

TEMPERATURE CONTROLLED CONTAINER

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INTRODUCTION

This invention relates to a container structure for use when transporting goods.

- 5 The container structure is particularly suitable for accommodating perishable fluids and it will be convenient to hereinafter describe the invention in relation to this particular application. It should be appreciated however that the invention has wider application.

10 BACKGROUND

The existing containers used in the shipping industry for transporting perishable fluids generally to provide stable temperature conditions to stop the fluid from spoiling. The container will normally be refrigerated by a unit which is either formed integrally with the container or provided on the ship to a number of
15 containers.

The existing refrigeration units include complex mechanical systems which require regular maintenance by suitably qualified technicians. Furthermore, they are prone to breakdown which inevitably leads to the goods spoiling.

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The existing refrigerated containers are designed to carry general cargo which requires the fluid to be packaged before it is suitable for the container.

- 25 It is an object of this invention to provide a container structure capable of maintaining relatively stable temperature conditions. It is another object of this invention to provide a container structure capable of bulk transportation of fluids in a relatively stable temperature condition.

SUMMARY

- 30 According to this invention there is provided a container structure for use in providing a stable temperature environment for transporting goods, the structure including a receptacle defining a space for accommodating the goods, at least one pipe positioned adjacent the receptacle for receiving a temperature controlling substance, wherein in use the at least one pipe accommodates the

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temperature controlling substance stabilizing the temperature in the space defined by the receptacle.

5 It is preferred that the at least one pipe is positioned about the perimeter of the receptacle and preferably formed on the exterior surface of the receptacle. It is further preferred that the at least one pipe be a closed system for the duration of its transportation use thereby avoiding the requirement that the structure rely on an independent refrigeration means for controlling the temperature of the refrigerant substance. The preferred temperature controlling substance is
10 glycol. It is further preferred that the receptacle and at least one pipe be surrounded by insulating means to improve the thermal efficiency of the structure. A preferred form of insulating means includes polyurethane.

15 It is preferred that the insulating means be clad with fibreglass to provide a protective coating.

It is preferred that the container structure include means for cleaning the interior surface of the receptacle. The preferred form of cleaning means includes spray nozzles associated with the interior surface of the receptacle being connectable
20 to a cleaning fluid source.

It is preferred that the receptacle include an inlet/outlet valve for controlling the movement of goods relative to the receptacle.

25 It is still further preferred that the receptacle include a pressure release valve having a threshold lower than the working pressure of the receptacle in the inlet/outlet valve.

30 It is still further preferred that the receptacle be formed from stainless steel.

It will be convenient to hereinafter describe a preferred embodiment of the invention with reference to the accompanying drawings. It should be understood that the particularity of the following description and associated

drawings is not to be considered as superseding the generality of the accompanying claims.

BRIEF DESCRIPTION OF DRAWINGS

5 Figure 1 illustrates a front elevation of the container structure according to an embodiment of the invention.

Figure 2 illustrates a cross-section of the container structure from Figure 1.

10 Figure 3 illustrates an exploded portion of the container structure from Figure 2.

Figure 4 illustrates the cleaning system for the container structure.

Figure 5 illustrates the entry/exit valve for the container structure.

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DESCRIPTION OF PREFERRED EMBODIMENT

Referring to Figure 1, there is illustrated a container structure 1 including a receptacle 2 for accommodating fluid and a plurality of pipes 3 for accommodating a temperature controlling substance positioned adjacent the wall of the receptacle 2. The illustrated pipes 3 extend longitudinally of the receptacle 2 with each pipe being connected to an adjacent pipe by a connecting element 4 located at the longitudinal ends of each pipe 3. The interconnection of the pipes 3 facilitates filling of the pipes 3 with the thermal controlling substance. It should be appreciated that it is not essential that the pipes 3 be interconnected as each pipe 3 may be filled individually.

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Any temperature controlling substance is suitable for use with the container 1, however glycol has been found most suitable. Glycol is considered most suitable as it remains in a fluid state below 0° Celsius.

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Referring now to Figure 2, the illustrated receptacle 2 is rounded or circular when viewed in cross-section. The circular cross-section facilitates dispensing of the fluid from a receptacle 2 and the absence of internal corners simplifies cleaning of the internal surface of the receptacle 2. A practical application for

the container 1 is for the transportation of fresh milk and therefore providing a clean receptacle 2 free from bacteria is important. It should be appreciated that receptacles of other shape or configuration may also be suitable.

5 Referring now to Figure 3, there is illustrated a portion of the receptacle 2 illustrated in Figure 2. The preferred shape of pipe is illustrated formed in part by a channel with the external surface of the receptacle closing the open portion of the channel. The preferred container 1 also includes insulation means preferably in the form of a polyurethane layer 5 of approximately 100 mm deep
10 surrounding the receptacle 2 and the pipes 3. Other forms of insulation may also be suitable.

Referring now to Figure 4, there is illustrated cleaning means in the form of spray heads 6 affixed to the inner surface of the receptacle 2. It is intended that
15 the spray heads 6 be connected to a cleaning fluid to enable cleaning of the interior of the receptacle. Other systems for cleaning the interior of the receptacle may also be considered suitable.

Referring now to Figure 5, there is illustrated the inlet/exit valve 7 which controls the flow of fluid relative to the receptacle 2. It is intended that the fluid and in particular the milk be provided to the receptacle 2 under pressure to fill the
20 receptacle before the valve 7 is shut off. This enables the receptacle 2 to drain without requiring pumping.

25 It is preferred that the exterior surface of the insulating layer 5 be clad in stainless steel. Further features such as manholes, relief valves, thermometers and walkways may also be included where necessary.

It is intended that the pipes 3 be supplied with chilled glycol at between -0.5°C and -1.0°C . Thereafter, the fresh milk is supplied to the receptacle 2 in a
30 relatively chilled state of approximately $+1^{\circ}\text{C}$. The container 1 can then be transported as a stand alone system not requiring treatment of the glycol for the duration of the journey with the insulation limiting temperature changes in the glycol.

It will be understood from the foregoing that the container structure described is capable of transporting bulk fluid in a temperature controlled environment.

- 5 Finally, it is to be understood that various alterations, modifications and/or additions may be introduced to the container previously described without departing from the spirit or ambit of the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A container structure for use transporting goods in a modified temperature environment, the structure including:
 - a receptacle defining a space for accommodating the goods,
 - at least one pipe positioned adjacent the receptacle for receiving a temperature controlling substance,
 - wherein in use the at least one pipe accommodates the temperature controlling substance stabilizing the temperature in the space defined by the receptacle, which after the introduction of said temperature controlling substance to said at least one pipe, said at least one pipe is sealed, said goods being introduced to said receptacle before, during or after introduction of said temperature controlling substance, and thereafter provides a modified temperature environment for said goods which requires no further thermal energy input.
2. A container structure according to claim 1, wherein the at least one pipe is positioned about the perimeter of the receptacle.
3. A container structure according to claim 1 or 2, wherein the at least one pipe is formed on an exterior surface of the receptacle.
4. A container structure according to any one of the preceding claims wherein in use the at least one pipe is a closed system for the duration of use.
5. A container structure wherein the at least one pipe includes a plurality of pipes.
6. A container structure according to any one of the preceding claims wherein the temperature controlling substance is chilled glycol.

7. A container structure according to any one of the preceding claims including insulating means surrounding the receptacle and at least one pipe to improve the thermal efficiency of the structure.

8. A container structure according to claim 7, wherein the insulating means includes an insulating layer of polyurethane.

9. A container structure according to claim 8, wherein the insulating layer is clad on its exterior surface with stainless steel.

10. A container structure according to any one of the preceding claims including cleaning means for cleaning the interior surface of the receptacle, the cleaning means including spray nozzles associated with the interior surface of the receptacle being connectable to a cleaning fluid source.

11. A container structure according to any one of the preceding claims including an inlet/outlet valve for controlling movement of the goods relative to the receptacle.

12. A container structure according to claim 11 including a pressure relief valve associated with the receptacle and located in a relatively elevated position.

13. A container structure according to any one of the preceding claims, wherein the receptacle is formed from stainless steel.