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(54) EXTRACTOR VALVE FOR BEVERAGE DISPENSING

(57) Extractor valve 1 for beverage dispensing with automatic switching from a beverage container 28 such as a barrel to another and installation of the said extractor valve 1 without interrupting service and without need for handling by an operator when the respective container 28 is empty; the extractor valve comprises connections 10 for inlet of gas into the container 28 and for actuating the extractor valve, electrical connections governed from a control panel 7, connectors and lines 48 to convey the beverage contained in the containers 28, as well as chilled water, to a tap, said lines 48 being connected to a connection box 17 that enables the liquid to be distributed to the dispensing tap 18 through a python.

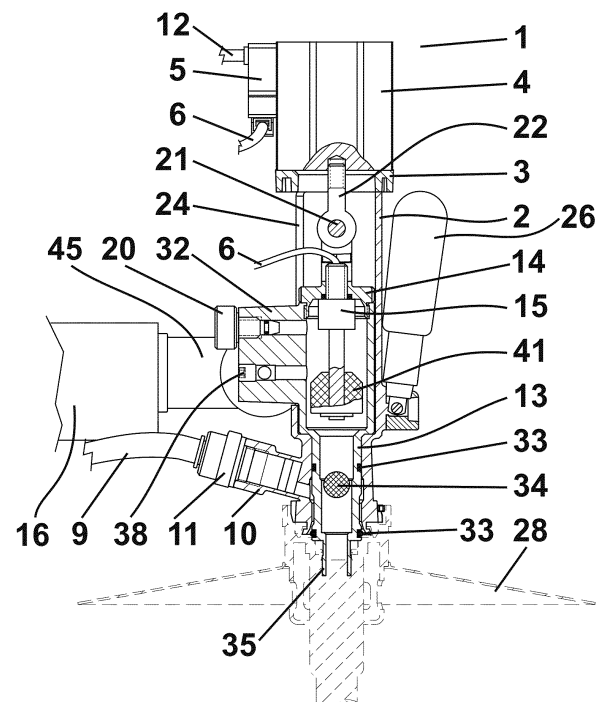


FIG.3

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Description

Field of the invention

[0001] The present invention pertains to the industrial sector dedicated to the manufacture of devices for the dispensing of cold carbonated beverages under pressure and in bulk, distributed in barrels, such as for example, beer.

[0002] The objective of the present invention is to develop an extractor valve with the feature that it provides automatic switching of beverage barrels without interruption and without the need for any intervention by an operator when the liquid in the barrel or corresponding container runs out.

[0003] The extractor valve described in this invention comprises connections for the gas inlet, electrical connections commanded from a control panel, connection for flood lines for the conduction of the liquid contents of the barrels together with chilled water, the said lines being connected to a linking device that allows the liquid to be distributed to the dispensing tap through a flood hose or a contact hose.

Background of the invention

[0004] At present, the storage of both alcoholic and non-alcoholic beverages in barrels or suchlike is considered to be an economic and reliable solution in public establishments such as bars, restaurants or cafés.

[0005] The main drawback of this arrangement in barrels or suchlike arises when it comes to switching over barrels, an action that necessarily has to be performed by an operator who is therefore forced to stop doing whatever he is working on at the time in order to perform the said barrel change and thereafter enable the liquid outflow to check the system is working correctly.

[0006] Another drawback is that in a number of current dispensing systems, for example for beer, the coupling used for the outlet dispensing tap or beer pull is different for each brand of beverage and thus the coupling or connection hose has to be adapted.

[0007] Seeking solutions to resolve the automation of the automatic switching of barrels or containers of beverage when they have run out, patent GB2415952 describes a beverage dispensing system with automatic container switching, of the type used in at least two containers or barrels of beverage, a beverage cooling system, and a series of draining and supply solenoid valves, all connected to the dispensing tap, and in which at least one valve, fitted to the barrel, is in turn connected to a gas dispensing system, with the entire system commanded by a control module.

[0008] It also incorporates a flow meter, a manometer and valves, which may be pneumatic or hydraulic.

[0009] The gas dispensing system comprises a valve and a gas cylinder and lastly, it includes a system for sanitising any devices not in service.

[0010] The drawback of that invention is that it does not specify how automatic barrel switching is achieved and fails to describe in any conclusive manner the way in which the empty barrel is replaced; consequently, it is not clear to an expert in the matter how such a changeover could be accomplished automatically, i.e., without the need for and involvement of at least one operator.

[0011] Similarly, in regard to the means employed for piercing the barrel, it is not clearly defined how such an action is to be performed.

[0012] A further solution can be found in patent ES2547497, which describes a beverage dispensing system for containers or barrels, which comprises a combination of different devices to guarantee automatic switching between kegs, containers or barrels without interrupting supply and with no need for handling when the liquid in each container or barrel runs out, but with the drawback that the main or piercing valve of the barrel is not described in full detail.

Description of the invention

[0013] In order to reduce the aforementioned drawbacks in the automation of automatic barrel or container changeover in beverage dispensing systems as much as possible, an extractor valve has been devised which enables automatic switching to the next barrel when the first one runs out without any interruption in the beverage dispensing supply, the said extractor valve being comprised of:

A fixed element that comprises a closing cover on its top part that also serves as a coupling element to a pneumatic piston fitted with an actuating solenoid valve, connected directly to a programmable control panel by means of electric wiring, the said fixed element being connected:

- to a cylinder of carbon dioxide via an inlet pipe linked to an intake connector with a non-return valve, which affords greater reliability to the extractor valve
- and to a line that in turn is connected to the actuating solenoid valve.

[0014] A moving element that comprises a locking sleeve on its top part, said locking sleeve incorporating a sensor with a float connected directly to a programmable control panel via electric wiring, said moving element being:

- connected to the beverage dispensing system by means of a flood hose,
- the opposite end of said flood hose being connected to a linking device that is connected to the beverage dispensing tap by means of a flood or contact hose,
- the said moving element including a bleed valve to relieve foam and gas.

[0015] The attachment between the fixed element and the moving element coupled inside the fixed element is achieved by means of a pin inserted between the locking sleeve on the moving element and a threaded joint on the pneumatic piston rod, integrated in the fixed element.

[0016] The fixed element comprises a cylindrically shaped casing with an inner cavity in which the moving element fits and is able to move by means of a machined groove positioned longitudinally inside the casing, the said casing including, on its outside, a threaded projection for fitting a lever handle to make handling the extractor valve easier when coupling or decoupling it from the relevant barrel.

[0017] On the top face of the fixed element casing, there are two bosses set at 180°, onto which a closing cover is attached by means of screws.

[0018] The fixed element casing includes, on its bottom part, a cylindrical section of a lesser diameter with a swivel-action machined anchoring in alignment with the outlet connection of a barrel, the said casing including an intake connection to which the carbon dioxide line is connected.

[0019] The fixed element casing is a structural means of coupling and holding the extractor valve onto the barrel and for that reason, it is a robust element made of high mechanical strength metals.

[0020] The closing cover on the fixed element has the shape of a reduced-thickness prism and includes two lugs positioned at an angle of 180° that line up with the bosses on the fixed element casing, including threaded bore holes on the surface so that the pneumatic piston can be attached by means of screws.

[0021] The pneumatic piston is of a double-acting type in order to transmit the necessary thrust on the moving element of the extractor valve in collaboration with the actuating solenoid valve to produce proper "piercing" of the barrel; in the same way, once the barrel is empty, it triggers the recoil movement of the moving element to "un-pierce" the barrel, immediately cutting off the inlet flow of gas from the barrel.

[0022] Having a solenoid valve incorporated in the pneumatic piston considerably reduces actuating response time and thus ensures the extractor valve operates more efficiently.

[0023] The moving element comprises a cylindrical valve body, which incorporates a cavity with a threaded section on its top part designed to house a sensor with a float, incorporating a distribution manifold, which fits snugly into the machined groove of the fixed element casing when the valve body is inserted into the inner cavity of the fixed element casing.

[0024] This distribution manifold has two front connections, a blind bottom connection and a top connection used for manual bleeding; it also has a side outlet connection for connecting a flood hose by means of a coupler.

[0025] The valve body of the moving element comprises, on its bottom part, of a cylindrical section of a lesser diameter, with O-rings between which a silicone anti-drip

ball that acts as a non-return valve to cut off or allow the outflow of liquid from the barrel is housed, the end of the said bottom part of the moving element valve body having a connection nozzle in order to pierce the corresponding barrel.

[0026] The locking sleeve comprises two facing extensions, including, on their lower end, a threaded section that aligns with the threaded section of the valve body, thus allowing its closing, while in the middle part, the locking sleeve has a threaded through-hole to house the sensor..

[0027] Both the flood hose or hoses and the contact hoses used in this beverage dispensing system are commercially available parts and include a return line for the water circuit and another independent line for water or which holds the beverage dispensing line inside it, all lines being sheathed with thermal insulation to ensure the beverage is kept permanently cold.

[0028] The linking device comprises a frame with an inlet cover and an outlet cover opposite it, and both covers incorporate coupling connectors.

The linking device also comprises branch connectors to connect the different lines between flood hoses or between flood hoses and contact hoses, the said linking device being tightly sealed by the joining of the frame to both covers by means of contact adhesives.

[0029] The beverage dispensing system with automatic barrel switching for an example of an installation for two barrels comprises:

- A CO2 cylinder with a pressure regulator and lines with two-way connectors and non-return valves connected to the CO2 inlet on the pneumatic piston actuating solenoid valve.
- Inlet pipes with two-way connectors connected to the CO2 intake connection of the fixed element of the extractor valve, each of the extractor valves being connected on their respective barrels.
- A programmable control panel connected to the general power supply, with direct wiring to the pneumatic piston actuating solenoid valve and to the sensor integrated in the valve body of the moving element.
- A closed water circuit with outlet and inlet to a cooler.
- Thermally insulated flood hoses for dispensing beverage, connected directly to a linking device from each side outlet of the distribution manifold of the moving element of each individual extractor valve.
- A linking device, for coupling flood hoses on one side and flood or contact hose, connected directly to the beverage dispenser tap.

[0030] The set-up of the linking device is carried out by running the return lines and the beverage lines of a

flood hose through the inlet cover and connecting the free ends of the return lines with a branch connector and using another branch connector to connect the beverage lines. Thus, the flood hose is fitted snugly into the inlet cover and then the connection of another flood or contact hose is carried out by repeating the same steps through the outlet cover and joining the return and beverage lines by means of the branch connectors..

[0031] Once the set-up has been carried out, the joints between the covers and the frame are sealed hermetically and the extractor valves are connected to their respective barrels, together with all the other parts that make up the system, which is then activated from the control panel, as programmed, and when the dispensing tap is turned on, the liquids begin to be distributed by the system in the following way:

The carbon dioxide (CO₂) intake connection, incorporated in the fixed element casing has an inner cavity that is sealed by means of two O-rings, located in the valve body of the moving element, the carbon dioxide being retained in said cavity for as long as the pneumatic piston rod is recoiled and the solenoid valve that actuates the pneumatic piston is not activated from the control panel, so that the barrel remains un-pierced.

[0032] When the solenoid valve of the pneumatic piston receives the start signal through its respective wiring from the control panel, as programmed, the moving element descends and "pierces" the barrel thanks to the mechanical action exerted by the thrust of the pneumatic piston threaded joint, causing the carbon dioxide retained in the inner cavity in the intake connection of the fixed element casing to come into contact with the inside of the barrel, which, as a result of the pressure difference, forces the beverage to flood into the cavity of the valve body of the moving element in the direction towards the side outlet connection, thus causing the float in the sensor and the silicone anti-drip ball to rise and open the line so the beverage can be dispensed.

[0033] From the moment the barrel is automatically "pierced" by the connection nozzle of the moving element valve body as a result of the thrust exerted by the pneumatic piston, the beverage begins to run through the flood hose towards a linking device, from which, by means of a flood or contact hose, it is dispensed through the dispensing tap - provided that the tap is open - as follows:

- The linking device keeps the return lines and beverage supply lines connected inside it, with the flood channels housed in the corresponding covers, so that the circulating water flows into the linking device and is continuously absorbed by the flood hose connected to the outlet cover, thus maintaining a constant dispensing and water cooling cycle.

[0034] The linking device makes it easier to operate

the system with all types of flood or contact hose, given that each manufacturer employs a different type of approved hose.

[0035] While the dispensing tap is turned off, the beverage stored inside the dispensing circuit will remain cold provided that the cooler in the system is in service, since the installation has a closed water circuit that runs into and out of the said cooler, the said closed circuit running parallel to the beverage line, being housed inside a thermally insulated flood hose.

[0036] This way the user can start using the beverage in the barrel whenever required without having to perform any additional operation apart from turning the dispensing tap on; and the system remains in stable equilibrium with both the sensor float and the silicone anti-drip ball floating.

[0037] When all the beverage in a barrel has been consumed, it gives way inside the circuit to the carbon dioxide that until now was pushing it, so that, as a result of the difference in density between both fluids, the sensor float stops floating and falls by gravity to the base of the sensor, triggering a reed switch that generates an electrical signal.

[0038] The electrical signal thus generated travels along the sensor cable and is received by the control module, thus causing the actuating solenoid valve that controls the pneumatic piston to switch, which in turn reverses the inflow of carbon dioxide in the pneumatic piston resulting in the rise of the threaded joint and of the moving element and consequently in the un-piercing of the barrel, at which point the flow of carbon dioxide from the CO₂ cylinder shuts off immediately.

[0039] In that same instant and completely automatically thanks to the programmable control module, at the same time as the first barrel is un-pierced, the next barrel connected in the installation is pierced and the cycle described above starts over again.

[0040] This means that switching from one barrel to another takes place almost instantaneously, thus minimising the amount of carbon dioxide that enters the beverage circuit and avoiding the need to bleed the entire circuit, with the benefits that this entails for the user, namely better user experience for customers, improved working conditions and convenience, reduced spillage and wastage of the beverage and gas, or, in other words, better use of raw materials, greater cost savings and a reduction in environmental impact.

[0041] Once the automatic switchover to the next barrel has taken place, a signal is emitted from the programmable control module to the user to indicate that the first barrel is empty and can be replaced at a suitable time with another full barrel, so that the cycle can continue indefinitely.

[0042] This signal can be sent and received in different ways, depending on the degree of technological implementation available in the establishment, and may range from a simple LED warning light fitted on the programmable control module to an App-based alert using a Wi-

Fi or Bluetooth network with electronic devices such as computers, tablets or smartphones.

[0043] The procedure to replace and change a barrel is completely manual and consists of folding down a lever handle fitted on the casing of the fixed element to make it easier to turn the extractor valve to the necessary position, depending on each barrel-maker's standard clamping system, so that once the extractor valve has been released, the empty barrel can be removed and replaced with the next one full of beverage, carrying out the inverse operation with the extractor valve.

[0044] When the contents of a barrel run out, the beverage circuit still remains permanently tight thanks to the silicone anti-drip ball, which acts as a non-return valve, and the valve body cavity remains with residues of beverage and carbon dioxide until the bleed valve is turned manually to completely drain the aforementioned cavity.

[0045] In the same way, as the circuit is kept sealed by means of the silicone anti-drip ball, any beverage that has not been expelled from the circuit during the barrel switchover operation is kept cooled by the circuit.

[0046] Thus, the barrel and the extractor valve are ready for a new cycle and the only remaining step is to record them in the programmable control module so as to indicate that the replacement operation has taken place and that a new barrel is available and fully operational when required, in this case, as soon as the next barrel runs out.

[0047] Persons skilled in the art will readily understand that this system can combine features from a number of embodiments with those from other possible embodiments, provided that such a combination is technically possible.

Benefits of the invention

[0048] The extractor valve for beverage dispensing with automatic barrel switching presented affords multiple advantages over those currently available, the most significant being that it enables almost instantaneous switching from one barrel to another, thus minimising the entry of carbon dioxide into the beverage circuit and avoiding the need to drain it completely, with the resulting benefits for the user, such as better user experience for customers, improved working conditions and convenience, reduced spillage and wastage of beverage and gas, or, in other words, enhanced use of raw materials, greater cost savings and a reduction in environmental impact.

[0049] Another highly significant advantage is that the pneumatic piston integrated in the extractor valve incorporates a solenoid valve to reduce response time.

[0050] A further important advantage is that the fixed element casing and the valve body of the moving element incorporate, on their top part, a locking element so that the fixed element is firmly attached to the moving element coupled inside the fixed element by means of a pin inserted between the said locking elements.

[0051] One more significant advantage to be added is that the dispensing system with extractor valves entails the installation of a linking device between the flood hoses connected to both the extractor valves and the dispensing tap through flood or contact hoses, thus making it much easier for the user to work with and dispense any brand of beverage.

Description of the drawings

[0052] To provide for a better understanding of the present invention, a practical preferred embodiment of the system is depicted in the annexed drawings:

Figures - 1 and 2 - show a view of the extractor valve coupled to a barrel.

Figure - 3 - shows a sectional view of the extractor valve coupled to a barrel.

Figure - 4 - shows an elevation, cross sectional and top view of the casing of the fixed element.

Figure - 5 - shows an elevation, cross-sectional and top view of the closing cover of the casing of the fixed element.

Figure - 6 - shows an elevation, cross-sectional view of the valve body of the moving element.

Figure - 7 - shows an elevation cross-sectional view of the locking sleeve of the valve body of the moving element.

Figures - 8 and 9 - show a detailed sectional view of the set-up of the linking device with flood and contact hoses

Figure - 10 - shows a diagram of an installation for a beverage dispensing with automatic container switching, which, in this example, comprises two extractor valves.

Preferred embodiment of the invention

[0053] The composition and characteristics of the invention may be better understood with the following description made with reference to the appended figures.

[0054] Figure 1 depicts a cross-sectional view of the extractor valve (1) coupled to a barrel (28), with details of the fixed element (2) with a closing cover (3) on its top part, which also serves to couple a pneumatic piston (4) equipped with an actuating solenoid valve (5).

[0055] The actuating solenoid valve (5) is commanded through electrical wiring (6) connected to a programmable control panel (7) and on the other side through a carbon dioxide line connected to a cylinder (8) of CO₂.

[0056] A lever handle (26) is incorporated onto the cas-

ing of the fixed element (2) intended to facilitate handling the extractor valve when piercing or un-piercing the barrel (28).

[0057] On the bottom part of the casing of the fixed element (2), an inlet pipe (9) is shown, which connects to a intake connection (10) of carbon dioxide from a cylinder (8) of CO₂, as well as a non-return valve (11) fitted on the said intake connection (10).

[0058] Furthermore, it also depicts a moving element (13) mounted on the inside of the fixed element (2) and protruding from that fixed element (2) is a distribution manifold (32), which has a bleed valve (20) on its top part used to enable flushing of the cavities in the extractor valve (1).

[0059] The connection with a flood hose (16) by means of a coupler (45) can also be seen on the distribution manifold (32).

[0060] Figure 2 depicts a front view of the extractor valve (1) coupled to a barrel (28), showing the fixed element (2) that houses the moving element (13) inside it, and the closing cover (3) coupled to the casing of the fixed element (2), there being positioned on the said closing cover (3), a pneumatic piston (4) that incorporates an actuating solenoid valve (5) connected to the dispensing system by means of electrical wiring (6) and a line (12) for the inlet of carbon dioxide.

[0061] Shown on the bottom part of the casing of the fixed element is an inlet pipe (9) for carbon dioxide, coming from the dispensing system.

[0062] Furthermore, the moving element (13) is depicted, showing a locking sleeve (14) on its top part, which also serves to house a sensor (15) with a float (41), connected to the dispensing system by means of electrical wiring (6).

[0063] A distribution manifold (32) on the moving element (13) is also depicted, showing the bleed valve (20) on its top part and a blind connection (38) on its bottom part, as well as a side outlet connection for the beverage line, that connects to a flood hose (16) by means of a coupler (45).

[0064] The flood hose (16) is shown, depicting a return line (46) and a flood line (47) which houses the beverage line (48) inside it, all lines being wrapped in a thermal insulating sheathing (49).

[0065] Figure 3 is a cross section view of the extractor valve (1) showing the components that comprise it when in operating position, that is to say, with the extractor valve (1) pierced into a barrel (28).

[0066] When the actuating solenoid valve (5) of the pneumatic piston (4) receives the start signal, as programmed, via the relevant wiring (6), the moving element (13) descends and automatically "pierces" the barrel (28) with the connection nozzle (35) of the valve body of the moving element (13) by means of the mechanical action exerted by the thrust of the threaded joint (22) of the pneumatic piston (4) causing the carbon dioxide channelled through the inlet pipe (9) and retained in the inner cavity of the intake connection (10) with a non-return

valve (11) of the casing of the fixed element (2) to come into contact with the barrel (28), which in turn, as a result of the pressure difference, pushes the beverage into the valve body cavity of the moving element (13) towards the flood hose (16), resulting in the rise of the float (41) of the sensor (15) and of the silicone anti-drip ball (34), allowing the beverage to flow out for dispensing.

[0067] The intake connection (10) for carbon dioxide (CO₂) incorporated in the casing of the fixed element (2) has an inner cavity which is sealed by means of two O-rings (33) positioned in the valve body of the moving element (13), the carbon dioxide being retained in said cavity while the rod of the pneumatic piston (4) is recoiled and the actuating solenoid valve (5) of the pneumatic piston (4) is not activated, so that the barrel (28) remains un-pierced.

[0068] It also shows the firm attachment between the fixed element (2) and the moving element (13) coupled inside the fixed element (2), which is achieved by means of a pin (21) inserted between the locking sleeve (14) of the moving element (13) and a threaded joint (22) in the pneumatic piston (4) rod incorporated in the fixed element (2).

[0069] The moving element (13) moves vertically through the cavity in the fixed element (2) along a machined groove (24) positioned longitudinally in the said casing.

[0070] The distribution manifold (32) is also depicted, showing the bleed valve (20), the blind bottom connection (38) and the coupler (45) connected to the flood hose (16).

[0071] The closing cover (3) is shown closing the casing of the fixed element (2) serving as a coupling for the pneumatic piston (4).

[0072] When all the beverage in the barrel (28) has been consumed, it gives way inside the circuit to the carbon dioxide that until now was pushing it, causing, due to a difference in density between both fluids, that the float (59) of the sensor (15) stops floating and drops by gravity to the bottom of the said sensor (15), thus triggering a reed switch which generates an electrical signal.

[0073] The electrical signal is received through the wiring (6) of the sensor (15), causing a change in the actuating solenoid valve (5) controlling the pneumatic piston (4) that reverting the entry of the carbon dioxide to the pneumatic piston (4) along the line (12) and causing the rise of the threaded joint (22), and the rise of the moving element (13), and consequently the un-piercing of the barrel (28), which automatically cuts off the inflow of carbon dioxide from the system instantaneously.

[0074] In addition, a lever handle (26) is shown attached to the casing of the fixed element (2).

[0075] Figure 4 shows the cylindrically-shaped casing of the fixed element (2) with an inner cavity (23) to house the moving element (13), which is able to move through the said inner cavity (23) by means of a machined groove (24) positioned longitudinally in said casing, incorporating on the outside of said casing a threaded projection

(25), intended for coupling a lever handle (26).

[0076] The casing of the fixed element (2) incorporates on its top part two bosses (27) positioned at 180°, intended for coupling a closing cover (3) by means of screws.

[0077] The casing of the fixed element (2) comprises, on its bottom part, a cylindrical section of a smaller diameter, incorporating a swivel-action machined anchoring (29) that aligns with the outlet connection of a barrel (28) and which incorporates an intake connection (10) for incoming carbon dioxide.

[0078] Figure 5 shows the closing cover (3) of the fixed element (2), in the shape of a prism of reduced thickness, which incorporates two lugs (30), positioned at an angle of 180°, that line up with the bosses (27) on the casing of the fixed element (2), incorporating on its surface threaded bore holes (31) for attaching the pneumatic piston (4) by means of screws.

[0079] Figure 6 shows the moving element (13) comprising a cylindrical valve body, which incorporates a cavity (36) with a threaded section (37) on its top part, incorporating a distribution manifold (32) with two front connections, a blind bottom connection (38), and a top connection (39) for manual bleeding, as well as a side outlet connection (40), intended for the connection of a flood hose (16).

[0080] The valve body of the moving element (13) comprises a cylindrical section of a smaller diameter on its bottom part, with O-rings (33), between which a silicone anti-drip ball (34) is fitted that works as an automatic non-return valve to close off or open the outflow of liquid from the barrel (28), the end of the lower part of the valve body in the moving element (13) being configured by a connection nozzle (35) to pierce the corresponding barrel (28).

[0081] Figure 7 depicts the locking sleeve (14) made up of two facing extensions (42), including, at the bottom end, a threaded section (43) that aligns with the threaded section (37) on the valve body to enable it to be locked down and the said locking sleeve (14) incorporating, in its central part, a threaded through-hole (44) intended for housing the sensor (15).

[0082] Figure 8 shows the linking device (17) between the flood hoses (16) and Figure 9 shows the linking device (17) between an inlet flood hose (16) and an outlet contact hose (19).

[0083] In Figures 8 and 9, the linking device (17) is comprised by a frame (50) with an inlet cover (51) and an outlet cover (52) opposite it, both of which are fitted with coupling connectors (53).

[0084] The linking device (17) also comprises branch connectors (54) for connections between different lines, both between flood hoses (16) and between flood hoses (16) and contact hoses (19), the said linking device (17) being tightly sealed by means of the joining of the frame (50) to both covers (51 and 52) by means of contact adhesives.

[0085] The frame (50) is depicted by a broken line to show the inner set-up between the different lines con-

necting the flood hoses (16) and contact hoses (19).

[0086] The linking device (17) keeps the return lines (46) and the beverage lines (48) connected inside it, while the flood lines (47) are housed inside the respective covers (51 and 52), so that the circulating water invades the linking device (17) and is continuously absorbed by the flood line (47) connected to the outlet cover (52), thus maintaining a constant cycle of water distribution and cooling.

[0087] Figure 10 shows a diagram of an installation for a beverage dispensing system with automatic barrel switching which in this example is formed by two barrels (28) and comprises:

- One cylinder (8) of CO₂ with a pressure regulator and lines (12) with two-way connectors (55) and non-return valves (11), connected to the CO₂ inlet on the actuating solenoid valve (5) of the pneumatic piston (4)
- Inlet pipes (9) with two-way connectors (55) that connect to the intake connection (10) for CO₂ of the fixed element (2) of the extractor valve (1), each extractor valve (1) being individually connected to its respective barrel (28).
- A programmable control panel (7) that connects the general power supply (56) via direct wiring (6) to the actuating solenoid valve (5) of the pneumatic piston (4) and to the sensor (15) integrated in the valve body of the moving element (13).
- A closed water circuit that runs into and out of a cooler (57).
- Flood hoses (16), thermally insulated, for dispensing beverage, connected directly to the linking device (17) from each side outlet connection (40) on the distribution manifold (32) of the moving element (13) of each extractor valve (1).
- A linking device (17) that provides the connection either between the flood hoses (16) or between the flood hoses (16) and the contact hoses (19) in direct connection with the dispensing tap (18) by means of the beverage line (48).

[0088] The installation procedure starts with mounting the linking device (17) by running the return lines (46) and beverage lines (48) of a flood hose (16) through the inlet cover (51) and connecting the free ends of the return lines (46) using with a branch connector (54) and doing the same thing with the beverage lines (48) with another branch connector (54), the flood line (47) remaining housed inside the inlet cover (51), then continuing by setting up another flood hose (16) or contact hose (19) and repeating the process, this time through the outlet cover (52), joining the return lines (46) and beverage lines (48) using the aforementioned branch connectors (54).

[0089] Once the set-up has been completed, the joints between the covers (51 and 52) and the frame (50) are tightly sealed, the extractor valves (1), as well as all the elements that make up the installation, are connected to

their respective barrels (28) and the system is activated from the control panel (7), as programmed, and when the dispensing tap (18) is turned on, the fluids begin to be dispensed by the system as follows:

The intake connection (10) for carbon dioxide (CO₂), which is incorporated in the casing of the fixed element (2), has an inner cavity sealed by means of two O-rings (33) positioned in the valve body of the moving element (13) and the carbon dioxide is retained in the said cavity for as long as the rod of the pneumatic piston (4) is recoiled and the actuating solenoid valve (5) of the pneumatic piston (4) has not been activated from the control panel (7), so that the barrel (28) remains un-pierced.

[0090] As soon as the actuating solenoid valve (5) of the pneumatic piston (4) receives the start signal from the control panel (7), as programmed, via the respective wiring (6), the moving element (13) descends and pierces the barrel (28) by means of the mechanical action exerted by the thrust of the threaded joint (22) exerted by the pneumatic piston (4), causing the carbon dioxide retained in the inner cavity of the intake connection (10) of the casing of the fixed element (2) to come into contact with the inside of the barrel (28) and as a consequence of the pressure difference, the beverage is pushed into the cavity of the valve body of the moving element (13), in the direction of the side outlet connection (40) of the moving element (13), making the float (59) of the sensor (15) and the silicone anti-drip ball (34) rise by floatation, thus allowing the beverage to flow out for dispensing.

[0091] From the moment the barrel (28) is automatically pierced by the connection nozzle (35) on the valve body of the moving element (13) as a result of the thrust exerted by the pneumatic piston (4), the beverage begins to flow through the respective flood hose (16) to a linking device (17), from where, via either a flood hose (16) or a contact hose (19), it is led to the dispensing tap (18), and when the tap is open, it is dispensed as follows:

- The linking device (17) connects the return lines (46) and beverage lines (48) inside it, while the flood lines (47) are housed in the inlet cover (51) or outlet cover (52) respectively, so that the circulating water invades the linking device (17) and is continuously absorbed by the flood line (47) connected to the outlet cover (52), thus maintaining a constant distribution cycle of cooling water.

[0092] While the dispensing tap (18) remains turned off, the beverage is stored in the distribution circuit, which is kept permanently cold as long as the cooler (57) located in the system is in service, because the system has a closed water circuit that starts and finishes at the cooler (57), the said closed circuit running parallel to the beverage line, being housed inside a flood hose (16) that is thermally insulated.

[0093] This way, the user can start using the beverage in the barrel (28) whenever required without the need for any additional operations except opening the dispensing tap (18) and the system remains in stable equilibrium with the float (41) of the sensor (15) and the silicone anti-drip ball (34) both floating.

[0094] When the beverage in the barrel (28) eventually runs out, it gives way inside the circuit to the carbon dioxide that until now was pushing it, causing, due to the difference in density between both fluids, that the float (41) of the sensor (15) stops floating and falls due to gravity to the bottom of the sensor (15), thus triggering a reed switch that generates an electrical signal.

[0095] The electrical signal is received by the control panel (7) via the wiring (6) of the sensor (15) and causing a change in the actuating solenoid valve (5) of the pneumatic piston (4), whereupon the input of carbon dioxide into the pneumatic piston (4) is reversed and so the threaded joint (22) and the moving element (13) rise resulting in the un-piercing of the barrel (28), whereupon the inflow of carbon dioxide from the cylinder (8) of CO₂ is automatically shut off.

[0096] At that same instant and in a fully automatic manner thanks to the programmable control panel (7), as soon as the first barrel (28) is un-pierced, the piercing of the next barrel (28) connected in the installation takes place, whereby a new cycle as described above starts over.

[0097] This system means that switching from one barrel (28) to another occurs almost instantaneously, minimising the inflow of carbon dioxide to the beverage circuit and thus avoiding the need for the entire circuit to be bled, with the obvious benefits that entails for the user, such as better user experience for their customers, improved working conditions and convenience, reduced spillage and wastage of beverage and gas or, in other words, better use of raw materials, greater cost savings and a lesser environmental impact.

[0098] Once automatic switching to the next barrel (28) has taken place, a signal is sent from the programmable control panel (7) to the user to notify that the first barrel (28) is empty and needs to be replaced with another full barrel as soon as it is a convenient moment for the user, thus enabling the cycle to continue indefinitely.

[0099] This signal can be transmitted and received in different ways, depending on the degree of technology implemented in the establishment, ranging from a simple LED-type light signal placed on the programmable control module (7) to an APP-type form of notification via a Wi-Fi / Bluetooth network with electronic devices such as computers, tablets or smartphones.

[0100] The procedure for replacing and changing an empty barrel (28) with a full one is purely manual and consists of folding down a lever handle (26) positioned on the casing of the fixed element (2) to allow the extractor valve (1) to be twisted as far as each individual manufacturer of barrels (28) specifies as standard, so that once the extractor valve (1) has been released, the empty bar-

rel (28) can be removed and replaced with the next one full of beverage, carrying out the inverse operation with the extractor valve (1).

[0101] When the contents of the barrel (28) have run out, the beverage circuit remains tight at all times due to the action of the silicone anti-drip ball (34), which serves as a non-return valve, the cavity of the valve body having remains of beverage and carbon dioxide and it being necessary to rotate the bleed valve (20) by hand until the said cavity is totally free.

[0102] In the same way as the circuit remains tight due to the silicone anti-drip ball (34), any beverage that has not been expelled by the circuit during the barrel (28) switching operation is kept cool by the circuit.

[0103] With this the barrel (28) and the extractor valve (1) are ready for a new cycle and it only remains to record it on the programmable control panel (7), indicating that the changeover operation has taken place and the new full barrel (28) is ready for use when necessary, in this case, when the next barrel (28) runs out.

Claims

1. Extractor valve for beverage dispensing, comprising a moving element (13) housed inside a fixed element (2) with a pneumatic piston (4), intended for piercing a barrel or container, **characterised in that:**

- the fixed element (2) comprises, on its top part, a closing cover (3) that also serves for coupling a pneumatic piston (4) with a threaded joint (22) on the rod of the pneumatic piston (4), the said pneumatic piston (4) incorporating an actuating solenoid valve (5), which is directly connected to a programmable control panel (7) via electrical wiring (6),

- the said fixed element (2) being connected to a cylinder (8) of carbon dioxide,

- through an inlet pipe (9) coupled to an intake connection (10) with a non-return valve (11),
- and with a line (12) in communication with the actuating solenoid valve (5).

- the moving element (13) comprising, on its top part, a locking sleeve (14), the said locking sleeve (14) incorporating a sensor (15) with a float (41), directly connected to a programmable control panel (7) via electrical wiring (6),
- the moving element (13) being connected to the beverage dispensing system

- by means of a flood hose (16) connected to a beverage dispensing tap (18) via a linking device (17) that connects to a flood hose (16) or contact hose (19),

- the said moving element including a bleed valve (20)

- the fixed element (2) and the moving element (13) coupled inside the fixed element (2), being firmly attached by means of a pin (21) inserted between the locking sleeve (14) of the moving element (13) and the threaded joint (22) on the rod of the pneumatic piston (4).

2. Extractor valve for beverage dispensing, according to the preceding claim **wherein** the fixed element (2) comprises a cylindrically-shaped casing with an inner cavity (23), with a machined groove (24) positioned longitudinally to said casing, the said casing incorporating

- on its top part, two bosses (27) positioned at 180°,
- on its middle area, a threaded projection (25) for coupling a lever handle (26) and an intake connection (10)
- and on its bottom part, a swivel-action machined anchoring (29), for coupling to a barrel (28).

3. Extractor valve for beverage dispensing, according to the preceding claims, **wherein** the closing cover (3) of the fixed element (2) has the shape of a reduced-thickness prism, incorporating two lugs (30) positioned at 180°, in alignment with the bosses (27) of the casing of the fixed element (2), incorporating on its surface, threaded bore holes (31) for coupling with the pneumatic piston (4).

4. Extractor valve for beverage dispensing, according to the preceding claims, **wherein** the moving element (13) comprises a cylindrical valve body which incorporates

- on its top part, a cavity (36) with a threaded section (37),
- on its middle area, a distribution manifold (32), provided with a blind bottom connection (38), a top connection (39) for bleeding, and a side outlet connection (40) for coupling with flood hoses (16),
- externally, on its bottom part, a cylindrical section of a smaller diameter, with O-rings (33) and a connection nozzle (35) positioned at its free end,
- and internally, on its bottom part, an anti-drip ball (34) made of silicone.

5. Extractor valve for beverage dispensing, according to the preceding claims, **wherein** the locking sleeve (14) comprises two facing extensions (42), comprising at the bottom end a threaded section (43), the

said locking sleeve (14) incorporating in its central part a threaded through-hole (44) where the sensor (15) is housed.

6. Extractor valve for beverage dispensing, according to the preceding claims, **wherein** the linking device (17) comprises a frame (50) with an inlet cover (51) and opposite it an outlet cover (52), both covers (51 and 52) incorporating coupling connectors (53), the said linking device (17) incorporating branch connectors (54) to connect the various flood lines (47), return lines (46) and beverage lines (48) that run inside the flood hoses (16) and contact hoses (19), the said linking device (17) being tightly sealed by joining the frame (50) and both the covers (51 and 52) by means of contact adhesive.
7. Extractor valve for beverage dispensing, according to the preceding claims, **wherein** the connection between the extractor valves (1) and the linking device (17) is fixed by flood hoses (16).
8. Extractor valve for beverage dispensing, according to the preceding claims, **wherein** the connection between the linking device (17) and the beverage dispensing tap (18) is fixed by flood hoses (16).
9. Extractor valve for beverage dispensing, according to the preceding claims, **wherein** the connection between the linking device (17) and the beverage dispensing tap (18) is fixed by contact hoses (19).

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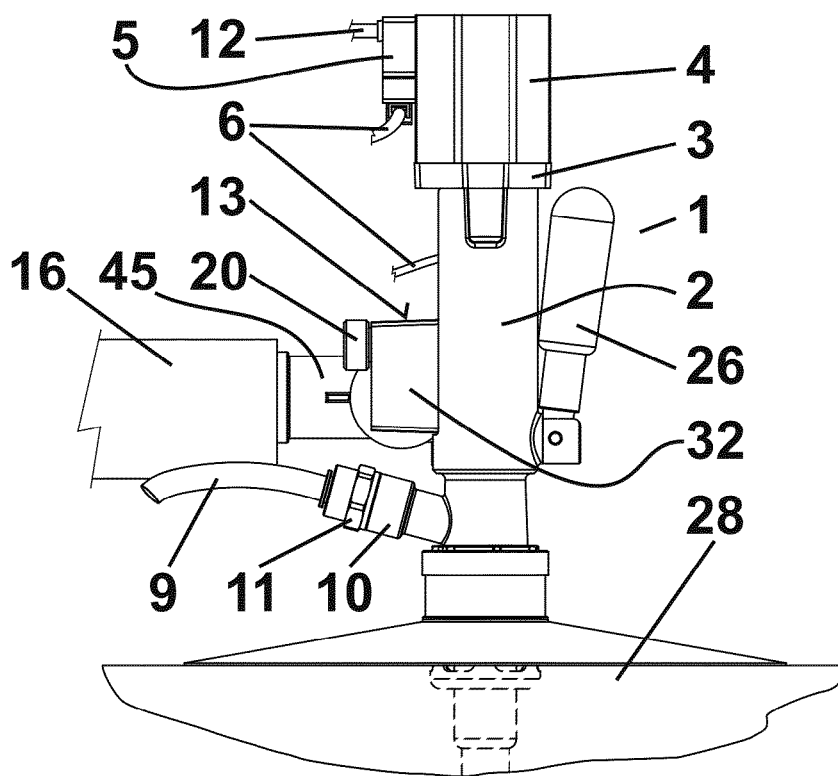


FIG.1

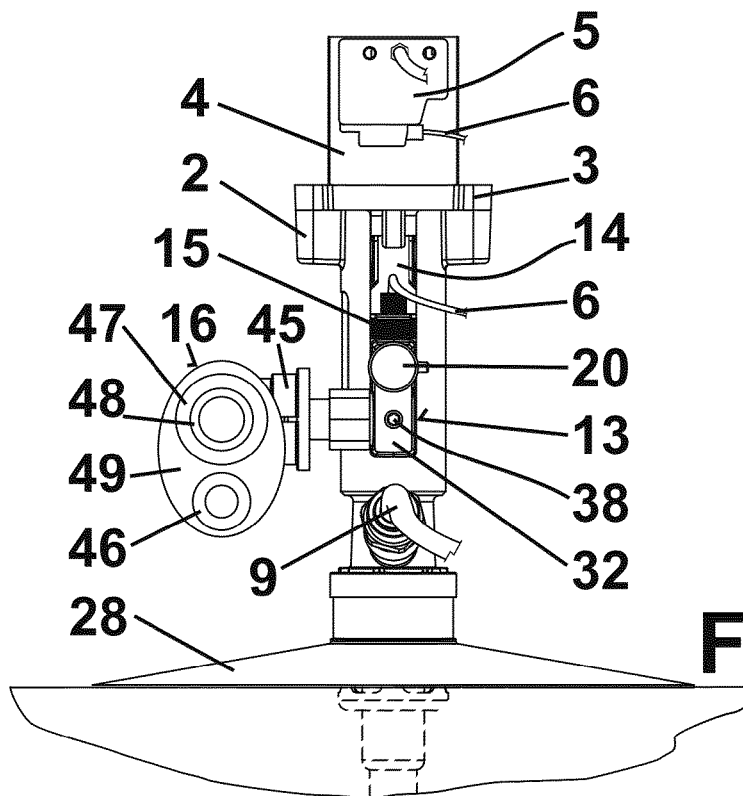


FIG.2

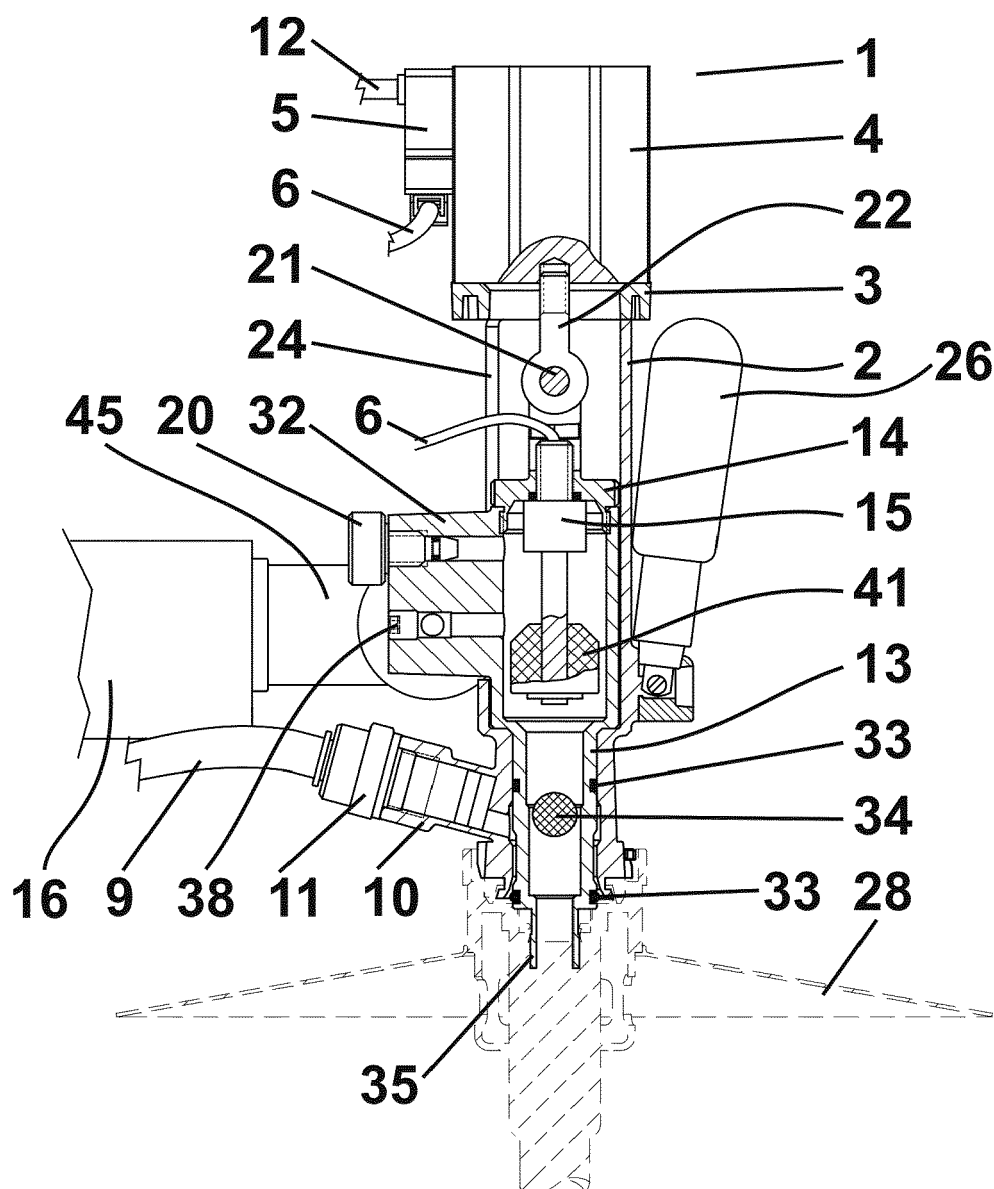


FIG.3

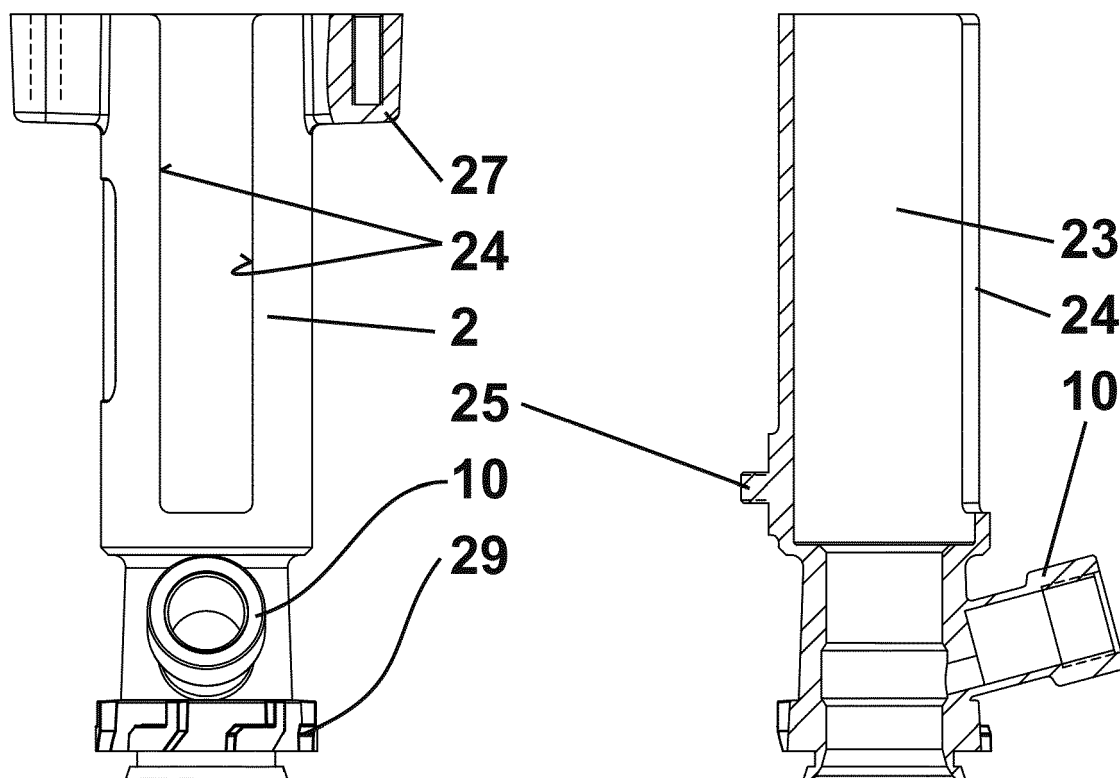


FIG.4

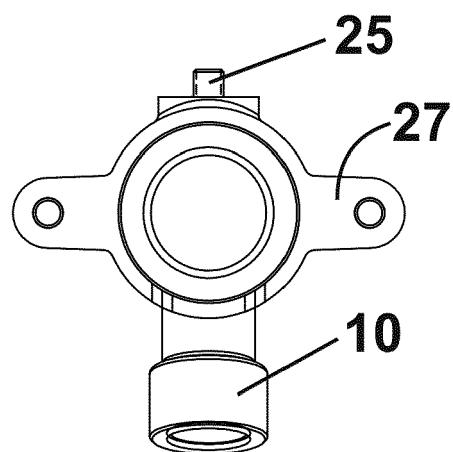
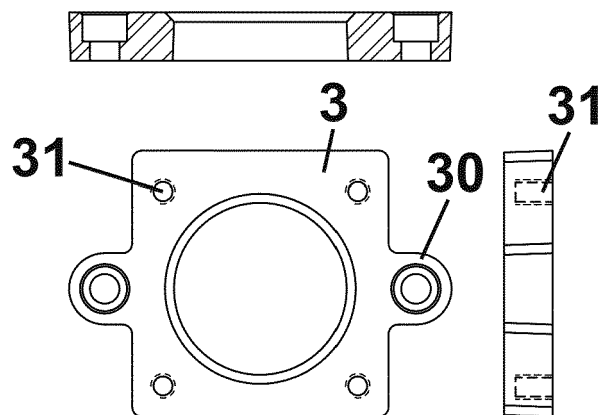


FIG.5



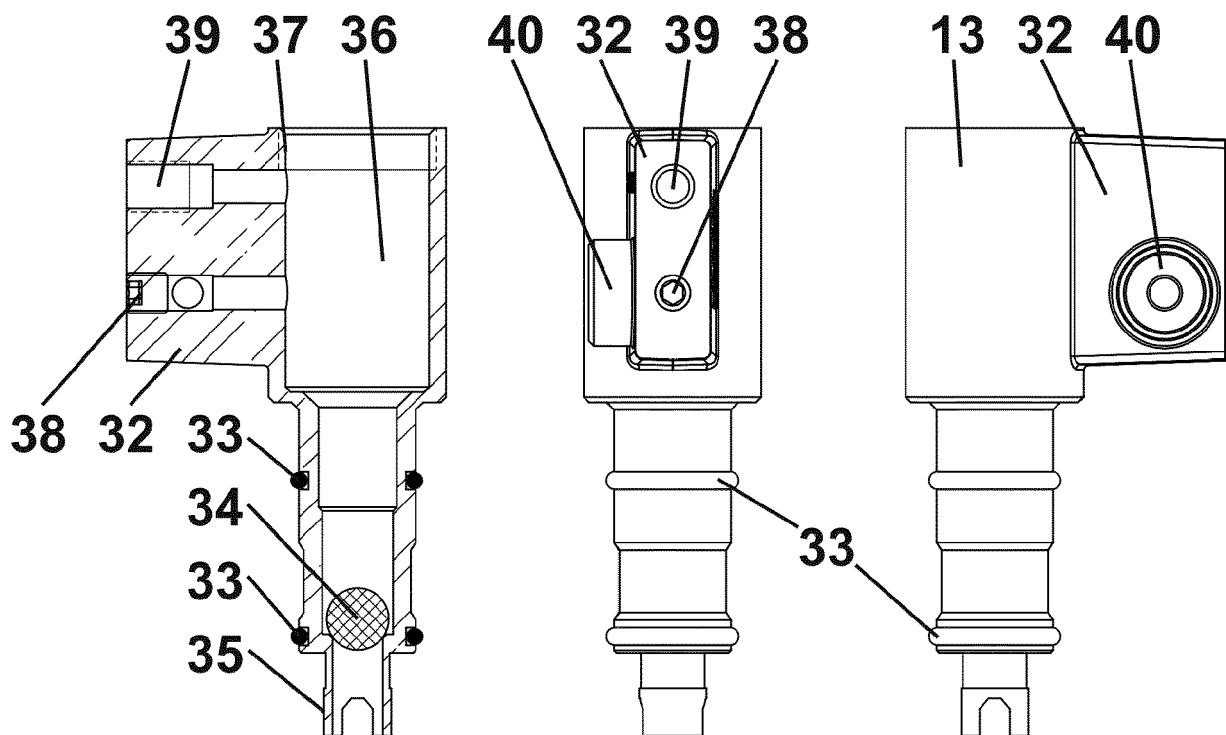


FIG.6

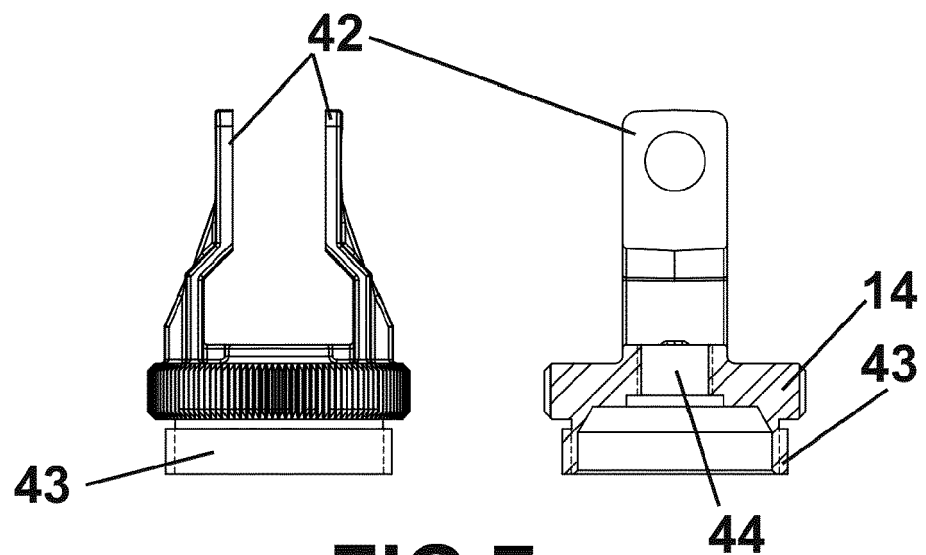


FIG.7

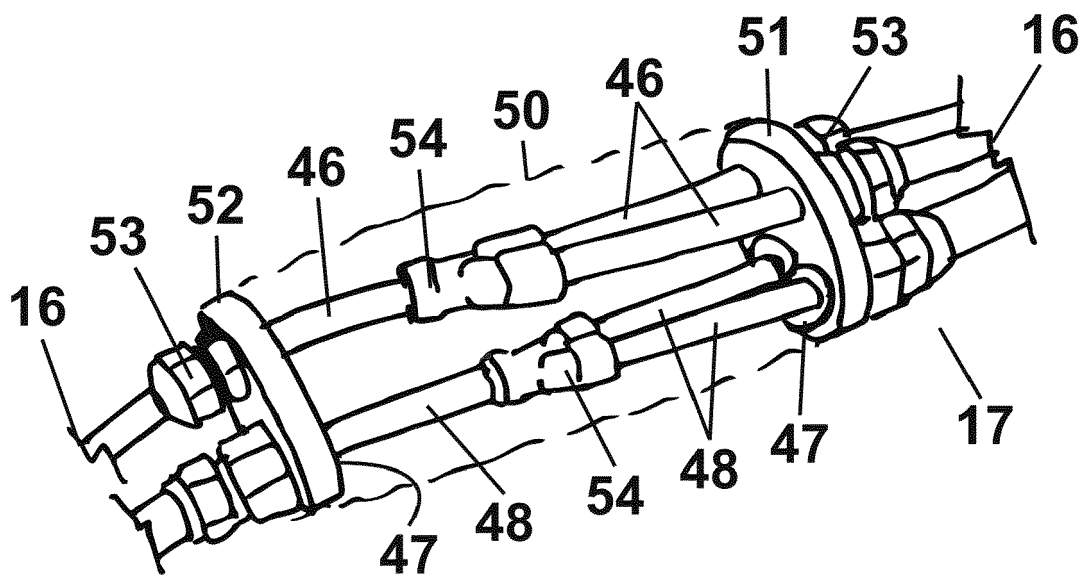


FIG. 8

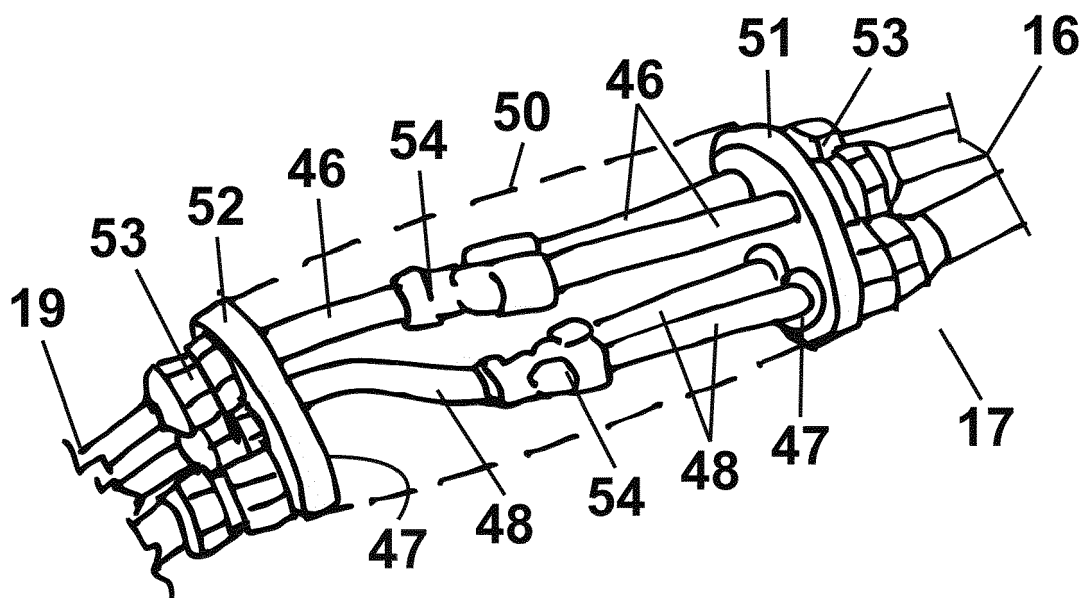


FIG. 9

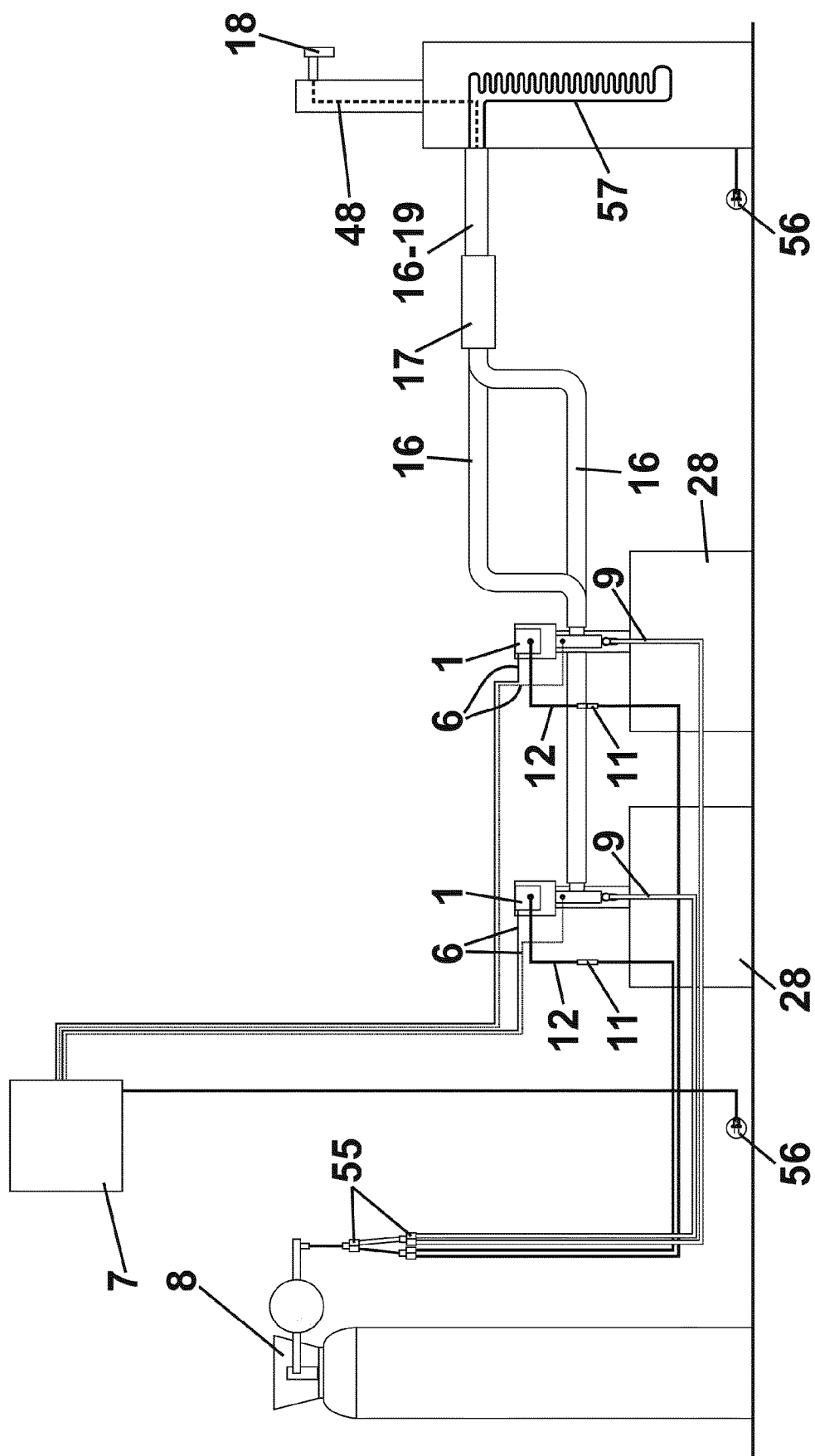


FIG.10



EUROPEAN SEARCH REPORT

Application Number
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A	GB 2 210 680 A (WHITFORD JOHN [GB]; PENRYN BUILDING CO [GB]) 14 June 1989 (1989-06-14) * page 11, line 4 - page 12, line 5 *	1	
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			B67D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 April 2018	Examiner Desittere, Michiel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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The members are as contained in the European Patent Office EDP file on
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10-04-2018

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GB 2210680	A	14-06-1989	NONE

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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