

Description

Device for maintaining the temperature of foods

The present invention relates to a device for maintaining the temperature of cooled foods having a food container for receiving the foods and a cooling module which may
5 be charged with a coolant.

Cooling foods is generally typical for maintaining their quality. In particular for food transports, it is to be ensured that specific temperatures are not exceeded. Typically, containers equipped with dry ice are used for this purpose, which only allow
10 maintaining temperature in narrow time limits, however, and are additionally cumbersome to handle because of the availability in blocks.

A thermal container system is described in DE 199 19 934 A1, which allows maintaining the temperature of the foods using carbon dioxide snow. A cooling module
15 is installed in a food container, into which liquid carbon dioxide may be introduced. Carbon dioxide snow is generated in the cooling module, cold gas arising by sublimation of carbon dioxide snow. The cooling module comprises an inner chamber and an outer chamber, the outer chamber having perforated layers which allow passage of cold gas into the food container. The cooling module is expediently situated
20 in the upper area of the food container, so that the cold gas sinks downward into the food container and cools the foods located therein.

If installed parts, such as partition walls, trays, holders, etc. are provided in the food container, sufficient supply of the entire container content with cold gas is not always
25 ensured, so that the danger of inadequate cooling of specific areas of the container content exists.

The present invention is based on the object of designing a device of the type cited at the beginning in such a way that the most uniform possible supply of the food container
30 with coolant is achieved cost effectively.

This object is achieved according to the present invention in that the cooling module is connected to a cavity in at least one wall of the food container and the wall on the

interior side of the food container has through openings from the cavity into the inner chamber of the food container for the exit of coolant into the food container.

During operation of the device, the cooling module is filled with the coolant, in particular liquid carbon dioxide. The cooling module is expediently designed in such a way that cold gas arising after the filling procedure, in particular carbon dioxide gas generated by the sublimation of carbon dioxide snow, is stored. The coolant, in particular the cold gas, flows into the cavity of the wall of the food container and may be discharged in a targeted and metered way via the openings in the wall into the inner chamber of the food container.

The present invention may be used particularly advantageously in food transport carriages, which comprise multiple separate chambers. Trays having foods, which must be kept cold, are typically laid in each chamber. Up to this point, such tray carriages have been cooled in a cold air device, the cooling power not always being adequate. A cost-effective solution is provided here by the present invention, using which a conventional cooling system, which must be installed in a complex way on the tray carriage, may be dispensed with.

The cooling module preferably installed in the food container acts as a cold reservoir, a cold transfer occurring into the partition walls and/or external walls of the food container. The coolant may be discharged in a targeted and metered way from the cavities of the partition walls and/or external walls via openings directly into the food container. The partition walls preferably have openings on both sides to be able to supply the chambers with coolant uniformly. If the walls have holders for food trays, the openings are preferably provided above the holders. The cold gas is thus introduced above the food, by which more uniform heat transfer is ensured.

A coolant feed, which has a line for liquid gas, which is connected to a liquid gas reservoir, is preferably attachable to the cooling module to supply the cooling module with the coolant. The liquid gas reservoir is preferably implemented as a liquid gas container. In addition, a nozzle/baffle system is advantageously provided in the cooling module, through which the coolant flows when the coolant feed is attached, coolant snow and coolant vapor arising. The cold gas arising during the filling procedure may be used as a partial flow for precooling the food container.

The essential advantage of the present invention is above all a uniform cold distribution in the inner chamber of the food container. In particular with food containers having separate chambers, the present invention represents a significant improvement in relation to typical solutions. The use of a device as described in DE 199 19 934 A1 is
5 problematic in such food containers. Because, with the solution suggested therein, the cold simply falls down from the cooling module installed in the top area of the food container onto the food situated in the food container, a cooling module must be installed in each chamber. In contrast, with the solution according to the present invention, a single cooling module suffices for the cold supply of all chambers. Because
10 of the connection between the cooling module and the cavities of the partition and/or external walls of the food container and the openings in the partition and/or external walls, uniform supply of all chambers is possible using one cooling module.

The solution according to the present invention also has the advantage that the
15 partition and/or external wall surfaces of the food container are moderately cooled, by which additional convection cold radiation is generated. A uniform cold distribution in the inner chamber is also ensured upon use in tray carriages, because the cold gas preferably flows out between the tray supports.

20 In the following, the present invention is explained in greater detail on the basis of exemplary embodiments schematically illustrated in the figures.

Figure 1 shows a food transport carriage having three chambers

25 Figure 2 shows a schematic sketch of the cooling of the chamber of a food transport carriage

The food transport carriage shown in Figure 1 comprises three chambers 1, 2, 3, which are separated from one another by partition walls 4, 5. Trays (not shown in the figure)
30 having food may be laid on holders (not shown) in each chamber. The foods are to be kept cold in the food transport carriage. For this purpose, a cooling module 6, which may be filled with liquid carbon dioxide via an adapter 7 for a filling gun, is situated in the top area of the food transport carriage. A nozzle/baffle system (not shown in the figure) is installed in the cooling module 6, so that CO₂ snow arises in the cooling
35 module 6 upon filling of the cooling module 6. The cooling module 6 may thus also be

referred to as a snow box. CO₂ cold gas arises from the CO₂ snow through sublimation, which flows via wire fabric 8 and cold gas transitions 9 from the cooling module 6 into the partition walls 4 and 5, which are implemented as hollow. The cold gas exits there on the sides of the partition walls 4 and 5 into the chambers 1, 2, and 3 via a distributed number of holes. The exit points are each located above the tray levels, i.e., above the foods, so that the heat transfer occurs uniformly distributed in the chambers and tray supports.

The principle of maintaining cold is shown in Figure 2 on the basis of a detail from the food transport carriage, which relates to the middle chamber. The cooling module 6 (snow box) is supplied with liquid carbon dioxide via the adapter 7. After filling with sufficient carbon dioxide snow, the filling gun is removed. The carbon dioxide sublimate flows into the cavities of the partition walls 4 and 5. The carbon dioxide sublimate may exit into the chambers of the food transport carriage via holes in the partition walls 4 and 5. The flow of the cold gas is illustrated by arrows 11 and 12. Holders for food trays are provided on the partition walls 4 and 5. These holders may be implemented as beads in the partition walls 4 and 5, for example. The holes for the exit of the cold gas are each provided above the holders 10.

Patent Claims

1. A device for maintaining the temperature of cooled foods having a food container
5 for receiving the food and a cooling module 6, which may be charged with a
coolant, the cooling module 6 being connected to a cavity in at least one wall 4, 5
of the food container and the wall 4, 5 on the interior of the food container having
through openings from the cavity into the inner chamber of the food container for
the exit of coolant into the food container, **characterized in that** the food container
10 is divided into chambers 1, 2, 3 by the wall 4, 5, the cooling module 6 is connected
to a cavity in the wall 4, 5, and the wall 4, 5 has openings on both sides for the exit
of coolant into the chambers 1, 2, 3 of the food container.
2. The device according to Claim 1, characterized in that the wall has holders for food
15 trays and the through openings are provided above the holders.
3. The device according to one of Claims 1 through 2, characterized in that the
coolant is connected to cavities in the external walls of the food container.
- 20 4. The device according to one of Claims 1 through 3, characterized in that a coolant
feed, which has a line for liquid gas, which is connected to a liquid gas reservoir, is
attachable to the cooling module 6.
- 25 5. The device according to one of Claims 1 through 4, characterized in that a
nozzle/baffle system is provided in the cooling module 6, through which the coolant
flows when the coolant feed is attached, coolant snow and coolant vapor arising.