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**Pallet container for the transport of
temperature-sensitive products**

The present invention relates to a pallet container for the transport of temperature-sensitive products according to the independent claim.

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The invention concerns the technical field of transport containers or transport boxes for logistic purposes in general and especially their area of application, for example for the long-distance transport of temperature-sensitive products from the fields of medicine, pharmacy or biotechnology.

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Transport containers of this type provide for a slight temperature change in the interior during transport. Thanks to special insulation and heat storage techniques, an internal temperature range of 2 °C to 8 °C can be maintained for more than 96 hours during transport to all climate zones worldwide.

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Document EP 2 876 389 B1 describes a transport container which, due to its excellent insulating properties, is very suitable for the transport of temperature-sensitive goods. The container wall includes vacuum insulation panels (VIP) in which a main body made of a porous material is enclosed in a gas-tight manner by means of a foil. The interior is evacuated when the enclosing foil is applied. In the container wall, the vacuum insulation panels can also be arranged in several layers in order to further improve the insulating properties. It is also envisaged to dispose passive melt-storage elements in the transport container. By using cooling sources, the period in

which the temperature in the interior is stable can be increased for well over 200 hours. The solution shown has proved particularly successful in the market for reusable transport containers.

- 5 A collapsible transport container from the air freight sector is described in Document EP 22 56 065 A1. The collapsed transport container can be returned for reuse in a space-saving manner. To ensure temperature-stable transport, insulation foams based on polyurethane or polystyrene are employed. The side walls are connected to each other by means of L-shaped rim portions. Thereby, part of the L-shaped portion
10 presses the adjoining panel against the panel being provided with the L-shaped portion. By pressing the foamed panels against each other through an elastic portion, airtight closure of the transport container is achieved. A disadvantage of this technique is that the connection provides low mechanical stability due to the elastic L-shaped portion, e.g. against impacts during transport. Another disadvantage is that
15 the insulation materials used exhibit inadequate insulating properties for many applications. Although the foamed insulating materials are appropriate for easily achieving airtight closure, airtight closure is also a disadvantage. For example, when dry ice is used as an additional cooling source, gas (air) must be able to escape from the interior to compensate for the excess pressure caused by the evaporation of the
20 dry ice, which may otherwise destroy the container. The same applies to the compensation of pressure differences during air-freight transports.

- Furthermore, a packaging container is known from Document US 3 327 882 A, which is closed by means of straps. From Document GB 2 500 657 A there is further known
25 a thermally insulating packaging container which has handles in the area of the edges which can be unfolded in order to lift the packaging container from the pallet.

- Embodiments of the present invention seek to provide a pallet container for the transport of temperature-sensitive products, which may generally overcome the
30 disadvantages of prior art and is particularly suitable for the application of dry ice.

Embodiments of the present invention provide a pallet container for the transport of temperature-sensitive products.

According to a one aspect, the invention encompasses a pallet container for the transport of temperature-sensitive products, wherein the pallet container comprises at least one side part, one bottom part, one top part and one lid part, each having at least one vacuum insulation panel disposed therein. The at least one side part, bottom part and top part comprise a common stop rim portion, against which stop rim portion the lid part comes to rest partially or fully circumferentially. The pallet container comprises at least one edge protection element for distributing a load applied by a tensioning element, wherein the stop rim portion comprises a projecting fold with an inner rim portion against which an outer rim portion of the lid part comes to rest in the closed state of the pallet container.

Due to the configuration with a stop rim portion in combination with an edge protection element, a stable pallet container is provided due to the force applied by the tensioning element, which does not create an airtight closure. In this way, a pallet container is provided which may overcome the disadvantages of prior art in terms of the airtight closure and, in particular, can be filled with dry ice.

In accordance with an advantageous embodiment, the stop rim portion comprises a projecting fold with an inner rim portion (with the surface normal pointing inwards) against which an outer rim portion (with the surface normal pointing outwards) of the lid part comes to rest in the closed state of the pallet container. The folded configuration may ensure secure positioning which prevents the lid part from slipping out of the tensioning element.

Advantageously, the side part, the bottom part, the top part and the lid part each comprise an outer cardboard layer and an inner cardboard layer, whereby the at least one vacuum insulation panel is disposed between the cardboard layers. The two cardboard layers advantageously are designed in such a way that the vacuum insulation panels are fully enclosed on the sides thereof.

According to a further embodiment, the edge protection element comes to rest loosely against the outer cardboard layer or is firmly connected to the outer cardboard layer. The firmly embodied arrangement provides the advantage that the lid part can be handled jointly with the edge protection element, while the loose arrangement provides advantages during transport.

In another embodiment, the inner cardboard layer of the lid part comprises the outer rim portion. This embodiment ensures that the inner cardboard layer rests against the inner rim portion and is tensioned against the inner rim portion by a force applied by the tensioning element to the outer cardboard layer.

The outer rim portion on the lid part is preferably formed by an edge running continuously over three sides with an inwardly offset partial portion. The fourth side, without an inwardly offset partial portion, is preferably placed on the bottom part, since the entire weight rests on this wide edge when the lid is placed on it.

In another embodiment, the inner cardboard layer includes receiving elements for refrigeration elements. For example, the receiving elements can be formed by U-shaped rails which are disposed relative to each other in such a way that the refrigeration elements can be inserted between them.

Advantageously, the edge protection element is made of cardboard or plastic. Both materials make it possible to realize a rigid configuration of the edge protection element and may be comparatively inexpensive to manufacture.

Particularly preferably, the tensioning element is configured as a length-adjustable tensioning belt or an elastic strap. The elastic strap, for example, can be made of a rubber material.

In accordance with an advantageous embodiment, the pallet container comprises three (separate) adjacently disposed side parts. The separate side parts can be transported compactly stacked for transport and, thanks to the combination of edge protection element and tensioning element, may be provided with a good connection for use during transport.

In the following, the invention will be explained in more detail using the examples shown in the attached drawings.

In the drawings:

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Fig. 1 shows a perspective side view of an exemplary embodiment of the pallet-container according to the invention for the transport of temperature-sensitive products;

10 Fig. 2 shows a side view of a lid part for the pallet container according to Fig. 1;

Fig. 3 shows an exploded view of the structure of a side part, bottom part, top part or lid part for the pallet container according to Fig. 1;

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Fig. 4 shows a perspective side view of the pallet container according to Fig. 1 in the closed state; and

20 Figs. 5 to 8 show a perspective side view of an exemplary embodiment of a first and second side part as well as the bottom part and the top part of the pallet container according to Fig. 1.

Fig. 1 shows a pallet container 1 for the transport of temperature-sensitive products in a perspective view.

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In the example shown, the pallet container 1 has three side parts 21 (respectively two side parts on the right/left and one rear part), a bottom part 22 and a top part 23. The pallet container 1 is shown open, i.e. without the lid part.

30 On the opened side, two opposite side parts 21, the bottom part 22 and the top part 23 have a common fully circumferential stop rim portion 4. When the pallet container 1 is closed, the lid part comes to rest firmly against the stop rim portion 4. The stop

rim portion 4 has a projecting fold 41 projecting from the outer side with an inner rim portion 42.

When the pallet container 1 is in the closed state, a complementarily embodied outer rim portion (see Fig. 2) of the lid part rests against the inner rim portion 42. Due to the configuration with a stop rim portion 4 in combination with an edge protection element 7 and a tensioning element 6 (see Fig. 4), both a stable pallet container 1 is provided and an air-permeable closure is created, for which reason the disadvantages of prior art with regard to the air-tight closure, in particular with regard to the use of dry ice, do not occur.

The pallet container 1 at each edge thereof has an edge protection element 7 made of cardboard (in the example shown) extending over the entire edge. The edge protecting elements 7 may be mitred at the end portion. In the example shown, the edge protection element 7 is glued on respectively one side to the respective outer side (outer cardboard layer 52; Fig. 3).

The pallet container 1 is designed as a pallet on the underside thereof in such a way that fork tools of a forklift truck can be inserted.

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Fig. 2 shows a lid part 24 as it can be placed on the opening of the pallet container according to Fig. 1. When the pallet container is in the closed state, the outer rim portion 43 of the lid part 24 comes to rest against the inner rim portion of the side part and the top part. For this purpose, an edge running continuously over three sides is formed on the outer rim portion 43 of the lid part 24 with an inwardly offset partial portion 431.

Fig. 3 shows an exploded view of the basic structure of a side part, bottom part, top part or lid part using the example of a side part for the pallet container according to Fig. 1.

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As seen from the left to the right, the structure comprises refrigeration elements 8 with fastening profiles 81, an inner cardboard layer 51, four vacuum insulation panels 3, an outer cardboard layer 52 and edge protection elements 7.

5 Between the outer cardboard layer 52 and the inner cardboard layer 51 the vacuum insulation panels 3 are arranged in such a way that they are laterally enclosed by the inner cardboard layer 51. The inner cardboard layer 51 comprises the outer rim portion 43 at the lid part. The receiving elements 81 for refrigeration elements 8 are attached to the inner cardboard layer 51.

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The closed pallet container is shown in **Fig. 4**. Thereby, the lid part according to Fig. 1 is placed on the opening of the pallet container according to Fig. 1. In the example shown, two tensioning elements 6 are arranged one above the other in the form of a tensioning belt.

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The respective parts of the pallet container described above without lid part can be seen again in detail in **Fig. 5** to **Fig. 8**, so that the construction of the pallet container becomes clear. The top part 23 has a circumferential rim 231, the width of which corresponds to the thickness of the side parts 21 (respectively two side parts in Fig. 6 and one rear part in Fig. 7). The bottom part 22 (Fig. 8) has an identical rim 221. The side parts 21 in Fig. 6 and 7 have a stop rim portion 4 against which the lid part (further side part) comes to rest firmly. The stop rim portion 4 has a projecting fold 41 projecting from the outer side with an inner rim portion 42.

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Claims

1. A pallet container (1) for the transport of temperature-sensitive products, which pallet container (1) comprises at least one side part (21), one bottom part (22), one top part (23) and one lid part (24), each having at least one vacuum insulation panel (3) disposed therein, and wherein the at least one side part (21), the bottom part (22) and the top part (23) comprise a common stop rim portion (4), against which stop rim portion (4) the lid part (24) comes to rest partially or fully circumferentially, characterized in that the pallet container (1) comprises at least one edge protection element (7) in order to distribute a load applied by a tensioning element (6), wherein the stop rim portion (4) comprises a projecting fold (41) with an inner rim portion (42) against which an outer rim portion (43) of the lid part (24) comes to rest in the closed state of the pallet container (1).
2. The pallet container (1) according to claim 1, wherein the side part (21), the bottom part (22), the top part (23) and the lid part (24) each comprise an outer cardboard layer (52) and an inner cardboard layer (51), between which the at least one vacuum insulation panel (3) is disposed.
3. The pallet container (1) according to claim 2, wherein the edge protection element (7) comes to rest loosely against the outer cardboard layer (52) or is firmly connected to the outer cardboard layer (52).
4. The pallet container (1) according to claim 2, wherein the inner cardboard layer (51) of the lid part (24) includes the outer rim portion (43).
5. The pallet container (1) according to claim 1, wherein the outer rim portion (43) on the lid part (24) is formed by an edge running continuously over three sides with an inwardly offset partial portion (431).
6. The pallet container (1) according to claim 2, wherein the inner cardboard layer (51) comprises receiving elements (81) for refrigeration elements (8).

7. The pallet container (1) according to one of the preceding claims, wherein the edge protection element (7) is made of cardboard or plastic.
8. The pallet container (1) according to one of the preceding claims, wherein the tensioning element (6) is a length-adjustable tensioning belt or an elastic strap.
9. The pallet container (1) according to one of the preceding claims, having three unitary or separate side parts (21) being disposed adjacent to one another.
10. The pallet container (1) according to one of the preceding claims, wherein the edge protection element (7) has a length corresponding to a side length of the pallet container (1).
11. The pallet container (1) according to one of the preceding claims, wherein the edge protection element (7) is configured in one piece or in multiple pieces, and wherein the edge protection element (7) completely encloses at least one side of the pallet container (1).
12. The pallet container (1) according to one of the preceding claims, wherein the edge protection element (7) includes two portions (71, 72) being arranged at right angles to one another.
13. The pallet container (1) according to claim 12, wherein the two portions (71, 72) being arranged at right angles to one another have a width in the range from 3 cm to 15 cm.
14. The pallet container (1) according to one of the preceding claims, wherein the edge protection element (7) is cut at at least one end portion (73) at an angle in the range of 15° to 100° with respect to a longitudinal axis of the edge protection element (7).