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(54) Bottle filling apparatus provided with a filling valve

(57) Bottle filling apparatus provided with a filling valve (1), which comprises: a central body (2), a vertical filling conduit (3) arranged below said central body, a beverage holding tank (4), a delivery conduit (5) connecting the beverage tank with the central body, an elastic diaphragm (16) that is contained in the central body and works as a shutter member. Vertically aligned in the central body there are arranged, from the top downwards, a buffer chamber (7), a rigid separating partition (9), a delivery chamber (8), said separating partition being partially arranged between said two chambers. These chambers open towards a same vertical wall (10) of the central body, and the buffer chamber is connected to the delivery conduit via an upper passage (14), while the delivery chamber is connected to the filling conduit via a lower passage (13), these passages being aligned with each other vertically.

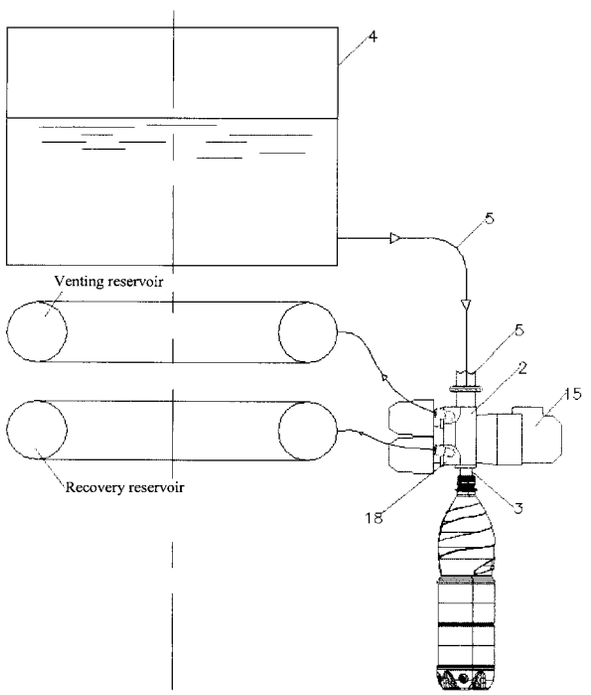

Fig. 1

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Description

[0001] The present invention refers to an improved kind of filling valves of a particularly advanced type, which are adapted to be used in conjunction with industrial bottle filling equipment for bottling various kinds of beverages, including both carbonated beverages, i.e. beverages charged with carbon dioxide, and so-called "flat", i.e. non-carbonated ones.

[0002] Owing to the particular kind of market, i.e. a typical mass-consumer one, and the particular kind of product, i.e. generally low-cost beverages, which the above-cited kind of equipment is involved in, it is absolutely necessary for this equipment to be able to fill considerable large numbers of bottles at a very fast output rate, thereby ensuring very high levels of productivity.

[0003] This kind of bottling equipment shall therefore be able to operate through almost continuous working cycles, i.e. under almost continuous-duty conditions, at very high filling rates and a minimum extent of interruptions in the working cycle thereof.

[0004] Widely known in the art is anyway the fact that filling or bottling plants generally require them to be allowed to periodically undergo rinsing or sanitization cycles, which have to be performed owing to a number of different requirements, which anyone skilled in the art is fully aware of and shall therefore not be reminded here.

[0005] Also widely known in the art is on the other hand the need for these plants to be able to ensure a high level of operating flexibility, in the sense that they should be as much as possible capable of both handling beverages of a most varied kind and filling bottles that may even widely vary in both the shape and the capacity thereof.

[0006] All these needs and requirements generally give rise to a number of operating drawbacks, which may be summarized as follows:

- a first such drawback derives from the fact that, with currently available prior-art plants and valves, and during the filling phase of certain kinds of beverages, there occurs a frothing, i.e. foam-building process; this effect is due to both the presence of conduits featuring various bends situated between the valve-shutting member and the bottle and the fact that the flow-rate at which bottles are filled is quite high, so that the beverages themselves are induced to flow under typically whirling conditions, thereby promoting foaming;

- a second drawback, connected to the first one, derives from the fact that the non-rectilinear, but markedly curvilinear kind of flowpath followed by bottling conduits brings about a fluid-dynamic resistance, i.e. frictional resistance to fluid flowing therethrough, generally known as pressure loss or drop in the art, which therefore tends to slow down the flow of the beverage, with the result of reducing the flow-rate and increasing the time required to fill the bottles, thereby affecting the overall productivity and efficiency of the bottling plant; in this connection, it should be duly reminded that a major limiting factor in a bottle filling process in an industrial plant of the above-cited kind is substantially given by the above-mentioned fluid-dynamic resistance, or pressure drop, and not the cycling or switching rate of the filling valve itself; as a result, if an increase in the filling rate is to be brought about, the need therefore arises for improvements to be pursued, which are primarily effective in reducing such pressure drop;

- a third drawback is a consequence of the bottling plant itself; in currently used plants, in fact, it is the bottle that, via the neck portion thereof coming into contact with and exerting a certain pressure against an appropriate spring, enables the filling phase to start; however, owing to such contact between the bottle and the spring being established and kept throughout the time during which the bottle dwells on the bottling carousel, regardless of the actual capacity of the bottle and/or the filling degree thereof, it ensues that small-capacity bottles, which therefore take a correspondingly shorter time to be filled, keep being attached to the filling plant, and engaging it uselessly, until they come to the end of carousel path, without therefore shortening the "gross" filling time and with the ultimate result of worsening the overall production efficiency of the entire plant;

- a fourth drawback is quite probably the most serious one and derives from the need for the bottling plant to undergo periodical "sanitization" cycles; in fact, each time that the plant is shut down and then started again, e.g. whenever the type of beverage being bottled is changed or owing to any other technical reason whatsoever, the need arises for the same plant to be thoroughly cleaned for removing residues generally forming in the conduits with the use of special fluids and processes.

[0007] Owing to such residues tending to form and become harboured in a particularly significant manner in interstices and bends, or anyway in conduit sections featuring geometrical discontinuities (due to the effect of micro-whirls or local calm flow), it clearly appears that such very sensible and absolutely necessary sanitization process becomes much more difficult and critical to carry out as the bottling or filling conduits tends to be longer and featuring a greater number of bends or geometrical discontinuities.

[0008] Known from the disclosures in US 6,192,946 and US 4,989,650, as well as WO 94/24037 is the practice of providing a valve for industrial bottling applications, in which the final passage of the beverage into the bottle is controlled by a mechanical shutter member ar-

ranged in a suitable position in the conduit connecting the beverage holding reservoir, ore tank, with the bottle to be filled; this solution, however, although largely known and functionally effective, has a major drawback in that the time during which the mechanical shutter member is kept open is strictly dependant on the position of the bottle on the bottling carousel, thereby making the solution itself undesirably rigid with respect to what would on the contrary prove as being an optimum degree of flexibility in view of catering for different types of bottles or other similar factors.

[0009] Disclosed in EP 1 293 475 A3 is a kind of valve that is also provided with a pneumatic control of the liquid flowing into the bottle, said pneumatic control comprising an elastic diaphragm-like member 9; this kind of valve does not, however, solve any of the afore-mentioned problems, while further adding a considerable complication owing to the presence of a large number of parts and devices that add to the difficulty and the degree of criticalness in carrying out any sanitization process.

[0010] Known from the disclosure in US 6,598,628 is an improved valve in a bottle filling apparatus, which is provided with a diaphragm 6 actuated by an electromagnetic valve synchronized from the outside. In this valve, the flow of beverage occurring towards the bottle to be filled is interrupted automatically when the level of the liquid inside the bottle being filled reaches up to the lower edge of the vent tube, while the air trapped in the valve prevents the liquid from escaping from, i.e. flowing out of the holding tank even if the outer diaphragm is still in an opening position.

[0011] The US patent publication No. 4,967,813 describes a filling valve, in which the shutter member is an elastic, pneumatically controlled diaphragm, and in which the liquid to be bottled is conveyed towards and into the bottle immediately downstream of said diaphragm.

[0012] Such solution appears to be particularly simple and advantageous in connection with all of the various kinds of drawbacks as noted above, except for the fact that the flowpath of the liquid coming from the beverage holding tank is rather complicated, since it includes a first 90°-bend, a second 180°-bend and, again, a third 90°-bend. As a result, the pressure drop or loss of this valve turns out to be surely quite high, and this valve is further quite unlikely to allow any high bottling or filling flow-rate to be reached.

[0013] Known from the disclosure in EP 1 299 303 B1 (of which the corresponding Italian document is the patent application No. BO2000A 000409, to which reference should therefore be made if a source of information in Italian language is wished) is a valve for bottling applications, which is in the shape of an overturned U, in which the flow of the beverage being bottled is interrupted by appropriately actuating an elastic diaphragm. This patent, however, includes a number of basic errors and wrong assumptions that may be briefly summarized as follows:

- a first such error relates to the circumstance according to which "... the stopping of the filling effect happens by siphon effect", as it is plainly stated in the related description (column 2, lines 52 et seq.). The error, in this case, lies in the fact that - quite on the contrary - the flow of the beverage practically stops only when the level of fluid in the venting conduit 3 becomes equal to the level of the fluid in the tank 9, and this owing not to a siphon effect, but rather to the well-known principle of communicating vessels;

- a second error lies in the fact that it is assumed and - following immediately the above-indicated statement - actually stated (col. 3, line 53) that "It is the residual air that being trapped inside the flowing conduits interrupts the downflow of the liquid...".

  Even in this case, the predominant principle of communicating vessels is plainly ignored, while erroneously ascribing the ability of stopping the beverage flow to the air buffer inside the bottle;

- a third error is tightly connected with the above-mentioned second one; closely following the above-indicated statement, it is in fact specially noted "... when inside the bottle is reached the level set by the position of the lower edge of the venting tube". In fact, it is not true - and cannot be true, actually - that the flow of the beverage is interrupted when the level determined by the position of the lower edge of the venting tube is reached in the bottle being filled, but - quite to the contrary - the liquid keeps flowing in and rises up into the venting tube itself until - owing again to the principle of communicating vessels - a pressure is reached inside the bottle, i. e. both in the air and the beverage thereinside, that is capable to push up the liquid to the same height as the liquid in the tank or reservoir 9.

[0014] And when such height is eventually reached, the pressure inside the bottle becomes significantly higher than the atmospheric pressure, thereby causing the level of the liquid in the bottle to necessarily become slightly higher than the level set by the lower edge of the venting tube, unlike what is on the contrary stated in the above-cited patent publication.

[0015] To put it shortly, when the level of the liquid in the bottle reaches up to the lower edge of the venting tube, the liquid goes on flowing down from the reservoir, but, as soon as it flows into the bottle, it also escapes therefrom through the venting tube.

[0016] And the error contained in the patent publication being discussed may quite likely be ascribable to just this fact, i.e. the fact that the level of the liquid in the bottle reaching the height of the lower edge of the venting tube certainly constitutes a discriminant, but not of the flow of the liquid from the tank or reservoir, as erro-

neously stated in the cited specification, but rather of the liquid starting to rise up through the venting tube, with the level of the liquid in the bottle remaining substantially stable.

[0017] In any case, the solution disclosed in the above-cited patent implies using an arrangement, in which the filling tube coming horizontally from the beverage tank or reservoir undergoes a first 90°-bending upwards in the direction of the valve, a second 90°-bending downstream of the valve, when it bends down from a vertical direction into a substantially horizontal one, and a third 90°-bending when it bends again into the vertical so as to fit and debouch into the bottle.

[0018] Two kinds of problems are basically encountered with such solution, i.e.:

a) PRESSURE LOSS: the presence of as many as three 90°-bends brings about a quite sensible, extremely detrimental pressure drop, as those skilled in the art are well aware of, since it is just the extent of this pressure drop that ultimately determines the actual beverage filling rate and, as a result, the overall productivity of the bottling plant;

b) POOR CLEANABILITY: the above-cited three 90°-bends bring also about respective variations in the flow direction of the liquid and, as a result, respective sites at which there occur whirls or conditions of relatively calm flow, where deposits tend therefore to settle.

[0019] Of course, this makes periodical cleaning of the bottling plant - i.e. an operation that is inherently a most critical one due to a number of largely known factors and reasons - much more difficult and awkward to perform.

[0020] It would therefore be desirable, and is actually the object of the present invention, to provide an industrial beverage bottling apparatus provided with a type of filling valves and related conduits, which are effective in doing away with the afore-indicated drawbacks and disadvantages, i.e. feature as few as possible bends or similar irregularities, are effective in preventing foaming, do not give rise to any excessive pressure drop, and are finally capable of being most conveniently, easily and effectively sanitized.

[0021] The above-noted apparatus must also be easily and readily implemented using existing or readily available means and techniques, and shall further be competitive in its construction; moreover, it shall not introduce or require any significant modification in the function, operation and construction of existing plants.

[0022] According to the present invention, these aims are reached in a particular kind of apparatus, and related filling valves, made and operating as recited in the appended claims.

[0023] Anyway, features and advantages of the present invention may be more readily understood from the description of an inventive apparatus that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a simplified outside view of a bottle filling apparatus provided with an improved filling valve according to the present invention;
- Figure 2 is an outside, diagonal perspective view of a main portion of a filling valve according to the present invention;
- Figure 3 is a diagonal perspective, bottom exploded view of the basic component parts of the valve according to the present invention;
- Figure 4 is a symbolical, see-through view of the component parts shown in Figure 3, in which the internal members and conduits of the valve are particularly emphasized;
- Figure 5 is a diagonal perspective, top exploded view of the basic component parts of the valve shown in Figure 3;
- Figure 6 is a diagonal perspective, outside view of a second main portion of the valve according to the present invention.

[0024] With reference to the above-cited Figures, in particular Figures 1 and 2, an industrial beverage bottling apparatus according to the present invention comprises a plurality of bottle filling valves 1, which comprise:

- a central body 2,
- a vertical beverage filling conduit 3, at the end of which there is provided a respective filling nozzle (not shown),
- a tank 4, or reservoir, adapted to hold the beverage to be bottled,
- a delivery conduit 5 connecting the beverage holding tank with said central body, the section of which running adjacent said central body is vertical.

[0025] Said central body is in the shape of a parallelepiped having vertical walls, and is provided internally with some recesses and some conduits, as indicated below.

[0026] With reference to Figures 2 and 3, vertically aligned in the central body there are arranged, from the top downwards, a buffer chamber 7 and a delivery chamber 8 situated therebelow; these chambers are only partially separated from each other by a common separating partition 9, so that these two chambers will be fluidly connected with each other by a channel 9A extending in the portion of said central body that is not occupied by said separating partition.

[0027] Said two chambers 7 and 8 are individually adjacent to and, therefore, open towards a common vertical side wall 10, while both the conformation and the arrangement thereof, along with the arrangement of said separating partition, are such that the overall line of intersection of said two chambers with said vertical wall 10 is a curved, preferably circular line that takes the form of a common closed edge 11, through which said two chambers and said separating partition are open towards the outside, i.e. are accessible from the outside from the side of said vertical wall 10. Even if this appears quite clearly from the Figures, it may be appropriate to specially point out here that, inside said curved line, said vertical wall 10 is merely a geometrical surface, i.e. not a physical one.

[0028] Said separating partition 9 is arranged between said two chambers in a manner as to enable the above-mentioned channel 9A connecting them with each other to extend along the same wall 10, as this readily appears in the illustrations in Figures 2 and 3. In other words, if said wall 10 is viewed from the outside, there can be seen said two distinct chambers 7 and 8 as separated from each other by the edge 12 - oriented towards said wall 10 - of said separating partition 9.

[0029] It can further be noticed that said separating partition delimits said buffer chamber 7 at the bottom and said delivery chamber 8 on top.

[0030] Further arranged in said central body there is a lower passage 13 connecting vertically, from the top downwards, said delivery chamber 8 with said filling conduit 3; similarly, there is arranged an upper passage 14 connecting vertically, from the bottom upwards, said buffer chamber 7 with said delivery conduit 5.

[0031] In a preferred embodiment, said lower and upper passages, said two chambers 7 and 8 and said separating partition are positioned in a mutually aligned arrangement along a same vertical.

[0032] The aperture that is so outwardly delimited by said closed edge 11, is however capable of being shut by a geometrically identical edge of an elastic diaphragm 16, which is arranged on a selectively actuatable pneumatic control member 15: according to the state of such pneumatic control member, said diaphragm can therefore be itself in a state in which it is either internally inflated, i.e. swollen up, or internally deflated, i.e. flattened out.

[0033] In the first case, a portion of the outer surface of the diaphragm is stretched out until it elastically penetrates said central body and ends up by resting against said outer edge 12 of said separating partition, thereby causing said channel 9A establishing a communication between said two chambers to be interrupted.

[0034] In the second case, the diaphragm retracts, thereby clearing said channel connecting the two chambers with each other.

[0035] Said elastic diaphragm 16 and the related selectively actuatable pneumatic control member 15 are largely known as such in the art, so that they shall not be discussed or dealt with any further in this context.

[0036] The advantages of the present invention can at this point be fully appreciated: in fact, the substantial absence of bends and similar geometrical irregularities in the various above-described conduits, except for a very slight and anyway unavoidable diversion in correspondence to the separating partition 9, prevents the flow of beverage from detrimentally suffering any unwanted pressure drop, thereby enabling quick bottle filling cycles to be attained, i.e. bottles to be filled in a very short time. This ultimately leads to a significant improvement in the overall productivity of the bottling plant.

[0037] In addition, this same circumstance that all said conduits, i.e. - in the right sequence - said delivery conduit 5, said upper passage 14, said buffer chamber 7, said delivery chamber 8, said lower conduit 13 and said filling conduit 3, are rectilinear in a mutually aligned arrangement, makes them look and work like a single rectilinear, vertical conduit, in which there are neither interstices nor sites at which the through-flowing beverage may undergo whirling, engulfing, stagnating or similar effects, so that they are able - among other things - to be sanitized in an absolutely effective and safe manner.

[0038] In an advantageous manner, and with reference to the accompanying Figures, said delivery chamber 8, or the related lower passage 13, is connected outwardly with a venting conduit 17, wherein said venting conduit performs as follows: upon completing a filling phase of a bottle with a carbonated-type beverage, and since the pressure in the bottle is at this point of approx. 3.5 bar (as a matter of fact, in view of preventing the beverage from bubbling over, the same beverage shall be kept at this pressure also during the bottling or filling phase and, therefore, even inside the bottle), the need arises - after the bottle has been so filled - for the pressure to be brought down again and, preferably, for the gas previously let into the bottle to be recovered. To this purpose, use is made precisely of said venting conduit 17, which is kept in a closed condition throughout the bottle filling phase and is only opened for a very short period of time just at the end of such bottle filling phase in view of recovering the gas and allowing the pressure inside the bottle to decrease.

[0039] Anyway, this particular process step is largely known to all those skilled in the art, so that it shall not be described here to any greater detail.

[0040] In an advantageous manner, and with reference to Figures 3 to 6, said venting conduit 17 debouches into a side body 18, which is provided with a first valve member. This valve member is made with substantially the same construction, technical and working features of the afore-described valve; it therefore is provided with a respective buffer chamber 20, a respective delivery chamber 21, a respective separating partition 22 arranged therebetween, and a respective diaphragm 23, which, as duly provided with respective pneumatic control or actuation means 24, is adapted to selectively

open/close the channel connecting said two chambers with each other; even in this case the two chambers and the related separating partition are aligned with each other vertically.

[0041] Said two chambers 20 and 21 are connected to respective conduits. Specifically, the buffer chamber is connected to said venting conduit 17 via a vent 25, whereas the related delivery chamber is connected to a respective final conduit 26 debouching either outside, i. e. into the atmosphere, or into a gas recovery reservoir (not shown).

[0042] These two chambers 20 and 21 may be arranged in any position relative to each other, but in a most advantageous manner - and for just the same reasons as already described and explained hereinbefore with reference to the buffer and delivery chambers 7 and 8 aligned along the same vertical - even these two chambers 20 and 21 are so positioned in a mutually aligned arrangement along the same vertical.

[0043] A further improvement of the afore-described valve can be provided as follows: in correspondence to the lower wall 30 of said central body, there may in fact be provided a recovery channel 31, i.e. a through-passing channel debouching onto said lower wall 30 of said central body 2 with a port 32, as well as onto the wall of said central body 2 with a respective port 33.

[0044] Said port 32 is connected to a recovery tube (not shown), which is automatically inserted in the bottle when the latter is raised so as to be applied onto said filling conduit 3; on the other hand, the task performed by this recovery tube, which is used for bottling both carbonated and non-carbonated beverages, is largely known to all those skilled in the art, so that it shall not be discussed any further in this context.

[0045] The outlet port 33 of said recovery channel 31 is in turn interconnected with a second conduit 34 of said side body 18, which is connected to the pressurizing and recovery means via a second respective, selectively actuatable valve means that is in turn incorporated in said side body 18. Even this valve member is made with substantially the same construction, technical and working features of the afore-described valve; it therefore is provided with a respective delivery chamber 40, a respective buffer chamber 41, a respective separating partition 42 arranged therebetween, and a respective diaphragm 43, which, as duly provided with respective pneumatic control or actuation means 44, is adapted to selectively open/close the channel connecting said two chambers with each other; advantageously, even in this case the two chambers and the related separating partition are aligned with each other vertically.

[0046] Said two chambers 40 and 41 are connected to respective conduits. Specifically, the buffer chamber is connected to said second conduit 34, whereas the related delivery chamber is connected to a respective third conduit 46 debouching into the beverage recovery reservoir or pressurizing means (not shown).

[0047] In an advantageous manner, even in this case of the recovery conduit, the related valve has its two chambers 40 and 41 and the related separating partition 42 situated therebetween mutually aligned along the same vertical, thereby attaining the same advantages in terms of cleanability and flow enhancement as already described with reference to the afore-discussed valves.

[0048] Furthermore, as most clearly illustrated in Figure 4, said two valve members incorporated in the side body 18 are provided and arranged in such a manner as to enable both the respective buffer chambers 21 and 41 and delivery chambers 20 and 40, and the respective separating partitions 22 and 42 therebetween, to face and, hence, open towards a common vertical wall 45 of said side body 18. This enables simpler and more cost-effective construction techniques to be implemented; in particular, it enables each one of said two valve means to be separated into respective devices which are in part incorporated in said side body 18, such as in the case of the buffer and delivery chambers and the related separating partition, and are accessible from the common outer wall 45, and are in part applied directly onto said same vertical wall 45 - on the outside thereof - as said two pneumatic actuating or control members 24 and 44 along with the respective diaphragms 23 and 43. As anyone skilled in the art is readily capable of appreciating, such constructive configuration does not only significantly enhance accessibility for improved convenience in maintenance and servicing, but also improves production standardization to a remarkable extent.

Claims

1. Industrial bottle filling apparatus provided with a kind of filling valve (1) that comprises:

- a central body (2),
- a vertical filling conduit (3) arranged below said central body,
- a beverage holding tank (4) containing the beverage to be bottled,
- a delivery conduit (5) connecting said beverage holding tank with said central body,
- an elastic diaphragm that is contained in said central body and works as the valve shutter member,

characterized in that vertically aligned in said central body there are arranged, from the top downwards,

- a buffer chamber (7),
- a rigid separating partition (9),
- a delivery chamber (8),

in which said separating partition is only partially arranged between said buffer chamber (7) and said

delivery chamber (8).

2. Industrial bottle filling apparatus according to claim 1, **characterized in that**:

- said buffer chamber and said delivery chamber are arranged to open towards a same vertical wall (10) of said central body, and a channel (9A) between said two chambers is delimited by an outer edge (12) of said separating partition, as well as by said vertical wall (10),
- said buffer chamber (7) is connected to said delivery conduit (5) via an upper passage (14) extending internally in said central body, and
- said delivery chamber (8) is connected to said filling conduit (3) via a lower passage (13) extending internally in said central body (2). these passages being aligned with each other vertically.

3. Industrial bottle filling apparatus according to claim 2, **characterized in that** said upper and lower passages (13, 14) are substantially aligned with each other vertically.

4. Industrial bottle filling apparatus according to any of the preceding claim 2 or 3, **characterized in that** on said same vertical wall (10), and in correspondence to said buffer chamber and said delivery chamber, there is applied an elastic diaphragm (16) adapted to be actuated by pneumatic actuation or control means (15) to selectively close/open said channel (9A) between said two chambers.

5. Industrial bottle filling apparatus according to claim 4, **characterized in that** said elastic diaphragm (16) is adapted to be applied with a portion thereof onto the entire said outer edge (12) of said separating partition.

6. Industrial bottle filling apparatus according to any of the preceding claims, **characterized in that** said central body (2) is provided with a venting conduit (17) connecting either said delivery chamber (8) or said lower passage (13) with the outside of said central body (2).

7. Industrial bottle filling apparatus according to claim 6, **characterized in that** there is provided a side body (18) in a juxtaposed arrangement relative to said central body, and **in that** in said side body there are arranged a first buffer chamber (20), a respective first delivery chamber (21) and a respective separating partition (22), in which said first buffer chamber (20) is connected to said venting conduit via a vent (25), and said first delivery chamber (21) is connected to a final conduit (26) leading to the outside of said side body, and in which said first buffer and delivery chambers (20, 21) and an edge of said separating partition are accessible from and open towards an outer wall (45) of said side body (18).

8. Industrial bottle filling apparatus according to claim 7, **characterized in that** said central body (2) is provided with a recovery or pressurizing channel (31) connecting the lower wall (30) of said central body with a side wall thereof; **in that** there is provided a side body (18) arranged on a side of said central body; **in that** in said side body there is provided a second buffer chamber (41), a respective second delivery chamber (40) and a respective second separating partition (42), in which said second buffer chamber (41) is connected to said recovery channel (31) via a second conduit (34), and said second delivery chamber (40) is connected to a third conduit (46) leading outside of said side body.

9. Industrial bottle filling apparatus according to claim 8, **characterized in that** at least one of said first or second buffer chambers (20, 41) and said respective delivery chambers (21, 40), as well as said respective separating partitions (22, 42), are aligned along the same vertical.

10. Industrial bottle filling apparatus according to any of the preceding claims 7 et seq., **characterized in that** said buffer chambers (20, 41) and said respective delivery chambers (21, 40), as well as said respective separating partitions (22, 42), are accessible from and open towards an outer wall (45) of said side body (18).

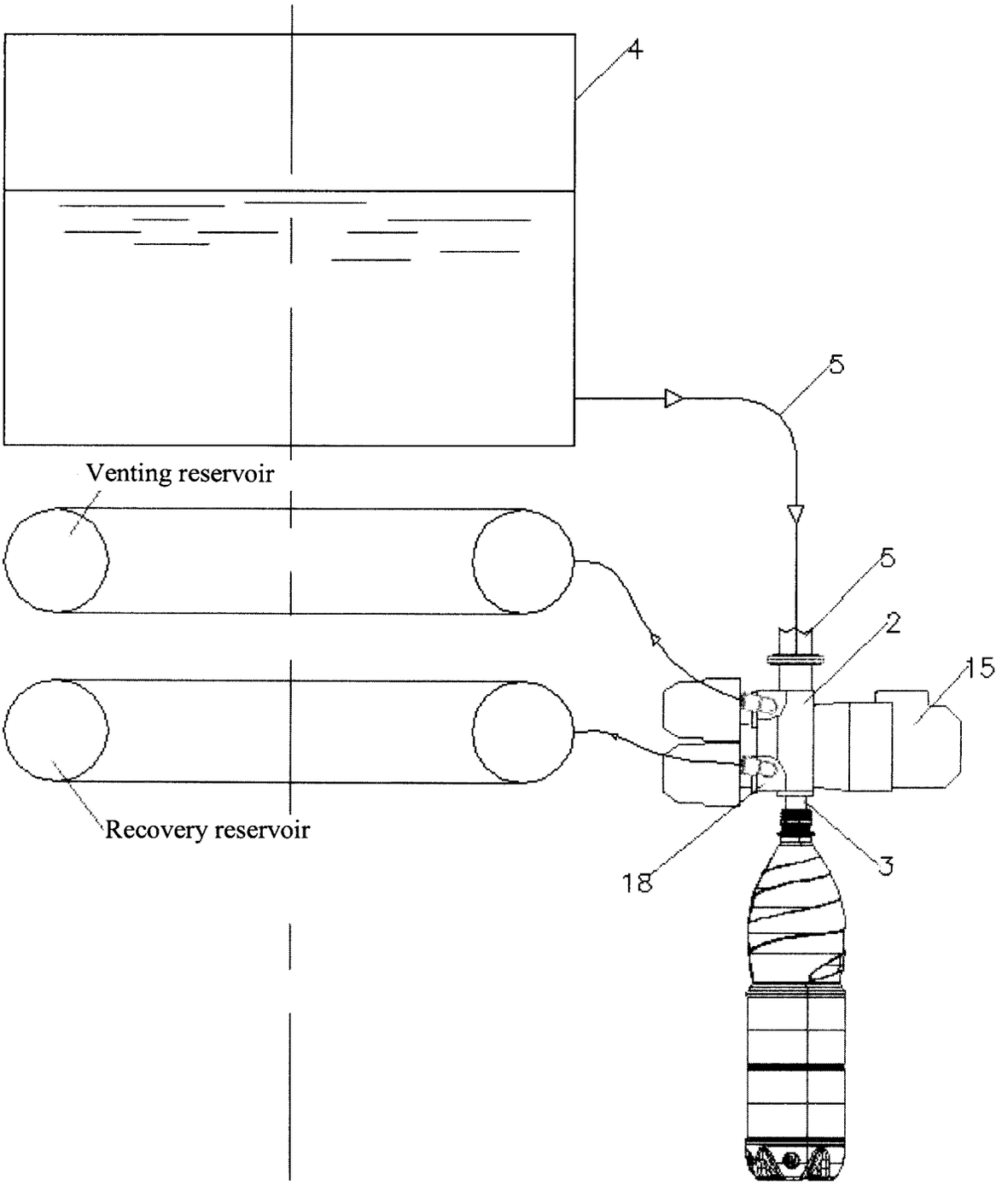

Fig. 1

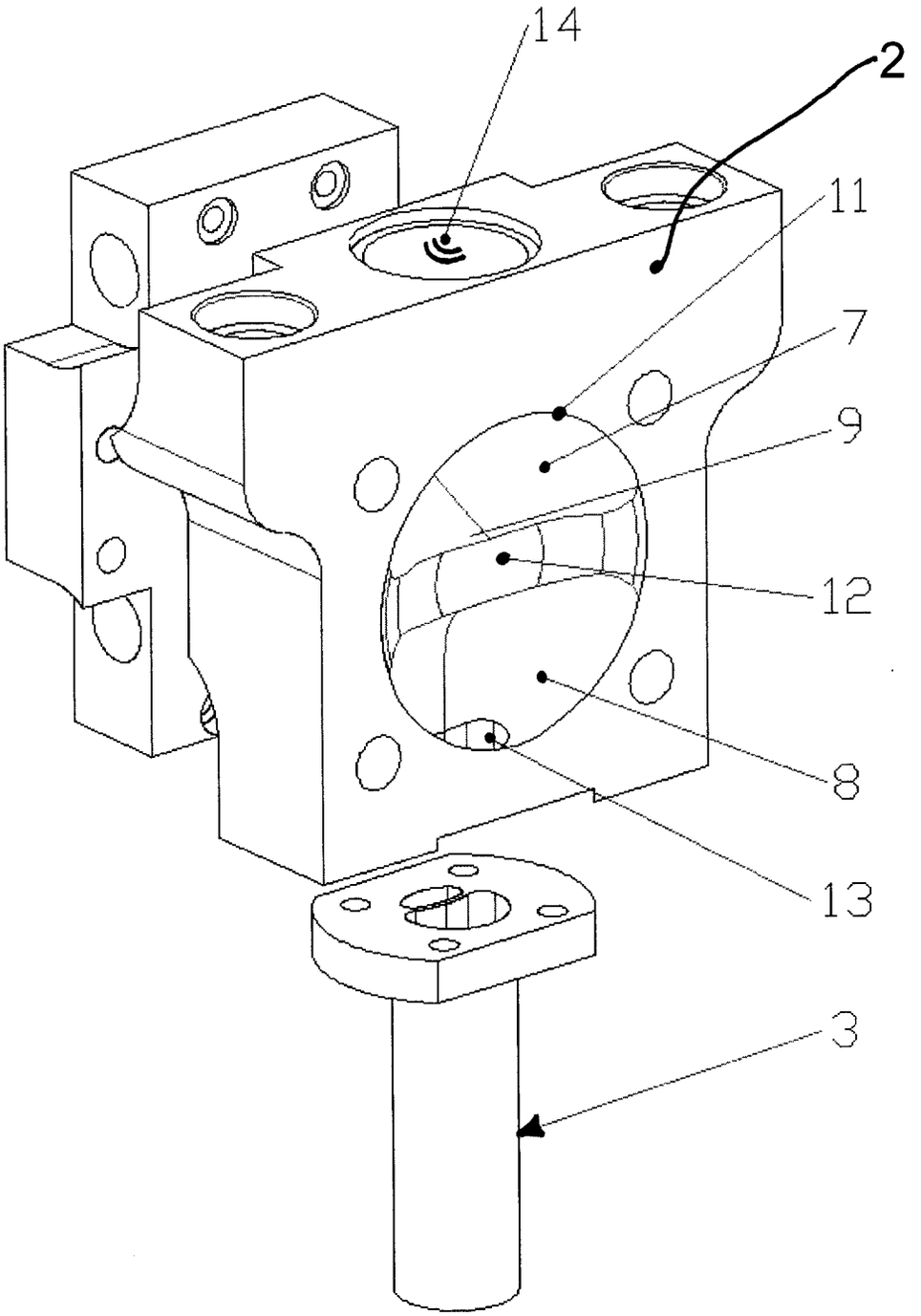

Fig. 2

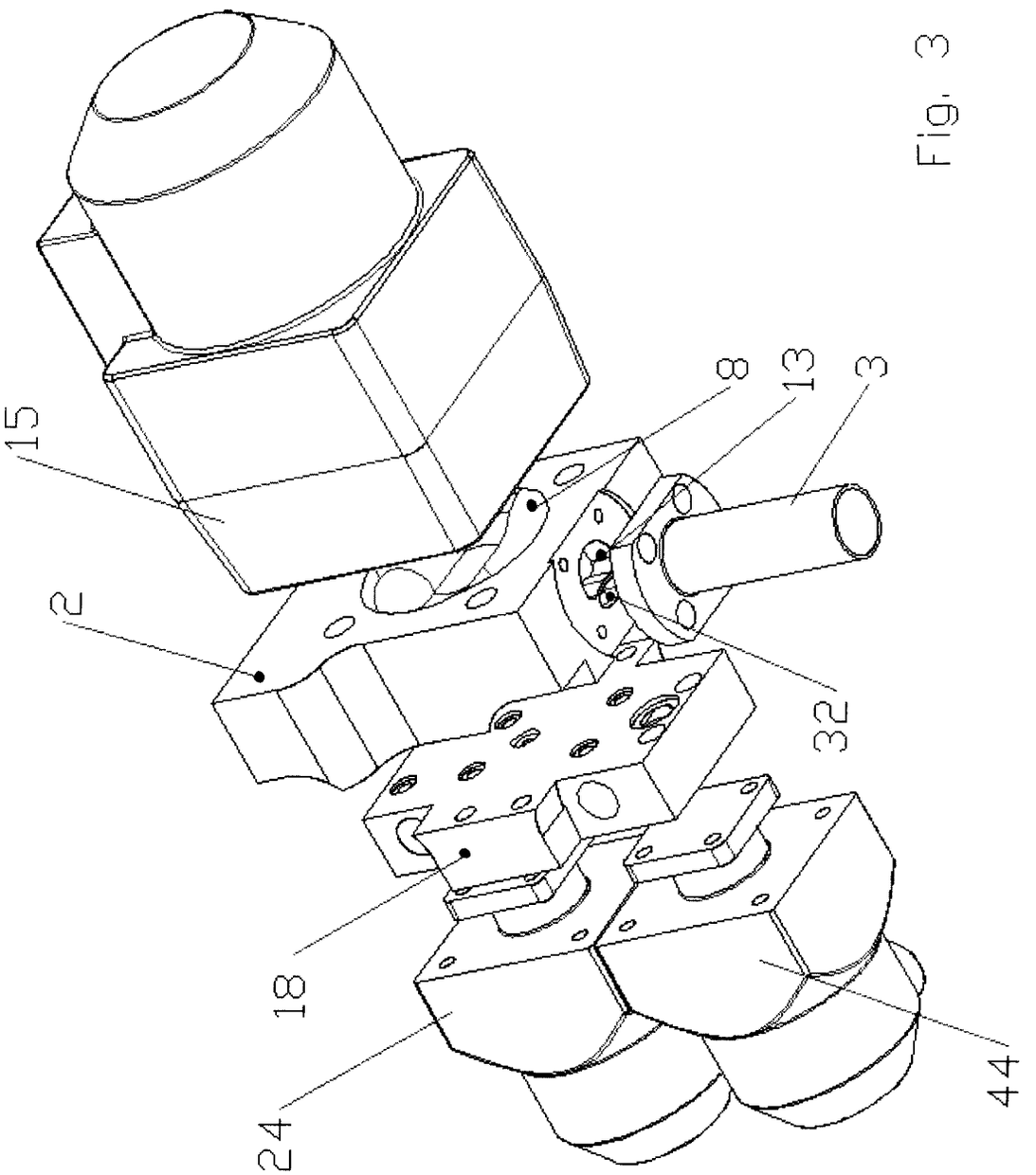

Fig. 3

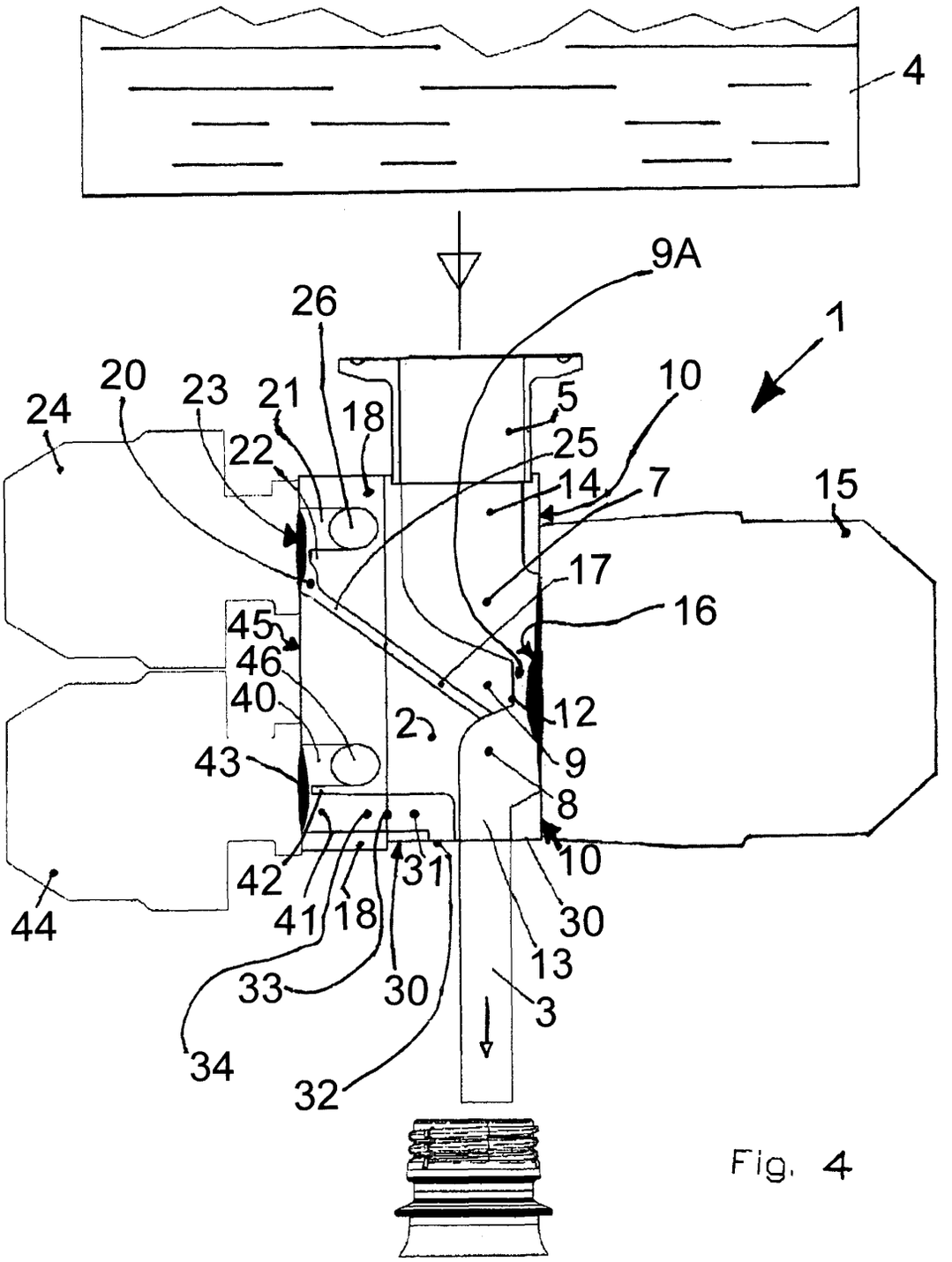
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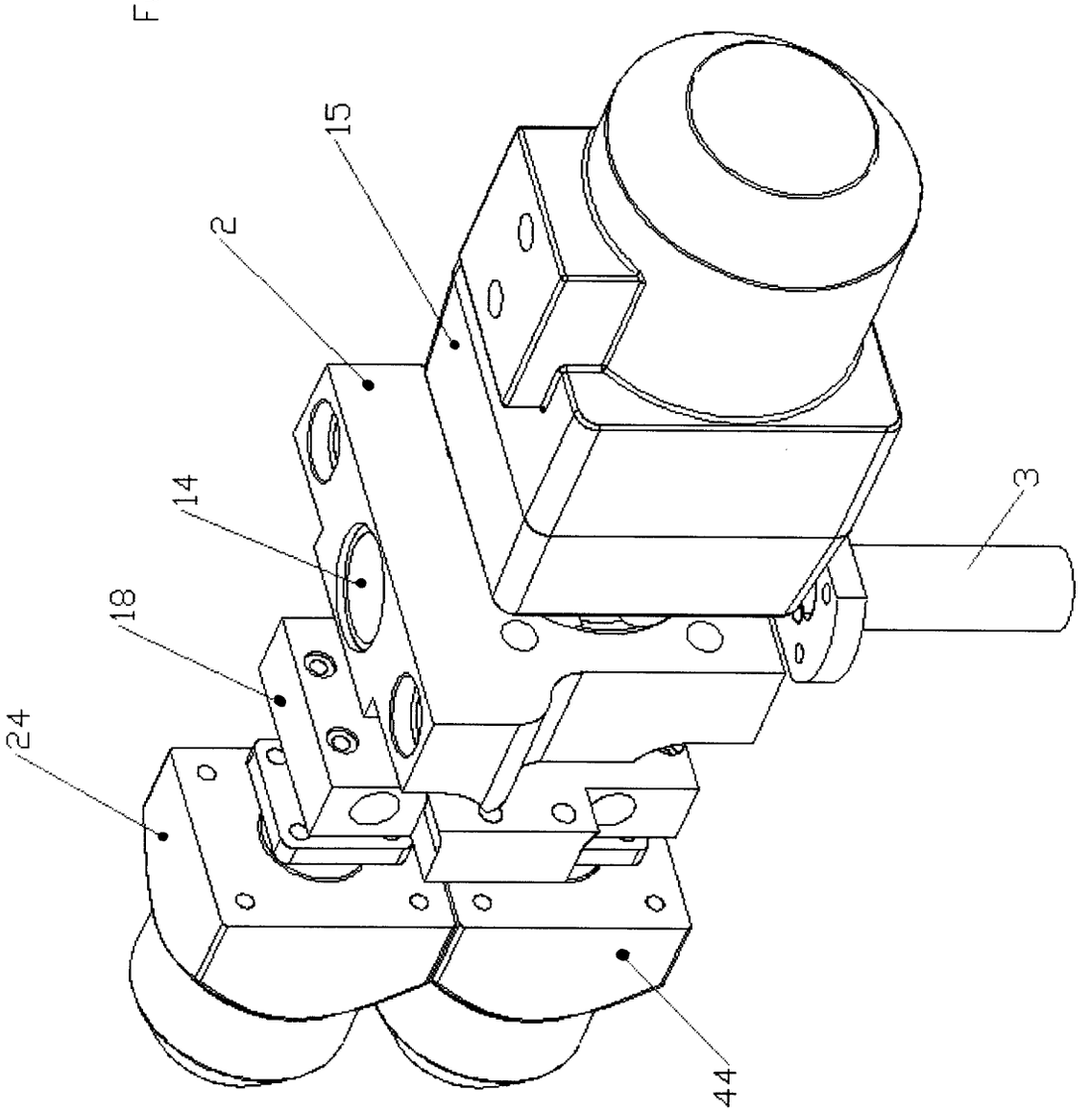
Fig. 4

Fig. 5



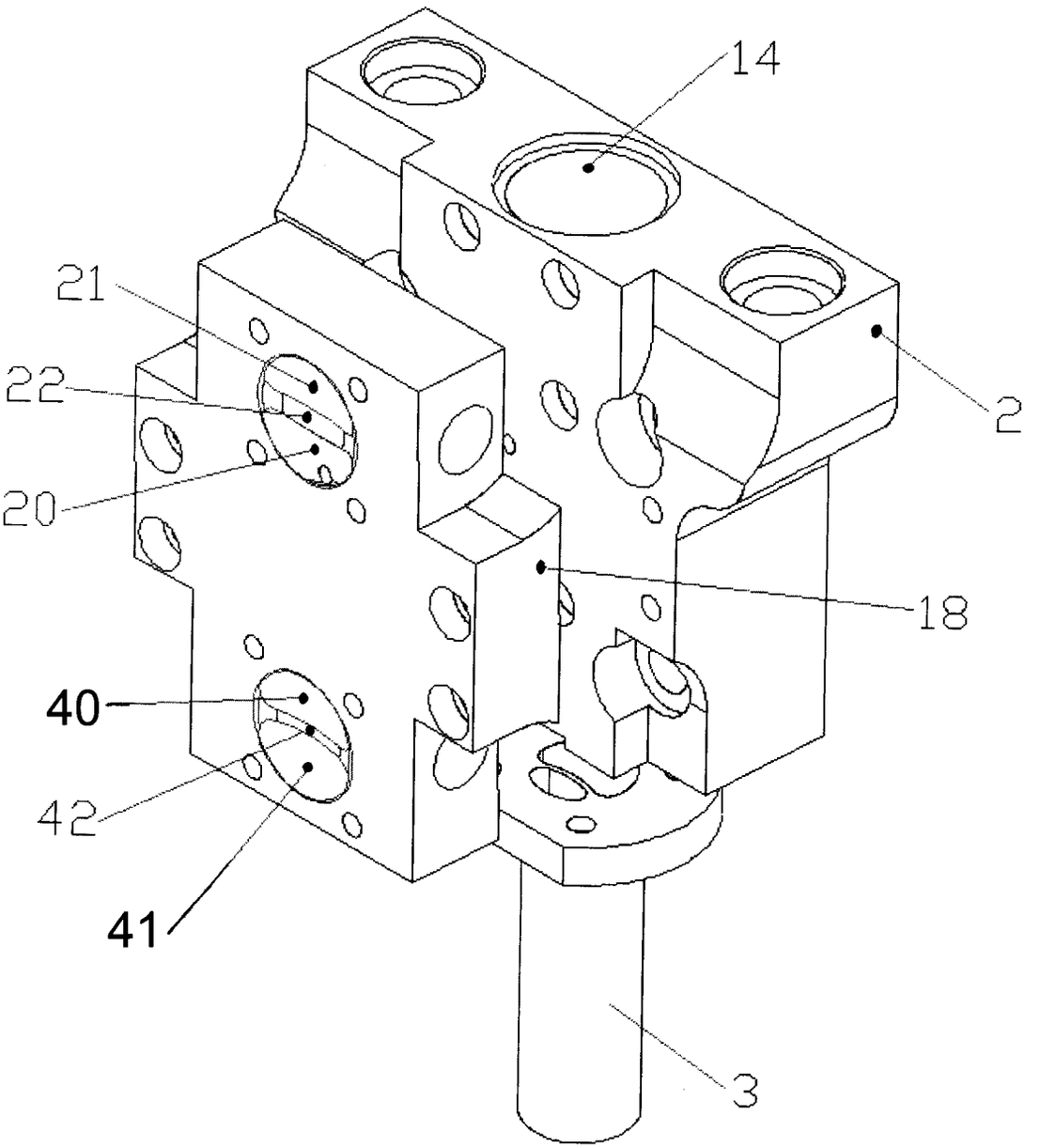


Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 August 2005	Wartenhorst, F

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