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(54) **REFRIGERATION APPLIANCE**

(57) A refrigeration appliance (1; 101) comprising: an outer cabinet (2) and an inner liner (6; 106) defining at least one compartment (10; 110) for the storage of products to be cooled; a working chamber (20) apt to receive at least one component for the functioning of the appliance (1; 101); at least one chamber wall (30, 32; 130, 132) at least partially delimiting the working chamber (20) and a foam material arranged in a space provided between the chamber wall (30, 32; 130, 132) and the outer

cabinet (2) or between said at least one chamber wall (30, 32; 130, 132) and the inner liner (6; 106). Said at least one chamber wall (30, 32; 130, 132) comprises at least a shield portion (31, 33; 130, 132) made of self-extinguishing plastic material, wherein the shield portion (31, 33; 130, 132) is arranged in said at least one chamber wall (30, 32; 130, 132) at a position wherein the foam material contacts said at least one chamber wall (30, 32; 130, 132).

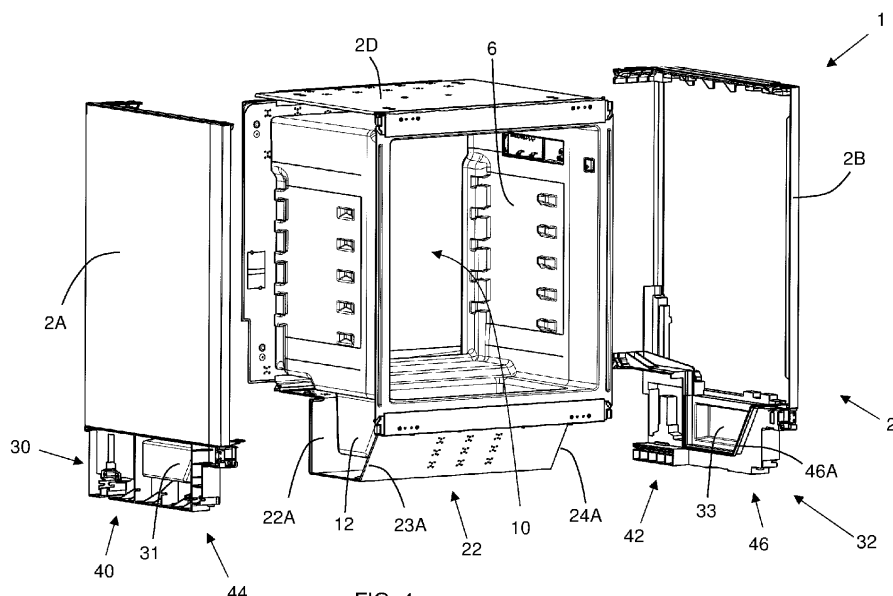


FIG. 4

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a refrigeration appliance, in particular to a refrigeration appliance provided with a working chamber receiving components for the functioning of the appliance.

BACKGROUND ART

[0002] Nowadays refrigeration appliances are extensively used, in particular refrigeration appliances for domestic use. We will refer, in particular, to domestic refrigeration appliances comprising one or more compartments, for example fresh food compartments and/or freezer compartments, for the storage of food and/or beverages.

[0003] A refrigeration appliance, hereinafter indicated simply with the term refrigerator, typically comprises a parallelepiped-shaped outer cabinet apt to place the refrigerator in a standing working position and an inner liner, disposed within the outer cabinet, which defines said one or more compartments.

[0004] The inner liner typically comprises a single plastic body opportunely shaped to define said one or more compartments or, in alternative known embodiments, two or more inner liners defines respective compartments.

[0005] The space defined between the outer cabinet and the inner liner(s) is advantageously filled with a thermal insulation material, preferably a foam insulation material, to thermally insulate the compartment(s) from the external environment.

[0006] The refrigeration is then equipped with a refrigeration system apt to cool the compartments and preferably comprises an electric motor-driven compressor, a condenser heat exchanger, a capillary tube, an evaporator and a fan for creating a cooling air stream for the compartment/s.

[0007] Part of the components of the refrigeration system are preferably arranged in a proper chamber of the refrigerator, or working chamber. The working chamber and components contained therein are preferably arranged on the bottom of the cabinet at its back side.

[0008] A particular focus in manufacturing of refrigerators relates the more effective design to meet the most demanding safety requirements in terms of fire protection.

[0009] A drawback of the known system is, in fact, the high flammability of said foam materials used in the refrigeration as thermal insulated material.

[0010] The most critical area subjected to a potential risk of fire is the working chamber containing the compressor or other electric components which represent critical heat-generating devices.

[0011] As known, furthermore, appliances are subjected to high-quality standards relating fire risk and have to

comply with various directives and regulations.

[0012] Another drawback of the known solutions lies in that one or more working chamber wall are in contact with the insulating foam materials and the accidental firing of the chamber wall would trigger fire of the foam, and then of the whole refrigerator cabinet.

[0013] One object of the present invention is therefore to overcome the limits posed by the known techniques.

[0014] It is an object of the invention to provide a refrigeration appliance with improved fire safety requirements compared to known systems.

[0015] It is another object of the invention to provide a refrigeration appliance having a cabinet able to avoid the flame propagation throughout the whole cabinet.

DISCLOSURE OF INVENTION

[0016] The applicant has found that by providing a refrigeration appliance having an outer cabinet, a working chamber apt to receive at least one component for the functioning of appliance and at least one chamber wall at least partially delimiting said working chamber, wherein said at least one chamber wall comprises at least a shield portion made of self-extinguishing plastic (or polymeric) material, it is possible to avoid, or at least mitigate, the risk of firing of the whole outer cabinet of the appliance.

[0017] According to one aspect of the present disclosure there is provided a refrigeration appliance comprising:

- an outer cabinet and an inner liner, internal to said outer cabinet, defining at least one compartment for the storage of products to be cooled;
- a working chamber apt to receive at least one component for the functioning of said appliance;
- at least one chamber wall at least partially delimiting said working chamber;
- a foam material arranged in a space provided between said at least one chamber wall and said outer cabinet or between said at least one chamber wall and said inner liner;

wherein said at least one chamber wall comprises at least a shield portion made of self-extinguishing plastic (or polymeric) material, wherein said shield portion is arranged in said at least one chamber wall at a position wherein said foam material contacts said at least one chamber wall.

[0018] Advantageously, the shield portion of the base support prevents that fire reaches the foam material in case of fire, then avoiding the flammability whole cabinet. Preferably, the self-extinguishing plastic material is a material that satisfies testing standard in accordance with IEC 60695-11-20 - Method 5VA. Preferably, the self-extinguishing plastic material is a flame retardant polypropylene compound, more preferably the product Dafnen® CR 09/K marketed by SIRMAR® (Italy).

[0019] Preferably, said at least one chamber wall is totally made of self-extinguishing plastic material so that the shield portion coincides with the at least one chamber wall.

[0020] Advantageously, manufacturing process of the chamber wall is simplified, for example by the realization of the chamber wall with the same material during a single injection moulding process.

[0021] In a preferred embodiment, the shield portion is defined by an insert element of said at least one chamber wall.

[0022] Advantageously, a dedicated self-extinguishing material is used inside the chamber wall only where needed.

[0023] According to a preferred embodiment of the invention, the material of said at least one chamber wall, except the insert element, is a plastic material, preferably a plastic single body.

[0024] Preferably, the plastic material is a polypropylene copolymer, more preferably the product SKYPLEN® code 4KC08.

[0025] In a preferred embodiment, the working chamber is arranged at a bottom part of the appliance and said at least one chamber wall defines a base support for the appliance.

[0026] According to a preferred embodiment of the invention, the foam material is arranged between the base support and the inner liner.

[0027] Preferably, the foam material comprises a thermal insulating material, preferably a fast reaction polyurethane (POLYOL+ISOCYANATE).

[0028] In a preferred embodiment, the outer cabinet comprises at least one lateral side wall that extends from a front side to a rear side of the appliance.

[0029] According to a preferred embodiment of the invention, the foam material is arranged between said at least one lateral side wall and said at least one chamber wall.

[0030] Preferably, said at least one lateral side wall at least partially laterally covers said at least one chamber wall, preferably said at least one lateral side wall entirely laterally covers said at least one chamber wall.

[0031] Advantageously, the lateral side wall confers a protection of the external environment against firing inside the working chamber.

[0032] Preferably, said at least one lateral side wall is realized in a non-flammable material, preferably in a metal material, more preferably made of iron or aluminium. Advantageously, the lateral side wall enhances said protection of the external environment.

[0033] In a preferred embodiment, said at least one chamber wall further comprises one or more supporting legs extending downwardly for placement of the appliance on a floor, preferably one or more supporting adjustable levelling supporting legs. According to a preferred embodiment of the invention, the working chamber is arranged on the back side of the appliance.

[0034] Preferably, said at least one lateral side wall

comprises two lateral side walls facing each other and said at least one chamber wall comprises two chamber walls facing each other and associated to a respective lateral side wall, said two chamber walls at least partially laterally delimiting the working chamber.

[0035] In a preferred embodiment, a cross bar connects the two chamber walls. According to a preferred embodiment of the invention, the refrigeration appliance further comprises a supporting element arranged in the lower part of the working chamber.

[0036] Generally, with working chamber it is meant a chamber containing at least an electric component and/or a refrigerating system component which allow the working of the refrigeration appliance; preferably, said component, when working, can potentially trigger a fire inside the working chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] Further characteristics and advantages of the present invention will be highlighted in greater detail in the following detailed description of preferred embodiments of the invention, provided with reference to the enclosed drawings. In such drawings:

- Figure 1 shows a front perspective view of a refrigeration appliance according to a preferred embodiment of the invention;
- Figure 2 shows a rear perspective view of the appliance of Figure 1;
- Figure 3 shows the appliance of Figure 2 with some elements removed therefrom;
- Figure 4 shows an exploded view of Figure 1;
- Figure 5 shows a partial exploded view of a detail of Figure 3;
- Figure 6 shows an exploded view of elements of Figure 3 isolated from the rest;
- Figure 7 shows the elements of Figure 6 from another point of view;
- Figure 8 shows an enlarged view of a detail of Figure 6;
- Figure 8 shows a front perspective view of a refrigeration appliance according to a further preferred embodiment of the invention;
- Figure 9 shows a rear perspective view of the appliance of Figure 8;
- Figure 10 shows the appliance of Figure 9 with some elements removed therefrom;
- Figure 11 shows an exploded view of Figure 8;
- Figure 12 shows an exploded view of a detail of Figure 10;
- Figure 13 shows an enlarged detail of Figure 12;
- Figure 14 shows an element of Figure 13 from another point of view.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0038] The refrigeration appliance according to the present invention has proved to be particularly advantageous when refers to a refrigeration appliance for domestic use. It should in any case be underlined that the present invention is not limited to this particular embodiment. On the contrary, the present invention conveniently refers to any refrigeration appliance being provided with a working chamber wherein components for the functioning of the refrigeration appliance are arranged.

[0039] Figures 1 and 2 show a refrigeration appliance 1, or refrigerator 1, according to a preferred embodiment of the invention.

[0040] The refrigerator 1 shown in the figures is a refrigerator 1 in the form of a domestic refrigerator, also known as compact refrigerator. The refrigerator 1 also preferably refers to a built-in solution.

[0041] However, the refrigerator according to the invention can have any desired configuration, for example a top mount or a bottom mount refrigerator wherein a freezer compartment and a fresh food compartment are disposed vertically one the other, preferably closed with two respective doors.

[0042] Furthermore, a stand-alone solution may be contemplated rather than a built-in solution.

[0043] The refrigerator 1 according to the first preferred embodiment illustrated and described herein preferably comprises a fresh food compartment 10 (Figure 4). A refrigeration system (not shown) is preferably provided to cool the compartment 10, more preferably the refrigeration system is apt to cool down air which is circulated inside the compartment 10.

[0044] The refrigeration system preferably comprises components configured to generate said cooling air flow. The refrigeration system preferably comprises a closed recirculating system filled with a suitable refrigerant, for example R12 or R134a. The refrigeration system preferably comprises an electric motor-driven compressor, a condenser heat exchanger, a pressure device such as a capillary tube or a thermostatic valve and an evaporator, which eventually define said components (not shown). A fan is also preferably used to circulate the cooled air inside the compartment 10.

[0045] The refrigerator 1 preferably comprises an outer cabinet 2 and an inner liner 6, internally received in the outer cabinet 2. The inner liner 6 preferably defines said fresh food compartment 10 (Figure 4).

[0046] A door 15 is preferably pivotally mounted to the outer cabinet 2 and is movable between an open position and a closed position to cover the fresh food compartment 10. The compartment 10 is preferably provided with support shelves and/or drawers (not shown).

[0047] According to the first preferred embodiment shown in the figures, the inner liner 6 preferably has a substantially parallelepiped shape and further comprises a lower storage space 12 for receiving, preferably, fresh

fruits and veggies.

[0048] The lower storage space 12 preferably has a trapezoidal shape, as visible in Figure 4.

5 [0049] The inner liner 6 is preferably made of a polymeric plastic material, such as PS (polystyrene).

[0050] The outer cabinet 2 is preferably parallelepiped-shaped and preferably comprises side walls 2A, 2B, 2C, 2D, preferably two lateral side walls 2A, 2B, a rear side wall 2C and a top side wall 2D.

10 [0051] In its standing working position, lateral side walls 2A, 2B and the rear side wall 2C are preferably aligned to a vertical direction.

[0052] The lateral side walls 2A, 2B (left side wall 2A and right side wall 2B) preferably extend from the front side to the rear side of the refrigerator 1.

15 [0053] Preferably, the side walls 2A, 2B, 2C, 2D are realized in a non-flammable material, preferably in a metal material, more preferably made of iron or aluminium.

20 [0054] A shaped panel 22 is preferably arranged at the lower part of the refrigerator 1 and preferably substantially follows the shape of the lower storage space 12, i. e. a trapezoidal shape. The shaped panel 22 is also preferably realized in a non-flammable material, preferably in a metal material, more preferably made of iron or aluminium.

25 [0055] The shaped panel 22 preferably has a rear side 22A which terminate inwardly with respect to the rear side wall 2C of the outer cabinet 2, as visible in Figure 2, to define a chamber 20, or working chamber 20. The working chamber 20 is thus preferably arranged at the back side of the refrigerator 1 and preferably at a bottom part of the rear side wall 2C.

30 [0056] The working chamber 20 preferably receives some components of the refrigeration system, for example the compressor and the capillary tube (not shown in the figures).

35 [0057] Generally, the working chamber 20 receives at least an electric component and/or a refrigerating system component which allow the working of the refrigerator 1; preferably, said component, when working, can potentially trigger a fire inside the working chamber 20.

[0058] The refrigerator 1 then preferably comprises at least one base support 30, 32 arranged at its lower side.

40 [0059] In the preferred embodiment illustrated herein, there are provided two base supports 30, 32 facing each other and preferably aligned with respective lateral side walls 2A, 2B. More preferably, a first base support 30, or left support 30, is aligned to, and substantially arranged below, the left side wall 2A and a second base support 32, or right support 32, is aligned to, and substantially arranged below, the right side wall 2B. The two base supports 30, 32 are preferably fixedly connected to respective lateral side walls 2A, 2B.

45 [0060] The base supports 30, 32 advantageously support the refrigerator 1 when the latest is positioned in its standing working position.

[0061] Preferably, the at least one base support 30, 32 at least partially delimits the working chamber 20; more

preferably the two base supports 30, 32 at least partially laterally delimit the working chamber 20.

[0062] Each base support 30, 32, therefore, eventually defines a chamber wall at least partially delimiting the working chamber 20.

[0063] The two base supports 30, 32 together with the shaped panel 22 eventually delimit the working chamber 20 and the working chamber 20 is preferably open towards the outside so that it can be conveniently accessible in case of maintenance. Furthermore, dissipation of heat produced by components inside the working chamber 20 is enhanced, in particular heat produced by the compressor.

[0064] More preferably, each base support 30, 32 comprises a first portion 40, 42 and a second portion 44, 46. The first portion 40, 42 is placed at the rear side of the refrigerator 1 and laterally delimits the working chamber 20.

[0065] The second portion 44, 46 is preferably configured to laterally abut against a respective lateral edge 23A, 24A of the shaped panel 22. In particular, as shown in Figure 4, the second portion 44, 46 of the base support 30, 32 comprises a shaped rib 44A, 46A matching the respective lateral edge 23A, 24A of the shaped panel 22.

[0066] In the preferred embodiments illustrated herein, the shaped ribs 44A, 46A and lateral edges 23A, 24A of the shaped panel 22 preferably have a trapezoidal shape. It is clear that in different preferred embodiments, said shapes may be any proper shapes matching each other.

[0067] Preferably, the base support 30, 32 comprises a single body extending from the front side to the rear side of the refrigerator 1. Preferably, the base support 30, 32 is constituted of a plastic single body, more preferably is moulded via an injection moulding process. Preferably, the base support 30, 32 is made of a polypropylene copolymer, more preferably the product SKY-PLÉN® code 4KC08.

[0068] Preferably, the first/left base support 30 extends, together with the first/left side wall 2A, from the front side to the rear side of the refrigerator 1 and, analogously, the second/right base support 32 extends, together with the second/right side wall 2B, from the front side to the rear side of the refrigerator 1. The side wall 2A, 2B partially laterally covers the base support 30, 32 or, in other words, a lower part of the base support 30, 32 is not covered by the side wall 2A, 2B and is exposed directly to the outside. According to the preferred embodiment illustrated in the figures 1 to 7, the lower part of the base support 30, 32 exposed directly to the outside involves majority of the base support 30, 32.

[0069] As explained, the base supports 30, 32 eventually support the refrigerator 1 when the latest is positioned in its standing working position.

[0070] At this purpose, the base supports 30, 32 preferably comprises one or more supporting legs 70 extending downwardly for placement of the refrigerator 1 on the floor. In Figure 1, two front supporting legs 70 are shown. Preferably, also two supporting legs (not shown) are ar-

ranged at the back of the base supports 30, 32.

[0071] In a preferred embodiment, the supporting legs are embodied as adjustable levelling supporting legs so that their lengths can be opportunely adjusted when the refrigerator 1 is placed in its standing working position.

[0072] A cross bar 72, then, preferably connects the two base supports 30, 32 (Figures 3 and 5). In the preferred embodiment illustrated in the figures, the cross bar 72 is preferably arranged at the rear side of the base supports 30, 32, above the working chamber 20, and transversally connects the same. The cross bar 72 is preferably connected with screws to the base supports 30, 32.

[0073] The cross bar 72 advantageously improves stability and stiffness of base supports 30, 32.

[0074] Furthermore, the base supports 30, 32 are opportunely configured to receive a supporting element 74 which is preferably arranged in the lower part of the working chamber 20, preferably to support components inside the working chamber 20 more preferably to support the compressor.

[0075] The supporting element 74 is preferably removably associated to the base supports 30, 32. Preferably, slits 76, 78 are realized at the base supports 30, 32 to slidably receive lateral sides of the supporting element 74.

[0076] In order to thermally insulate the compartment 10 from the external environment a thermal insulation material is preferably used to externally enclose the inner liner 6 as much as possible. More preferably, a foam insulation material is used during manufacturing of the refrigerator 1 to cover and contact the outer surface of the inner liner 6.

[0077] The foam material preferably comprises a fast reaction polyurethane (POLYOL+ISOCYANATE).

[0078] Preferably, referring to Figure 4, a foam insulation material is used to fill the space defined between the inner liner 6 and the side walls 2A, 2B, 2C, 2D and the space defined between the lower storage space 12 of the inner liner 6, the shaped panel 22 and the base supports 30, 32.

[0079] More preferably, the foam insulation material occupies the space delimited by the shaped rib 44A, 46A of the second portion 44, 46 of the base support 30, 32.

[0080] According to an aspect of the invention, the base support 30, 32 preferably comprises a shield portion 31, 33 made of self-extinguishing plastic (or polymeric) material, wherein the shield portion 31, 33 is arranged in the base support 30, 32 at a position wherein the foam material contacts the base support 30, 32.

[0081] Preferably, the self-extinguishing plastic material is a material that satisfies testing standard in accordance with IEC 60695-11-20 - Method 5VA. Preferably, the self-extinguishing plastic material is a flame retardant polypropylene compound, more preferably the product Dafnelen® CR 09/K marketed by SIRMAR® (Italy).

[0082] In the preferred embodiment illustrated in the figures, the shield portion 31, 33 comprises an insert el-

ement 31, 33 associated to the base support 30, 32 wherein the outer contour of the insert element 31, 33 follows the shaped rib 44A, 46A of the second portion 44, 46.

[0083] The foam insulation material that occupies the space delimited by the shaped rib 44A, 46A of the second portion 44, 46 is preferably exclusively in contact with the shield portion 31, 33 of the base support 30, 32 while the other parts of the base support 30, 32 external to the shield portion 31, 33 are not in contact with the foam insulation material.

[0084] In other words, the foam material arranged in the space provided between the base support 30, 32 and the inner liner 6, in particular between the base support 30, 32 and the lower storage space 12 of the inner liner 6, is exclusively in contact with the shield portion 31, 33 while the foam material does not contact the other parts of the base support 30, 32 which are not made of self-extinguishing material, i.e. preferably made of other type of plastic materials. According to an advantageous aspect of the invention, the shield portion 31, 33 of the base support 30, 32 prevents that fire reaches the foam material in case of fire, in particular in case the base support 30, 32 catches fire.

[0085] As known, in fact, foam materials are extremely flammable materials.

[0086] Such an event may be particularly relevant in the refrigerator 1 according to the invention being the working chamber 20 delimited by the base supports 30, 32 and, at the same time, receives the most critical heat-generating device of the refrigerator 1, constituted for example by the compressor or any other component (electrical components and/or refrigerating system components) that can potentially trigger a fire inside the working chamber.

[0087] In general, the shield portion 31, 33 prevents that fire reaches the foam material in case of fire in proximity of the base support 30, 32.

[0088] Advantageously, the base support 30, 32 with its the shield portion 31, 33 improved fire safety requirements of the refrigerator 1 avoiding, or at least mitigating, the risk of firing of the whole outer cabinet 2 of the refrigerator 1. Still advantageously, the self-extinguishing material of the shield portion 31, 33 is used inside the base support 30, 32 only where needed.

[0089] With reference to Figures 8 to 14 a refrigerator 101 according to a further preferred embodiment of the invention is described. In the drawings, corresponding characteristics and/or components compared to previous preferred embodiment are identified by the same reference numbers.

[0090] The refrigerator 101 shown in the figures is a stand-alone bottom mount refrigerator 101, i.e. of the type including a freezer compartment 110 disposed vertically below a fresh food compartment 10, as visible in Figure 11.

[0091] A refrigeration system (not shown) is preferably provided to cool the compartments 10, 110, more pref-

erably the refrigeration system is apt to cool down air which is circulated inside the compartments 10, 110.

[0092] The refrigeration system preferably comprises components configured to generate said cooling air flow. The refrigeration system preferably comprises a closed recirculating system filled with a suitable refrigerant, for example R12 or R134a. The refrigeration system preferably comprises an electric motor-driven compressor, a condenser heat exchanger, a pressure device such as a capillary tube or a thermostatic valve and an evaporator, which eventually define said components (not shown). A fan is also preferably used to circulate the cooled air inside the compartments 10, 110.

[0093] The refrigerator 101 preferably comprises an outer cabinet 2 and an inner liner 106, internally received in the outer cabinet 2. The inner liner 106 preferably defines said fresh food compartment 10 and said freezer compartment 110.

[0094] A door 15 is preferably pivotally mounted to the outer cabinet 2 and is movable between an open position and a closed position to cover the fresh food compartment 10 and a door 115 is preferably pivotally mounted to the outer cabinet 2 and is movable between an open position and a closed position to cover the freezer compartment 110. The compartments 10, 110 are preferably provided with support shelves and/or drawers (not shown).

[0095] In the preferred embodiment illustrated and described hereinbelow, the compartments 10, 110 are defined by the inner liner 106 preferably formed as a one-piece monolithic body.

[0096] In different preferred embodiments, the compartments 10, 110 may be defined by respective separated inner liners.

[0097] According to this preferred embodiment, the compartments 10, 110 have a substantially parallelepiped shape.

[0098] The inner liner 106 is preferably made of a polymeric plastic material, such as PS (polystyrene).

[0099] The outer cabinet 2 is preferably parallelepiped-shaped and preferably comprises side walls 2A, 2B, 2C, 2D, preferably two lateral side walls 2A, 2B, a rear side wall 2C and a top side wall 2D.

[0100] In its standing working position, lateral side walls 2A, 2B and the rear side wall 2C are preferably aligned to a vertical direction.

[0101] The lateral side walls 2A, 2B (left side wall 2A and right side wall 2B) preferably extend from the front side to the rear side of the refrigerator 101.

[0102] Preferably, the side walls 2A, 2B, 2C, 2D are realized in a non-flammable material, preferably in a metal material, more preferably made of iron or aluminium.

[0103] Some of said components of the refrigeration system are preferably arranged in a working chamber 20 of the refrigerator 101.

[0104] The working chamber 20 is preferably arranged at the back side of the refrigerator 101 and preferably at a bottom part of the rear side wall 2C.

[0105] The working chamber 20 is preferably thermally-insulated and/or sound-insulated, in particular thermally-insulated with respect to the freezer compartment 110. A shaped panel 122 is preferably interposed between the working chamber 20 and the freezer compartment 110, as depicted in Figure 9. The shaped panel 122 is also preferably realized in a non-flammable material, preferably in a metal material, more preferably made of iron or aluminium.

[0106] The refrigerator 101 then preferably comprises at least one base support 130, 132 arranged at its lower side.

[0107] In the preferred embodiment illustrated herein, there are provided two base supports 130, 132 facing each other and preferably aligned with respective lateral side walls 2A, 2B. More preferably, a first base support 130, or left support 130, is aligned to, and substantially arranged below, the left side wall 2A and a second base support 132, or right support 132, is aligned to, and substantially arranged below, the right side wall 2B. The two base supports 130, 132 are preferably fixedly connected to respective lateral side walls 2A, 2B.

[0108] The base supports 130, 132 advantageously support the refrigerator 101 when the latest is positioned in its standing working position.

[0109] Preferably, the at least one base support 130, 132 at least partially delimits the working chamber 20; more preferably the two base supports 130, 132 at least partially laterally delimit the working chamber 20.

[0110] Each base support 130, 132, therefore, eventually defines a chamber wall at least partially delimiting the working chamber 20.

[0111] The two base supports 130, 132 together with the shaped panel 122 eventually delimit the working chamber 20 and the working chamber 20 is preferably open towards the outside so that it can be conveniently accessible in case of maintenance. Furthermore, dissipation of heat produced by components inside the working chamber 20 is enhanced, in particular heat produced by the compressor.

[0112] The working chamber 20 is then preferably delimited by the shaped panel 122 in the back-to-front direction while the working chamber 20 is preferably open towards the outside.

[0113] More preferably, each base support 130, 132 comprises a first portion 140, 142 and a second portion 144, 146. The first portion 140, 142 is placed at the rear side of the refrigerator 101 and laterally delimits the working chamber 20. The second portion 144, 146 extends towards the front side of the refrigerator 101.

[0114] The base support 130, 132 is preferably configured to laterally abut against a respective lateral edge 124A of the shaped panel 122. In particular, as shown in Figures 11 and 13, the base support 130, 132 comprises a shaped rib 144A, 146A matching the respective lateral edge 124A of the shaped panel 122.

[0115] Preferably, the base support 130, 132 comprises a single body extending from the front side to the rear

side of the refrigerator 101. Preferably, the base support 130, 132 is constituted of a plastic single body, as better described later. Advantageously, according to this preferred embodiment, manufacturing process of the base support 130, 132 is simplified compared to previous embodiment comprising and insert.

[0116] Preferably, the first/left base support 130 extends, together with the first/left side wall 2A, from the front side to the rear side of the refrigerator 101 and, analogously, the second/right base support 132 extends, together with the second/right side wall 2B, from the front side to the rear side of the refrigerator 101.

[0117] The side wall 2A, 2B entirely laterally covers the base support 130, 132 or, in other words, no one surface of the base support 130, 132 is exposed directly to the outside. Advantageously, such a solution allows to improve the aesthetic appearance of the refrigerator 101.

[0118] Preferably, the base support 130, 132 comprises an external surface 150 that faces the respective side wall 2A, 2B of the outer cabinet 2 and hence said external surface 150 is not exposed directly to the outside.

[0119] Advantageously, the lateral side wall 2A, 2B confers a protection of the external environment against firing inside the working chamber 20, in particular when the lateral side wall 2A, 2B is realized in a non-flammable material, preferably in a metal material, more preferably made of iron or aluminium.

[0120] As explained, the base supports 130, 132 eventually support the refrigerator 101 when the latest is positioned in its standing working position.

[0121] At this purpose, the base supports 130, 132 preferably comprises one or more supporting legs 170a, 170b, 171a, 171b extending downwardly for placement of the refrigerator 101 on the floor, more preferably a right front leg 170a, a left front leg 171a, a rear right leg 170b and a left rear leg 171b.

[0122] In a further preferred embodiment, the supporting legs may be embodied as adjustable levelling supporting legs so that their lengths can be opportunely adjusted when the refrigerator 101 is placed in its standing working position.

[0123] A cross bar 72, then, preferably connects the two base supports 130, 132 (Figure 10). In the preferred embodiment illustrated in the figures, the cross bar 72 is preferably arranged at the rear side of the base supports 130, 132, above the working chamber 20, and transversally connects the same. The cross bar 72 is preferably connected with screws to the base supports 130, 132.

[0124] The cross bar 72 advantageously improves stability and stiffness of base supports 130, 132.

[0125] Furthermore, the base supports 130, 132 are opportunely configured to receive a supporting element 74 which is preferably arranged in the lower part of the working chamber 20, preferably to support components inside the working chamber 20 more preferably to support the compressor.

[0126] The supporting element 74 is preferably removably associated to the base supports 130, 132. Preferably,

bly, slits 76, 78 are realized at the base supports 130, 132 to slidably receive lateral sides of the supporting element 74.

[0127] In order to thermally insulate the compartments 10, 110 from the external environment a thermal insulation material is preferably used to externally enclose the inner liner 106 as much as possible. More preferably, a foam insulation material is used during manufacturing of the refrigerator 101 to cover and contact the outer surface of the inner liner 106.

[0128] The foam material preferably comprises a fast reaction polyurethane (POLYOL+ISOCYANATE).

[0129] Preferably, a foam insulation material is used to fill the space defined between the inner liner 106 and the side walls 2A, 2B, 2C, 2D.

[0130] Furthermore, preferably, the foam insulation material fills the space defined between the side walls 2A, 2B and the base supports 130, 132, more preferably the space between the external surfaces 150, 152 of the base supports 130, 132 and the side walls 2A, 2B. The external surfaces 150, 152 of the base supports 130, 132 are therefore in contact with the foam insulation material.

[0131] According to an aspect of the invention, the base support 130, 132 is totally made of self-extinguishing plastic (or polymeric) material.

[0132] Preferably, the self-extinguishing plastic material is a material that satisfies testing standard in accordance with IEC 60695-11-20 - Method 5VA. Preferably, the self-extinguishing plastic material is a flame retardant polypropylene compound, more preferably the product Dafnelen® CR 09/K marketed by SIRMAL® (Italy).

[0133] Advantageously, the foam material arranged in the space provided between the base support 130, 132 and the inner liner 106 is exclusively in contact with the self-extinguishing plastic material of the base support 130, 132.

[0134] According to an advantageous aspect of the invention, the self-extinguishing plastic material of the base supports 130, 132 prevents that fire reaches the foam material in case of fire, in particular in case the base support 30, 32 catches fire. As known, in fact, foam materials are extremely flammable materials.

[0135] Such an event may be particularly relevant in the refrigerator 101 according to the invention being the working chamber 20 delimited by the base supports 130, 132 and, at the same time, receiving the most critical heat-generating device of the refrigerator 101 constituted by the compressor.

[0136] In general, the base supports 130, 132 prevents that fire reaches the foam material in case of fire in proximity of the base support 130, 132.

[0137] It has thus been shown that the present invention allows all the set objects to be achieved. In particular, the refrigeration appliance of the invention makes it possible to improve fire safety requirements of the appliance compared to known refrigeration appliances.

[0138] While the present invention has been described with reference to the particular embodiments shown in

the figures, it should be noted that the present invention is not limited to the specific embodiments illustrated and described herein; on the contrary, further variants of the embodiments described herein fall within the scope of the present invention, which is defined in the claims.

[0139] For example, the refrigerator according to the first embodiment described above may comprise a base support totally made of self-extinguishing plastic material, i.e. a base support as described for the second embodiment. Vice versa, the refrigerator according to the second embodiment may comprise a base support having an insert element made of self-extinguishing plastic material, i.e. a base support as described for the first embodiment.

Claims

1. A refrigeration appliance (1; 101) comprising:

- an outer cabinet (2) and an inner liner (6; 106), internal to said outer cabinet (2), defining at least one compartment (10; 110) for the storage of products to be cooled;
- a working chamber (20) apt to receive at least one component for the functioning of said appliance (1; 101);
- at least one chamber wall (30, 32; 130, 132) at least partially delimiting said working chamber (20);
- a foam material arranged in a space provided between said at least one chamber wall (30, 32; 130, 132) and said outer cabinet (2) or between said at least one chamber wall (30, 32; 130, 132) and said inner liner (6; 106);

wherein said at least one chamber wall (30, 32; 130, 132) comprises at least a shield portion (31, 33; 130, 132) made of self-extinguishing plastic material, wherein said shield portion (31, 33; 130, 132) is arranged in said at least one chamber wall (30, 32; 130, 132) at a position wherein said foam material contacts said at least one chamber wall (30, 32; 130, 132).

2. A refrigeration appliance (101) according to claim 1, wherein said at least one chamber wall (130, 132) is totally made of self-extinguishing plastic material so that said shield portion (130, 132) coincides with said at least one chamber wall (130, 132).

3. A refrigeration appliance (1) according to claim 1, wherein said shield portion (31, 33) is defined by an insert element of said at least one chamber wall (30, 32).

4. A refrigeration appliance (1; 101) according to claim 3, wherein the material of said at least one chamber

wall (30, 32; 130, 132), except said insert element, is a plastic material, preferably a plastic single body, more preferably a polypropylene copolymer.

5. A refrigeration appliance (1; 101) according to any of the preceding claims, wherein said self-extinguishing plastic material is a material that satisfies testing standard in accordance with IEC 60695-11-20 - Method 5VA, preferably a flame retardant polypropylene compound. 5 10
6. A refrigeration appliance (1; 101) according to any of the preceding claims, wherein said working chamber (20) is arranged at a bottom part of said appliance (1; 101) and said at least one chamber wall (30, 32; 130, 132) defines a base support (30, 32; 130, 132) for said appliance (1; 101). 15
7. A refrigeration appliance (1) according to claim 6, wherein said foam material is arranged between said base support (30, 32) and said inner liner (6; 106). 20
8. A refrigeration appliance (1; 101) according to any of the preceding claims, wherein said foam material comprises a thermal insulating material, preferably a fast reaction polyurethane. 25
9. A refrigeration appliance (1; 101) according to any of the preceding claims, wherein said outer cabinet (2) comprising at least one lateral side wall (2A, 2B) that extends from a front side to a rear side of said appliance (1; 101). 30
10. A refrigeration appliance (1; 101) according to claim 9, wherein said foam material is arranged between said at least one lateral side wall (2A, 2B) and said at least one chamber wall (130, 132). 35
11. A refrigeration appliance (1; 101) according to claim 9 or 10, wherein said at least one lateral side wall (2A, 2B) at least partially laterally covers said at least one chamber wall (30, 32; 130, 132), preferably said at least one lateral side wall (2A, 2B) entirely laterally covers said at least one chamber wall (130, 132). 40 45
12. A refrigeration appliance (1; 101) according to any of the preceding claims, wherein said at least one chamber wall (30, 32; 130, 132) further comprises one or more supporting legs (70; 170a, 170b, 171a, 171b) extending downwardly for placement of said appliance (1; 101) on a floor, preferably one or more supporting adjustable levelling supporting legs (70). 50
13. A refrigeration appliance (1; 101) according to any of the preceding claims, wherein said working chamber (20) is arranged on the back side of said appliance (1; 101). 55

14. A refrigeration appliance (1; 101) according to any of the claims 9 to 11, wherein said at least one lateral side wall (2A, 2B) comprises two lateral side walls (2A, 2B) facing each other and said at least one chamber wall (30, 32; 130, 132) comprises two chamber walls (30, 32; 130, 132) facing each other and associated to a respective lateral side wall (2A, 2B), said two chamber walls (30, 32; 130, 132) at least partially laterally delimiting said working chamber (20).

15. A refrigeration appliance (1; 101) according to claim 14, wherein it comprises a cross bar (72) connecting said two chamber walls (30, 32; 130, 132).

16. A refrigeration appliance (1; 101) according to any of the preceding claims, wherein it comprises a supporting element (74) arranged in the lower part of said working chamber (20).

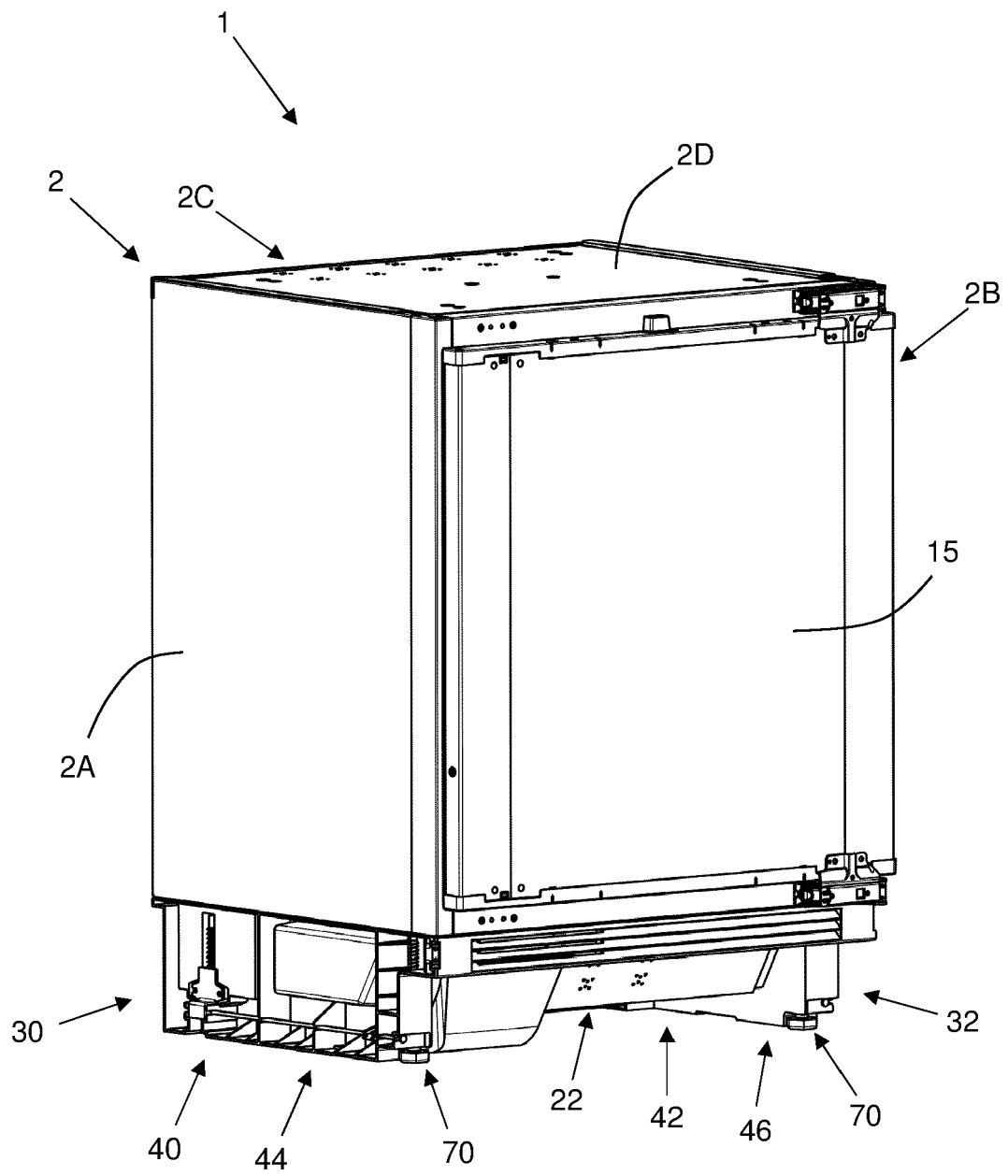


FIG. 1

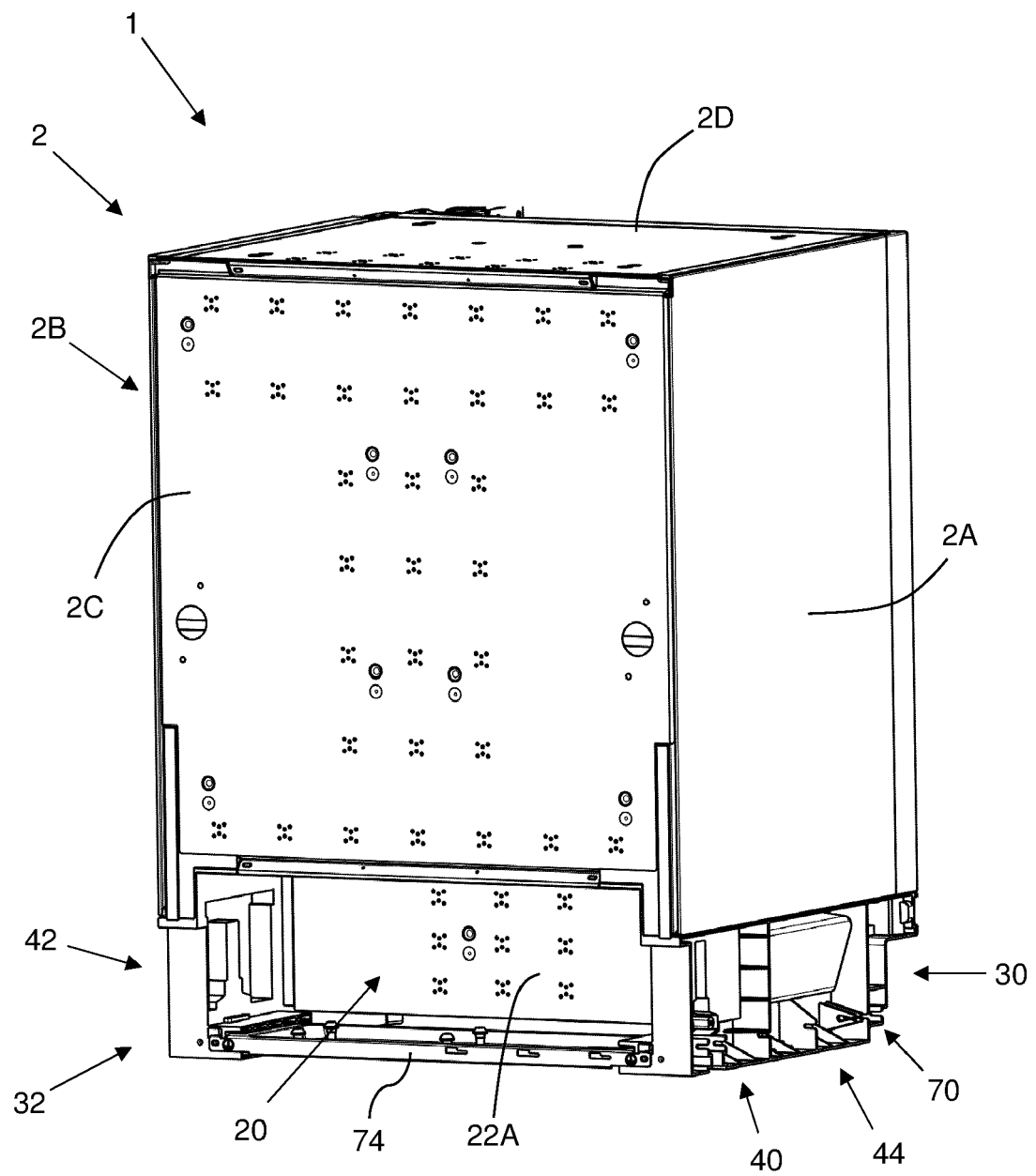


FIG. 2

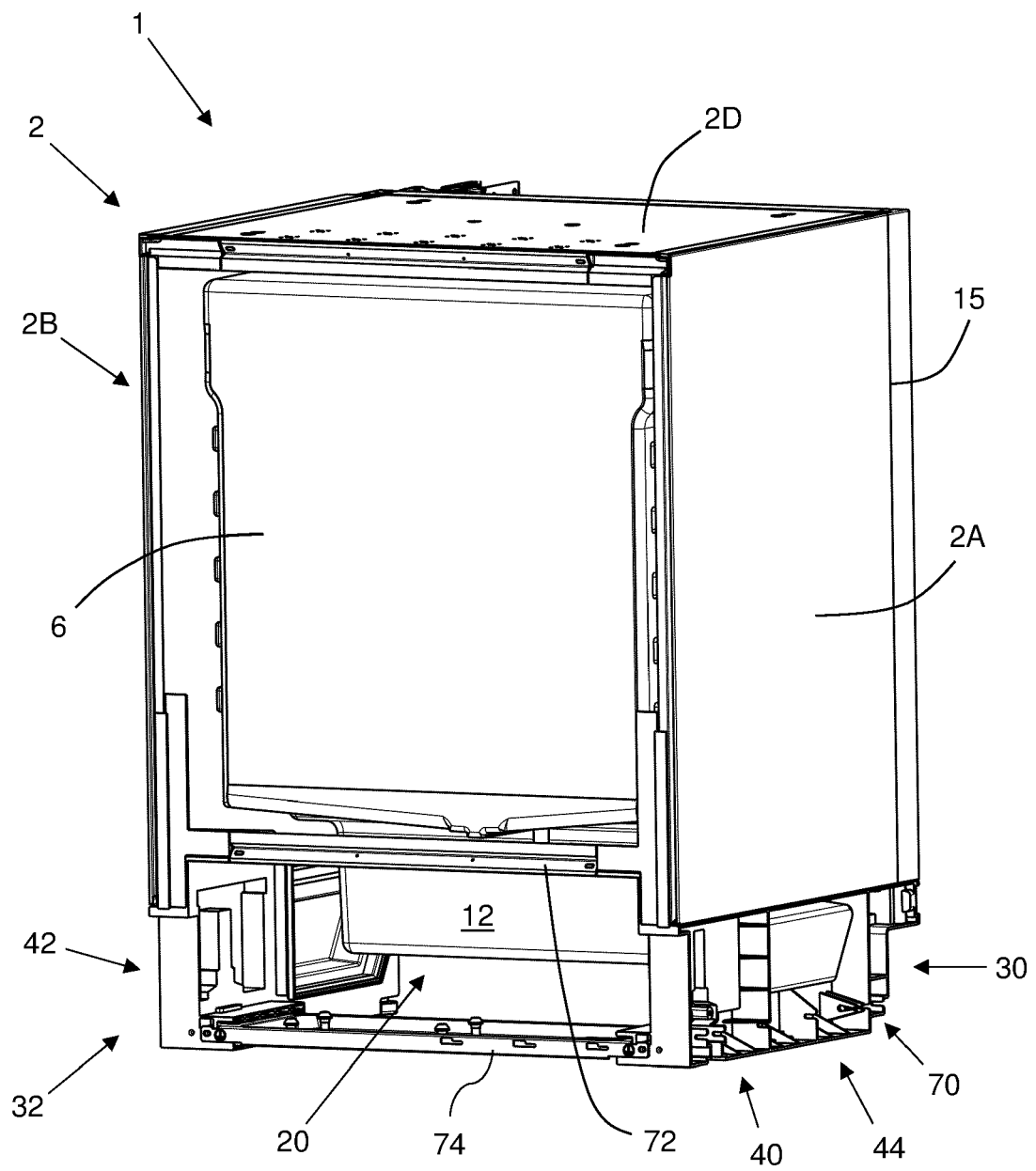


FIG. 3

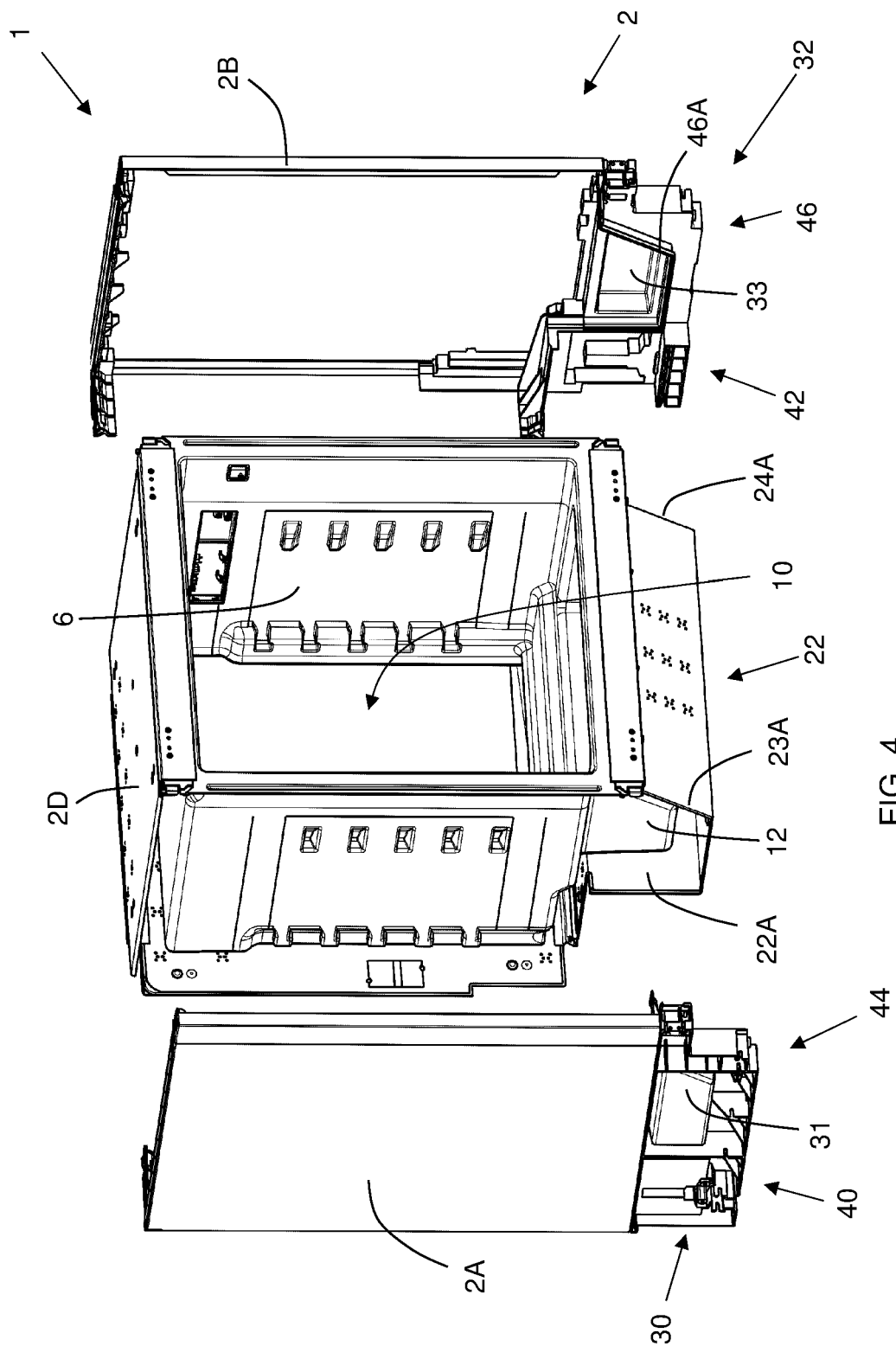


FIG. 4

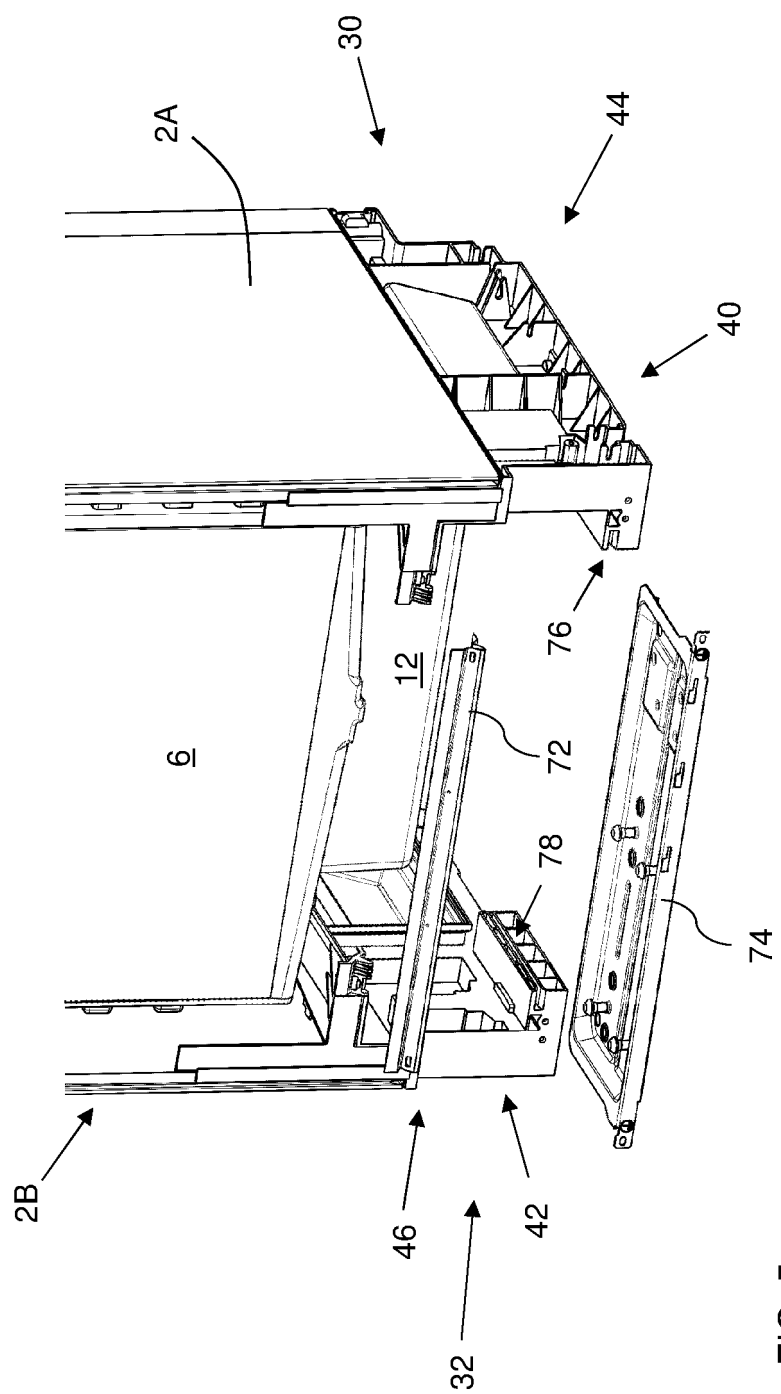


FIG. 5

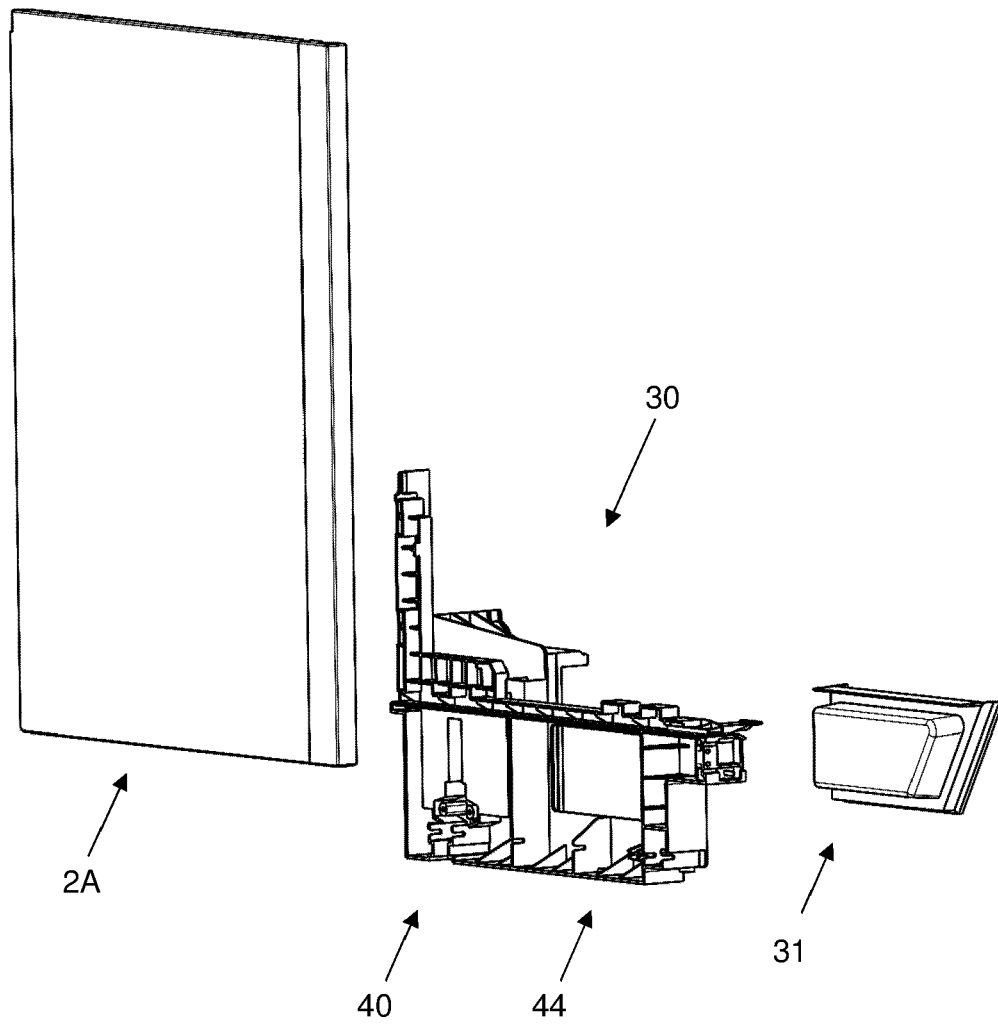


FIG. 6

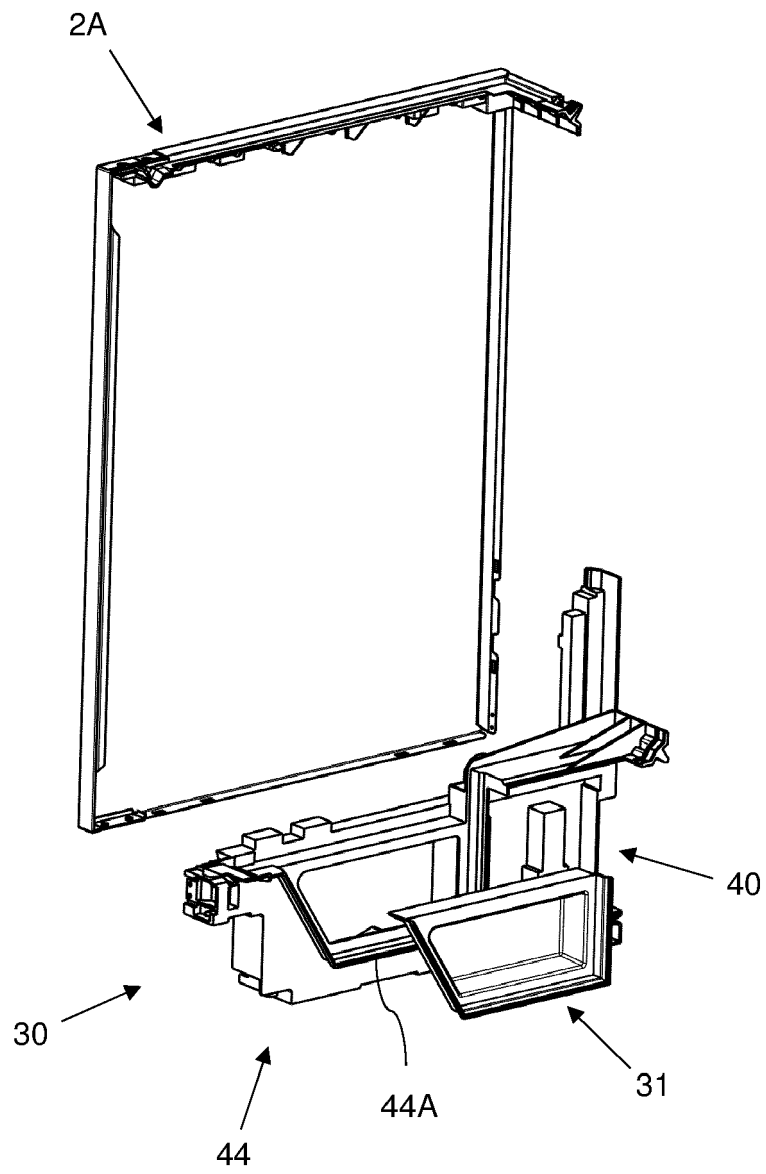
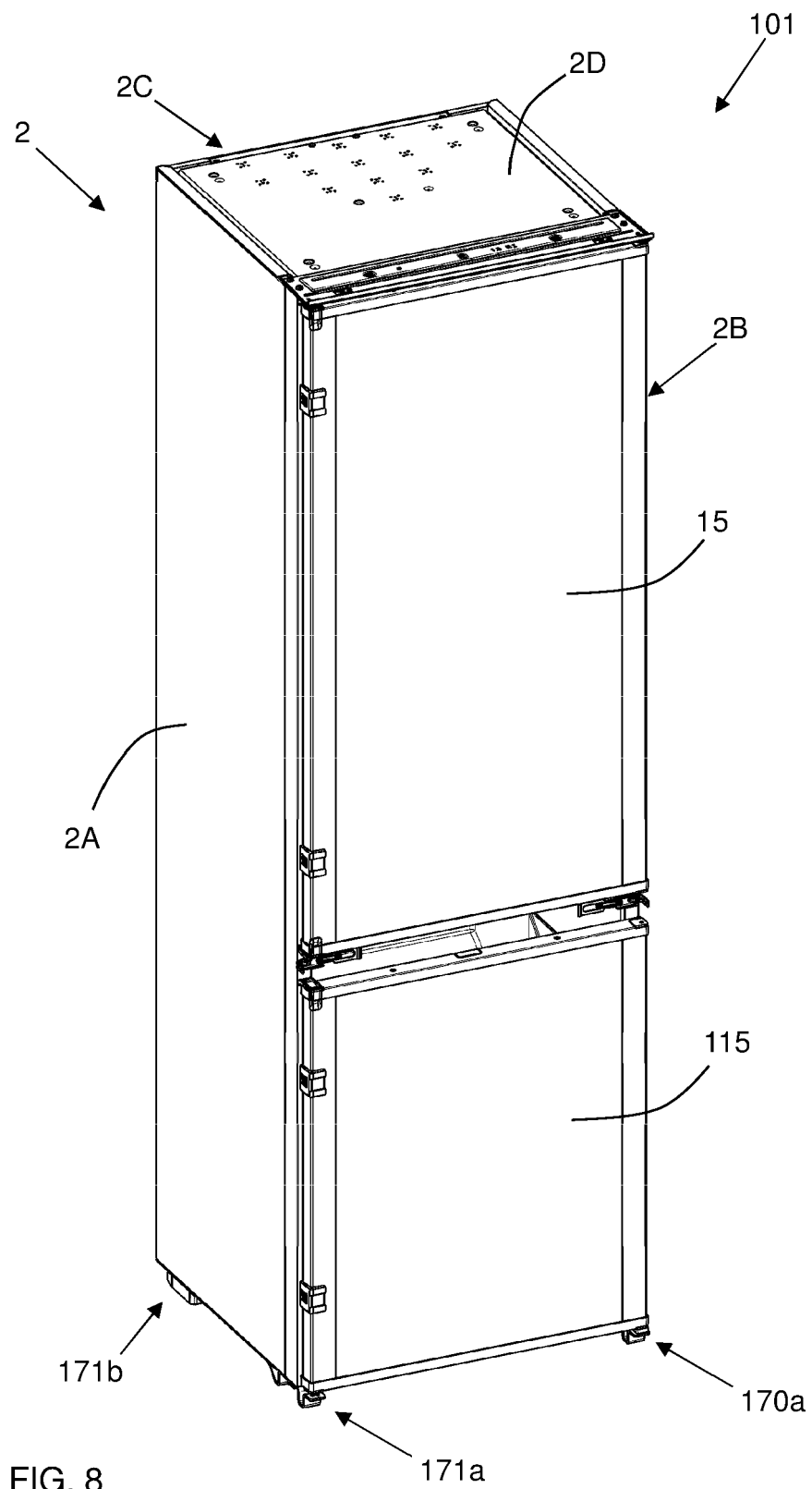


FIG. 7



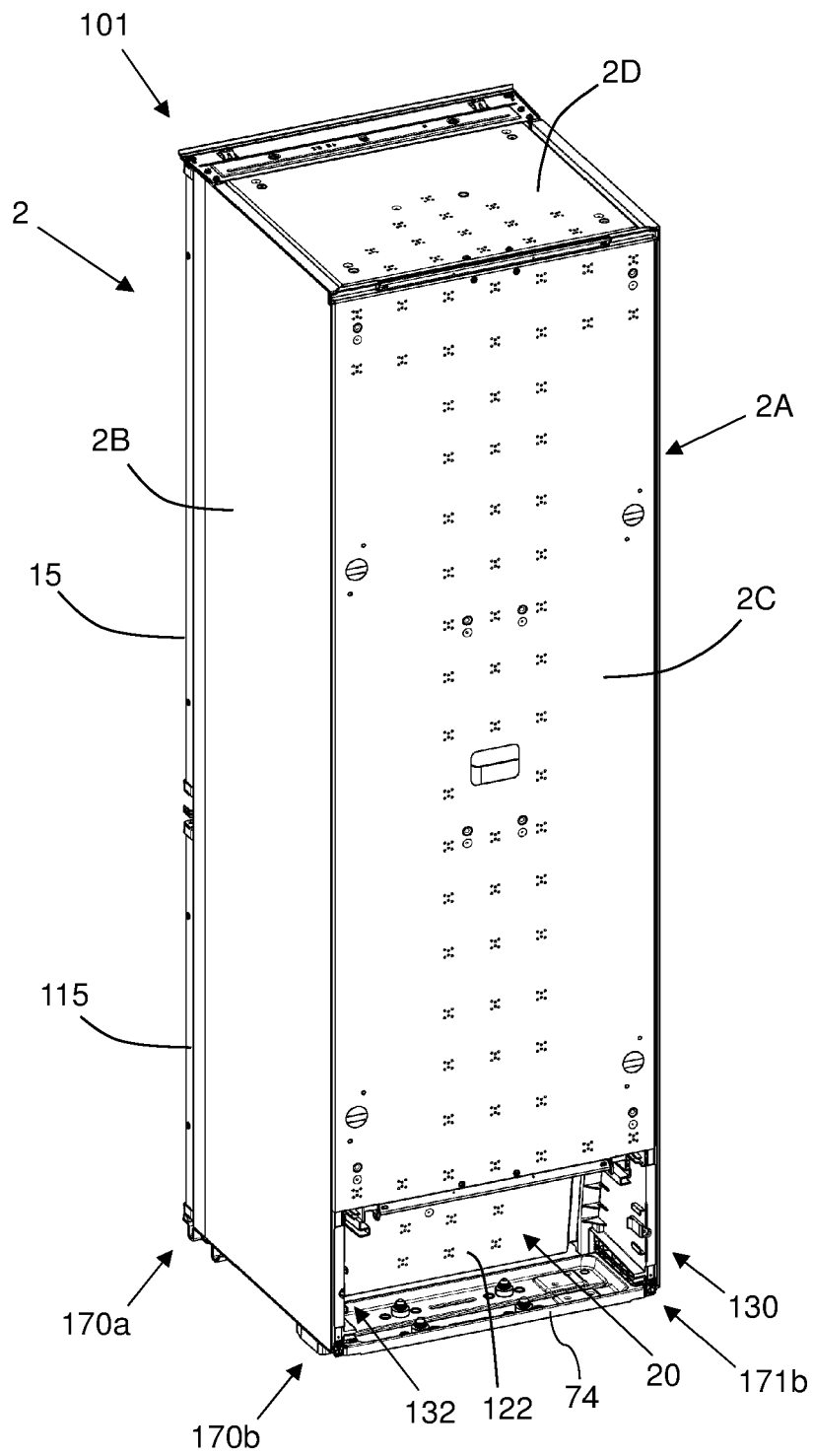


FIG. 9

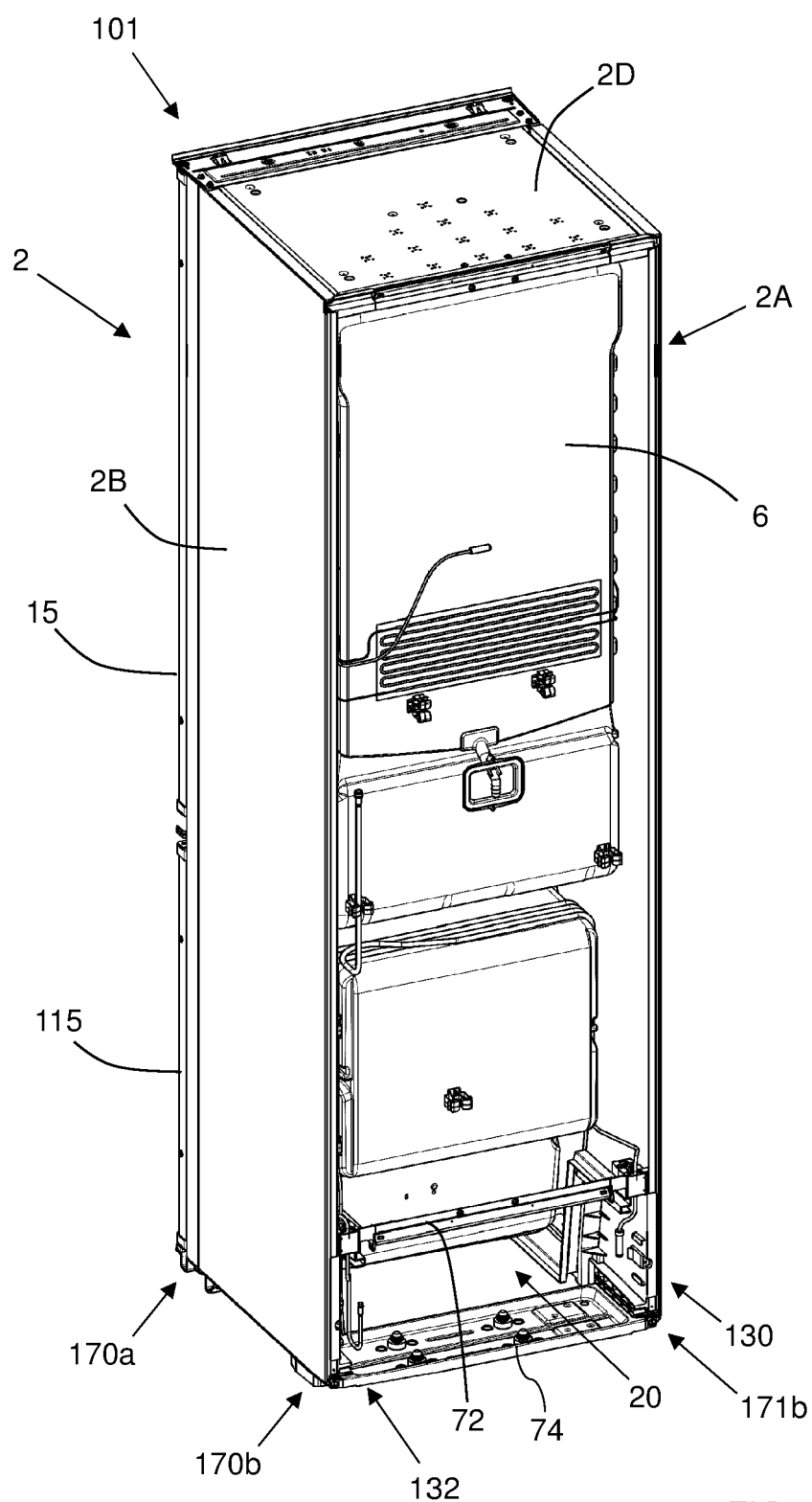


FIG. 10

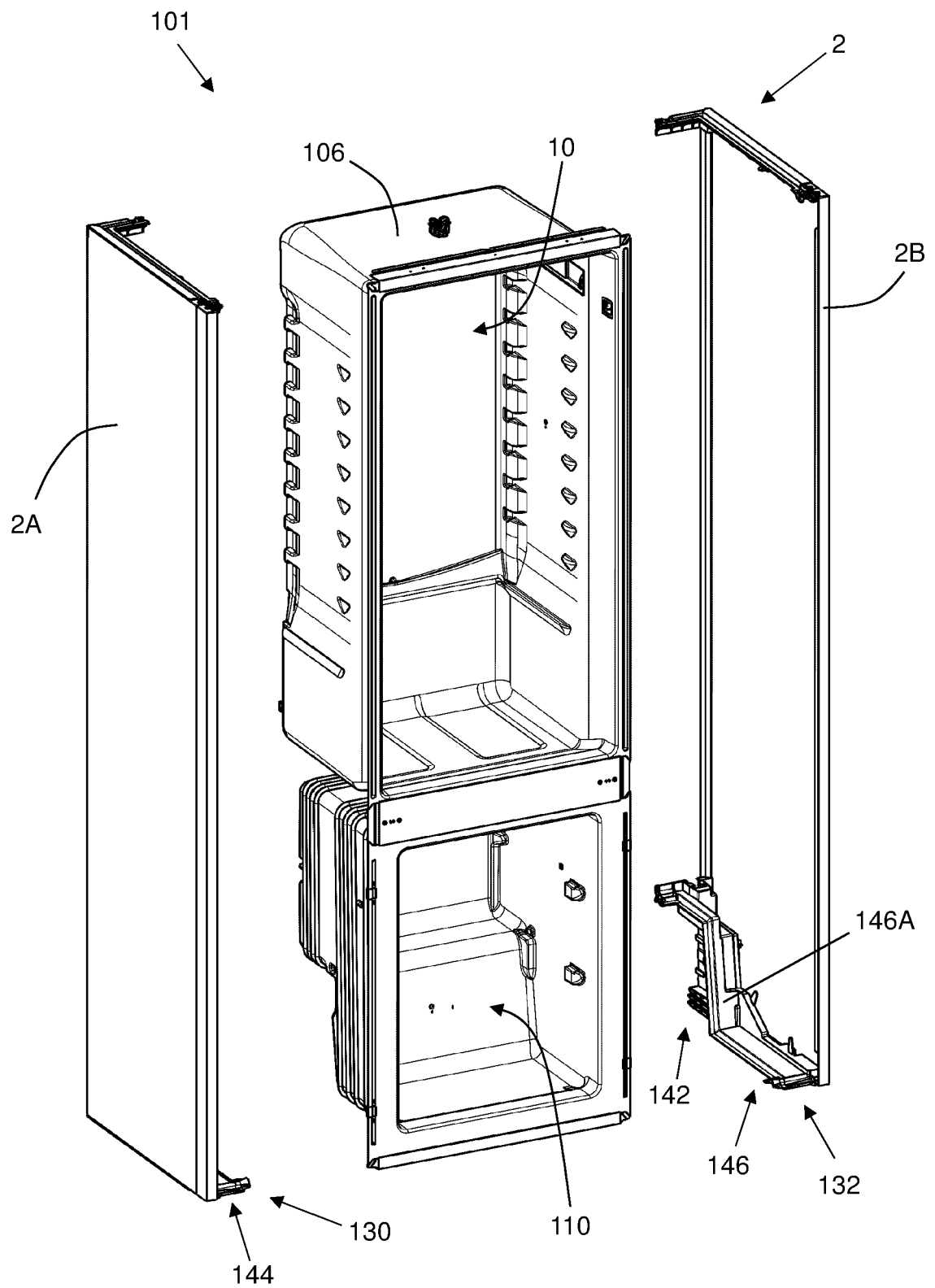


FIG. 11

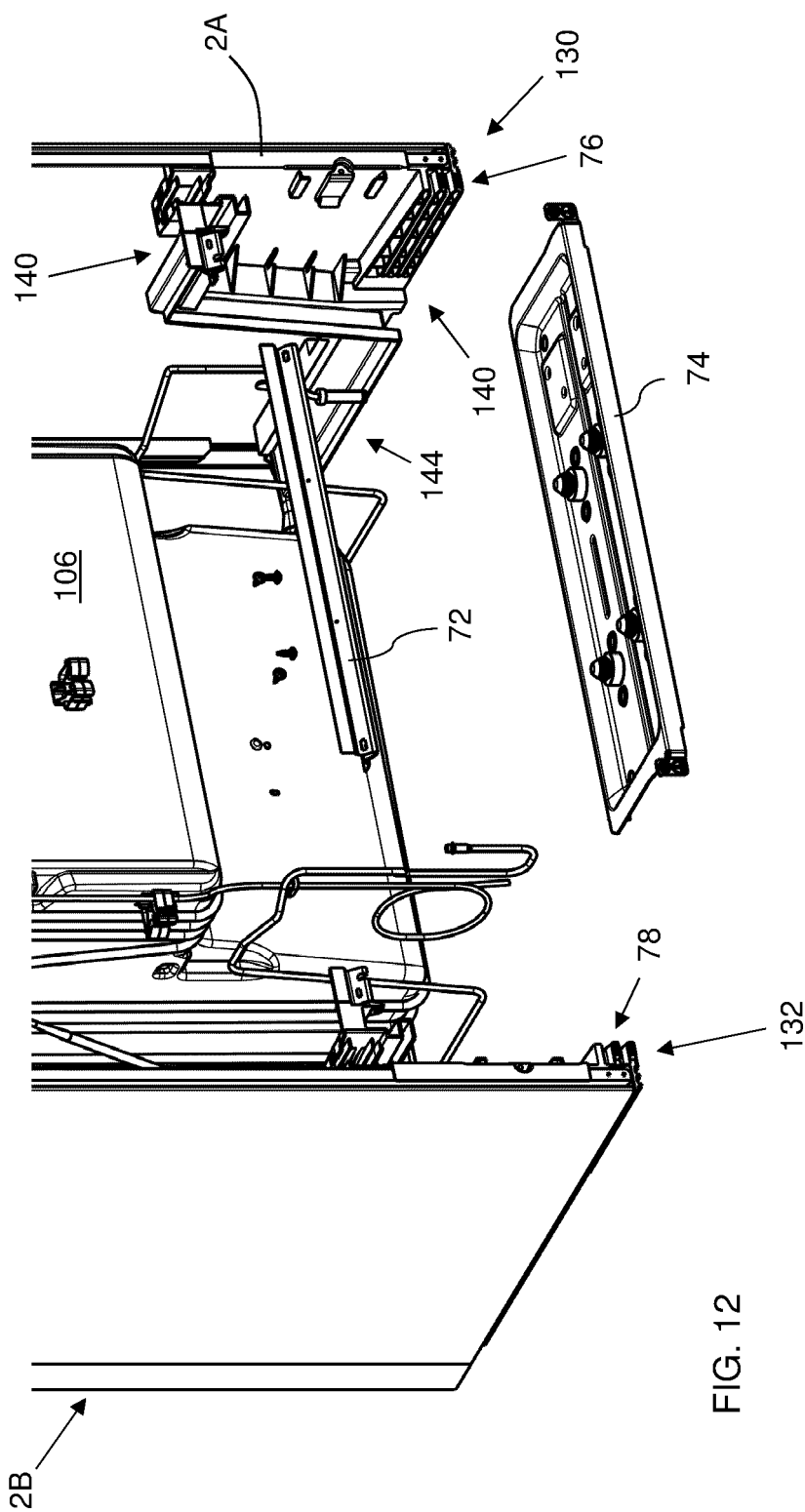
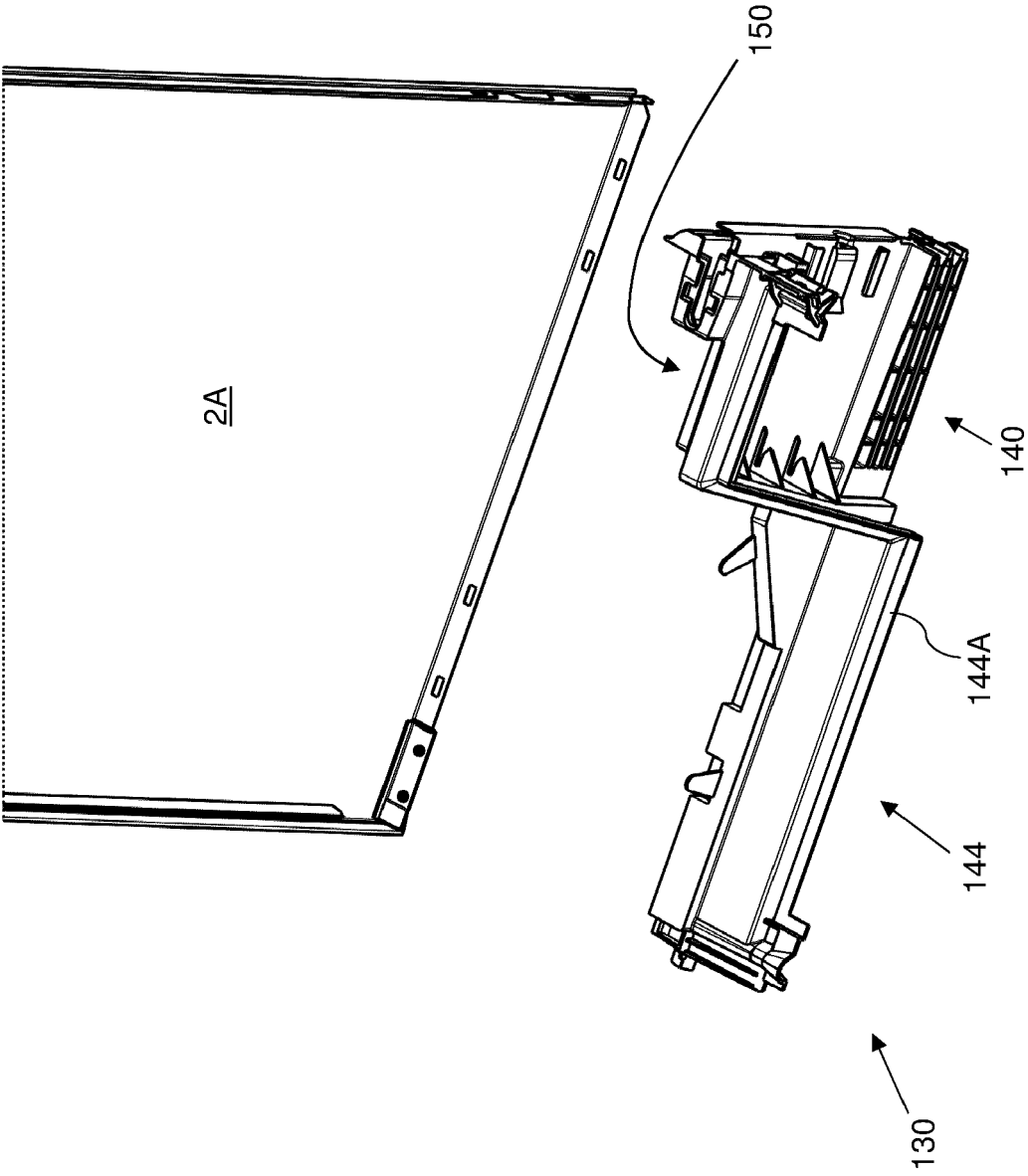


FIG. 12



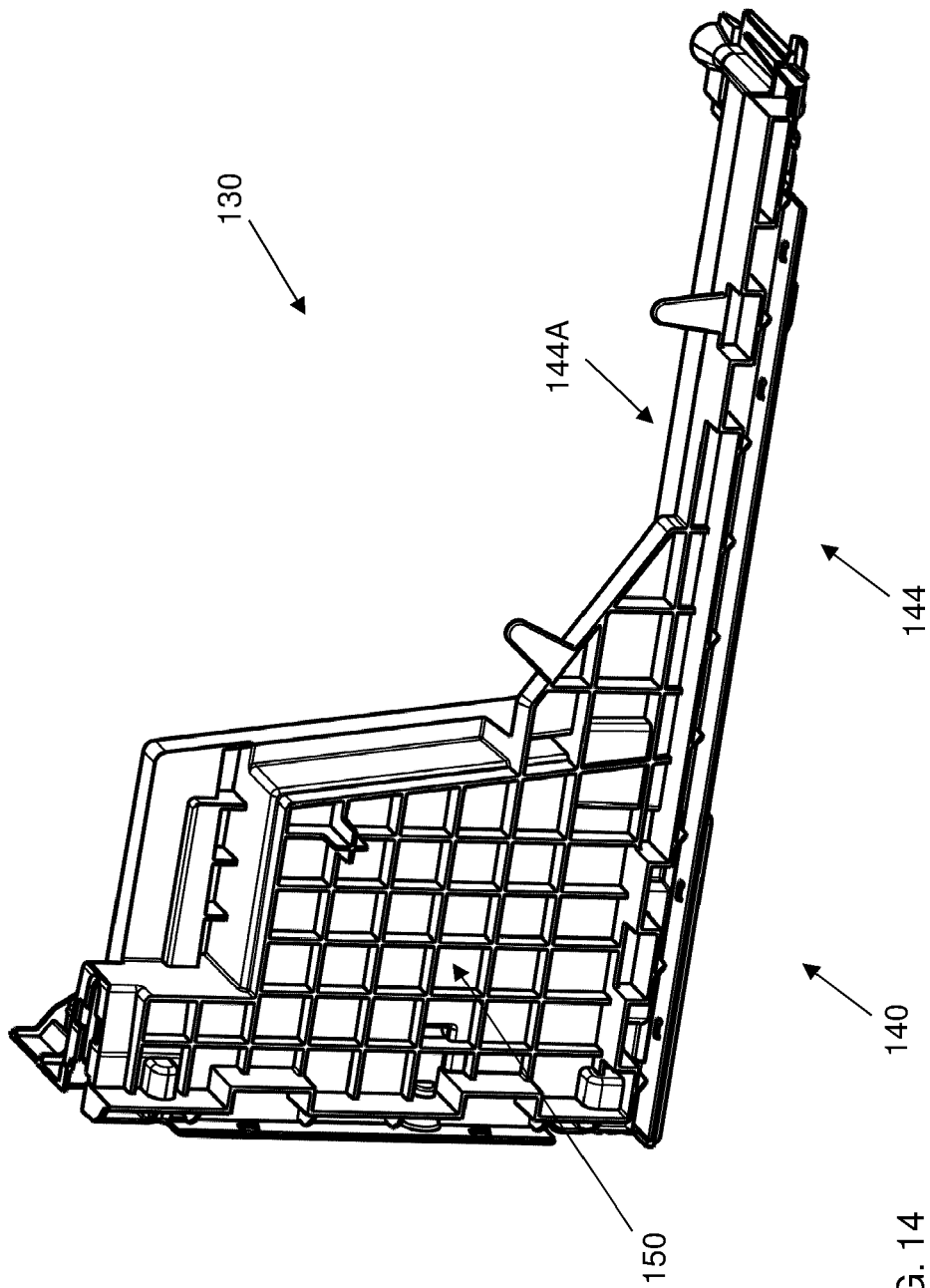


FIG. 14



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			F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 December 2021	Examiner Kuljis, Bruno
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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ON EUROPEAN PATENT APPLICATION NO.**

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