



US 20020050147A1

(19) **United States**

(12) **Patent Application Publication**
Mai et al.

(10) **Pub. No.: US 2002/0050147 A1**

(43) **Pub. Date: May 2, 2002**

(54) **INSULATING CONTAINER**

(30) **Foreign Application Priority Data**

(75) Inventors: **Hans-Joachim Mai**,
Dautphetal-Holzhausen (DE);
Hans-Jurgen Weber,
Dautphetal-Wolfgruben (DE)

Oct. 31, 2000 (DE)..... 200 18 635.3

Publication Classification

(51) **Int. Cl.⁷** **F25D 3/08**

(52) **U.S. Cl.** **62/457.2; 62/371**

Correspondence Address:

**Finnegan, Henderson, Farabow,
Garrett & Dunner, L.L.P.**
1300 I Street, N.W.
Washington, DC 20005-3315 (US)

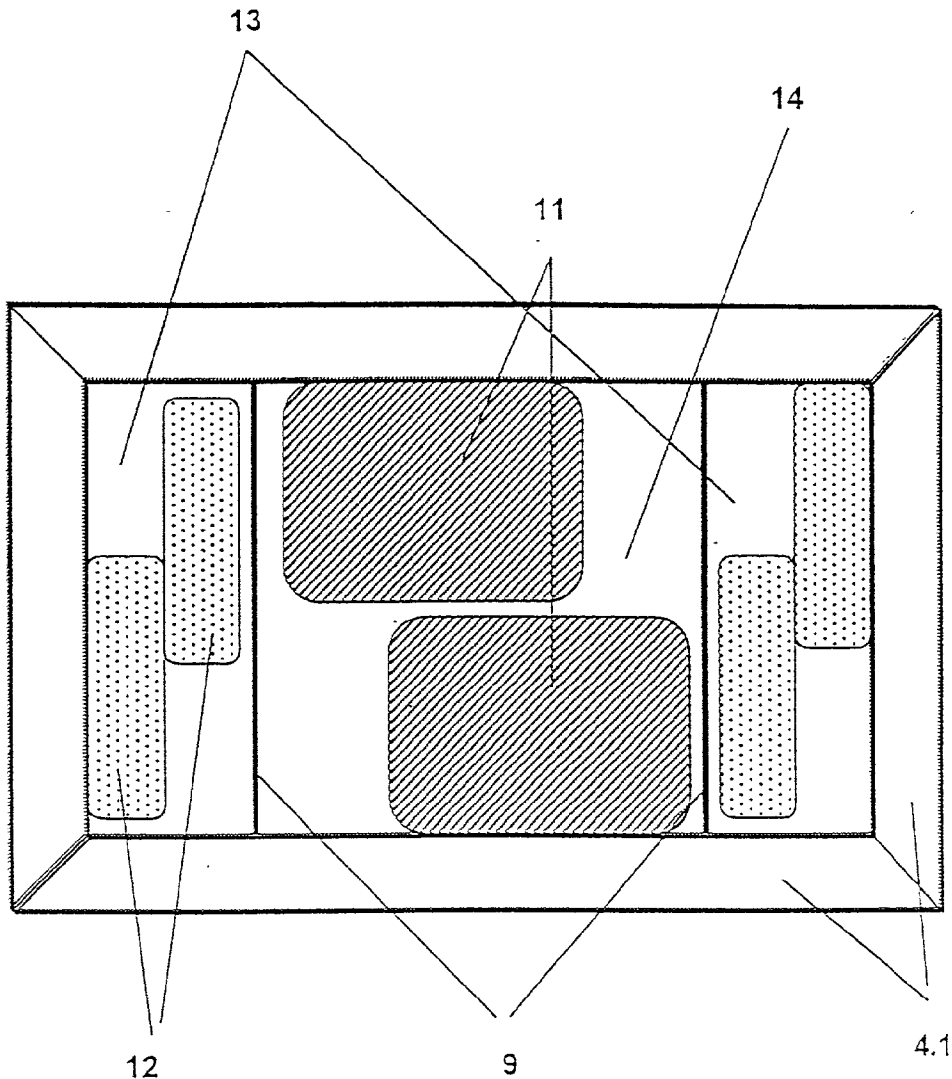
(57) **ABSTRACT**

(73) Assignee: **Dade Behring Marburg GmbH**

(21) Appl. No.: **09/970,652**

(22) Filed: **Oct. 5, 2001**

The invention relates to containers for the dispatch and storage of commodities under controlled temperature conditions, in which the refrigerating or heating agents used for maintaining a specific temperature range can be introduced, spatially separated from the commodities in the interior of the container by one or more separators.



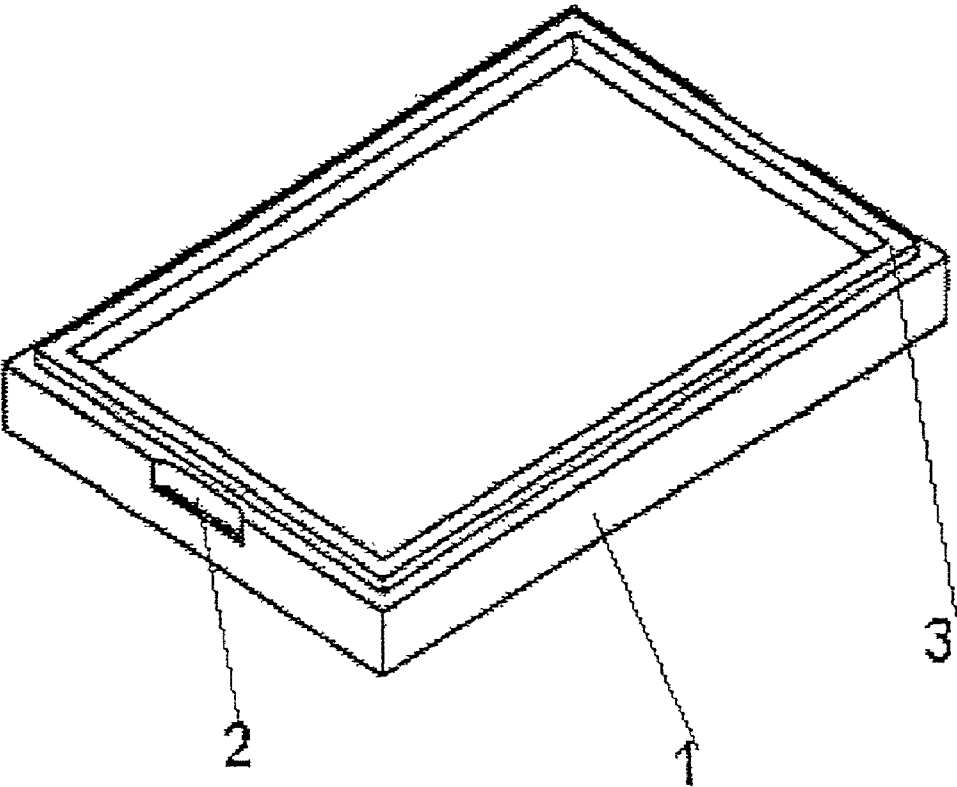


Fig. 1

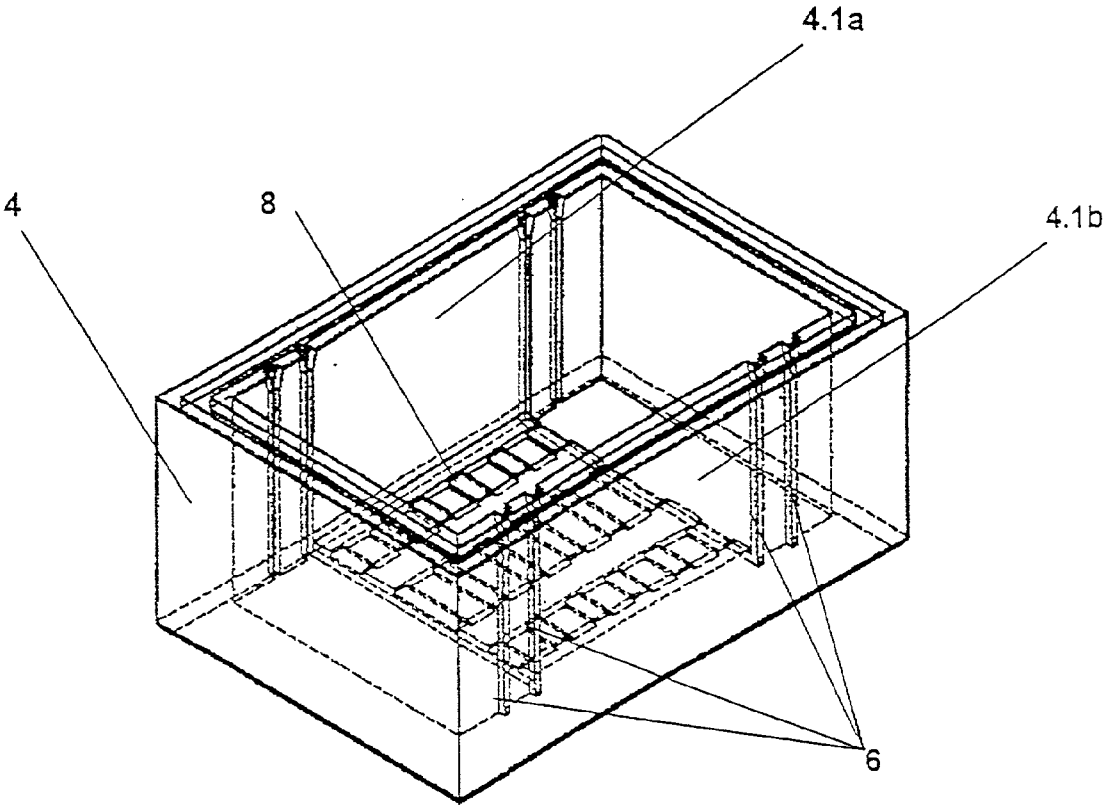


Fig. 2a

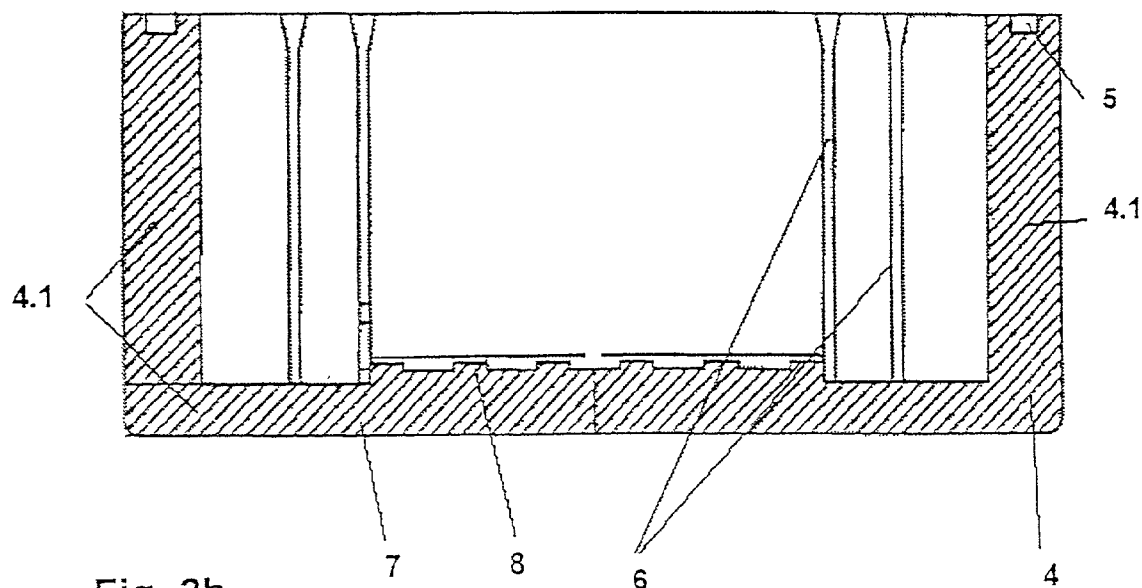


Fig. 2b

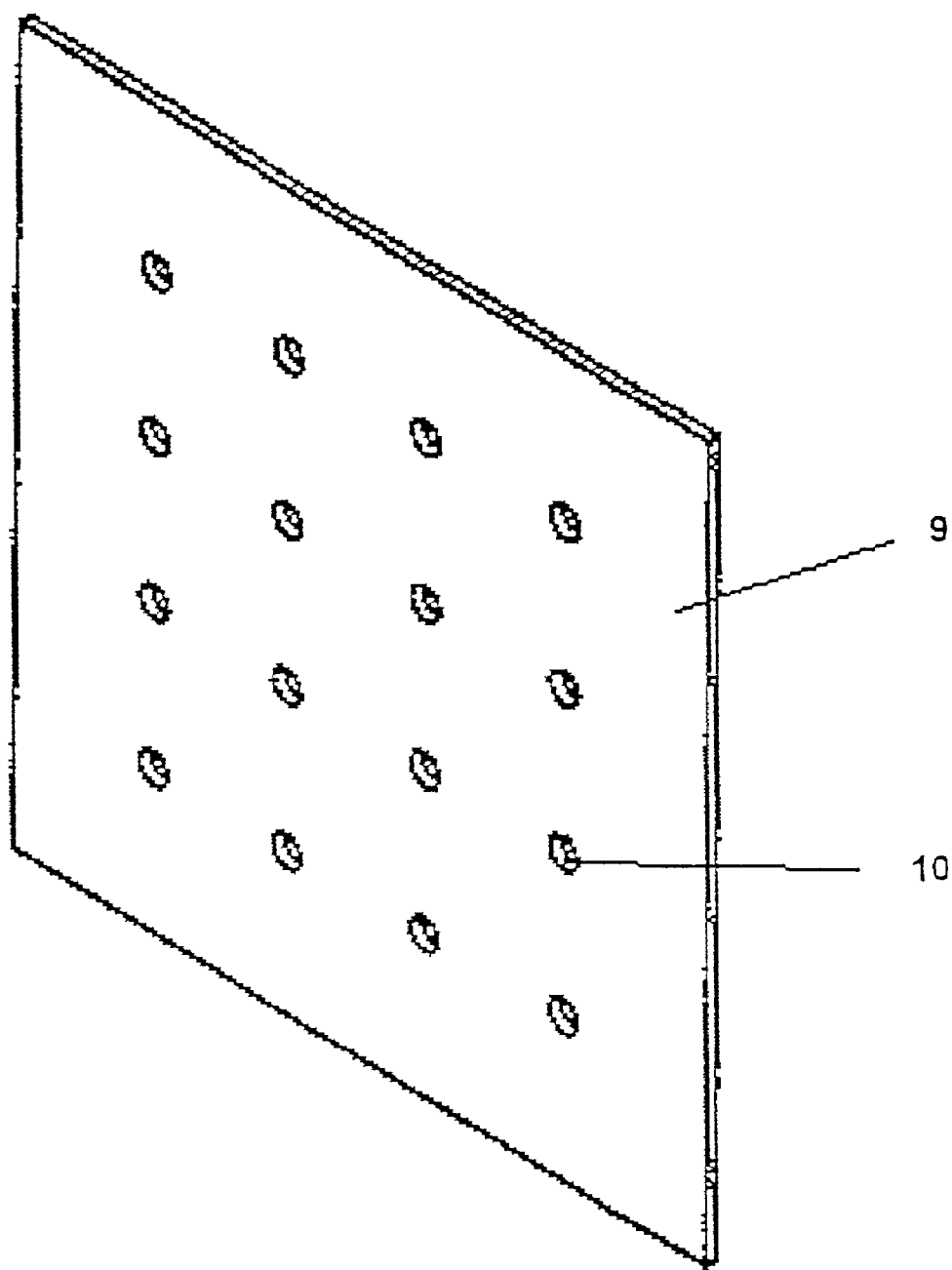


Fig. 3

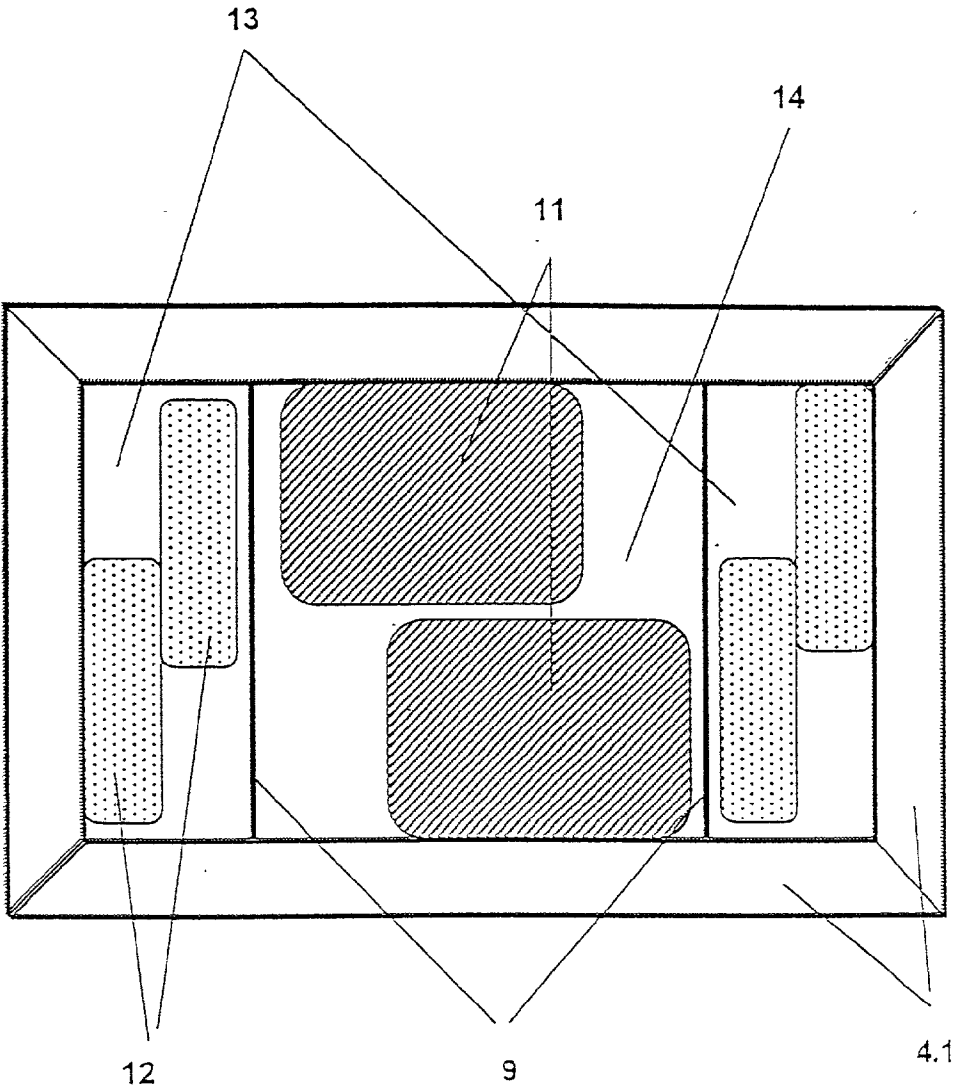


Fig. 4

INSULATING CONTAINER

[0001] The invention relates to containers for the dispatch and/or storage of commodities under controlled temperature conditions.

[0002] Commodities often have to be stored and dispatched under controlled temperature conditions. Thus, for example, it is customary to dispatch specific commodities, such as, for example, pharmaceuticals or diagnostic aids, as refrigerated commodities.

[0003] The previous practice of dispatching such products at +2 to +8° C. in a refrigerated motor truck is questionable with regard to the relatively high costs and from points of view of environmental protection. There are also customers who cannot be reached by refrigerated motor truck. In order to ensure, even for these customers, that the commodity remains refrigerated at a temperature of +2 to +8° C. for the transport duration, the commodity is normally dispatched, together with refrigerating elements, in thermally insulating Styropor containers. However, the disadvantage of conventional containers is that the temperature distribution within the container during active refrigeration is highly uneven. At some points, the desired temperature range is exceeded, and at others the commodity in the container is frozen. Moreover, condensation water forms on the refrigerating elements, which is not led away from the products to be transported, so that the commodity and/or its packaging may become moist.

[0004] The set object, therefore, is to design the container in such a way as to ensure uniform circulation of the cold or heat in the interior of the container.

[0005] This object is achieved by the provision of a container with a bottom part and a top part consisting of thermally insulating material, in which the refrigerating or heating agents used for maintaining a specific temperature range can be introduced, separated spatially. From the commodity in the interior of the container, by means of one or more separators, that is to say the container according to the invention is divided on the inside by the separators preferably into horizontal and/or vertical spatial regions which may serve in each case for the reception of commodities or thermal control agents, the separators ensuring that the refrigerating or heating agents (thermal control agents) do not come into direct contact with the commodity. Since the commodity and the thermal control agents are locally separated from one another, this prevents local overheating or undercooling of the commodity as a result of direct contact with the thermal control agent. Thermal exchange does not take place by direct contact, but by the circulation of the gas or gas mixture, preferably air, within the container. This brings about the uniform temperature distribution within the container.

[0006] The container according to the invention is suitable equally for the dispatch and/or storage of frozen commodities, refrigerated commodities or commodities which are to be dispatched or stored at a temperature above the ambient temperature. The desired temperature range in the container is achieved by the addition of refrigerating agents or heating agents. The refrigerating agent for frozen commodities may, for example, be dry ice. Ice bags or refrigerating elements based on gel, such as, for example, gel ice packs, may be used for refrigerated commodities. If a temperature range

within the container which is above the ambient temperature is required, this may be achieved, for example, by means of bags or containers with heated water or gel.

[0007] Preferred embodiments of the invention are described in claims 2-14.

[0008] In a preferred embodiment, the separators are designed as inner walls which, preferably together with the container outer walls, form one or more reception spaces (compartments) for the refrigerating or heating agents and, separated from them by these inner walls, one or more reception spaces for the commodities. Various configurations are possible. In this case, however, the spatial separation of the commodities and the thermal control agents is important. For example, the container bottom part may be divided into three regions by two vertical inner walls, so that a middle compartment, which serves for reception of commodities, and two outer compartments for receiving the thermal control agents are obtained. Also, by inner walls being drawn in in the middle of the container, one or more compartments for the reception of commodities may be obtained, which are surrounded on all sides and, if appropriate, also from below and/or from above by compartments for the reception of thermal control agents; or the thermal control agents may be introduced into the middle compartment or middle compartments and the commodities into the outer compartments.

[0009] In the preferred embodiment of the invention, the separators consist of a material which conducts the heat better than the material of the container outer walls, or they consist of the same material as the container outer walls, but then have preferably a smaller wall thickness than that of the container outer walls. Containers in which the separator or separators have one or more orifices are particularly preferred. The advantage of these embodiments is that thermal exchange takes place preferably via the inner walls between the compartments, not via the outer walls.

[0010] Very particularly preferred are the containers according to the invention in which the separators have one or more orifices which allow a rapid and uniform circulation of the gas or gas mixture, preferably air, located in the container between the reception region or reception regions for the thermal control agents and the reception region or reception regions for the commodities. The orifices may, for example, be slots or holes of any shape, for example round, oval or star-shaped holes. The number and size of the holes can also vary. Round or roundish holes with a diameter in the range of 0.1 to 5 cm are preferred, those with a diameter in the range of 0.1 to 2 cm are particularly preferred, and holes with a diameter in the range of 0.3 to 1.2 cm are very particularly preferred. The orifices and the number of orifices per separator are to be such that the stability of the separators remains sufficiently ensured, so that, for example when the commodities are displaced during transport, the separators have sufficient safety against breakage. The orifices should also be such that the thermal control agents cannot come directly into contact with the commodities.

[0011] The separators may be connected fixedly or releasably to the outer walls of the container. Thus, for example, the bottom part, including the separators, may be formed or foamed from a single piece. The separators may also be adhesively bonded or else otherwise fixedly connected to the outer walls. In a particularly preferred embodiment of the

invention, the separators are connected releasably to the outer walls, for example the separator is inserted into a groove or flute of the inside of the corresponding outer walls. A container is very particularly preferred in which the separators can be connected to the outer walls or to themselves in such a way that larger or smaller compartments for commodities of thermal control agents can be produced, as required. This may be achieved, for example, by the inside of the outer walls having a plurality of parallel depressions, into which the separators can be pushed.

[0012] In a very particularly preferred embodiment of the invention, the separators are designed as removable partitions. In a preferred container according to the invention, the container bottom part has reception devices for one or more, preferably two, vertical partitions. This reception device may, for example, be a groove, flute, depression, guide strip or clearance in the corresponding outer walls. Other embodiments according to the invention have one or more horizontal partitions as separators. Yet other embodiments according to the invention have both one or more vertical and one or more horizontal removable partitions.

[0013] The container according to the invention may have, on the inner bottom, elevations onto which a horizontal partition can be laid. The elevations, which may also be configured in the form of webs, steps or mosaic-like patterns, should preferably be designed in such a way that, in the region of the container bottom, the gas or gas mixture located in the container can circulate freely between the compartment or compartments having the thermal control agents and the compartment or compartments having the commodities.

[0014] The outer walls of the container according to the invention may consist of one or more materials. Preferably, the top part and the bottom part consist of the same thermally insulating material. Preferred material for the outer walls is, for example, foamed polystyrene or foamed polyurethane. Important material properties are not only the heat-insulating capacity, but also the strength which protects the transported goods during transport. For this reason, the top part and the bottom part should, if possible, be produced in each case from one piece. The wall thickness depends on the respective material and on the desired insulation properties. A wall thickness of 1 to 10 cm is preferred, and a wall thickness of 3 to 5 cm is very particularly preferred.

[0015] The material of the separators may, for example, be polystyrene, polypropylene, polyethylene or corrugated cardboard. The separators may be compact partitions or else have cavities. The material for the separators should preferably possess substantially better thermal conduction than the material of the outer walls. Removable web plates, which consist in each case of two plastic plates with a hollow chamber profile, are very particularly preferred as separators.

[0016] The shape of the container according to the invention may vary. The container according to the invention may, for example, be box-shaped, spherical or barrel-shaped. Containers with an inner volume in the range of 0.001 to 5 m³ are preferred, with an inner volume in the range of 0.01 to 2 m³ particularly preferred and with an inner volume in the range of 0.02 to 1 m³ very particularly preferred. A box-shaped container with a minimum dimension of 200 mm×100 mm×100 mm and a maximum dimension of 1200 mm×1000 mm×1250 mm is very particularly preferred.

[0017] In a preferred embodiment of the container according to the invention, a beading between the top part and bottom part of the container is such that the two parts close by suction.

[0018] The container according to the invention may, for example, be dispatched, packaged in an outer carton, preferably consisting of corrugated cardboard.

[0019] The container according to the invention is suitable particularly for the storage and/or dispatch of frozen commodities, refrigerated commodities or commodities which are to be dispatched at a temperature above the ambient temperature. Where frozen commodities are concerned, the container inner temperature should be below 0° C. Where refrigerated commodities are concerned, this temperature should be above 0° C. and preferably in the range of +2 to +8° C. The container according to the invention is suitable particularly for the dispatch and/or storage of pharmaceuticals and diagnostic aids.

[0020] The teaching according to the invention also embraces, in particular, the use of removable partitions, preferably those with circulation orifices, for the spatial separation of thermal control agents and commodities in containers for the storage and/or transport of frozen commodities, refrigerated commodities or commodities which are to be dispatched at a temperature above the ambient temperature.

[0021] The advantageous embodiment of the invention described in the following example serves for an illustrative explanation of individual aspects of the invention and is not to be understood as a restriction.

[0022] FIG. 1 shows an oblique view of the top part, looking toward the underside of the container lid.

[0023] FIG. 2a shows an oblique view of the bottom part illustrated as being partially transparent, and

[0024] FIG. 2b shows a longitudinal section through the container bottom part.

[0025] FIG. 3 shows an elevation view of a separator with circulation orifices.

[0026] FIG. 4 shows a horizontal section through the filled container bottom part.

EXAMPLE 1

[0027] The container is illustrated in more detail in FIGS. 1-4. The top part 1 of the container forms, as it were, the container lid and the upper outer wall. The lid 1 has grip recesses 2 and part of a closing system (3, 5) which takes the form of a tongue-and-groove system. The beading between the lid and the container bottom part 4 should be such that the two parts close by suction. The bottom part 4 consists of the lower and the lateral outer walls 4.1. Guide strips 6 or grooves for the separators 9 are made on the inner side walls (4.1a, 4.1b) located in each case opposite one another. The guide strips or grooves 6 are arranged at different distances from one another for a flexible space division for the thermal control agents 12 and the commodities 11. For a further improvement in homogeneous temperature distribution, the bottom 7 is provided with webs 8 between the vertical separators 9. The distance between the commodities and the bottom allows air circulation even in the bottom region. It is

ensured, furthermore, that condensation water does not come into contact with the commodities. The removable partition **9**, preferably a web plate, as the preferred separator, has circulation orifices **10** for gas exchange between the compartments. These orifices are distributed preferably uniformly over the base area of the removable partition. The diameter of the orifices may amount, for example, to 8 mm. The removable partitions are fixed together with the inside of the corresponding outer walls of the container by means of grooves **6**.

[0028] The reason for the separators is to provide separate sections for thermal control agents **12** (compartments for the thermal control agents **13**) and for commodities **11** (compartments for the commodities **14**), in order thereby to prevent thermal load at particular points and at the same time to ensure a uniform temperature distribution within the container. The thermal control agents should expediently be arranged around the commodities, but without direct contact with them, for example by the thermal control agents being introduced into the outer compartments which are obtained by two vertical separators being pushed into the guide strips (see also **FIG. 4**) and by a separator being laid onto the commodities.

1. A container with a bottom part (**4**) and with a top part (**1**) consisting of thermally insulating material for the dispatch and storage of commodities, wherein the refrigerating or heating agents (**12**) used for maintaining a specific temperature range can be introduced, spatially separated from the commodities (**11**) in the interior of the container by one or more separators (**9**).

2. The container as claimed in claim 1, wherein the separators (**9**) are designed as inner walls which, preferably together with the container outer walls (**4.1, 1**), form one or more reception spaces (**13**) for the refrigerating or heating agents (**12**) and one or more reception spaces (**14**) for the commodities (**11**).

3. The container as claimed in claim 1 or 2, wherein the separators (**9**) consist of a material which conducts the heat

better than the material of the container outer walls (**1, 4.1**), or wherein the separators consist of the same material as the container outer walls, but then have a smaller wall thickness than that of the container outer walls.

4. The container as claimed in one of claims 1-3, wherein the separators (**9**) have one or more orifices (**10**).

5. The container as claimed in one of claims 1-4, wherein the separators (**9**) are connected fixedly or releasably to the outer walls (**1, 4.1**) of the container.

6. The container as claimed in one of claims 1-5, wherein the separators are designed as removable partitions (**9**).

7. The container as claimed in claim 6, wherein the bottom part has one or more reception devices (**6**) for one or more, preferably two, vertical removable partitions.

8. The container as claimed in claim 6 or 7, which has one or more horizontal removable partitions as separators.

9. The container as claimed in one of claims 1-8, wherein the container bottom (**7**) has elevations (**8**), onto which a horizontal removable partition can be laid.

10. The container as claimed in one of claims 1-9, wherein the outer walls (**1, 4.1**) consist of foamed polystyrene or polyurethane.

11. The container as claimed in one of claims 1-10, wherein the separators (**9**) consist of polystyrene, polypropylene, polyethylene or corrugated cardboard.

12. The container as claimed in one of claims 1-11, wherein web plates are used as separators.

13. The use of a container for the storage and/or dispatch of commodities, in particular of pharmaceuticals and/or diagnostic aids.

14. The use of removable partitions for the spatial separation of thermal control agents and commodities in containers for the storage and/or transport of frozen commodities, refrigerated commodities or commodities which are to be dispatched at a temperature above the ambient temperature.

* * * * *