allows easy dispensing of viscous liquid materials.

[0014] The invention furthermore aims at providing a device for dispensing measured quantities of a liquid material that allows the cleaning operations of the device to be made optimally without having to disassemble the device itself.

[0015] Also, the invention aims at providing a device for dispensing measured quantities of liquid material of simple constructive and functional conception, provided with certainly reliable operation, versatile in use, and which is relatively inexpensive.

[0016] The aims mentioned are achieved, according to the present invention, by the device for dispensing measured quantities of a liquid material and by the apparatus for measuring measured quantities of a liquid material according to claims 1 and 11.

[0017] The device for dispensing measured quantities of a liquid material comprises a hollow containment body which defines a chamber inside thereof, suitable for receiving said liquid material to be dispensed, said containing body having, at one end, at least one loading opening and at least one discharge opening arranged to allow respectively the insertion of a predefined quantity of said liquid material in said chamber and the dispensing of said predefined quantity of said liquid material; a piston, which is shiftable inside said chamber, along a longitudinal direction which is parallel to a longitudinal axis of said containment body; a valve, arranged inside said chamber, near said end of said containment body, said valve being operable in a first configuration, in which it connects said chamber directly with said at least one loading opening, and in a second configuration, in which it connects said chamber directly with said discharge opening.

[0018] Said valve can be operated in rotation around an axis parallel to said longitudinal axis so as to assume said first configuration and said second configuration.

[0019] Said valve is mounted in abutment of a first flange, which defines a top surface of said containment body. It is noted that the surfaces of said valve and of said first flange seal, during the loading and unloading steps of said liquid material, so that the leakage of said liquid material is avoided.

[0020] Said valve comprises a stem, which extends longitudinally through said first flange.

[0021] Said device also comprises an elastic means, associated with the stem and with said first flange, said elastic means being capable of ensuring contact between said valve and said first flange, in said step of loading said liquid material into said chamber and in said step of discharge of said liquid material from said chamber.

[0022] A safety member is associated with said stem, which is capable of cooperating with said elastic means so that said first flange and said valve are kept in contact in said loading and unloading steps. It should be noted that the cooperation between the elastic means and the safety member enables the contact between the flange and the valve to be ensured even in the case where high pressures are exerted by the material on the valve. In particular, during the loading and unloading steps, the contact between the surface of the first flange and the surface of the valve, which is ensured by the action of the elastic means and of the safety member, enables the passage of the liquid material between the surface, preventing the loss of liquid material and therefore the efficiency of the device is increased.

[0023] Preferably said at least one loading opening and said at least one discharge opening shape respective conduit which extend, at least for a portion, along a direction substantially parallel to said longitudinal axis of

said containment body.

[0024] Preferably each of said conduit extends for the entire length along a direction substantially parallel to said longitudinal axis of said containment body.

5 **[0025]** Preferably, inside each conduit a relative attachment tube is inserted, which may be connected to the means dispensing liquid material.

[0026] Preferably, said valve has at least one through hole and is actuated in rotation between said first configuration, in which said at least one hole is aligned with said loading opening to connect said chamber directly with said at least one loading opening, and said second configuration, in which said at least one hole is aligned with said discharge opening to connect said chamber directly with said discharge opening.

10 **[0027]** The fact of providing a pair of openings, respectively of loading and unloading opening, made in an axial direction enables the volume of the chamber to be optimally set, since, in the case in which the openings are made in a direction substantially orthogonal to the longitudinal axis of the containment body, it is necessary to increase the thickness value of the relative wall of the containment body so that consequently the containment capacity of the chamber is reduced. Furthermore, the fact that the valve, operated in rotation, enables the through hole to be alternately aligned with the loading opening and with the discharge opening, represents a simple and effective solution.

20 **[0028]** According to an aspect of the invention, said valve comprises a substantially disc-shaped body having at least one said through hole.

[0029] Preferably said at least one hole of said valve body extends in a direction parallel to said longitudinal axis.

30 **[0030]** Preferably, said stem is associated with said body of said valve.

[0031] Preferably, said stem is integral with said body of said valve.

[0032] Preferably, said stem is made of stainless steel.

40 **[0033]** Preferably, said body of said valve is made of a ceramic material.

[0034] Advantageously, said valve is shiftable along a longitudinal direction, which is parallel to said longitudinal axis. The translation of the valve in said longitudinal direction enables, in a cleaning step of the device, a sanitising fluid to flow between the valve and the first flange, making the cleaning of the chamber more efficient.

[0035] Preferably, said elastic means comprise a spring, which is coaxial with said stem.

50 **[0036]** Preferably, said spring is mounted around said stem and around a portion of said first flange.

[0037] Preferably, said spring is protected by a protective casing arranged coaxially with said stem.

55 **[0038]** According to an aspect of the invention, said safety member comprises a pivot which is slidably inserted inside a slot.

[0039] Preferably, said slot is formed on said protective casing of said spring.

[0040] Preferably, said slot defines a first section, which extends transversely with respect to said stem, said pivot being slidable in said first portion during rotation of said valve.

[0041] Preferably, said slot defines a second portion, which extends longitudinally with respect to said stem, said pivot being slidable in said second portion in a translation step of said valve.

[0042] Advantageously, between said first flange and said stem first sealing means is interposed, suitable for minimising the passage of said sanitising fluid between the surfaces, in said cleaning step.

[0043] Preferably, said first sealing means is made of a polymeric material.

[0044] Preferably, said chamber shapes a first portion and a second portion, communicating with said first portion.

[0045] Advantageously, said first portion has a greater cross section than the cross section of said second portion.

[0046] Preferably said first portion and said second portion are connected by a connecting portion.

[0047] Preferably, said connecting portion has a substantially frustoconical shape.

[0048] Preferably, said first portion and said second portion have a substantially cylindrical shape.

[0049] Advantageously said piston comprises a head having a smaller cross section than the cross section of said first portion so that at least one passage channel for said sanitising fluid is defined between said head and the side walls of said first portion, in said cleaning step of said device.

[0050] The features relating to the chamber, such as the provision of a first portion having a greater cross section of the cross section of the second portion communicating with it and the fact that the head of the piston has a smaller cross section than that of the first portion, enables the passage channels to be defined between the piston head and the chamber walls. The passage channels allow the sanitising fluid to flow efficiently throughout the chamber, even around the piston head. Moreover, the translation of the valve allows the sanitising fluid to pass between a lateral surface of the valve body and the chamber walls, as well as between the valve body and the first flange, helping to efficiently clean the chamber. This ensures optimal cleaning.

[0051] The present invention also relates to an apparatus for dispensing measured quantities of a liquid material which comprises a frame and at least one said device which lies on a longitudinal plane and that is supported by said frame.

[0052] Preferably the apparatus comprises a plurality of said devices, regularly spaced apart, which lie on said longitudinal plane.

[0053] The present invention also relates to a method for cleaning a device for dispensing measured quantities of a liquid material. Such method provides the step of arranging at least one said device for dispensing meas-

ured quantities of a liquid material.

[0054] The method then provides for shifting the valve along a longitudinal direction parallel to the longitudinal axis of the containment body.

[0055] The piston is then shifted along said longitudinal direction until positioning said piston head substantially at said first portion, said head being spaced from said valve.

[0056] Then, the method provides for inserting a sanitising fluid into the chamber and, after an interval of time elapsed since the insertion of said sanitising fluid, said sanitizing fluid is discharged from said chamber.

Description of drawings

[0057] The details of the invention will become more apparent from the detailed description of a preferred embodiment of the device for dispensing measured quantities of a liquid material, illustrated by way of example in the accompanying drawings, where:

Figure 1 shows a perspective view of the device for dispensing measured quantities of a liquid material according to the present invention;

Figure 2 shows a front view of the device;

Figure 3 shows a section view according to the plane of trace III-III illustrated in figure 2;

Figure 4 shows a top view of the device;

Figure 5 shows a view according to the plane of trace V-V illustrated in Figure 4;

Figure 6 shows a perspective view of an enlarged detail of the device;

Figure 7 shows a top view of the detail illustrated in Figure 6 in which some components are not visible;

Figure 8 shows a section view of the detail illustrated in figure 7 according to the plane of trace VIII-VIII;

Figures 9 and 10 respectively show a front longitudinal section view and a longitudinal section view in perspective of the device during an operative step;

Figure 11 shows a perspective view of an apparatus for dispensing measured quantities of a liquid material comprising a series of devices according to the present invention.

Best mode

[0058] With particular reference to these figures, the reference numeral 1 indicates the device for dispensing measured quantities of a liquid material according to the present invention.

[0059] The device for dispensing measured quantities of a liquid material 1 will be indicated, from now on, with the term device, for simplicity.

[0060] The device 1 comprises a hollow containment body 2, which defines a chamber 3 inside thereof, which is suitable for receiving the liquid material to be dispensed.

[0061] The liquid material may be, for example, a liquid

pharmaceutical product.

[0062] Inside the chamber 3 a piston 4 is arranged slidably, which is shiftable along a direction parallel to a longitudinal axis A of the containing body 2.

[0063] The chamber 3 shapes a first portion 5 and a second portion 6, communicating with the first portion 5.

[0064] The first portion 5 has a greater cross section than the cross section of the second portion 6 and is located at one end of the containment body 2, which is arranged at the top, in use.

[0065] The first portion 5 and the second portion 6 are connected by means of a connecting portion 7 having a substantially frustoconical shape.

[0066] Preferably the first portion 5 and the second portion 6 are substantially cylindrical.

[0067] Preferably the corners of the inner walls of the connecting portion 7 are rounded.

[0068] The containment body 2 has at the aforementioned end at least one loading opening 8 and at least one discharge opening, one of which is visible in Figure 5. Said openings are arranged to allow respectively a predefined quantity of the liquid material to be inserted in the chamber 3 and the predefined quantity of the liquid material to be dispensed from the chamber 3 towards the dispensing means, here not shown, which carries the liquid material towards the containers to be filled, also not shown.

[0069] The loading opening and the discharge opening shape respective conduits, which extend, at least for a portion, along a direction substantially parallel to a longitudinal axis A of the containment body 2.

[0070] Preferably each of the conduits extends through the whole length along an axial direction, substantially parallel to the longitudinal axis A.

[0071] The containment body 2 is associated above with a first flange 9, which defines one top surface. On the first flange 9 the loading and discharge openings 8 are made, in which a first attachment tube 10 and a second attachment tube 11 are respectively inserted, and which are suitable of being connected to the dispensing means.

[0072] A first ferrule 12 is mounted at the periphery of the flange 9, in a seat shaped by the containment body 2, and suitable for tightening the containment body 2 with the flange 9.

[0073] A second flange 13 is associated with the containing body 2 at the bottom and a second ferrule 14 is mounted in a seat shaped by the containment body 2 to tighten the second flange 13 with the containing body 2.

[0074] Inside the chamber 3, near the top of the containment body 2, a valve 15 is mounted, which may be actuated between a first configuration, in which it connects the chamber 3 with the loading opening 8, and a second configuration, in which it connects the chamber 3 with the discharge opening.

[0075] The valve 15 comprises a substantially discoidal body 16 having at least one through hole 17.

[0076] The valve 15 is in abutment of the surface of

the first flange 9 facing towards the inside of the chamber 3, during the loading and discharge steps of the liquid material. The contact between the surface of the valve 15 and the surface of the first flange 9 produces the seal, during the loading and unloading steps, avoiding the occurrence of leakage of the liquid material to be dispensed.

[0077] According to a preferred embodiment, the valve 15 is actuated in rotation around the longitudinal axis A to assume the first configuration, in which the hole 17 is aligned with the loading opening 8, or the second configuration, in which the hole 17 is aligned with the discharge opening.

[0078] The valve 15 may also be shifted in a longitudinal direction, parallel to the longitudinal axis A, so that it is distanced from the flange 9, in a cleaning step of the chamber 3.

[0079] The discoidal body 16 of the valve 15 is integral with a stem 18 which extends in a longitudinal direction, through the first flange 9. In particular, the stem 18 passes through a passage channel formed in the first flange 9.

[0080] The stem 18 protrudes, for a portion thereof, from the passage channel and is connected by means of transmission means to the first actuator means, not shown, capable of operating the valve 15 in the aforesaid rotational and translational motion.

[0081] A first seal means 19 is interposed between the first flange 9 and the stem 18 to minimise the passage of a sanitising fluid between the surfaces. This sanitising fluid is introduced into the chamber 3 during the cleaning step of the device.

[0082] Preferably the first sealing means 19 is made of a polymeric material.

[0083] The first sealing means 19 comprises, for example, an X-ring.

[0084] Preferably, second sealing means 20 is interposed between the first flange 9 and the containing body 2 to minimise the leakage phenomena of the sanitising fluid.

[0085] An elastic means 21 is associated with the stem 18 and the flange 9, capable of exerting a force for maintaining the first flange 9 and the valve 15 in mutual contact during the loading and unloading phases.

[0086] The elastic means 21 preferably comprises a spring mounted around the stem 18 and around a portion of the first flange 9. The spring is protected by a protective casing 22 coaxial to the stem 18.

[0087] The stem 18 is also associated with a safety member 23, which performs the function of cooperating with the spring to keep the first flange 9 in contact with the valve 15, during the loading and unloading steps, above all in the case where high pressures are exerted on the valve 15 from the liquid material inserted in the chamber 3 (see Figure 5).

[0088] The safety member 23 comprises a pin which is slidable in a slot 230 (see Figures 6 and 8).

[0089] The slot 230 is preferably made on the spring protection casing.

[0090] The slot 230 defines a first channel 230a, which

extends transversely with respect to the stem 18, and a second channel 230b, which extends longitudinally. The first channel 230a is arranged for the sliding of the pin when the valve 15 is rotated around the longitudinal axis A, while, the second channel 230b is arranged for the sliding of the pin in the case in which the valve 15 is translated in the longitudinal direction.

[0091] The slot 230 is substantially L-shaped.

[0092] The piston 4 is mounted at the end of the containment body 2 opposite to the end at which the valve 15 is mounted.

[0093] More in detail, the piston 4 comprises a head 24, which is positioned in abutment with the second flange 13, in a loading step of the liquid material into the chamber 3.

[0094] A tubular element 25 is integrally connected to the head 24, which extends longitudinally through the second flange 13 and is slidable in a passage channel defined by the second flange 13.

[0095] The tubular element 25 is connected to a second actuator means, not shown, which shifts the piston 4 along the longitudinal direction parallel to the axis A.

[0096] A locking pin 26 is radially associated with the tubular element 25 and is capable of blocking the rotation of the piston 4 around the longitudinal axis A.

[0097] On the head 24 there are sealing means 27, suitable for facilitating the sliding of the piston 4 inside the chamber 3.

[0098] The cross section of the head of the piston 4 has a lower value than the smaller cross section of the connecting portion 7 and with respect to the cross section of the first portion 5 of the chamber 3. In this way, at least one passage channel is shaped between the head 24 of the piston 4 and the walls of the connecting portion 7, and between the head 24 of the piston and the walls of the first portion 5, during the cleaning step (see Figures 6 and 7), through which the sanitising fluid flows, preferably a liquid sanitising material.

[0099] A second discharge opening 28 is made on the second flange 13 for discharging the sanitising fluid, at the end of the cleaning step.

[0100] In this opening 28 a third attachment tube 29 is inserted, suitable for being connected to a collecting means of the sanitising material, not visible in the figures.

[0101] Between the second flange 13 and the containment body 2 a third sealing means 30 is arranged, made, for example, of an O-ring.

[0102] The device 1 is suitable for being applied in an apparatus for dispensing measured quantities of a liquid material, indicated with 100 in the figures.

[0103] The apparatus 100 comprises at least one device 1, which is arranged on a longitudinal plane.

[0104] Preferably the apparatus 100 provides a plurality of devices 1, regularly spaced apart, which lie on the same longitudinal plane.

[0105] The devices 1 are supported by a frame 101 of the apparatus 100 comprising a first support member 102, which extends on a substantially horizontal plane,

above with respect to the devices 1.

[0106] The frame 101 also comprises a second support member 103 mounted on a support base 104.

[0107] Each device 1 is connected, at one end, to the first support member 102 and, at the opposite end, to the second support member 103.

[0108] The second support member 103 may be made of a series of support elements 105 each, shaping a pair of arms 106, which support respective tubular elements 8 of a pair of adjacent devices 1.

[0109] Preferably, the first supporting member 102 houses inside thereof the transmission means of the first actuator means, not visible in the figures, to move the valves 15 of the devices 1, according to a rotary or translational motion according to the operating step.

[0110] Preferably, the second support member 103 houses a second actuator means, not shown, to shift the pistons 4 along a longitudinal direction.

[0111] Preferably the first and the second actuator means move the devices 1 synchronously.

[0112] The apparatus 100 comprises the dispensing means, connected to the discharge openings of the devices 1, to convey the measured liquid material towards the containers to be filled.

[0113] The containers may be bottles, capsules or the like.

[0114] A supply means of a liquid material is connected to the attachment tubes 10 of the loading openings 8 of the devices 1, suitable for transporting the material taken from a storage tank.

[0115] The apparatus also comprises a means for supplying the sanitising material, suitable for supplying the sanitising material into the chambers 3, through the loading openings 8, during the cleaning step. It is possible to provide for a selection means to connect the loading openings alternatively with the means for supplying the liquid material to be dispensed and with the means for supplying the sanitising material.

[0116] The operation of the device according to the present invention is easy to understand from the above description.

[0117] At the beginning of an operating cycle for filling the containers, each device 1 has the head of the piston 24 in abutment of the second flange 13 and the valve 15 matching the first flange 9.

[0118] The material is then loaded into the devices 1.

[0119] The loading step provides, for each device 1, to actuate in rotation, on command of the first actuator means, the valve 15 around the longitudinal axis A of a predetermined angle, so that the through hole 17 is aligned with the loading opening 8.

[0120] The loading step then provides for inserting the liquid material carried by the supply means into the chamber 3, through the loading opening 8. The chamber 3 is filled with a predetermined amount of material set by the volume of the chamber 3 itself.

[0121] Then, a step of unloading the material is carried out, which provides for the valve 15 to be rotated again

about the longitudinal axis A, by a predetermined angle, to align the through hole 17 with the discharge opening. The piston 4 is then actuated in a suitable phase relationship with the rotation of the valve 15 in translational motion in the longitudinal direction parallel to the axis A, in order to exert a thrust force on the material contained in the chamber 3.

[0122] The piston 4 is translated by the second actuator means for a stroke sufficient to dispense the entire amount of the liquid material contained in the chamber 3, through the discharge opening to the dispensing means.

[0123] When it is necessary to carry out a cleaning operation of the devices 1, for example in the case where the type of liquid material to be dispensed is changed, or to periodically clean the devices 1 between an operating cycle and the next cycle, one proceeds, first of all, the configuration of the devices 1, suitable for cleaning, is made. Therefore, for each device 1, the valve 15 is shifted in a direction parallel to the axis A, distancing it from the surface of the first flange 9.

[0124] Furthermore, the piston 4 is shifted along the direction A until the head 24 is positioned substantially at the first portion 5 of the chamber 3 or between the connecting portion 7 and the first portion 5 of the chamber 3. The head 24 is positioned so that it is spaced from the valve 15 by a meatus.

[0125] Once the devices 1 have been prepared in the suitable configuration described above, the cleaning process provides for connecting the loading openings 8 with the means for supplying the sanitising fluid.

[0126] The sanitising fluid is then inserted into the chamber 3 through the loading opening 8.

[0127] Finally, after a predetermined time interval elapsed from the insertion of the sanitising fluid, such sanitising fluid is conveyed into the discharge opening 29 towards the collection means.

[0128] The device for dispensing measured quantities of a liquid material achieves the purpose of being able to efficiently dispense liquid materials having different physical features thanks to the fact of providing a valve arranged near the loading and unloading openings of the liquid material, which, if activated, connects the chamber directly with said openings, respectively in the step of insertion of the liquid material into the chamber and the discharge of the liquid material from the chamber.

[0129] It should be noted, in fact, that the material passes through the opening arranged on the containment body and is conveyed directly into the chamber, upon actuation of the valve, without having to pass through passages having reduced sections, which may represent a problem, in particular if the material is viscous.

[0130] It should be considered that the viscous materials may tend to crystallise, therefore, devising a direct passage of the material from the feeding means to the chamber and from the chamber to the dispensing means, through the loading and unloading openings, this tendency to crystallisation is countered.

[0131] A prerogative of the invention is the fact that the valve has a simple structure or a substantially disc-shaped body having a through hole suitable for being aligned, alternatively, with the loading opening and with the discharge opening of the liquid material. In addition, the valve is easily actuated by rotating the valve, in particular around the longitudinal axis of the containment body.

[0132] It should also be emphasised that, during the loading and unloading steps, the contact between the surface of the first flange and the surface of the valve, which is ensured by the action of the elastic means and of the safety device, makes it possible to block the passage of the liquid material between the surfaces, preventing the liquid material from leaking and also preventing the sealing means from being contaminated by the liquid material. therefore, the seal produced by the aforementioned surfaces also has the effect of facilitating the cleaning phase.

[0133] A further prerogative of the invention is the possibility of optimally cleaning the chamber, without having to disassemble the device. This is possible thanks to the configuration of the chamber and the possibility of translating the valve along a longitudinal direction, inside the chamber. More particularly, the fact that the chamber comprises a first portion having a greater cross section of the cross section of the second portion communicating with it and that the head of the piston has a smaller cross-section than that of the first portion, allows the channels of passage between the piston head and the chamber walls to be defined. The passage channels allow the sanitising fluid to flow efficiently throughout the chamber, even around the piston head. Moreover, the translation of the valve allows the sanitising fluid to pass between a lateral surface of the valve body and the chamber walls, as well as between the valve body and the first flange, helping to efficiently clean the chamber.

[0134] It is also noted that the provision of the sealing means, arranged between the first flange and the valve stem, minimises the losses of the sanitising fluid.

[0135] The device described by way of example, may change according to the different requirements.

[0136] In the practical embodiment of the invention, the materials used, as well as the shape and the dimensions, may change according to the needs.

[0137] Should the technical features mentioned in any claim be followed by reference signs, such reference signs were included strictly with the aim of enhancing the understanding of the claims and hence they shall not be deemed restrictive in any manner whatsoever on the scope of each element identified for exemplifying purposes by such reference signs.

Claims

1. Device for dispensing measured quantities of a liquid material comprising

a hollow containment body (2) which defines inside thereof a chamber (3) capable of receiving said liquid material to be dispensed, said containment body (2) having at one end at least one loading opening (8) and at least one discharge opening arranged to allow respectively a predefined quantity of said liquid material to be inserted in said chamber (3) and said predefined quantity of said liquid material to be dispensed;

a piston (4) shiftable inside said chamber (3), along a longitudinal direction parallel to a longitudinal axis (A) of said containment body (2);

a valve (15) arranged inside said chamber (3), close to said end of said containment body (2), said valve (15) being operable in rotation around an axis parallel to said longitudinal axis (A) between a first configuration, where it connects said chamber (3) directly with said at least one loading opening (8), and in a second configuration, where it connects said chamber (3) directly with said discharge opening, said valve (15) being mounted matching a first flange (9), which defines a top surface of said containing body (2), the surfaces of said valve (15) and of said first flange (9) making a sealing, in a step of loading said liquid material in said chamber (3) and in a step of discharging said liquid material from said chamber (3), so that the phenomena of leakage of said liquid material are avoided, said valve (15) comprising a stem (18), which develops longitudinally through said first flange (9);

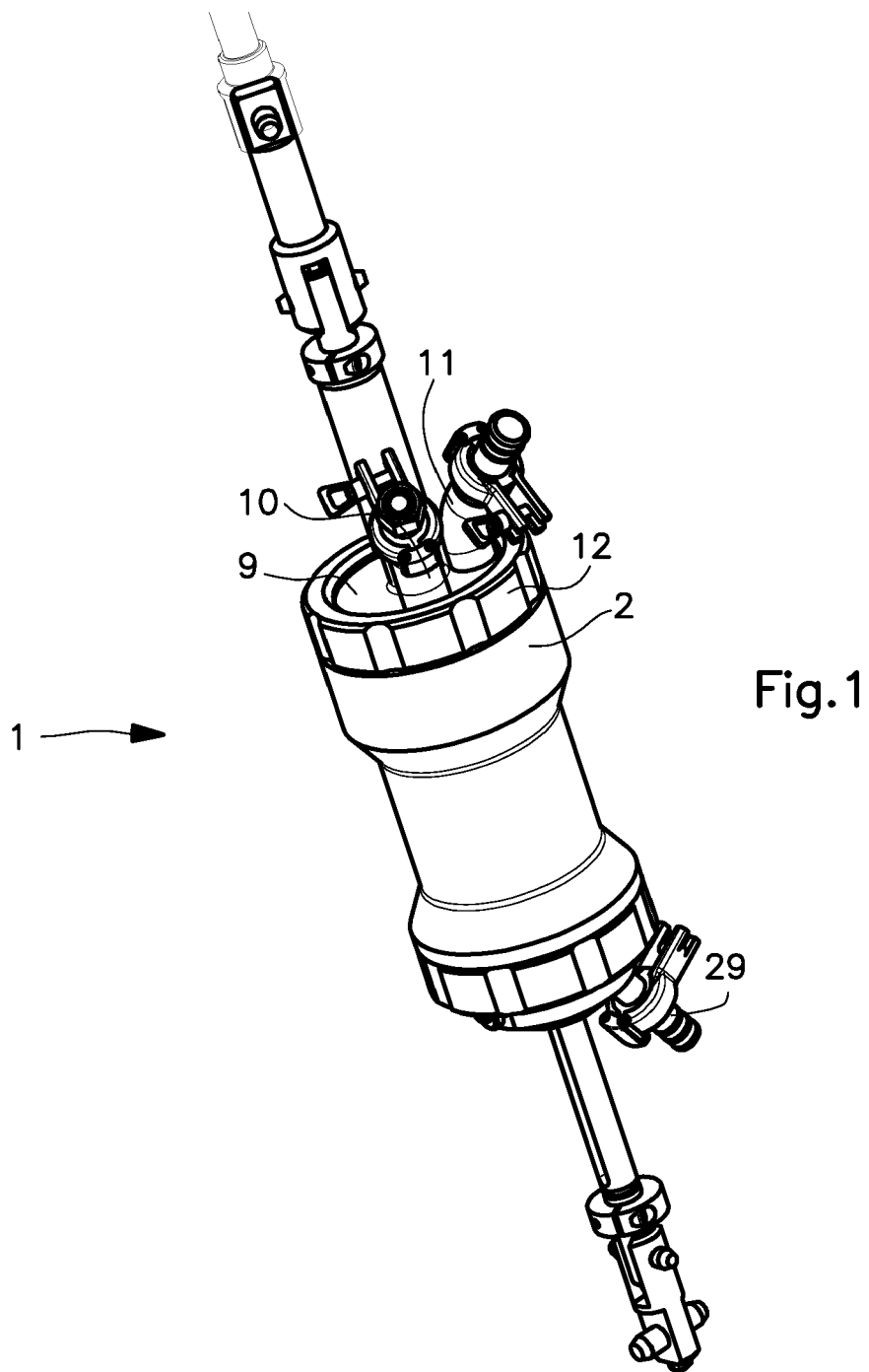
elastic means (21) associated with said stem (18) and with said first flange (9), said elastic means (21) being capable of ensuring contact between said valve (15) and said first flange (9) in said step of loading said liquid material in said chamber (3) and in said step of discharging said liquid material from said chamber (3);

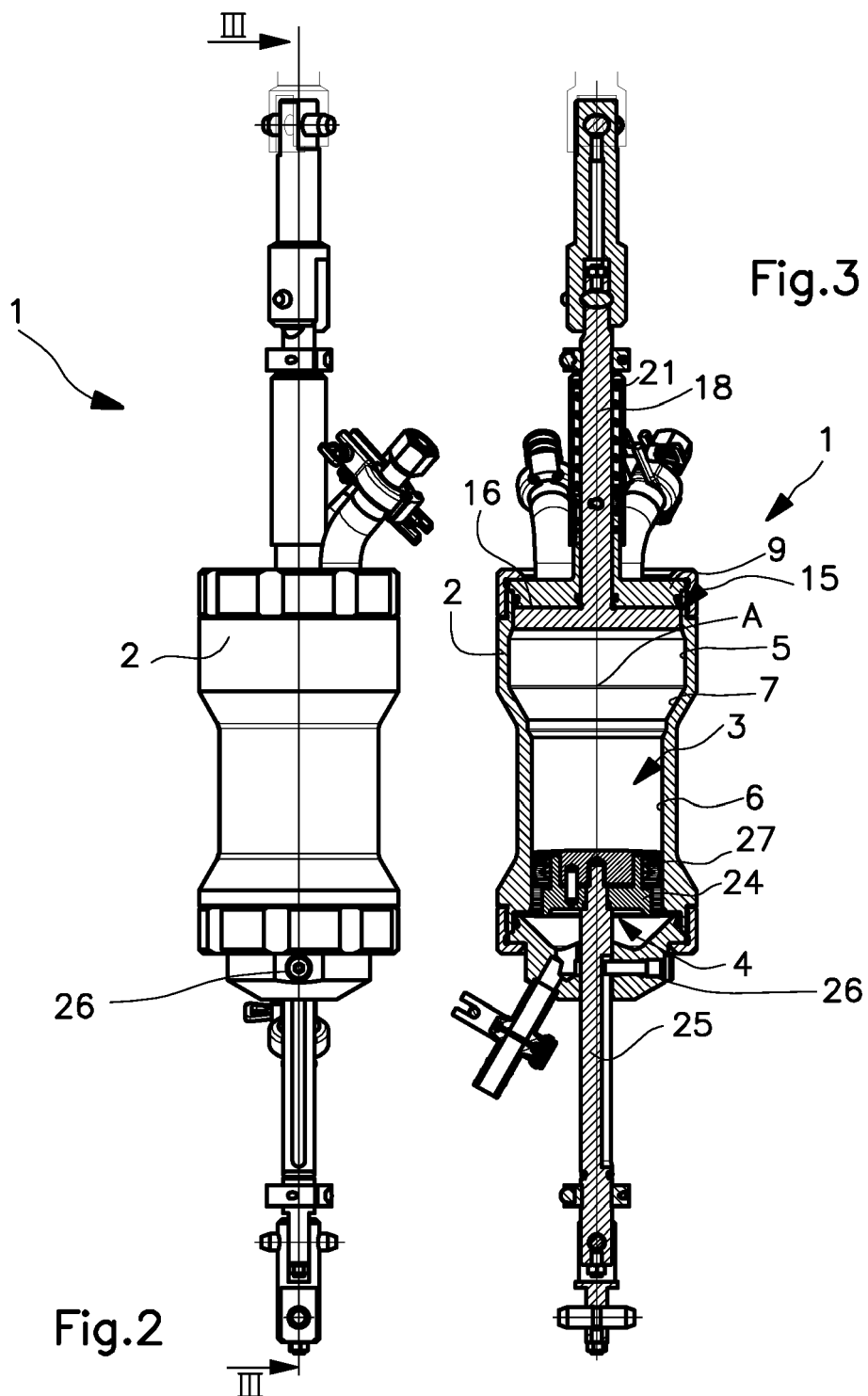
a safety member (23), associated with said stem (18), which cooperates with said elastic means (21) in order to ensure the contact, in said loading and unloading steps, of said liquid material, said first flange (9) with said valve (15).

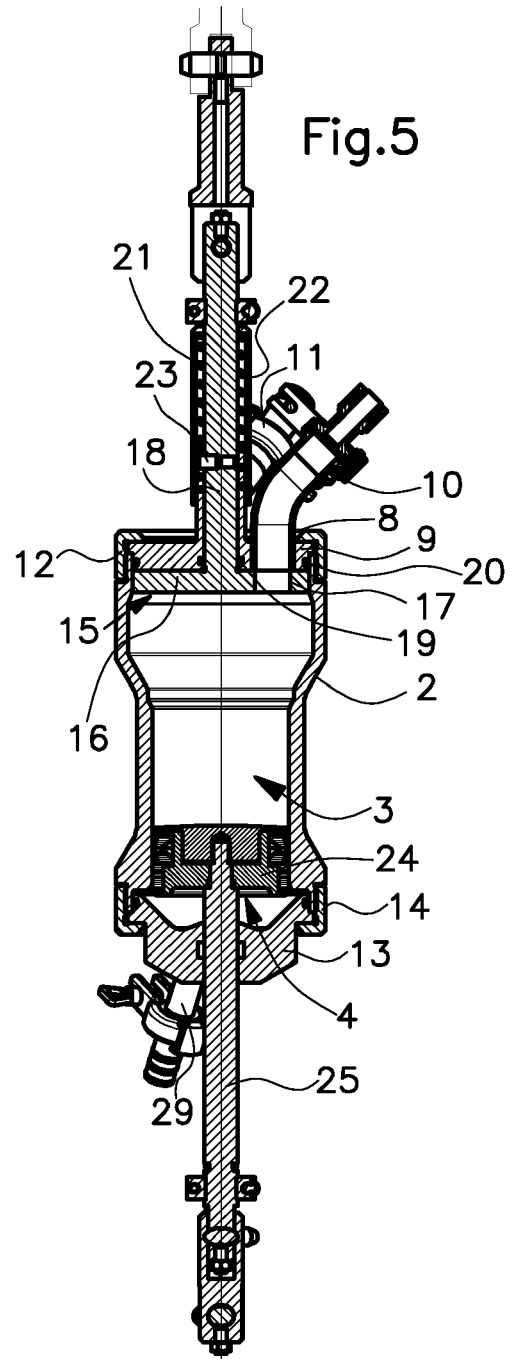
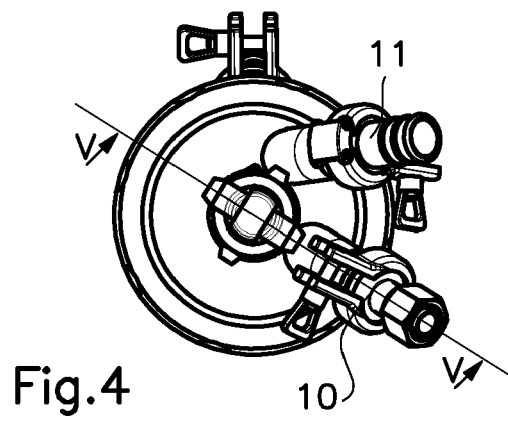
2. Device according to claim 1, **characterised in that** said valve (15) is shiftable along a longitudinal direction parallel to said longitudinal axis (A).
3. Device according to claim 1 or 2, **characterised in that** said at least one loading opening (8) and said at least one discharge opening shape respective conduits, which extend, at least in part, along a direction substantially parallel to said longitudinal axis (A) of said containment body (2).
4. Device according to one of the claims 1-3, **characterised in that** said valve (15) has at least one through hole (17), said valve (15) being shifted in rotation between said first configuration, where said

at least one hole (17) is aligned with said loading opening (8), and said second configuration, where said at least one hole (17) is aligned with said discharge opening.

5. Device according to claim 4, **characterised in that** said valve (15) comprises a substantially discoidal body (16) wherein said at least one hole (17) is made.
6. Device according to claim 5, **characterised in that** said at least one hole (17) of said valve (15) extends in a direction parallel to said longitudinal axis (A).
7. Device according to one of the preceding claims, **characterised in that** said elastic means (21) comprises a spring mounted coaxially with said stem (18).
8. Device according to one of the claims 2-7, **characterised in that** said safety member (23) comprises a pivot inserted slidably in a slot (230).
9. Device according to claim 8, **characterised in that** said slot (230) defines a first section (230a), which extends transversely with respect to said stem (18), said pivot being slidable in said first section (230a) during the rotation step of said valve (15).
10. Device according to claim 9, **characterised in that** said slot (230) defines a second section (230b), which extends longitudinally, said pivot being slidable in said second section (230b) during the translation step of said valve (15).
11. Apparatus for dispensing measured quantities of a liquid material, comprising a frame (101); at least one device (1) according to one of claims 1-10, which lies on a longitudinal plane and is supported by said frame (101).
12. Apparatus according to claim 11, **characterised in that** it comprises a plurality of said devices (1), regularly spaced apart, which lie on said longitudinal plane.







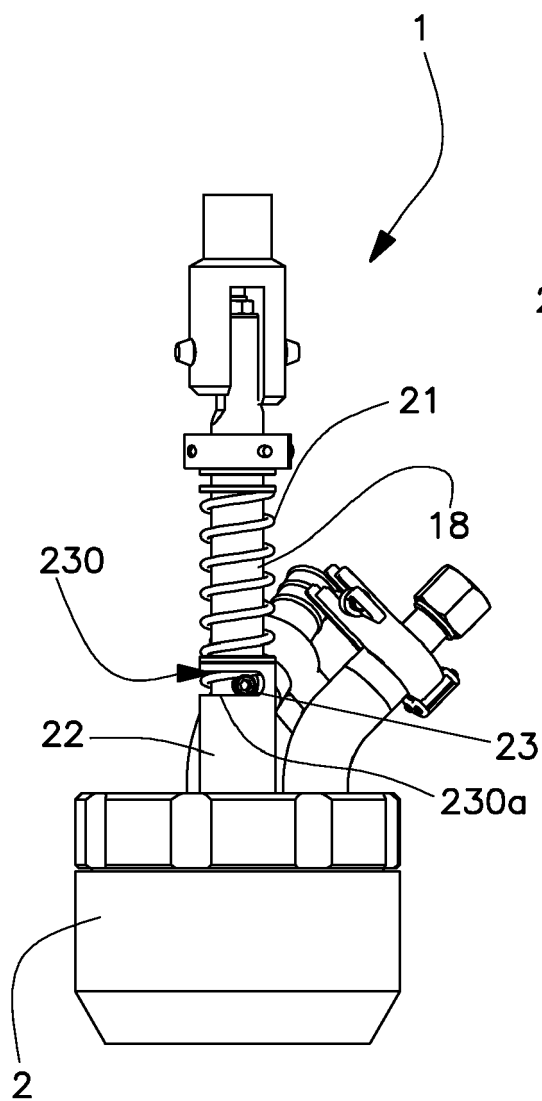


Fig. 6

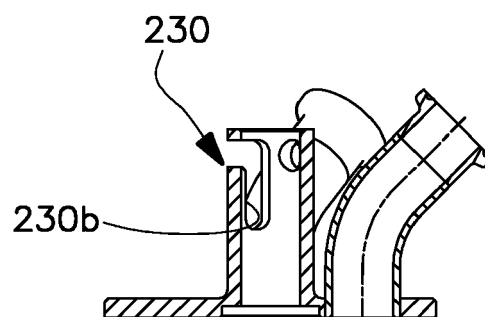


Fig. 8

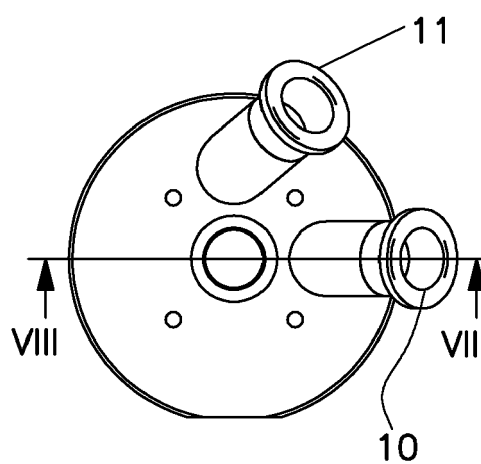
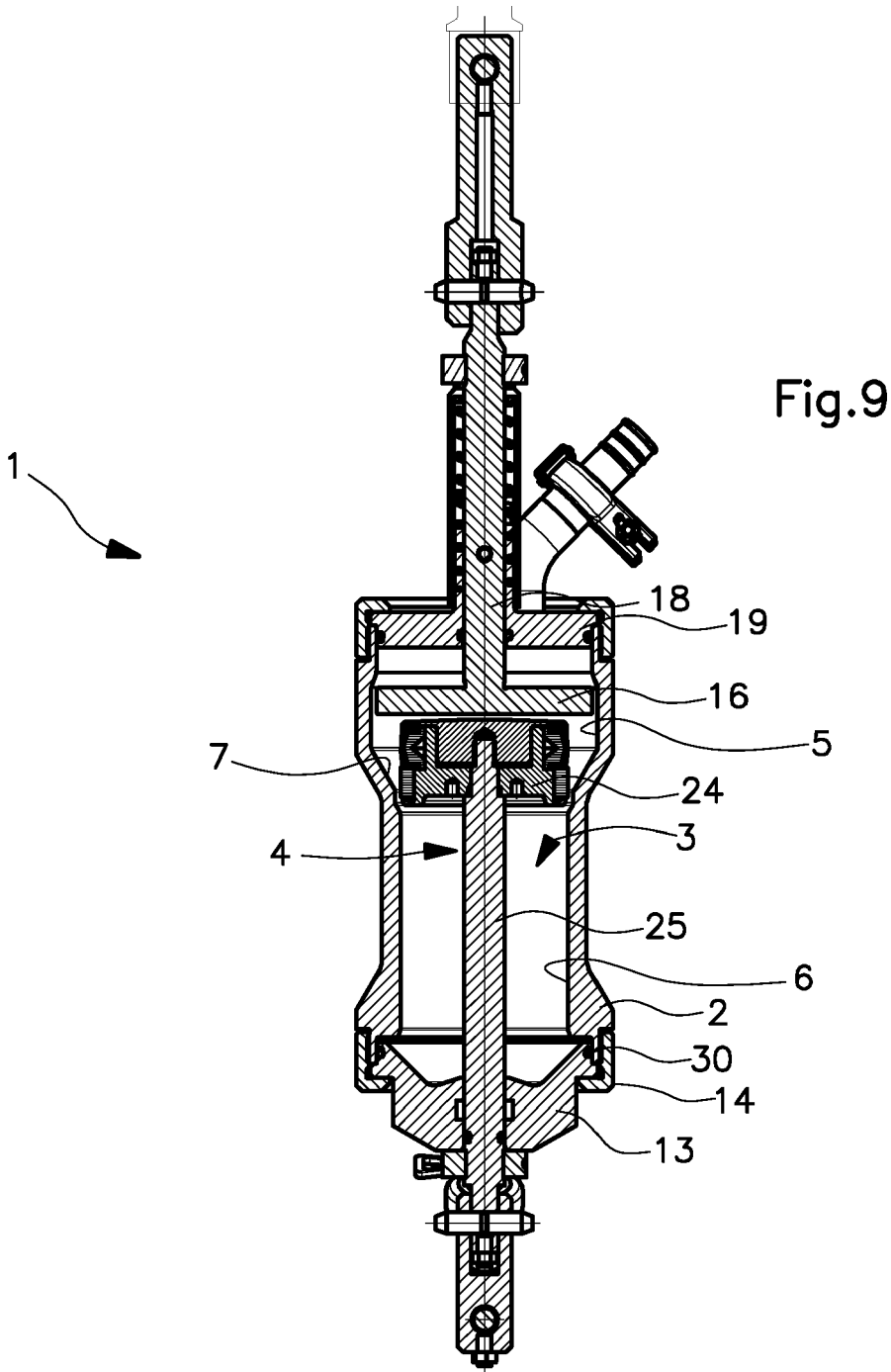


Fig. 7



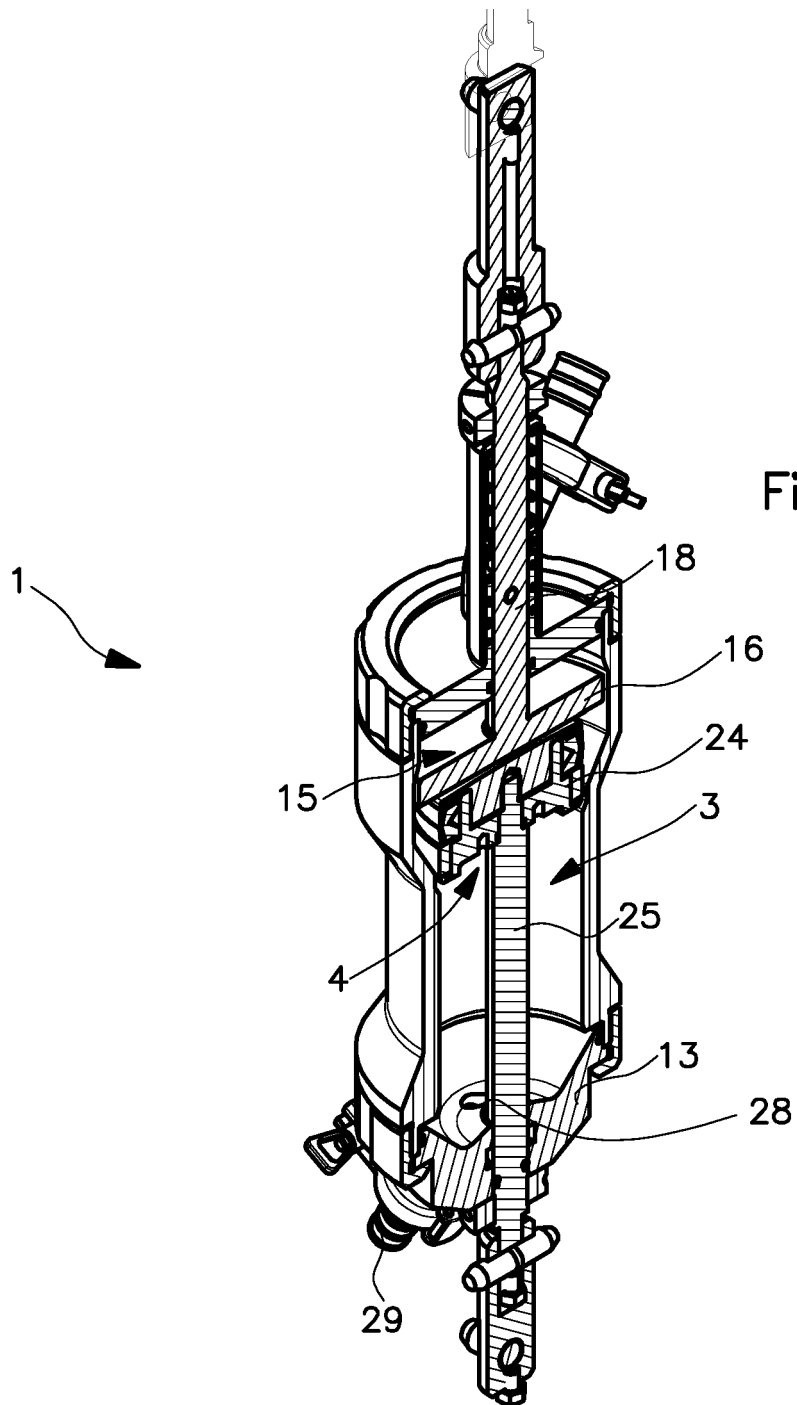
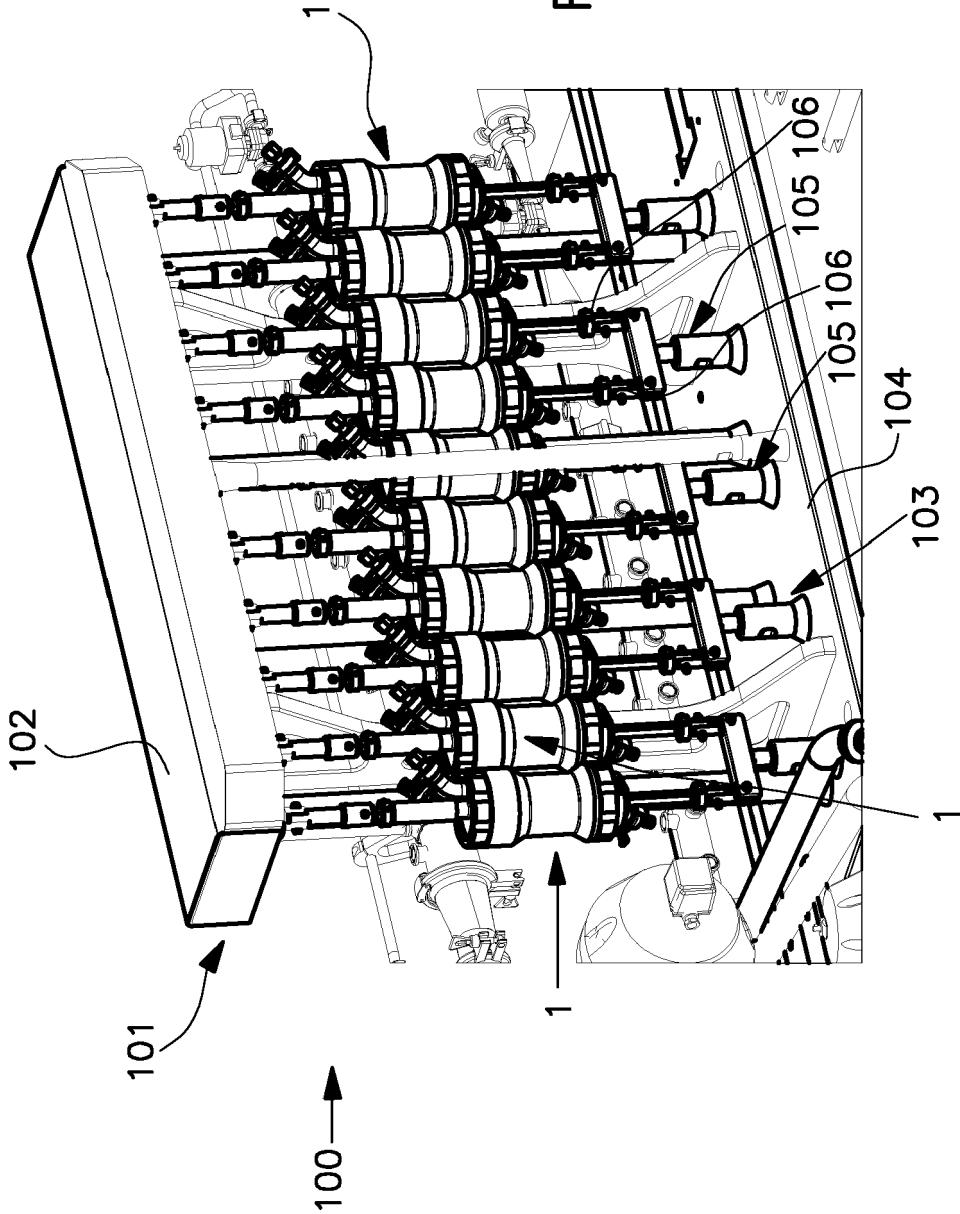


Fig.11





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Place of search Munich		Date of completion of the search 11 February 2020	Examiner Pinna, Stefano
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