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(54) **Method and device of detecting the operational mode of a beverage system**

(57) The present invention relates to a method of detecting the operational mode of a beverage dispensing system, which comprises a sealable pressure chamber (10) to be shifted between a first open position and a second closed position, a collapsible keg (168) to be received within the sealable pressure chamber, a tapping line (68), at least during use connected to the collapsible keg, and a fluid pressure source (112) connected to the pressure chamber for pressurising the pressure chamber. The beverage dispensing system further comprises a first detector having a pressure input and a control pressure output and a second detector having a pressure input and a control pressure output. The method comprises evaluating as a logical AND the control pressures from the control pressure outputs of the detectors and determining the operational mode of the beverage dispensing system.

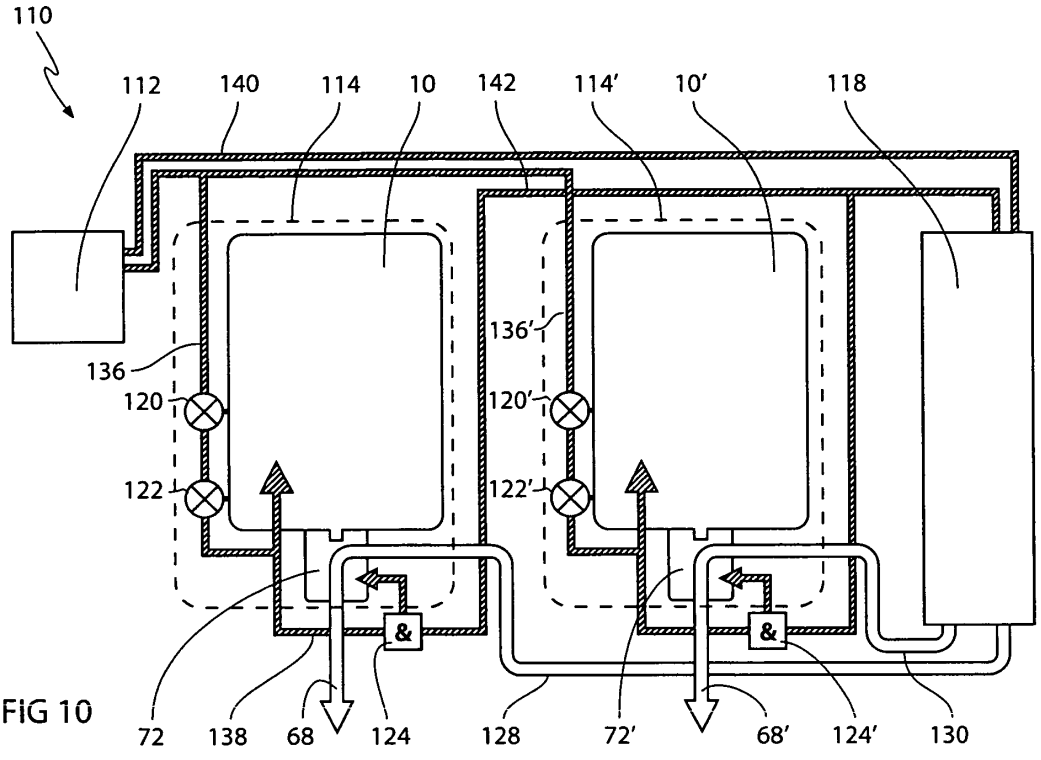

FIG 10

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Description

[0001] Beverage dispensing systems are typically used in beverage dispensing establishments for efficiently dispensing large quantities of beverage. Typically, beverage dispensing systems are used to dispense carbonated alcoholic beverages such as draught beer and cider. However, also non-alcoholic beverages such as soft drinks and non-carbonated beverages such as wine and fruit juice may be dispensed using a beverage dispensing system. Beverage dispensing systems are mostly for professional users such as in establishments like bars, restaurants and hotels, however, increasingly also for private users such as in private homes.

[0002] Professional beverage dispensing systems typically dispense beverage provided in large beverage kegs. Such beverage kegs may hold 20-50 litres of beverage for a professional beverage dispensing system for allowing typically 50-100 beverage dispensing operations before needing to exchange the beverage keg. Typically, beverage kegs are made of solid materials such as steel and re-filled a number of times. Inbetween each filling the beverage kegs are carefully cleaned. Insufficient cleaning may lead to unhygienic beverage kegs, which may in turn lead to health problems for the beverage consumer. Alternatively, beverage kegs are made collapsible for single use only due to the above hygiene concern. An example of such a beverage dispensing system using collapsible beverage kegs is the DraughtMaster™ system provided by the applicant company. Such beverage dispensing systems using collapsible beverage kegs typically have the beverage keg installed in a pressure chamber.

[0003] When dispensing beverage from the beverage dispensing system, a pressure fluid is allowed to enter the beverage keg in case of using a metal keg, or the pressure chamber in case of using a collapsible keg. When using a metal keg, the keg itself may be considered to be the pressure chamber. During the dispensing of beverage from the pressure chamber, the pressure fluid acts on the beverage and forces the beverage out of the pressure chamber. If a collapsible beverage keg is used, the beverage keg collapses while dispensing the beverage and the volume of the beverage keg is reduced corresponding to the amount of dispensed beverage. The collapsible beverage kegs are preferably made of flexible and disposable material such as plastic.

[0004] While performing a dispensing operation the force of the pressure causes the beverage to flow out of the beverage container and into a tapping line. The tapping line leads to a tapping device typically having a tapping valve and a tapping handle for allowing an operator to control the tapping valve and thereby the beverage dispensing operation. The operator, such as a bartender or barmaid, uses the tapping device to control the rate of beverage dispensing. After each beverage dispensing operation, residual beverage will inevitably be left in the tapping line and in the tapping device. After a certain amount of time a layer of residual beverage may be formed inside the tapping line and tapping device. Such layers of residual beverage may solidify and eventually clog the tapping line and/or the tapping device, which will impair the beverage dispensing operation. However, well before clogging the tapping line and/or tapping device, the residual beverage will pose a hygienic problem. The tapping line and the tapping device constitute areas where bacterial growth may be accelerated due to the presence of beverage, the large surface area in comparison to the beverage volume, the lack of sufficient cooling and the close proximity to the outside. Bacterial growth due to lack of hygiene in the tapping line and the tapping device may constitute a quality problem for the beverage consumer. Additionally, crust formation of solidified beverage within the tapping line may occur. Therefore there is a need for technologies for cleaning the tapping line and the tapping device after a certain period of time or alternatively after a certain number of beverage dispensing operations.

[0005] In the pending and not yet published European patent application having the application number 07388059.3 and filed on 20 August 2007, a beverage distribution system having a separate rinsing line has been described. By using a specially designed discharge valve, rinsing fluid or beverage may enter the tapping line selectively. Rinsing fluid is provided from a separate pressurized reservoir. The discharge valve includes safety features for avoiding mixing rinsing fluid and beverage.

[0006] In WO 2007/076584A2 an automatic home multi beer dispensing apparatus is described. The above publication briefly describes that a cleaning cartridge may be used for cleaning the beverage dispensing apparatus. However, the publication does not describe any further details of how the cleaning is performed.

[0007] In the pending and not yet published European patent application having the application number 08388029.4 and filed on the 11 September 2008, a cleaning and flushing cartridge for internal use is described. The cleaning and flushing cartridge is installed in the pressure chamber similar to a beverage keg and dispensed similar to a beverage.

[0008] It may however be advantageous to provide an external system for cleaning and flushing, which may be operated while a beverage keg or alternatively beverage is still accommodated inside the pressure chamber.

[0009] Beverage dispensing systems are often operated in bars, restaurants and similar establishments. Such establishments tend under certain circumstances to subject the operators to a high level of stress. In the present context it has been observed that accidents may occur as a result of incorrect manipulation of the beverage dispensing system during exchange of the collapsible beverage keg inside the pressure chamber. When the beverage keg is about to be changed, the pressure chamber is de-pressurized, the used beverage keg is removed, a new beverage keg is installed and the pressure chamber is re-pressurized. It should not be possible to pressurize the pressure chamber when it is

open, since a high pressurized flow jet may form and cause injuries to any nearby persons. Likewise, any cleaning or flushing operations must be prevented if the pressure chamber is open, since unhealthy and possibly toxic cleaning fluid and flushing fluid may be ejected from the pressure chamber onto nearby persons. Without any safety means, such accidents may occur frequently.

[0010] Trying to operate the beverage dispensing system without any beverage keg may cause pressure fluid to enter the dispensing line, eject through the beverage tap and cause injuries to the operator. Thus, any attempts of operating the beverage dispensing system without any beverage keg installed should be prevented. Likewise, rinsing of the tapping line without a beverage keg should also be prevented, since cleaning and flushing fluids may enter and contaminate the pressure chamber. When the beverage container is closed, there is normally not any way of determining the operational mode of the beverage dispensing system. The detection of a proper operational mode is therefore crucial for the safe operation of a beverage dispensing system.

[0011] It is therefore an object of the present invention to provide technologies for detecting the operational mode of a beverage dispensing system. Further objects of the present invention include providing technologies for cleaning and flushing a beverage dispensing system by using an external cleaning and flushing cartridge.

[0012] The above need and the above objects together with numerous other needs and objects, which will be evident from the below detailed description, are according to a first aspect of the present invention obtained by a method of detecting the operational mode of a beverage dispensing system, the beverage dispensing system comprising:

a sealable pressure chamber to be shifted between a first open position and a second closed position,
a collapsible keg to be received within the sealable pressure chamber,
a tapping line, at least during use connected to the collapsible keg,
a fluid pressure source connected to the pressure chamber for pressurising the pressure chamber,
a first detector having a pressure input for receiving fluid pressure from the fluid pressure source and a control pressure output, detecting whether the sealable pressure chamber is in the first open position or in the second closed position and, provided the sealable pressure chamber is in the second closed position, supplying a control pressure from the control pressure output, and
a second detector having a pressure input for receiving fluid pressure from the fluid pressure source and a control pressure output, detecting whether or not the collapsible keg is positioned in the sealable pressure chamber and, provided the keg is positioned in the sealable pressure chamber, supplying a control pressure from the control pressure output,
the method comprising evaluating as a logical AND the control pressures from the control pressure outputs of the first and second detectors and determining the operational mode of the beverage dispensing system, the operational mode only to be accomplished provided both control pressures are supplied from the control pressure outputs of the first and second detectors.

[0013] Most pressure chambers have a detachable lid for accessing the interior of the pressure chamber when installing or removing a beverage keg. Some pressure chambers may have a vertical orientation when in the closed position, and may be swung into a horizontal orientation when in the open position when the beverage keg is about to be changed. Before opening the beverage keg, the pressurized air is normally let out slowly to avoid injuries when opening the lid. When the pressure chamber is sealed and pressurized with pressure fluid, the volume of the collapsible keg is reduced as the beverage is dispensed through the tapping line. The tapping line typically leads to a beverage tap for controlled dispensing of the beverage. The fluid pressure source may comprise an air compressor or any other suitable device for generating a pressure fluid having a pressure suitable for beverage dispensing.

[0014] The first detector may supply pressure fluid from the control pressure output of the first detector when the pressure chamber is closed. Consequently, no pressure fluid is supplied from the control pressure output of the first detector if the pressure chamber is opened. The first detector may e.g. detect if the beverage container is swung into a vertical orientation and/or if the lid is applied. The second detector likewise detects if a beverage keg is correctly installed in the pressure chamber and then supplies pressure fluid from the control pressure outlet of the second detector. If no beverage container is installed of if the beverage container is falsely installed, i.e. not in fluid communication with the tapping line, no pressure fluid is supplied from the control pressure output of the second detector.

[0015] The logical AND evaluation should be understood to mean that the operational mode is not determined accomplished if none or only one of the first and second detectors supplies the control pressure from its control pressure output. Only if both the first and second detectors supply the control pressure from their respective control pressure outputs, the operational mode is determined accomplished. The above control pressures and determination of the operational mode may preferably be used in combination with a safety system for preventing or at least discouraging the use of the beverage dispensing system when the beverage dispensing system is not in the operational mode.

[0016] It may be contemplated as a part of a logical system to use a simple and cheap electronic circuit for determining the operational mode instead of using a control pressure, i.e. a pneumatic signal, which would be more complicated and

expensive to realize. In the present case the control pressure has surprisingly been found to be superior to an electrical circuit for determining the operational mode, since electrical components are not fail-safe in the present environment comprising beverage, cleaning fluids and flushing fluids. A short-circuit caused by fluid intrusion into the electronic circuits may cause a failure of the electronic system and a complete loss of the logical system and thereby the safety system.

[0017] The safety system may be contemplated to include means for allowing the pressure chamber to be pressurized only if the operational mode is accomplished.

[0018] According to the first aspect the enabling mode may be indicated by an indication signal, such as e.g. a green light, a green signal plate or the like. Such indication signals may preferably be located at a plurality of suitable locations, such as at the beverage tap and at the pressure chamber.

[0019] According to the first aspect the first and second detectors may be connected in a series configuration or alternatively be connected to a AND pressure valve for generating an enabling pressure, provided the operational mode is accomplished. By connecting the first and second detectors in a series connection it is contemplated that no enabling pressure is generated if one of the detectors is not supplying the control pressure. The enabling pressure is thus directly generated from the control pressure. Alternatively the control pressures are used to control an AND pressure valve. An AND valve allows supply of pressure fluid if both the first and second control pressures are supplied. Such valves are well known in the art. The enabling pressure may preferably be used for pressurizing the pressure chamber, thereby creating a fail-safe safety system. When any of the detectors does not supply the control pressures, the pressure chamber cannot be pressurized.

[0020] According to the first aspect a discharge valve may be provided between the beverage keg and the tapping line, the discharge valve having a beverage dispensing position and a closed position, wherein the operational mode corresponds to the pressure chamber being pressurized, and the enabling pressure is used for causing the discharge valve to assume the beverage dispensing position. The discharge valve may prevent beverage from entering the tapping line by preventing fluid communication between the beverage keg and the tapping line if the beverage dispensing system is not in the operational mode. When the operational mode is accomplished, the discharge valve may allow beverage dispensing by restoring fluid communication between the beverage keg and the tapping line. The discharge valve preferably uses the enabling pressure to assume the beverage dispensing position. Without the enabling pressure, the closed position may be assumed by a counter-acting spring or the like.

[0021] According to the first aspect a rinsing cartridge may be provided in fluid communication with the tapping line, and a third detector having a pressure input for receiving fluid pressure from the rinsing cartridge and a control pressure output, detecting whether or not the rinsing cartridge is pressurized, and provided the rinsing cartridge is pressurized, supplying a control pressure from the control pressure output, wherein the method comprising evaluating as a logical AND the control pressures from the control pressure outputs of the first, second and third detectors and determining a rinsing mode of the beverage dispensing system is only accomplished provided all three control pressures are supplied from the control pressure outputs of the first, second and third detectors.

[0022] Cleaning and flushing should not be allowed to commence if the pressure chamber is not pressurized, i.e. if the pressure chamber is opened or if no keg is present in the pressure chamber. This requirement prevents cleaning fluid from accidentally entering the pressure chamber when the pressure chamber is open. A third detector may be used for detecting when the rinsing cartridge is pressurized, since rinsing cannot commence without a pressurized rinsing cartridge. The third detector may supply a pressure fluid from the control pressure output of the third detector when the rinsing cartridge is pressurized. Consequently, no pressure fluid is supplied from the control pressure output of the third detector if the rinsing cartridge is not pressurized.

[0023] The logical AND evaluation should be understood to mean that the rinsing mode is not determined accomplished if none or only one or two of the first, second and third detectors supply the control pressure from its control pressure outputs. Only if all of the first, second and third detectors supply the control pressure from their respective control pressure outputs, the rinsing mode is determined accomplished. The above control pressures and determination of the rinsing mode may preferably be used in combination with a safety system for preventing or at least discouraging the use of the rinsing cartridge when the beverage dispensing system is not in the rinsing mode.

[0024] From the above it is contemplated that the supply of control pressure from the control pressure outlets of both the first and the second detectors are a prerequisite for determining both the rinsing mode and the operational mode. Therefore, some embodiments may use two subsequent logical AND evaluations: In a first step the control pressure outputs of the first and the second detectors are evaluated as a logical AND for determining the operational mode, and in a subsequent step the result from the first step and the control pressure output of the third detector are evaluated as a logical AND for determining the rinsing mode.

[0025] According to the first aspect the rinsing mode may be indicated by an indication signal, such as e.g. a red light, a red signal plate or the like. Such indication signals may preferably be located at a plurality of suitable locations, such as at the beverage tap and at the pressure chamber, for avoiding attempts of performing any beverage dispensing operations when the rinsing mode has been determined. According to the first aspect the first, second and third detectors may be connected in a series configuration or alternatively be connected to an AND pressure valve for generating a

rinse-enable pressure provided the rinsing mode is accomplished. By connecting the first, second and third detectors in a series connection it is contemplated that no rinse-enable pressure is generated if one of the detectors does not supply the control pressure. The rinse-enable pressure is thus directly generated from the control pressure. Alternatively the control pressures are used to control an AND pressure valve. An AND valve allows supply of pressure fluid if all of the first, second and third control signals are supplied. Such valves are well known in the art. Either an AND pressure valve having three inputs, or alternatively two series-connected AND pressure valves, each having two inputs, are used.

[0026] According to the first aspect a discharge valve may be provided between the rinsing cartridges and the tapping line, the discharge valve having a rinsing position, where the rinsing mode corresponding to the rinsing cartridge being pressurized, and the rinse-enable pressure is used for causing the discharge valve to assume the rinsing position.

[0027] The discharge valve may prevent cleaning and flushing fluid from entering the tapping line by preventing fluid communication between the rinsing cartridge and the tapping line if the beverage dispensing system is not in the rinsing mode. When the rinsing mode is accomplished, the discharge valve may allow beverage dispensing by restoring fluid communication between the rinsing cartridge and the tapping line. The discharge valve is preferably using the rinse-enable pressure to assume the rinsing position. Without the enabling pressure, the closed position may be assumed by means of a counter-acting spring or the like. Preferably, the discharge valve has three positions: a rinsing position, a beverage dispensing position and a closed position. The rinse-enable pressure, the enabling pressure and the spring cause the valve to assume the three above-mentioned positions.

[0028] According to the first aspect the rinsing cartridge may be detachably installed onto the pressure chamber, or alternatively the rinsing cartridge constitutes a separate rinsing unit. The rinsing cartridge is preferably prepared and subsequently attached to the side of the pressure chamber for initiating rinsing. Alternatively, a centralized rinsing unit may be used.

[0029] According to the first aspect the rinsing cartridge may be pressurized by the enabling pressure, or alternatively the rinsing cartridge may be pressurized by the fluid pressure source or the pressure chamber. By pressurizing the rinsing cartridge by the enabling pressure, it can be ensured that the rinsing mode is determined only when the pressure chamber is also pressurized. Alternatively, there may be an interconnection between the pressure chamber and the rinsing cartridge such that the rinsing cartridge is pressurized by the pressure chamber. Yet alternatively, the rinsing cartridge may have a separate connection to the fluid pressure source independently from the pressure chamber and the enabling pressure.

[0030] According to the first aspect the rinsing cartridge may be connected to a plurality of beverage dispensing systems. Preferably, a centralized rinsing cartridge may constitute a common rinsing unit for a plurality of beverage dispensing systems. The beverage dispensing systems sharing one rinsing cartridge preferably belong to the same set, i.e. their respective beverage taps are located close to each other, e.g. on the same bar counter. The tapping lines of the beverage dispensing systems typically are separated, however in some embodiments a common tapping line may be used.

[0031] According to the first aspect the rinsing cartridge may be provided with a switch for selectively supplying cleaning and flushing fluid from the rinsing cartridge to one tapping line of the plurality of beverage dispensing systems. A switch may be used for selectively distributing cleaning and flushing fluid to only one beverage dispensing system at a time to make it possible to determine the exact amount of cleaning and flushing fluid passing through each tapping line. Alternatively, all of the tapping lines are simultaneously rinsed, allowing the rinsing process to be performed quickly, however without any possibility of determining the amount of cleaning and flushing fluid passing through each tapping line.

[0032] According to the first aspect the rinsing cartridge may be provided with a switch for selectively supplying the control pressure output of the third detector to one of the beverage dispensing systems, or alternatively the control pressure output of the third detector may be supplied to all of the beverage dispensing systems. By supplying the control pressure output of the third detector to all of the beverage dispensing systems, it is avoided that some beverage dispensing systems are in the rinsing mode, while others are in operational mode. This is an important safety feature, since confusion between rinsing fluids and beverage is avoided when beverage dispensing is not allowed at the same time as rinsing. By selectively supplying the control pressure output of the third detector to one of the beverage dispensing systems, beverage dispensing and rinsing is possible at the same time.

[0033] The above need and the above objects together with numerous other needs and objects, which will be evident from the below detailed description, are according to a second aspect of the present invention obtained by a system for detecting the operational mode of a beverage dispensing system, the beverage dispensing system comprising:

a sealable pressure chamber to be shifted between a first open position and a second closed position,
a collapsible keg to be received within the sealable pressure chamber,
a tapping line at least during use connected to the collapsible keg,
a fluid pressure source connected to the pressure chamber for pressurising the pressure chamber,
a first detector having a pressure input for receiving fluid pressure from the fluid pressure source and a control pressure output for detecting whether the sealable pressure chamber is in the first open position or in the second

closed position and, provided the sealable pressure chamber is in the second closed position, supplying a control pressure from the control pressure output,
a second detector having a pressure input for receiving fluid pressure from the fluid pressure source and a control pressure output for detecting whether or not the collapsible keg is positioned in the sealable pressure chamber and, provided the keg is positioned in the sealable pressure chamber supplying a control pressure from the control pressure output, and
an evaluation unit for evaluating as a logical AND the control pressures from the control pressure outputs of the first and second detectors and determining the operational mode of the beverage dispensing system, the operational mode only to be accomplished provided both control pressures are supplied from the control pressure outputs of the first and second detectors.

[0034] The evaluation unit may preferably be operating entirely mechanical, i.e. as a pneumatic system, for avoiding any risk of failure, e.g. by fluids entering an electrical circuit etc. It is contemplated that the above mentioned system may be used in connection with the above mentioned methods. Any of the features according to the above mentioned first aspect may be equally applied according to the second aspect.

[0035] The present safety system may comprise a security valve which prevents the discharge valve from assuming the rinsing position if the rinsing cartridge and the pressure chamber are not pressurized. If the pressure chamber is opened it cannot be pressurized and thus the discharge valve will not assume the rinsing position. If the pressure chamber is pressurized, the rinsing position is automatically assumed when the rinsing cartridge is pressurized, thus allowing rinsing fluid to enter the tapping line. The security valve is preferably designed to only allow pressure fluid to propagate from the security valve to the discharge valve if pressure fluid is supplied from both the pressure chamber and the rinsing cartridge. The discharge valve is preferably a pneumatic valve, i.e. when pressure fluid is supplied from both the pressure chamber and the rinsing cartridge, the pressure fluid will propagate to the discharge valve and cause the discharge valve to assume the rinsing position. For the safe operation of the external cleaning and flushing system, some safety requirements are essential for avoiding personal injuries and the like. Preferably, all of the beverage taps belonging to the same establishment or located on the same bar counter should be operating in the same mode. For example, it should not be possible to dispense beverage from some of the beverage taps while cleaning the others. The reason for this is the apparent risk of confusing beverage and cleaning fluid.

[0036] The present invention is now to be described in greater detail with reference to the drawings, wherein:

Fig. 1 is a series of figures showing an external cleaning and flushing cartridge,
Fig. 2 is a series of figures showing a collapsible cleaning cartridge,
Fig. 3 is a series of figures showing a pre-filled cleaning cartridge,
Fig. 4 is a series of figures showing a dissolving cleaning tablet,
Fig. 5 is a series of figures showing a piston-controlled external cleaning and flushing cartridge,
Fig. 6 is a top and close-up view of an external cleaning and flushing cartridge,
Fig. 7 is an external cleaning and flushing cartridge installed on a pressure chamber,
Fig. 8 is a set of interconnected pressure chambers for a centralized external cleaning and flushing unit,
Fig. 9 is a base part for a pressure chamber,
Fig. 10 is a centralized rinsing system in rinsing mode,
Fig. 11 is a centralized rinsing system in beverage dispensing mode,
Fig. 12 is a centralized rinsing system in closed-off mode,
Fig. 13 is a local rinsing system in rinsing mode,
Fig. 14 is a local rinsing system in beverage dispensing mode,
Fig. 15 is a local rinsing system in closed-off mode,
Fig. 16 is a discharge valve in beverage dispensing mode,
Fig. 17 is a discharge valve in rinsing mode, and
Fig. 18 is an alternative embodiment of the centralized rinsing system.

[0037] A detailed description of the figures of some presently preferred embodiments of the present invention follows below.

[0038] Fig. 1A shows a most preferred embodiment of an external cleaning and flushing unit 20. The cleaning and flushing unit 20 comprises an outer chamber constituting a flushing fluid cartridge 36 having a volume of about four litres and an inner chamber constituting a cleaning fluid cartridge 46 having a volume of about one litre. The volumes of one and four litres respectively are typical values suitable for most beverage dispensing systems. The flushing fluid cartridge 36 is in fluid communication with the cleaning fluid cartridge 46 via a cartridge interconnection 40, which interconnects the lower part of the flushing fluid cartridge 36 and the upper part of the cleaning fluid cartridge 46. Flushing fluid may flow into the cartridge interconnection 40 at a flushing fluid outlet 38 located at the bottom of the flushing fluid cartridge

36 and flow via the cartridge interconnection 40 into the cleaning fluid cartridge 46 and enter the cleaning fluid cartridge 46 via a flushing fluid inlet 42 located at the top of the cleaning fluid cartridge 46. A check valve 43 is provided at the flushing fluid inlet 42 to avoid cleaning fluid flowing into the flushing fluid cartridge 36.

[0039] A rinsing fluid outlet 24 is provided at the bottom of the cleaning fluid cartridge 46. Rinsing fluid is in the present context understood to comprise any of the cleaning fluids and flushing fluids. A rinsing line 25 connects the rinsing fluid outlet 24 to a rinsing connector 27 located at the side of the cleaning and flushing unit 20. A float valve 50 is provided inside the cleaning fluid cartridge 46 for avoiding pressure fluid in the cleaning fluid cartridge 46 to escape into the rinsing fluid outlet 24. The float valve 50 will permit liquids, i.e. flushing and cleaning fluid, to flow out through the rinsing fluid outlet 24 and prevent gas, i.e. pressure fluid from flowing out through the rinsing fluid outlet 24. A set of flanges constituting a float valve support 52 will ensure that the float valve 50 is positioned in a secure closed state in the cleaning fluid cartridge 46 when no cleaning fluid is present in the cleaning fluid cartridge 46. A pressure fluid pipe 29 provides pressure fluid from the side of the cleaning and flushing unit to the upper interior part of the flushing fluid cartridge 36 to avoid any flushing fluid entering the pressure fluid pipe 29 when the flushing fluid cartridge 36 is filled.

[0040] The cleaning and flushing unit 20 may be prepared by filling flushing fluid, i.e. water, into the cleaning fluid cartridge 46 and the flushing fluid cartridge 36. The flushing fluid cartridge 36 is subsequently sealed from the cleaning fluid cartridge 46 by a flushing fluid cap 56. The flushing fluid cap 56 seals the flushing fluid cartridge but allows access to the cleaning fluid cartridge through an opening 54. When the flushing fluid cartridge 36 has been properly separated from the cleaning fluid cartridge 46, a cleaning tablet 59 is dissolved in the cleaning fluid cartridge 46, transforming the flushing fluid accommodated in the cleaning fluid cartridge 46 to cleaning fluid. Alternatively, the cleaning constituent may be provided as a powder, liquid or paste, or a combination thereof, preferably in a specific metered amount or unit dose. Afterwards, the cleaning fluid cartridge 46 is sealed by a cleaning fluid cap 58.

[0041] Fig. 1B shows the cleaning and flushing unit 20 of Fig. 1A when it has been installed in a beverage dispensing system (not shown). By providing pressure fluid, e.g. pressurized air, into the flushing fluid cartridge 36 via the pressure fluid pipe 29, the pressure fluid causes the flushing fluid in the flushing fluid cartridge 36 to enter the cleaning fluid cartridge 46 via the cartridge interconnection 40. The flushing fluid leaves the flushing fluid cartridge 36 through the flushing fluid outlet 38 and enters the cleaning fluid cartridge 46 through the flushing fluid inlet 42, thereby causing the cleaning fluid in the cleaning fluid cartridge 46 to be expelled through the rinsing fluid outlet 24 and further via the rinsing line 25 and the rinsing connector 27. The fluid flow directions are indicated in the figure by arrows. The rinsing connector 27 should be connected to the tapping line and the beverage tap of the beverage dispensing system, which it is desired to clean (not shown). The beverage tap (not shown) is located on the opposite end of the tapping line and typically located on a bar counter. The cleaning fluid is distinguished from the flushing fluid in the figure by small bubbles.

[0042] Fig. 1C shows the cleaning and flushing unit 20 of Fig. 1A when the flushing fluid cartridge 36 is empty and the cleaning fluid cartridge 46 is filled with flushing fluid. The pressure fluid is causing flushing fluid to be expelled through the rinsing fluid outlet 24. When the cleaning fluid cartridge 46 is empty the floating valve 50 has reached the bottom of the cleaning fluid cartridge 46 and prevents any pressure fluid from being expelled though the rinsing fluid outlet 24.

[0043] Fig. 2A shows another embodiment of an external cleaning and flushing unit 20'. The external cleaning and flushing unit 20' comprises a flushing fluid cartridge 36 constituting most of the interior of the cleaning and flushing unit 20'. A cleaning fluid cartridge 46' is provided in the form of a flexible container pre-filled with cleaning fluid. The cleaning fluid cartridge 46' comprises a piercing element and connector 60 constituting a sharp knife of needle or a similar rupturing element. The connector 60 is connected to the rinsing fluid outlet 24, providing fluid communication between the cleaning fluid cartridge 46' and the rinsing line 25. After the cleaning fluid cartridge 46' has been installed, the flushing fluid cartridge 36 is filled with flushing fluid and the cap 58 is attached, sealing off the flushing fluid cartridge 36.

[0044] Fig. 2B shows the cleaning and flushing unit 20' of Fig. 2A when it has been installed in a beverage dispensing system (not shown). The pressure fluid entering the flushing fluid cartridge 36 via the pressure fluid pipe 29 causes the flushing fluid to subject the cleaning fluid cartridge 46' to a pressure force. The cleaning fluid is thereby expelled through the connector 60 towards the rinsing line 25 while the cleaning fluid cartridge 46' collapses. The cleaning fluid cartridge 46' will collapse onto the connector 60 and the cleaning fluid cartridge 46' will be pierced or ruptured by the connector 60.

[0045] Fig. 2C shows the cleaning and flushing unit 20 of Fig. 1A when the flushing fluid cartridge 36 is empty and ruptured or alternatively pierced, allowing the flushing fluid to be expelled through the rinsing fluid outlet 24.

[0046] Fig. 3A shows another embodiment of an external cleaning and flushing unit 20". The cleaning and flushing unit 20" comprises a flushing fluid cartridge 36 constituting most of the interior of the cleaning and flushing unit 20". A cleaning fluid cartridge 46'" is provided at the bottom of the flushing fluid cartridge 36. The cleaning fluid cartridge 46'" is pre-filled with cleaning fluid and connected to the rinsing fluid outlet 24. The flushing fluid inlet 42' of the cleaning fluid cartridge 46"' is located opposite the rinsing fluid outlet 24. The flushing fluid cartridge 36 is provided with a float valve 50.

[0047] Fig. 3B shows the cleaning and flushing unit 20" of Fig. 2A when it has been installed in a beverage dispensing system (not shown). The pressure fluid entering the flushing fluid cartridge 36 via the pressure fluid pipe 29 causes the flushing fluid to enter the cleaning fluid cartridge 46'" through the flushing fluid inlet 42'. The cleaning fluid is thereby expelled through the rinsing fluid outlet 24 towards the rinsing line 25.

[0048] Fig. 3C shows the cleaning and flushing unit 20" of Fig. 3A when the cleaning fluid cartridge 46"' is filled with flushing fluid. The pressure fluid is causing flushing fluid to be expelled through the rinsing fluid outlet 24. When the flushing fluid cartridge 36 is empty, the floating valve 50 has reached the bottom of the flushing fluid cartridge 46'" and prevents any pressure fluid from being expelled though the rinsing fluid outlet 24.

[0049] Fig. 4A-C shows a further embodiment of an external cleaning and flushing unit 20"' very similar to Fig. 3A-C, with the exception that the cleaning fluid cartridge 46"' comprises a cleaning tablet 59, which dissolves and creates cleaning fluid as the flushing fluid flows into the cleaning fluid cartridge 46'" as described above in connection with Fig. 3B. When about 1 litre of flushing fluid has passed through the cleaning fluid cartridge 46"', the cleaning tablet 59 is completely dissolved and the remaining flushing fluid continues to flow out through the rinsing fluid outlet 24.

[0050] Fig. 5A shows a further embodiment of an external cleaning and flushing unit 20"". The cleaning and flushing unit 20"" comprises an outer flushing fluid cartridge 36' and an inner cleaning fluid cartridge 46"" similar to Fig. 1 and Fig. 2.

[0051] In addition to a pressure fluid pipe 29, which supplies pressure fluid to the top of the flushing fluid cartridge 36', an auxiliary pressure fluid pipe 29' is provided to supply pressure fluid to the top of the cleaning fluid cartridge 46"" at the pressure fluid inlets 44', 44". Both the cleaning fluid cartridge 46"" and the flushing fluid cartridge 36' is filled with flushing fluid, and a cleaning tablet 59 is dissolved in the cleaning fluid cartridge to create cleaning fluid.

[0052] Fig. 5B shows the flushing fluid cartridge 36' and the cleaning fluid cartridge 46"" being divided into a respective upper space and lower space by an inner piston 53 and an outer piston 55, respectively. The respective flushing and cleaning fluids are accommodated in the respective lower spaces below the respective inner and outer piston 53, 55. Pressure fluid is allowed to enter the upper space of the cleaning fluid cartridge 46"" and act on the inner piston 53 which in turn acts to press out the cleaning fluid through the rinsing fluid outlet 24'. The lower spaces of the flushing fluid cartridge 36' and the cleaning fluid cartridge 46"" are interconnected by a flushing fluid inlet 42'. A flushing fluid valve 57 is located at the bottom and inside of the cleaning fluid cartridge 46"" and prevents flushing fluid from entering the cleaning fluid cartridge 46"" from the flushing fluid cartridge 36'. The flushing fluid valve 57 defines a plurality of holes which are sealed to the wall between the flushing and cleaning fluid cartridges 36', 46"". As the inner piston 53 is pressed by the pressure fluid towards the rinsing fluid outlet 24', the inner piston 53 will act on the flushing fluid valve 57 and push the flushing fluid valve 57 into a valve recess 51. When the flushing fluid valve 57 has contacted the bottom of the valve recess 51, the inner piston 53 will have reached its final position and the holes located in the flushing fluid valve 57 will be in registration with the flushing fluid inlet 42'. Fluid communication is established between the flushing fluid cartridge 36' and the cleaning fluid cartridge 46"" via the flushing fluid valve 57 and the flushing fluid inlet 42'.

[0053] Fig. 5C shows the flushing fluid being pressed out of the rinsing fluid outlet 24' by the outer piston 55 while pressure fluid is allowed to enter the upper space of the flushing fluid cartridge 36' through the pressure fluid inlet 44'. The flow direction of the flushing fluid is indicated in the figure by arrows. When the outer piston 55 has reached its final position, the outer piston 55 will prevent pressure fluid from entering the rinsing fluid outlet 24', thereby eliminating the need for a ball valve for this purpose. The present embodiment has the advantage of physically separating the pressure fluid from the flushing and cleaning fluids and it may therefore preferably be used in connection with a liquid pressure fluid. Such liquid pressure fluids may comprise water.

[0054] Fig. 6A shows a top view of the embodiment of an external cleaning and flushing unit 20 as shown in Fig. 1. Cleaning and flushing fluid is expelled from the cleaning and flushing unit 20 through the rinsing connector 27. The rinsing connector 27 may be connected to a pressure chamber or beverage dispensing system (not shown). Two pressure fluid connectors 28 are located on each side of the rinsing connector 27 for providing pressure fluid to the cleaning and flushing unit 20 through the pressure fluid pipe 29 (not shown in the present view). The pressure fluid connectors 28 are interconnected as a part of a safety system, which will be further explained in connection with Figs. 13-15.

[0055] Fig. 6B shows a close up view of the embodiment of an external cleaning and flushing unit 20 as shown in Fig. 1. When the cleaning and flushing unit is empty, the float valve 50 seals the rinsing fluid outlet 24 and prevents any pressure fluid from leaving the cleaning and flushing unit 20 through the rinsing connector 27. In the present view, the pressure fluid connectors 28 are not visible.

[0056] Fig. 7 shows a cleaning and flushing unit 20 being installed outside a pressure chamber 10. The pressure chamber 10 may preferably accommodate a collapsible beverage container. The pressure chamber is accommodated in a housing 114. The beverage container (not shown) may be accessed by swinging or pivoting the pressure chamber from its current vertical orientation to a horizontal orientation and subsequently removing the upper part constituting a lid 14 of the pressure chamber 10 by using the grips 12. The cleaning and flushing unit 20 is preferably made of rigid plastics or alternatively metal. The cleaning and flushing unit 20 may preferably be at least partially transparent to allow an external observer to determine the level of cleaning and flushing fluid accommodated inside the cleaning and flushing unit 20. In order to distinguish between the cleaning and flushing fluids the cleaning fluid may be dyed a specific colour, such as green, red or blue. The cleaning and flushing unit 20 preferably has a cylindrical shape.

[0057] Fig. 8 shows a plurality of pressure chambers 10, 10', 10". The pressure chambers 10, 10', 10" are connected individually to a centralized cleaning and flushing unit by a set of rinsing fluid supplies 128 and commonly to a fourth pressure tube 142. A control valve 124 controls pressure fluid flow from the fourth pressure tube 142 to a discharge

valve (not shown here but to be described below in Figs. 9-18 and designated reference numeral 72) constituting a keg coupler of the pressure chamber 10. The control valve 124 will be further described in connection with Figs. 10-12. The cleaning and flushing fluid is provided from a centralized cleaning and flushing unit (not shown here but to be described below in Figs. 10-12 and designated reference numeral 118) connected to the far end of the set of rinsing fluid supplies 128. The centralized cleaning and flushing unit (not shown here but to be described below) may comprise a cleaning and flushing unit 20 as described above in connection with any of the figures 1-6, however it may be significantly larger, depending on the number of pressure chambers 10 and/or tapping lines/beverage taps it is intended to serve.

[0058] Fig. 9 shows a set of beverage dispensing base parts 66 for use with any of the above embodiments of the pressure chamber (not shown here but described in Figs. 7-8 and to be described below in Figs. 10-15 and designated reference numeral 10). A tapping line 68 is provided at the rear of the base part 66. A beverage container (not shown) may be installed on top of the base part 66 and connected to a beverage outlet 70. The tapping line 68 delivers beverage as well as cleaning and flushing fluid to the beverage tap (not shown). The base part 66 includes a discharge valve 72 for selectively allowing either beverage from the beverage outlet 70 or cleaning/flushing fluid from the first rinsing fluid supply 128 to be dispensed via the tapping line 68. The pressure chamber is pressurized via a pressure fluid pipeline 74 and a pressure fluid inlet 76. It is contemplated that the above embodiment of a base part 66 may also be used with the local cleaning and flushing units as described above in connection with Fig. 7.

[0059] Figs. 10-15 show two specific embodiments of a centralized and local rinsing system 110, 116, respectively, having a safety system for controlling the rinsing and beverage dispensing. The safety system prevents rinsing from commencing if the pressure chamber 10 is not pressurized or if the discharge valve 72 is not in the rinsing position. Figs. 10-12 show a centralized rinsing system for a plurality of pressure chambers, whereas Figs. 13-15 show a local rinsing system for one pressure chamber only. The centralized and local rinsing system 110, 116 each comprises two identical pressure chambers 10, 10'.

[0060] Fig. 10 shows a centralized rinsing system 110 in rinsing mode. The centralized rinsing system comprises an air compressor 112, a first pressure chamber 10, a second pressure chamber 10', and a centralized cleaning and flushing unit 118. The air compressor 112 is by a first pressure tube 136 connected to the first pressure chamber 10 via a primary safety valve 120 and a secondary safety valve 122. When a beverage keg is installed in the pressure chamber 10, the primary safety valve 120 allows compressed air to flow from the air compressor 112 towards the secondary safety valve 122. The secondary safety valve 122 allows compressed air to pressurize the pressure chamber 10 when the pressure chamber assumes the vertical orientation shown in Fig. 7, which indicates that the first pressure chamber 10 is ready for beverage dispensing. The secondary safety valve 122 prevents compressed air from pressurizing the first pressure chamber 10 when the pressure chamber 10 has assumed the horizontal orientation. Any of the pressure chambers 10, 10' may be swung into their horizontal orientation when a new beverage keg is to be installed, e.g. when the original beverage keg is empty. In the horizontal orientation, compressed air is allowed to leave the pressure chamber 10, thereby allowing the lid of the pressure chamber 10 to be safely removed and the beverage keg to be changed. When the first pressure chamber 10 is pressurized, the pressure will also act on a control valve 124 via a second pressure tube 138. The control valve 124 will be further described below. The first and second pressure chambers 10, 10' are accommodated in a first and second housing 114, 114', respectively.

[0061] The air compressor 112 is further by a third pressure tube 140 connected to the centralized cleaning and flushing unit 118. The cleaning and flushing unit 118 is further by a fourth pressure tube 142 connected to the control valve 124 so that a pressure will act on the control valve 124 when the rinsing unit 118 is pressurized. When the control valve 124 is subjected to pressure from both the cleaning and flushing unit 118 and the first pressure chamber 10, it will allow pressure fluid to act on a discharge valve 72 and cause it to assume the rinsing and flushing position. The discharge valve 72 is of the same type as the discharge valve 72 described above in connection with Fig. 9. The same type of discharge valve is further described in Figs. 16-17 under the same reference. When the discharge valve 72 has assumed the rinsing position, cleaning and flushing fluids are allowed to enter the discharge valve 72 via a first rinsing fluid supply 128 and leave the discharge valve 72 via a tapping line 68. At the same time, beverage is prevented from entering the discharge valve 72 so that any contact between rinsing fluid and beverage is avoided.

[0062] The second pressure chamber 10' is by a second rinsing fluid supply 130 connected to the cleaning and flushing unit 118, separately in relation to the first pressure chamber 10. For safety reasons, both of the discharge valves 72, 72' of the pressure chambers 10, 10' will assume the rinsing position if they are pressurized. This is to avoid beverage dispensing and rinsing from different taps at the same time, which would be a safety hazard since cleaning fluid may accidentally be confused with beverage. A switch may be provided on the cleaning and flushing unit 118 for selectively providing cleaning and flushing fluids to one of the first or second pressure chambers 10, 10'. In an alternative embodiment, both tapping lines 68 of the pressure chambers 10, 10' may be provided with cleaning and flushing fluids simultaneously.

[0063] Fig. 11 shows the centralized rinsing system 110 in the beverage dispensing mode. In the beverage dispensing mode, the air compressor 112 may deliver pressurized air to the cleaning and flushing unit 118. However, the pressurized air is prevented from acting on the control valve 124 via the fourth pressure tube 142 as the fourth pressure tube 142 is vented to the atmosphere in the beverage dispensing mode through a venting valve not shown in the drawings. When

the control valve 124 is not subjected to pressure from both the first pressure chamber 10 and the cleaning and flushing unit 118, the control valve 124 will prevent air pressure from acting on the discharge valve 72. This causes the discharge valve 72 to assume the beverage dispensing position. When the discharge valve 72 has assumed the beverage dispensing position, beverage is allowed to flow from the first pressure chamber 10 towards the tapping line 68. At the same time, rinsing fluid is prevented from entering the discharge valve 72.

[0064] Fig. 12 shows the centralized rinsing system 110 in a closed mode. The closed mode implies that either the primary safety valve 120 and/or the secondary safety valve 122 is closed, i.e. that either the pressure chamber 10 is swung into the horizontal position or a beverage keg is not present inside the first pressure chamber 10. Pressurized air is prevented from pressurising the first pressure chamber 10 and consequently, the control valve 124 will not supply any pressure fluid to the discharge valve 72. In the closed mode both beverage and rinsing fluid is prevented from entering the discharge valve and flow out towards the tapping line 68.

[0065] Fig. 13 shows a local rinsing system 116 in the rinsing mode. Similar to the central rinsing system 110 described above, the local rinsing system 116 comprises a compressor 112, a first pressure chamber 10 and a second pressure chamber 10'. The cleaning and flushing unit 118 described above in connection with Figs. 10-12 has been replaced by a first rinsing cartridge 132 mounted in connection with the first pressure chamber 10 and a second rinsing cartridge 132' mounted in connection with the second pressure chamber 10'. The first and second rinsing cartridges 132 and 132', respectively, may be of the type described above in connection with Figs. 1-7. The first pressure chamber 10 is connected to the first rinsing cartridge 132 via the second pressure tube 138 so that when the first pressure chamber 10 is pressurized, the first rinsing cartridge 132 is pressurized as well. The first rinsing cartridge 132 is further connected to the discharge valve 72 so that when the first rinsing cartridge is pressurized, the pressure acts on the discharge valve 72 via the fourth pressure tube 142 so that the discharge valve 72 assumes the rinsing position. In the rinsing position, rinsing fluid is allowed to flow from the first rinsing cartridge 132 through the discharge valve 72 towards the tapping line 68'.

[0066] Fig. 14 shows a local rinsing system 116 in a beverage dispensing mode. To assume the beverage dispensing mode, the first rinsing cartridge 132 is simply removed from the first pressure chamber 10. When the first rinsing cartridge 132 is removed, a check valve (not shown) prevents pressurized air from leaving the first pressure chamber 10 via the second pressure tube 138. Consequently, no pressurized air will act on the discharge valve 72, which causes the discharge valve 72 to assume the beverage dispensing position. The beverage dispensing position allows the beverage to flow through the discharge valve 72' towards the tapping line 68'.

[0067] Fig. 15 shows a local rinsing system 116 in a closed mode. The closed mode for the local rinsing system 116 corresponds to the closed mode of the centralized rinsing system 110 and will therefore not be further discussed.

[0068] Fig.16 is a schematic cut-through, close-up view of a discharge valve 72, as illustrated in the above drawings.

[0069] The discharge valve 72 comprises a rod 174, which is located inside the coupling housing 192 and which is adapted to act on a ball-seal 176. The ball-seal 176 is in the present embodiment not a part of the coupling housing 192, but part of the beverage container 168. The ball-seal 176 is received in the base part 186. The discharge valve 72 is operable between three possible positions, which constitute a first position, and opposite second position and an intermediate position. As will be described in greater detail below, the intermediate position constitutes the beverage dispensing position whereas the first and second positions constitute the rinsing position and the closed position, respectively.

[0070] The ball-seal 176 is located in the base part 186 in a defined space between an inlet constriction 178 and an outlet constriction 180. The inlet constriction 178 and the outlet constriction 180 both include an opening or aperture for allowing beverage to flow from the beverage container 168 via the inlet and outlet constrictions 178, 180 and further through the coupling housing 192 towards a beverage outlet 182. Both the inlet constriction 178 and the outlet constriction 180 constitute valve seats, which the ball-seal 176 may seal against. The ball-seal 176 will either establish a seal against the inlet constriction 178 or the outlet constriction 180, or remain in the intermediate position, shown in Fig. 16, which constitutes the beverage dispensing position. The coupling housing 192 accommodates the rod 174 and fits to the base part 186. The coupling housing 192 is fixated to the floor such that when the pressure chamber 10 and the beverage container 168 are swung or pivoted into the horizontal orientation, the coupling housing 192 including the rod 174 remains with the bottom wall, and the discharge valve 72 including the ball-seal 176 remains with the beverage container 168. The rod 174 and the coupling housing 192 may thus be made of rigid and non-disposable materials such as metal.

[0071] When the pressure chamber is in the vertical orientation a fitting 198 seals between the base part 186 and the coupling housing 192. The fitting 198 is shifted downwards to allow the pressure chamber 10 to swing into the horizontal orientation.

[0072] When the rod 174 is in the beverage dispensing position, i.e. in the active or intermediate position as shown in Fig. 16, beverage may flow from the beverage container 168 past the ball-seal 176 and through the beverage outlet 182. The beverage outlet 182 is in fluid communication with the tapping line.

[0073] Initially, when a new sealed beverage container 168 is installed, the base part 186 is sealed off by a laminate sealing at the outlet constriction 180. The laminate sealing is broken by the rod 174 when installing the beverage container 168. This allows beverage to be dispensed from the beverage container 168.

[0074] When the coupling housing 192, and thereby also the rod 174, is separated from the beverage container 168, the beverage, indicated by a shading in the figure, will exert a force on the ball-seal 176 pushing the ball-seal 176 against the outlet constriction 180 defining the closed position, i.e. the second passive position, thereby sealing off the beverage container 168.

[0075] In Fig. 16 the ball-seal 176 is positioned between the inlet constriction 178 and the outlet constriction 180, allowing beverage to flow from the beverage container 168 past the ball-seal 176 and further through the beverage outlet 182 to the tapping line.

[0076] The beverage container 168 is fitted with the base part 186, wherein the top part of the discharge valve 72 is received. The ball-seal 176, the inlet constriction 178 and the outlet constriction 180 are components of the base part 186.

[0077] From the beverage dispensing position shown in Fig. 16, the rod 174 may be shifted towards the beverage container 168 or towards the beverage outlet 182 and tapping line 68. A spring 184 presses the rod 174 in the direction away from the beverage container 168 into the closed position. The discharge valve 72 is preferably used together with the safety system described in Figs. 10-15. The pressure chamber may be pressurized only when beverage dispensing is allowed, i.e. when a beverage keg 168 has been installed and the pressure chamber has been swung into vertical orientation. Consequently, the pressure inside the pressure chamber may be used for applying an intermediate force onto the spring 184, holding the rod 174 in the beverage dispensing position shown in Fig. 16. By adding the force applied from the safety system, the rod 174 moves towards the beverage container 168 into the rinsing position further described in Fig. 17.

[0078] Fig. 17 is a schematic cut-through, close-up view of the same assembly shown in Fig. 16, with the discharge valve 72 slightly rotated around the vertical axis for disclosing a rinsing fluid inlet 190 and a rinsing fluid supply 128, which is not shown in Fig. 16, and the rod 174 in the rinsing position instead of the beverage dispensing position shown in Fig. 16. It is shown that the rinsing fluid inlet 190 is located at the coupling housing 192. The rinsing fluid inlet 190 is used for performing rinsing of the discharge valve 72 and the tapping line. A rinsing fluid may be introduced via the rinsing fluid inlet 190 and rinses the space within the discharge valve 72.

[0079] When the rod 174 is in the rinsing position, the ball-seal 176 is pushed into contact with the inlet constriction 178 so that a sealing effect is created securing that rinsing fluid does not enter the inside of the beverage container 168, which would contaminate the beverage stored in the beverage container 168.

[0080] When the rod 174 is in the rinsing position, i.e. in the first position as shown in Fig. 17, the ball-seal 176 and the inlet constriction 178 establish a seal preventing rinsing fluid from entering the beverage container 168, however, allowing the rinsing fluid to flush and rinse the discharge valve 72 and the tapping line. By opening the beverage tap when the rod 174 is in the rinsing position, rinsing fluid will flow out of the beverage tap and flush and rinse the discharge valve 72 as well as the tapping line and beverage tap (not shown).

[0081] The coupling housing 192 interconnects the outlet constriction 180 of the discharge valve 72 and the beverage outlet 182. The rinsing fluid inlet 190 is attached to the coupling housing 192 as well, but in a position below a rinsing valve seat 196. When the rod 174 is in the rinsing position, a corresponding rinsing valve element 194 allows fluid communication between the rinsing fluid inlet 190 and the coupling housing 192. When the rod is moved away from the rinsing position to the dispensing position or the closed position, the rinsing valve element 194 contacts the rinsing valve seat 196 and prevents fluid communication between the coupling housing 192 and the rinsing fluid inlet 190. This is to prevent beverage and rinsing fluid from mixing when the rod 174 is in the dispensing position.

[0082] After the cleaning fluid, flushing fluid, i.e. tap water, is introduced through the rinsing fluid inlet 190 to flush the discharge valve 72 and the tapping line so that residual cleaning fluid is not dispensed with the beverage in the first beverage dispensing operation after rinsing.

[0083] Fig. 18 shows an alternative embodiment of the centralized rinsing system 110'. By providing a separate cleaning and flushing unit 118, pressure fluid may be selectively provided to one of the control valves 124, 124'. In the presently shown embodiment, pressure fluid is supplied only to the control valve 124' belonging to the second pressure chamber 10'. A switch may be used for this purpose. Since both pressure chambers 10, 10' are pressurized, the discharge valve 72 belonging to the first pressure chamber 10 will assume the beverage dispensing position, and the discharge valve 72' of the second pressure chamber 10' will assume the rinsing mode. Thus, cleaning and flushing fluid may be supplied to the discharge valves 72, 72' of both pressure chambers 10, 10'. However, since only the discharge valve 72' of the second pressure chamber 10' is in the rinsing position, it will allow cleaning and flushing fluid to propagate through the second rinsing fluid supply 130 and tapping line 68' of the second pressure chamber 10', and rinsing and flushing fluid will be prevented from entering the tapping line 68 belonging to the first pressure chamber 10. It should be noted that beverage and cleaning fluid may be dispensed simultaneously in the present embodiment and thus the present embodiment does not fulfil the highest level of safety since beverage and rinsing fluid may be accidentally mixed up by a careless operator. The present embodiment does, however, bring slightly more flexibility to the rinsing operation and at the same time provides some basic safety requirements such as preventing the rinsing operation when the pressure chamber is opened and not pressurized.

List of features with reference to the figures:

[0084]

10.	Pressure chamber	72.	Discharge valve
12.	Grip	74.	Pressure fluid pipeline
14.	Lid	76.	Pressure fluid inlet
20.	External cleaning and flushing unit	110.	Centralized rinsing system
24.	Rinsing fluid outlet	112.	Air compressor
25.	Rinsing line	114.	Housing
27.	Rinsing connector	116.	Local rinsing system
28.	Pressure fluid connector	118.	Centralized cleaning / flushing unit
29.	Pressure fluid pipe	120.	Primary safety valve
36.	Flushing fluid cartridge	122.	Secondary safety valve
38.	Flushing fluid outlet	124.	Control valve
40.	Cartridge interconnection	128.	First rinsing fluid supply
42.	Flushing fluid inlet	130.	Second rinsing fluid supply
43.	Check valve	132.	Rinsing cartridge
44.	Pressure fluid inlet	136.	First pressure tube
46.	Cleaning fluid cartridge	138.	Second pressure tube
50.	Float valve	140.	Third pressure tube
51.	Valve recess	142.	Fourth pressure tube
52.	Float valve support	168.	Beverage container
53.	Inner piston	174.	Rod
54.	Opening	176.	Ball-seal
55.	Outer piston	178.	Inlet constriction
56.	Flushing fluid cap	180.	Outlet constriction
57.	Flushing fluid valve	182.	Beverage outlet
58.	Cleaning fluid cap	184.	Spring
59.	Cleaning tablet	186.	Base part
60.	Connector (piercing element)	190.	Rinsing fluid inlet
65.	Valve	192.	Coupling housing
66.	Base part	194.	Rinsing valve element
68.	Tapping line	196.	Rinsing valve seat
70.	Beverage outlet	198.	Fitting

Claims

1. A method of detecting the operational mode of a beverage dispensing system, the beverage dispensing system comprising:

   a sealable pressure chamber to be shifted between a first open position and a second closed position,
   a collapsible keg to be received within the sealable pressure chamber,

a tapping line, at least during use connected to said collapsible keg,
a fluid pressure source connected to the pressure chamber for pressurising the pressure chamber,
a first detector having a pressure input for receiving fluid pressure from said fluid pressure source and a control pressure output, detecting whether said sealable pressure chamber is in said first open position or in said second closed position and, provided said sealable pressure chamber is in said second closed position, supplying a control pressure from said control pressure output, and
a second detector having a pressure input for receiving fluid pressure from said fluid pressure source and a control pressure output, detecting whether or not said collapsible keg is positioned in said sealable pressure chamber and, provided said keg is positioned in said sealable pressure chamber, supplying a control pressure from said control pressure output,
the method comprising evaluating as a logical AND said control pressures from said control pressure outputs of said first and second detectors and determining said operational mode of said beverage dispensing system, said operational mode only to be accomplished provided both control pressures are supplied from said control pressure outputs of said first and second detectors.

2. The method according to claim 1, wherein said enabling mode is indicated by an indication signal, such as e.g. a green light, a green signal plate or the like.

3. The method according to any of the preceding claims, said first and second detectors being connected in a series configuration or alternatively being connected to a AND pressure valve for generating an enabling pressure, provided said operational mode is accomplished.

4. The method according to claim 3, further providing a discharge valve between said beverage keg and said tapping line, said discharge valve having a beverage dispensing position and a closed position, wherein said operational mode corresponds to said pressure chamber being pressurized, and said enabling pressure is used for causing said discharge valve to assume said beverage dispensing position.

5. The method according to any of the preceding claims, further providing a rinsing cartridge in fluid communication with said tapping line, and a third detector having a pressure input for receiving fluid pressure from said rinsing cartridge and a control pressure output, detecting whether or not said rinsing cartridge is pressurized, and provided said rinsing cartridge is pressurized, supplying a control pressure from said control pressure output, wherein the method comprising evaluating as a logical AND said control pressures from said control pressure outputs of said first, second and third detectors and determining a rinsing mode of said beverage dispensing system is only accomplished provided all three control pressures are supplied from said control pressure outputs of said first, second and third detectors.

6. The method according to claim 5, wherein said rinsing mode is indicated by an indication signal, such as e.g. a red light, a red signal plate or the like.

7. The method according to any of claims 5-6, said first, second and third detectors being connected in a series configuration or alternatively being connected to a AND pressure valve for generating a rinse-enable pressure, provided said rinsing mode is accomplished.

8. The method according to claim 7, further providing a discharge valve between said rinsing cartridge and said tapping line, said discharge valve having a rinsing position, wherein said rinsing mode corresponds to said rinsing cartridge being pressurized, and said rinse-enable pressure is used for causing said discharge valve to assume said rinsing position.

9. The method according to any of claims 5-8, wherein said rinsing cartridge is detachably installed onto said pressure chamber, or alternatively said rinsing cartridge constitutes a separate rinsing unit.

10. The method according to any of claims 5-9, further comprising any of the features of claim 3, and wherein said rinsing cartridge is pressurized by said enabling pressure, or further comprising said rinsing cartridge being pressurized by said fluid pressure source or said pressure chamber.

11. The method according to any of claims 5-10, wherein said rinsing cartridge is connected to a plurality of beverage-dispensing systems.

12. The method according to claim 11, wherein said rinsing cartridge is provided with a switch for selectively supplying rinsing fluid from said rinsing cartridge to one tapping line of the said plurality of beverage dispensing systems.

13. The method according to claims 11-12, wherein said rinsing cartridge is provided with a switch for selectively supplying said control pressure output of said third detector to one of the said beverage dispensing systems, or alternatively where said control pressure output of said third detector is supplied to all of said beverage dispensing systems.

14. A system for detecting the operational mode of a beverage dispensing system, the beverage dispensing system comprising:

a sealable pressure chamber to be shifted between a first open position and a second closed position,
a collapsible keg to be received within the sealable pressure chamber,
a tapping line, at least during use connected to said collapsible keg,
a fluid pressure source connected to the pressure chamber for pressurising the pressure chamber,
a first detector having a pressure input for receiving fluid pressure from said fluid pressure source and a control pressure output for detecting whether said sealable pressure chamber is in said first open position or in said second closed position and, provided said sealable pressure chamber is in said second closed position, supplying a control pressure from said control pressure output,
a second detector having a pressure input for receiving fluid pressure from said fluid pressure source and a control pressure output for detecting whether or not said collapsible keg is positioned in said sealable pressure chamber and, provided said keg is positioned in said sealable pressure chamber, supplying a control pressure from said control pressure output, and
an evaluation unit for evaluating as a logical AND said control pressures from said control pressure outputs of said first and second detectors and determining said operational mode of said beverage dispensing system, said operational mode only to be accomplished provided both control pressures are supplied from said control pressure outputs of said first and second detectors.

15. A system according to claim 14, further comprising any of the features of claims 1-13.

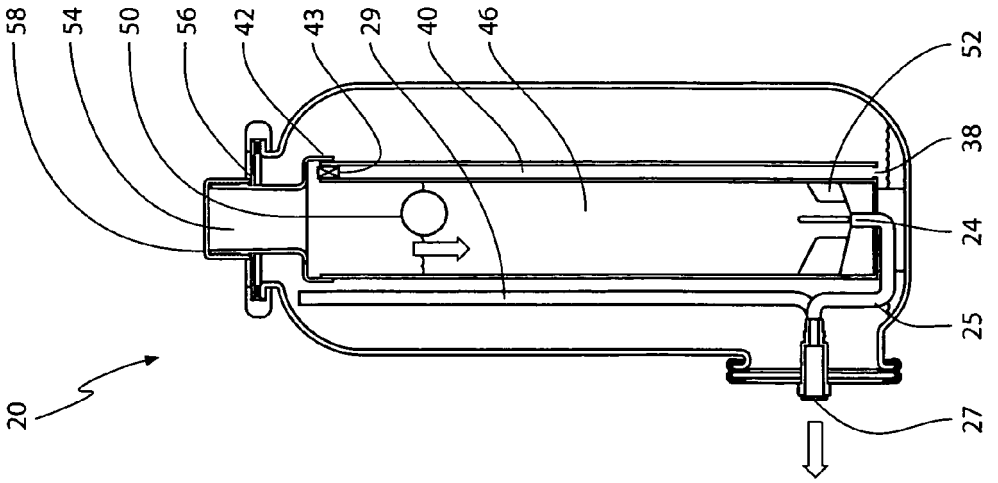

FIG 1C

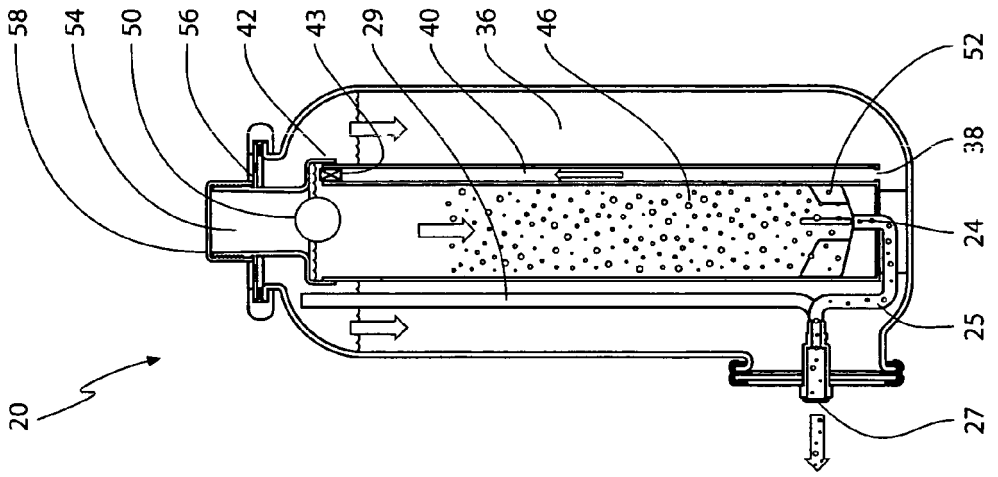

FIG 1B

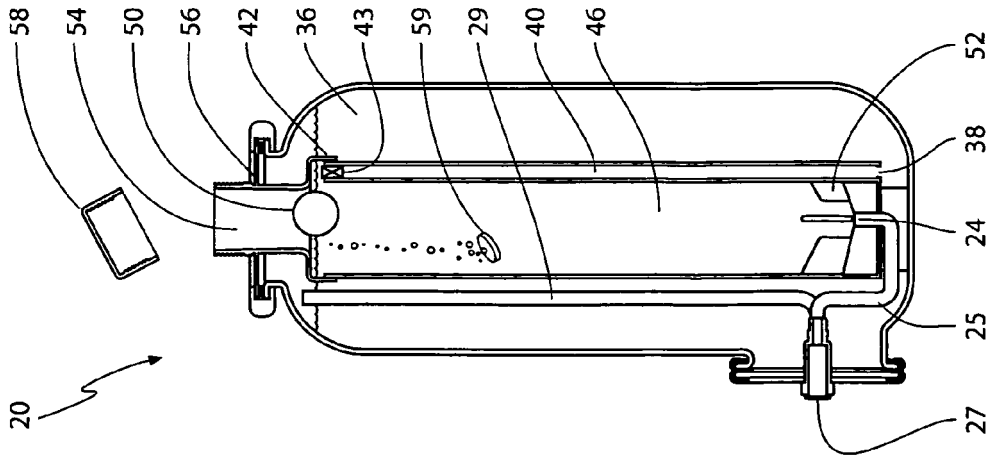

FIG 1A

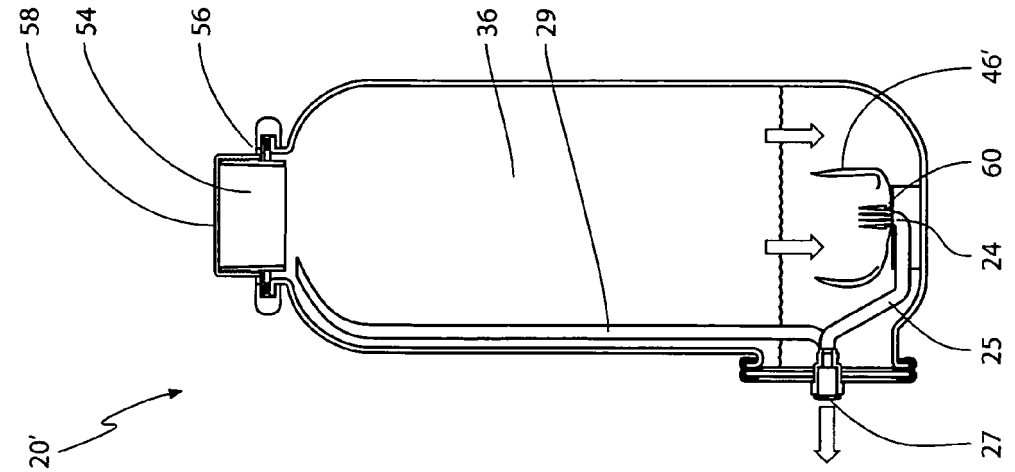

FIG 2C

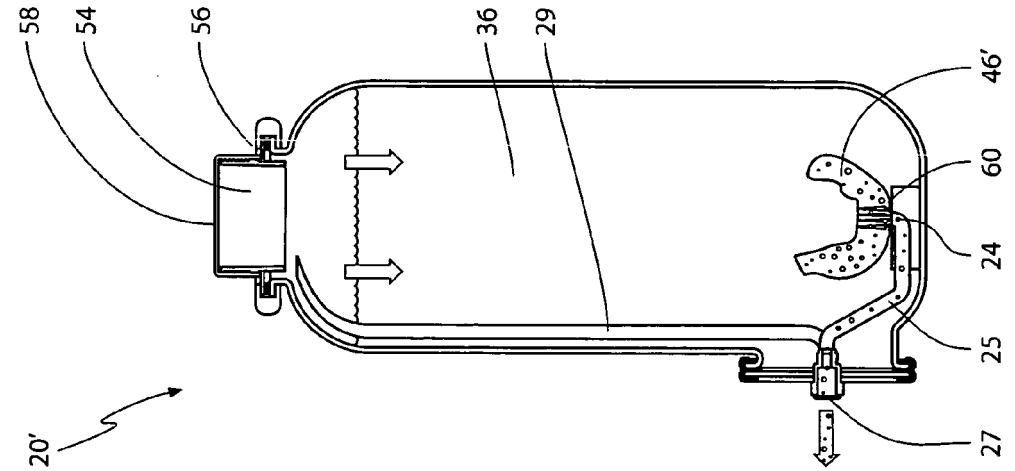

FIG 2B

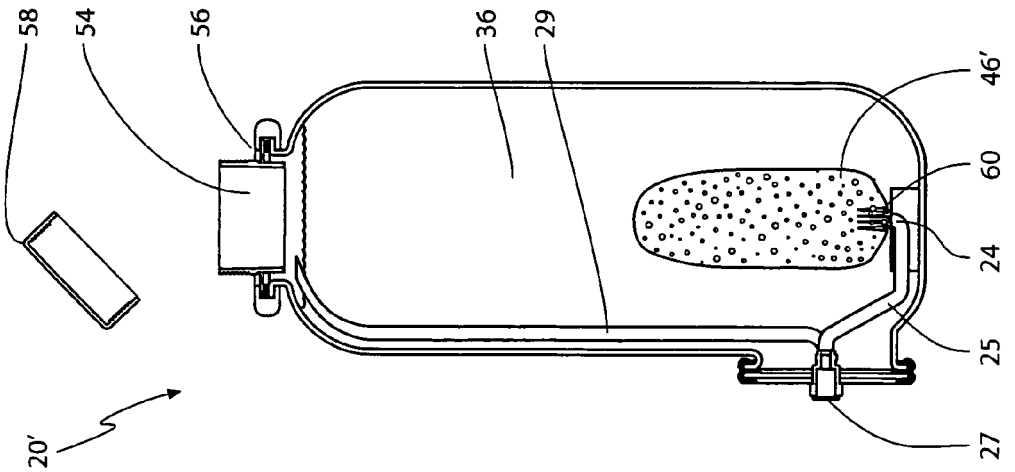

FIG 2A

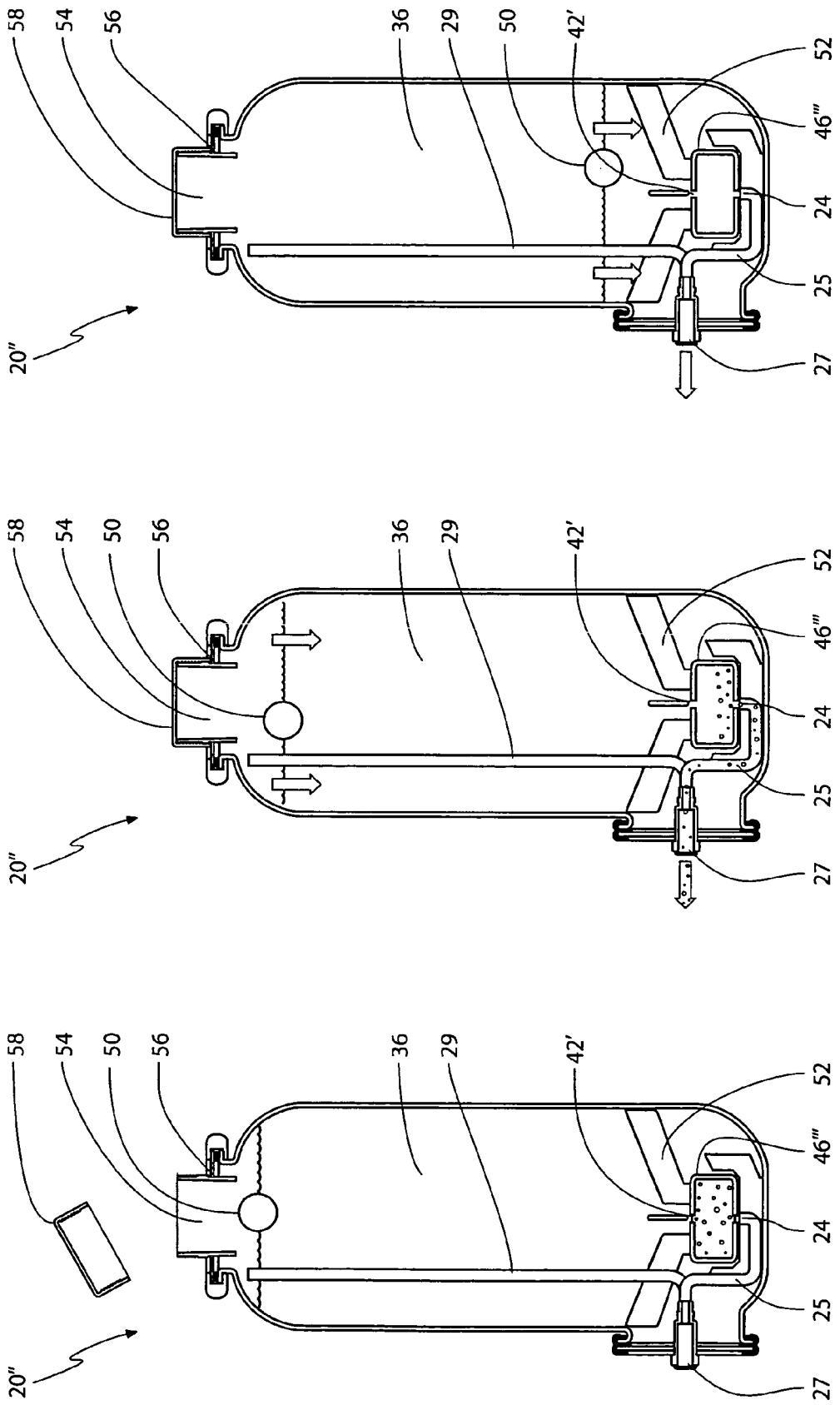

FIG 3A

FIG 3B

FIG 3C

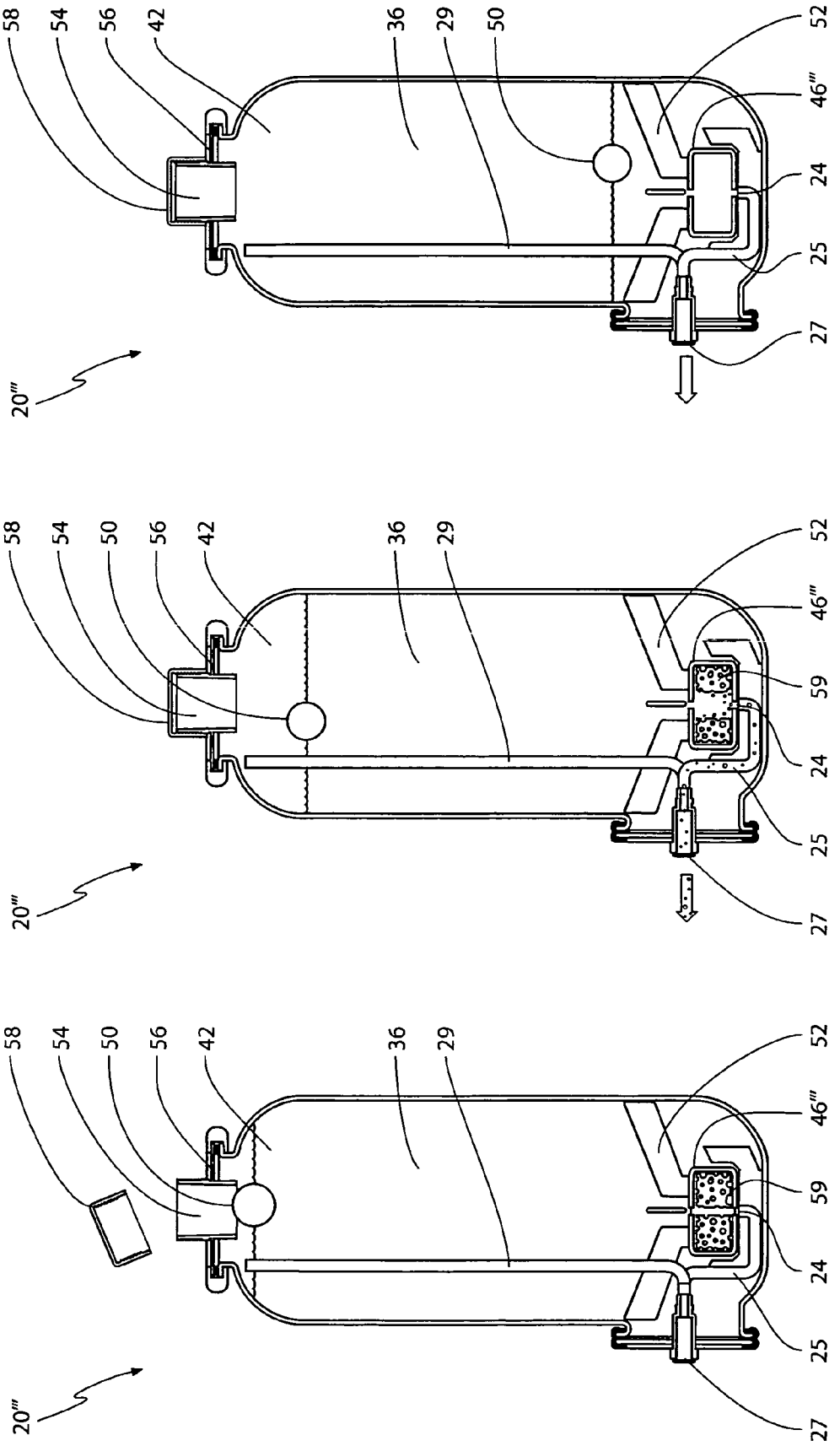

FIG 4C

FIG 4B

FIG 4A

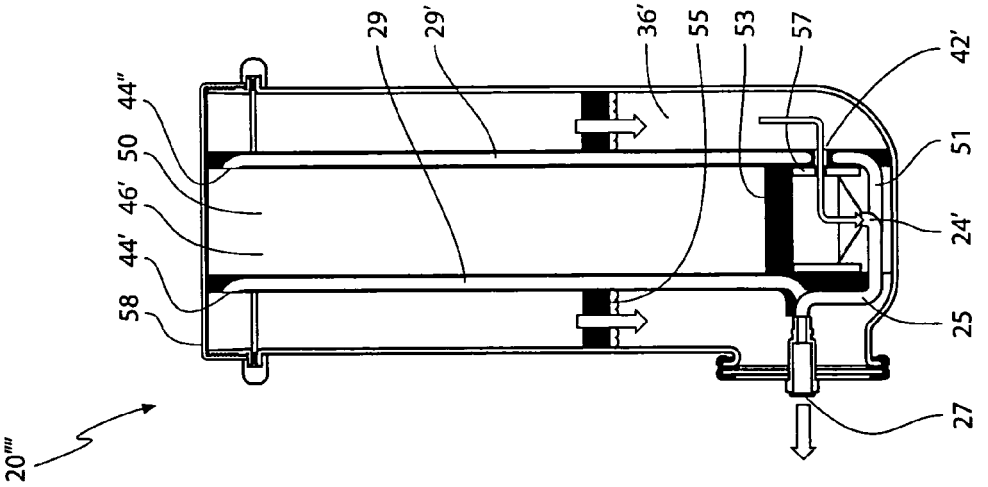

FIG 5C

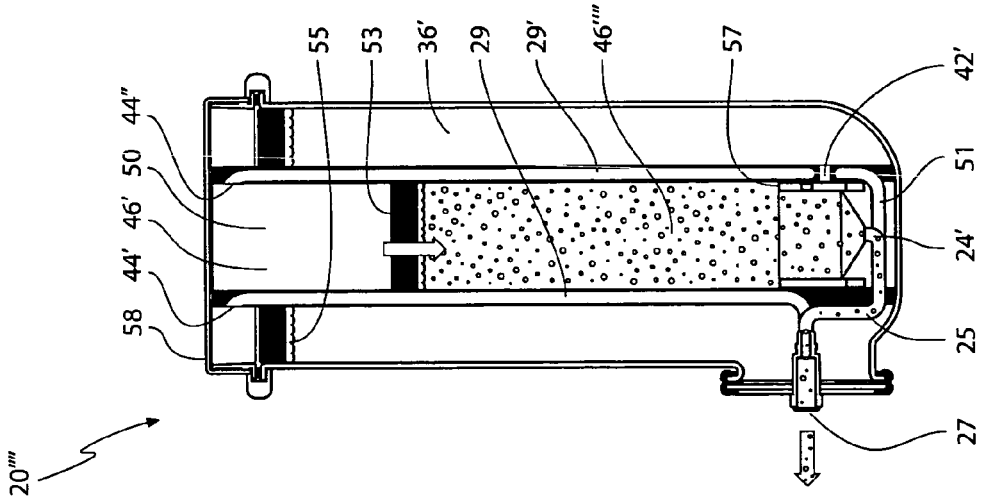

FIG 5B

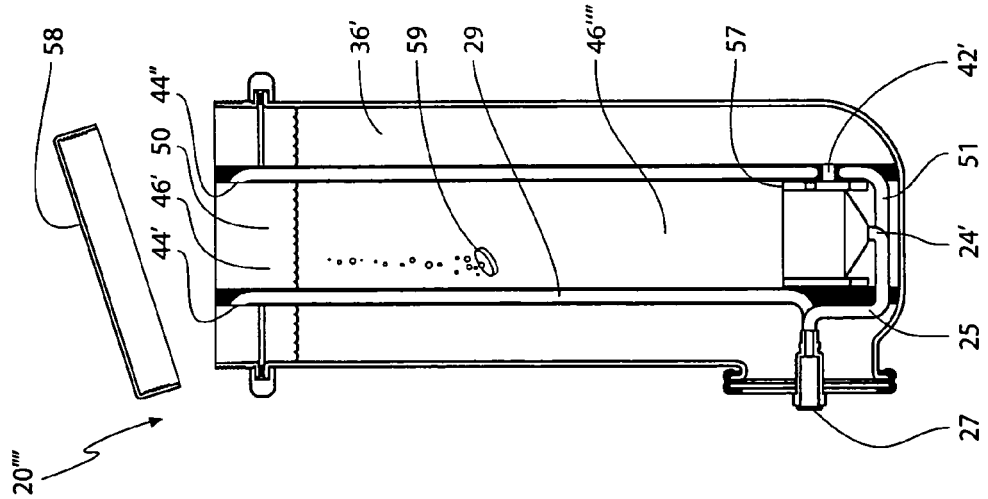

FIG 5A

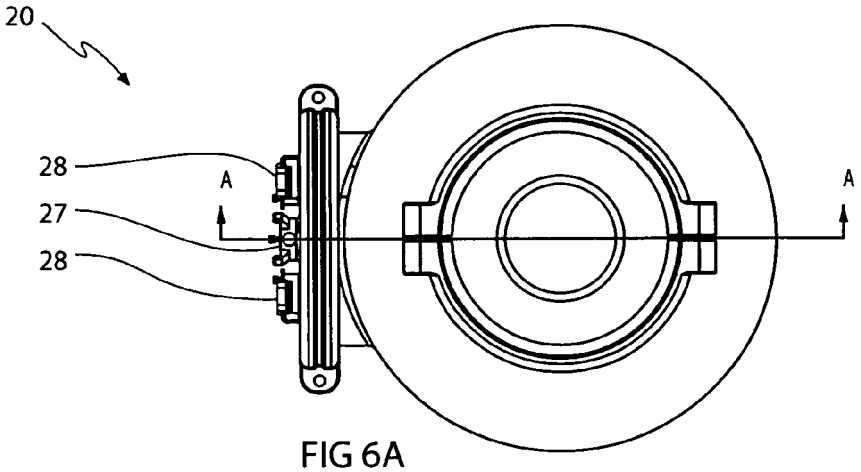

FIG 6A

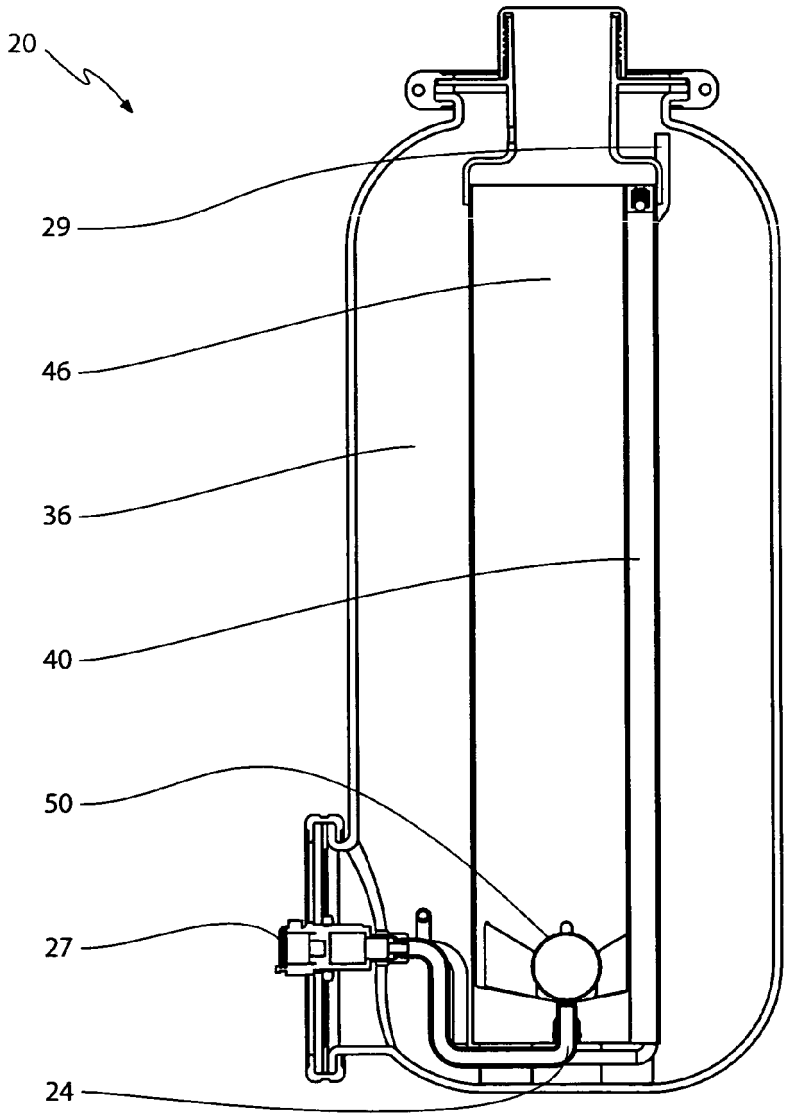

FIG 6B

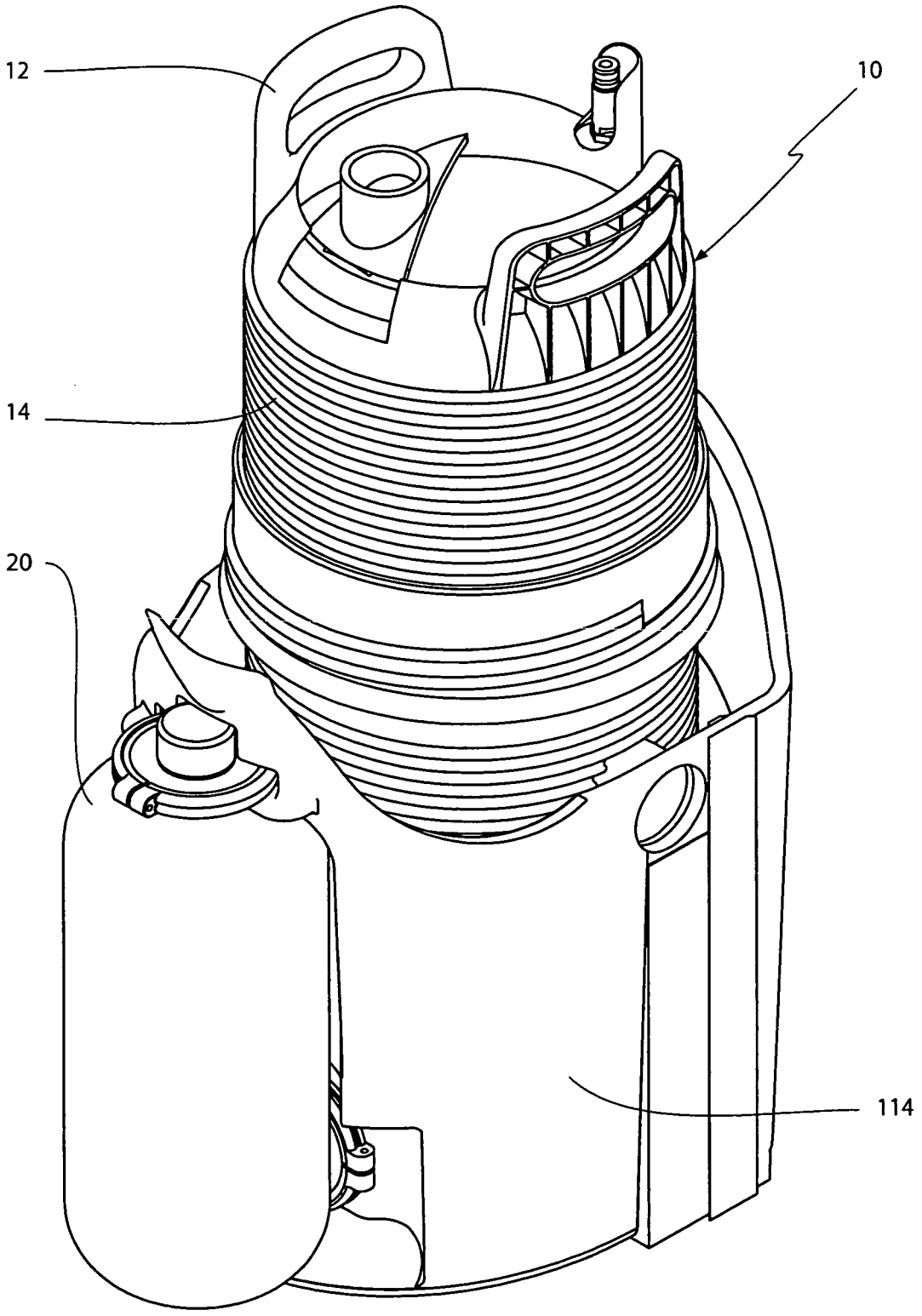

FIG 7

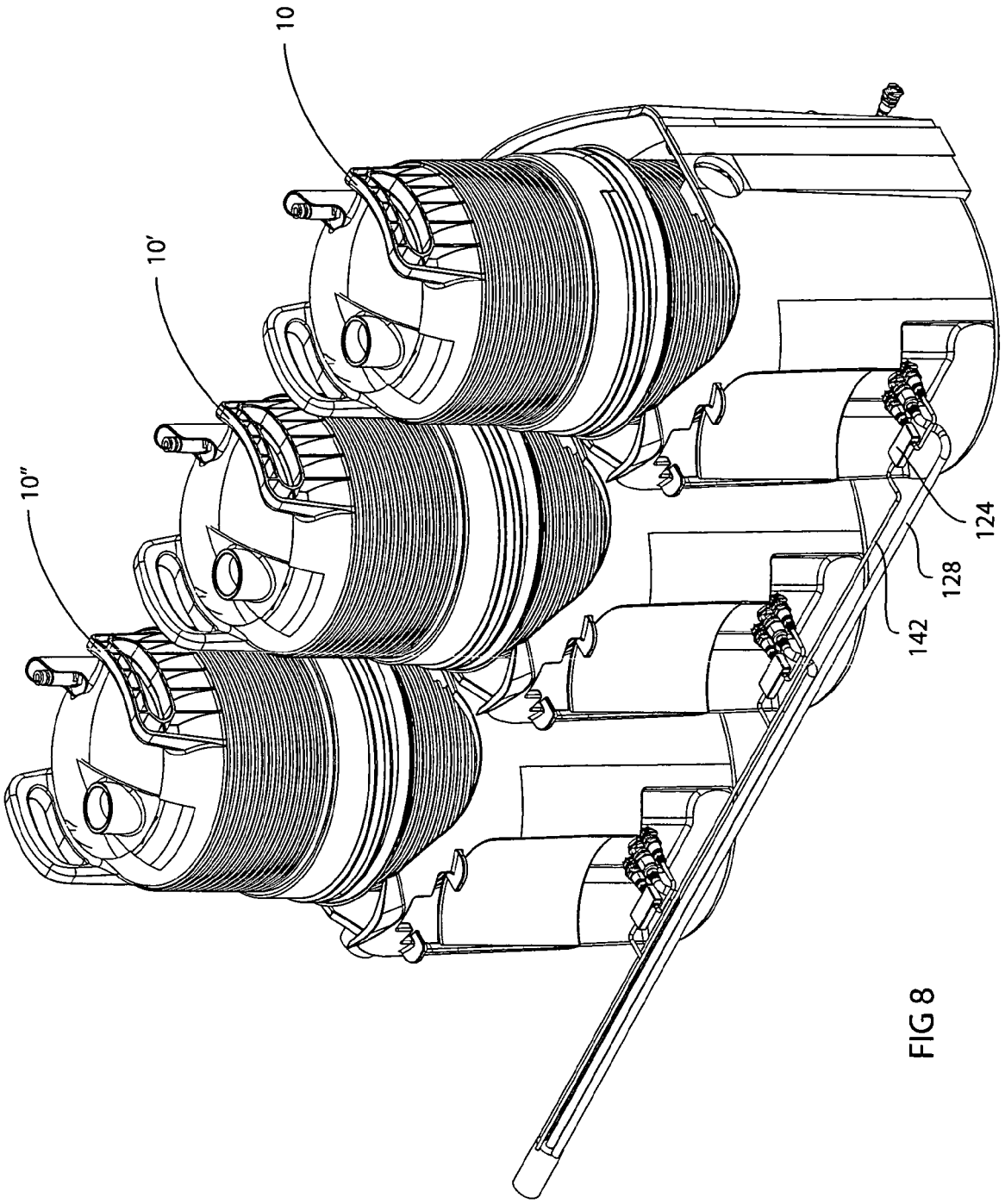

FIG 8

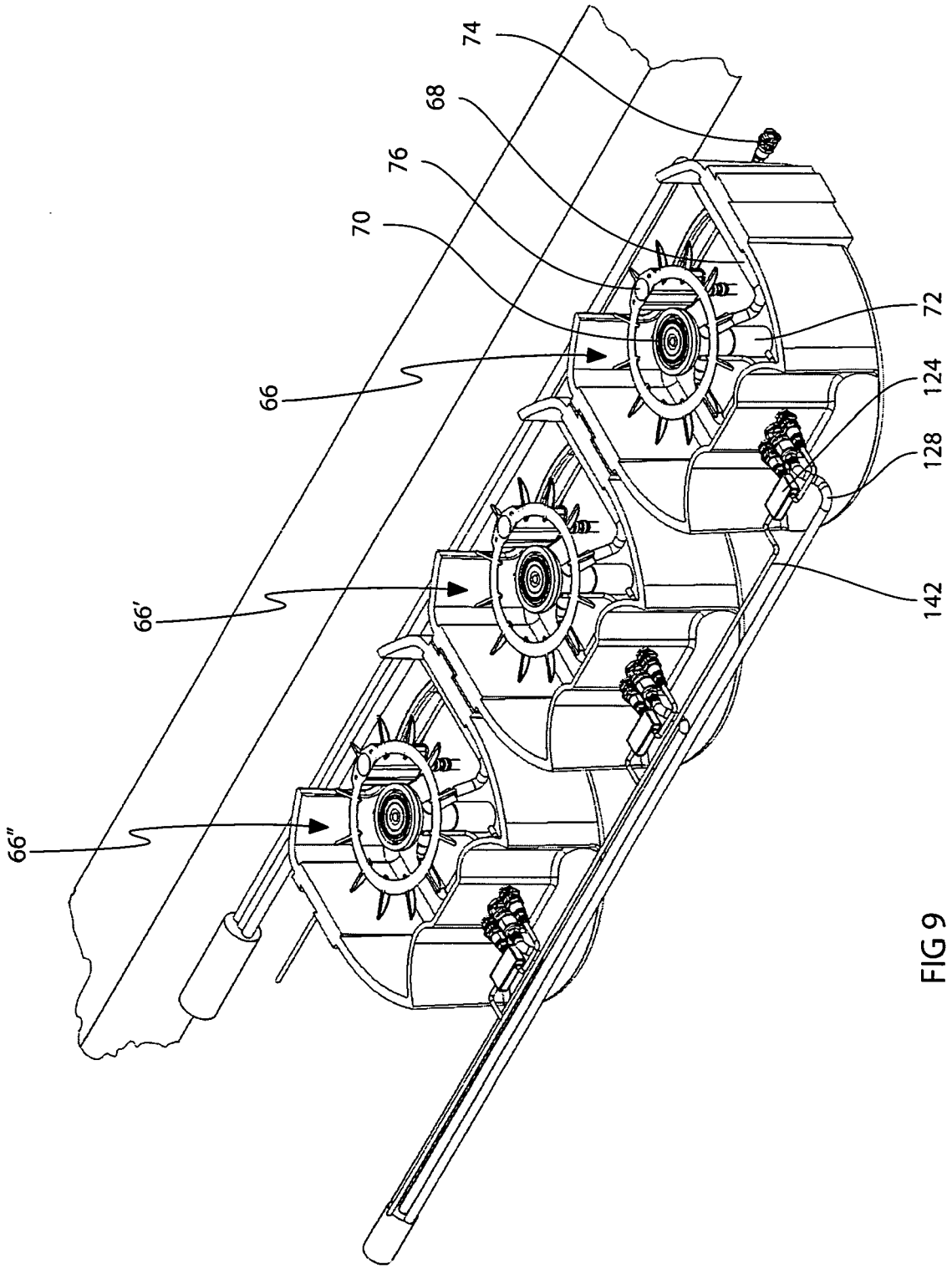

FIG 9

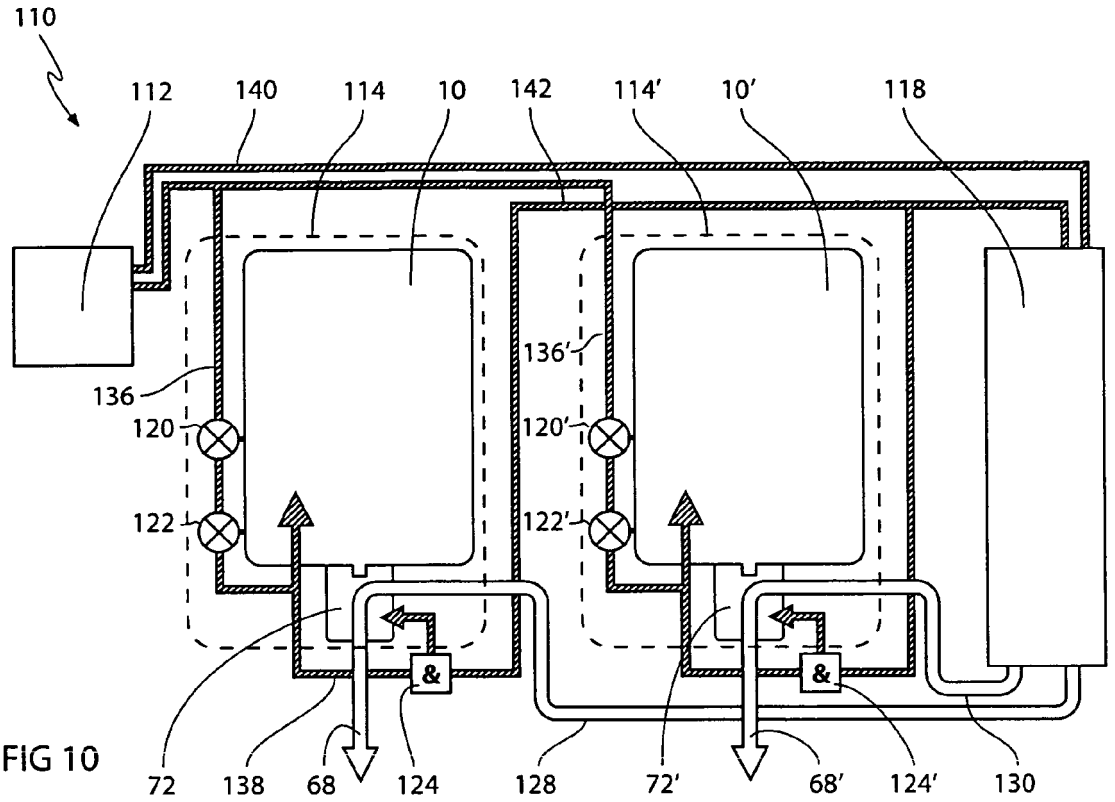
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FIG 10

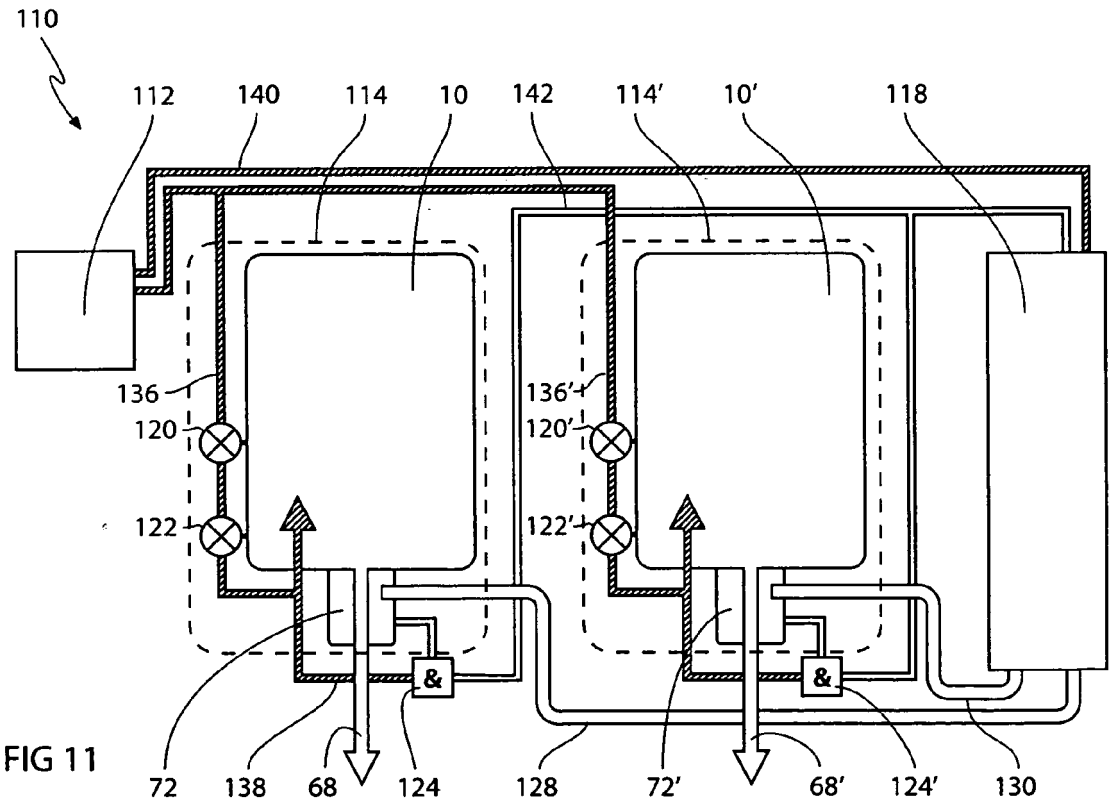
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FIG 11

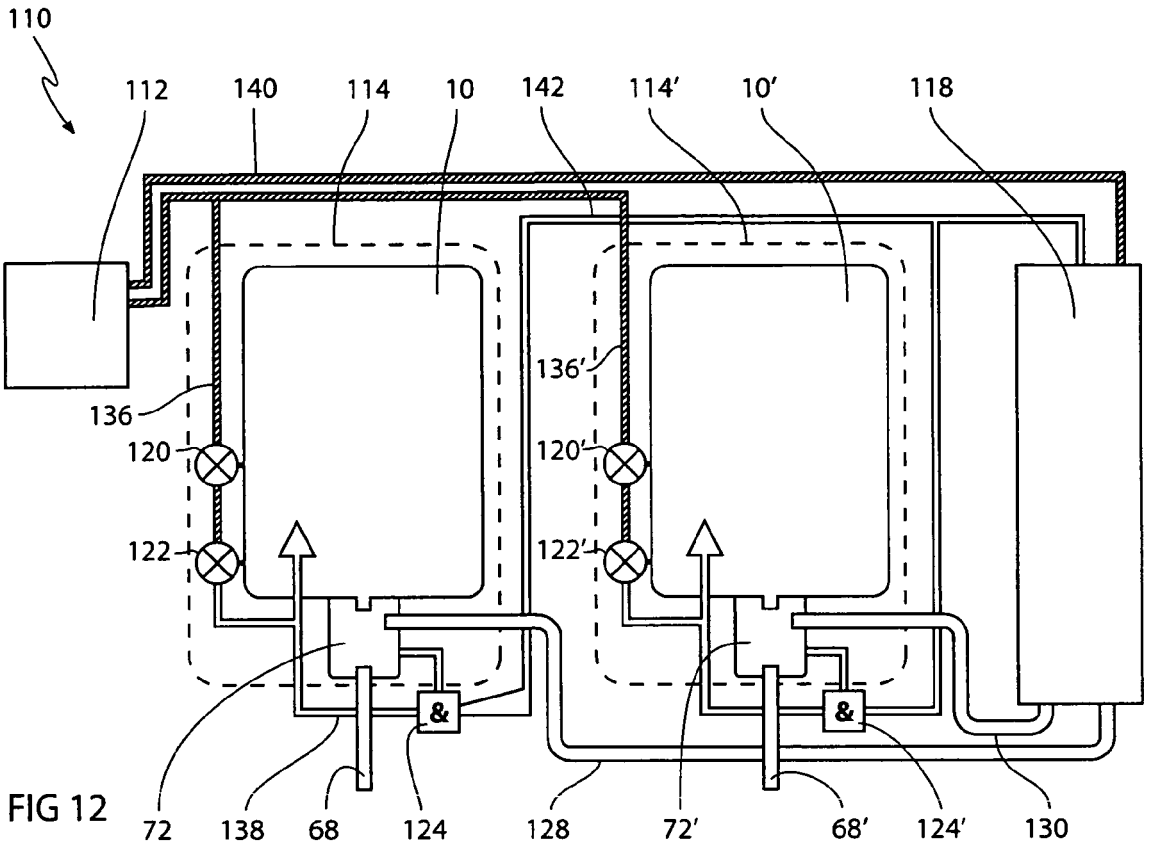
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FIG 12

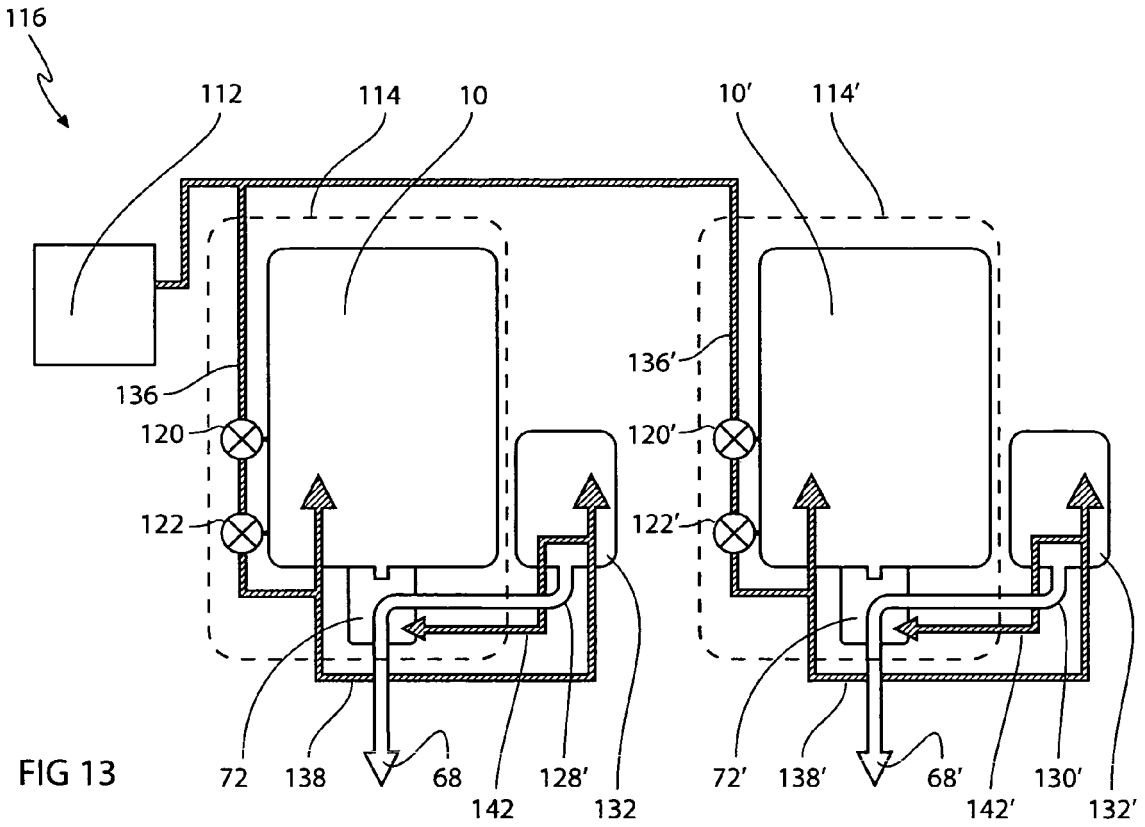
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FIG 13

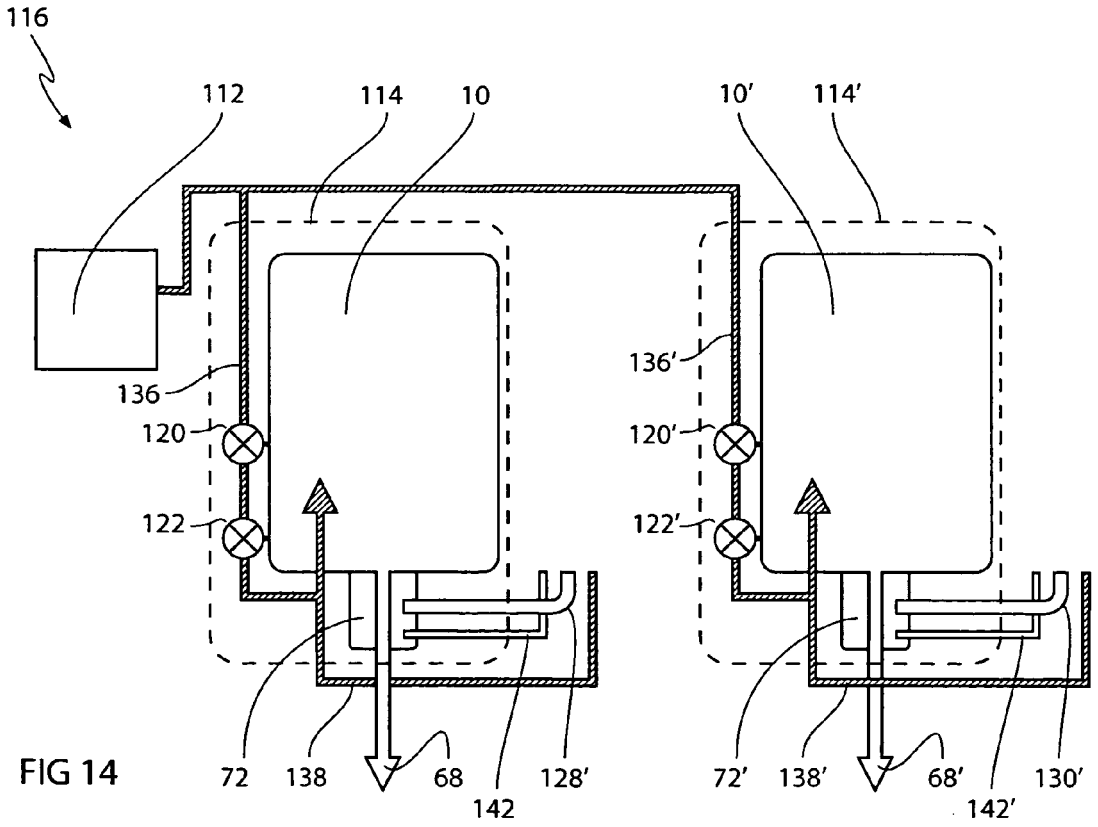
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FIG 14

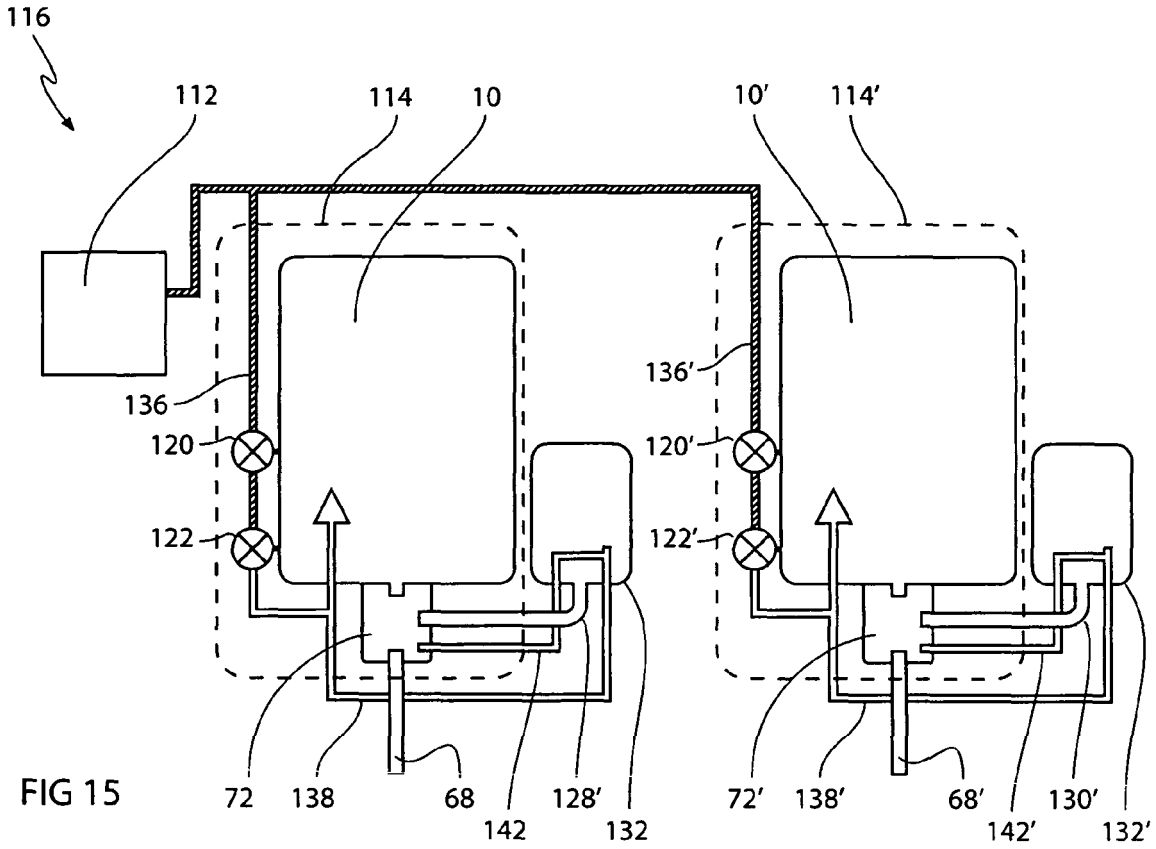
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FIG 15

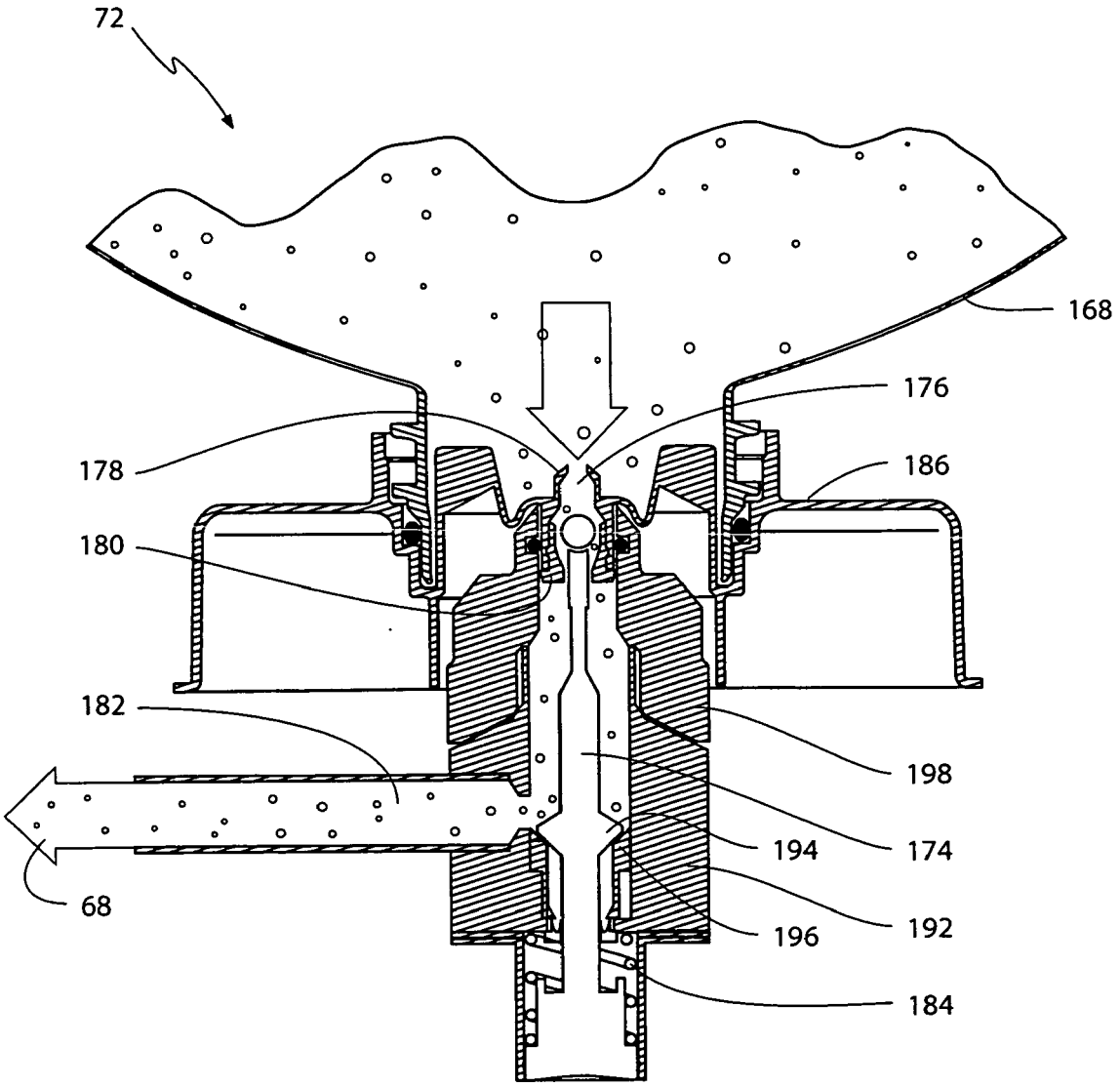

FIG 16

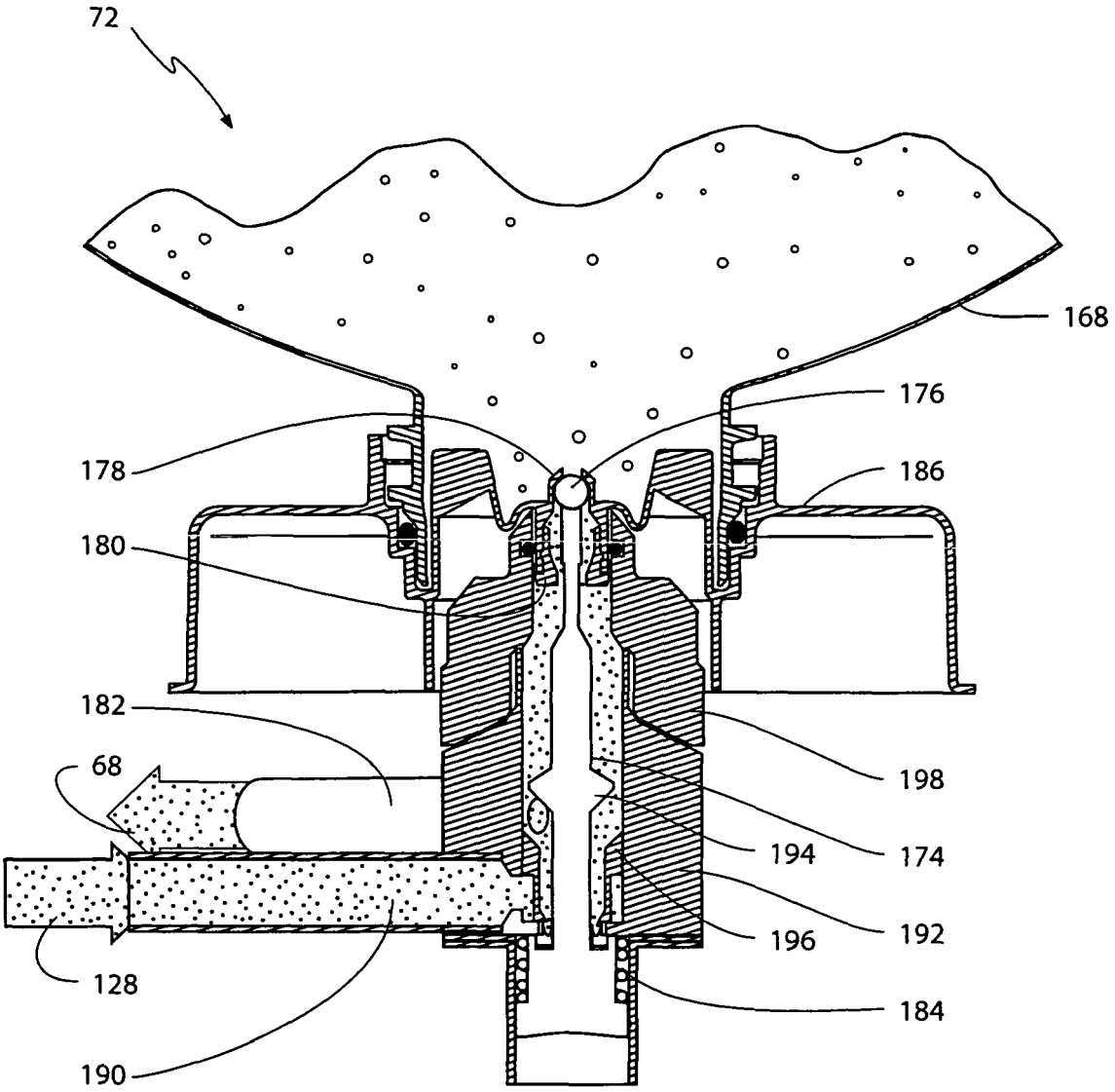

FIG 17

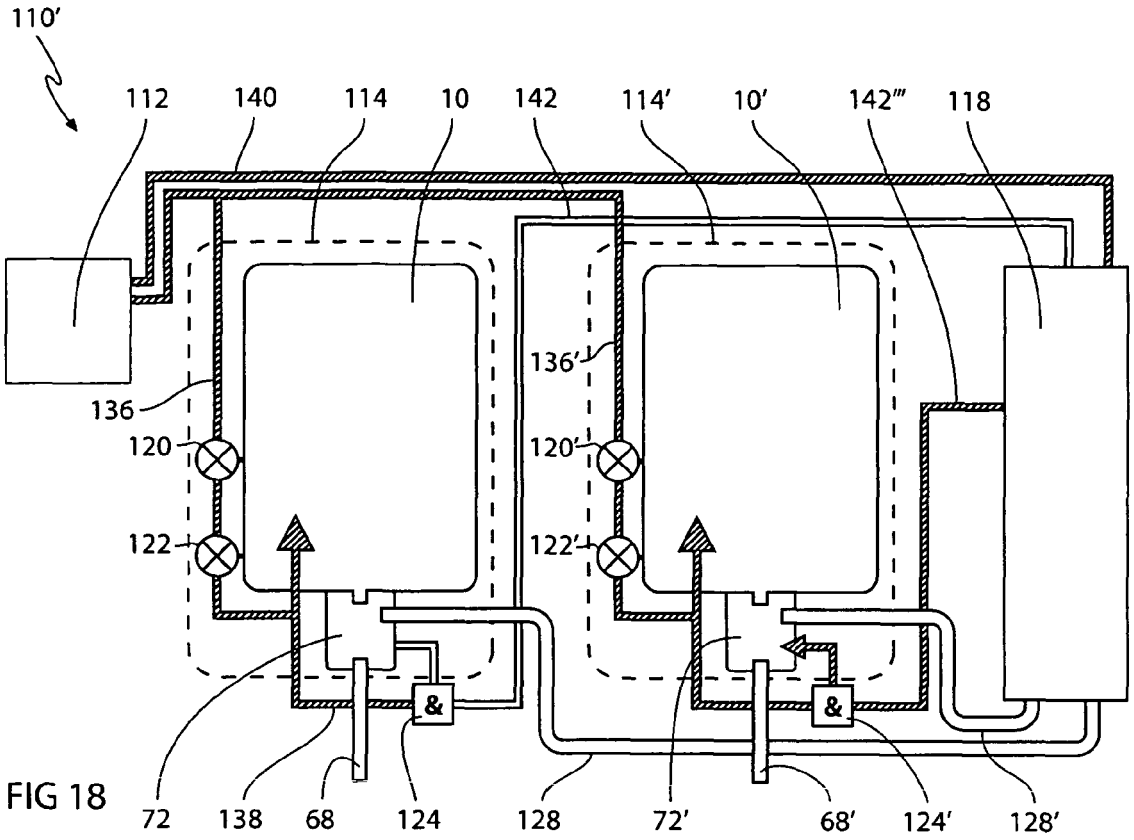
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FIG 18

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EUROPEAN SEARCH REPORT

Application Number
EP 08 38 8043

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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)

B67D
B08B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 August 2009	Desittere, Michiel

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17-08-2009

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