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(54) **DOSING ASSEMBLY**

DOSIERANORDNUNG

ENSEMBLE DE DOSAGE

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Description

[0001] The present invention relates to a dosing assembly for use in a heating or cooling system.

[0002] Heating systems in buildings very often use a working fluid (typically water) which is heated by a boiler and circulated under pressure through tubing to heat exchangers such as radiators to heat areas of the building. The fluid is retained and recirculated, thus passing through the system any number of times. The fluid can become contaminated to form a sludge which can impair the efficient operation of the heating system. Contaminants include deposited calcium carbonate (limescale), by-products of corrosion in the system such as rust or magnetite, particulate impurities, and microbiological growths including fungi and yeast.

[0003] Sludge can affect performance of items exposed to the fluid, such as pumps and the heat exchangers of boilers, and can cause local blockages which impair system performance. If unmanaged, sludge can eventually necessitate flushing of the system with clean fluid and other remedial action to remove blockages and to replace damaged components.

[0004] To resist this fluid contamination, it is common to (a) incorporate filtration to capture contaminants and (b) treat the fluid chemically.

[0005] Chemical additives can be used among other things to inhibit corrosion, reducing build-up of corrosion products, to resist deposition of limescale, and to provide a biocidal effect reducing biological contamination. Antifreeze may also be used to prevent the damage that would result from freezing of water in pipes in a building whose heating system is left inactive for extended periods.

[0006] Filters used in heating systems may serve to block and physically capture particulates and/or may use magnets to capture ferrous material from the fluid.

[0007] Since a closed loop heating system is normally pressurised, it is desirable - and well known - to incorporate into such systems a dosing pot through which chemicals in liquid form are able to be introduced to the system without any need to de-pressurise or drain the system. A known configuration is depicted in Figure 1. The dosing pot 10 is formed as a vessel capable of withstanding the heating system's internal pressure and connectable via isolating valves between two points of the heating system, one at higher pressure than the other. In this example opening of an inlet-side isolating valve 12 connects the dosing pot 10 to a fluid supply line 14 of the heating system when open, and an outlet-side isolating valve 16 serves when open to connect the dosing pot 10 to a return line 18 of the system. The supply line 14 is, while fluid is flowing around the system, at greater pressure than the return line 18, so that when the isolating valves are open a small part of the total fluid flow is diverted through the dosing pot 10 to distribute chemicals contained in it in the fluid. In order to supply chemicals to the dosing pot 10, both isolating valves 12, 16 are closed to isolate the dosing pot 10 from the heating system. Fluid is drained from the dosing pot 10 through a drain valve 20 to make room for the chemicals to be introduced. The chemicals, temporarily contained in a tundish 22, can then be released into the dosing pot 10 through a fill valve 24. The fill and drain valves 24, 20 are then closed and the isolating valves opened.

[0008] Since a portion of the fluid flow through the heating system is diverted through the dosing pot 10, it can additionally be used to house a filter. GB2503672 describes such an arrangement which is to be filled with chemicals in liquid form through a non-return valve, and which contains both a media filter and a magnetic "collector" for collecting ferromagnetic material.

[0009] Dosing pots are typically suited to use with chemicals in liquid form, but suitable chemicals are also commercially available which are supplied as solid bodies to be dissolved in the fluid. The type of dosing pot disclosed in GB2503762 is not suitable for use with solid chemicals. It has a lid which is bolted to the body of the pot and through which passes a dosing port formed as a narrow, internally threaded tube for connection to a supply of liquid treatment chemicals via a non-return valve and an isolating valve. The dosing port is not suitable for introduction of solid chemicals, being too narrow for this purpose.

[0010] While the above discussion relates to heating systems, similar challenges arise in relation to certain closed loop cooling systems and the invention is applicable to either.

[0011] US 2011/094949 A1 (Just) discloses a dechlorinator for dechlorinating a stream of water. It has a housing with an inlet and an outlet. The housing defines a flow path between the inlet and the outlet. A filter is supported in the housing and located in the flow path and a dechlorinating tablet is operatively supported in the housing in the flow path downstream of the filter.

[0012] US 2002/195404 A1 (Pickens et al) discloses a method for dissolving a solid chemical material such as calcium hypochlorite in a solvating liquid which in this case is water since the embodiment disclosed is applied in relation to a swimming pool. The apparatus depicted in this document comprises a pump, a filter and a heater. A chemical feeder and a gas injector are also used.

[0013] US 5181533 A (Kooi) describes a dispensing device to dissolve in particular fertilisers or pesticides into aqueous solutions.

[0014] In accordance with a first aspect of the present invention there is a dosing assembly according to claim 1.

[0015] Specific embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a schematic representation of a dosing pot arrangement belonging to the prior art;

Figure 2 shows a dosing pot embodying the present invention, a dosing vessel being cut away to reveal

interior components;

Figure 3 corresponds to Figure 2 except that the dosing vessel is not cut away;

Figure 4 is a schematic representation of a dosing arrangement using a dosing pot according to the present invention;

Figure 5 is a side view of a further dosing pot embodying the present invention;

Figure 6 corresponds to Figure 5 except that the dosing vessel is cut away;

Figure 7 is an exploded view of a lid used with the dosing pot of Figures 5 and 6; and

Figures 8a and 8b are side and plan views respectively of a bubble coalescing device used in the dosing pot of Figures 5 and 6.

[0016] The dosing assembly 100 depicted in Figures 2 and 3 is for installation in a heating or cooling system to supply treatment chemicals to the system. It can be mounted in a "side stream", which is to say that it need not receive the full flow through the system but can instead be connected, in the manner depicted in Figure 1, between two points in the system between which there is a pressure difference, causing a side stream flow through the dosing assembly 100. As well as dosing the fluid in the system, the dosing assembly 100 serves in the present embodiment to:

filter the system fluid to reduce contamination;

vent air from the fluid; and

monitor pressure, and provide a warning if it deviates from an acceptable range.

[0017] All of these aspects will now be described in more detail.

[0018] The dosing assembly 100 comprises a dosing vessel 102 defining a dosing chamber 104. In the present embodiment the dosing vessel 102 is cylindrical, having an open upper end which is closed by a removable lid 106 in use, and a lower wall 108 which is domed in the present embodiment and through which passes an axially directed fluid outlet port 110. In the present embodiment the dosing vessel 102 has a stepped diameter so that above the dosing chamber 104 is a narrower neck portion 112 leading to the lid 106. A laterally directed fluid inlet port 114 is formed in the neck portion's side wall. Fluid normally flows in use in a downward direction from the fluid inlet port 114 to the fluid outlet port 110.

[0019] The lid 106 is able to be disengaged from the dosing vessel 102 by turning it, and is thus removable from the dosing vessel 102 to leave its upper end open. The dosing vessel will typically be de-pressurised before the lid 106 is removed, but in the event of misuse there is the possibility that the lid might be released while the dosing vessel 102 is exposed to the elevated pressure in the system. In the absence of some form of protection, this might result in the lid being forcibly propelled from the dosing vessel 102, and in subsequent uncontrolled venting of hot liquid from the vessel. As a safety feature, the lid 106 engages with the neck portion 112 of the dosing vessel 102 in such a manner that its disengagement involves first moving it to a captive pressure release configuration, in which a path is opened for release of pressure from the dosing chamber 104 but the lid 106 remains captively attached to the neck portion 112 and so cannot be ejected, and then moving the lid 106 to a full release configuration in which it is able to be removed from the dosing vessel 102. If, upon moving the lid to the captive pressure release configuration, the user observes that gas or liquid is being expelled, then the user is able to close the lid 106 and so prevent mishap. Suitable lid mechanisms are known to the skilled person. One such conforms to a DIN standard and is known in the trade as a "DIN lid".

[0020] In Figure 2, the dosing vessel 102 is seen to contain a bubble coalescing device 116 and a basket 118.

[0021] The basket 118 is disposed in the dosing chamber 104 but can be removed from the dosing vessel 102 through its open upper end, while the lid 106 is not in place. In the present embodiment it is generally cylindrical in form, having a side wall 120 whose lower end is closed by an end wall 122 and whose upper end 124 is open. The walls of the basket 118 are permeable to fluid. They may for example comprise wire mesh. Alternatively they may comprise metal or other sheet material provided with multiple small openings. Whatever its construction, the basket serves in use to receive and carry treatment chemicals in solid form without preventing fluid flow through the dosing chamber 104. Flow from the fluid inlet port 114 to the fluid outlet port 110 passes through the basket 118 containing the chemicals, ensuring that they are exposed to the flow and so become dissolved and distributed through the fluid in the system.

[0022] The basket 118 has in the present embodiment an outwardly turned upper lip 126 which seats on an internal shoulder of the dosing vessel 102 to maintain the basket in position.

[0023] The function of the bubble coalescing device 116, which in the present embodiment is more specifically a micro-bubble coalescing device, is to cause small air bubbles in the fluid flow to coalesce forming larger bubbles which will rise to an automatic air vent 128 which is carried by and passes through the lid 106. In this way the dosing assembly 100 enables air to be vented from the system. Suitable automatic air vents 128, able to release air without problematic loss of system pressure, are in themselves well known in the art.

[0024] In the present embodiment the bubble coalesc-

ing device comprises a ring structure which offers large openings for flow of fluid, but also has a large surface area for collection of bubbles. Suitable ringshaped metal or plastics structures are sold under the generic name "Pall rings".

[0025] The dosing assembly 100 can be connected in a heating system in the manner depicted in Figure 4 with its fluid inlet port 114 being led via inlet-side isolating valve 412 to a high pressure point in the system, its fluid outlet port 110 being led to both (a) drain valve 420 and (b) outlet-side isolating valve 416. Comparing Figure 4 with Figure 1, note that no tundish 22 or fill valve 24 is required in use of the dosing assembly 100 embodying the present invention.

[0026] In use, in order to dose the system with chemicals the dosing vessel 102 is first isolated from system pressure by closing the isolating valves 412 and 416. Some fluid can be drained from the dosing vessel 102 through the drain valve 420, which serves to de-pressurise the vessel. The lid 106 is then removed and the coalescing device 116 and the basket 118 can be removed from the dosing vessel 102 through its open upper end simply by lifting them out. Treatment chemicals in solid form can be placed in the basket 118. Chemicals in liquid form can simply be poured into the dosing vessel 102. The basket 118 and the coalescing device 116 are then returned to the dosing vessel 102, the lid 106 is replaced and engaged to seal the vessel, and the isolating valves 412, 416 are opened to enable fluid flow through the dosing vessel 102 and so distribute the chemicals through the system.

[0027] After dosing, the dosing assembly 100 can be used as a filter. For this purpose, a suitable filter such as a bag filter is placed in the basket 118. The bag filter may be suspended across the open upper end 124 of the basket, which serves to support the filter in use.

[0028] With reference to Figure 3, provision is made for sensing pressure within the dosing vessel 102. In the present embodiment there is a first pressure sensor housed in a first sensor port 130 upstream of the basket 118 and a second pressure sensor housed in a second sensor port 132 downstream of the basket 118. Both provide output signals to an electronic controller 134. The pressure data may in principle be output in a variety of different ways. The dosing assembly 100 may for example be provided with a display for the data. But in the present embodiment the pressure data is supplied to a building management system which monitors the data and provides a warning signal in the event that pressure indicative of a fault is detected. Specifically, the pressure difference between the two sensors is monitored. An excessive pressure drop is likely to result from a build-up of material in the filter, and so may be interpreted as an indication that servicing or renewal of the filter is required.

[0029] Figures 5 to 8 represent a second embodiment of the invention and shows some additional detail of it. This embodiment shares various features with the first embodiment and corresponding components and features are given the same reference numerals.

[0030] In the second embodiment the dosing vessel 102 is provided with depending legs 200 to facilitate its mounting in an upright orientation. The lid 106 is seen in Figure 7 to be formed of two parts - a securing ring 202 and a captive cover 204. A threaded collar 206 is received in and secured to the open upper end of the dosing vessel 102. In the present embodiment the collar 206 is welded to the dosing vessel 102. It carries an external screw thread 208 to engage a complementary internal thread (not seen) of the securing ring 202. The cover 204 has a circumferential shoulder 210 which engages with a complementary shoulder (not seen) inside the securing ring 202 to render the cover captive. When the securing ring is 202 screwed down onto the collar 206, the cover 204 is sandwiched between the securing ring 202 and the collar 206 and a seal is formed. Loosening the securing ring 202 allows this seal to be broken and pressure to be vented, but the cover 204 remains captive until the securing ring 202 has been screwed fully off the collar 206.

[0031] Figure 8 provides details of the micro-bubble coalescing device 116 which comprises a mesh cage 212 containing pall rings 214.

[0032] In this embodiment the inlet port 114 is selectively closable and openable by an inlet valve 220. Inlet pressure sensor 222 monitors inlet pressure and displays it on gauge 224, as well as providing an electrical sensor output. Outlet port 110 is selectively closable and openable by an outlet valve 226 and outlet pressure sensor 228 monitors outlet pressure, as well as providing an electrical sensor output.

[0033] The dosing vessel 102 is to be clad in a thermally insulating jacket, to minimise heat loss. This feature is not shown in the drawings. It presents a challenge in that it is desirable to be able to detect visually any weeping or more serious leakage from the dosing vessel 102. The jacket, by covering the dosing vessel, may hide the signs of such problems. To address this challenge the jacket preferably incorporates an element which undergoes a visible change upon contact with water. In particular, the element in question may change colour upon contact with water. A suitable element may comprise a pH indicator applied to the exterior of the jacket. The system fluid is typically alkaline, and so causes a visible change to the colour of the pH indicator if it contacts the treated surface of the jacket, giving a visible warning of weeping or leakage. In the present embodiment this element takes the form of a pH sensitive leak detector patch 234 mounted in the vicinity of the inlet, which is the most likely point of leakage.

[0034] As in the first embodiment the dosing vessel 102 is able to receive a basket 118 through its wide upper opening at the top of neck 236. The basket 118 has a flange 238 at its upper end which seats on an internal shoulder of the dosing vessel 102 to locate the basket 118. The basket 118 can be used to introduce chemicals (i.e. for dosing) or can carry a suitable filter which may

be a bag filter. The large opening enables use of dosing chemicals in solid form.

[0035] The filter chosen will typically have a pore size between 50 microns and 0.5 microns, although the present invention imposes no particular limit on the level of filtration chosen for a particular application. In an established system the practice may be adopted of using a relatively coarse filter when the dosing vessel is first installed, to remedy poor fluid quality, and then replacing that with a finer filter.

[0036] A perforated diffuser disc 240 beneath the basket 118. This can support solid water treatment chemicals placed in the dosing vessel 102, without the filter, if required.

[0037] The present embodiment has a control panel 242 which carries a user control interface and display, and which incorporates the electronic controller. The electronic controller monitors the pressure difference between the inlet and the outlet. As noted above an excessive pressure difference suggests that the filter requires cleaning or replacement. The electronic controller of the present embodiment is configured to determine based on the pressure difference when the filter is 75% loaded and when it is 100% loaded and hence in need of remedial action, and to give user outputs indicating these states. Such outputs may take the form of illumination of warning lights, for example, or of an audible alarm signal.

[0038] The dosing system of the present invention may be employed in cooling systems including air conditioning systems.

Claims

1. A dosing assembly (100) for connection to a heating or cooling system, the dosing assembly (100) comprising a dosing vessel (102) which defines a dosing chamber (104) and which is provided with a fluid inlet port (114) communicating with the dosing chamber (104) and connectable to a higher pressure part of the system, and a fluid outlet port (110) communicating with the dosing chamber (104) and connectable to a lower pressure part of the system, the dosing vessel (102) having an upwardly facing opening communicating with the dosing chamber (104), and a removable lid (106) for closing and sealing the said opening, the assembly further comprising a basket (118) which is insertable in and removable from the dosing chamber (104) through the said opening, the basket (118) being configured to receive and retain fluid treatment chemicals, and when disposed in the dosing chamber (104) to maintain the said chemicals in a flow path through the dosing chamber (104) from the fluid inlet port (114) to the fluid outlet port (110), the basket (118) being permeable to fluid flowing along the flow path and enabling the solid form chemicals to be exposed to fluid flow and so to be dissolved in the fluid and carried through the system, **characterised in that** the dosing vessel (102) houses a bubble coalescing device (116) which promotes coalescing of bubbles and their consequent exhaustion from the dosing chamber (104).

2. A dosing assembly (100) as claimed in claim 1 which further comprises an automatic air vent (128) for exhausting air from within the dosing chamber (104).

3. A dosing assembly (100) as claimed in claim 2 in which the automatic air vent (128) is carried by the lid (106).

4. A dosing assembly (100) as claimed in any preceding claim in which the lid (106) is configured to be disengaged by a process which involve first disengaging the lid (106) by moving it to a captive pressure release configuration, in which a path is opened for release of pressure from the dosing chamber (104) but the lid (106) remains captively attached and so cannot be ejected, and then moving the lid (106) to a full release configuration in which it is able to be removed from the dosing vessel (102).

5. A dosing assembly (100) as claimed in any preceding claim further comprising a filter received in the basket (118) to filter fluid passing from the fluid inlet port (114) to the fluid outlet port (110).

6. A dosing assembly (100) as claimed in claim 5 in which the filter is a bag type filter.

7. A dosing assembly (100) as claimed in any preceding claim in which an open upper end (126) of the basket (118) is shaped to rest stably upon a complementary feature within the dosing chamber (104) to support and locate the basket (118).

8. A dosing assembly (100) as claimed in any preceding claim in which the bubble coalescing device (116) is disposed above the basket (118).

9. A dosing assembly (100) as claimed in any preceding claim comprising two pressure sensors (222, 228) arranged to sense pressure upstream and downstream respectively of the basket (118).

10. A dosing assembly (100) as claimed in claim 9 connected to an electronic system configured to detect when a difference between pressures sensed by the two sensors (222, 228) exceeds a predetermined threshold.

11. A dosing assembly (100) as claimed in any preceding claim in which the dosing vessel (102) is provided with a thermally insulating jacket and comprises a material which changes colour in response to contact with the system fluid.

Patentansprüche

1. Dosieranordnung (100) für eine Verbindung mit einem Heiz- oder Kühlsystem, wobei die Dosieranordnung (100) einen Dosierbehälter (102) umfasst, der eine Dosierkammer (104) definiert und der mit einem Fluideinlasszugang (114), der mit der Dosierkammer (104) kommuniziert und mit einem Teil höheren Drucks des Systems verbindbar ist, und mit einem Fluidauslasszugang (110), der mit der Dosierkammer (104) kommuniziert und mit einem Teil niedrigeren Drucks des Systems verbindbar ist, versehen ist, wobei der Dosierbehälter (102) eine nach oben gerichtete Öffnung, die mit der Dosierkammer (104) kommuniziert, und einen entfernbaren Deckel (106) zum Schließen und Abdichten der Öffnung aufweist, wobei die Anordnung ferner einen Korb (118) umfasst, der durch die Öffnung in die Dosierkammer (104) einführbar und aus dieser entfernbar ist, wobei der Korb (118) konfiguriert ist, um Fluidbehandlungschemikalien aufzunehmen und zurückzuhalten, und der Korb (118), wenn er in der Dosierkammer (104) eingerichtet ist, um die Chemikalien in einem Strömungsweg durch die Dosierkammer (104) von dem Fluideinlasszugang (114) zu dem Fluidauslasszugang (110) zu halten, für Fluid durchlässig ist, das entlang des Strömungsweges strömt, und den Feststoffchemikalien ermöglicht, einer Fluidströmung ausgesetzt zu sein und so in dem Fluid gelöst und durch das System getragen zu werden, **dadurch gekennzeichnet, dass** der Dosierbehälter (102) eine Blasenkoaleszenzvorrichtung (116) beherbergt, die ein Koaleszieren von Blasen und ihre daraus folgende Ausstoßung aus der Dosierkammer (104) fördert.

2. Dosieranordnung (100) nach Anspruch 1, die ferner eine automatische Entlüftungseinrichtung (128) zum Ausstoßen von Luft aus dem Inneren der Dosierkammer (104) umfasst.

3. Dosieranordnung (100) nach Anspruch 2, wobei die automatische Entlüftungseinrichtung (128) durch den Deckel (106) getragen wird.

4. Dosieranordnung (100) nach einem vorhergehenden Anspruch, wobei der Deckel (106) konfiguriert ist, um durch einen Vorgang außer Eingriff gebracht zu werden, der zuerst das Außereingriffbringen des Deckels (106) durch Bewegen in eine unverlierbare Druckablasskonfiguration, in der ein Weg für eine Ablassung von Druck aus der Dosierkammer (104) geöffnet ist, aber der Deckel (106) unverlierbar angebracht bleibt und so nicht ausgeworfen werden kann, und dann das Bewegen des Deckels (106) in eine Vollablasskonfiguration involviert, in der er in der Lage ist, von dem Dosierbehälter (102) entfernt zu werden.

5. Dosieranordnung (100) nach einem vorhergehenden Anspruch, die ferner einen Filter umfasst, der in dem Korb (118) aufgenommen ist, um Fluid zu filtern, das von dem Fluideinlasszugang (114) zu dem Fluidauslasszugang (110) läuft.

6. Dosieranordnung (100) nach Anspruch 5, wobei der Filter ein Filter nach Beutelart ist.

7. Dosieranordnung (100) nach einem vorhergehenden Anspruch, wobei ein offenes oberes Ende (126) des Korbs (118) geformt ist, um auf einem komplementären Merkmal im Inneren der Dosierkammer (104) stabil aufzuliegen, um den Korb (118) zu stützen und aufzustellen.

8. Dosieranordnung (100) nach einem vorhergehenden Anspruch, wobei die Blasenkoaleszenzvorrichtung (116) über dem Korb (118) eingerichtet ist.

9. Dosieranordnung (100) nach einem vorhergehenden Anspruch, die zwei Drucksensoren (222, 228) umfasst, die arrangiert sind, um Druck stromaufwärts beziehungsweise stromabwärts des Korbs (118) zu erfassen.

10. Dosieranordnung (100) nach Anspruch 9, die mit einem elektronischen System verbunden ist, das konfiguriert ist, um zu erkennen, wenn eine Differenz zwischen Drücken, die durch die zwei Sensoren (222, 228) erfasst werden, einen zuvor bestimmten Schwellenwert überschreitet.

11. Dosieranordnung (100) nach einem vorhergehenden Anspruch, wobei der Dosierbehälter (102) mit einem wärmeisolierenden Mantel versehen ist und ein Material umfasst, das seine Farbe als Reaktion auf eine Berührung mit dem Systemfluid ändert.

Revendications

1. Ensemble de dosage (100) destiné au raccordement d'un système de chauffage ou de refroidissement, l'ensemble de dosage (100) comprenant un récipient de dosage (102) qui définit une chambre de dosage (104) et qui est pourvu d'un orifice d'entrée de fluide (114) communiquant avec la chambre de dosage (104) et pouvant être raccordé à une partie à pression plus élevée du système, et un orifice de sortie de fluide (110) communiquant avec la chambre de dosage (104) et pouvant être raccordé à une partie à pression moins élevée du système, le récipient de dosage (102) ayant une ouverture tournée vers le haut communiquant avec la chambre de dosage (104), et un couvercle amovible (106) pour fermer et sceller ladite ouverture, l'ensemble comprenant en outre un panier (118) qui peut être inséré et retiré

de la chambre de dosage (104) à travers ladite ouverture, le panier (118) étant conçu pour recevoir et retenir les produits chimiques de traitement de fluide, et lorsqu'il est disposé dans la chambre de dosage (104), pour maintenir lesdits produits chimiques dans un trajet d'écoulement à travers la chambre de dosage (104) de l'orifice d'entrée de fluide (114) à l'orifice de sortie de fluide (110), le panier (118) étant perméable au fluide s'écoulant le long du trajet d'écoulement et permettant aux produits chimiques sous forme solide d'être exposés à l'écoulement de fluide et d'être ainsi dissous dans le fluide et transportés à travers le système, **caractérisé en ce que** le récipient de dosage (102) loge un dispositif de coalescence de bulles (116) qui favorise la coalescence de bulles et leur épuisement consécutif de la chambre de dosage (104).

2. Ensemble de dosage (100) selon la revendication 1, qui comprend en outre un évent d'aération automatique (128) pour évacuer de l'air provenant de l'intérieur de la chambre de dosage (104).

3. Ensemble de dosage (100) selon la revendication 2, dans lequel l'évent d'aération automatique (128) est porté par le couvercle (106).

4. Ensemble de dosage (100) selon l'une quelconque des revendications précédentes, dans lequel le couvercle (106) est conçu pour être désolidarisé par un processus qui implique d'abord la désolidarisation du couvercle (106) en le déplaçant vers une configuration de relâchement de pression captive, dans laquelle un trajet est ouvert pour relâcher la pression de la chambre de dosage (104), mais le couvercle (106) reste attaché de manière captive et ne peut donc pas être éjecté, puis en déplaçant le couvercle (106) vers une configuration de relâchement complet dans laquelle il peut être retiré du récipient de dosage (102).

5. Ensemble de dosage (100) selon l'une quelconque des revendications précédentes, comprenant en outre un filtre reçu dans le panier (118) pour filtrer du fluide passant de l'orifice d'entrée de fluide (114) à l'orifice de sortie de fluide (110).

6. Ensemble de dosage (100) selon la revendication 5, dans lequel le filtre est un filtre de type sac.

7. Ensemble de dosage (100) selon l'une quelconque des revendications précédentes, dans lequel une extrémité supérieure ouverte (126) du panier (118) est formée pour reposer de manière stable sur une forme complémentaire à l'intérieur de la chambre de dosage (104) afin de supporter et positionner le panier (118).

8. Ensemble de dosage (100) selon l'une quelconque des revendications précédentes, dans lequel le dispositif de coalescence de bulles (116) est disposé au-dessus du panier (118).

9. Ensemble de dosage (100) selon l'une quelconque des revendications précédentes, comprenant deux capteurs de pression (222, 228) agencés pour détecter la pression respectivement en amont et en aval du panier (118).

10. Ensemble de dosage (100) selon la revendication 9, connecté à un système électronique configuré pour détecter lorsqu'une différence entre les pressions détectées par les deux capteurs (222, 228) dépasse un seuil prédéterminé.

11. Ensemble de dosage (100) selon l'une quelconque des revendications précédentes, dans lequel le récipient de dosage (102) est pourvu d'une chemise thermiquement isolante et comprend un matériau qui change de couleur en réponse au contact avec le fluide du système.

Figure 1

PRIOR ART

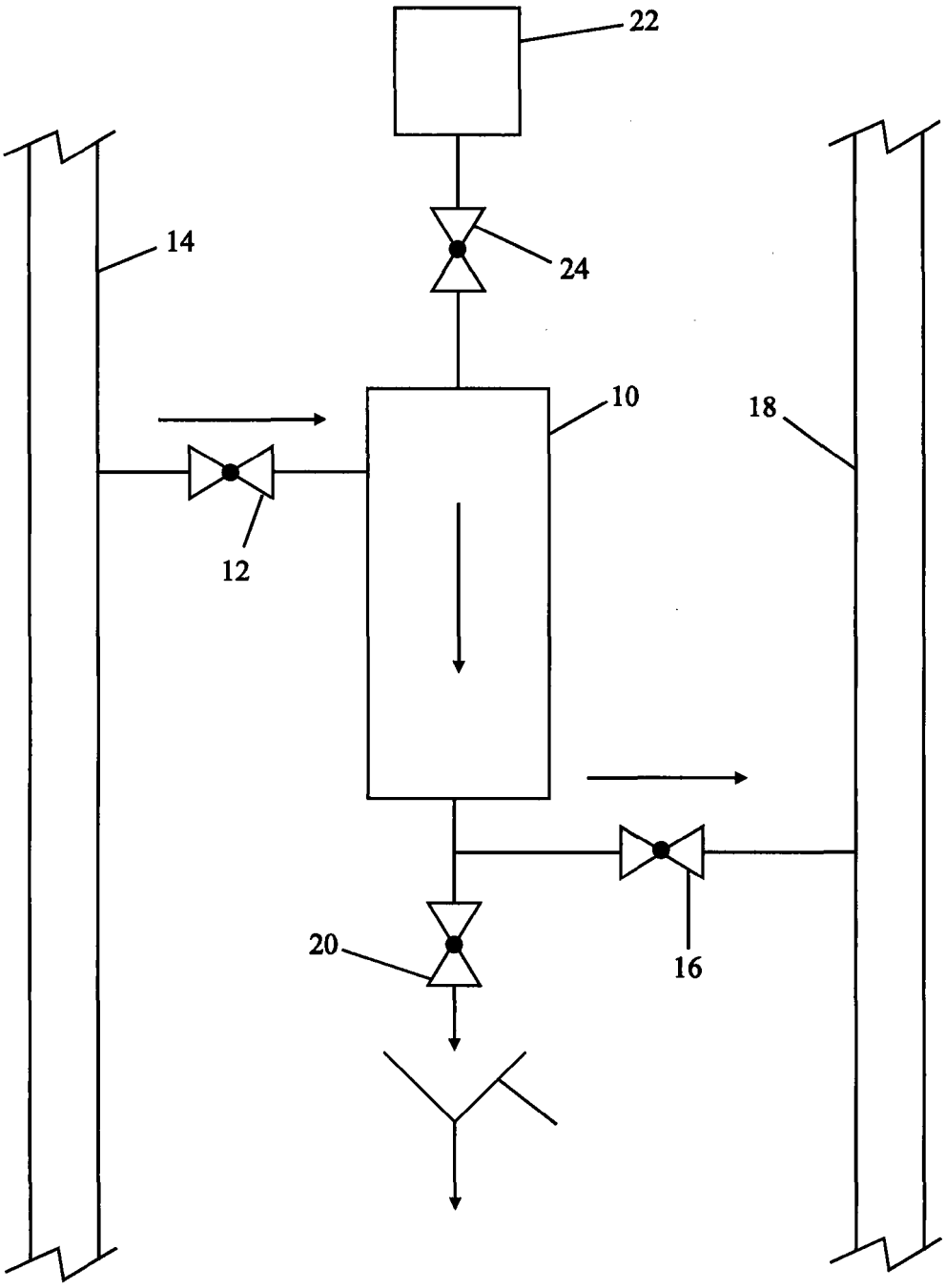


Figure 2

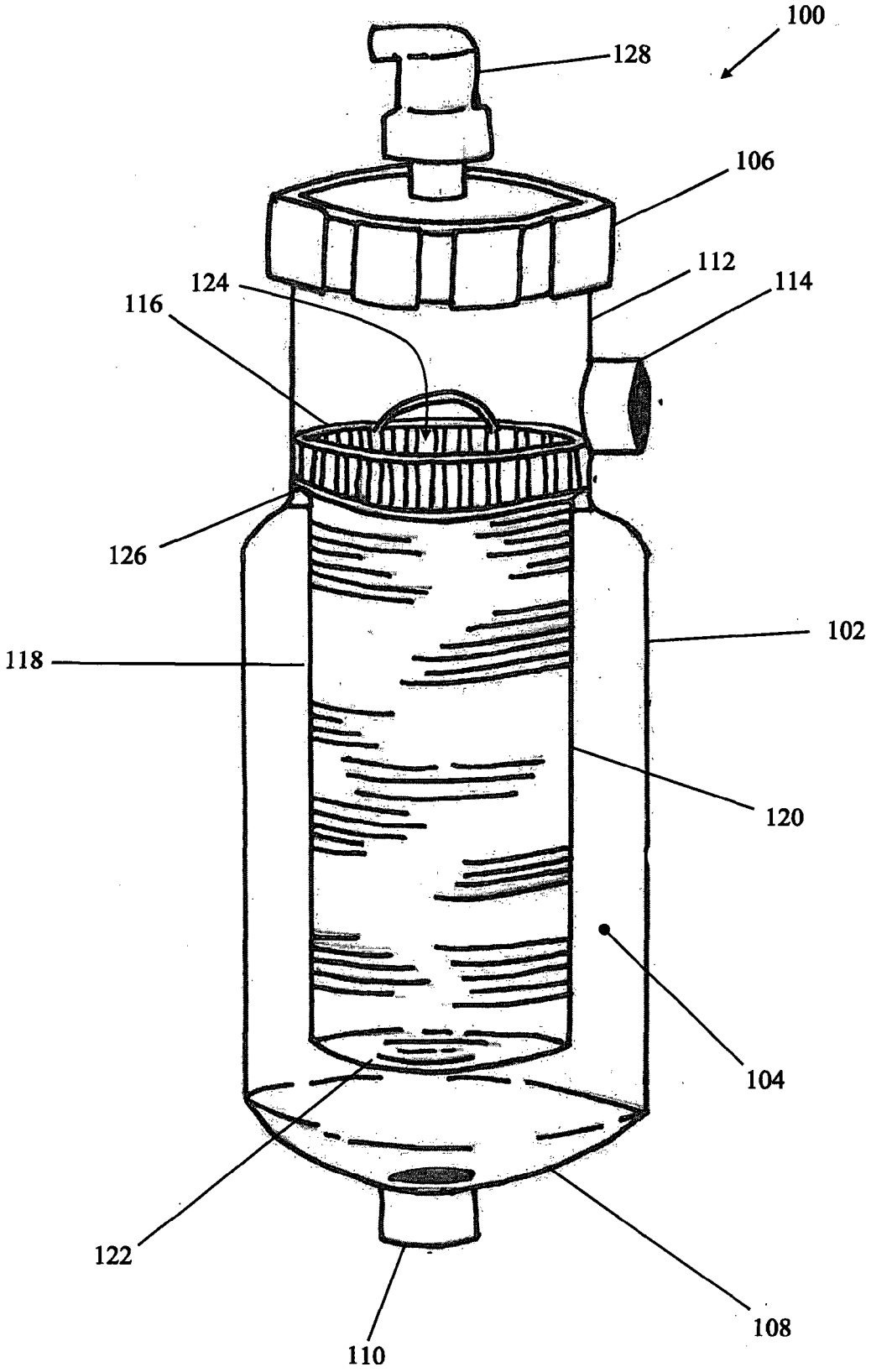


Figure 3

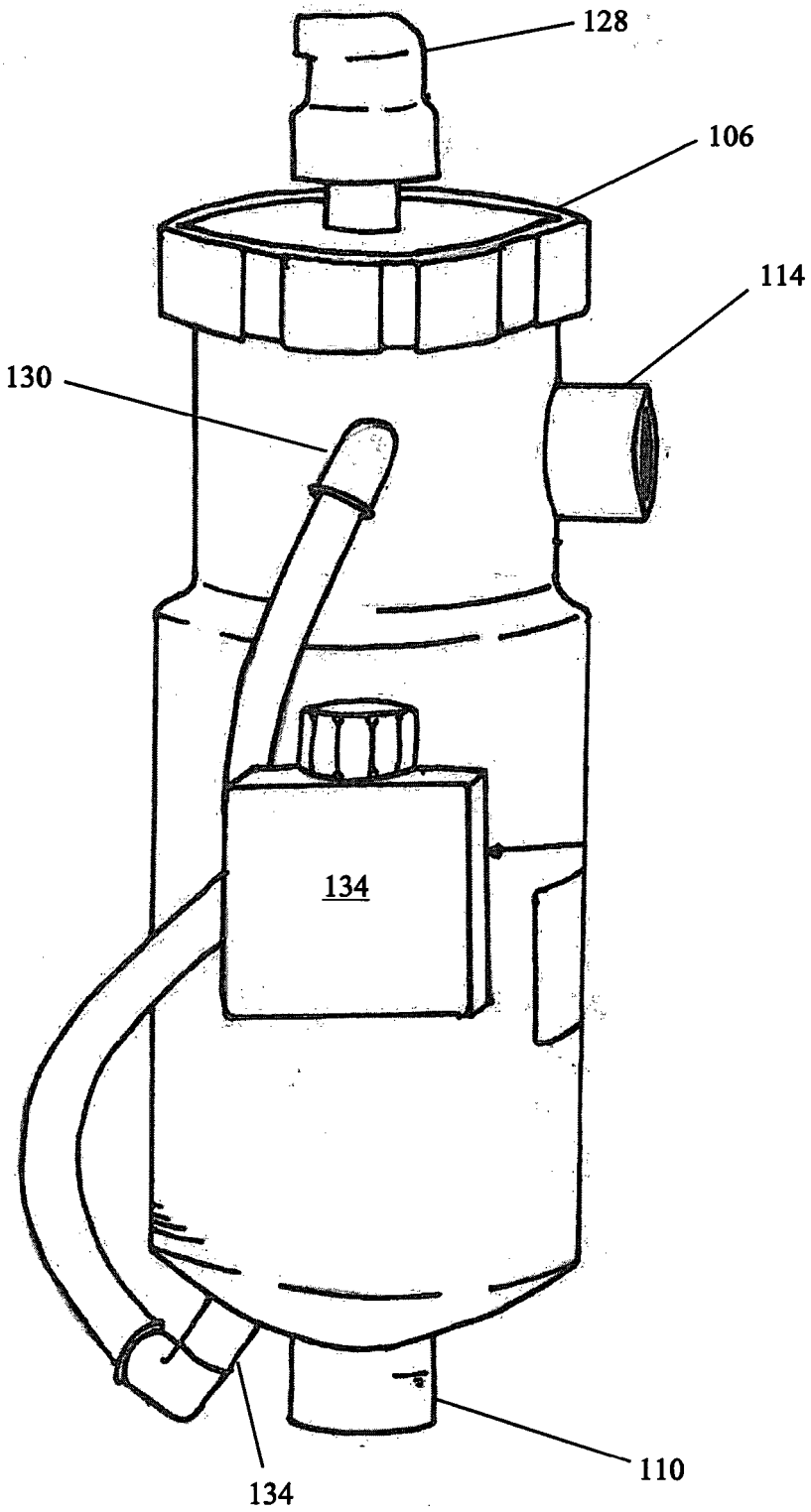


Figure 4

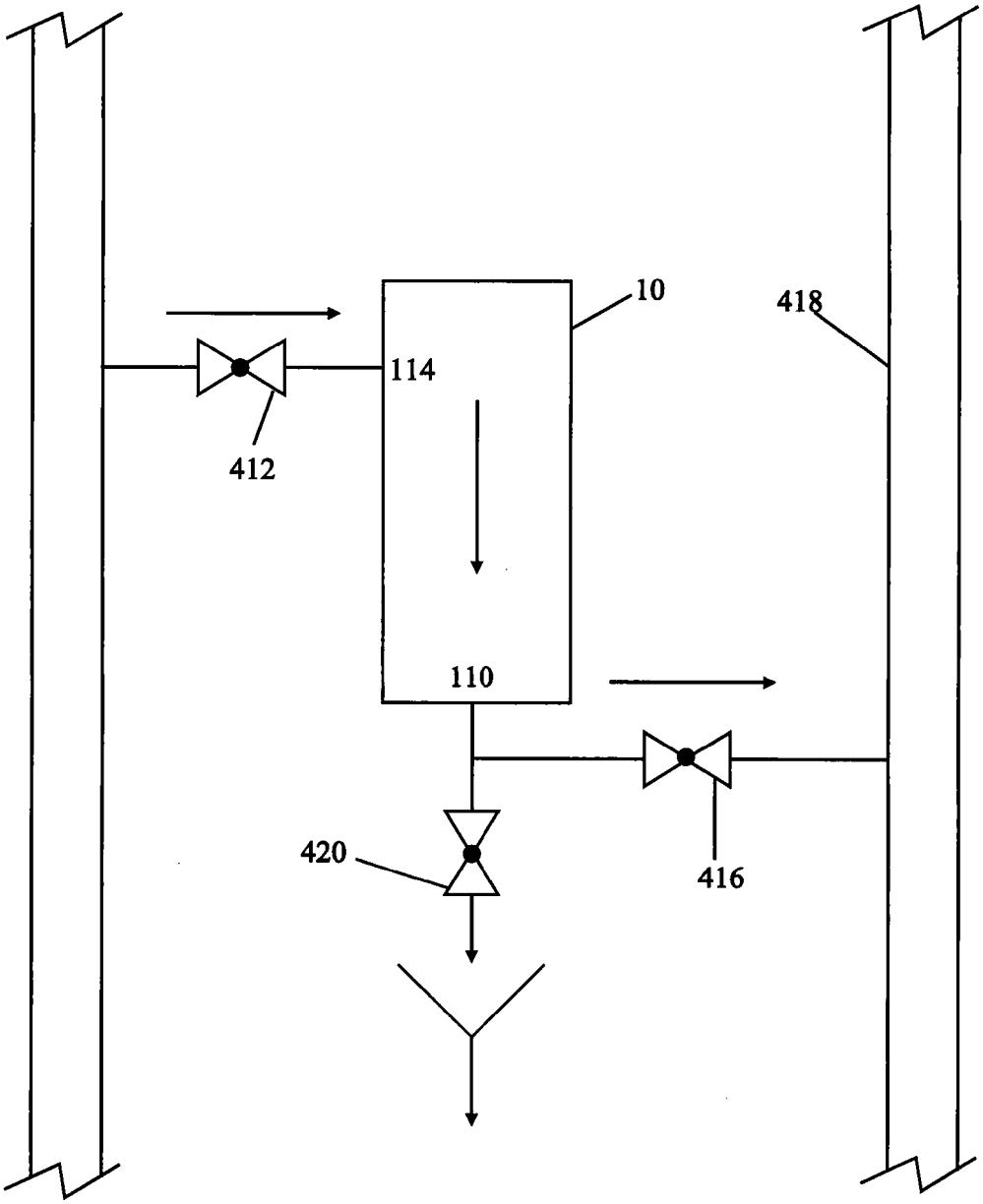
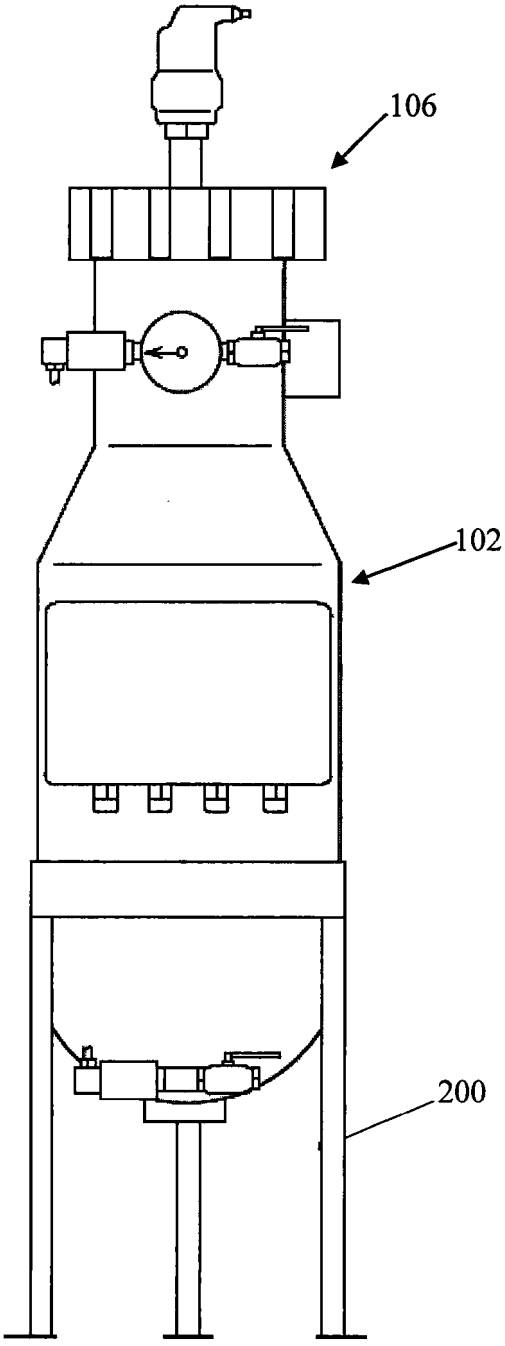


Figure 5



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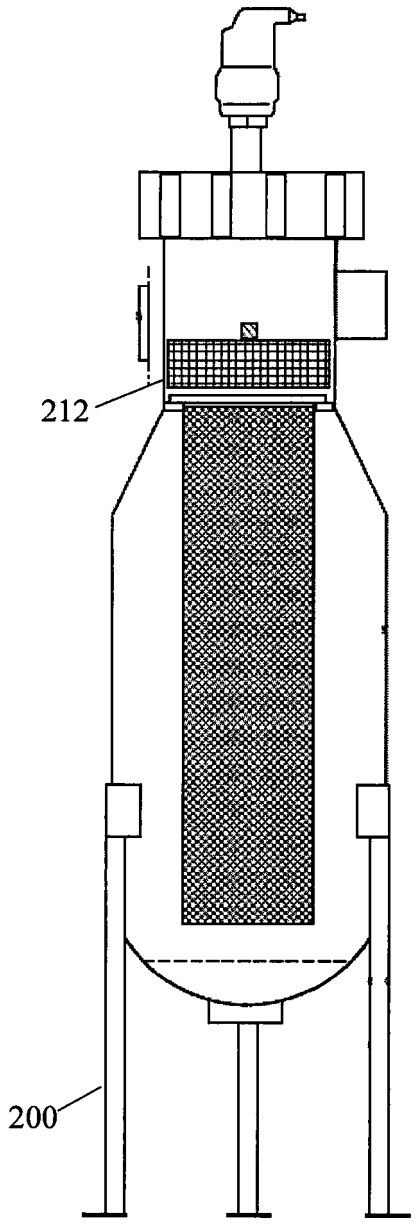


Figure 7

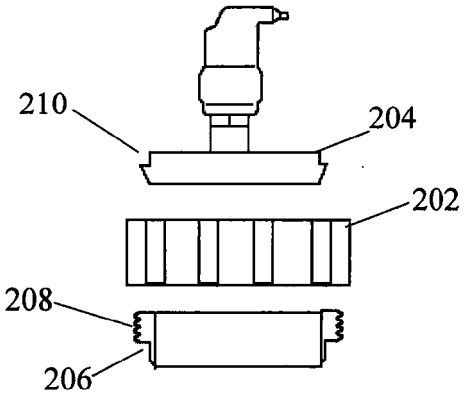


Figure 8a

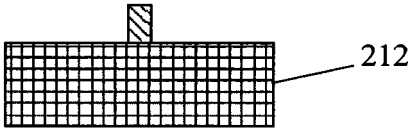
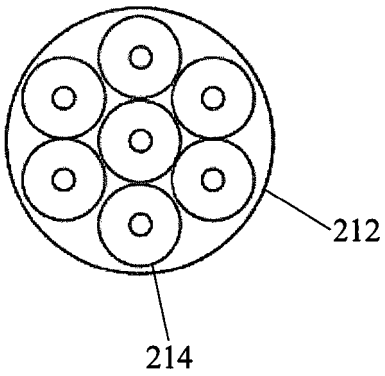


Figure 8b



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