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(54) REFRIGERATED DISPLAY COUNTER WITH IMPROVED INSULATION SYSTEM

(57) A refrigerated display counter (100) comprises: a frame (1), a back wall (10), a front wall (11), two side walls (12), a refrigerated compartment (R) defined by the frame (1) and the walls, a refrigeration system that is configured in such a way to cool the refrigerated compartment (R), support means (2) disposed in the refrigerated compartment (R) in order to support products to be displayed, and insulation panels (3, 4) disposed on the walls of the refrigerated display counter.

The insulation panels comprise two insulation panels (4) of vacuum insulation panel (VIP) type that are disposed on the back wall (10) and on the front wall (11) of the refrigerated display counter, respectively,

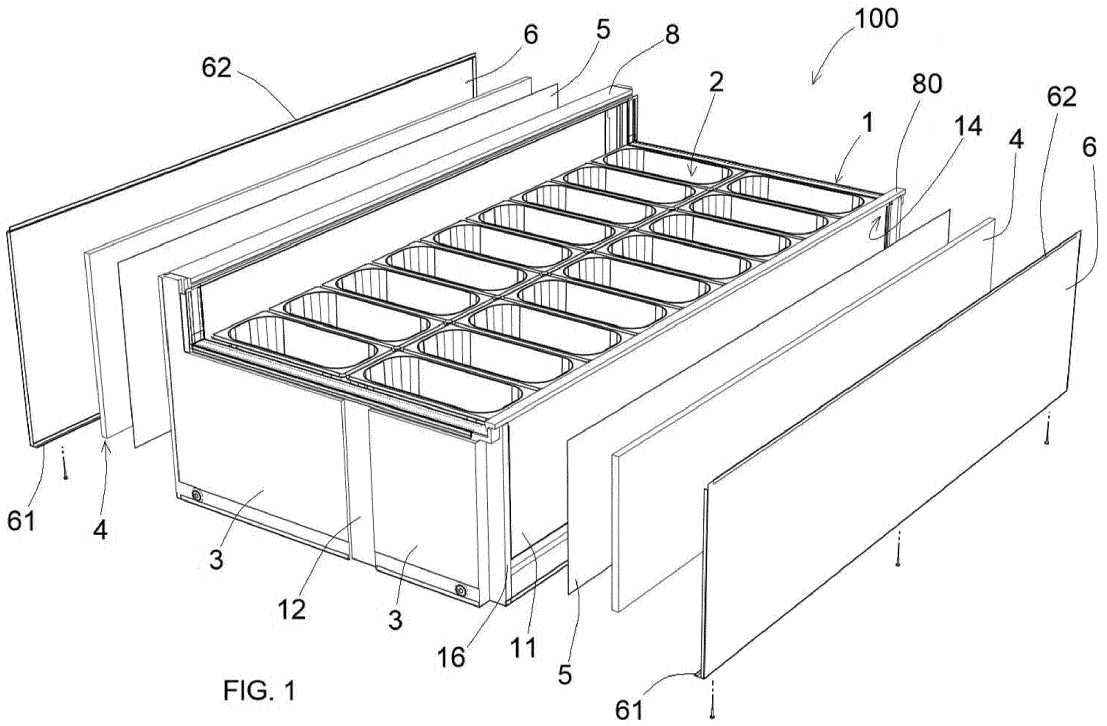

FIG. 1

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Description

[0001] The present invention relates to a refrigerated display counter with an improved insulation system.

[0002] Refrigerated display counters are known on the market and used to display ice cream contained in tubs, and also to display pastry items.

[0003] Such refrigerated display counters are provided with a refrigeration system suitable for refrigerating a refrigerated compartment that contains the products to be displayed.

[0004] The temperature of the refrigerated compartment must be kept within a wide range, which can vary from -20°C to +20°C. In fact, ice cream must be stored at approximately -20°C, pastry items at approximately +4°C and pralines at approximately +20°C.

[0005] The refrigerated compartment is obtained by means of insulation panels that generally consist in sheet metal or plastic walls that define a cavity wherein polyurethane foam is injected with a density of approximately 40 Kg/m^3.

[0006] This type of insulation panels is impaired by some drawbacks because of the fact that said panels do not guarantee a good thermal insulation. In view of the above, panels with a thickness of approximately 50-60 mm must be used.

[0007] Therefore, the refrigerated display counters of the prior art have a large volume because of the high thickness of the panels. Such a drawback is especially experienced in the case of small shops, where a very small space is dedicated to the refrigerated display counter because of the small dimensions and of the high rent of the shop.

[0008] Vacuum panels, which are normally defined as "Vacuum Insulation Panels (VIPs)" are known on the market. These panels use the insulation power of vacuum to increase the thermal resistance compared to traditional panels. Vacuum panels are obtained with a tight film that creates a chamber filled with a filler where vacuum is created.

[0009] This type of vacuum panels is generally used in the aeronautics industry or for laboratory applications at cryo-temperatures.

[0010] The vacuum panels are impaired by the fact that they are extremely fragile. In fact, if the film is perforated, the vacuum inside the panel is lost and the panel loses its insulation properties.

[0011] For this reason, vacuum panels are not used for refrigerated display counters. In fact, refrigerated display counters are continuously handled by operators and users, who may damage the vacuum panels and impair the insulation properties of the refrigerated compartment.

[0012] WO03083386 discloses a method for dispensing frozen food products by means of an insulated container.

[0013] The purpose of the present invention is to eliminate the drawbacks of the prior art by disclosing a refrigerated display counter provided with an insulation system that is effective, efficacious, reliable, versatile, not cumbersome and simple to install.

[0014] These purposes are achieved according to the invention with the characteristics of the independent claim 1.

[0015] Advantageous embodiments of the invention appear from the dependent claims.

[0016] The refrigerated display counter of the invention is defined by claim 1.

[0017] The advantages of the refrigerated display counter according to the invention, which comprises vacuum insulation panels (VIP), are evident. In fact, VIPs guarantee a higher thermal insulation compared to traditional insulation panels, and have a lower thickness, thus reducing the volume of the refrigerated display counter.

[0018] Additional features of the invention will appear manifest from the following detailed description, which refers to a merely illustrative, not limiting embodiment, as illustrated in the appended figures, wherein:

Fig. 1 is an exploded perspective view of the refrigerated display counter according to the invention;
Fig. 2 is a view of the refrigerated display counter of Fig. 1 rotated by 90°;
Fig. 3 is an exploded side view of the refrigerated display counter of Fig. 1;
Fig. 4 is the same view as Fig 2, with the refrigerated display counter in assembled condition;
Fig. 5 is a cross-sectional view taken along the vertical plane V-V of Fig. 4;
Fig. 6 is a diagrammatic sectional view of a vacuum panel of the refrigerated display counter according to the invention; and
Fig. 7 is a diagrammatic perspective view of a laminate film of the vacuum panel of Fig. 6.

[0019] With reference to the Figures, a refrigerated display counter according to the invention is disclosed, which is generally indicated with reference numeral (100).

[0020] The refrigerated display counter (100) comprises:

- a frame (1),
- a front wall (1) suitable for facing the consumers,
- a back wall (10) suitable for facing the operator, and
- two side walls (12).

[0021] The front wall and the back wall (10, 11) are longer than the side walls (12).

[0022] The front wall (11) is lower than the back wall (10).

[0023] The frame (1) and the walls (10, 11, 12) define a refrigerated compartment (R) (Fig. 5) with a substantially parallelepiped shape.

[0024] The refrigerated compartment (R) is refrigerated by means of a refrigeration system of known type,

which is omitted in the drawings. Support means (2) are disposed in the refrigerated compartment (R) to support the products to be displayed. For illustrative purposes, the support means (2) can be ice cream tubs. However, the support means (2) can be a top or trays to support pastry products to be displayed and kept at a controlled temperature.

[0025] Insulation panels (3) are disposed on the side walls (12) of the refrigerated display counter. The insulation panels (3) of the side walls are of traditional type. For illustrative purposes, the insulation panels (3) of the side walls have sheet metal or plastic walls that define a cavity wherein foam polyurethane is injected and have a thickness of 50-60 mm. The insulation panels (3) are used for structural fixings at least on two sides of the refrigerated display counter.

[0026] The back wall (10) and the front wall (11) of the refrigerated display counter are provided with recessed seats (13, 14) defined by rectangular frames (15, 16).

[0027] Insulation panels (4) of vacuum insulation panel type (VIP) are disposed in the recessed seats (13, 14) of the back wall and of the front wall.

[0028] With reference to Fig. 6, the insulation panel (4) of VIP type comprises an external film (40) that generates a gas-tight enclosure filled with a core (41) made of fiber or pulverulent material, which represents the structural part of the panel.

[0029] The core (41) may comprise an insulation material in fiber form (glass wool), or in porous form (open-cell polyurethane foam) or in pulverulent form (silica powder).

[0030] An absorber material (42), which is commonly known as "getter", is disposed inside the enclosure of the panel in order to absorb gas, if any, and maintain the vacuum inside the enclosure of the panel.

[0031] The absorber material (42) may comprise materials with oxide and calcium salts base or Zirconium-Aluminum alloys (St 101), Zirconium - Vanadium - Iron alloys (St 707) and Zirconium-Nickel alloys (St 198).

[0032] The external film (40) may comprise a laminated multi-layer film composed of layers of various materials, such as polymer layers and layers of aluminum deposited on a polymer layer.

[0033] The polymer layers may be polyamide (PA), polyethylene (PE), polyethylene terephthalate (PET) or other materials that permit thermowelding operations after the evacuation process.

[0034] The aluminum can be deposited on the polymer layer by means of sputtering or vapor deposition (PVD). The aluminum layer is used for protection against water vapor.

[0035] Fig. 7 illustrates an example of external film (40) composed of a multi-layer laminate film, comprising:

- a first layer (4a) of thermoweldable polyethylene,
- a second layer (4b) of aluminum,
- a third layer (40c) of polyethylene, and
- a fourth layer (40d) of polyamide or oriented polypropylene.

[0036] Such a type of external film (40) has a thickness of approximately 6 μm.

[0037] A vacuum with a pressure lower than 0.1 mbar is created inside the enclosure of the insulation panel (4). Then the external film (40) is thermowelded by means of thermowelding (W).

[0038] The insulation panels (4) of VIP type have a thickness of approximately 15 mm.

[0039] The two insulation panels (4) of VIP type are disposed in sandwich configuration between an internal soft layer (5) and an external protection layer (6).

[0040] For illustrative purposes, the internal soft layer (5) may comprise a soft, deformable material and has a thickness of approximately 1mm.

[0041] For instance, the external protection layer (6) may comprise a sheet metal or a hard plastic plate. The external protection layer (6) has a thickness of approximately 1 mm.

[0042] Each external protection layer (6) is coupled with the frame (1) by means of coupling means (M) in such a way to cover the insulation panel (4) of VIP type.

[0043] The external protection layer (6) comprises:

- a flange (61) that protrudes in lower position; and
- a rib (62) that protrudes in upper position.

[0044] With reference to Fig. 5, the frame (1) comprises:

- two base sections (7, 70) disposed under the back wall (10) and under the front wall (11), respectively; and
- two upper sections (8, 80) disposed above the back wall (10) and above the front wall (11), respectively.

[0045] The coupling means (M) join the lower flange (61) of each insulation panel (4) with the base sections (7, 70) of the frame and the upper rib (62) of each insulation panel (4) with the upper sections (7, 70) of the frame.

[0046] Advantageously, the coupling means (M) are of removable type. In view of the above, if the insulation panel (4) is damaged, the external protection layer (6) can be removed and the insulation panel (4) can be replaced.

[0047] For example, the coupling means (M) can be screw means (V) or fit-in means.

[0048] Numerous equivalent variations and modifications can be made to the present embodiment of the invention, which are within the reach of an expert of the field and in any case fall within the scope of the invention as disclosed by the appended claims.

Claims

1. Refrigerated display counter (100) comprising:

    - a frame (1),
    - a back wall (1) suitable for facing an operator,
    - a front wall (1) suitable for facing the consumers,
    - two side walls (12);
    - a refrigerated compartment (R) defined by the frame (1) and the walls,
    - a refrigeration system that is configured in such a way to cool the refrigerated compartment (R),
    - support means (2) disposed in the refrigerated compartment (R) in order to support products to be displayed, and
    - insulation panels (3, 4) disposed on the walls of the refrigerated display counter,

    wherein said insulation panels comprise two insulation panels (4) of vacuum insulation panel (VIP) type that are disposed on the back wall (10) and on the front wall (11) of the refrigerated display counter, respectively,
    wherein the insulation panels (4) of VIP type are disposed in recessed seats (13, 14) obtained in said back wall (10) and in said front wall (11) and are protected by external protection layers (6);
    wherein the external protection layer (6) is coupled with said frame (1) of the refrigerated display counter by means of removable coupling means (M);
    characterized in that
    the external protection layer (6) of the back wall comprises:

    - a flange (61) that protrudes in lower position in order to be engaged with a base section (7) disposed under the back wall (10); and
    - a rib (62) that protrudes in upper position in order to be engaged with an upper section (8) disposed above the back wall (10); and

    the external protection layer (6) of the front wall comprises:

    - a flange (61) that protrudes in lower position in order to be engaged with a base section (70) disposed under the front wall (11); and
    - a rib (62) that protrudes in upper position in order to be engaged with an upper section (80) disposed above the front wall (11).

2. The refrigerated display counter (100) of claim 1, wherein said insulation panels (4) of VIP type have a thickness comprised between 15 mm and 25 mm.

3. The refrigerated display counter (100) of claim 1 or 2, wherein each insulation panel (4) of VIP type is disposed in sandwich configuration between a soft internal layer (5) and an external protection layer (6).

4. The refrigerated display counter (100) of any one of the preceding claims, wherein each insulation panel (4) of VIP type comprises an external film (40) that generates a gas-tight enclosure filled with a core (41) made of fiber or pulverulent material where vacuum is created with a pressure value that is lower than 0.1 mbar.

5. The refrigerated display counter (100) of claim 4, wherein said core (41) of the insulation panel (4) of VIP type comprises an insulation material in fiber form, such as glass wool, or in porous form, such as open-cell polyurethane foam, or in pulverulent form, such as silica powder.

6. The refrigerated display counter (100) of claim 4 or 5, wherein each insulation panel (4) of VIP type comprises an absorber material (42) disposed inside the enclosure of the panel in order to absorb gas, if any, and maintain the vacuum inside the enclosure of the panel, said absorber material (42) comprising materials with oxide and calcium salts base or Zirconium-Aluminum alloys (St 101), Zirconium - Vanadium - Iron alloys (St 707) and Zirconium-Nickel alloys (St 198).

7. The refrigerated display counter (100) of any one of claims 4 to 6, wherein said external film (40) comprises a laminated multi-layer film composed of polymer layers and of at least one aluminum layer deposited on a polymer layer.

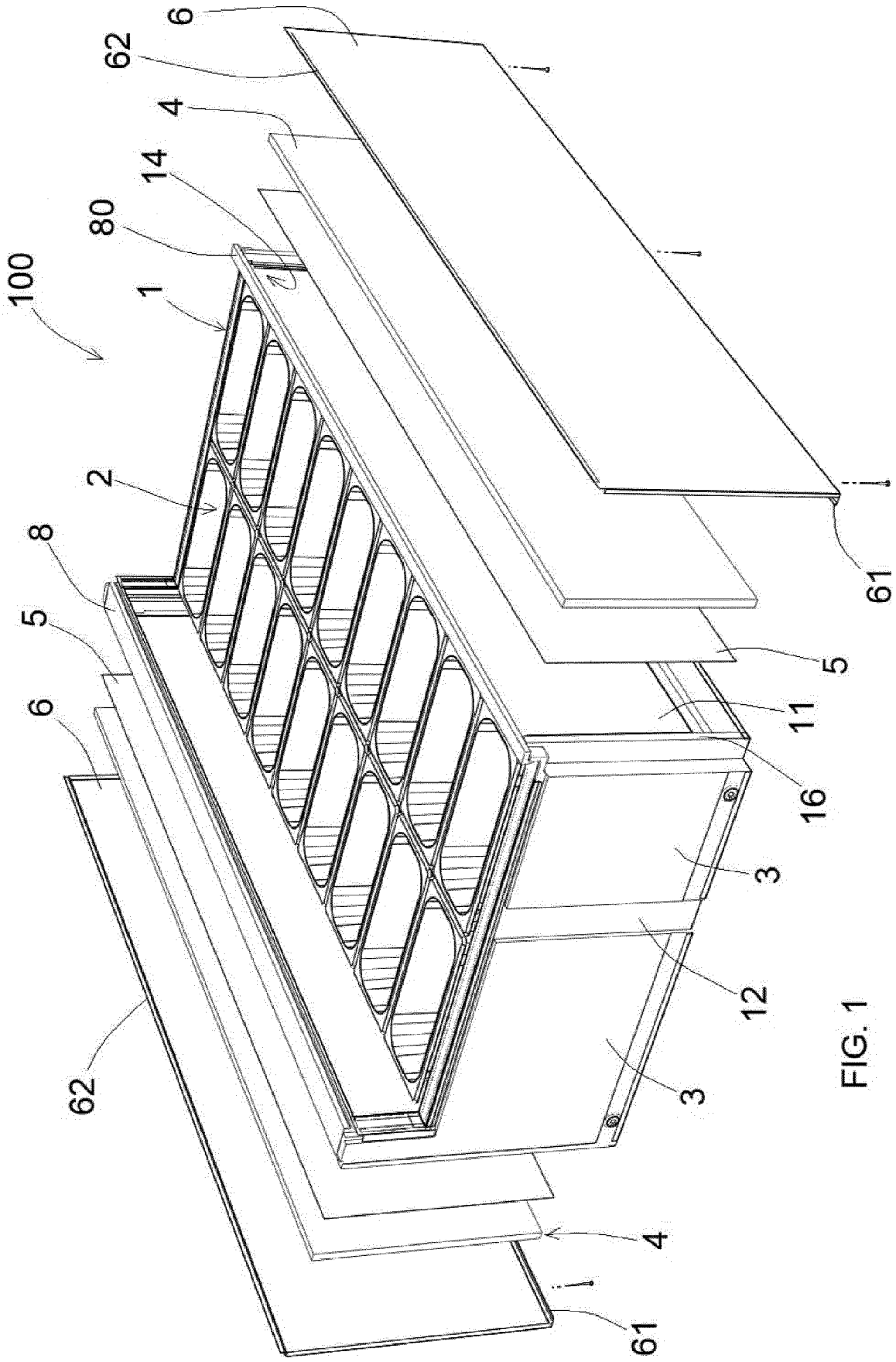

FIG. 1

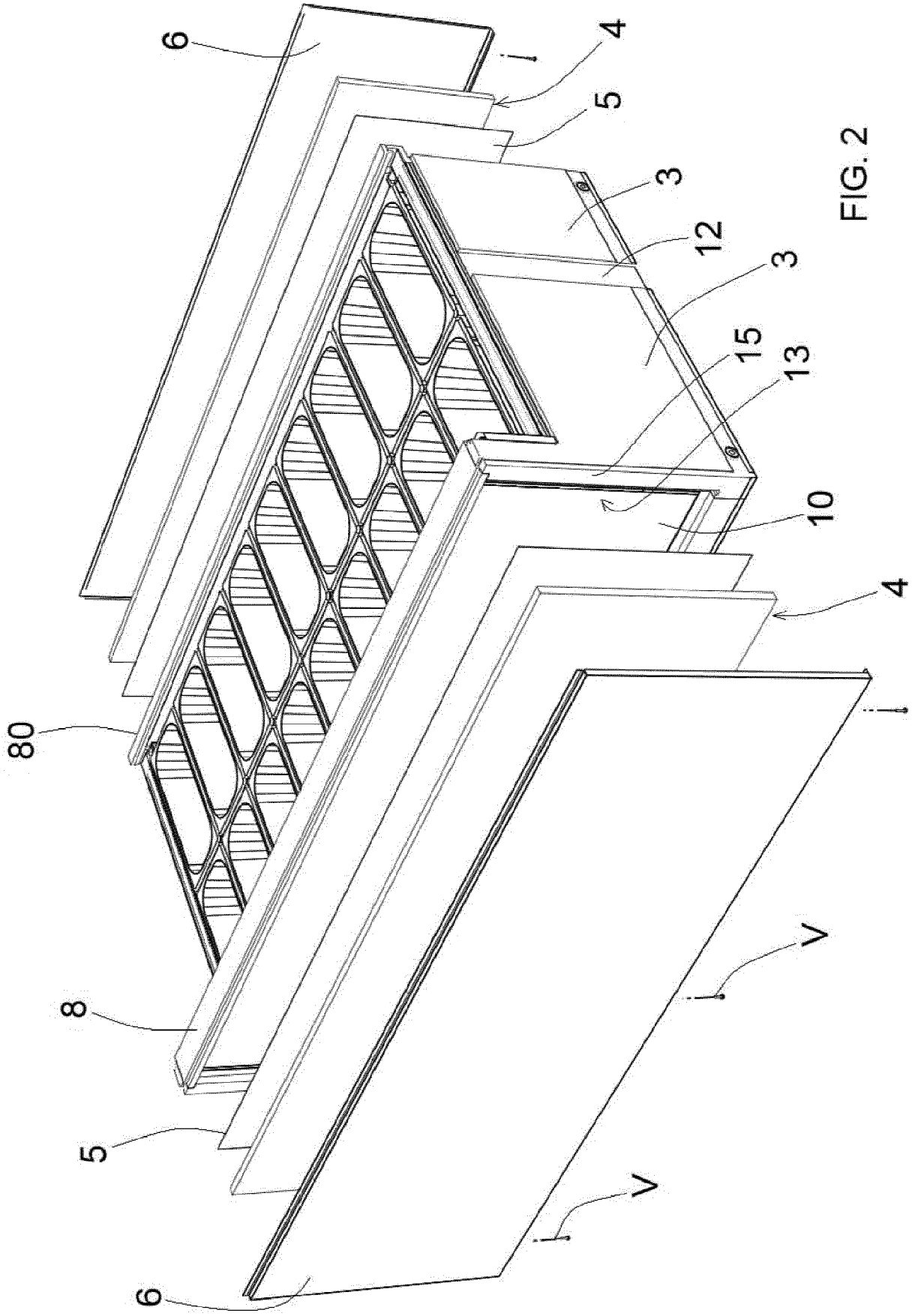

FIG. 2

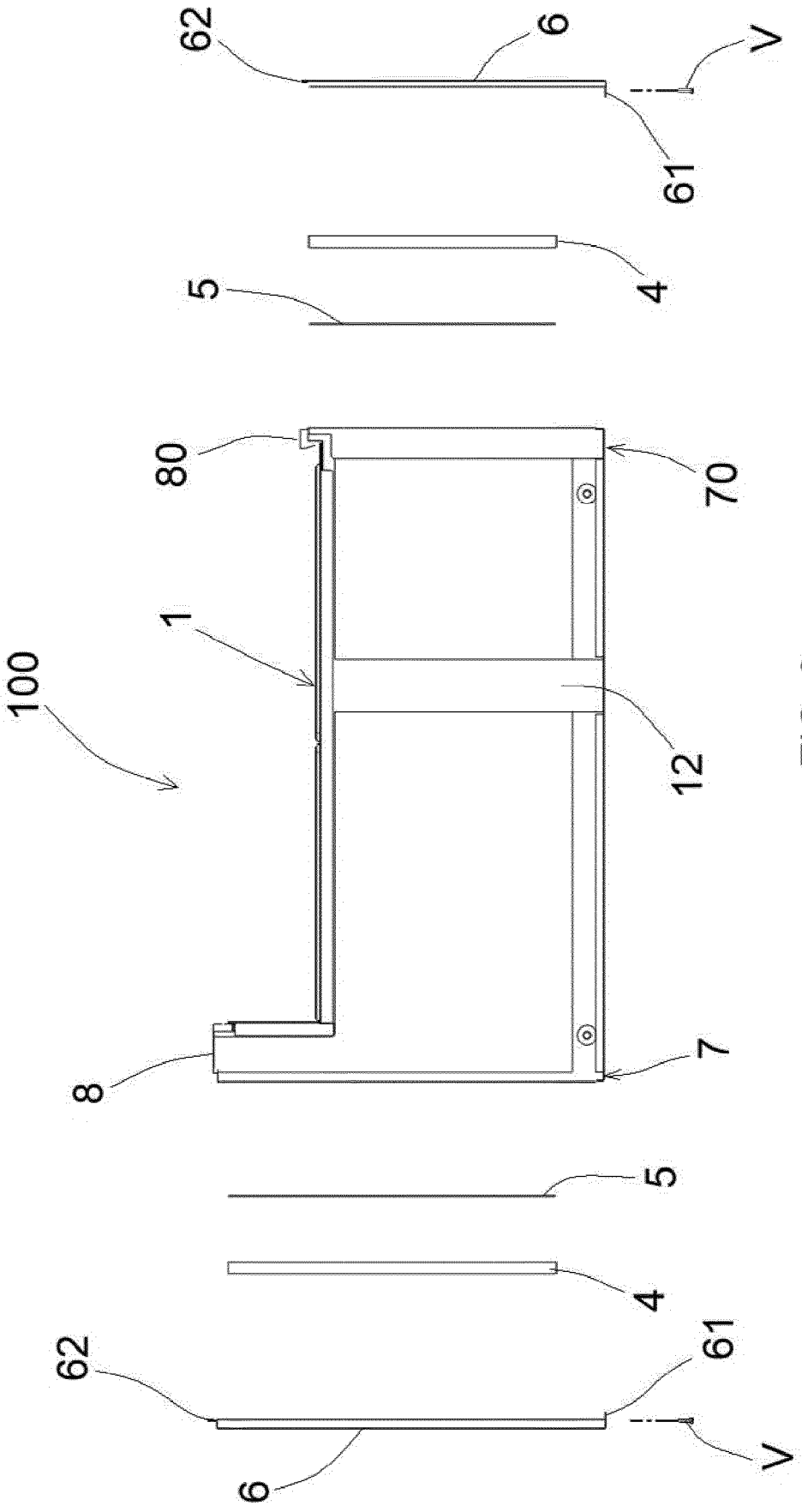

FIG. 3

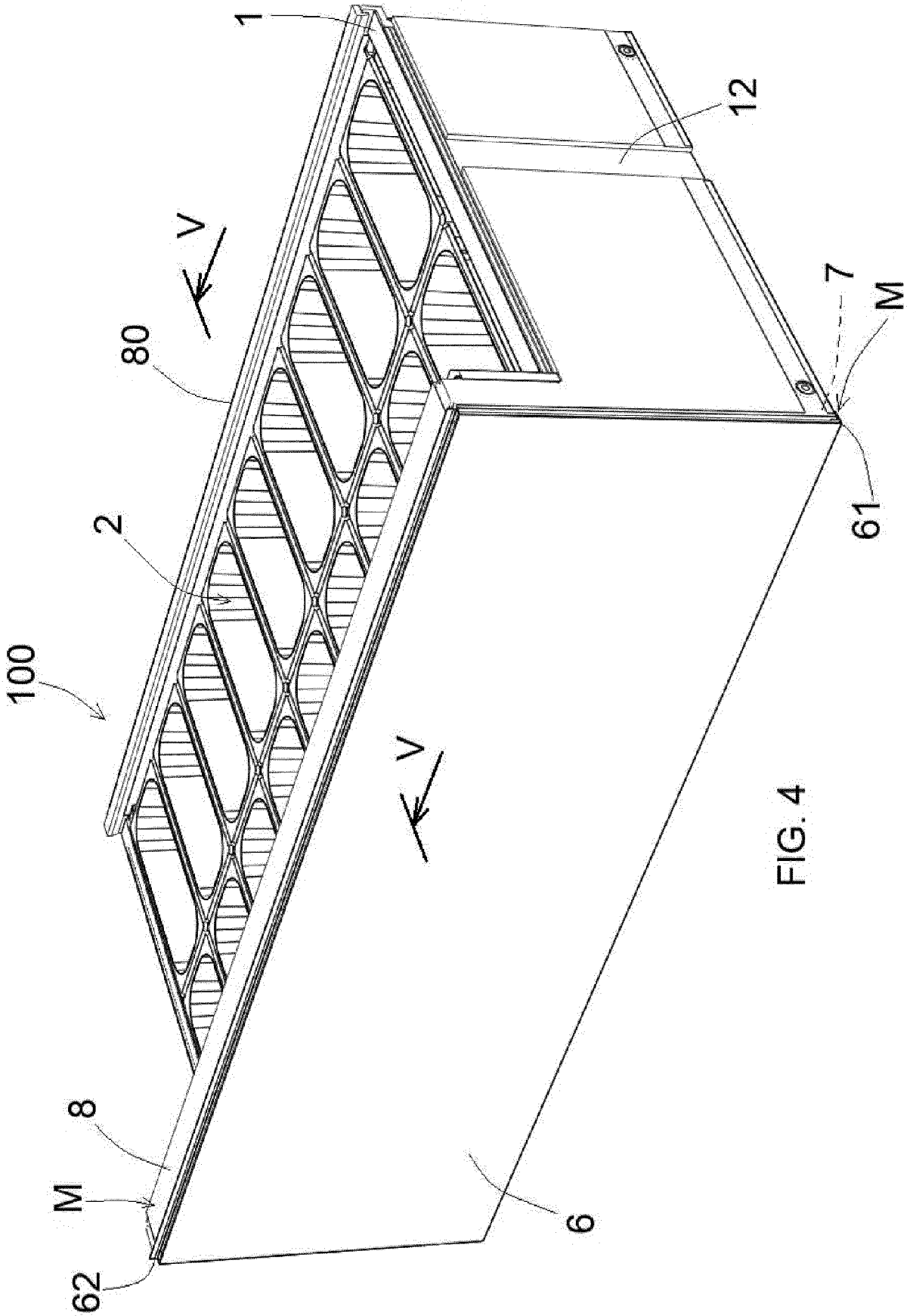

FIG. 4

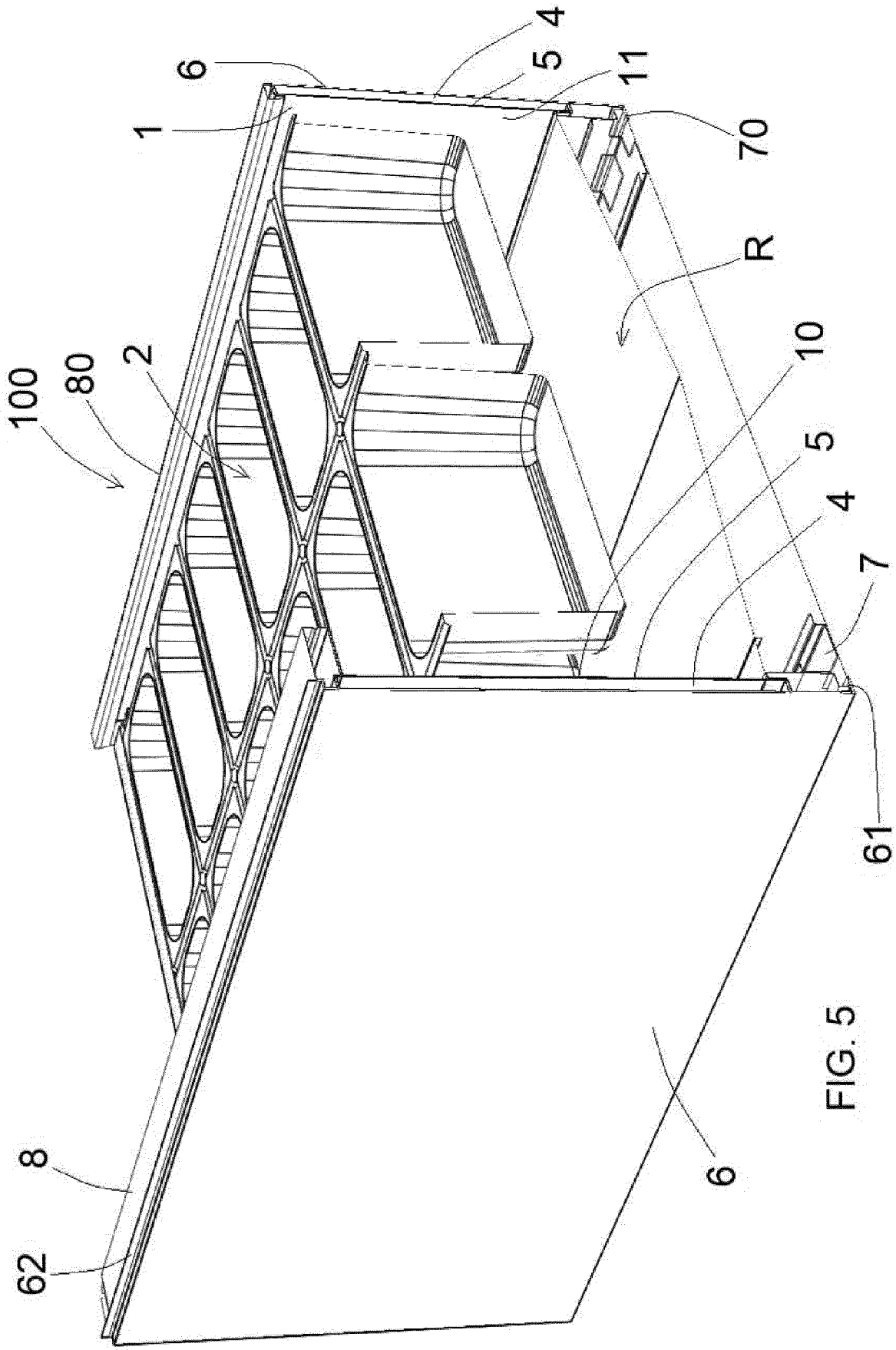

FIG. 5

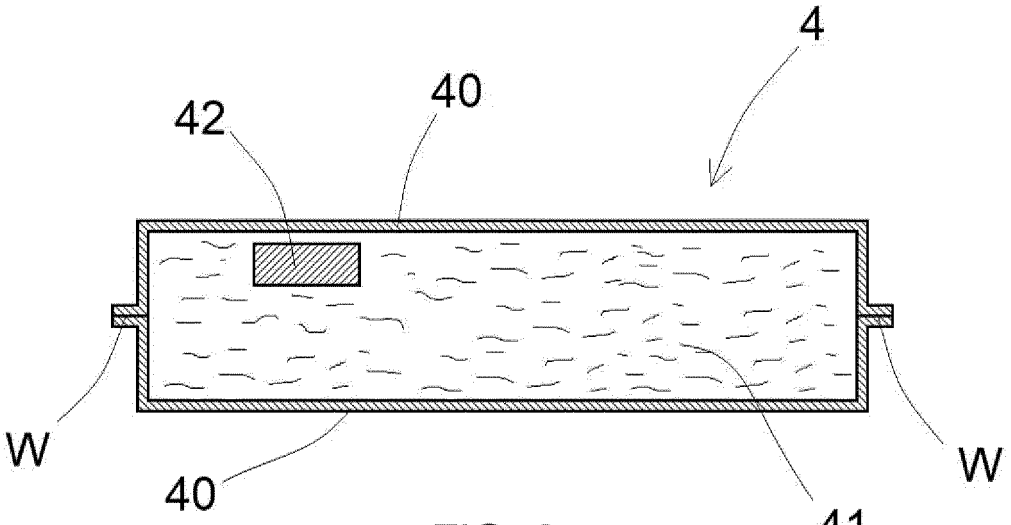

FIG. 6

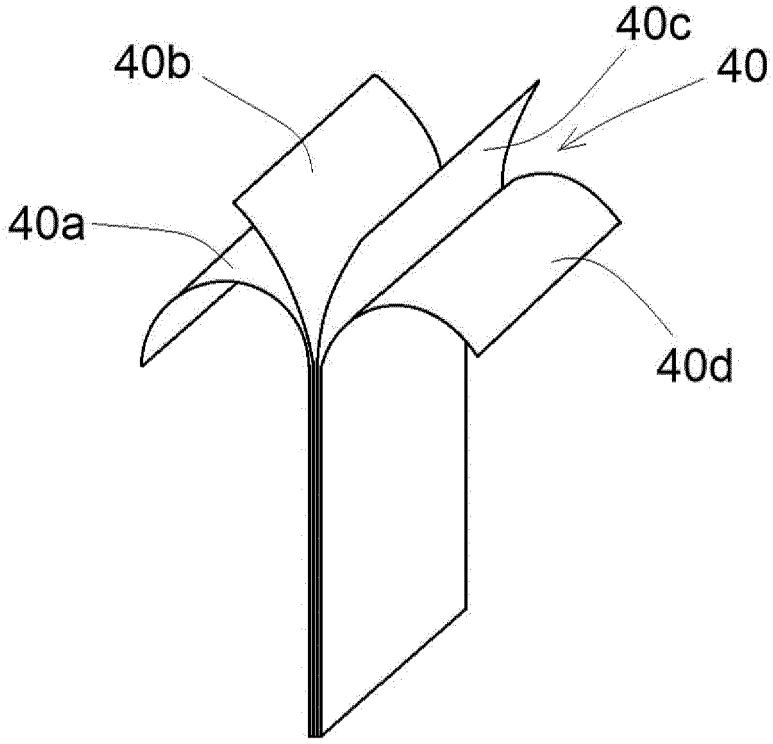

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 19 19 1706

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 03/083386 A1 (UNILEVER PLC [GB]; UNILEVER NV [NL]; LEVER HINDUSTAN LTD [IN]; HALE MI) 9 October 2003 (2003-10-09) * page 5, paragraph 2 * * figures 1,3 *	1-7	INV. A47F3/04 B65D81/38 F25D23/06
A	US 2012/318808 A1 (MCCORMICK BRUCE [US]) 20 December 2012 (2012-12-20) * paragraph [0048] - paragraph [0049] * * figures 1-2,6-8 *	1-7	
A	US 2007/152551 A1 (KIM YOUNG-BAE [KR] ET AL) 5 July 2007 (2007-07-05) * paragraph [0054] - paragraph [0056] * * figures 8-9 *	1-7	
A	WO 2006/009063 A1 (MATSUSHITA ELECTRIC IND CO LTD [JP]; TSUNETSUGU KEISUKE) 26 January 2006 (2006-01-26) * paragraph [0059] * * paragraph [0067] * * figures 1-2 *	1-7	

TECHNICAL FIELDS SEARCHED (IPC)

A47F
F25D
B65D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 October 2019	Bitton, Alexandre

CATEGORY OF CITED DOCUMENTS

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11-10-2019

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