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(54) **FLUID-CONTAINMENT VESSEL.**

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Description

This invention relates to an enclosed fluid-containment vessel for use with a sealed central heating system and an unvented hot water system supplied with water from a regulated pressure source.

A known form of such a fluid-containment vessel is disclosed in EP-A-260989 and comprises an arrangement of chambers forming an indirect hot water cylinder and expansion tank and a further chamber forming a heating system expansion tank, the further chamber being formed by the provision of two spaced disc-like partition walls welded to the interior of the vessel in an upper region thereof. The further chamber is subjected to repeated thermal cycling resulting in repeated expansion and contraction of the partition walls which introduces the danger of weld breakdown thereby leading to mixing of the water from the two systems which is highly undesireable because the water in the central heating system is comparatively impure and would lead to contamination of the comparatively pure water in the hot water system.

It is an object of the present invention to provide a new and improved enclosed fluid-containment vessel for use with a sealed central heating system and unvented hot water system supplied with water from a regulated pressure source.

According to the present invention there is provided an enclosed fluid-containment vessel for use with a sealed central heating (CH) system and an unvented hot water (HW) system supplied with water from a regulated pressure source, said vessel comprising a first chamber forming an indirect HW cylinder and integral expansion tank and having a header region for storing air surmounting a lower region for storing water, said lower region incorporating heater means for heating stored water and for thereby releasing dissolved air from said water whereby to fill the header region with air, first upper port means adjacent the top of said lower region for delivering stored fluid to the exterior of the vessel and second lower port means remote from the top of said lower region for receiving water to be stored from the exterior of the vessel; a second chamber forming a CH system expansion tank and having a header region for storing air surmounting a lower region for storing water, said second chamber comprising an auto air vent means arranged to enable venting of the second chamber to the exterior of the vessel when the stored water level in the second chamber is less than a set level, said lower region comprising port means for transmitting CH system fluid to and from the exterior of the vessel; the arrangement of said first and second chambers being such that each header region has a predetermined volumetric capacity which is greater than that required to accommodate thermal expansion of water from the pertaining chamber lower region; and a fluid transmitting passageway extending between said first and second chambers, said passageway opening into the respective header regions at a level which is above that attained by thermal water expansion from the pertaining chamber lower region, wherein said first chamber is defined by the walls of said vessel, and said second chamber is formed as a discrete unit located within said vessel and connected to the walls thereof only by the port means and auto air vent means of the second chamber, and said fluid transmitting passageway comprises a tube mounted on and projecting outwardly from said unit.

By virtue of the fact that the second chamber which forms the central heating system expansion tank is in the form of a discrete unit connected only to the walls of the vessel at two points, thermal cycling does not impose any severe loading since the discrete unit is itself free to expand and contract within the volume of the first chamber. Consequently, the problem of weld break-down is virtually eliminated.

The discrete unit forming the second chamber may be positioned at any level within the vessel.

In one form the fluid transmitting passageway which extends between the first and second chambers and which comprises a tube mounted on and projecting outwardly from the discrete unit forming the second chamber terminates at the header region of the second chamber without projecting substantially into the interior thereof. Another form this tube does project into the interior of the second chamber and is configured to form a water trap therein prior to opening into the header region of the second chamber.

The second chamber may be a partitioned unit comprising first and second side-by-side compartments which are in communication with one another at adjacent tops thereof and the port means of the second chamber is connected to one of these compartments whilst the fluid transmitting passageway tube projects into the other of said compartments to terminate adjacent the bottom thereof, thereby forming a water trap in said other compartment.

Embodiments of the present invention will now be described by way of example with reference to accompanying drawings, in which:

Fig. 1 schematically illustrates the known form of fluid containment vessel;

Fig. 2 illustrates a vessel in accordance with the present invention;

Fig. 3 is a sectional view taken on the line 3-3 of Fig. 2;

Fig. 4 illustrates a first form of a component of the Fig. 2 vessel;

Fig. 5 illustrates a second form of the component and Fig. 6 illustrates a third form of the component.

The fluid-containment vessel 1, which is illustrated in Fig. 1, is described in detail in EP-A-260989 which additionally describes the full operational detail of the vessel and which is to be referred to for addi-

tional information. For the purposes of clarity, however, a brief description of the vessel 1 is herein provided. Vessel 1 comprises a lowermost chamber A, which functions as a hot water storage tank and which is in fluid communication with an uppermost chamber C via a passageway 5 in the form of a pipe extending through partition walls 2-3 which are disc-like formations welded to the walls of the vessel 1 and which, together with the vessel wall, forms a third chamber B which functions as a central heating system expansion tank. A vent tube 6 extends from the top of chamber B to the top of chamber C. A further tube 7 extends from the bottom of chamber C, and therefore through chamber B, to the bottom of chamber A for the purpose of providing a water re-circulation path between chambers A and C. Cold water to be stored in vessel 1, particularly in chamber A thereof is delivered from the street mains via pipe 16 with stop cock 11 to a pressure regulating valve 13 and enters the lower end of chamber A via a one-way valve 14. Between regulator 13 and valve 14, port 15 is provided to enable pressure-regulated cold water to be delivered to a variety of other appliances (such as taps) not shown.

Chamber A contains a heater 17 whereby water in chamber A can be heated, and this hot water gravitates through pipe 5 to chamber C where it is drawn off via port 8 in the side wall of vessel 1. The action of heating the water in chamber A causes release of dissolved air and this gathers in the domed portion 4 of vessel 1 so that the upper end of tube 6 opens into this air volume.

The sealed central heating system (not shown) is provided with an expansion pipe which is connected to port 10 of chamber B and it will be appreciated that heater 17 is conveniently formed as a water heated coil connected to the central heating system. Chamber B is provided with an auto air vent 18 which is set to vent to atmosphere the interior of chamber B when the water level therein falls below a set level. A similar vent 19, is optionally provided in chamber C. Chamber C is also provided with a pressure relief and anti-vacuum valve 9. A similar valve 12 is provided at the top end of chamber A.

In normal operation of vessel 1, chamber A is completely water filled as is pipe 5, whereas chambers B and C are only partly water filled, the header regions of chambers B and C being air filled and intercommunicating via tube 6. The magnitude of this air volume varies as the water content of vessel 1 varies in temperature due to thermal expansion when the water is heated. The repeated thermal cycling which occurs within the vessel results in partitions 2 and 3 experiencing repeated expansion and contraction forces which tend to crack or loosen the annular weld which joins each of partitions 2 and 3 to the wall of vessel 1. In this connection it will be appreciated that the vessel 1 is normally made of copper or other metal (such as stainless steel).

Fig. 2 illustrates a vessel 20 in accordance with the present invention and which comprises all of the components of the vessel 1 of Fig. 1 except as herein after explained. Thus vessel 20 comprises a single first chamber 21 formed by the walls of the vessel 20 and having the same functional effect as the chambers A and C together of Fig.1. A second chamber 22 is formed as a discrete unit and is located within vessel 20 and is connected to the walls thereof only by a port 23 (which connects to the central heating system expansion pipe) and the auto-vent 24. Tube 25 extends upwardly from the top of unit 22 to terminate within domed portion 26 of the vessel 20 in the same manner as tube 6 for Fig 1.

The port 23 is formed at the end of a tube 23A and the auto vent 24 is similarly formed at the end of a tube 24A, tubes 23A, 24A being coplanar and mutually inclined at an angle of about 90° as is best seen in Fig. 3. Various other angles between tubes 23A,24A are also suitable depending upon the mechanical design. With this arrangement repeated thermal cycling of the vessel 20 enables thermal cycling of unit 22 substantially independently of the walls of vessel 20. If so desired tubes 23A and 24A can be provided with corrugated walls to further increase the mechanical isolation of unit 22 from the walls of vessel 20 Each tube 23A, 24A is secured to the wall of the vessel 20 via a flange on the tube and located on the inside of the vessel wall and a washer and nut on the outside of the vessel wall, the nut being threadedly carried by the tube..

Because the unit 22 is connected only to the walls of vessel 20 at two points, it can be located at any level within the vessel provided that tube 25 has its upper end terminating in the air space within dome 26 Unit 22 may be above or below heater 17..

Fig. 4 illustrates a first form of the unit 22, and which is formed by dish shaped pressings 28A and 28B joined by a seam weld 29. In this form the tube 25 projects outwardly from the unit 22, but terminates at the top end of the chamber formed by unit 22 without projecting substantially into the interior thereof.

Another form of the unit 22 is illustrated in Fig. 5, this being substantially similar to the Fig. 4 form except that tube 25 projects into the interior of the chamber and is configured at 31 to form a U shaped water trap prior to the tube 25 opening into the top end of the chamber at 32.

Fig. 6 illustrates a still further form of the unit 22 which includes first and second side by side compartments formed by the dish shaped pressings 28A and 28B and a central partition 28C secured to the seam weld 29 except at gap 30 which allows the side-by-side compartments to be in communication with each other at the tops of these compartments. The tube 25 extends into one of the compartments and to the lower end thereof so as to form a water trap with water

in that compartment and lying below the level of gap or weir 30. Port 23 and vent 24 are connected to the other compartment

Claims

1. An enclosed fluid-containment vessel for use with a sealed central heating (CH) system and an unvented hot water (HW) system supplied with water from a regulated pressure source comprises a first chamber (21) forming an indirect HW cylinder and integral expansion tank and having a header region for storing air surmounting a lower region for storing water, said lower region incorporating heater means (17) for heating stored water and for thereby releasing dissolved air from said water whereby to fill the header region with air, first upper port means (8) adjacent the top of said lower region for delivering stored fluid to the exterior of the vessel (20) and second lower port means (15) remote from the top of said lower region for receiving water to be stored from the exterior of the vessel; a second chamber (22) forming a CH system expansion tank and having a header region for storing air surmounting a lower region for storing water, said second chamber (22) comprising an auto air vent means (24) arranged to enable venting of the second chamber (22) to the exterior of the vessel when the stored water level in the second chamber is less than a set level, said lower region comprising port means (23) for transmitting CH system fluid to and from the exterior of the vessel; the arrangement of said first and second chambers (21,22) being such that each header region has a predetermined volumetric capacity which is greater than that required to accommodate thermal expansion of water from the pertaining chamber lower region; and a fluid transmitting passageway (25) extends between said first and second chambers (21,22), said passageway (25) opening into the respective header regions at a level which is above that attained by thermal water expansion from the pertaining chamber lower region, wherein said first chamber (21) is defined by the walls of said vessel (20), and said second chamber (22) is formed as a discrete unit located within said vessel (20) and connected to the walls thereof only by the port means (23) and auto air vent means (24) of the second chamber (22), and said fluid transmitting passageway (25) comprises a tube mounted on and projecting outwardly from said unit.

2. A vessel as claimed in claim 1, wherein said passageway tube (25) terminates at the header region of the second chamber (22) without projecting substantially into the interior thereof.

3. A vessel as claimed in claim 1, wherein said passageway tube (25) enters into the second chamber (22) and is configured to form a water trap (31) therein prior to opening into the header region of the second chamber (22).

4. A vessel as claimed in any preceding claim, wherein the second chamber (22) is formed by dish-shaped pressings 28A,28B joined by a seam weld (29).

5. A vessel as claimed in claim 1, wherein the second chamber (22) is a partitioned unit comprising first and second side-by-side compartments which are in communication with one another at adjacent tops thereof and the port means of the second chamber is connected to one of these compartments whilst the fluid transmitting passageway tube projects into the other of said compartments to terminate adjacent the bottom thereof, thereby forming a water trap in said other compartment.

Patentansprüche

1. Geschlossener Flüssigkeitsbehälter zur Verwendung bei einem geschlossenen Zentralheizungssystem (ZH-System) und einem Warmwassersystem (WW-System) ohne Entlüftung, das mit Wasser versorgt wird, das von einem geregelten Druckerzeuger kommt, gekennzeichnet durch eine erste Kammer (21), die einen indirekten WW-Zylinder und einen integrierten Ausdehnungsbehälter bildet und einen oberen Sammelbereich zum Speichern von Luft hat, der sich oberhalb eines unteren Bereichs zum Speichern von Wasser befindet, wobei der untere Bereich aufweist: eine Heizeinrichtung (17) zum Erwärmen des gespeicherten Wassers und zum dadurch verursachten Herauslösen von gelöster Luft aus dem Wasser, um den oberen Sammelbereich mit Luft zu füllen, ein erstes oberes Anschlußmittel (8), die an den oberen Teil des unteren Bereichs angrenzt, zum Abgeben von gespeicherter Flüssigkeit aus dem Behälter (20) nach draußen und ein zweites unteres Anschlußmittel (15), die vom oberen Teil des unteren Bereichs entfernt liegt, zum Aufnehmen von zu speicherndem Wasser in den Behälter von draußen; eine zweite Kammer (22), die ein ZH-System-Ausdehnungsgefäß bildet und einen oberen Sammelbereich zum Speichern von Luft hat, der sich oberhalb eines unteren Bereichs zum Speichern von Wasser befindet, wobei die zweite Kammer (22) eine Selbstentlüftungseinrichtung (24) aufweist, die angeordnet ist, um das

Entlüften der zweiten Kammer (22) in die äußere Umgebung des Behälters zu ermöglichen, wenn der Füllstand des gespeicherten Wassers geringer ist als ein vorgegebener Füllstand, wobei der untere Bereich ein Anschlußmittel (23) zum Überleiten der ZH-System-Flüssigkeit in die äußere Umgebung und aus der äußeren Umgebung des Behälters (20) aufweist, wobei die erste und die zweite Kammer (21, 22) so angeordnet sind, daß jeder obere Sammelbereich ein vorbestimmtes Aufnahmevolumen hat, das größer ist als dasjenige, das erforderlich ist, um der thermischen Ausdehnung des Wassers aus dem unteren Bereich der betreffenden Kammer Platz zu bieten; und einen Flüssigkeitsüberleitungsleitung (25), die sich zwischen der ersten und der zweiten Kammer (21, 22) erstreckt, wobei die Leitung (25) sich in den entsprechenden oberen Sammelbereich hinein öffnet, und zwar in einer Höhe oberhalb des Füllstands, der von der thermischen Ausdehnung des Wassers aus dem unteren Bereich der betreffenden Kammer erreicht wird, wobei die erste Kammer (21) begrenzt wird von den Wänden des Behälters (20) und die zweite Kammer (22) als eine getrennte Einheit ausgebildet ist, die sich in dem Behälter (20) befindet und mit dessen Wänden lediglich über das Anschlußmittel (23) und die Selbstentlüftungseinrichtung (24) der zweiten Kammer (22) verbunden ist, und die Flüssigkeitsüberleitungsleitung (25) ein Rohr aufweist, das an der Einheit befestigt ist und sich von dieser nach draußen erstreckt.

2. Behälter nach Anspruch 1, wobei das Rohr der Überleitungsleitung (25) am oberen Sammelbereich der zweiten Kammer (22) endet, ohne sich wesentlich in deren Inneres zu erstrecken.

3. Behälter nach Anspruch 1, wobei das Rohr der Überleitungsleitung (25) in die zweite Kammer (22) eintritt und so gestaltet ist, daß es dort vor der Öffnung in den oberen Sammelbereich der zweiten Kammer (22) einen Wasserabscheider (31) bildet.

4. Behälter nach einem der vorangegangenen Ansprüche, wobei die zweite Kammer (22) durch schüsselförmige Preßteile (28A, 28B), die durch eine Schweißnaht (29) verbunden sind, gebildet wird.

5. Behälter nach Anspruch 1, wobei die zweite Kammer (22) eine unterteilte Einheit ist, die eine erste und eine zweite Teilkammer aufweist, die nebeneinanderliegen und an ihren oberen nebeneinanderliegenden Teilen kommunizierend miteinander verbunden sind, und das Anschlußmittel der zweiten Kammer mit einer dieser Teilkammern verbunden ist, während das Rohr der Flüssigkeitsüberleitungsleitung sich in die andere der Teilkammern erstreckt, um angrenzend an deren unteren Teil zu enden, wodurch in der anderen Teilkammer ein Wasserabscheider gebildet wird.

Revendications

1. Un réservoir fermé contenant un fluide destiné à être utilisé avec un système de chauffage central scellé (CH) et un système d'eau chaude non éventé (HW) alimenté en eau à partir d'une source de pression réglée, comprenant une première chambre (21) formant un cylindre HW indirect et un vase d'expansion incorporé et comportant une région de tête pour stocker de l'air, surmontant une région inférieure pour stocker de l'eau, ladite région inférieure incorporant un moyen de chauffage (17) pour chauffer l'eau stockée et pour dégager ainsi de l'air dissous de ladite eau et pour remplir d'air la région de tête, un premier moyen d'embouchure supérieur (8) adjacent au sommet de ladite région inférieure, pour déverser le fluide stocké vers l'extérieur du réservoir (20) ainsi qu'un deuxième moyen d'embouchure inférieur (15) éloigné du sommet de ladite région inférieure, pour recevoir l'eau devant être stockée à partir de l'extérieur du réservoir; une deuxième chambre (22) formant un vase d'expansion d'un système CH et possédant une région de tête pour stocker de l'air, surmontant une région inférieure pour stocker de l'eau, ladite deuxième chambre (22) comprenant un moyen d'aération automatique (24) agencé de sorte à permettre l'élimination d'air de la deuxième chambre (22) vers l'extérieur du réservoir lorsque le niveau d'eau stockée dans la deuxième chambre est inférieur à un niveau fixé, ladite région inférieure comprenant un moyen d'embouchure (23) pour transmettre le fluide du système CH vers l'extérieur du réservoir et pour l'en ramener; l'agencement des dites première et deuxième chambres (21, 22) étant tel que chaque région de tête a une capacité volumétrique déterminée, supérieure à celle requise pour permettre la dilatation thermique de l'eau à partir de la région inférieure de la chambre correspondante; et un passage de transmission de fluide (25) s'étendant entre lesdites première et deuxième chambres (21, 22), ledit passage (25) débouchant dans les régions de tête respectives à un niveau supérieur à celui atteint par la dilatation thermique de l'eau à partir de la région inférieure de la chambre correspondante, dans lequel ladite première chambre (21) est définie par les parois du dit réservoir (20), ladite deuxième chambre (22) étant formée comme une unité discrète agencée à l'intérieur du dit réservoir (20)

et connectée aux parois correspondantes uniquement par l'intermédiaire du moyen d'embouchure (23) et du moyen d'aération (24) de la deuxième chambre (22), ledit passage de transmission de fluide (25) comprenant un tube qui y est monté et s'étend vers l'extérieur de ladite unité.

2. Un réservoir selon la revendication 1, dans lequel ledit tube de passage (25) aboutit à la région de tête de la deuxième chambre (22) et ne s'étend pratiquement pas vers l'intérieur de celle-ci.

3. Un réservoir selon la revendication 1, dans lequel ledit tube de passage (25) rentre dans la deuxième chambre (22) et est configuré de sorte à y former un séparateur d'eau (31) avant de déboucher dans la région de tête de la deuxième chambre (22).

4. Un réservoir selon l'une quelconque des revendications précédentes, dans lequel la deuxième chambre (22) est formée par des éléments moulés en forme de cuvette 28A, 288 assemblés par une soudure continue (29).

5. Un réservoir selon la revendication 1, dans lequel la deuxième chambre (22) est une unité cloisonnée comprenant des premier et deuxième compartiments juxtaposés, communiquant l'un avec l'autre au niveau des sommets adjacents correspondants, le moyen d'embouchure de la deuxième chambre étant connecté à l'un de ces compartiments, tandis que le passage de transmission de fluide s'étend dans l'autre des dits compartiments pour aboutir dans une position adjacente à la base correspondante, formant ainsi un séparateur d'eau dans ledit autre compartiment.

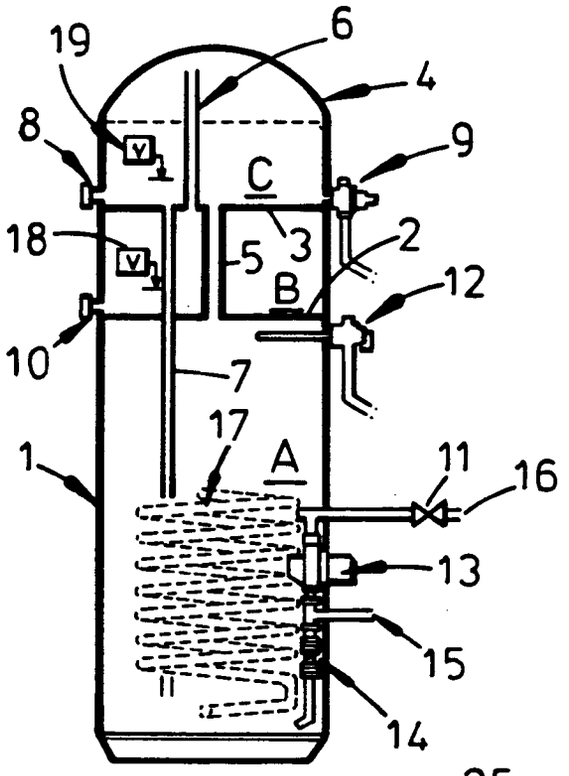

FIG. 1

(Prior art)

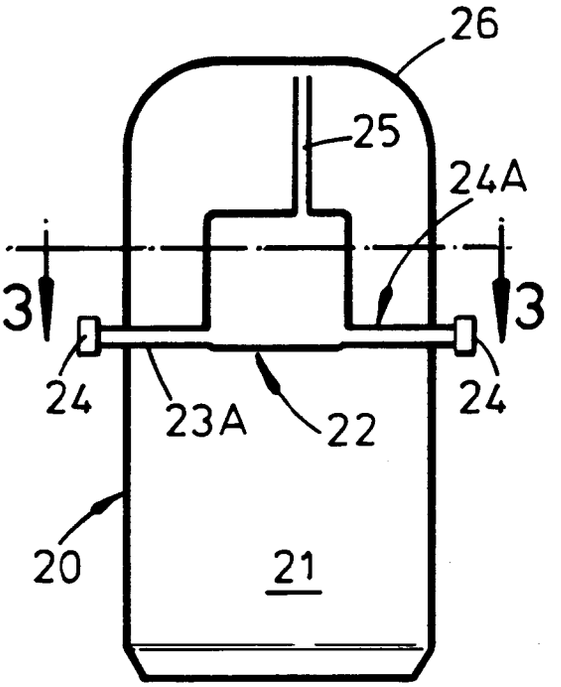

FIG. 2

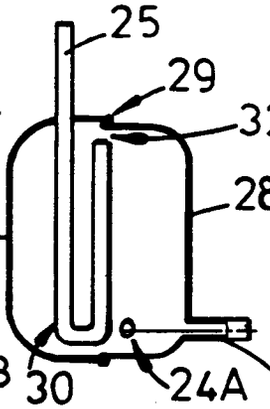

FIG. 5

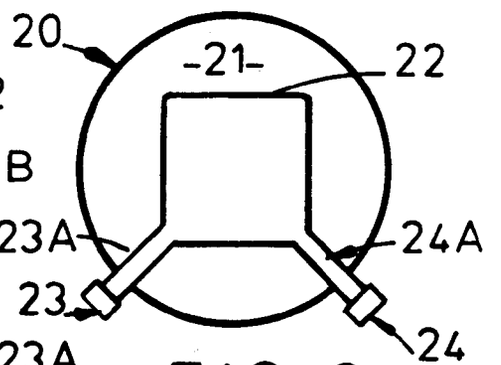

FIG. 3

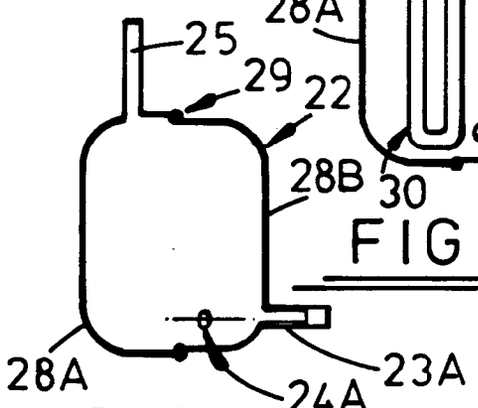

FIG. 4

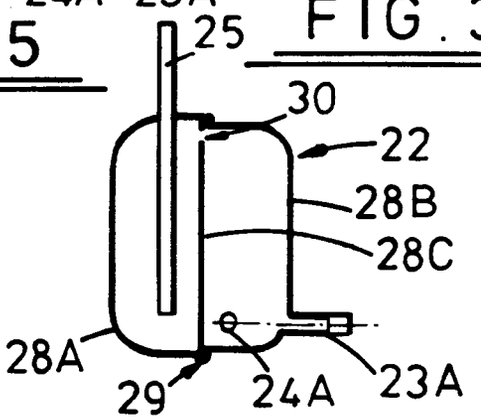

FIG. 6