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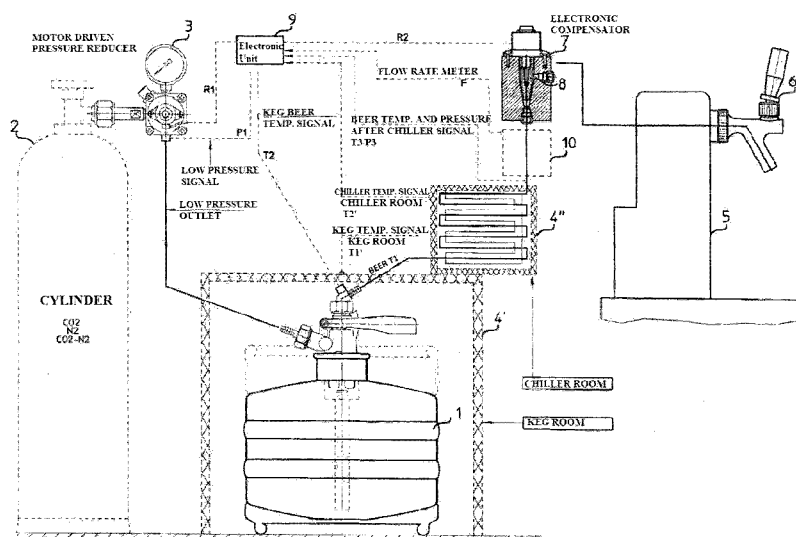


Fig. 1b

(57) Abstract: The present invention relates to a control system of tapping carbonated and non-carbonated beverages from installations to be used in refreshment business. More particularly, the present invention discloses a system, embodied by use of proper instruments, allowing to regulate and maintain always in optimal conditions, pressure as a function of temperature of storage and deliver of the beverage.

CONTROL SYSTEM FOR A BEVERAGE DISPENSER

The present invention relates to a system of controlling tapping of carbonated and non-carbonated beverages from installations to be used in refreshment business. More particularly the present invention relates to a system, implemented through use of proper equipment, allowing to set and hold optimal conditions of pressure as a function of the temperature of storage and delivery of carbonated beverages.

The installations for storage and tapping of beverages, more particularly the carbonated ones, generally comprise a number of elements adapted to keep the correct temperature and pressure of the beverage both inside a keg and in the final delivery stage. It is well known that a carbonated beverage should comprise inside a determined quantity of gas, and be served at a determined temperature in order that its taste at the customer's palate be considered good. It is also known that these installations are subject to variable climatic conditions, due to summer or winter outer temperatures, affecting temperature and carbonation of the stored beverage, if the thrust pressure is not adequately adjusted. Moreover, storage duration or quantity of tapped beverage also affect quality of the delivered product as well as latency between two subsequent deliveries or delivery cycles.

A system is generally installed and calibrated by a skilled technician, who sets the main components of the system, to optimize delivery and storage of the product during its consumption. The main components generally comprise a keg and a cylinder containing high pressure gas (usually CO₂, N₂ or their mixtures) which is let into the keg and set by a manual pressure reducer, lowering the pressure at the cylinder outlet at the required value.

Said gas, passing through the reducer, enters the keg thus forming a plenum chamber. When the tap is opened, this pushes the carbonated beverage, e.g. beer, through the keg outlet pipe up to the consumer's glass. Two systems are generally used to regulate the temperature. In the first system the keg is entirely placed in a cooling room under controlled temperature such as a frozen counter. In the other system the pipes connecting keg and tap pass through a fast cooling unit, such as a coil dipped in a water bath at the melting ice temperature, also referred to as ice bank or chiller. Before the outlet tap a flow rate compensator is also provided, to adjust the beer outflow.

The beverage pressure is generally regulated so as to overcome the flow resistance of the hydraulic circuit, but for carbonated beverages, when the used gas is CO₂ or a CO₂/N₂ mixture, pressure must be adjusted also to keep constant the beverage carbonation level, and for beverages like beer, also to prevent frothing because of gas leak from beverage. The consequent high tapping pressures oblige to “brake” the beverage flow before reaching the tap, so as to obtain a determined manageable outflow of beverage to the glass. To tap beer, regulation is usually made to obtain a flow rate of 2 to 2.5 L/min of delivered beer. Moreover, in braking the flow it is also necessary to avoid formation of a swirling flow that would cause a decarbonation of beverage and excess frothing during tapping. These flow regulations are managed by means of the mentioned flow compensator, just designed for this purpose.

In a system of this kind, the pressure reducer and the compensator are regulated and set manually during the calibration operations by a skilled technician, during the stages of installation or periodical maintenance of the system. The compensator may possibly be adjusted even by the user, since the compensator is arranged on the tapping column. On the contrary, the pressure reducer cannot be adjusted by the user during the tapping operations.

The reducer outlet pressure should theoretically be a linear function increasing together with the temperature of the carbonated beverage. Indeed the reducer outlet pressure is given by the beverage equilibrium pressure rising linearly together with temperature, plus the system flow resistance, caused by distance and difference in height between keg and delivery point. As above said, normal practice is that the reducer regulation is fixed and is calibrated for different environmental conditions only twice in a year, at summer-winter change and viceversa.

It is clear that the conditions at the time of calibration, namely the “theoretical” conditions under which the reducer is set, do not correspond to the actual environmental every day and continuously variable conditions. Therefore the system operates for most part of the time under temperature conditions not corresponding to those existing at the calibration time. Moreover, variations are not considered in respect of the steady state operation, due to the quantity of delivered beverage, which is very unlikely to be always the same, and indeed it changes according to hour of the day, days with higher or lower demand or days where the system is not used.

As already said, the compensator may be regulated by user, and this allows user tapping the beverage to adjust the flow factor given by the compensator (namely the localized flow resistance), that may increase or decrease the frothing trend of some beverages like beer. However the user does not and cannot take into account the regulations set on the reducer in the calibration stage, so that the user should continuously adjust both the compensator and the reducer, in order to obtain a good quality of beverage; on the contrary it will be difficult nowadays to adjust the compensator precisely, in respect of the reducer calibration.

Therefore the tapping process is at present a process that must take place under conditions as close as possible to the steady state as it was calibrated and set the entire system, to obtain optimal operation and quality of the delivered product.

When tapping occurs under non-optimal conditions, for instance if operator in delivering beverage finds that there is too much froth, beverage lost the correct carbonation or is not sufficiently cool and so on, then he tries to manually remove one of these defects by acting on the compensator or what is worse, trying to modify the reducer settings. In this way operator in the end risks to produce malfunction of the system, with consequent need of calling maintenance and related costs, and possible operation shutdown with economic loss. It may also happen that the reducer is no more correctly regulated when the cylinder is nearly exhausted, and also in this case if the operator modifies the reducer settings, this may lead to malfunction.

In addition, the required tapping pressures, which are then dissipated by the localized loss of compensator, manually operated randomly by operator, cause a much greater consumption of gas; the tapping pressures (required to prevent excess frothing for some beverages like beer at high temperature) cause an earlier gas consumption of the cylinder, needing further maintenance and cost for its change, and it is also well known that CO₂ dispersion in the atmosphere is very negative for the environment.

Document DE 4222424 A1 discloses the electronic management of pressure in the keg in respect of temperature but is focussing on an automatic mechanism of tilting the glass (simulating a barman's action) and straightening it when a sensor (like those of the automatic faucets) detects the presence of the correct filling level. There is no indication of electronic flow management with a compensator allowing to balance thrust variations in the keg caused by tapping with CO₂ reduction.

Document EP 1528036 A2 discloses a conventional faucet with usual flow

compensator, to be actuated manually or preset. It does not change automatically the compensator position, nor discloses tapping under various conditions of gas thrust.

Document FR 2653421 A1 discloses a system of electronic management of pressure in the keg but there is no disclosure of an electronic management of compensator.

Document FR 2659314 A1 discloses a further development of the preceding document and additionally proposes a solution for managing the tapping pressure in the keg (solution not using an electronic pressure reducer), and a solution for preventing frothing caused by the length of beer falling into the glass. There is no indication of electronic compensation of flow.

Finally document US 2003/080142 A1 does not disclose an electronic management of compensator and relates more particularly to a system to keep a pressure balance in a container, detecting opening of the beer delivery tap to determine when it is time to reset the pressure in the keg as a function of temperature.

All the above discussed documents propose only tapping operations taking into account the beer temperature to determine the thrust pressures, but do not consider that by using an electronically variable compensator, different tapping strategies may be adopted (in comparison with that being based in function of temperature only) according to specific sale time, which take into consideration unbalances in the beer thrust, that are then automatically again balanced by the electronic compensator.

The object of the present invention is to provide a system of delivery and storage of carbonated beverages in kegs, which is capable of self regulation so as to operate to the best in any condition of the installation, thus providing at any time the best quality of beverage.

A further object of the invention is to provide for a system requiring very little maintenance, since the system is able to be self-regulating, with great economic advantage for the user.

Another object of the present invention is the possibility of saving on gas consumption in view of the self-regulation of the system, with an additional economic advantage.

Still a further object of the present invention is to provide for a system having an enhanced environmental impact, because the optimization of the mutual

regulation of reducer and compensator, gas waste is reduced to a minimum and is not dispersed into the environment.

An additional object of the present invention is to provide for a system which is managed, regulated and controlled in an autonomous way, handling and holding the conditions of optimal storage and delivery of beverages at any time.

A further object of the present invention is to provide for a smart control system that is able to improve the active safety against gas leaks and in general overpressure in pressurized containers.

These and other objects are achieved by the system of the present invention, relating to installations for storage and tapping of beverages, more particularly carbonated beverages, generally comprising a keg or similar container, a cylinder containing a pressurized gas, a pressure reducer, a temperature adjusting unit and a flow compensator; more particularly in said system compensator and reducer are regulated by an automatic unit for the dynamic adjustment of the installation settings as a function of the conditions and/or requirements of the system. According to the present invention, the compensator constantly balances the actions of the reducer keeping constant the tapping flow. Therefore the two elements, compensator and reducer, are mutually adjusted according to the actions of either component in the transient states: each element acts selecting the behaviour logic which is more consistent with the present setting of the other element.

In view of the real-time automatic control of pressure, it is possible to detect in a very simple and economic way, very little gas leaks in the installation even in the business closure hours and to stop timely the system, should they occur. Also in view of the automatic control it is possible to prevent the reducer of delivering pressures higher than the operating pressure of the keg. These two features are active safety systems in an installation, which were not taken into account up to now and are not provided in the prior art installations.

The system of the invention allows to optimize gas consumption by tapping at lower pressures than the standard ones, with a clear economic saving and improvement in the environmental impact. Moreover, said automatic regulation allows to optimize delivery of beverage at any time, achieving the correct tapping carbonation and tasting temperature.

In addition, in a particularly advantageous way, operator should no more regulate any setting, thus greatly simplifying the tapping operation. This enhances

the performance of the installation, that does not risk to be put in a position of malfunction by wrong handling of the operator.

Finally, in a very advantageous way, the installation provided with the self-management system of the present invention, even in case of malfunction is in a position to stop automatically and indicate the problem even preventively, thus allowing a quick and timely maintenance intervention. This is particularly useful because it is possible to make a targeted intervention, not requiring to check the entire installation. Moreover, delivery of beverage is interrupted when said beverage is not in the correct condition for being delivered, therefore allowing to avoid useless waste.

Thus it is clear that this involves less maintenance interventions with consequent economic saving for the user of the installation. Operative reliability of the installation therefore is greatly enhanced, and consequently also its performances.

These and other advantages of the control system for installations of storage and delivery of carbonated beverages according to the present invention, will become apparent from the following detailed description of a preferred embodiment to be read with reference to the accompanying sheets of drawings, in which:

Fig. 1 shows a prior art installation with keg placed in a refrigerator;

Fig. 1a shows a prior art installation inclusive of a chiller;

Fig. 1b shows an embodiment of the system of the invention, adapted to store and deliver carbonated beverages;

Figs. 2a and 2b show two embodiments of pressure reducer adapted to achieve the objects of the present invention;

Figs. 3, 3a and 3b show three embodiments of compensator, each adapted to achieve the objects of the present invention; and

Fig. 4 shows the system of the present invention with the addition of a variation.

With reference now to Figs. 1, 1a and 1b, a conventional prior art installation for storage and tapping of carbonated beverages is schematically shown in Fig. 1, to be compared with the same kind of installation, but provided with the system described in the present invention, shown in Fig. 1b. This type of installation, as already mentioned in the introductory part of this description, comprises in all the installations of Figs. 1, 1a, 1b, a keg 1, connected to a cylinder 2 containing a gas

such as CO₂, N₂ or their mixtures; a reducer 3 connected at its inlet to the cylinder, adjusting the gas pressure to the desired value, and at its outlet to the keg 1. The system further comprises, according to the kind of cooling unit provided in the installation, a chiller group 4'' that in Fig. 1a is shown as a cooling unit through which the beverage pipe is passing, arranged between keg 1 and a tapping faucet 6 and provided with a cooling coil dipped in a water bath at the temperature of melting ice. Alternatively, as shown in Fig. 1, keg 1 may be inserted directly inside a proper refrigerating unit 4'.

Finally, the installation comprises a tapping unit 5 that in the prior art systems of Figs. 1 and 1a, comprises a tapping faucet 6, a flow compensator 7 integral with unit 5. Said compensator 7 is usually handled by operator to adjust the beer flow, e.g. when too much beer or too little beer is delivered, too much froth is generated and so forth.

On the contrary and as shown in Fig. 1b, in the installation managed by the system described in the present invention, all the main constitutive elements of the system are connected, monitored and controlled by an electronic control unit 9. Moreover, in case of the illustrated preferred embodiment, compensator 7 is not accessible by operator but is actuated by the control unit 9.

Thus in this installation shown in Fig. 1b, the electronic control unit 9 is connected to the reducer 3, that sends a measure signal P3 of the reduced gas pressure (tapping pressure) outgoing from cylinder 2. The electronic control unit 9 receives also either a temperature control signal T1 from keg 1 (when keg is dipped in a refrigerator 4') or a temperature signal T1' (when the system includes a chiller 4'') as well as a temperature control signal T2 of the beverage contained in keg 1; finally, again in case of presence of chiller 4'', the electronic control unit 9 receives a temperature signal T3 and a pressure signal P3 of the beverage outgoing from chiller 4''. At last unit 9 receives a beverage flow signal F from a flow rate meter 10 upstream the compensator. A variation of the system shown in Fig. 1b is illustrated in Fig. 4, in which the manual faucet 6 is replaced by a suitable known solenoid valve 41, managed by the electronic unit 9. Faucet 42 in this way becomes an automatic device. This variation allows the system to operate also with reset deliveries or in self-service mode or in a so-called vending installation.

It is clear that the control unit 9 here described is capable of regulating automatically all the essential parameters for the best storage and delivery of

beverages without leaving anything to manual adjustment. More particularly, the elements that must be mutually regulated one another, namely reducer 3 and compensator 7, are monitored and regulated continually by the electronic unit 9, which is therefore able to keep the optimal conditions of the installation and of the beverage delivery.

In Figures 2a and 2b two different types of reducers as well as in Figures 3, 3a, 3b three different kinds of compensators are illustrated, all suitable for the objects of the invention.

In a preferred embodiment of the present invention, the installation comprises the reducer of Fig. 2a and the compensator of Fig. 3a; more particularly the reducer illustrated in Fig. 2a is a motorized reducer with safety release, comprising a lower body 19 in which a high pressure valve 20 is inserted, an upper body 21 in which an electronic linear stepping motor 22 is arranged. Inside the lower body 19 there is a high pressure inlet duct 30, a low pressure chamber 31 and a corresponding outlet duct 32. Valve 20 arranged in the lower body 19 controls the communication between inlet duct 30 and outlet duct 32. The linear stepping motor 22 is connected to the upper body 21 e.g. by screws 25 or elastic springs 26 which are calibrated to withstand the thrust of low pressure on the O-ring 27 up to a determined maximum value variable for instance between 6 and 10 bars. Over such a value, said springs 26 allow the motor 22 to be released, so that motor 22 rises up to screws 25 acting as limit stop, thus achieving closure of the high pressure valve in case of malfunction due e.g. to power failure. When the solution with screws 25 but without springs 26 is adopted, said screws 25 act as a rigid fastening of motor 22 to body 21. Motor 22 of the motorized reducer 3', in a particular advantageous way, acts directly on the high pressure valve 20, so that the electronic actuator 22 requires moderate forces for its operation, this allowing to use low price electronic actuators 22, thus optimizing the installation costs besides providing for a direct and consequently quicker and better control of valve opening.

The only inconvenience of the above described reducer 3' is that, in case of power failure during operation, if the high pressure valve 20 is open, this valve remains open. In order to get round this problem, in the present invention the control unit 9 is provided with a safety subsystem: for instance said electronic control unit is provided with capacitors suitably dimensioned and adapted to supply to the linear stepping motor 22 the current required to achieve the closure, in case of power

failure. An additional safety subsystem may be implemented for instance through springs 26, here acting as mechanical closure element, and said release springs 26, over a predetermined pressure, do not hold motor 22 any more, letting it to rise, with consequent closure of the high pressure valve 20.

A second embodiment is illustrated by the motorized reducer 3' of Fig. 2a, coupled with the membrane motorized reducer 3'' of Fig. 2b. In this type of reducer 3'', piston 28 of electric motor 29 acts to adjust compression of adjusting springs 34 of a traditional prior art membrane pressure reducer 35. Therefore the electric motor 29 acts directly on the adjusting spring 34 of the membrane, so that in case of sudden power failure the valve closes because of the pressure thrust on the membrane. In this case the advantage is that no additional safety systems are required, which however the control system of the present invention prefers to use to optimize the installation.

In Fig. 3 a compensator 7' suitable for the object of the present invention is illustrated. It is to be pointed out that several kinds of compensator may be used, all suitable for different reasons to the object of the invention, but each compensator should have some characteristics making that compensator particularly preferred in some conditions. For instance Fig. 3 shows an automatic compensator constituted by a cone 37 that slides inside body 33 and regulates the area of passage of the beverage incoming from the side "IN", thus allowing to actively modify the flow rate outgoing from the side "OUT". Position of cone 37 is controlled by an electronic linear stepping motor 22 adjusting cone opening through a lever system 38. Spring 35 helps cone 37 in the passage opening motion. Use of the described compensator 7' is advantageous when reduction of efficiency losses due to friction is desired, as the lever system allows to reduce the parts sliding one against another in comparison with the solution illustrated in Fig. 3b.

An alternative compensator 7'' is illustrated in Fig. 3a: said compensator 7'' is particularly suitable for a preferred embodiment of the present invention. In this compensator 7'', motor 22'' is directly connected to cone 36, and in this case it must be more powerful than motor 22, but in a particularly advantageous way it is apparent that compensator 7'' includes few elements, making its maintenance very simple when it is needed to be periodically disassembled for cleaning and changing possible worn parts.

Still another compensator 7''' adapted for the object of the present invention is

shown in Fig. 3b, where cone 40 is actuated by wedge 37, which closes also the orifice of body 39. The wedge sides on the shutter side have greater angles in respect of the cone side, so that the shutter movement is always wider than the motion of cone 40, which therefore is the only element regulating the flow rate. The advantage of this solution is to join in a single element the functions of faucet 6 and compensator 7, while the drawback is the lower efficiency due to the various sliding parts.

Basically, the electronic control unit 9 causes reducer and compensator to operate while being mutually informed of the actions of the other part, since they both depend on the single unit 9. This aspect of the present invention is particularly advantageous for handling the tapping operation during the transient state of filling a glass. For instance, if reducer 3 starts to let the tapping pressure decrease (CO_2 saving), compensator 7, expecting a flow decreasing trend due to less thrust, mainly corrects the decreasing flow and not the increasing flow that might be due to variations of faucet opening made by the operator. In addition, compensator 7 informed of the pressure (thrust) that reducer 3 is setting in keg 1, does not try to track the opening shuttings, thus removing the risk of possible flow variations that the operator may make unintentionally on the faucet.

In view of the foregoing description of the automatic control system of the present invention, it is clear that this system also allows to prevent beer waste. Indeed, when compensator 7 detects from flow meter 10 (if the meter is placed just at the keg outlet) that beer is exhausted, said compensator 7 closes, preventing to empty the duct length from keg 1 to faucet 6, and reducer 3 stops gas delivery. This allows obviously to save both gas and beer. As a matter of fact and as known by the skilled persons in this filed, when keg 1 is changed, the first beer flowing in an empty duct, tends to become froth and is discarded. Since the last beer of the previous keg remains in the duct, this waste is avoided.

Moreover, said system appears to be further advantageous with regard to gas saving, because in the periods of higher sale, with the cooling installations 4' or 4'' operating at steady state, the tapping pressures P_3 may preferably be kept from 30% to 50% lower than the standard values. This is due to the electronic compensator 7 and reducer 3, that are being reset to achieve a correct tapping with lower pressures P_3 .

Frothing is averted by the electronic control unit 9, controlling reduction of

pressure as a function of the environmental parameters (more particularly temperature), and the idle time between two subsequent tappings. Indeed, after a dwell time for instance between 300 and 600 seconds (according to temperature), the unit resets the standard thrust to avoid said problem.

At the business closure time the correct storage pressures are obviously reset. Savings occur especially in the high sale time, the most interesting factor for the business management.

A great advantage of this system is then the possibility of take action and remedying immediately for a problem of excess froth. Through a flow rate measurement one can immediately become aware when beer starts to froth in a circuit, because the flow rate detected by the compensator changes suddenly and in an anomalous way. Then the system is self-regulating to be reset on higher pressures and more braked flows in order to stop excess froth, if generated by poor pressures. This would be impossible in a traditional installation, where the operator should leave the tapping counter to reset manually the reducer.

The electronic unit 9 then processes the received signals of pressure temperature and flow rate, by means of proper dedicated algorithms and management software and sends real-time regulation signals R_1 and R_2 to reducer and compensator, respectively, thus achieving an automatic and continuous control of the installation.

Although the term "compensator" was used in the foregoing description, to indicate the element adjusting the beverage flow rate, it has to be understood that such a compensator might be physically implemented with various embodiments of devices, contrivances and members carrying out a function of braking the beverage flow, so that the term "compensator" should be intended both in the description and the claims, as comprising any device, contrivance or member carrying out such a function. Finally, it has to be understood that some preferred embodiments of the system of the present invention were described only as illustrative examples, but many variations, modifications, additions and/or substitutions of elements may be made thereto, without departing however from its scope of protection, as it results defined in the appended claims.

CLAIMS

1. A control system for delivery and storage of beverages, comprising at least a keg (1), a gas cylinder (2) containing high pressure gas, a pressure reducer (3), groups for temperature adjustment (4',4''), a compensator (7) and a faucet (6), said system being characterized by an electronic control unit (9) managing in an automatic and mutually controlled way, the settings of the pressure reducer (3) and of the compensator (7), wherein at each variation of the thrust pressure, due to variations of parameters or gas saving, such a variation of the compensator automatically corresponds as to keep constant the predetermined outgoing flow without requiring external intervention, thus achieving the best flow of beverage and a delivery constant time.

2. The control system according to claim 1, wherein said pressure reducer (3) can be, for example, a motorized reducer (3 ') or a motorized reducer with a membrane (3 ").

3. The control system according to any of the preceding claims, wherein said compensator (7) continuously balances the actions of said pressure reducer (3), to maintain a constant flow to the faucet (6), said reducer (3) being adjusted according to the behavior of said compensator (7) during the transient periods and vice versa.

4. The control system according to any of the preceding claims, wherein said pressure reducer (3) and said compensator (7) are regulated according to the logic of behavior defined by said control unit (9).

5. The control system according to any of the preceding claims, comprising a subsystem for the control of the temperature.

6. The control system according to any of the preceding claims, wherein the management of the installation by means of the electronic control unit (9) is self-regulated in real time according to parameters of pressure (P3; P1) and temperature (T2,T1,T1',T3) and a flow rate measurement (F).

7. The control system according to claim 6, wherein the automatic management of the installation includes safety systems, such as the detection of gas leaks within the installation.

8. The control system according to any of the preceding claims, wherein an additional safety sub-system, derived by the automatic management of the pressure, allows to inhibit the pressure reducer (3) from providing pressures higher

than the operating pressure of the keg (1).

9. The control system according to the preceding claims, wherein the active pressure control allows tapping with lower pressures than the standard ones, and so to reduce the gas consumption of the high pressure gas cylinder (2).

10. The control system according to the preceding claims, wherein the automatic adjustment allows at any time checking of the beverage tapping.

11. The control system according to the preceding claims, wherein the setting adjustment of the installation is managed by the electronic control unit (9) in a fully automatic way.

12. The control system according to the preceding claims, wherein in case of malfunction, said electronic control unit (9) switches the installation automatically off, and provides an indication of the failure.

13. The control system according to the preceding claims, wherein said faucet (6) is replaced by a suitable solenoid valve (41) or other automatic faucet (42) and managed by the electronic control unit (9).

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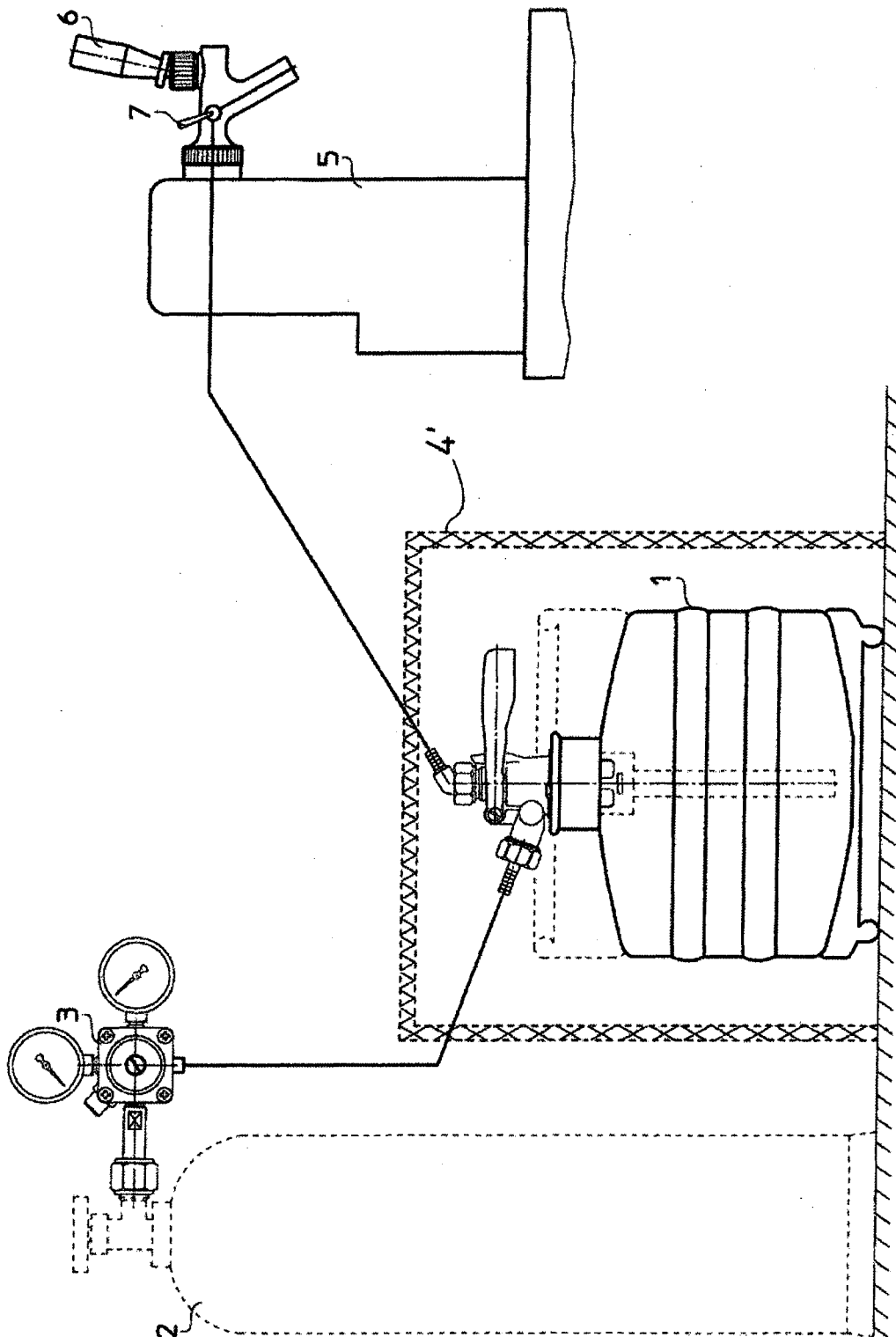


Fig. 1

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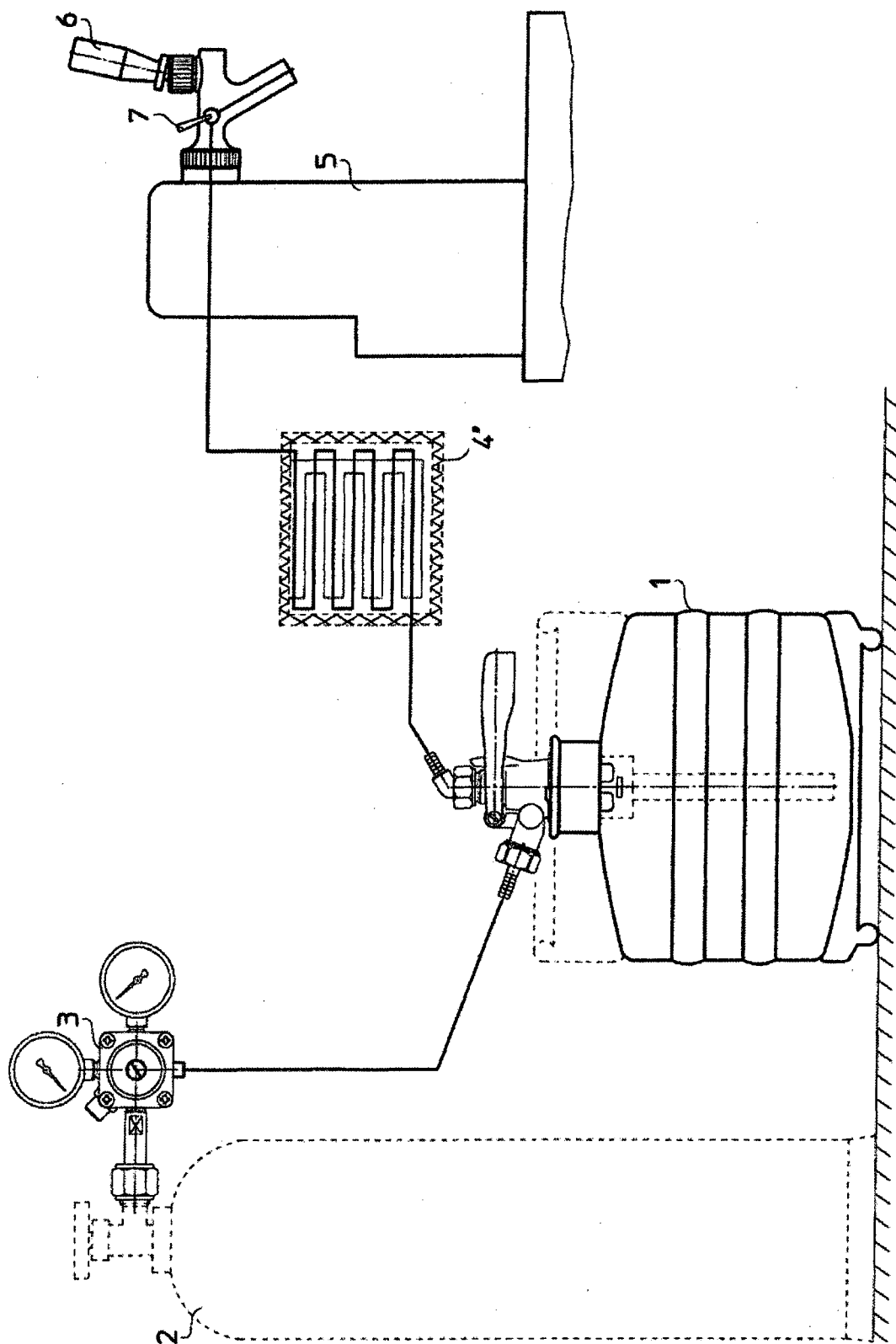


Fig. 1a

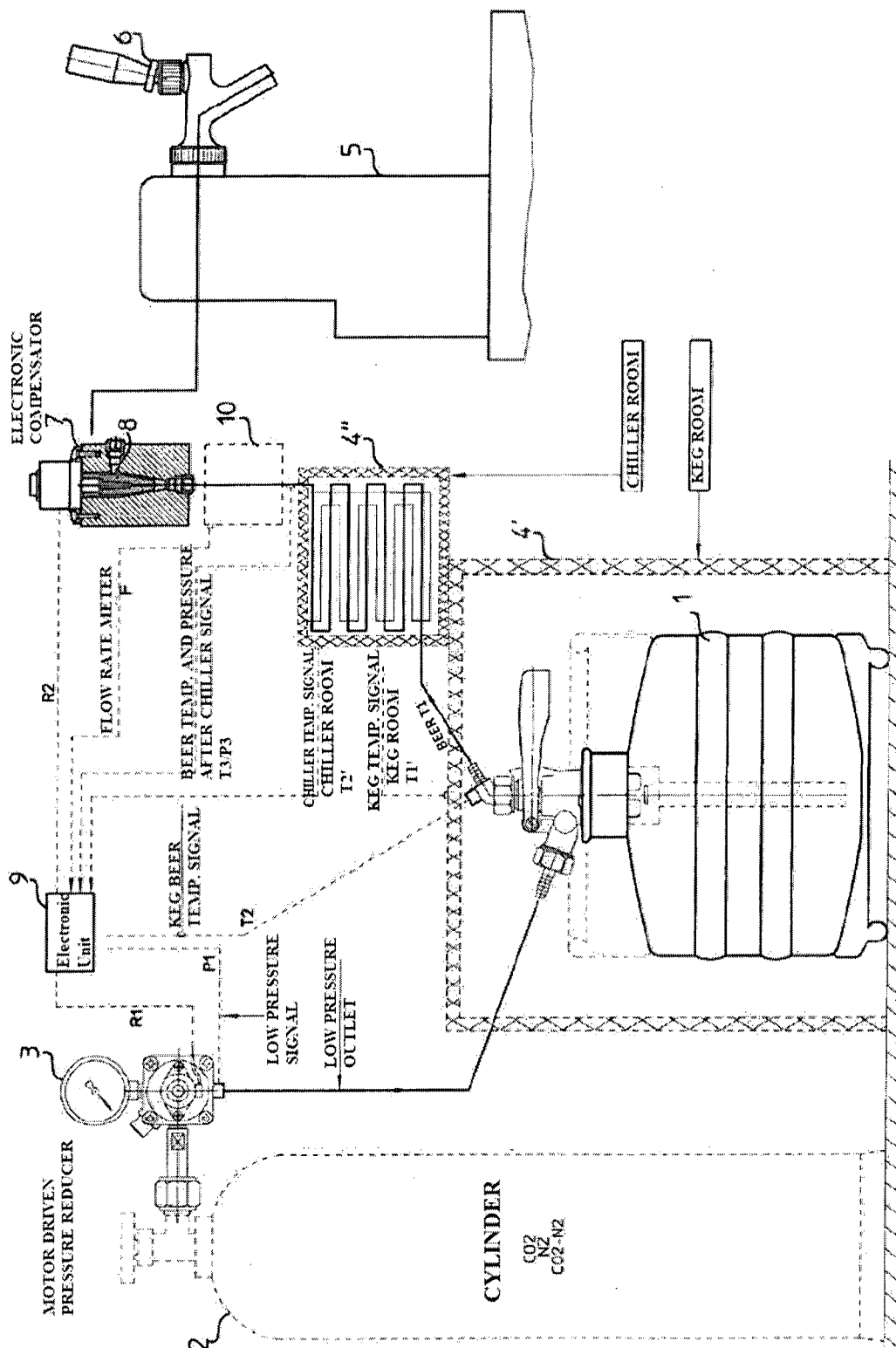
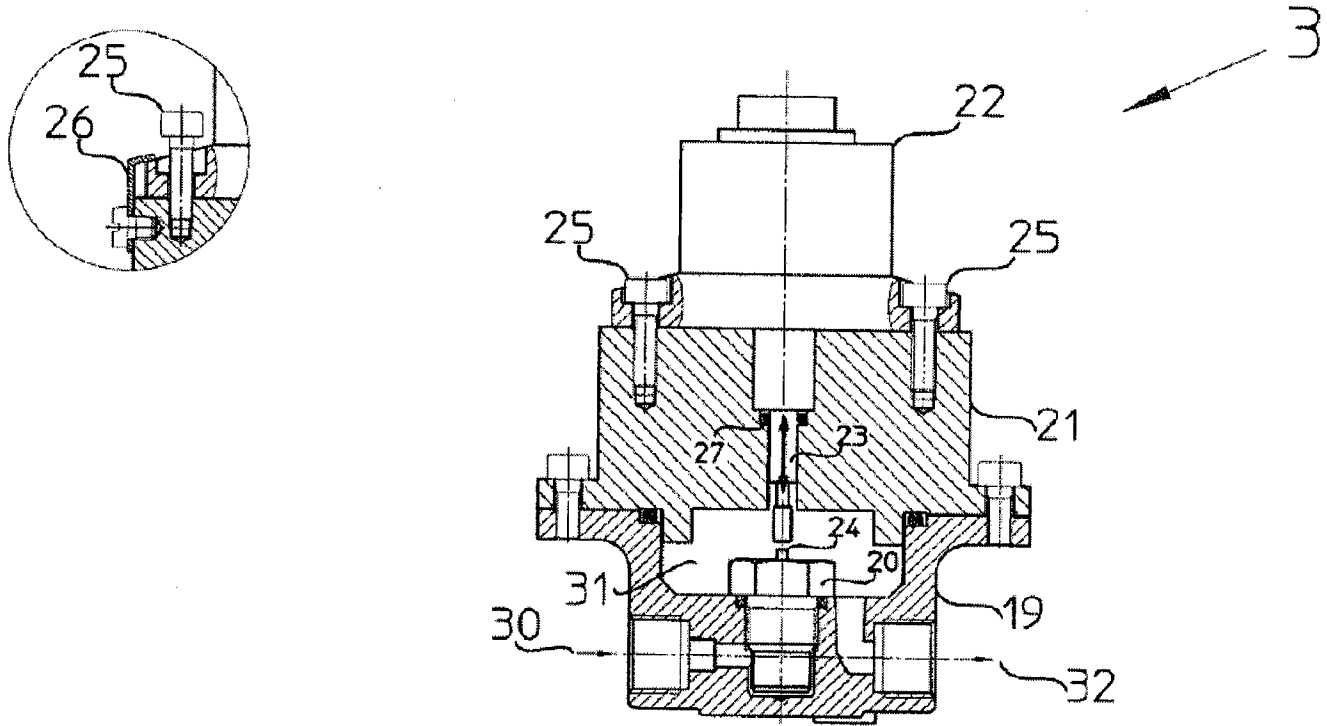


Fig. 1b



MOTOR DRIVEN PRESSURE REDUCER

Fig. 2a

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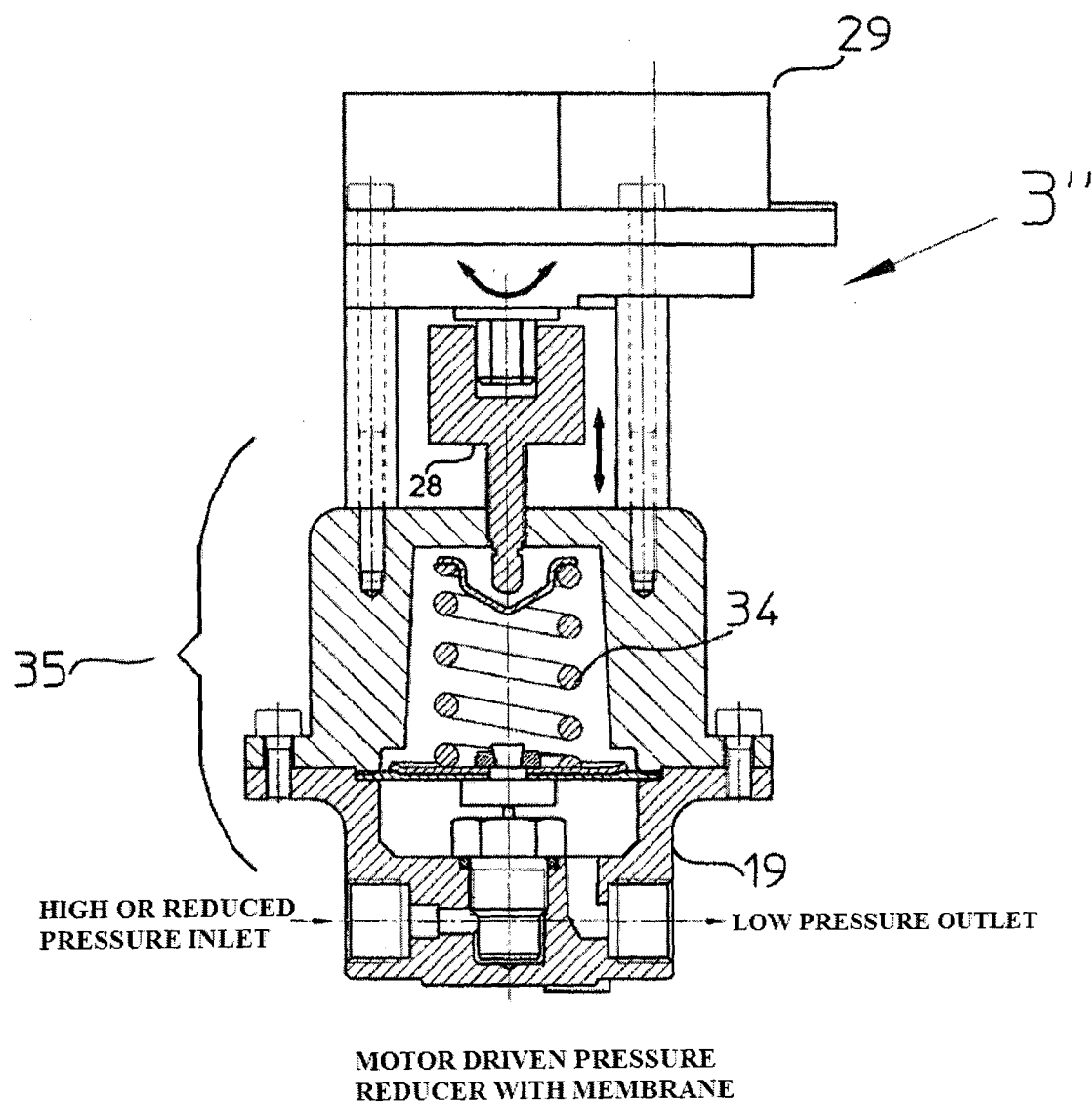


Fig. 2b

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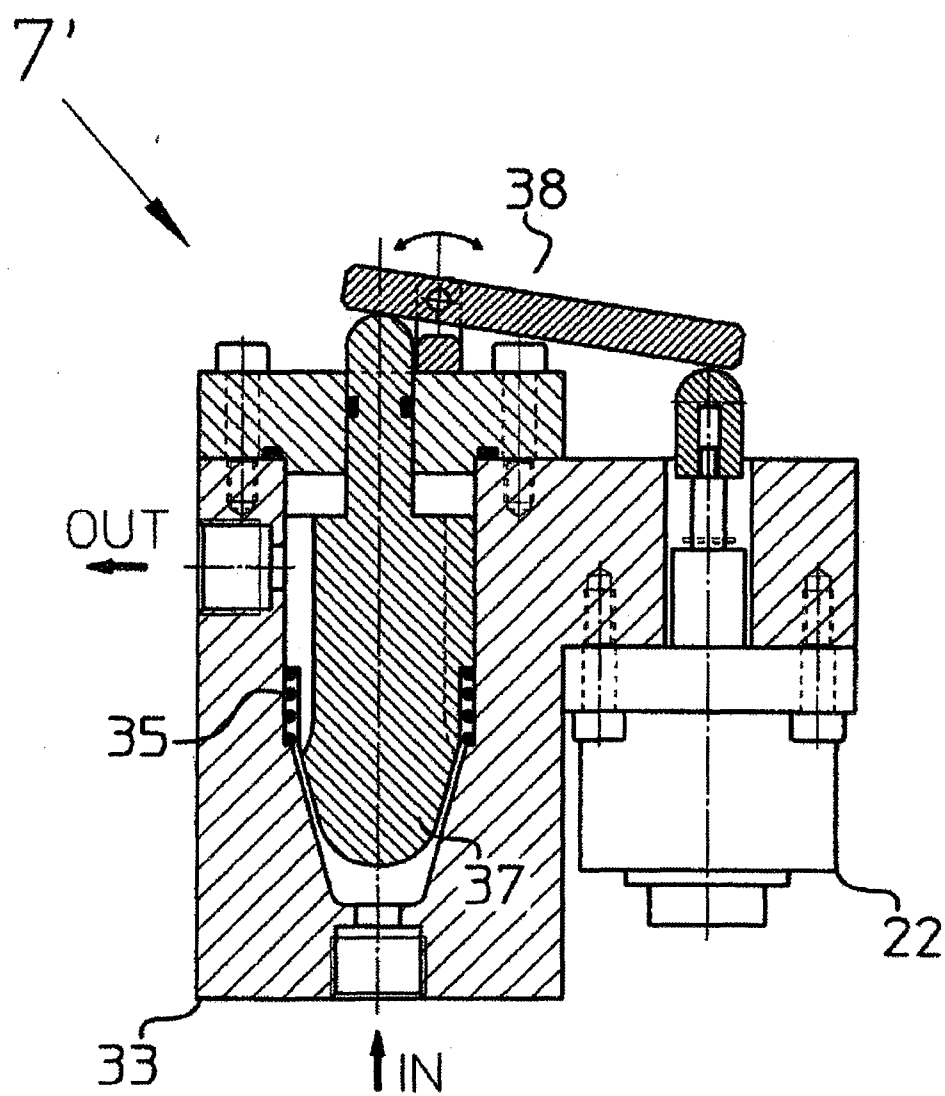


Fig. 3

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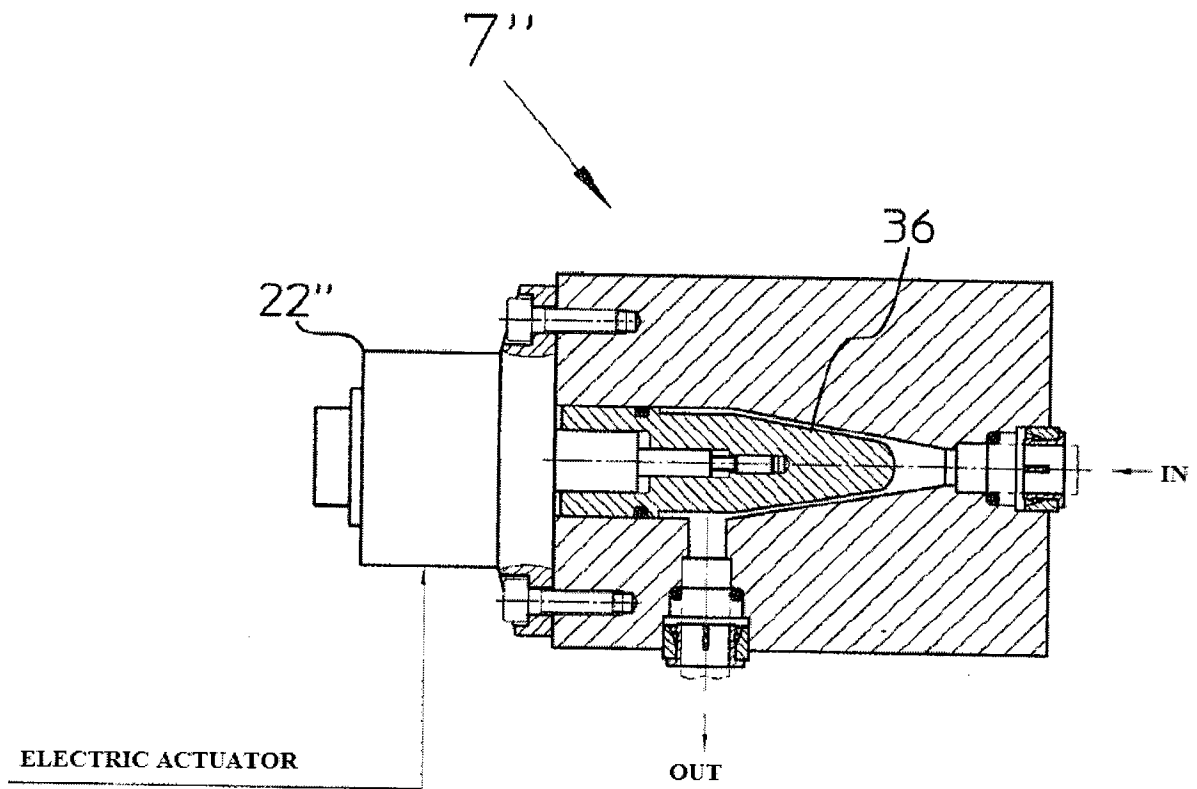


Fig. 3a

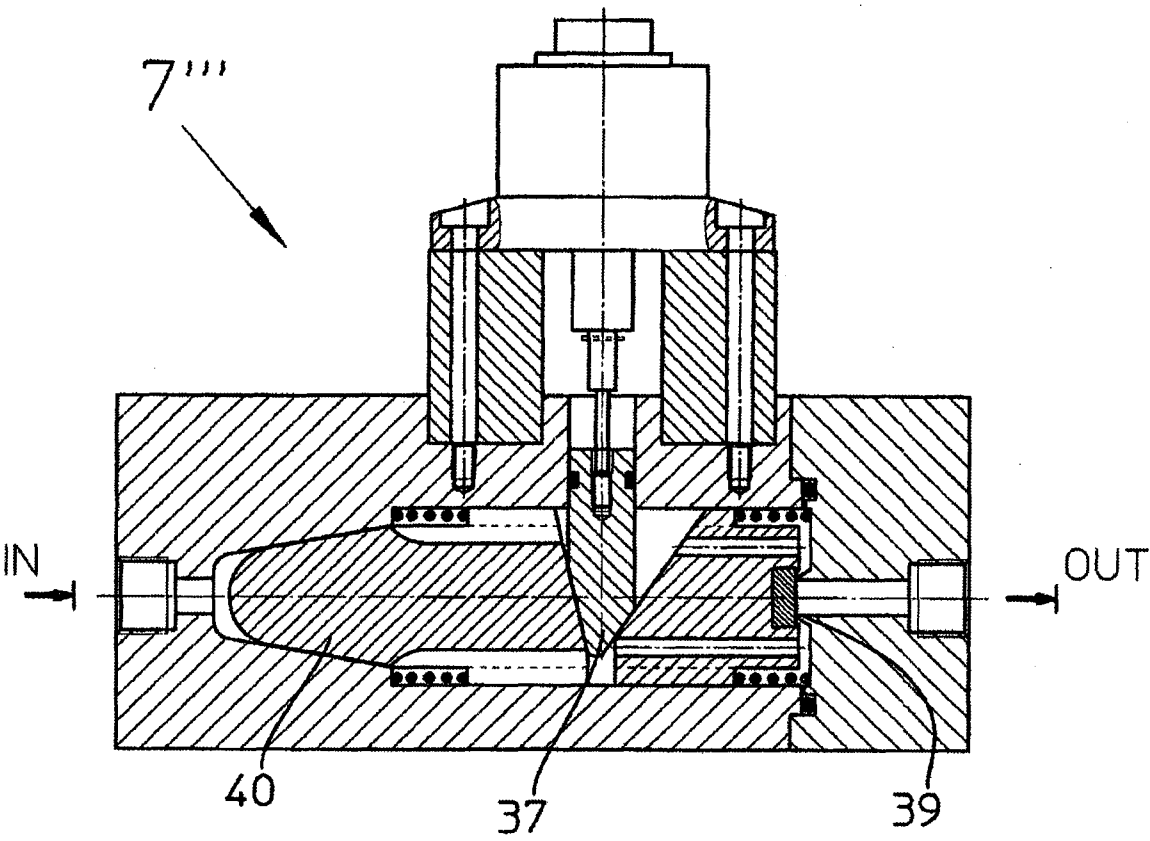


Fig. 3b

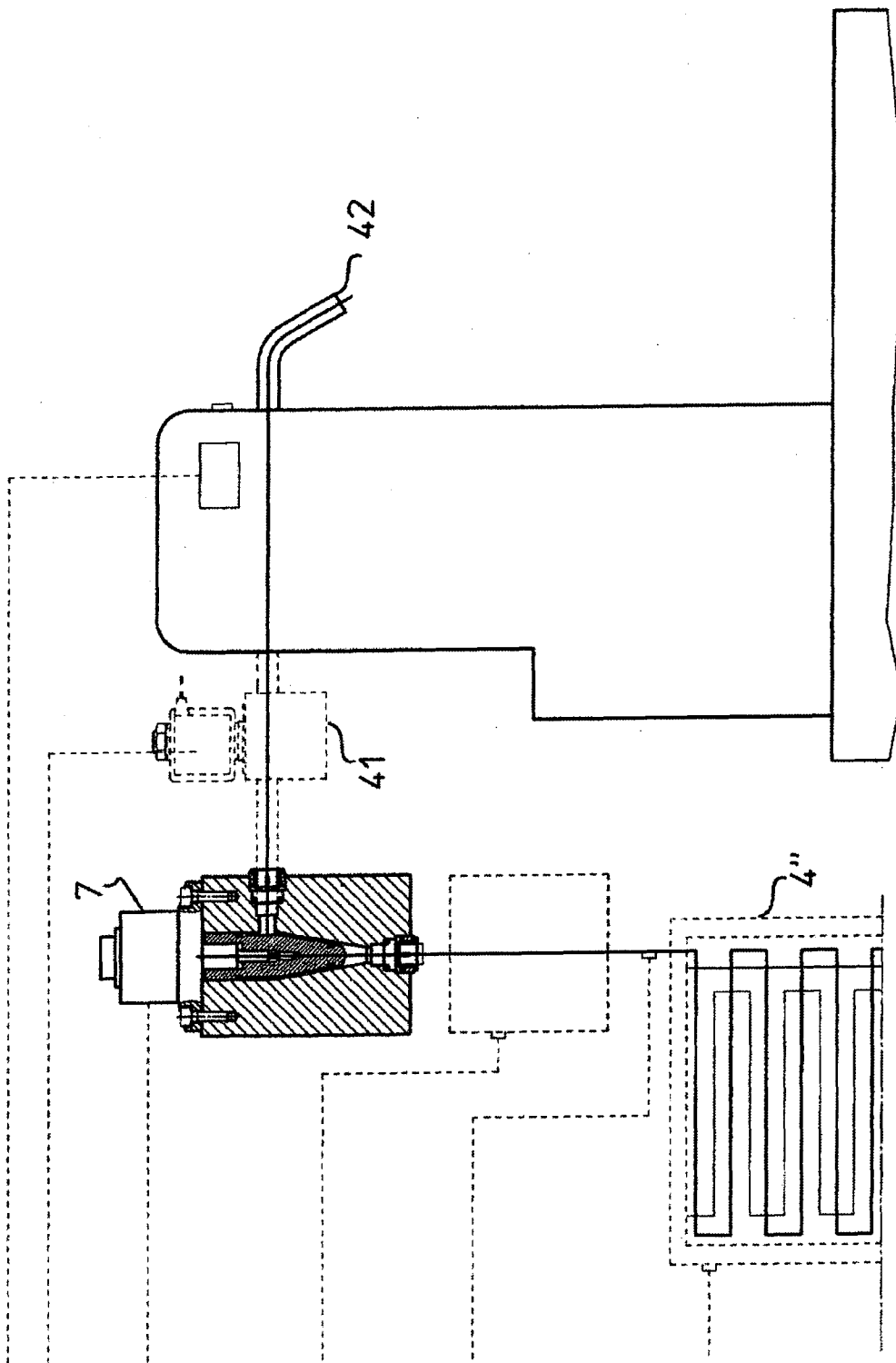


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/001409

A. CLASSIFICATION OF SUBJECT MATTER
INV. B67D1/12 B67D1/08 B67D1/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B67D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2011/180565 A1 (RACINO DAVID [US] ET AL) 28 July 2011 (2011-07-28) paragraphs [0002], [0009] - [0011], [0013], [0015], [0017], [0022], [0023], [0024], [0026] -----	1-13
Y	EP 1 528 036 A2 (IMI CORNELIUS UK LTD [GB]) 4 May 2005 (2005-05-04) paragraphs [0002], [0005], [0041], [0042]; figures 2,3 -----	1-13
A	WO 01/52621 A2 (EXEL NELSON ENGINEERING LLC [US] DISPENSING SYSTEMS INC [US]) 26 July 2001 (2001-07-26) page 7, line 24 - page 9, line 6; figures 1-3 ----- -/--	1



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

11 December 2014

Date of mailing of the international search report

23/12/2014

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2014/001409

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 730 323 A (OSBORNE JOHN O [US]) 24 March 1998 (1998-03-24) abstract; figures -----	1
A	DE 196 33 970 A1 (FUJI ELECTRIC CO LTD [JP]) 13 March 1997 (1997-03-13) column 2, lines 20-56 column 3, lines 20-24 column 4, lines 18-61; figures 1-4 -----	1
A	DE 42 22 424 A1 (TOSHIBA MACHINE CO LTD [JP]) 8 April 1993 (1993-04-08) column 4, line 3 - column 6, line 18 -----	1
A	FR 2 653 421 A1 (KIRIN BREWERY [JP]) 26 April 1991 (1991-04-26) page 5, line 33 - page 7, line 4 page 9, line 33 - page 10, line 1; figures 1, 10, 13 -----	1
A	FR 2 659 314 A1 (KIRIN BREWERY [JP]) 13 September 1991 (1991-09-13) page 24, line 4 - page 25, line 8; figure 1 -----	1
A	US 2003/080142 A1 (MEHEEN DAVID [US]) 1 May 2003 (2003-05-01) paragraphs [0021] - [0027]; figure 2 -----	1
A	EP 2 053 014 A1 (HOSHIZAKI ELECTRIC CO LTD [JP]) 29 April 2009 (2009-04-29) paragraphs [0005], [0014]; figures 1, 4 -----	1
A	GB 2 454 904 A (OSWALD TOM [GB]) 27 May 2009 (2009-05-27) abstract; figure 1 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2014/001409

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011180565	A1	28-07-2011	NONE
EP 1528036	A2	04-05-2005	NONE
WO 0152621	A2	26-07-2001	AU 3451601 A 31-07-2001 WO 0152621 A2 26-07-2001
US 5730323	A	24-03-1998	NONE
DE 19633970	A1	13-03-1997	DE 19633970 A1 13-03-1997 US 5871121 A 16-02-1999
DE 4222424	A1	08-04-1993	DE 4222424 A1 08-04-1993 JP 2960590 B2 06-10-1999 JP H0585594 A 06-04-1993 US 5335705 A 09-08-1994
FR 2653421	A1	26-04-1991	FR 2653421 A1 26-04-1991 JP H0364296 U 24-06-1991 JP H0752080 Y2 29-11-1995
FR 2659314	A1	13-09-1991	NONE
US 2003080142	A1	01-05-2003	NONE
EP 2053014	A1	29-04-2009	EP 2053014 A1 29-04-2009 JP 5139290 B2 06-02-2013 US 2009194564 A1 06-08-2009 WO 2008010454 A1 24-01-2008
GB 2454904	A	27-05-2009	NONE