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(54) Boiling water units.

(57) A polyurethane outer liner for a metal tank used to house water at or near boiling point. The liner is provided with a number of expansion joints disposed vertically in the walls thereof and extending through the body of the liner. Each expansion joint is filled with a high temperature flexible silicone material. The liner is further channelled to prevent a clear point effect between the liner and the wall of the boiling water unit of which the tank is a part. The liner is coated with a moisture impervious acrylic gaze.

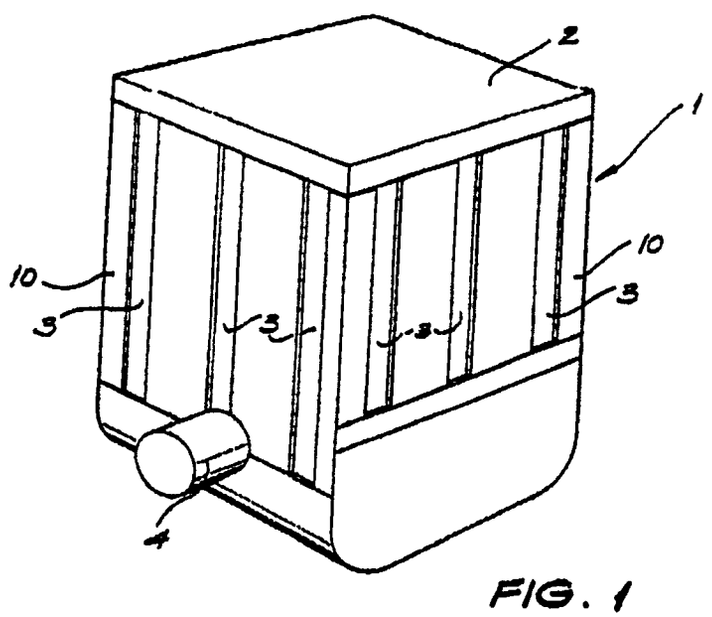

FIG. 1

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BOILING WATER UNITS

This invention relates to boiling water units and is particularly concerned with the type of units depicted and described in the specification of Australian Patent 531449, the disclosure of which is incorporated herein by reference.

This invention is more particularly concerned with the insulation of the tank from which boiling water is dispensed. In this specification the term "boiling water" is to be taken to include hot water with a temperature greater than approximately 90 ° C.

Traditionally, the metal tank utilized to contain boiling water in the unit of Australian Patent 531449 is provided with an external insulation layer of polyurethane. Certain problems have arisen in the narrowly confined space in which the aforesaid tank is required to be accommodated.

It has been found, for example, that a thin walled polyurethane lining has insufficient inherent strength to prevent distortion which arises from its continual contact with a metal tank through which heat is conducted from its boiling water contents. It is further of importance in an application where space is paramount, such as in a unit where a close fitting outer cover is fitted, that such a thin walled polyurethane liner should be dimensionally stable. Polyurethane has a tendency to absorb moisture and to swell when operating in a humid or moist atmosphere. A further problem which arises in some applications is that if a thin walled polyurethane liner fitted to a metal tank to insulate the same, that tank containing very hot water, is then fitted with a close fitting outer cover, a "dew point" effect can arise on the inner wall of the outer cover and moisture which precipitates will run down the inner wall of the outer cover and perhaps leak from the boiling water unit.

It is an object of this invention to ameliorate the above stated disadvantages of conventional boiling water units.

This invention in one broad form provides a polyurethane outer liner for a metal tank adapted to house boiling water, said liner being provided with one or more expansion joints. It is preferred that the tank be substantially in the form of a rectangular prism and that the polyurethane liner be provided with four expansion joints, one in each vertical wall thereof, each expansion joint being centrally disposed of its respective wall and extending vertically therethrough. It is further preferred that the expansion joints extend into the base portion of the polyurethane liner. The preferred expansion joint is a simple cut out gap in the wall of the liner and it is preferred that the gap is at least filled with a suitable sealing material such as a high temperature flexible silicone gel, with a pocket of air trapped between the filling material and the wall of the boiling water containing tank. The provision of such a pocket of air reduces heat loss from the boiling water containing tank through the expansion joint.

It is further preferred that the polyurethane liner be provided with an outer vapour barrier applied using a suitable sealer such as an acrylic glaze composition. Such a vapour barrier substantially prevents the absorption of moisture by the polyurethane liner which thus retains its original shape for an extended period. The preferred glaze composition comprises:

plastic emulsion	90-95%
synthetic resin emulsion	1.5-3%
cellulose compounds	1-2%
siliceous materials	4-6%

The most preferred acrylic glaze composition is as follows:

plastic emulsion	91.60%
synthetic resin emulsion	2.13%
cellulose compounds	1.25%
siliceous materials	5.02%
	100.00%

It has further been found that the "dew point" problem referred to above is at lest substantially ameliorated

by the provision in the polyurethane liner of a plurality of ventilation channels through which air can flow to dispose of any moisture which might otherwise accumulate on the exterior of the polyurethane liner. These ventilation channels are simply grooves cut into but not through the exterior surface of the liner. Typically, each vertical wall of the liner will have three such grooves cut vertically therein. The aforesaid expansion joint is preferably located axially of the centre such ventilation channel. Each ventilation channel has a width approximately 5-15% and preferably about 10% of the width of the wall.

By way of example only, one embodiment of a tank liner according to this invention will now be described with reference to the accompanying drawings wherein:

FIG. 1 is a perspective of the tank liner of this embodiment

FIG. 2 depicts a typical side of the liner of FIG. 1 in horizontal section; and

FIG. 3 is a section of the contact region between the polyurethane liner and the tank wall.

In the drawings, polyurethane liner shown generally at 1 has removable lid portion 2 and vertical walls 10. Ventilation channels 3 are disposed vertically in each wall 10 and spout 4 is provided for the egress of water from interior 9 of the tank about which liner 1 is disposed.

Vapour barrier 5 of the aforesaid preferred acrylic glaze composition is applied to the total outer surface of liner 1 whose polyurethane body is depicted at 6.

In central ventilation channel 3 is disposed an expansion joint which is filled adjacent the surface of liner 1 with a high temperature flexible silicone material 7. Air pocket 8 remains between the silicone material and the surface of the lined tank 11.

As depicted in FIG. 3, tank 11 incorporates stainless steel liner 8 which has an etched or otherwise roughened surface 7. Polyurethane liner 6 is adhered to etched surface 7 of tank 11.

It will be appreciated by the man skilled in the art that a tank liner constructed in accordance with the above described preferred embodiment of this invention constitutes a substantial improvement over conventional such tank liners and overcomes the aforesaid difficulties encountered with such conventional liners.

Claims

1. A polyurethane outer liner for a metal tank adapted to house boiling water, said liner being provided with one or more expansion joints extending through the wall of the liner, the or each expansion joint being disposed vertically in the liner when the liner is in use, and the or each expansion joint being filled with a high temperature resistant flexible material.

2. A liner as defined in claim 1 wherein said liner is substantially in the shape of a rectangular prism and wherein there are four said expansion joints, one each located centrally or respective vertical walls of said liner.

3. A liner as defined in claim 2 wherein one or more of said expansion joints extends into the base portion of said liner.

4. A liner as defined in any one of the preceding claims wherein, in the or each expansion joint, an air gap is left between the said material and the rear face of the liner.

5. A liner as defined in any one of the preceding claims wherein said material is a silicone material, preferably a gel.

6. A liner as defined in any one of the preceding claims, further comprising a plurality of channels cut vertically into the walls of said liner.

7. A liner as defined in claim 6 wherein each wall of said liner is provided with three parallel ventilation channels and wherein the expansion joint in each wall of said liner is located axially of respective central said ventilation channels.

8. A liner as defined in any one of the preceding claims provided with a glaze comprising an acrylic resin.

9. A liner as defined in claim 8 wherein said glaze comprises plastic emulsion 90-95%, synthetic resin emulsion 1.5-3%, cellulose compounds 1-2% and silicaceous materials 4-6%.

10. A liner as defined in claim 9 wherein said acrylic glaze composition is plastic emulsion 91.6%, synthetic resin emulsion 2.13%, cellulose compounds 1.25% and silicaceous materials 5.02%.

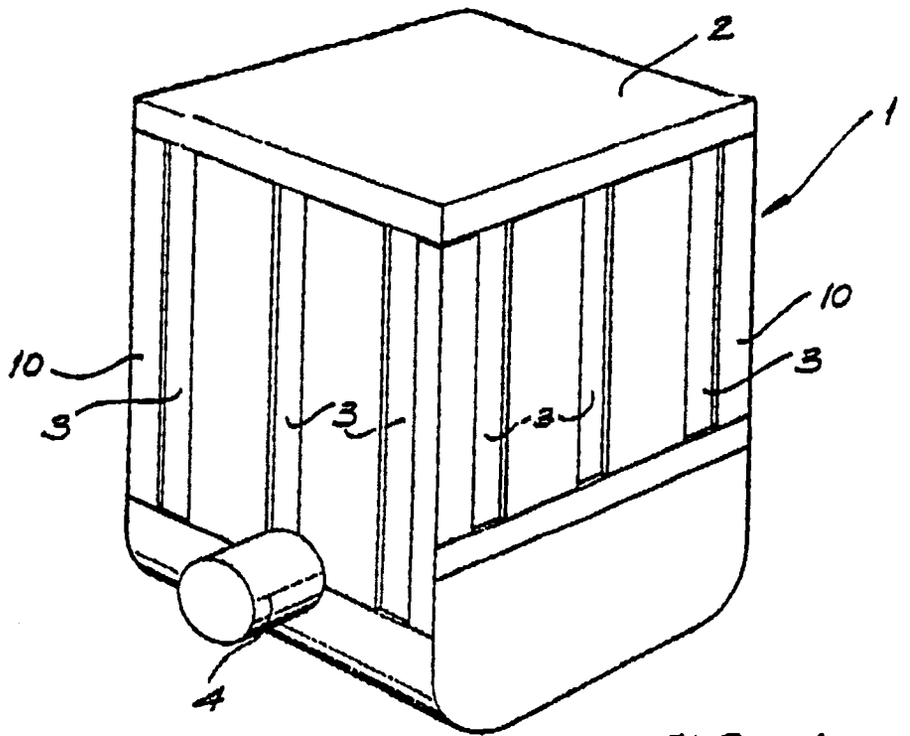

FIG. 1

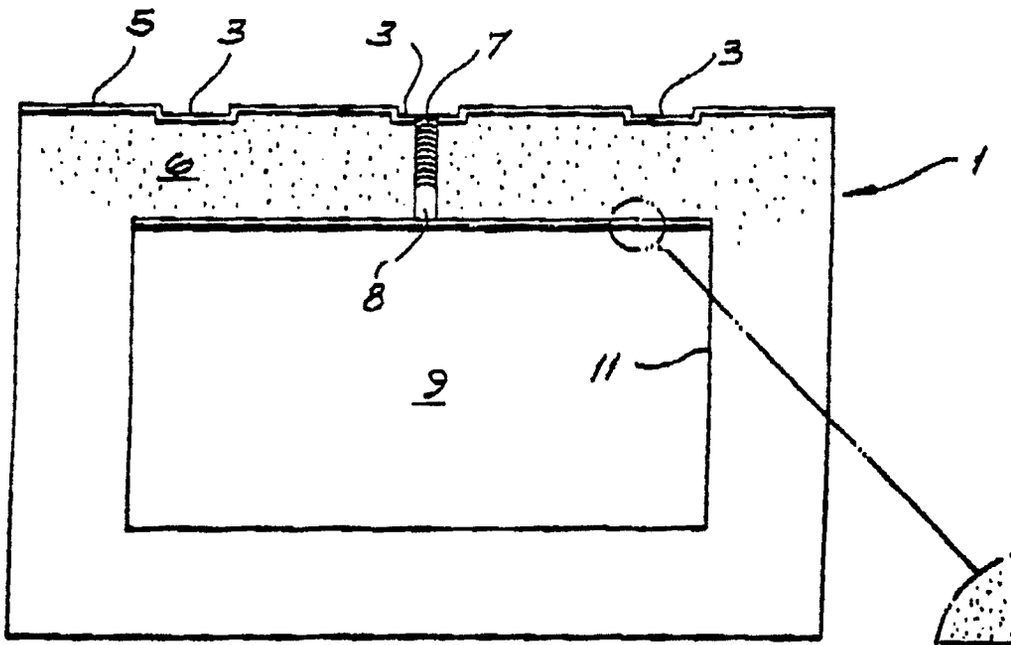

FIG. 2

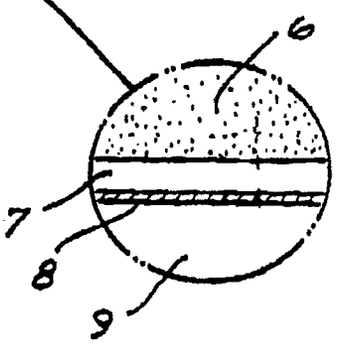

FIG. 3