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(54) **HEATABLE CONTAINER**

(57) A heatable container (1) comprising a container space (2) and a casing (3), which is arranged to cover said container space (2). The casing (3) comprises a cavity space (4) for receiving a first heat transfer medium (6). The cavity space (4) is provided with a heat transfer channel (5), which is arranged to be connected to a source supplying a second heat transfer medium (7).

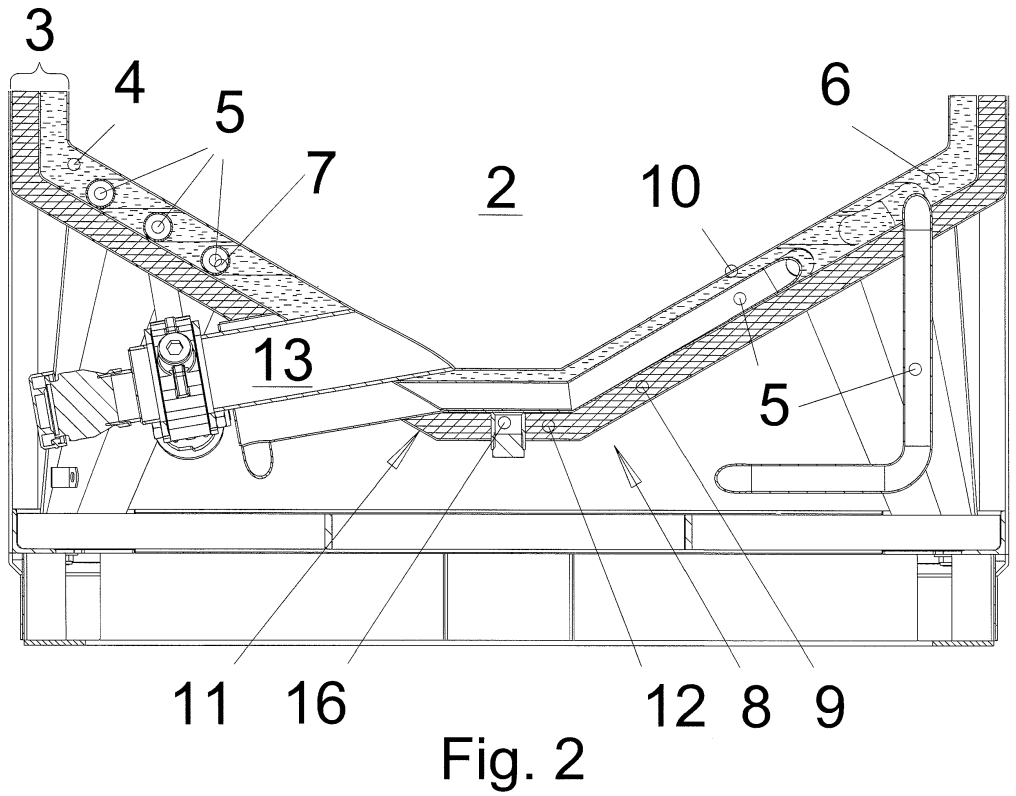

Fig. 2

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Description

Background

[0001] The invention relates to a heatable container.

[0002] Containers are known, which are used for storing and transporting different substances and provided with heating means for heating these substances. In some containers the heating means comprise a cavity or heating mantle which is arranged in the casing of the container and to which heating medium, such as water, is supplied. A problem with these solutions is that if high pressure must be maintained in said cavity - for example, to make the heating more effective or to use normal pressurized water from the supply network - material thicknesses of the cavity must be dimensioned quite large, which increases the manufacturing costs of the container considerably.

Brief description

[0003] The container of the invention is characterized by what is disclosed in the characterizing part of the independent claim. Other embodiments of the invention are characterized by what is disclosed in the other claims.

[0004] Inventive embodiments are also disclosed in the specification and drawings of this application. The inventive contents of the application may also be defined in ways other than those described in the following claims. The inventive contents may also consist of several separate inventions, particularly if the invention is examined in the light of expressed or implicit sub-tasks or in view of obtained benefits or benefit groups. In such a case, some of the definitions contained in the following claims may be unnecessary in view of the separate inventive ideas. Features of the different embodiments of the invention may be applied to other embodiments within the scope of the basic inventive idea.

[0005] The idea of the invention is that the cavity, i.e. the heating mantle, of the container casing is provided with a heat-transfer channel, which is supplied with a second heat transfer medium used for heating a first heat transfer medium in the cavity. This provides the advantage that no high pressures are directed to the cavity although the container would be heated with a highpressure heat transfer medium, and thus the casing of the container may be made of lighter and thinner structures. Another advantage is that the container is at least not necessarily regarded as a pressure vessel, and thus inspections prescribed by law for pressure vessels are unnecessary.

Brief description of the figures

[0006] The invention will be described in closer detail in the accompanying drawings, in which

Figure 1 is a schematic perspective view of a heatable container and

Figure 2 is a schematic, partially cross-sectional side view of the bottom part of a heatable container.

[0007] For the sake of clarity, the figures show the invention in a simplified manner. Similar parts are marked with the same reference numbers in the figures.

Detailed description

[0008] Figure 1 is a schematic perspective view of a heatable container.

[0009] The container 1 may be a container intended for transporting and/or storing explosive substances, for example. Of course the container 1 may also be used for transporting and/or storing other substances that require heating. Said substance may be liquid, gaseous or solid under NTP conditions. According to an idea, the substance is a plant-protecting agent, which is in a solid state under NTP conditions. To discharge the substance from the container, it must be heated to become liquid. In other words, the container 1 is preferably heated only when needed.

[0010] In most cases the volume of the container 1 is 200 to 3000 litres, typically 1000 litres, for instance.

[0011] The container 1 comprises a casing 3, which is arranged to cover a container space. The material of the casing 3 may be, for instance, metal, plastic, plastic composite or other similar material known per se.

[0012] In this case, the outer surface 11 of the container has a cylindrical form and its bottom is conical. The bottom of the container 1 is provided with a discharge channel 13, through which the material in the container can be removed. On the top surface of the container 1 there is a filling channel 14, through which the container 1 can be filled. It is to be noted that the casing may also have some other shape and the shape, number and position of the discharge channel and the filling channel may vary.

[0013] The container 1 may comprise support structures 15 or the like arranged outside the casing.

[0014] Figure 2 is a schematic, partially cross-sectional side view of the bottom part of a heatable container.

[0015] The casing 3 comprises a cavity space 4 for receiving a first heat transfer medium 6. The cavity space 4 is separated from a container space 2 in such a manner that the substances contained in the cavity space 4 and the container space 2 cannot be mixed with one another. The cavity space 4 is arranged in a casing part 8 forming the bottom of the container space 2, and from there it may extend as high as to a casing part forming the upper surface of the container 1. According to an idea, the cavity space 4 is restricted to the casing part 8 forming the bottom, possibly rising a small distance upwards from there. The cavity space 4 may rise to the same height throughout the entire casing 3, but this is by no means necessary.

[0016] The first heat transfer medium 6 may be water, a water-glycol mixture, oil, etc. The first heat transfer medium 6 may be added to the cavity space 4 through a

filling hole, which is not shown in the figure for the sake of simplicity. If necessary, the first heat transfer medium 6 is removed from the cavity space 4 through a discharge channel 16.

[0017] In the present embodiment, the cavity space 4 is formed between an outer layer 9 and an inner layer 10 of the layered casing 3. The layered structure may be provided in the entire casing 3 or only in some of its parts, in which case the other parts of the casing 3 have a different kind of structure.

[0018] The cavity space 4 is provided with a heat transfer channel 5, which is arranged to be connected to a heat source supplying a second heat transfer medium 7. The heat transfer channel 5 is separated from the cavity space 4 as well as from the container space 2 in such a manner that the substances contained, firstly, in the heat transfer channel 5 and the cavity space 4 and, secondly, in the heat transfer channel 5 and the container space 2 cannot be mixed with one another. It is to be noted that said heat source is not shown in the figure for the sake of simplicity. According to an idea, the second heat transfer medium 7 is circulated between the heat source and the heat transfer channel 5. The second heat transfer medium 7 may have a similar or different composition with respect to the first heat transfer medium 6. The second heat transfer medium 6 may be liquid, gaseous, such as water vapour.

[0019] In the present embodiment, the heat transfer channel 5 comprises a pipe, which is arranged to extend around the cavity space 4 in the casing part 8 forming the bottom of the container space, but not higher. In a second embodiment, the heat transfer channel 5 is arranged to extend to the upper part of the cavity space 4. In a third embodiment, the heat transfer channel 5 is arranged at parts of the cavity space 4 on the side walls of the casing, but not in the casing part 8 forming the bottom of the container space. The heat transfer channel 5 may be made of metal, plastic or plastic composite, for instance.

[0020] According to an idea, the heat transfer channel 5 is integrated into the casing 3, in other words, the heat transfer channel 5 consists at least partly of the casing 3.

[0021] In an embodiment of the container, the structure of the heat transfer channel 5 is dimensioned for an internal pressure of at least 6 bar. The heat transfer channel 5 may be made of a pipe with a pressure rating of PN16, for example. The pressure in the heat transfer channel 5 does not load or stress the cavity space 4 or the casing 3. Of the heat transfer media, only the pressure of the first heat transfer medium 6 is directed to the last mentioned items, the pressure being independent of the pressure in the heat transfer channel 5. In other words, the volume at a high pressure, such as 6 bar, can be limited to be very small. According to an idea, said volume is 10 litres at most. The temperatures applied may be quite high, for instance approximately +150°C.

[0022] In the embodiment shown in Figure 2, a heat-insulating layer 12, which may be e.g. polyurethane or other heat-insulating material known per se, is arranged between the outer surface 11 of the container and the cavity space 4. The heat-insulating layer 12 reduces heat losses of the container. However, the heat-insulating layer 12 is not essential.

[0023] In some cases, features disclosed in this application may be used as such, regardless of other features. On the other hand, when necessary, features disclosed in this application may be combined in order to provide different combinations.

[0024] In summary, it may be noted that the heatable container of the invention is characterized in that the cavity space is provided with a heat transfer channel, which is arranged to be connected to a source supplying a second heat transfer medium.

[0025] The drawings and the related description are only intended to illustrate the idea of the invention. It will be apparent to a person skilled in the art that the invention is not restricted to the above-described embodiments disclosing the invention through some examples, but various modifications and different applications of the invention are feasible within the inventive idea defined in the accompanying claims.

Reference numbers

[0026]

1	heatable container
2	container space
3	casing
4	cavity space
5	heat transfer channel
6	first heat transfer medium
7	second heat transfer medium
8	casing part forming the bottom of the container space
9	outer layer
10	inner layer
11	outer surface
12	heat-insulating layer
13	discharge channel
14	filling channel
15	support structure
16	discharge channel

Claims

1. A heatable container (1) comprising
a container space (2),
a casing (3), which is arranged to cover said container space (2), the casing (3) comprising a cavity space (4) for receiving a first heat transfer medium (6), **characterized in that**
the cavity space (4) is provided with a heat transfer channel (5), which is arranged to be connected to a source supplying a second heat transfer medium (7).

2. A container as claimed in claim 1, **characterized in that** the cavity space (4) is at least partly arranged in a casing part (8) forming the bottom of the container space (2).

3. A container as claimed in claim 1 or 2, **characterized in that** the heat transfer channel (5) is a pipe, which is arranged to extend around the cavity space (4).

4. A container as claimed in any one of the preceding claims, **characterized in that** the casing (3) is at least partly a layered structure comprising an outer layer (9) and an inner layer (10) and that the cavity space (4) is arranged between the outer layer (9) and the inner layer (10).

5. A container as claimed in any one of the preceding claims, **characterized in that** a heat-insulating layer (12) is arranged between the outer surface (11) of the container and the cavity space (4).

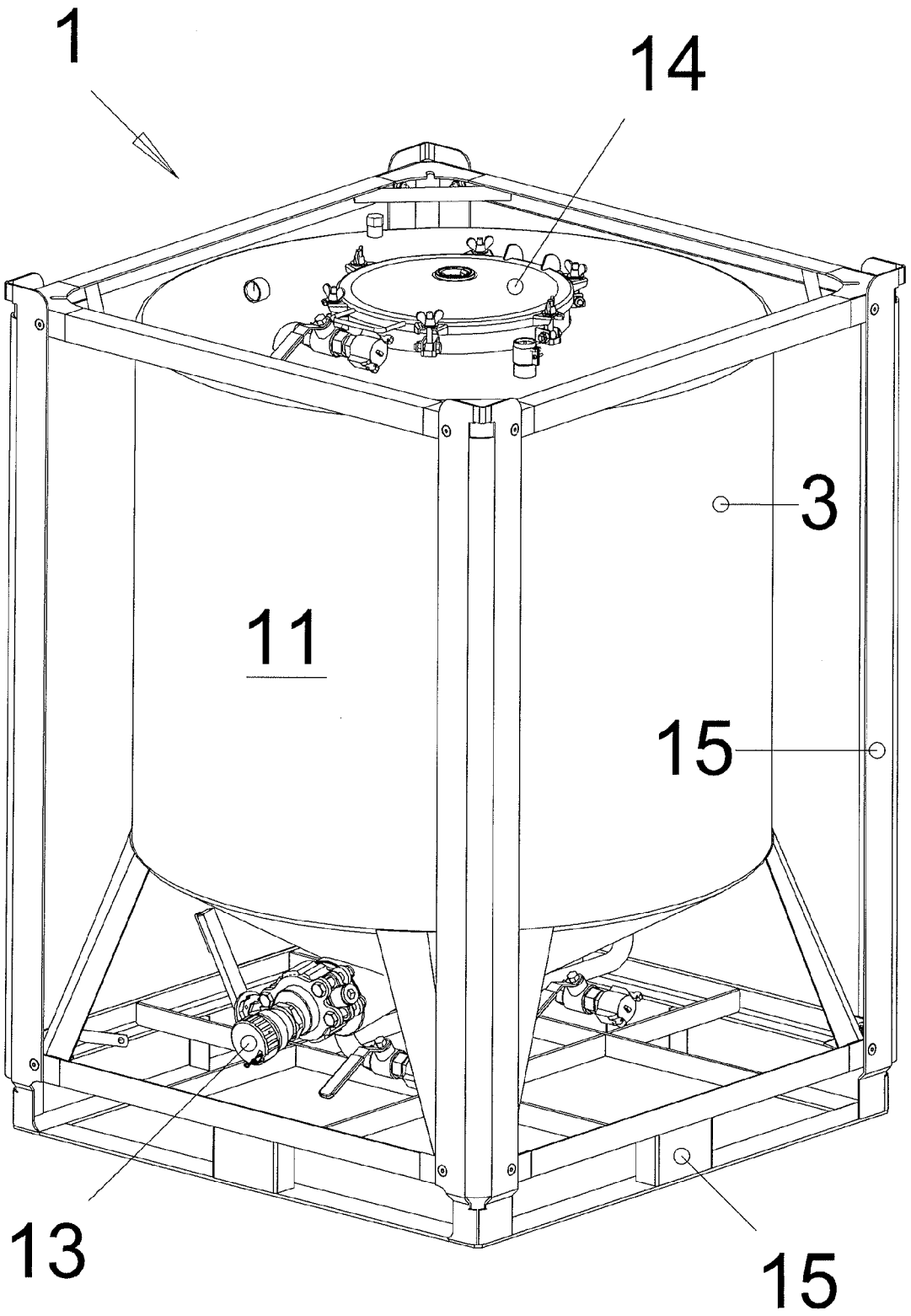

Fig. 1

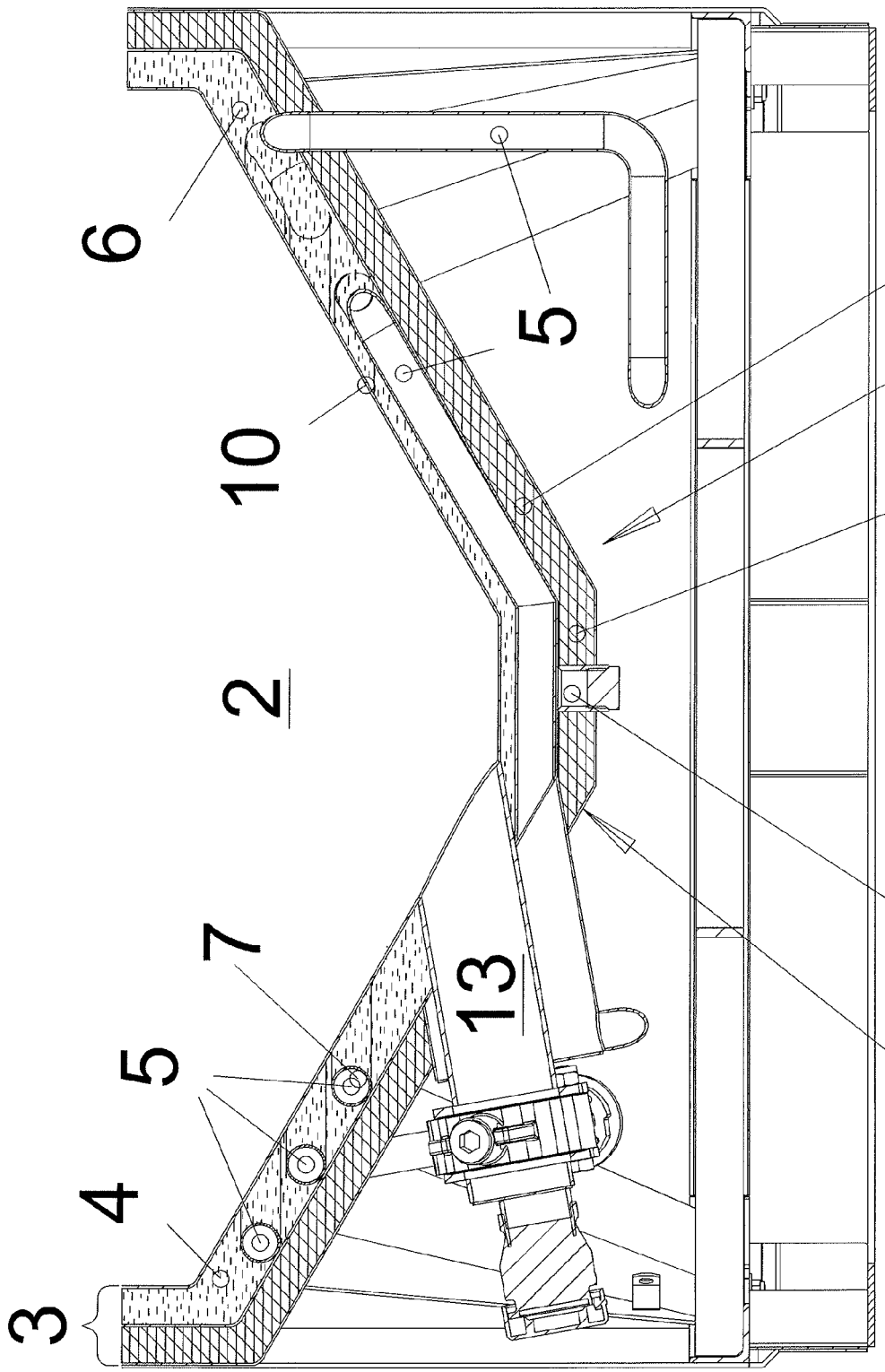

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 15 17 5430

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 201 427 766 Y (JIANHUA TU) 24 March 2010 (2010-03-24) * the whole document *	1-5	INV. B65D88/74
X	FR 1 465 285 A (WILLEM ROELOF KLEINE) 6 January 1967 (1967-01-06) * page 2, column 1, paragraph 6 - page 2, column 2, paragraph 3 * * figures 1-2 *	1-5	
X	DE 11 33 744 B (HANS G NISSEN) 26 July 1962 (1962-07-26) * the whole document *	1-4	
A	US 3 451 225 A (HILL DARYL G ET AL) 24 June 1969 (1969-06-24) * column 1, line 65 - column 2, line 58 * * figures 1-3 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 November 2015	Piolat, Olivier

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 17 5430

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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18-11-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82