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(56) Documents cited
GB 2209385 A GB 1148813 A GB 0808690 A
EP 0069042 A1 WO 85/03997 A1 US 4299100 A

(58) Field of search
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(54) **Chillable storage devices**

(57) A chillable storage means for food, such as fish, meat and vegetables, comprises an open-topped box (2) having an integrally formed enclosure (4) in the base thereof which is filled with a freezable liquid such as propylene glycol or salt solution. Metal sheets (6) are provided in the walls of the box to conduct heat to the cold base. The box is stackable so that the cold base of an upper box closes the top of a lower box and prevents heat loss.

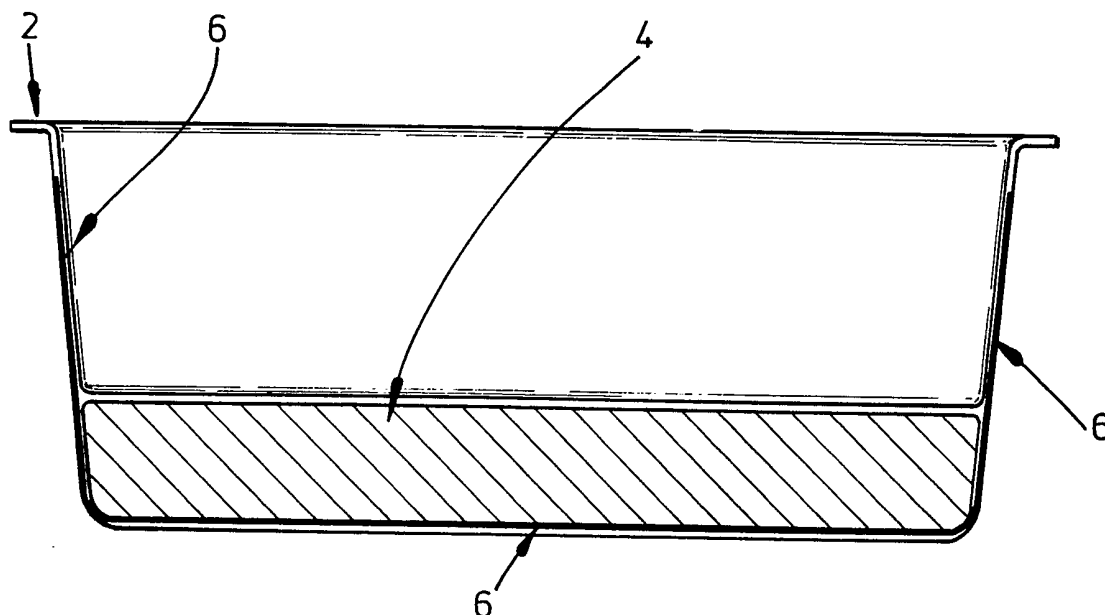
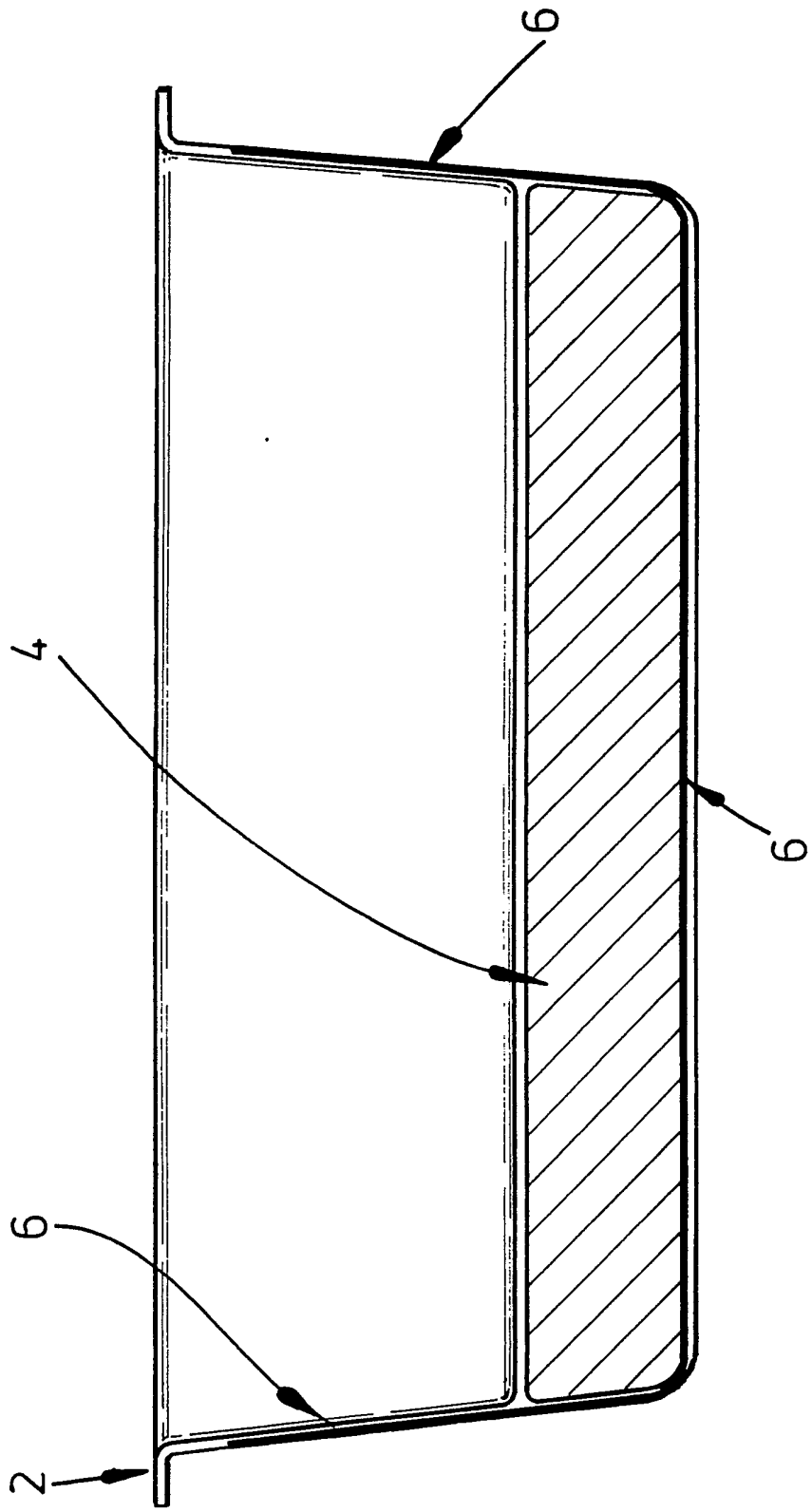


FIG. 1



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FIG. 1

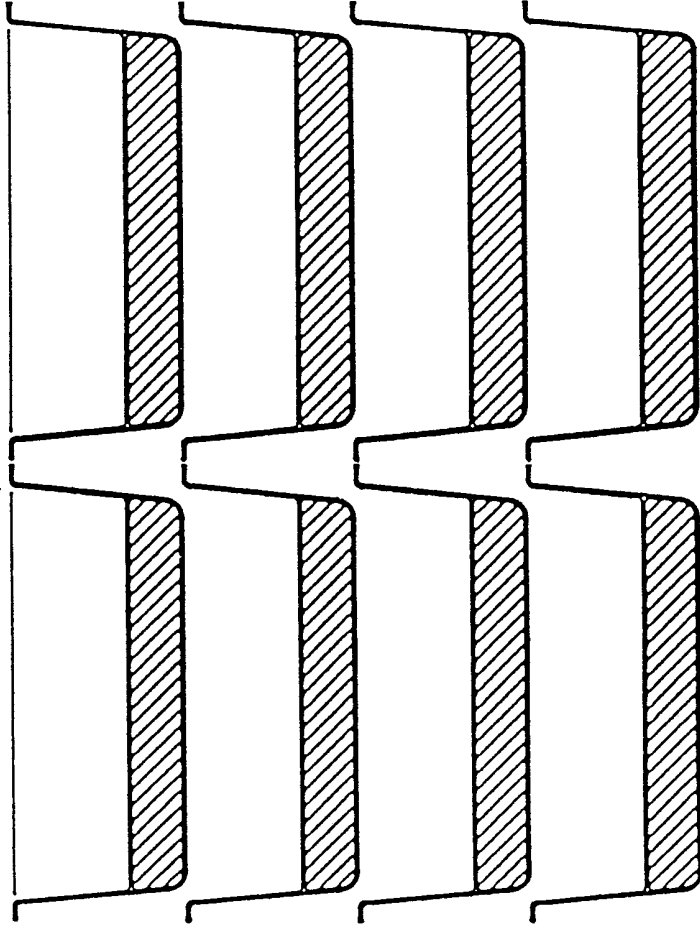
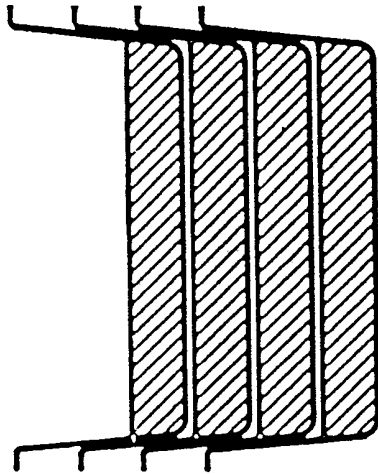


FIG. 2

FIG. 3



CHILLING EQUIPMENT

The present invention relates to storage means for cooling and storing chilled food, which allows the prevention of dehydration, gives close control over storage temperature and allows the controlled partial freezing process known as super chilling, if required.

Modern large-scale methods of food production and food processing have resulting in an increasing awareness of the effects of food-borne pathogenic bacteria, and may also have contributed to the emergence of resistant and psychrophilic strains such as Aeromonas or Listeria monocytogenes. This awareness has resulted in legislation concerning the temperatures at which chilled food shall be stored, transported and displayed. However, the legislation may prove difficult to comply with in practice since the increased refrigeration required may have undesirable side effects such as increased dehydration or uncontrolled partial freezing.

It has long been known that dehydration can be minimised by isolating the stored product from convective heat transfer and by absorbing incoming heat before it reaches the product. These principles are exemplified in the jacketed cold store (Young, O.C., "The Jacket Principle in Canadian Cold Storage", Canadian Refrigeration Journal, Nov. 1952).

It is an object of the present invention to mitigate

these problems and to provide a simple chillable storage means.

The present invention provides a chillable storage means which comprises a container for containing food which is integrally provided with a sealed enclosure containing a freezable liquid having a freezing point below 0°C.

In order to surround the food product with a protective barrier of low temperature material, the sides of the storage box preferably contain sheets of high conductivity material (such as metal plates) which will conduct heat entering the sides of the box to the freezable liquid. Usually, the freezable liquid will be located in the base of the container. By incorporating the high conductivity sheet material in the sides of the box, the sides may be kept relatively thin, thereby allowing the containers to be provided in an open-top format which allows nesting of the containers for storage when empty.

In use, the containers would generally be arranged in a stack so that the product being stored would be completely surrounded by cold surfaces formed by the base and sides of a lower container, together with the base of an upper container.

The container is preferably integrally moulded from a plastics material so as to integrally provide the sealed enclosure with freezable liquid. Alternatively,

compartments may be provided within the container into which may be slid separate sealed cells containing the freezable liquid.

The freezable liquid will generally be a product approved for use with food, such as food grade propylene glycol or common salt solution, so as not to constitute a hazard in the event of accidental leakage. Liquids which expand on freezing may be used, but an air space may be provided or the container may be formed of a flexible material, e.g. a plastics material, to minimise damage to the container. The nature, concentration and volume of the freezable liquid is chosen to bring the stored product to the desired storage temperature and to maintain it at that temperature for the desired storage time. Prior to use, the storage means would be refrigerated to solidify the freezable liquid, which would then remain in the freezing temperature range till all the solution had melted. The frozen liquid would thus maintain a constant temperature within the container, i.e. the freezing point of the liquid, until all the liquid had melted. In this way, close control over the temperature is achieved in a simple manner.

The invention also extends to a method of storing products such as food by using the chillable storage means. The present invention may be used to transport chilled fish and meat cuts (where partial freezing may be desired, though not to the extent of denaturing the

product), and the transport of soft cheese and "cook-chill" foods. It could also be used for the transport of fresh vegetables, such as broccoli where low temperature and high humidity without freezing are required.

An embodiment of the present invention will now be described by way of example only in conjunction with the drawings wherein:-

Figure 1 is a cross-sectional view of a chillable storage means according to the invention;

Figure 2 shows a number of empty storage means nested together in a stack; and

Figure 3 shows a number of storage means filled with products stacked together in such a way as to minimise heat entry.

As shown in Figure 1, the chillable storage means is of particularly simple construction and comprises a open-topped box 2 having an integrally formed enclosure 4 provided in the base thereof and filled with a freezable liquid such as propylene glycol or salt solution. Metal sheets 6 are provided in the walls and base of the box to conduct heat towards the freezable liquid.

The container may be integrally moulded from a plastics material. The metal sheets may be continuous or perforate, or in the form of straps or strips, such that the metal is integrally embedded within the walls of the box.

The enclosure 4 is filled with freezable liquid at the manufacture stage and thereafter the enclosure is sealed, such as by heat sealing.

If required, a lid may be provided, which is of sufficient strength to allow the full containers to be stacked one on top of the other during storage.

Figure 2 shows a nest of empty containers, which thus take up a minimum of space when not in use.

The container may be used in the manner shown in Figure 3. Firstly, the empty containers are placed in a refrigeration unit until the freezable liquid has become frozen. The containers may then be packed with the product, such as food, which is either packaged or unpackaged. The open tops of the containers are then sealed with a lid. The full containers may then be arranged in a stack as shown in Figure 3. In this arrangement, the open-top of each container is cooled by the base of the container above. In order to further minimise heat loss, the uppermost containers may be provided with lids containing slabs of freezable liquid in special sealed enclosures. Similarly, the sides of the stack may also be protected against undue heat entry. After the product has been used, the containers may be recovered, cleaned and reused.

In fact, the containers may form the basis of a transport and distribution system, where containers are either frozen on site using a freezing tunnel - or are

delivered pre-frozen. The containers are packed with product and distributed in special insulated trucks. After the containers have been emptied, they are collected again and returned to the depot for cleaning and re-use.

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CLAIMS

1. A chillable storage means which comprises a container for containing food which is integrally provided with a sealed enclosure containing a freezable liquid having a freezing point below 0°C.
2. A storage means according to claim 1 wherein the container is open-topped, having a base and sides depending therefrom.
3. A storage means according to claim 2 wherein the freezable liquid is located in the base of the container.
4. A storage means according to claim 3 wherein the sides of the container include sheets of relatively high heat conductivity material, which conduct incoming heat down to the container base.
5. A storage means according to any of claims 2 to 4 wherein the open-topped container is stackable with other such storage means, such that the base of an upper stacked container fits into the open top of a lower container in the stack.
6. A storage means according to any preceding claim integrally moulded from plastics material.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

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 9105590.5

Relevant Technical fields

(i) UK CI (Edition K) F4H

(ii) Int CI (Edition 5) F25D

Search Examiner

M C MONK

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

7 APRIL 1992

Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB A 2209385 COOL WATER See eg. Figure 4	1-3, 5, 6
X	GB 1148813 A ALADDIN See eg. Figures 4, 6, 8	1-3, 6
X	GB 808690 A SZEKELY See eg. Figure 1; plate (2)	1-4, 6
X	US 4299100 A FREEZE SLEEVES Whole document	1-3, 5, 6
X	EP A1 0069042 BAUWENS Whole document	1-6
X	WO 85/03997 A1 GAZEAM Whole document	1-3



Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

N: Document indicating lack of novelty or of inventive step.

C: Document indicating lack of inventive step if combined with one or more other documents of the same category.

B: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).