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ROTARY FILLER MACHINE

- (57)

A rotary filling machine (200) comprising a plurality of devices (1) for filling containers (100) with a filling, preferably liquid, product or a two-phase product, wherein each container (100) is located under the filling device (1), said device (1) comprising, top to bottom, a dosing device (50), a diverting valve (60), and a nozzle (10) located in the proximity of the container (100), wherein, via the diverting valve (60), a corresponding amount of filling product is inserted into the dosing device (50) and subsequently transferred to the nozzle (10) from which the product exits to be inserted in the container (100), where-
- in a discharge manifold (40) of the product is provided for between the diverting valve (60) and the nozzle (10) in which a shutter member (30) operates to allow and/or prevent the passage of the product (200) to the nozzle (10), **characterized in that** said device (1) comprises handling means (35) to activate/deactivate the shutter member (30), during the operational phases of the rotary filling machine (200), independently of the working position of the filling device (1) on the rotary filling machine (200).

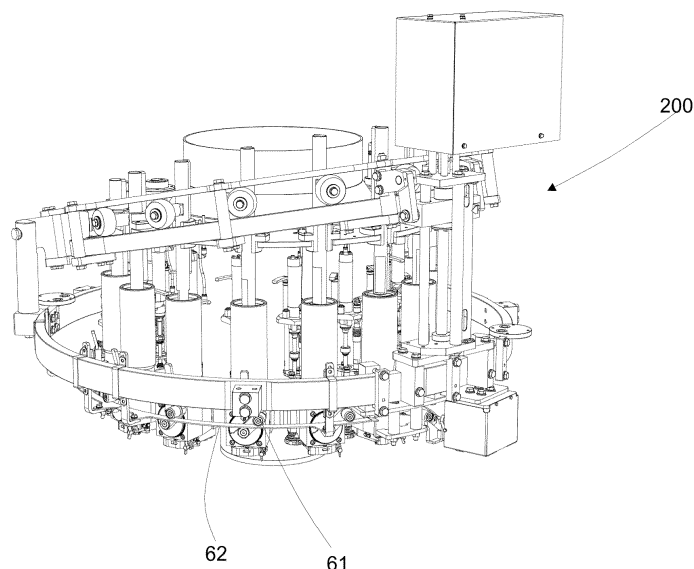


Fig.1a

Description

FIELD OF APPLICATION OF THE INVENTION

[0001] The present invention falls within the field of devices to fill a container with a filling product in a filling plant. In particular, the filling device can be installed on a filling machine of the rotary type.

STATE OF THE ART

[0002] The use of filling devices in filling systems to introduce the respective filling product into containers to be filled is known. Said devices are suitable for processing different types of products, for example a liquid product, even carbonated or semi-liquid, such as a sauce, or a viscous product, such as an oil, or a fibrous product, such as a pulp or a juice, or a product with two phases i.e. liquid and solid, such as a minestrone or a soup, etc. The containers can, for example, be PET or glass containers, in particular bottles, cans, jars, etc. The containers may, for example, be PET or glass containers, in particular bottles, cans, jars, etc.

[0003] For this purpose, the containers are arranged under the filling device, and in particular under a nozzle of said filling device. The filling device generally comprises, above said nozzle, a diverting valve and a dosing device.

[0004] The nozzle comprises an exit mouth from which the product exits to enter the container to be filled.

[0005] Through the opening of the diverting valve towards the product containment tanks, a corresponding amount of filling product is introduced into the dosing device, for example, by means of a suctioning system due to the movement of a piston inside a filling chamber of the dosing device.

[0006] Through the opening of the diverting valve towards the nozzle, said amount of product is subsequently transferred to the nozzle, and hence to the container.

[0007] The diverting valve is generally of the rotary type, and comprises a body valve that is movable relative to a stationary seat of the diverting valve.

[0008] The achievement of the two suctioning and filling positions of the diverting valve is generally carried out by means of a control lever, which is integral with the valve body which engages in a mechanical cam of the filling machine and puts said valve body in rotation inside the valve seat.

[0009] The rotation of the valve body between a suction position and a filling position allows performing the suctioning phase and the filling phase of the device, respectively.

[0010] In particular, during the suctioning phase, the body valve is positioned as to put in fluid communication the filling chamber of the dosing device with the tanks containing the product; the plunger of the dosing device rises to create a suctioning effect that leads to the filling of the chamber with the product.

[0011] In said position, referred to as the suctioning position, the valve body does not allow the passage of product from the filling chamber of the doser, to the nozzle.

[0012] Instead, during the filling phase, the valve body is positioned so as to put in fluid communication the filling chamber of the dosing device with the nozzle; the plunger of the dosing device lowers to make the product exit the filling chamber.

[0013] In said position, referred to as the filling position, the valve body closes the passage of the product between the filling chamber of the dosing device and the tanks containing the product.

[0014] Solutions are known in the prior art, that provide, between the diverting valve and the nozzle, a discharge manifold on which a shutter member acts, which is movable between an open position in which it allows the passage of the product to the nozzle and a closed position, in which it prevents said passage.

[0015] In particular, the shutter member operates synchronized with the diverting valve so that, when the diverting valve is in the suctioning phase, the shutter member is closed, i.e., it blocks the passage of the product from the discharge manifold to the nozzle.

[0016] Vice versa, when the diverting valve is in the filling phase, the shutter member is open, i.e., it allows for the passage of the product from the discharge manifold to the nozzle.

[0017] Therefore, in the filling phase the filling chamber of the dosing device, the dosing valve, and the nozzle are in fluid communication.

[0018] Generally rotary filling machines are known, in which the dosing plunger reaches the two suctioning and filling positions via a driving member integral with the plunger body that engages in a mechanic cam of the filling machine and puts in translation said plunger inside the filling chamber of the dosing device.

[0019] The same occurs to the shutter member, which according to the prior art is set in motion by mechanical means present on the rotary filler, i.e., it comprises an engagement member that cooperates with a mechanic cam of the filling machine.

[0020] Thereby, the dosing plunger, diverting valve, and shutter member are driven by the cams of the filling machine and in particular at each relative position between the cam and filling device a precise working phase corresponds.

[0021] At each working phase the dosing plunger, diverting valve, and shutter member are synchronized with each other.

[0022] A disadvantage of this solution is due to the fact that when the rotary filler needs to be stopped instantaneously, for example due to an emergency stop, the filling devices that are in the position of filling continue to make the product exit, and in greater amount, when the system starts to show wear.

[0023] In fact, since the working phase is defined by the mutual position of the cams of the rotary filler with

the respective dosing plunger, diverting valve and shutter member, these remain in the position where they are located at the time of the stop.

[0024] Therefore, if the filling devices, at the time of the stop, are in the filling phase, i.e., with the diverting valve and the shutter member positioned so that the filling chamber of the dosing device is in fluid communication with the nozzle, the dosing plunger remains stationary, but, due to gravity, the product contained in the filling chamber keeps outflowing.

[0025] This leads to a lack of control over the delivery phase, creating production waste and consequent economic damage.

[0026] Another disadvantage is due to the fact that the dosing plunger, the diverting valve and the shutter member constrain their working phase to each specific position of the filling device on the machine. The operation of the filling device is constrained to the rotation of the rotary machine.

[0027] Dosing plunger, diverting valve and shutter member open and close always together according to the same times, positions, and law of motion, always being constrained to the position of the device during the rotation of the machine, not allowing to manage optimized openings/closures for different products.

[0028] Since the stroke of the shutter member is constrained, it is impossible to create hydraulic seal closure for liquids with a water-like viscosity that cannot be processed by the current mechanical solutions.

[0029] This does not allow the shutter to be closed so as to be able to treat liquid products such as water or with a viscosity equal to that of water, even carbonated ones, because as it is not possible to vary the work cycle, it is not possible to keep the shutter member resting on the nozzle to make a seal.

[0030] Therefore, the known machines are not able to properly process products having too different densities, because the closure of the shutter member always occurs according to the same law of motion, being the shutter member driven by the mechanical cams of the filling machine in which, to each relative position between cam and filling device a precise working position corresponds.

[0031] For example, in the known art, the shutter member always has to perform the closure cycle, while for some products such as, for example, mayonnaise, it would be more advantageous not to perform a closure of the shutter member.

DISCLOSURE AND ADVANTAGES OF THE INVENTION

[0032] The technical problem underlying the present invention is to provide a device for filling containers that is structurally and functionally designed to overcome one or more of the limitations set out above with reference to the cited prior art.

[0033] In the context of the aforementioned problem, a main aim of the invention is to develop a rotary filling

machine with a device for filling containers with a nozzle capable of operating in an unconstrained manner relative to the working position of the device on the rotary filling machine.

5 **[0034]** In particular, the filling device is able to block the exit of the product also when the rotary filling machine is stopped.

10 **[0035]** It further allows perfecting a rotary filling machine with a device for filling containers comprising a shutter member able to perform an adjustable and unconstrained closure/opening, independently of the working phase that is in progress in the filling machine, which makes the solution flexible to the different types of filling and to a plurality of more or less viscous products.

15 **[0036]** Furthermore, said shutter member allows performing a precise and reliable closure, during the operational filling phases.

20 **[0037]** Said shutter member allows a precise and instantaneous closure with elimination of the dripping and the dripping times.

25 **[0038]** In particular, it is the object of the invention a rotary filling machine comprising a plurality of devices for filling containers with a filling product of any type, for example liquid, or a product with two phases, in which each container is arranged below the filling device.

30 **[0039]** Preferably, said device comprises, from top to bottom, a dosing device, a diverting valve and a nozzle located in the proximity of the container, wherein, through the diverting valve, a corresponding amount of filling product is introduced into the dosing device, and subsequently transferred to the nozzle, from which the product exits to be inserted into the container.

35 **[0040]** Preferably, a discharge manifold of the product is provided between the diverting valve and the nozzle.

40 Preferably, in said discharge manifold a shutter member operates to allow/prevent the passage of the product to the nozzle 10.

45 **[0041]** Preferably, said device comprises handling means to activate/deactivate the shutter member, during the operational phases of the filling machine, independently of the working position of the filling device on the rotary filling machine.

50 **[0042]** By virtue of this solution, it is possible to unconstrain the opening/closure of the shutter member from the rotation of the rotary machine.

55 **[0043]** This also allows making a more flexible machine for use with different products, allowing to manage the shutter member with different times, positions and laws of motion.

[0044] This further allows obtaining a shutter member that is able to work with nozzles of different types.

[0045] This also allows achieving a shutter member that is able to differentiate the working manner, for example, performing multiple closures, partial closures, or openings, or not performing the closure.

[0046] Preferably, the handling means are configured to translate according to a vertical direction said shutter member between at least one first position and a second

position, and vice versa.

[0047] This allows achieving a simple and easily integrated solution on devices.

[0048] A possible embodiment provides that said handling means are able to bring the shutter member to the second position, which matches with a closure position when the rotary filling machine moves from the operational phase to the stop phase independently of the working phase at which the machine has stopped.

[0049] This allows preventing uncontrolled leaks or outflows of product.

[0050] Preferably, the handling means move the shutter member independently of the operational position of the dosing device and/or the diverting valve.

[0051] By virtue of this solution, the shutter member can open and close according to times, positions and laws of motion that are not constrained to those of the dosing plunger and/or the diverting valve.

[0052] Preferably, when the diverting valve is in the filling phase, the shutter member is preferably at the first position, which allows the passage of the product from the discharge manifold to the nozzle, vice versa, when the diverting valve is in the suctioning phase, the shutter member is preferably at the second position, that blocks the passage of the product from the discharge manifold to the nozzle.

[0053] This allows a safe operation of the device adapted to reduce wastes and outflows.

[0054] Preferably, the handling means comprise drive and management members that allow to vary the management of said handling means to adapt the operation of the shutter member to particular working and product conditions.

[0055] This permits to manage the shutter member with different times, positions, and laws of motion according to the product, and permits the definition of specific working recipes.

[0056] Preferably, the discharge manifold comprises an inlet channel and a output channel, which intercepts a discharge duct, located between the discharge manifold and the nozzle, and in which the shutter member operates to allow or prevent a fluid communication.

[0057] Preferably, said discharge duct extends above the nozzle and preferably coaxial with a through hole of the nozzle.

[0058] Preferably, the shutter member comprises a plug, in a preferably cylindrical shape, which is adapted to slide at least inside the discharge duct.

[0059] Preferably, the handling means are located above and coaxial with the shutter member, in particular with the plug.

[0060] Optionally, said handling means comprise a piston, preferably of the pneumatic type.

[0061] This allows achieving a simple and economic solution.

[0062] Preferably, the shutter device and the handling means are located side by side to the dosing device, preferably to the filling chamber.

[0063] By virtue of this characteristic, a particularly compact and less cumbersome solution is obtained.

[0064] Such and other objects are achieved by virtue of the characteristics of the invention set forth in the independent claim 1. The independent claims outline preferred and/or particularly advantageous aspects of the invention.

[0065] Said objects and advantages are all achieved by the rotary filling machine with an improved filling device, which is the object of the present invention, which is characterized by what is set forth in the claims outlined herein below.

BRIEF DESCRIPTION OF THE EMBODIMENTS

[0066] This and other characteristics will be further highlighted by the following description of some embodiments, illustrated purely by way of example and not by way of limitation in the attached drawing tables.

- Fig. 1a, 1b: shows an axonometric view of a rotary filling machine with filling device according to the invention;
- Fig. 2a, 2b: shows according to two different axonometric views the filling device according to the invention;
- Fig. 3a, 3b: shows a sectional view of a rotary filling machine with a device according to the invention in the two-working phases of suctioning and filling with fluid highlighted;
- Fig. 4: shows an axonometric view of the filling device with detail of the inspection device highlighted;
- Fig. 5a, 5b: shows a plan view and respective sectional view of a device according to the invention in the two working phases of suctioning and filling without fluid highlighted;
- Fig. 6a, 6b, 6c: shows a plan view and respective sectional view of a filling device for liquid products in the phase of start filling without fluid highlighted;
- Fig. 6d, 6e, 6f shows a plan view and respective sectional view of a filling device for liquid products in phase of start suctioning without fluid highlighted;
- Fig. 7a, 7b: shows two sectional views of a filling device for liquid or semiliquid products in phase of start filling with fluid highlighted;
- Fig. 7c, 7d: shows two sectional views of a filling device for liquid or semiliquid products in phase of start suctioning with fluid highlighted;
- Fig. 8a, 8b, 8c: shows a plan view and respective sectional view of a filling device for dense/semi-dense products, in phase of start filling without fluid highlighted;
- Fig. 8d, 8e, 8f shows a plan view and respective sectional view of a filling device for dense/semi-dense products, in phase of start suctioning without fluid highlighted;
- Fig. 9a, 9b: shows highlighted two sectional views

of a filling device for dense/semi-dense products, in phase of start filling with fluid;

- Fig. 9c, 9d: shows two sectional views of a filling device for dense/semi-dense products, in phase of start suctioning with fluid highlighted;
- Fig. 10a, 10b: shows two sectional views of the detail of the manifold of a filling device.

DESCRIPTION OF THE INVENTION

[0067] With particular reference to Fig. 2a, 2b, a device 1 for filling containers 1 with a given filling product is depicted.

[0068] Said product, preferably liquid, can be of a fluid, semi-dense, or dense type such as sauces, honey, oil, creams, yogurt, milk, water, or a fibrous product, such as a pulp or juice, or a product with two phases, that is, liquid and solid such as a minestrone or a soup, etc.

[0069] Said device 1 is installable in a filling plant in particular in a rotary filling machine 200.

[0070] In figs. 1a, 1b, a rotary filling machine 200 is depicted, onto which a plurality of devices 1 are installed.

[0071] To each device 1 a working station corresponds, in which the rotary filling machine 200 carries out a specific operational phase of filling or suctioning.

[0072] Said rotary filling machines 200 can process containers 100 of different types, for example, 100 containers in glass, plastic, or metal cans, with different capacities and, for example, with capacities from 20 ml up to 5 or 10 liters.

[0073] The containers 100 can be, for example, PET or glass containers, in particular, bottles, cans, jars, etc.

[0074] The containers 100 to be filled are arranged below the filling device 1 and receive the product by downfall

[0075] In particular, the container 100 is located below a nozzle 10 of said filling device 1.

[0076] The filling device 1 in fact comprises, in sequence, from the top down, a dosing device 50, a diverting valve 60 and the nozzle 10.

[0077] Through the opening of the diverting valve 60 towards product containment tanks 201, a corresponding amount of filling product is introduced into the dosing device 50, for example, by a suctioning system due to the motion of an inner plunger 52 to a filling chamber 51 of the dosing device.

[0078] This working phase is referred to herein below as the suctioning phase.

[0079] The dosing device 50 is filled during the suctioning phase with a quantity of product that corresponds to the one that has to be inserted into the container 100 to be filled.

[0080] Through the opening of the diverting valve 60 towards the nozzle 10, said amount of product is subsequently transferred to the nozzle 10, hence to the container 100.

[0081] Therefore, said amount of product is transferred from the dosing device 50 to the nozzle 10. Said working phase is referred to herein below as the filling phase.

[0082] Said nozzle 10 comprises an outlet mouth 11 from which the product exits to be introduced into the container 100

[0083] The outlet port 11 is located near the container 100 above the inlet 101 of the container 100, as highlighted in Figs. 7b, 7d and 9b, 9d.

[0084] The outlet port 11 can be placed inside the container 100, in particular in the proximity of the bottom of the container 100.

[0085] The diverting valve 60 is generally a three-way valve, preferably of the rotary type.

[0086] Said diverting valve 60 preferably comprises a valve body 65 that is movable and placed inside a seat 66 of the diverting valve 60.

[0087] In particular, the rotation of the valve body 65 between a suctioning position I and a filling position II allows to respectively perform the suctioning phase and the filling phase of the dosing device 50.

[0088] In particular, during the suctioning phase the valve body 65 is positioned as to put in fluid communication a filling chamber 51 of the dosing device 50 with the tanks 201 containing the product; the plunger 52 of the dosing device rises to create the suction effect that leads to the filling of the chamber 51 with the product.

[0089] In said position of the valve body 65, referred to as the suctioning position I, the valve body 65 does not allow the passage of product from the filling chamber 51 of the dosing device 50 to the nozzle 10.

[0090] During the filling phase, the valve body 65 is conversely positioned as to put in fluid communication the filling chamber 51 of the dosing device 50 with the nozzle 10; the plunger 52 of the dosing device lowers to make the product exit from the filling chamber 51.

[0091] In said position of the valve body 65, referred to as the filling position II, the valve body 65 prevents the passage of the product between the filling chamber 51 of the dosing device 50 and the tanks 201 containing the product.

[0092] Preferably, the diverting valve 60 comprises a driving member 61 rotatable according to a first rotational axis X orthogonal to a vertical direction Z.

[0093] The achievement of the two suctioning I and filling II positions of the diverting valve 60 is generally carried out by said driving member 61, which preferably rotates integral with the valve body 65.

[0094] Said drive member 61 preferably is rotated by engaging/disengaging with an engaging profile 62 of the rotary filling machine 200.

[0095] Thus, the rotation of the drive member 61 puts said valve body 65 in rotation inside the seat 66 of the tap 60.

[0096] In particular, in the case of a rotary filling machine 200, said engaging profile 62 extends along a stretch of circumference of the stroke along which said devices 1 move during the rotation of the rotary filling machine 200.

[0097] The above-mentioned description is also common to the prior art.

[0098] According to an advantageous aspect of the invention, the filling device 1 provides, between the diverting valve 60 and the nozzle 10, for a discharge manifold 40 onto which a shutter member 30 acts.

[0099] Said shutter member 30 allows and/or prevents the passage of the product 200 to the nozzle 10.

[0100] Preferably, said shutter member 30 is movable at least between a first position A and a second position C.

[0101] In particular, the first position A is one of the possible positions referred to as opening positions, in which the shutter member 30 allows the passage of the product to the nozzle 10.

[0102] In the following, we'll often refer to the first position A as the open position A.

[0103] Also the second position C can be one of the possible positions referred to as opening positions, in which the shutter member 30 allows the passage of the product to the nozzle 10, for example in a partialised manner.

[0104] More often, the second position C is one of the possible positions referred to as closure positions, in which the shutter member 30 prevents said passage.

[0105] Frequently in the text we'll refer to the second position C as the closed position C even though this is not to be intended in a limitative manner.

[0106] In particular, the shutter member 30 operates in a related way to the diverting valve 60.

[0107] In particular, when the diverting valve 60 is in the filling phase, the shutter member 30 is in the first position A, preferably the open position A, i.e. it allows for the passage of the product from the discharge manifold 40 to the nozzle 10.

[0108] In particular, vice versa, when the diverting valve 60 is in the suctioning phase, the shutter member 30 is at the second position C, preferably the closed position C, i.e. it blocks the passage of the product from the discharge manifold 40 to the nozzle 10.

[0109] By virtue of this operation, undesired leaks and outflows of product are prevented.

[0110] A possible embodiment can provide that, when the diverting valve 60 is in the suctioning phase, the shutter member 30 remains in the first opening position A as it was in the filling phase.

[0111] In the filling phase, the filling chamber 51 of the dosing device 50, the dosing valve 60 and the nozzle 10 are in fluid communication.

[0112] As represented in the pictures, the discharge manifold 40 is preferably located under the diverting valve 60.

[0113] In particular, the valve body 65 comprises a transfer duct 64, which, in the filling position II, arranges as to put the filling chamber 51 of the dosing device 50 in fluid communication with discharge manifold 40.

[0114] According to a preferred embodiment represented in the Figure, said discharge manifold 40 comprises an intermediate zone 43, which extends preferably horizontal between the dosing valve 60 and the nozzle 10.

[0115] Said discharge manifold 40 can additionally

comprise an inlet channel 41 and preferably an output channel 42.

[0116] Preferably, the inlet channel 41 extends from the intermediate zone 43 towards the valve body 65.

[0117] Preferably, the output channel 42 extends from the intermediate zone 43 towards the nozzle 10.

[0118] In particular, when the valve body 65 is in the filling position II, the transfer duct 64 is positioned so as to put the filling chamber 51 of the dosing device 50 in fluid communication with the discharge manifold 40.

[0119] Said transfer duct 64 is preferably arranged in the vertical direction Z when the valve body 65 is in the filling position II.

[0120] In particular, when the valve body 65 is in the filling position II, the transfer duct 64 comprises an exit 64' which is opposed to an input section 41' of the inlet channel 41 of the discharge manifold 40.

[0121] According to a preferred embodiment represented in the Figure, the output channel 42 extends from the intermediate zone 43, preferably upwardly, to the point where an output section 42' thereof intercepts a discharge duct 12 in which the shutter member 30 operates.

[0122] According to a preferred embodiment, at the discharge duct 12, the shutter member 30 operates to allow or prevent the fluid communication between the discharge manifold 40 and the nozzle 10.

[0123] Said discharge duct 12 can extend above the nozzle 10 and preferably coaxial with a through hole 10' of the nozzle 10.

[0124] In particular, the shutter member 30 comprises a plug 31 having a preferably cylindric shape.

[0125] Said plug 31 is preferably capable to slide at least inside the discharge duct 12.

[0126] Said discharge duct 12 is also configured to drive the plug 31 during its translation between the open position A and the closed position C.

[0127] As represented in the figures, the shutter member 30 is preferably located side by side to the dosing device 50.

[0128] Preferably, the plug 31 and discharge duct 12 are located side by side to the diverting valve 60, in particular to the opposite side relative to the drive member 61.

[0129] In Fig. 5a, 5b an embodiment is represented, in which the shutter member 30, and in particular the plug 31 and discharge duct 12, are not located on the rotation axes X, but on an axis incident thereto to free a communication space between the diverting valve 60 and the tanks 201.

[0130] Aim of said shutter member 30 is to prevent the passage of the product from the discharge manifold 40 to the nozzle 10, for example, according to two possible embodiments.

[0131] In each of said embodiments described herein below, the shutter member 30, and in particular the plug 31, reaches a different closed position C, in which it prevents the passage of the product from the discharge man-

ifold 40 to the nozzle 10.

[0132] In both the embodiments described below, the shutter member 30, when it is reaching the closed position C, brings the plug 31 in front of the output section 42' blocking the flow from the output channel 42 of the discharge manifold 40.

[0133] In particular, the shutter member 30 blocks the output section 42' via a translation of the plug 31, in the vertical direction inside the discharge duct 12.

[0134] According to a first embodiment represented in the Figs. 8 and 9, the plug 31 of the shutter member 30 flows into the discharge duct 12 and proceeds inside the nozzle 10 to the outlet port 11 thereof.

[0135] Therefore, the shutter member 30 is said to be a cleaning member that pushes all the product to exit the outlet port 11 of the nozzle 10.

[0136] The closed position C of the shutter member 30 in such a case coincides with the reaching of the outlet port 11 by the plug 31.

[0137] Said first embodiment is preferably used when the filling product is more viscous than water.

[0138] This operation, that carries out a cleaning inside the discharge duct 12 continuing inside the nozzle 10 until the outlet port 11, ensures a complete outflow of the product, that wouldn't otherwise be ensured in conjunction with a product more viscous than water.

[0139] According to a second embodiment represented in the figures 6 and 7, the plug 31 of the shutter member 30 flows inside the discharge duct 12 and stops at an input mouth 13 of the nozzle 10 without sliding thereinto.

[0140] In particular, the plug 31 of the shutter member 30 engages on the input port 13 of the nozzle 10 preferably via a sealing member.

[0141] The closed position C of the shutter member 30 in such a case coincides with the reaching of the input port 13 by the plug 31.

[0142] Said second embodiment is preferably used when the filling product is liquid and with a viscosity similar to water.

[0143] This operation by making a seal on input to the nozzle 10 blocks the product and avoids drippings and outflows due to liquid products, which increase as the wear increases in the traditional systems, and can be assessed, with the first embodiment in conjunction with a liquid product.

[0144] These are only two possible examples of embodiments of nozzles 10 in conjunction with the shutter member 30 which can additionally vary as a function of the type of product.

[0145] Advantageously, the presence of the discharge manifold 40 and of the respective shutter member 30 permits to optimize the filling.

[0146] In fact, a clear separation thereby is achieved, between the fluid path in the suctioning phase and the fluid path in the filling phase.

[0147] In practice, during the suctioning phase of the product into the dosing device 50, the product follows a

fized path from the diverting valve 60, while in the exit phase it follows another path, which is defined by the discharge manifold duct 40.

[0148] This is important, as the possible air bubble, which can be formed with liquid products at the discharge window, is not subsequently affected by the inflow of the product to be dosed, which this takes a dosing which is in no manner affected by the air bubble and by its different compression ability.

[0149] Furthermore, in the phase of discharging the dosed product the air bubble is always expelled, but in any case it did not take part in the volume of the product to be dosed.

[0150] Additionally, the configuration of the discharge manifold 40 in which the intermediate zone 43 is located below the input section 41' and the input section 42' allows an operation of a syphon type.

[0151] Preferably, the output section 42' is located also above the input section 41'.

[0152] In fact, by virtue of said discharge manifold 40, any formed air bubbles remain trapped in said discharge manifold 40, and in particular the elevated position of the input section 42' makes it so that the bubble, if any, remains confined in the proximity of this are.

[0153] Therefore, any air bubbles that should form do not take part in any way in the amount of suctioned product, thus being able to achieve an extremely precise dosing. Said air bubble, if present, in particular with liquid products, is expelled at each new filling cycle.

[0154] By virtue of this solution, a filling device 1 is achieved, which allows having a better filling precision compared to a device in which only the tap 60 allows/prevents the passage of product.

[0155] The so-shaped nozzle 10 also helps reducing possible leakages from the tap 60, intercepting and blocking them it goes into a fully closed position C.

[0156] Said leakages are more evident with very fluid and slightly viscous products, for example, water.

[0157] By virtue of this solution the shutter member 30 allows to achieve a precise and instantaneous closure with the elimination of the dripping and consequently the dripping times.

[0158] Optionally, as represented in Fig. 4, the discharge manifold 40 can comprise openable inspection means 45 for the control and cleaning.

[0159] Said inspection means 45 are preferably located under the seat 66, preferably on the side of the drive member 61.

[0160] In particular, said inspection means 45 comprise a port 46 hinged to rotate according to a vertical axis for its opening/closure.

[0161] It is the object of the invention a filling device 1 and a rotary filling machine 200 in which the shutter member 30 moves, preferably translates in the vertical direction, in particular between the first position A and the second position C, independently of the position of the filling device 1 inside the rotary filling machine 200.

[0162] In fact, the device preferably 1 comprises han-

dling means 35 of said shutter member 30.

[0163] In particular, said handling means 35 are configured to bring the plug 31 to the closed position C.

[0164] Preferably, said handling means 35 are configured to make it so that the plug 31 takes the closed position C when the rotary filling machine 200, on which the device 1 is installed, is in the stop phase.

[0165] In such a case, said closed position C is reached independently of the working phase in progress at the time when the machine 200 has stopped.

[0166] The stop phase can occur due to a emergency stop, or a machine downtime related to stops of other machines of the plant, or in any situations where the machine 200 passes from the operational phase to the not-operational of stop phase.

[0167] Therefore, a first variation of the invention provides that said handling means 35 intervene only in the stop phase.

[0168] In said variation, said handling means 35 can be operative on all stations of the machine 200, or only on the stations in which the filling is performed and therefore on the ones where the filling is in progress at the time of stop.

[0169] Optionally, said handling means 35 can be installed on the rotary filling machine 200 so as to cooperate with the device 1 at the stations configured for the filling.

[0170] Therefore, said handling means 35 can be provided only at the filling stations.

[0171] This first variation provides for making the handling means 35 work to bring the plug to the closed position C only in the stop phase of the machine 200.

[0172] For the operation of the shutter member 30 during the entire working, both filling and suctioning, cycle, said first variation in particular provides for the presence on the rotary filling machine 200 of a mechanic cam, not represented in the Figure, which cooperates with an engagement member of the shutter member 30 to bring it from the closed position C to the open position A, and vice versa.

[0173] Thereby, the shutter member 30 is driven by the mechanic cam of the rotary filling machine 200, and in particular at each relative position between the cam and filling device 1 a precise working phase and a precise position of the shutter member 30 correspond.

[0174] The handling means 35 intervene in place of the mechanic cam, only in the machine 200 stop phase to prevent the exit of the product, preferably at the filling stations.

[0175] A second, more flexible, variation represented in the Figure, provides that said handling means 35 may be associated with each filling device 1.

[0176] Said solution does not provide for the presence on the rotary filling machine 200 of a mechanic cam, which cooperates with an engagement member of the shutter member 30 for the operation during the entire working cycle.

[0177] In such a case, the handling means 35 move

the shutter member 30 during the entire working cycle.

[0178] In said second variation, said handling means 35 are configured to be able to move the shutter member 30, independently of the operational position at which the device 1 is coated, during the working cycle of the machine 200 and therefore independently of the device 1 being in a filling or suctioning phase.

[0179] In such a case, each filling device 1 preferably comprises handling means 35 integrated to it.

[0180] Said handling means 35 are internally installed on the filling device 1.

[0181] The handling of the shutter member 30 always occurs via the handling means 35, both during the working cycle and during the possible stop phases of the machine 200.

[0182] This allows unconstraining the movement of the shutter member 30 from the precise working position of the rotary filling machine 200, thus making each shutter member 30 independent of the other ones and of the position thereof.

[0183] Therefore, by virtue of this solution, each shutter member 30 can work with a law of motion different from product 200 to product 200.

[0184] Moreover, as a function of the product 200, it is also possible to decide to perform partial closures or openings, multiple cycles of closure, or not to perform the closure of the shutter member 30.

[0185] Preferably, said handling means 35 are configured to translate according to a vertical direction Z said shutter member 30 from the first position A to the second position C, and vice versa.

[0186] Preferably, said handling means 35 are placed located and coaxial with the shutter member 30, in particular the plug 31.

[0187] Said handling means 35 comprise a piston 36, preferably of the pneumatic type.

[0188] Alternative solutions in which the handling means include electric, electro-pneumatic pistons, etc. also fall within the scope of protection.

[0189] As represented in the figures, the shutter device 30 and the handling means 35 are positioned side by side to the dosing device 50.

[0190] Preferably, the handling means 35 are positioned side by side to the filling chamber 51.

[0191] An embodiment represented in the figures provides for the shutter member 30 to be in the closed position C when the piston 36 is in the extended, i.e., lowered, configuration.

[0192] Vice versa, the shutter member 30 is in the open position A when the piston 36 is in the retracted, i.e., raised, configuration.

[0193] The opposite solution is also to be understood as falling within the protection scope, in which when the shutter element 30 is in the closed position C, the piston 36 is in the retracted configuration, and vice versa, when the shutter element 30 is in the open position A, the piston 36 is in the extended configuration.

[0194] By virtue of this solution, the shutter member

30 allows for an adjustable closure according to a law of motion suitable to the fluid being processed.

[0195] Associated with the handling means 35, drive and management members are preferably present, that allow to vary the management of the handling means 35 to adapt the operation of the shutter member 30 to particular working conditions.

[0196] Therefore, in said second variation, the device 1 can be used in a very flexible manner, with products having different consistency, to achieve optimal closure and/or opening for a determined product.

[0197] This allows an operation of the shutter member 30 not only independently of the working position of the device 1 in the filling machine, but also an operation that can be managed according to specific recipes.

[0198] For example, with this solution it is possible to manage ways of operation of the shutter member 30 that adapt both the closure or opening speeds to the type of product 200.

[0199] By virtue of this solution, different strokes of the shutter member 30 can also be managed, which can move to the open A or closed position C which are different from time to time and generally linked to the type of product processed 200.

[0200] It can also be provided that the shutter member 30 carries out a closing cycle which involves, for example, multiple cycles, a double cycle: closing, opening. and closing again.

[0201] This operation is particularly effective to manage products 200 that make a thread or that are sticking. Preferably, said handling means 35 allow moving the shutter member 30 independently of the operational position of the dosing device 50 and/or the diverting valve 60.

[0202] It can also be provided that the shutter element 30 does not carry out the closing cycle, such as for example with products such as mayonnaise.

[0203] In such a case, the shutter member 30 remains at the first filling position A.

[0204] In particular, it is possible to manage the achievement of the open position A in a deferred manner compared to the mechanical opening of the diverter valve 60 during the filling phase.

[0205] Just as it is possible to manage the achievement of the closed position C in a deferred manner compared to the mechanical closing of the diverter valve 60 during the suction phase.

[0206] A preferred embodiment provides that that components described above require setting and disassembly that can be carried out completely without tools and therefore in a simple and quick manner.

[0207] However, it is understood that what is described above has an illustrative and non-limiting value, therefore any variations of detail that may be necessary for technical and/or functional reasons are considered from now on to fall within the same protection scope defined by the claims herein below.

Claims

1. A rotary filling machine (200) comprising a plurality of devices (1) for filling containers (100) with a filling, preferably liquid, product or a two-phase product, wherein each container (100) is located under the filling device (1), said device (1) comprising, top to bottom, a dosing device (50), a three-way diverting valve (60) preferably of the rotary type, and a nozzle (10) located in the proximity of the container (100), in which, via the diverting valve (60), a corresponding amount of filling product is inserted in the dosing device (50) and subsequently transferred to the nozzle (10), from which the product exits to be inserted into the container (100), in which a discharge manifold (40) of the product is provided for between the diverting valve (60) and the nozzle (10), in which a shutter member (30) operates to allow and/or prevent the passage of the product (200) to the nozzle (10), said device (1) comprises handling means (35) to activate/deactivate the shutter member (30), during the operational phases of the rotary filling machine (200), independently of the working position of the filling device (1) on the rotary filling machine (200).
2. The rotary filling machine (200), according to any one of the preceding claims, wherein the handling means (35) are configured to translate said shutter member (30) according to a vertical direction (Z) between at least one first position (A) and a second position (C), and vice versa.
3. The rotary filling machine (200), according to any one of the preceding claims, wherein the handling means (35) bring the shutter member (30) to the second position (C), which corresponds to the closure position of the nozzle (10) when the rotary filling machine (200) moves from the operational phase to the stop phase, independently of the working phase where the machine (200) stopped.
4. The rotary filling machine (200), according to any one of the preceding claims, wherein the handling means (35) move the shutter member (30) independently of the operational position of the dosing device (50) and/or the diverting valve (60).
5. The rotary filling machine (200), according to any one of the preceding claims, wherein, when the diverting valve (60) is in the filling phase, the shutter member (30) preferably is in the first position (A), which allows the passage of the product from the discharge manifold (40) to the nozzle (10), vice versa, when the diverting valve (60) is in the suctioning phase, the shutter member (30) preferably is in the second position (C), which blocks the passage of the product from the discharge manifold (40) to the nozzle (10).

zle (10).

6. The rotary filling machine (200), according to any one of the preceding claims, wherein the handling means (35) comprise drive and management members that allow to vary the management of said handling means (35) to adapt the operation of the shutter member (30) to particular working and product conditions. 5
7. The rotary filling machine (200), according to any one of the preceding claims, wherein the discharge manifold (40) comprises an inlet channel (41) and an output channel (42), which intercepts a discharge duct (12), located between the discharge manifold (40) and the nozzle (10), and in which operates the shutter member (30) to allow or prevent a fluid communication. 10
8. The rotary filling machine (200), according to any one of the preceding claims, wherein said discharge duct (12) extends above the nozzle (10) and preferably coaxial with a through hole (10') of the nozzle (10). 15
9. The rotary filling machine (200), according to any one of the preceding claims, wherein the shutter member (30) comprises a plug (31) in a preferably cylindric shape, which is adapted to slide at least inside the discharge duct (12). 20
10. The rotary filling machine (200), according to any one of the preceding claims, wherein handling means (35) are located above and coaxial with the shutter member (30), in particular with the plug (31). 25
11. The rotary filling machine (200), according to any one of the preceding claims, wherein said handling means (35) comprise a piston (36), preferably of the pneumatic type. 30
12. The rotary filling machine (200), according to any one of the preceding claims, wherein the shutter device (30) and the handling means (35) are located side by side to the dosing device (50), preferably to the filling chamber (51). 35

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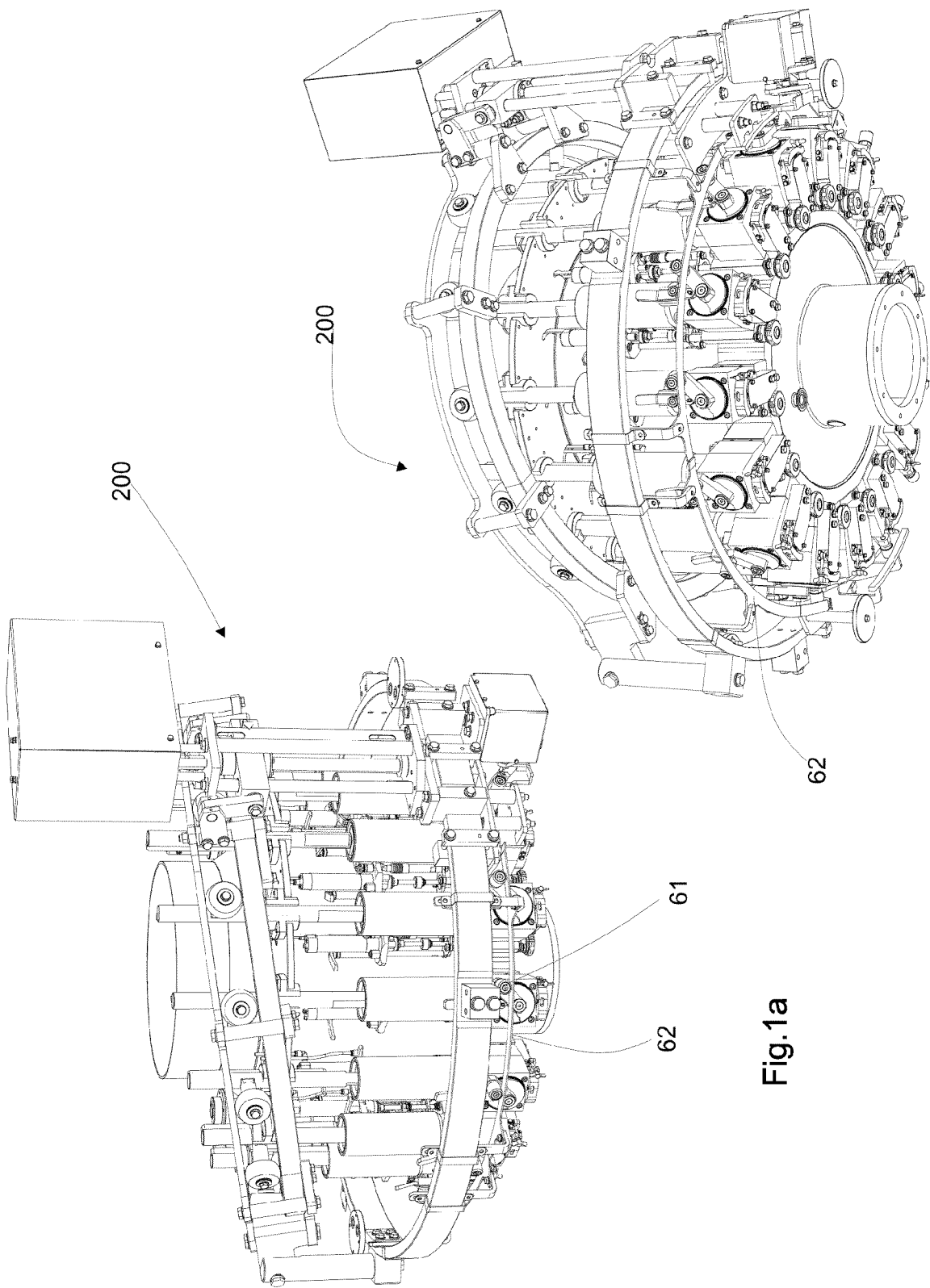


Fig.1a

Fig.1b

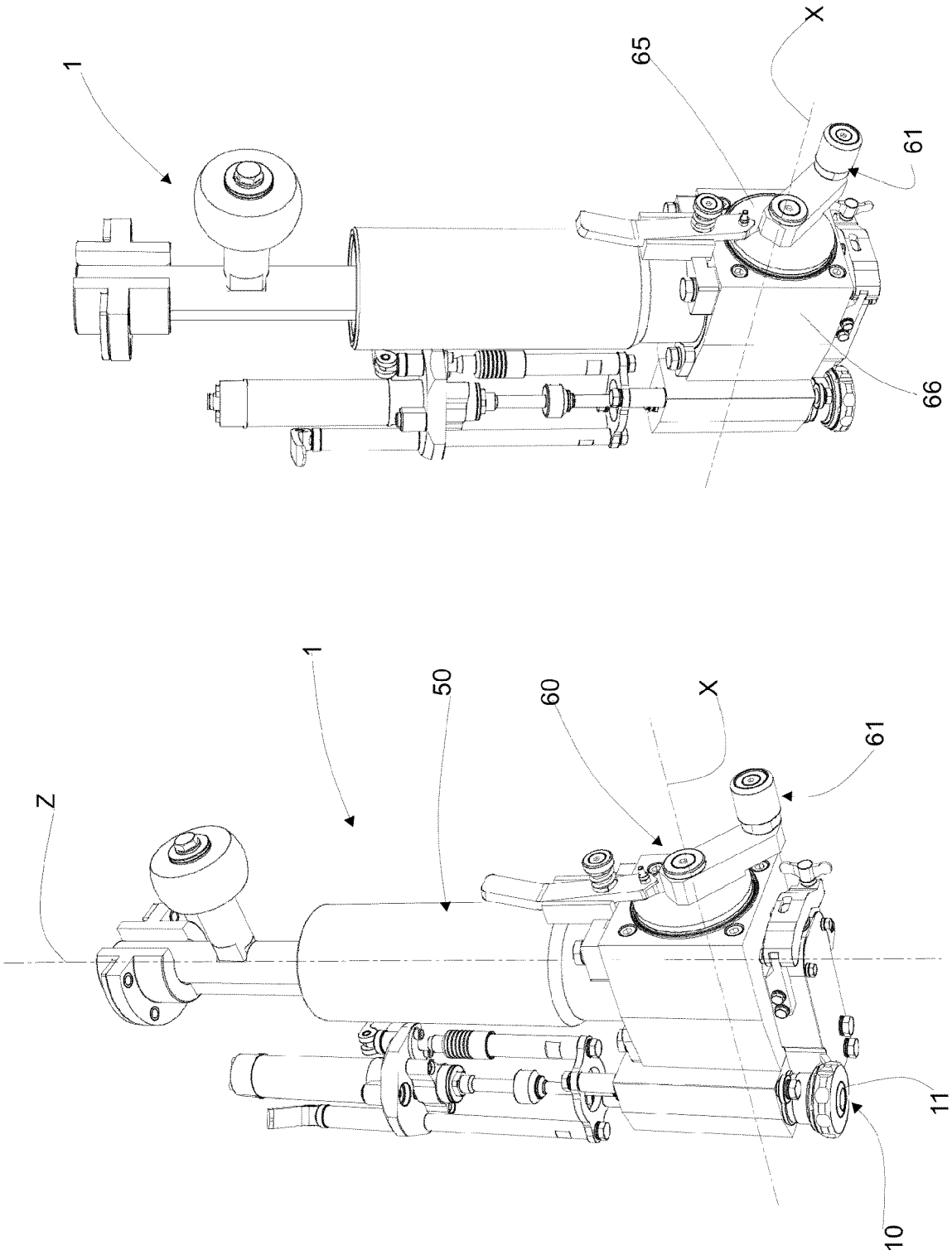


Fig.2b

Fig.2a

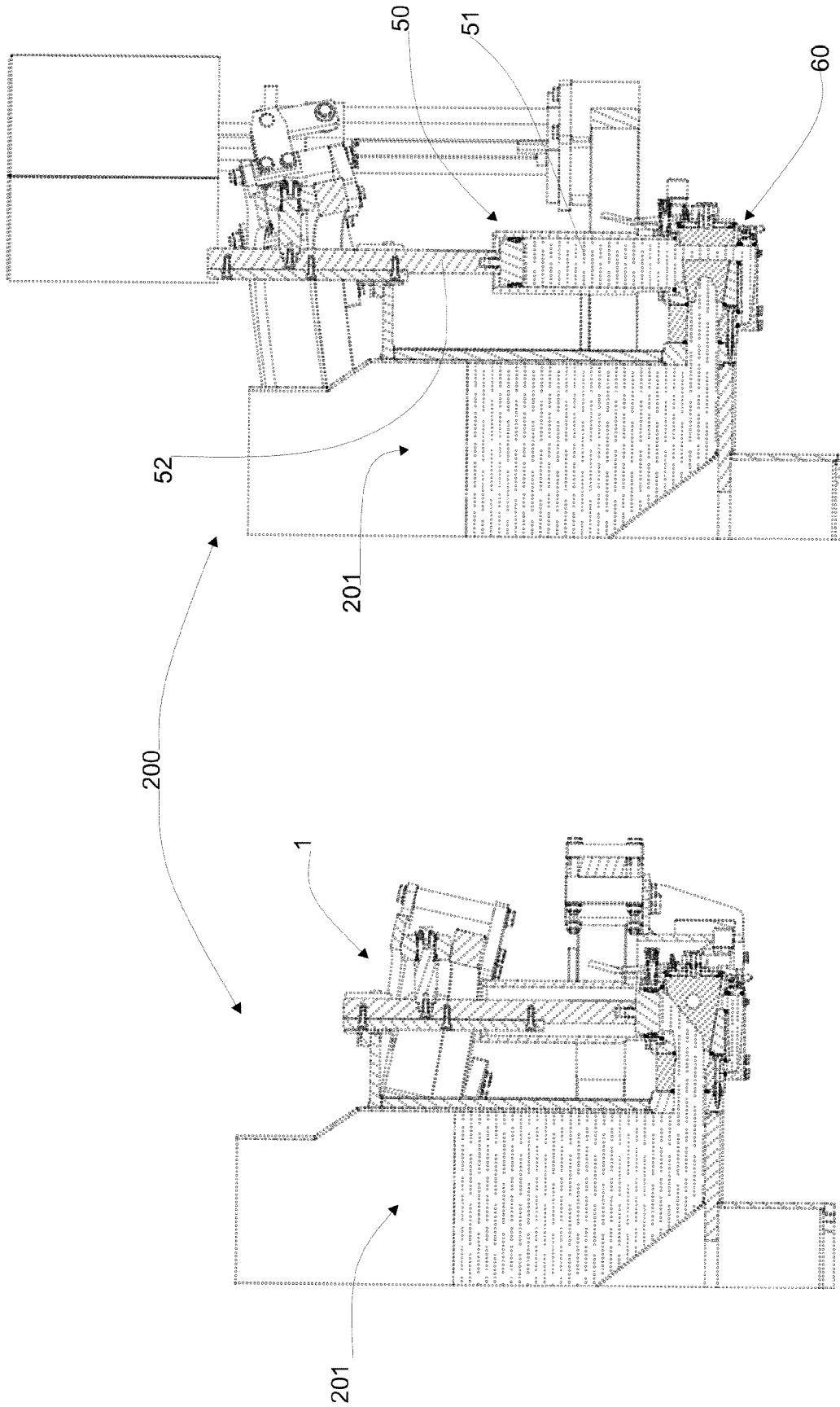


Fig.3b

Fig.3a

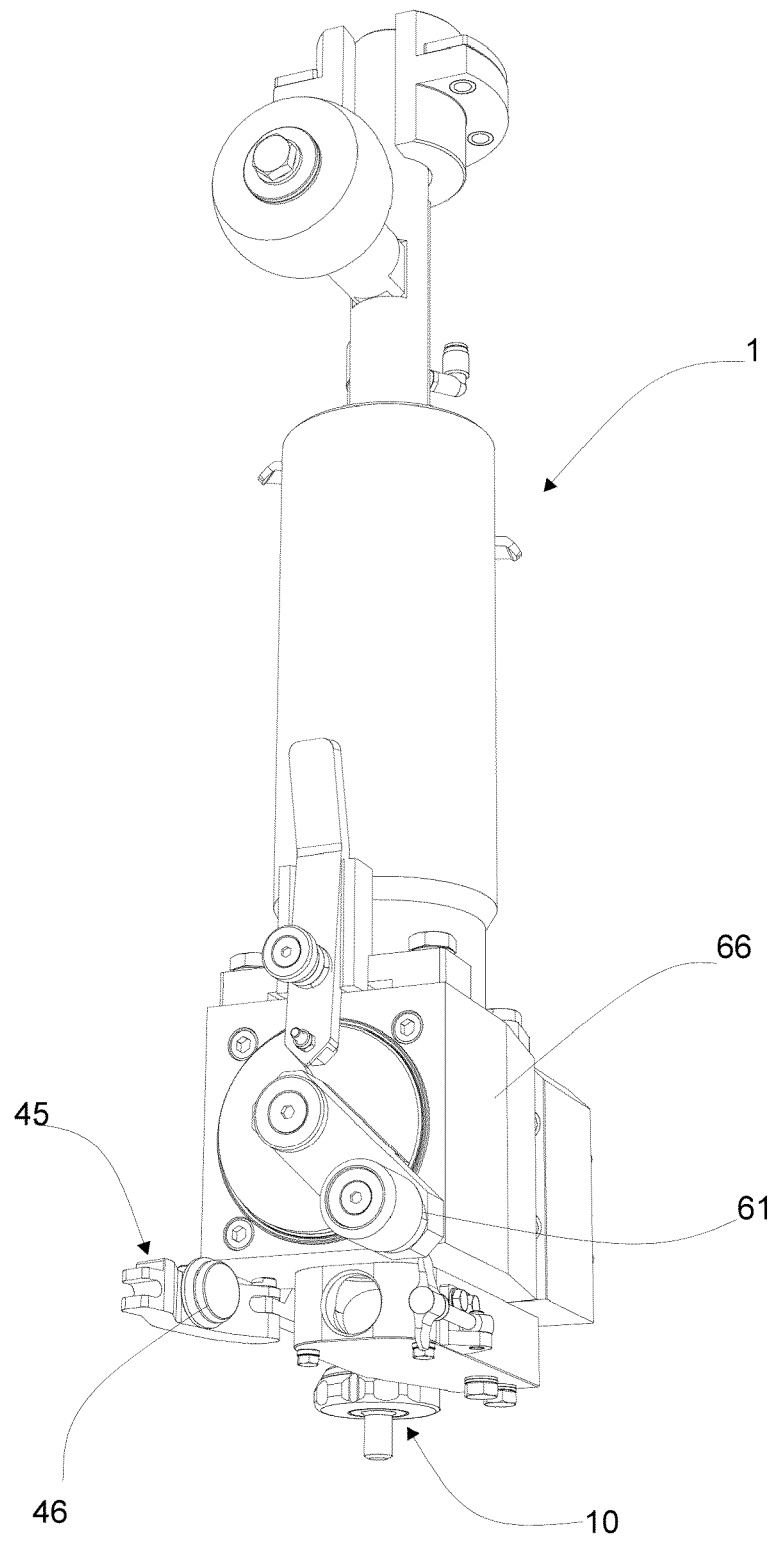


Fig.4

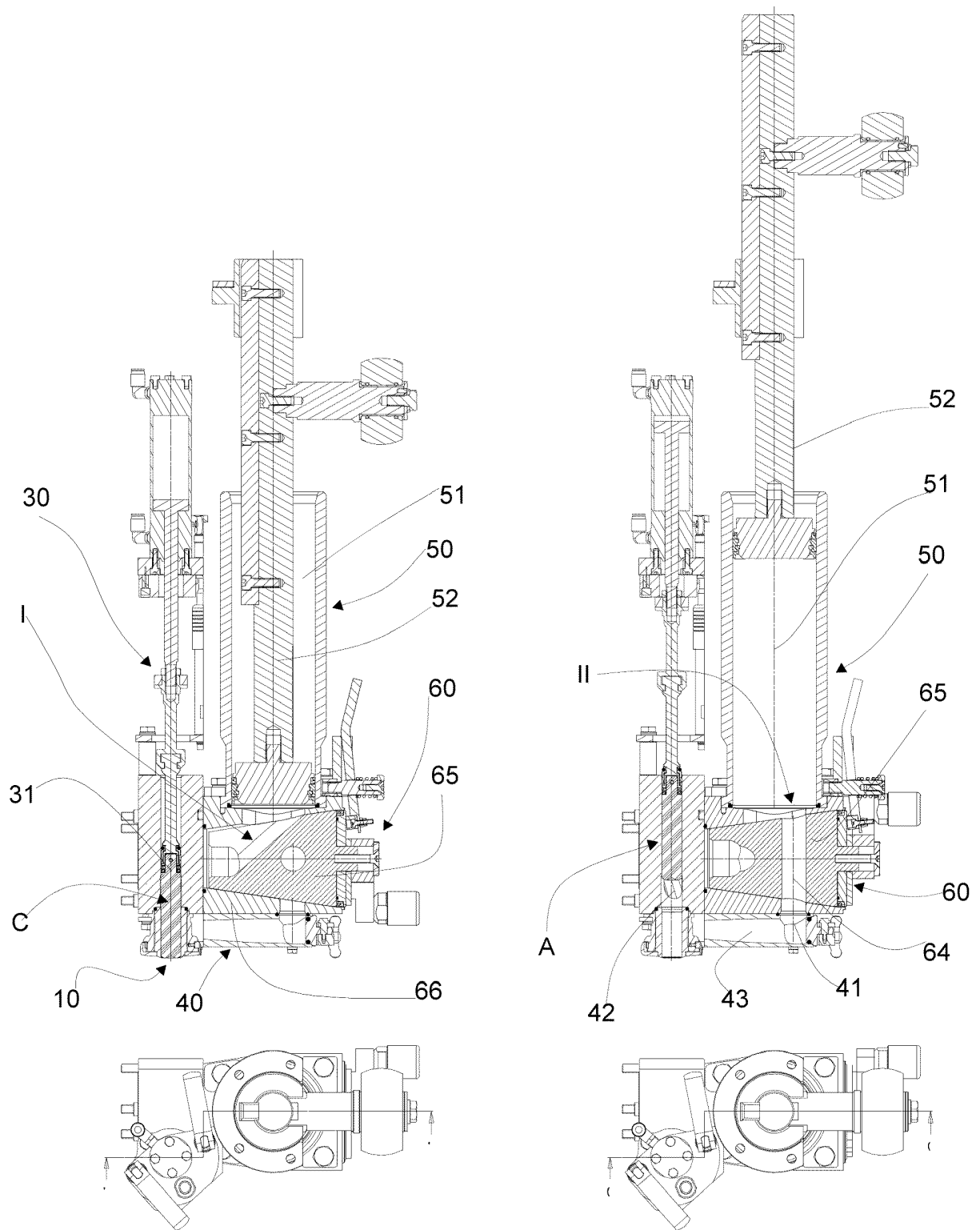


Fig.5a

Fig.5b

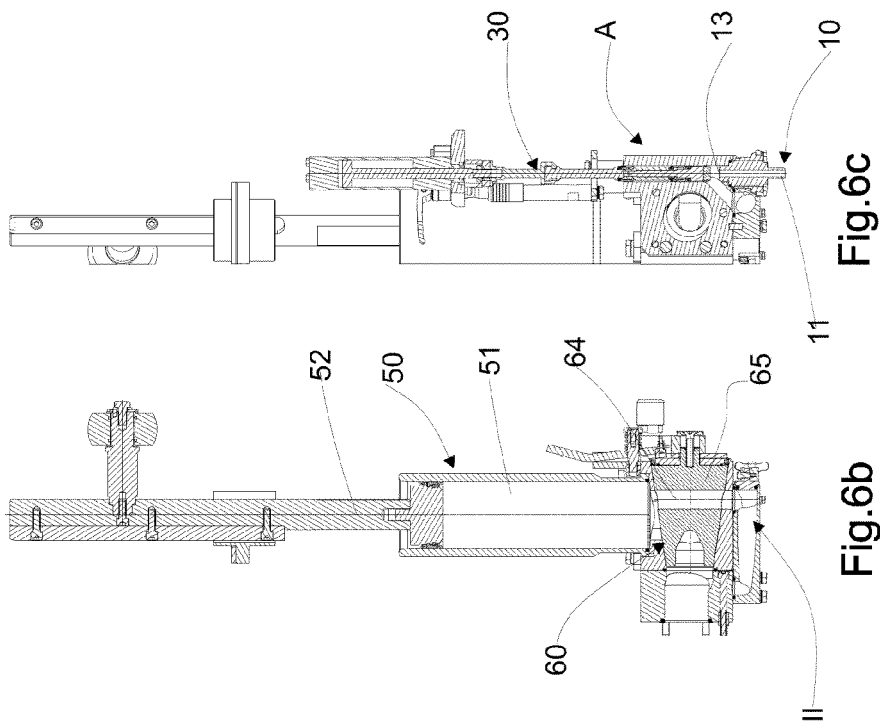


Fig. 6a

Fig. 6b

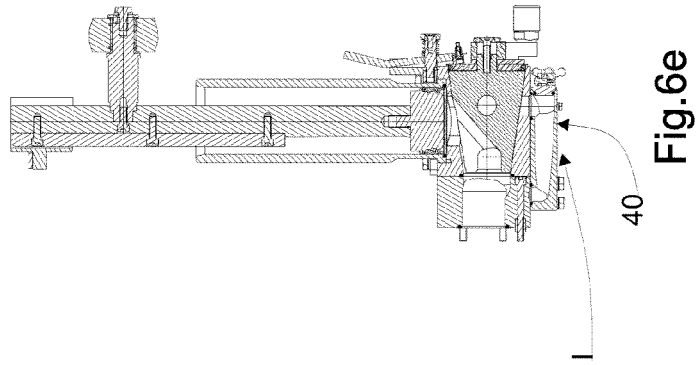


Fig. 6c

Fig. 6e

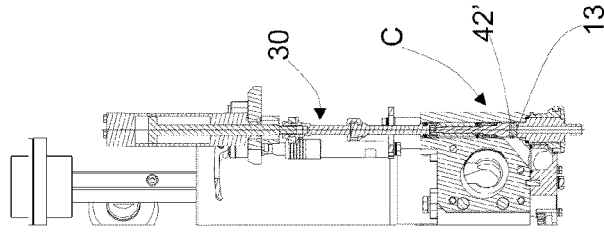


Fig. 6d

Fig. 6f

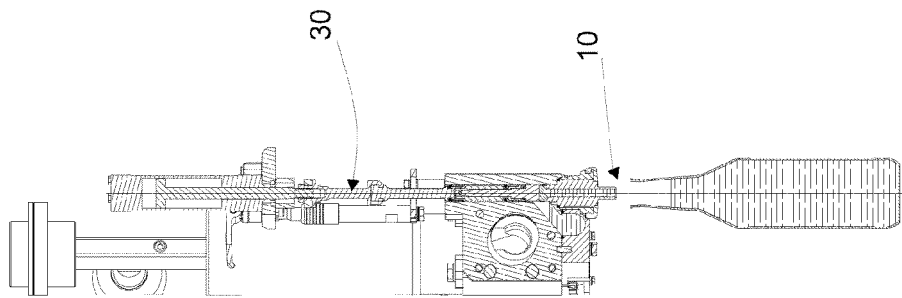


Fig. 7d

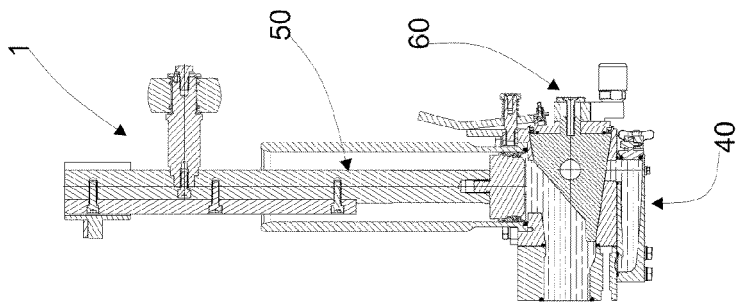


Fig. 7c

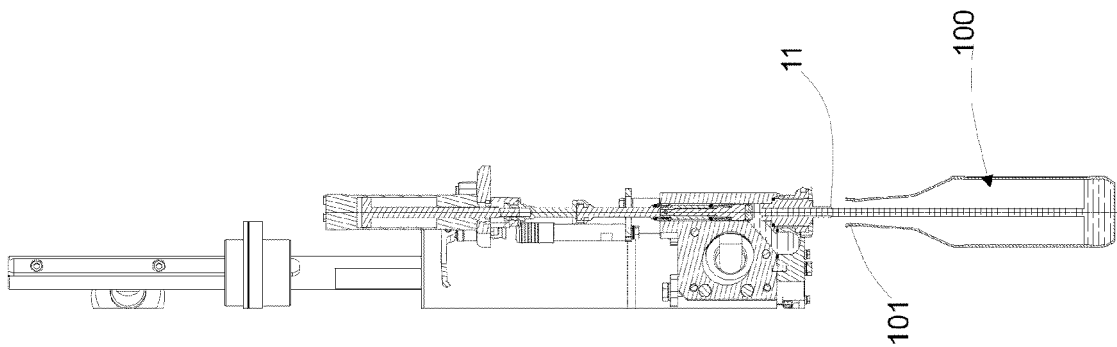


Fig. 7b

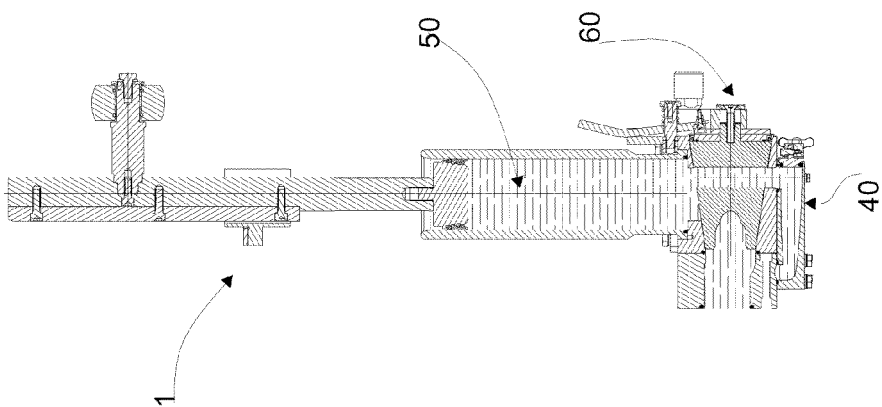


Fig. 7a

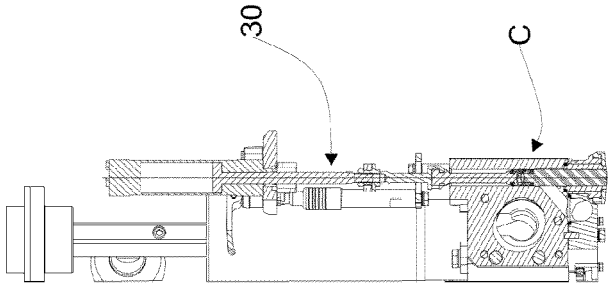


Fig. 8f

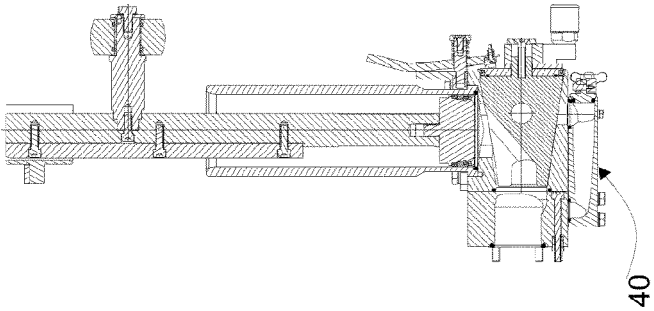


Fig. 8e

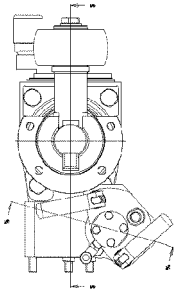


Fig. 8d

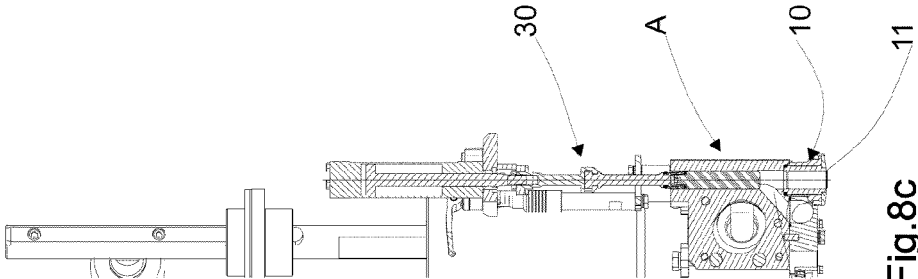


Fig. 8c

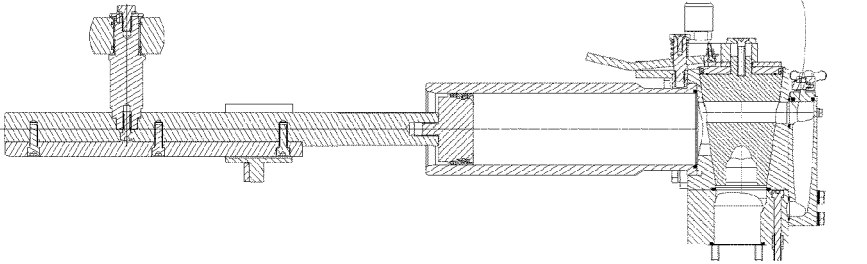


Fig. 8b

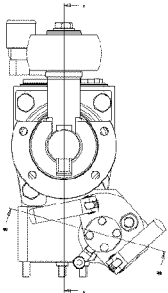


Fig. 8a

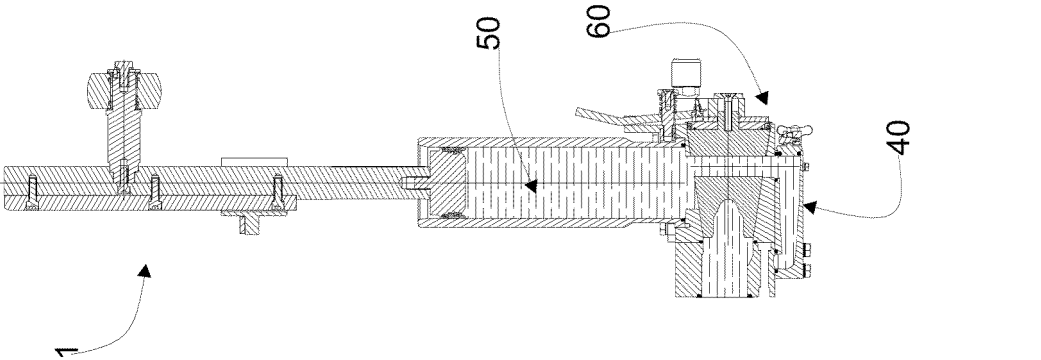


Fig. 9a

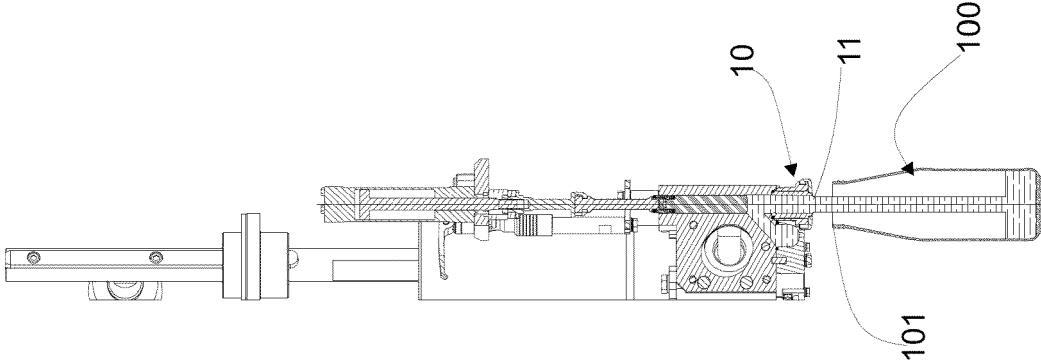


Fig. 9b

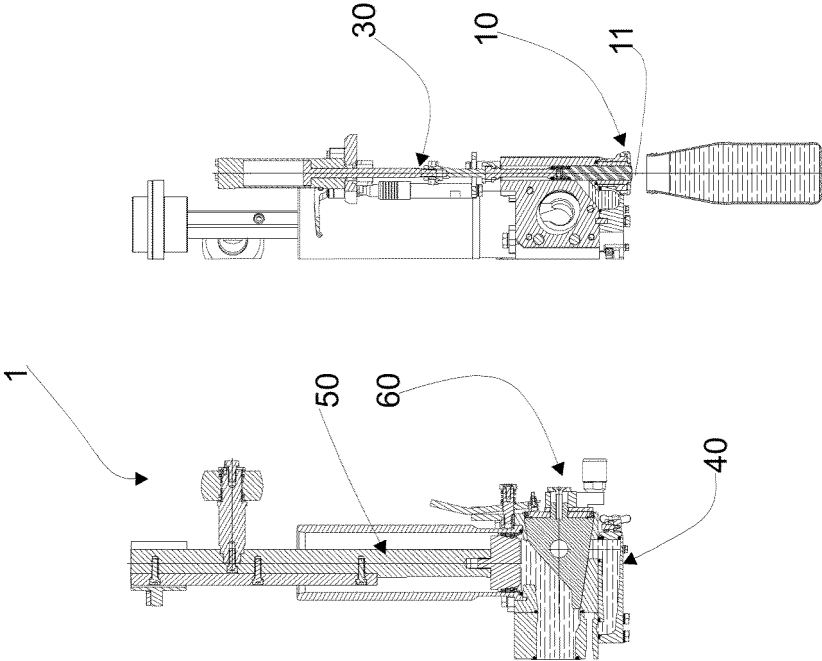


Fig. 9c

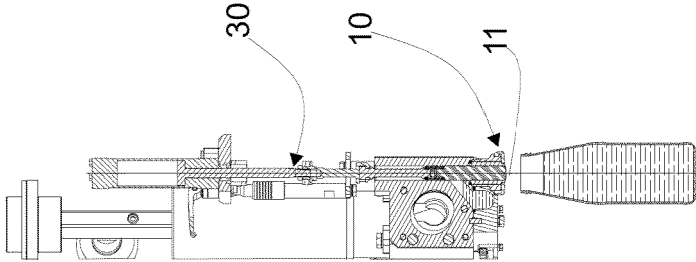


Fig. 9d

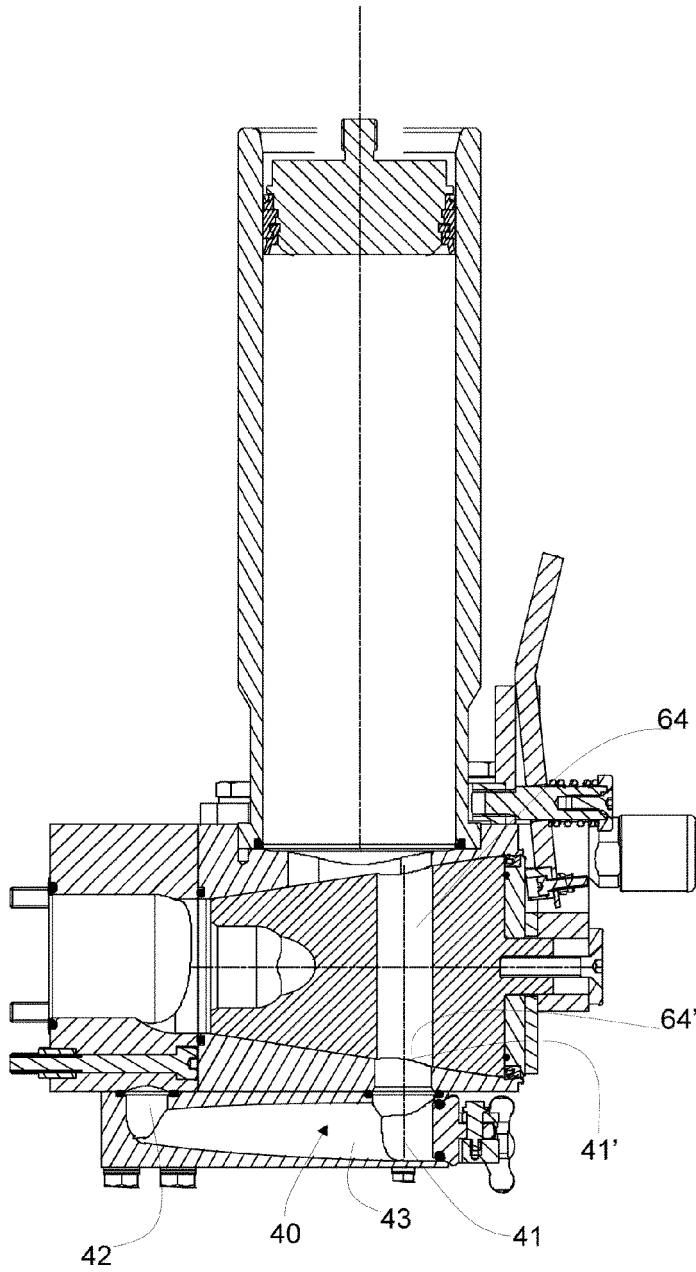


Fig. 10a

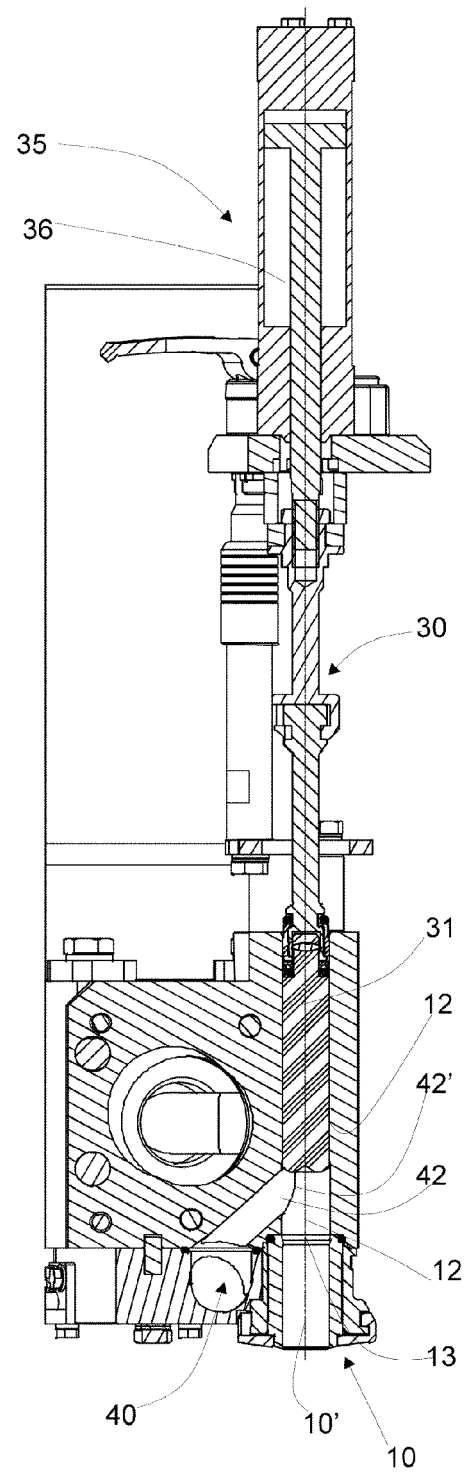


Fig. 10b



EUROPEAN SEARCH REPORT

Application Number

EP 24 17 9383

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS
SEARCHED (IPC)

B67C

The present search report has been drawn up for all claims

Place of search

The Hague

Date of completion of the search

10 October 2024

Examiner

Luepke, Erik

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 24 17 9383

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