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(54) Container and system for the storage and the transport of products

(57) A container for the storage and the transport of products comprises a plurality of walls (2) connected together to define a containing compartment (3), and at least one heat exchanger (8) for controlling the temperature in the interior of the containing compartment (3), said heat exchanger (8) being integrated into at least one of said walls (2).

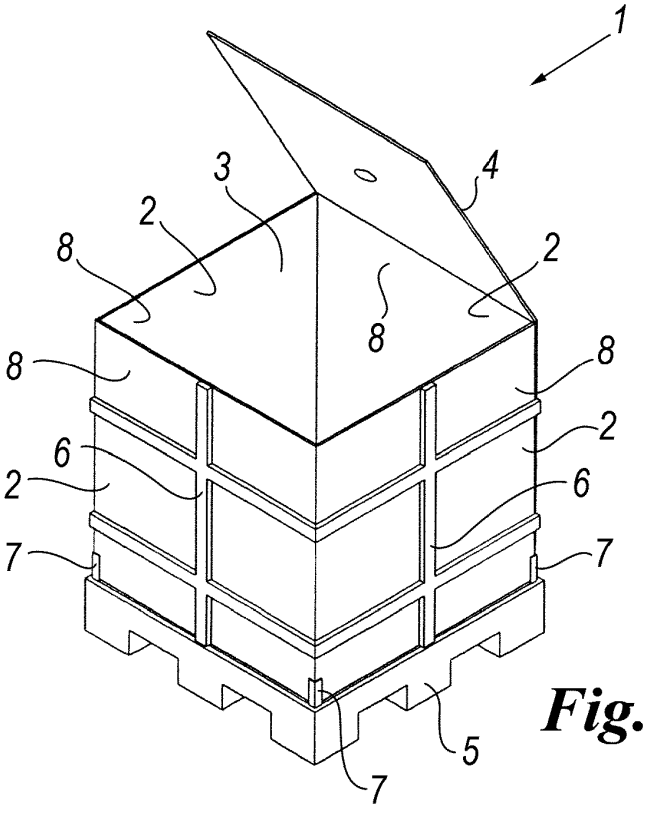

Fig. 1

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Description

[0001] The present invention relates to a container and system for the storage and the transport of products.

[0002] In storing and transporting products, use is made of rigid containers, provided or not provided with a lid, in which the products are placed.

[0003] In particular, these products can be disposed inside the container or, in the case of liquid products, be introduced in impermeable bags which are them introduced into the container.

[0004] For certain products, storage and transport preferably take place under constant or controlled temperature conditions to prevent product quality deterioration.

[0005] In other cases, certain products are introduced and withdrawn in liquid form but remain stored and transported in solid form. For example, a product of this type is palm oil or cocoa butter.

[0006] In this case, the product is introduced in liquid form into the bag contained in the container and is solidified during transport and storage. When it is to be withdrawn, the product is heated and again liquefied using separate heating means.

[0007] Using known containers, these operations can be uncomfortable and require considerable time for their implementation.

[0008] In this context, the technical aim on which the present invention is based is to propose a container and a system for the storage and transport of products which overcome the aforestated drawback of the known art.

[0009] A particular object of the present invention is to provide a container and a system for the storage and transport of products which enables products to be stored and transported in a conditioned environment in a simple manner. The stated technical aim and the specified object are substantially attained by a container and a system for the storage and transport of products comprising the technical characteristics stated in one or more of the accompanying claims.

[0010] Further characteristics and advantages of the present invention will be more apparent from the indicative and therefore non-limiting description of a preferred but non-exclusive embodiment of a container and a system for the storage and transport of products, as illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of a container for the storage and transport of products in accordance with a first embodiment of the present invention;

Figure 2 is a perspective view of a detail of the container of Figure 1;

Figure 3 is a perspective view of a second embodiment of a container in accordance with the present invention;

Figure 4 is a perspective view of a detail of the container of Figure 3;

Figure 5 is a section through an alternative embodiment of the container in accordance with the present invention;

Figure 6 is a schematic representation of a system for the storage and transport of products in accordance with the present invention.

[0011] With reference to the accompanying figures, the reference numeral 1 indicates overall a container for the storage and transport of products in accordance with the present invention.

[0012] Preferably the container 1 is an IBC, i.e. an intermediate bulk container, with a volume between 0.9 m^3 and 1.6 m^3.

[0013] The container 1 comprises a plurality of walls 2 connected together to define a containing compartment 3 for containing products.

[0014] As shown, the container 1 comprises five walls 2, namely one base wall and four lateral walls, connected together such that the containing compartment 3 is of cubic shape. The walls 3 are square.

[0015] The container 1 also comprises a lid 4 hinged to one of the lateral walls 2. In other embodiments, the lid is absent.

[0016] It should be noted that the cubic shape is not an essential characteristic. In this respect, in other non-illustrated embodiments, the container 1 comprises a different number of walls 2 connected together to define corresponding containing compartments 2 of different shapes, such as cylindrical, generally parallelepiped, of hexagonal section, octagonal or others.

[0017] A base 5 is associated with the base wall 2. For example this base 5 can be a pallet enabling the container 1 to be easily and quickly moved. For example, the base 5 can also be a single piece connected to the base wall 2. In addition, wheels (not shown) can be mounted on the base 5 to facilitate handling of the container 1.

[0018] Ribs 6 can be associated with the walls as reinforcement.

[0019] in addition, angular reinforcement pieces 7 can be associated with the vertices of the container 1.

[0020] The container 1 also comprises at least one heat exchanger 8 to control the temperature inside the containing compartment 3.

[0021] According to the present invention, the heat exchanger 8 is integrated into at least one of the walls 2.

[0022] Preferably, the container 1 comprises a plurality of heat exchangers 8, each integrated into a corresponding wall 2. The lid 4 can also be integrated into a respective heat exchanger 8.

[0023] Advantageously, all the heat exchangers comprise respective hairpin coils 9 integrated into the walls 2. The coils 9 are fed with a flow of a thermovector fluid conditioned by a suitable conditioning device 10 separate from the container 1.

[0024] The heat exchangers 8 integrated into the walls 2 are in mutual fluid communication via flexible pipes. Alternatively, they can be in fluid communication via hydraulic couplings or via channels provided in the interior

of the supporting structure of the wall 2 connecting the various walls 2 together.

[0025] Advantageously, the thermovector fluid is just water. Alternatively, the thermovector fluid can be water with one or more additives, such as glycol.

[0026] In a non-illustrated embodiment, between the channels defining the hairpin coils 9, auxiliary channels are disposed filled with phase change materials. For example, such materials can be paraffinic organic composites and hydrocarbons obtainable as byproducts of petroleum refining or by polymerization, and certain inorganic compounds such as salt hydrates.

[0027] The use of these materials considerably increases the thermal stability of the containing compartment 3.

[0028] In the embodiment shown in Figures 1 and 2, the walls 2 comprise panels 11 of plastic material, preferably polycarbonate.

[0029] Preferably, the panels 11 are of multi-layer material comprising two faces 12 between which an interspace is defined. A structure for example of multiwall form is fixed into the interspace.

[0030] In particular, the multiwall structure is disposed such that the cells extend along a direction substantially transverse to the thickness of the panel 11.

[0031] In this manner, the hairpin coil 9 is defined by the suitably connected cells of the panel 11, within which the thermovector fluid is channelled.

[0032] For example, as shown in particular in Figure 2, each panel 11 presents closure pieces 15 disposed at the ends of the panels 11. Apertures (not shown) between the cells of each panel 11 enable the fluid to transit from one cell to another.

[0033] Connection elements 27 enable the closure pieces 15 to be fixed to the relative panel.

[0034] Alternatively, as shown in Figure 2, the connection elements can connect the closure pieces 15 together.

[0035] In the embodiment shown in Figures 3 and 4, the hairpin coils 9 are rigid and of metal.

[0036] In this case, the hairpin coils 9 each comprise a plurality of conduits 16 connected together by curved tubular pieces 17 made of metal.

[0037] In this manner the hairpin coils 9 have a sufficient rigidity to define the walls 2.

[0038] Two panels 18, preferably of plastic material and/or preferably thermally insulating, are laid against each hairpin coil 9 to close and cover each wall 2. In all cases the walls 2 can be rotatably linked together. For example, the walls 2 are hinged together.

[0039] In this manner, walls 2 of the container 1 can be folded one on another to compact the bulk of the container 1 when unused.

[0040] In a preferred embodiment (Figure 5), the container 1 also comprises a bag 19 formed of impermeable flexible material, preferably plastic.

[0041] For example, the material can be a polyethylene film, or a polyethylene and polyamide laminate film, possibly comprising several film layers bonded together only on welding the bag.

[0042] The bag 19 is introduced into the containing compartment 3 and is filled with liquid products.

[0043] The bag 19 presents an inlet aperture 20 which enables the product to be introduced into the bag 19.

[0044] The inlet aperture20 is closed by an inlet cap 21. The inlet aperture 20 is positioned at the lid 4 of the container 1, when the bag 19 is introduced into the containing compartment 3.

[0045] The bag 19 also presents an outlet aperture 22 enabling the product to be extracted.

[0046] The outlet aperture 22 is closed by an outlet cap 23. The outlet aperture 22 is positioned at the base wall 2, when the bag 19 is introduced into the containing compartment 3.

[0047] The outlet aperture 22, just as the cap 23, is positioned at an outlet hole 28 provided in one of the walls 2 of the container 1.

[0048] In this manner, the bag 19 can be emptied by accessing the outlet aperture 23 via the hole 28, without extracting the bag 19 from the containing compartment 3.

[0049] As shown in Figure 5, the outlet hole 28 is positioned in a lateral wall 2. However it could instead be positioned in the base wall 2.

[0050] The bag 19 also presents one or more auxiliary apertures 24 enabling further access to the interior of the bag 19.

[0051] The auxiliary aperture24 is closed by an auxiliary cap 25 or can be in the form of a unidirectional flow valve. The auxiliary aperture 24 is preferably positioned at the lid 4 of the container 1 when the bag 19 is introduced into the containing compartment 3. The auxiliary aperture 24 can however be instead positioned in other walls 2 of the container 1.

[0052] In this respect, the container 1 comprises one or more spacers 26 insertable into the bag 19.

[0053] This insertion can be carried out before, during or after filling.

[0054] The spacer 26 is advantageously applied in the case of liquid products which solidify after filling.

[0055] In this case, when the bag 19 is to be emptied, the product must be again liquefied, for which it is heated.

[0056] The spacer 26 creates a cavity in the solidified product into which a heating element is inserted.

[0057] In this case, the product is melted from the outside by means of the hairpin coils 9 associated with the walls 2 and from the inside by means of the heating element inserted into the cavity formed by the spacer 26.

[0058] The spacer 26 is inserted into the bag 19 through the auxiliary aperture 24. For example, the spacer 26 is a tubular element preferably of circular cross-section. Other shapes are however possible.

[0059] Preferably, the spacer 26 is an inflatable element such that when not in use, its bulk is reduced to a minimum.

[0060] With reference to the conditioning device 10, this can be connected to various feed means.

[0061] For example, it can be connected to the electric mains. Alternatively, it can be connected to a vehicle alternator.

[0062] Again, the conditioning device 10 can be connected to a solar panel or to a wind generator.

[0063] Although the aforedescribed container is an IBC container, it can also be another type of container.

[0064] Bt way of example, the container 1 is a 20 ft or 40 ft intermodal container. Again, the container can be the containing body of a van or a trailer for goods transport.

[0065] The present invention also relates to a system 30 for the storage and transport of products which comprises a plurality of containers 1, such as the aforedescribed (Figure 6).

[0066] The system 30 also comprises the said conditioning device 10 connected to the containers 1 via pipes 31, to feed them with the thermovector fluid at the required temperature.

[0067] Preferably, the containers 1 are connected together in parallel to make the conditioning of the respective containing compartments 3 uniform. Alternatively, the containers 1 can be connected in series.

[0068] The conditioning device 10 comprises a heat exchanger which cools or heats the thermovector fluid. A pump 32 is mounted downstream of the conditioning device 10 to ensure correct flow of the thermovector fluid.

[0069] In a non-illustrated embodiment, the system 30 is applied in sea transport. In this case, the system does not comprise the conditioning device, but comprises the pump 32 which withdraws water from the sea and circulates it through the heat exchangers 8 of the containers 1.

[0070] The temperature of the sea water is sufficiently low and stable to ensure good conditioning of the containing compartments 3 without wasting further energy.

[0071] The invention thus described attains the proposed object and provides important advantages.

[0072] In this respect, the described container and system enable storage and transport of products in a conditioned environment, i.e. at controlled temperature, in a simple manner.

[0073] This is particularly advantageous in the case in which the transported or stored product presents certain properties which are influenced by varying temperature conditions.

[0074] Moreover, in transporting solidified liquid products, product filling and emptying are accelerated when the product has to be again melted.

Claims

1. A container for the storage and the transport of products, comprising a plurality of walls (2) connected together to define a containing compartment (3), and at least one heat exchanger (8) for controlling the temperature in the interior of the containing compartment (3), **characterised in that** said heat exchanger (8) is integrated into at least one of said walls (2).

2. A container as claimed in claim 1, **characterised in that** said wall (2) presents an interspace; said heat exchanger (8) comprising a hairpin coil (9) for the flow of a thermovector fluid disposed in said interspace.

3. A container as claimed in claim 2, **characterised in that** said wall (2) comprises a panel (11) of multiwall material, said hairpin coil (9) being defined by the cells of said panel (11).

4. A container as claimed in any one of the preceding claims, **characterised in that** said heat exchanger (8) comprises a rigid metal hairpin coil (9) defining said wall (2).

5. A container as claimed in claim 4, **characterised by** comprising panels (18), preferably of plastic material and/or preferably insulating, laid against the two sides of the metal hairpin coil 9 to cover said wall 2.

6. A container as claimed in any one of the preceding claims, **characterised in that** said walls (2) are connected together by hinges such as to be able to be folded one on another.

7. A container as claimed in any one of the preceding claims, **characterised by** comprising, for containing liquid products, a bag (19) of impermeable material disposed inside the containing compartment (3); said bag (19) presenting an inlet aperture (20) for inserting said product and an outlet aperture (22) for product extraction.

8. A container as claimed in claim 7, **characterised by** further comprising one or more spacers (26) insertable into said bag (19); said bag (19) comprising one or more auxiliary apertures (24) for inserting said spacer (26).

9. A container as claimed in claim 8, **characterised in that** said spacer (26) is an inflatable tubular element.

10. A container as claimed in any one of the preceding claims, **characterised by** further comprising, for the thermovector fluid, a conditioning device (10) connected to said heat exchanger (8).

11. A product transport system comprising a plurality of containers (1) in accordance with any one of the preceding claims and a conditioning device (10) connected to the heat exchangers (8) of each container (1).

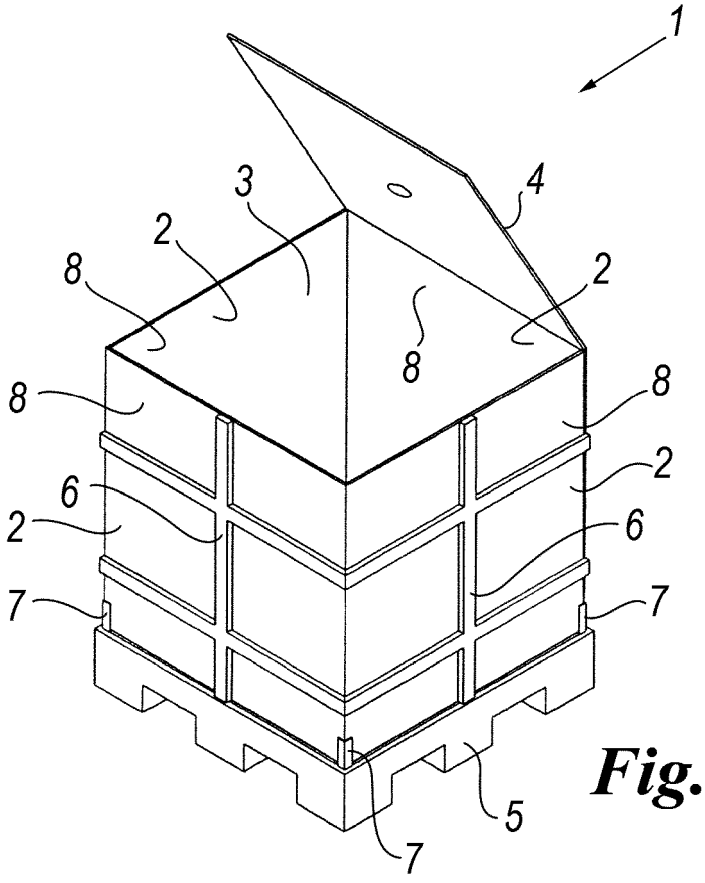

Fig. 1

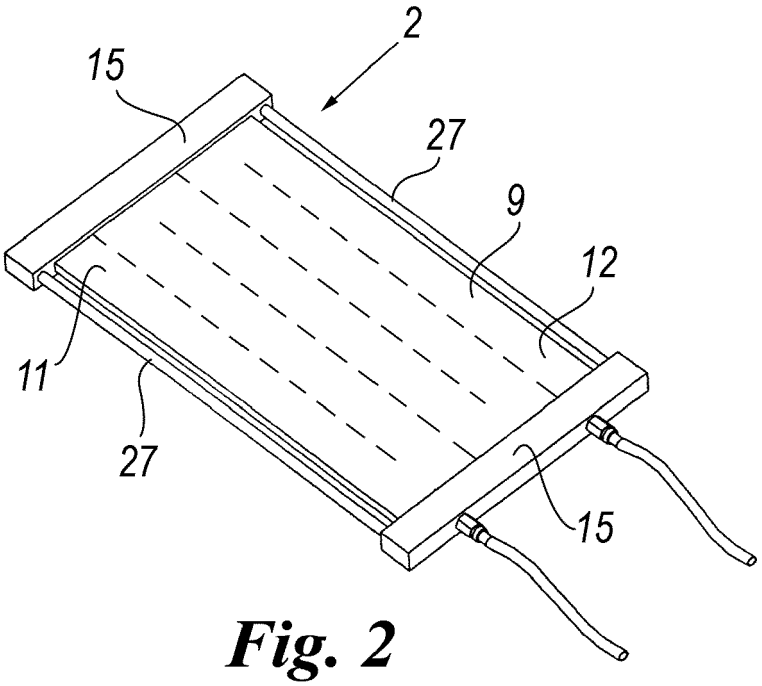

Fig. 2

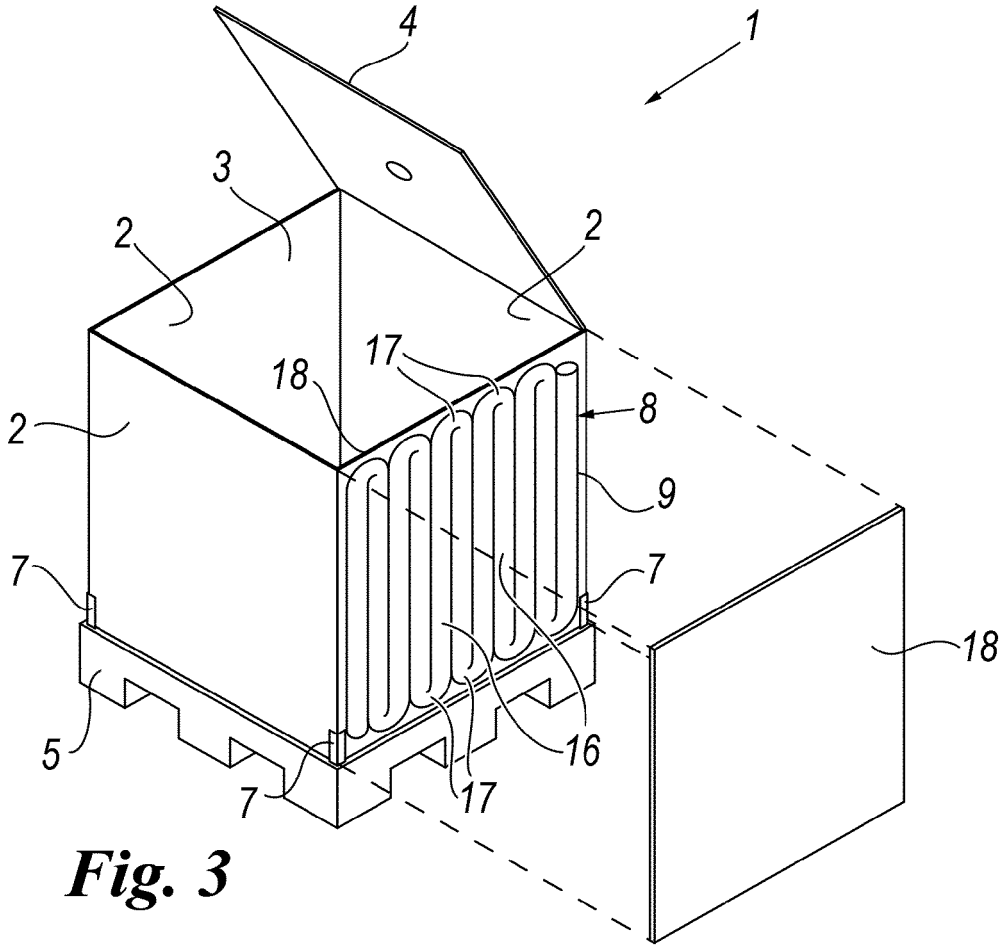

Fig. 3

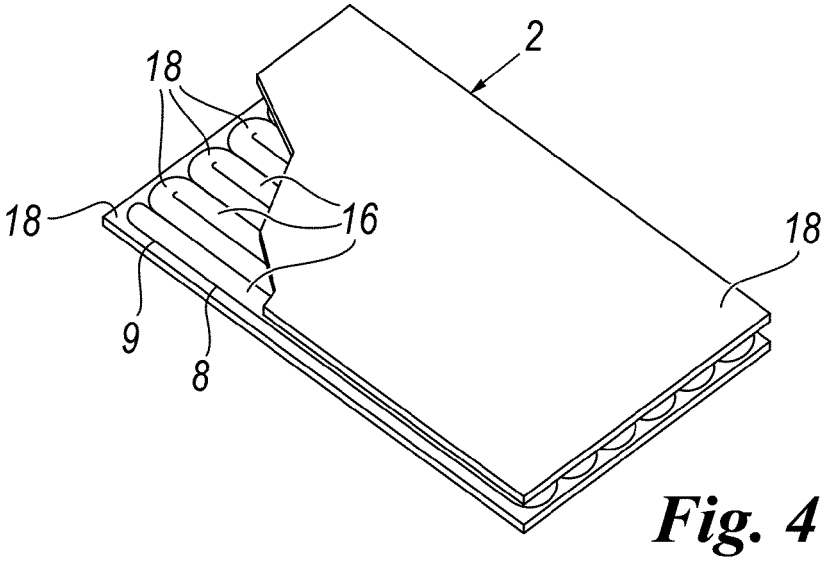

Fig. 4

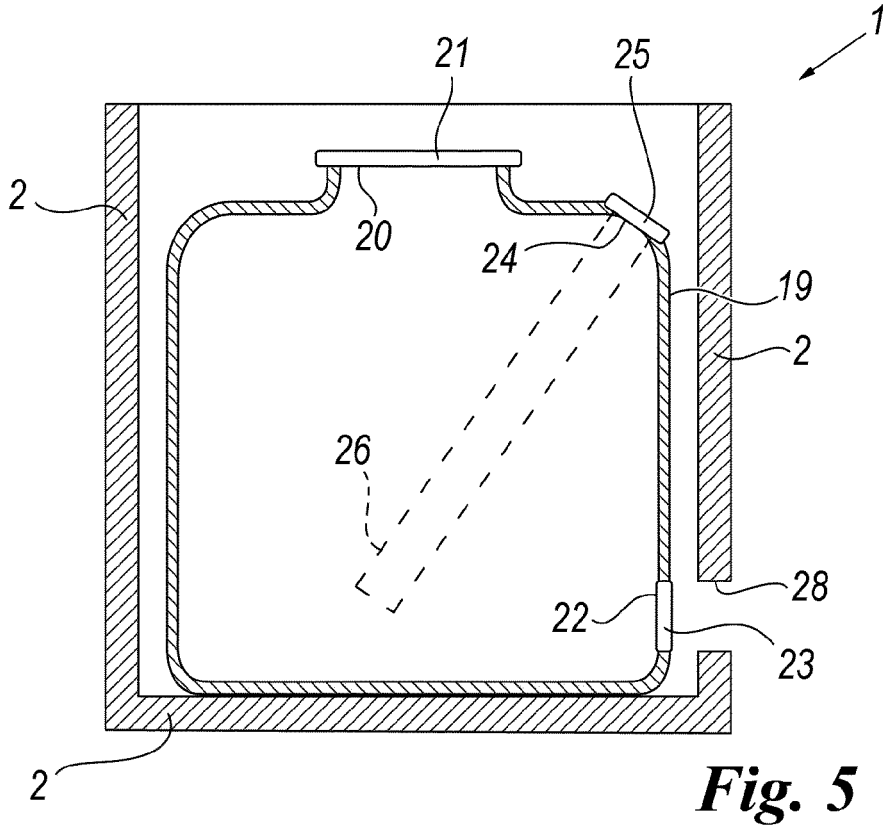
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Fig. 5

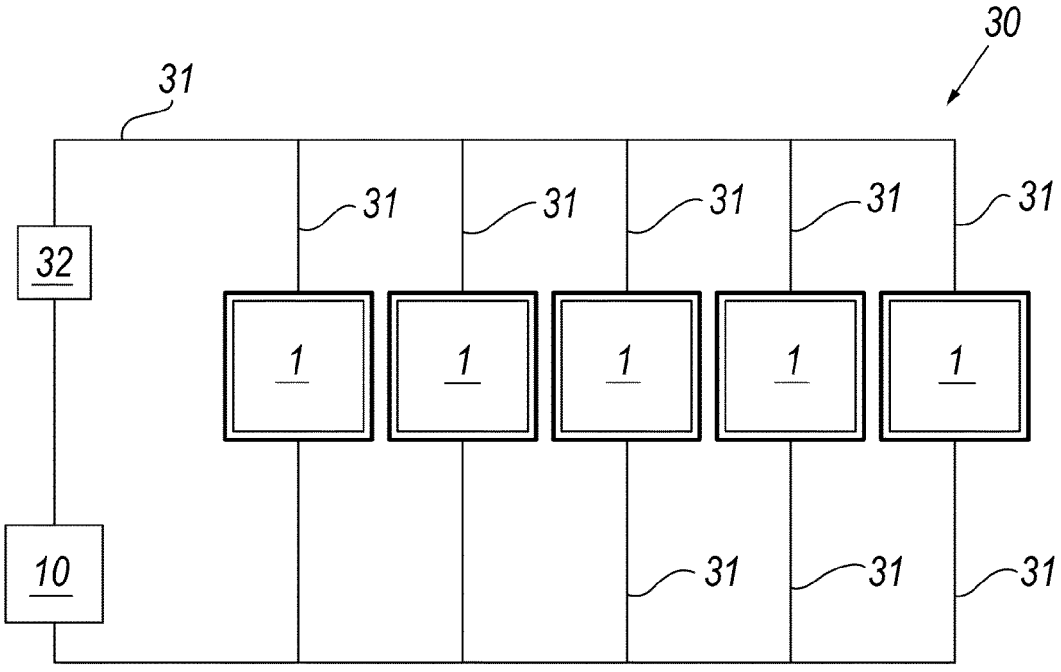
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Fig. 6