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54 **PARTITIONED HOT WATER TANK.**

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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 break-down thereby leading to mixing of the water from the two systems which is highly undesirable 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 and second chambers are formed by the walls of said vessel on opposite sides of a single disc-like partition welded to the vessel walls, and said fluid transmitting passageway comprises a tube mounted on and projecting from said partition.

By virtue of the fact that there is only one partition separating the first and second chambers one such chamber is formed at the top of the vessel and thermal cycling does not impose any serious problem since the single partition is comparatively free to expand and contract within the vessel. Advantageously, the single partition is ring corrugated. Consequently, the problem of weld break-down is substantially mitigated.

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 first vessel in accordance with the present invention; and

Fig. 3 illustrates a second vessel in accordance with the present invention.

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 additional 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 first 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 located within vessel 20 and is separated from chamber 21 by a single disc-like partition wall 3. Partition wall 3 may be ring corrugated. Tube 6 is secured to partition wall 3 and extends upwardly therefrom to open into the header region of chamber 22 within dome 4. Chamber 22 has the same functional effect as chamber B in Fig. 1.

Fig 3 illustrates a second vessel 30 in accordance with the present invention and which comprises all of the components of the vessel 1 of Fig. 1 except as hereinafter explained. Thus, vessel 30 comprises a single first chamber 21 formed by the walls of the vessel 30 and having the same functional effect as the chambers A and C together of Fig. 1. A second chamber 22 having the same functional effect as chamber B of Fig. 1, is located within vessel 30 and is separated from chamber 21 by a single disc-like partition wall 3, from which tube 6 extends upwardly into the header region of chamber 21 within dome 4.

It will be appreciated that in Fig. 2 chamber 22 is at the top end of the vessel 20, whereas in Fig. 3, chamber 21 is at the top end of the vessel 30. Chamber 21 is of substantially larger capacity than chamber 22 in order to accommodate the conventionally large volume of stored hot water for the hot water system. In each case, however, the chambers, 21, 22 are separated only by a single partition wall 3, which is peripherally welded to the walls of the pertaining vessel 20, 30 and which carries the tube 6, the length of which depends upon the location of the partition wall 3 within the vessel.

The vessels 20, 30 form two chambers 21, 22 each of which, in use, is only partly water filled and tube 6 opens into the respective air-filled header regions of the chambers 21, 22. The location of port 8 and auto air vent 19 determines the extent of the air filled header in chamber 21. The mechanical construction of the vessel 20, 30 is relatively simple because of the provision of only a single disc-like partition 3 which is connected to the walls of the vessel only around the outer perimeter so that it is comparatively free to expand and contract within the vessel so that the problem of weld break-down is substantially reduced.

### 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 (20); 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 (18) arranged to enable venting of the second chamber (22) to the exterior of the vessel when the stored water level in the second chamber (22) is less than a set level, said lower region comprising port means (10) for transmitting CH system fluid to and from the exterior of the vessel (20); 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 (6) extending between said first and second chambers (21,22), said passageway (6) 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 and second chambers (21,22) are formed by the walls of said vessel (20) on opposite sides of a single disc-like partition (3) welded to the vessel walls, and said fluid transmitting passageway (6) comprises a tube mounted on and projecting from said partition (3).

2. A vessel as claimed in Claim 1, when the upper part of the vessel 20 forms the second chamber (22) and the lower part of the vessel (20) forms the first chamber (21).

#### 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 (20) 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 in der zweiten Kammer (22) ge-

ringer ist als ein vorgegebener Füllstand, wobei der untere Bereich ein Anschlußmittel (10) 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 eine Flüssigkeitsüberleitungsleitung (6), die sich zwischen der ersten und der zweiten Kammer (21, 22) erstreckt, wobei die Leitung (6) 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 und die zweite Kammer (21, 22) von den Wänden des Behälters (20) gebildet werden, und zwar auf gegenüberliegenden Seiten einer einzelnen scheibenähnlichen Trennwand (3), die an die Wände der Behälters angeschweißt ist, und die Flüssigkeitsüberleitungsleitung (6) ein Rohr aufweist, das an der Trennwand (3) befestigt ist und sich von dieser erstreckt.

2. Behälter nach Anspruch 1, wobei der obere Teil des Behälters (20) eine zweite Kammer (22) und der untere Teil des Behälters (20) eine erste Kammer (21) bildet.

#### 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 inférieure (15), éloigné du sommet de ladite région inférieure, pour recevoir de l'eau devant être stockée à partir de l'extérieur du dit réservoir (20); une deuxième chambre (22) formant un vase d'expansion d'un système CH et possédant une ré-

gion 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 (18) 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 (22) est inférieur à un niveau fixé, ladite région inférieure comprenant un moyen d'embouchure (10) pour transmettre du fluide du système CH vers l'extérieur du réservoir (20) 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 (6) s'étendant entre lesdites première et deuxième chambres (21, 22), ledit passage (6) 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 lesdites première et deuxième chambres (21, 22) sont formées par les parois du dit réservoir (20) sur les côtés opposés d'une seule cloison en forme de disque (3) soudée aux parois du réservoir, ledit passage de transmission de fluide (6) comprenant un tube qui y est monté et qui s'étend à partir de ladite cloison (3).

2. Un réservoir selon la revendication 1, dans laquelle la partie supérieure du réservoir (20) forme la deuxième chambre (22), la partie inférieure du réservoir (20) formant la première chambre (21).

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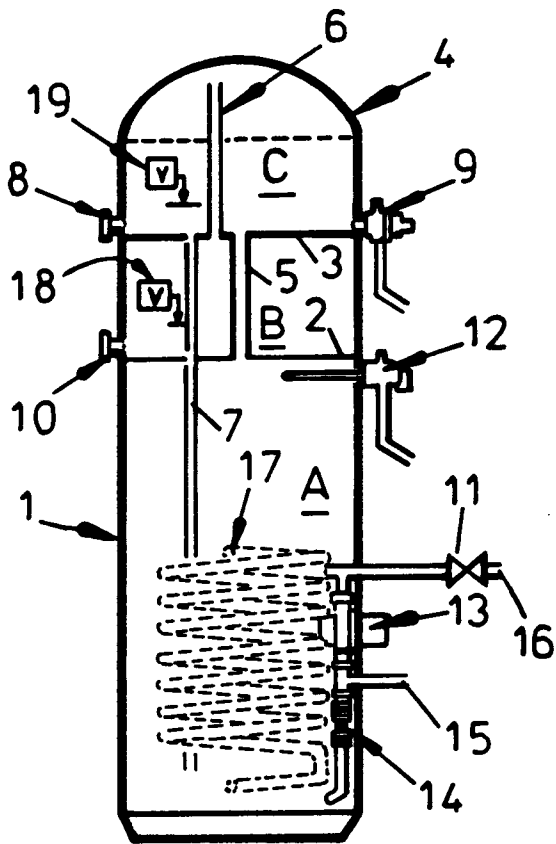


FIG. 1

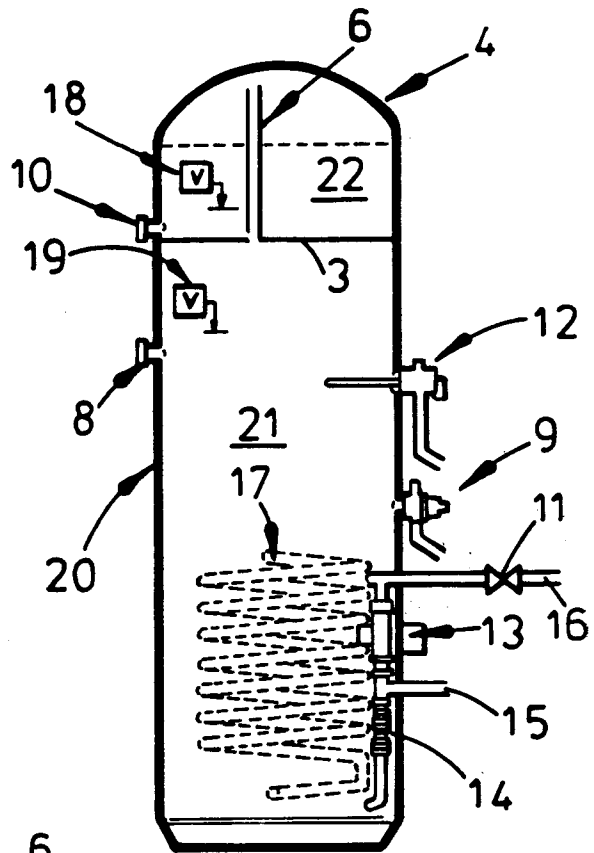


FIG. 2

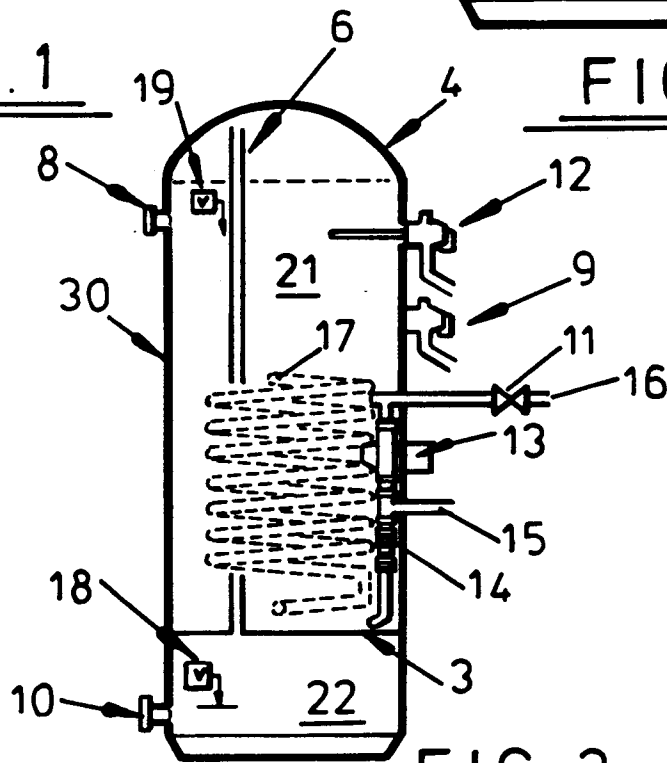


FIG. 3