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(12) # EUROPEAN PATENT APPLICATION

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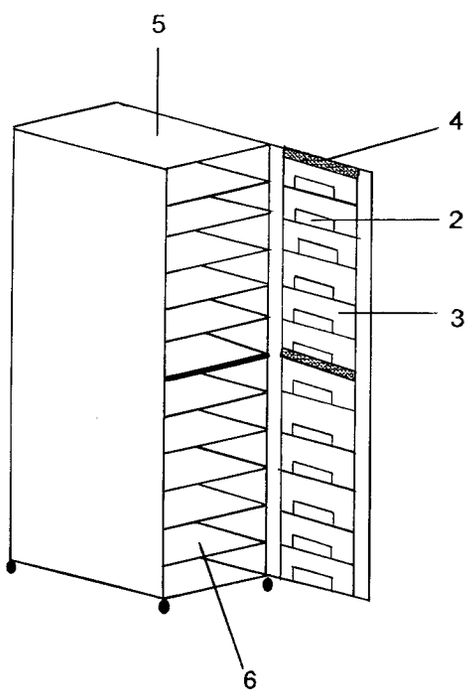
(54) **Cooling system.**

(57) A cooling system 1, for cooling and freezing food and drinks kept in trollies or containers 5, is disclosed. The cooling system comprises dry ice slices 2, placed in front of compartments 6, constituting the inner of the trollies or containers. The invented cooling system includes a cheap and simple way of handling food and drinks satisfactory when conventional refrigerating systems can not be used.

fig. 1b



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This invention relates to a cooling system for cooling and freezing food and drinks kept in trollies or containers by using dry ice slices.

Using dry ice slices for cooling and freezing food and drinks in trollies or containers is a technique well known in the art, especially in connection with airline catering. The drawback with this system is however that the temperature is hard to control in a way that makes it fairly the same at the top, the middle and the bottom of the trolley. The tendency when using this system is that the 4-5 upper trays are inclined to freeze and thereby destroying the food, for the trays in the middle the temperature is correct, and for the trays at the bottom the temperature is too high which makes the amount of bacteria increasing and the quality of the food are reduced.

As an example Association of European Airlines (AEA) has set forth a temperature specification;

Food and drinks:	+5 °C	tolerance +0/-1 °C
Ambient temperature:	+ 22 °C	tolerance ± 1 °C
Duration for 2 hours		tolerance + 1 hour/-0.

The requirements to observe the temperatures set by organizations like AEA are becoming more and more strict, which make them more and more difficult to fulfil. Thus, there is a large need and desire to find a more suitable technique to make it possible to comply with the strict requirements concerning temperatures for food and drinks.

The European patent specifications having the following publication numbers; 77960, 136458, 166086 and 337860, are all describing different systems for cooling food and drinks in mealcarts or containers by using dry ice. A common feature for the solutions disclosed in these four patent specifications is the location of the dry ice which is at the upper part of the meal carts or containers. As already explained, a drawback with such systems are the difficulties by controlling the temperature in the meal carts or containers.

Food handling systems like the one described in British patent application no. 2259357, where dry ice in form of CO_2 snow is used to cool the food are also belonging to the prior art. However, such systems are rather complicated, expensive and time consuming.

The main object of this invention is to achieve a cooling system for cooling and freezing food and drinks in trollies and containers where the temperature is approximately the same all over in the container or trolley.

Another object of the invention is to achieve a cooling system as described in the above paragraph, that is cheap and easy to handle.

These and other objects are obtained by placing dry ice slices in front of the compartments in the trollies or containers as defined in the attached claims 1-4.

In the following the invention will be further explained by reference to the attached drawings and by examples.

Fig. 1a shows the cooling system when dry ice slices are kept in flow-packs and suspended to the trolley or container.

Fig. 1b shows the cooling system when dry ice disks are kept in flow-packs and suspended to the inside of the door of the trolley or container.

Fig. 1c shows a flow-pack where the holding arrangement is a handel, and a closed trolley or container equipped with a cooling system comprising dry ice slices packed in a flow-pack having a handel at the upper end.

Fig. 2 shows a segment of the cooling system when dry ice slices are vacuum-packed in plastic which are pre-moulded, and thus resting steadily on the shelves or trays in the trolley or container when placed in the compartment openings.

Equipments referred to in the drawings:

1: Cooling system
2: Dry ice slice
3: Flow-pack
4: Holding arrangement
5: Trolley or container (meal cart)
6: Compartment.

To meet the demands set forth by the users not having the possibilities to chill food and drinks by conventional refrigeration, the development of a new and improved cooling system not being encumbered with the above described drawbacks, was started.

This development resulted in the cooling system according to the present invention which is based on a kind of separate cooling of each compartment in the container or trolley. The cooling medium used is dry ice slices.

The trollies or containers 5, might be divided into compartments 6, either by permanent shelves or by trays pushed on rails in the trollies or containers. The trollies or containers might be open or closed. The food and drinks might be placed directly on the shelves, or trays with food and drinks like prepared meals might be placed on the shelves or pushed into the trollies or containers on the rails.

The disclosed cooling system 1, comprises dry ice slices 2, which is placed in front of the opening of the compartments 6.

The size of the dry ice slices might vary to suite the different kinds of trollies or containers, and to adjust varying cooling periods. The length and hight of the slices are chosen on the basis of length and hight of the compartment openings in the trolley or container. The length and hight of the slices are smaller or equal to those of the compartment openings. The thickness of the slices are decided on the basis of wanted cooling period. The thickness of the slices are increased in relation to increasing cooling periods. Regarding airline catering the duration of the flight is decisive for the thickness chosen for the dry ice slices.

In the two following examples alternative shapings of the invented cooling system is described.

Example 1.

Dry ice slices 2, were packed in flow-packs 3 as shown in fig. 1a, 1b and 1c. The flow-packs were made of paper and might be of varying lengths; i.e. the flow-packs might be able to keep varying amounts of dry ice slices, preferably from 1 till 10. The distance between the dry ice slices in the flow -packs were chosen on the basis of the kind of trolley or container that the flow-packs were designed for, i.e. the number and hight of compartments in the trolley or container were decisive factors. At the upper end of the flow-packs there was a holding arrangement 4. The holding arrangement preferably were double-sided tape, or for trollies or containers having doors possibly a handle which are kept outside the door when closed. One or more flow-packs packed with dry ice slices were fastened to the trollies or containers by the holding arrangement either at the front of the trollies or containers themselves or at the doors thereof. If more flow-packs containing dry ice slices were used they were fastened beneath each other in a way that all compartments containing food and drinks were completely or partly closed by one slice each.

Example 2.

Before placed in the compartment openings, the dry ice slices 2, were vacuum-packed in plastic. The plastic material might be of different stiffness. The plastic was pre-moulded in a way that when surrounding the dry ice slices, it was resting steadily on the shelves or trays in the trolley or container when placed in the compartment openings. This is shown in fig. 2. Thus, no holding or fastening means were needed to keep the dry ice slices in the right position. Further the surrounding plastic material made the dry ice slices more easy to handle.

A cooling system where an even temperature is obtained during the whole trolley or container, by using dry ice slices, is disclosed. Further, this cooling system has made it possible to satisfy the temperature requirements set by organizations like AEA. By varying the size of the dry ice slices the provided cooling system is very flexible in respect of fitting different kinds of trollies and containers and acting satisfactory for varying cooling periods. The disclosed system is simple and easy to handle, and as dry ice slices are placed in front of all the compartments, the CO_2-atmosphere caused by evaporation of the dry ice which retards the bacteria growth, is evenly spread during the whole trolley or container.

Contrary to the dry ice based cooling systems known in the art, the present system comprises dry ice slices placed in front of every compartment containing food and drinks. The invented cooling system includes a cheap and simple way of handling food and drinks satisfactory when conventional refrigerating systems can not be used.

Claims

1. Cooling system (1) for cooling and freezing food and drinks kept in trollies or containers (5) by using dry ice slices,
characterized in that
the cooling system comprises dry ice slices (2) placed in front of compartments (6) constituting the

inner of the trolley or container.

2. Cooling system according to claim 1,
characterized in that
the dry ice slices (2) are packed in one or more flow-packs (3) having a holding arrangement (4) at the upper end.

3. Cooling system according to claim 2,
characterized in that
the holding arrangement is a double-sided tape or a handle.

4. Cooling system according to claim 1,
characterized in that
the dry ice slices (2) are vacuum-packed in plastic which are pre-moulded.

fig. 1a

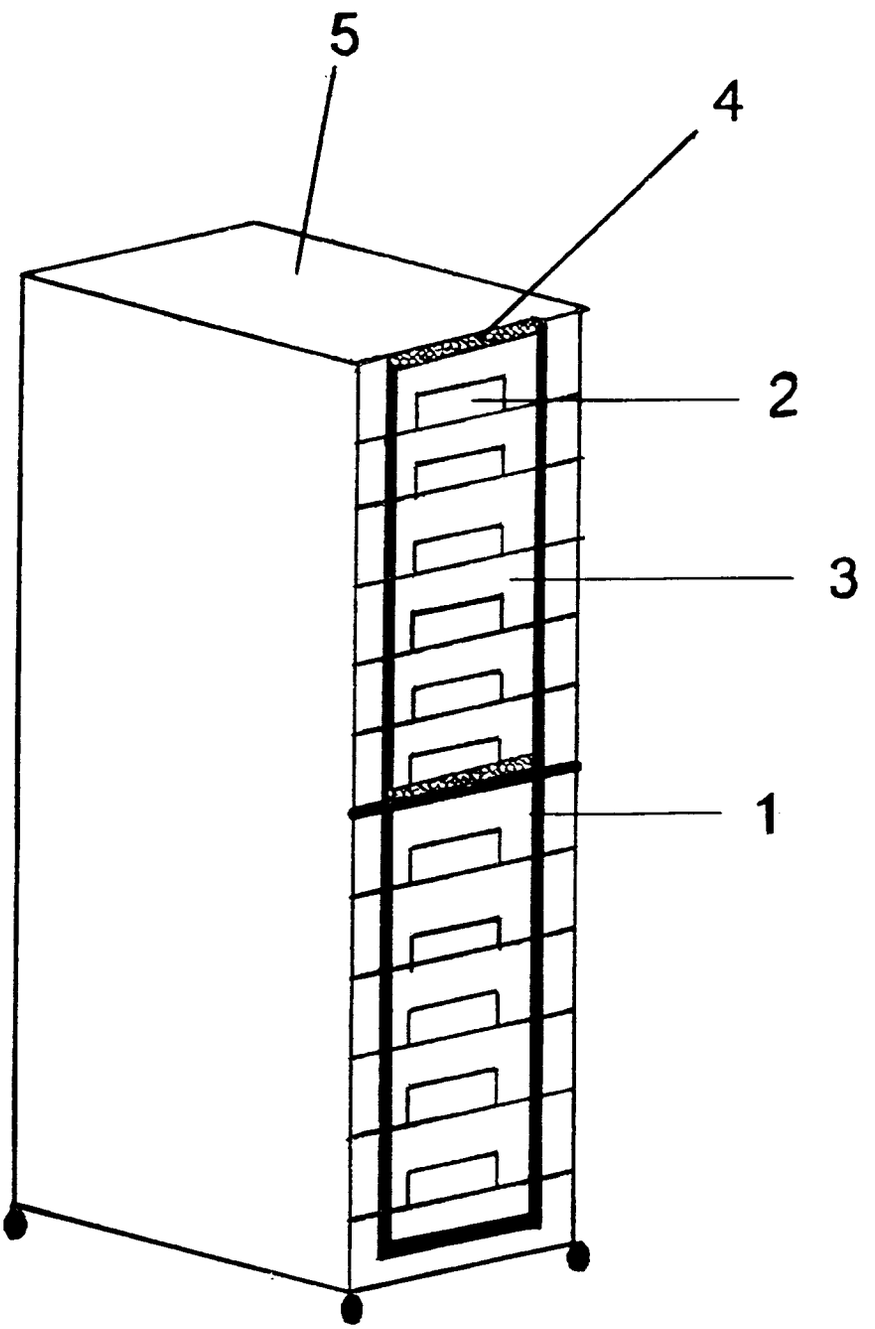

fig. 1b

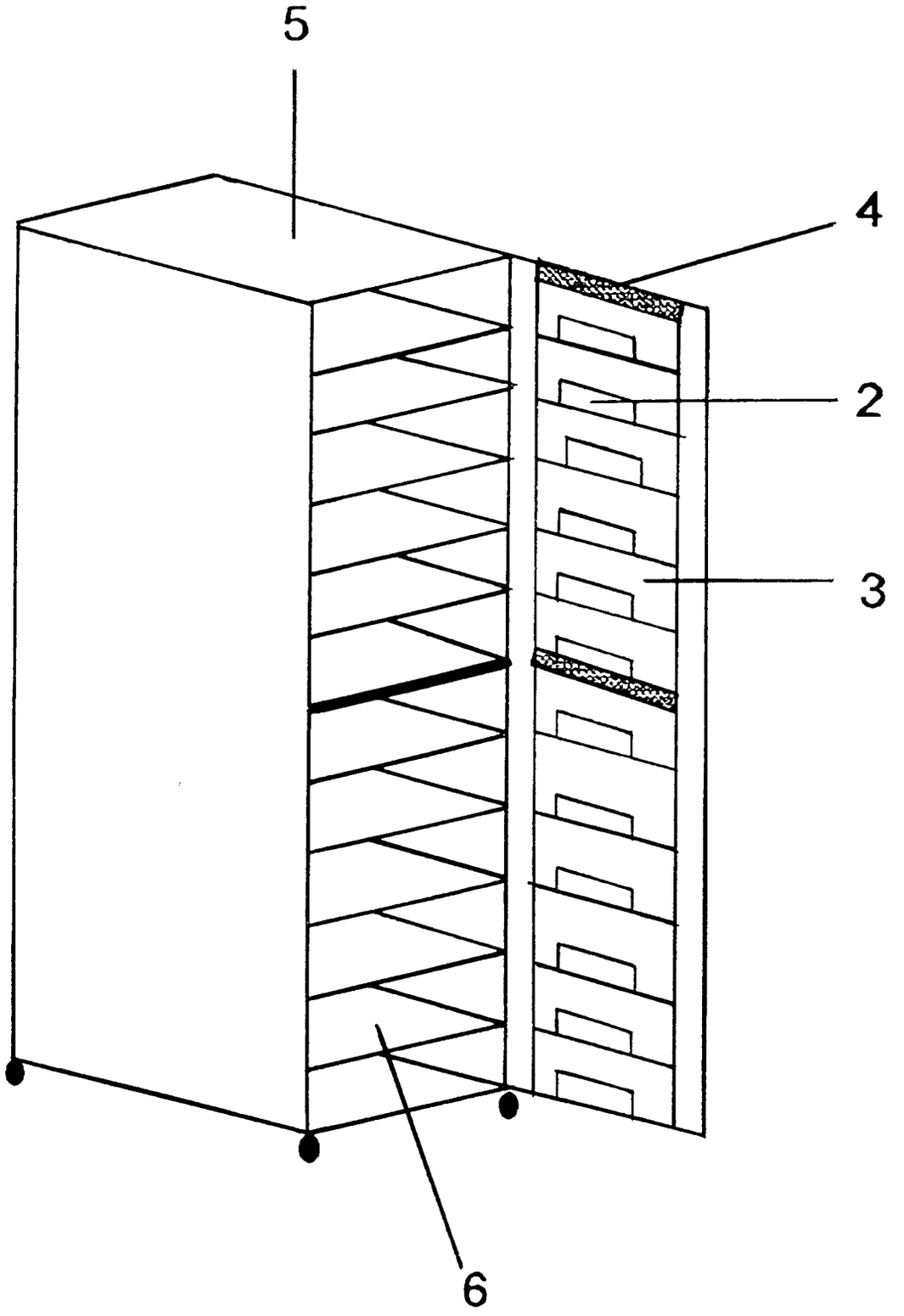

fig. 1c

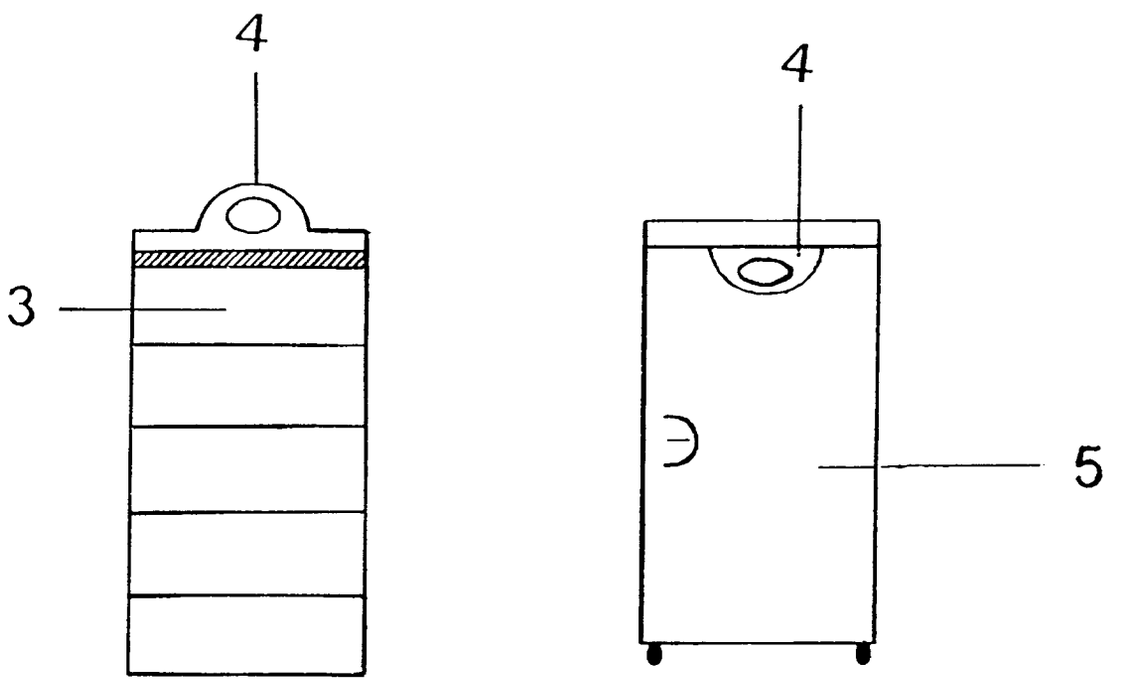

fig. 2