



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.05.2018 Bulletin 2018/20

(51) Int Cl.:
F25D 21/04 (2006.01)

(21) Application number: **17198919.7**

(22) Date of filing: **27.10.2017**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(72) Inventors:
• **TANDURA, Alberto**
33080 Porcia (PN) (IT)
• **GENTILE, Marco**
33080 Porcia (PN) (IT)
• **TONON, Matteo**
33080 Porcia (PN) (IT)

(30) Priority: **15.11.2016 IT 201600115344**

(74) Representative: **Electrolux Group Patents**
AB Electrolux
Group Patents
105 45 Stockholm (SE)

(71) Applicant: **ELECTROLUX APPLIANCES**
AKTIEBOLAG
105 45 Stockholm (SE)

(54) **REFRIGERATION APPARATUS, IN PARTICULAR A BUILT-IN APPARATUS, WITH AN ANTI-CONDENSATION SYSTEM**

(57) A refrigerating apparatus (1) comprising a casing or body (10) comprising an inner case (32) with an access aperture (34) adapted to define a compartment for storing goods to be cooled or frozen, and an outer case (80, 84, 86, 88, 90) that is externally coupled to said inner case (32). The internal case (32) comprises a front edge (66) having an outer side (68) and an inner side (69) and the outer case (80, 84, 86, 88, 90) comprises

an edge (85) that is coupled at the outer side (68) of the front edge (66).

A heating element (142) associated to the body (10) and adapted to prevent the formation of condensation between the body (10) and a door (140) closing the compartment.

The heating element (142) is accommodated at the inner side (69) of the front edge (66) of the inner case (32).

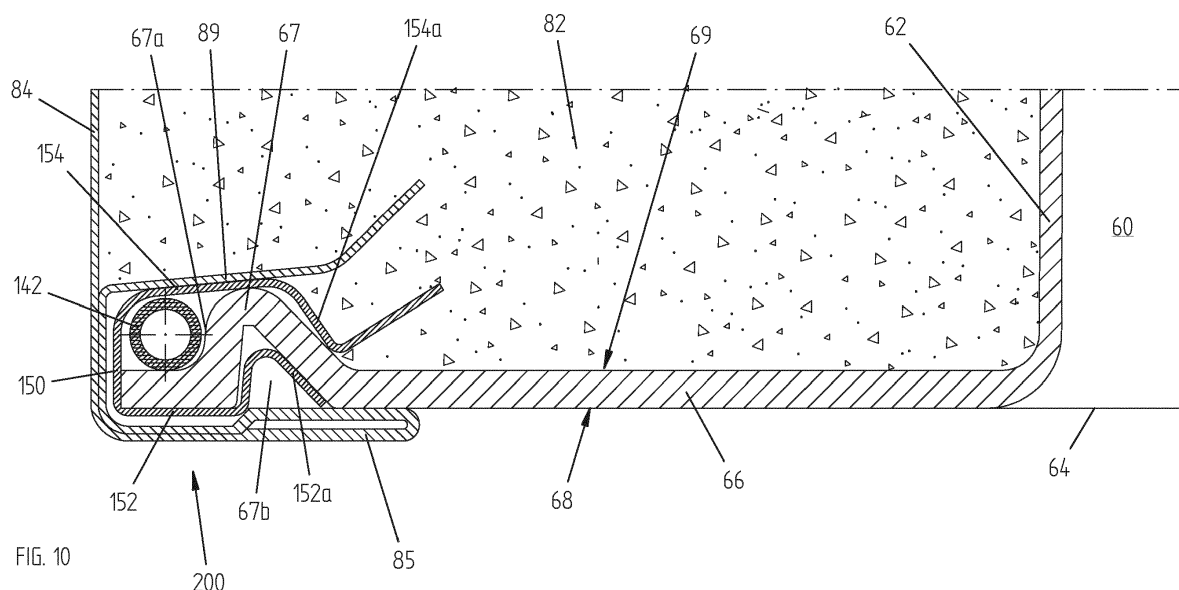


FIG. 10

Description

TECHNICAL FIELD OF THE INVENTION

[0001] This invention lies within the technical field of the production of refrigeration apparatuses, for example a refrigerator or a freezer or a combined solution. More particularly, this invention relates to the production of an anti-condensation system with which such apparatus is provided.

DESCRIPTION OF THE STATE OF THE ART

[0002] A first type of refrigeration apparatus of a known type, domestic and/or professional, comprises a casing provided with a refrigeration compartment adapted to keep the goods stored therein at a cooling temperature ranging typically between 1 ° and 10°C.

[0003] Another type of refrigeration apparatus of a known type, domestic and/or professional, comprises a casing equipped with a freezer compartment adapted to freeze the goods stored therein at a freezing temperature ranging typically between a temperature of -16° and -28°C. Typically, the freezer compartment is used to store goods for longer periods of time than the refrigeration compartment.

[0004] Other widespread refrigeration apparatuses are composed of solutions of a combined type that include the presence in the casing of a refrigeration compartment and a freezer compartment, typically arranged one above the other.

[0005] The refrigeration and/or freezer compartment, preferably box-shaped, is provided with an access aperture for the introduction/extraction of goods which is associated to a door for the hermetic closure of the compartment.

[0006] The apparatus can be provided with one door or several doors, for example one door for the refrigeration compartment and one door for the freezer compartment in the case of a combined system.

[0007] The refrigeration apparatuses of known type can constitute a stand-alone or free-standing product or can be built-in, meaning appropriately configured in order to be accommodated in special structures arranged within a certain environment, typically within a kitchen cabinet. This structure can completely hide the apparatus or, in other cases, accommodate it at least partly, for example by covering the side walls thereof and leaving the door or doors of the apparatus accessible.

[0008] In the following description general reference may be made to a compartment, which may mean indifferently a refrigeration compartment or a freezer compartment.

[0009] Due to the temperature difference between the inside and outside of the compartment, particularly at the access aperture, the generation/build-up of condensation water is known.

[0010] In order to prevent the formation of this conden-

sation water which, for example, in the case of a freezer compartment can freeze and prevent the door from opening, anti-condensation systems are known that use heating elements that serve to heat the mutual contact surfaces between the door and access aperture of the compartment so as to discourage/counteract the condensation that would occur on these surfaces if they were cold. These heating elements are therefore typically accommodated inside the casing near the mutual contact surfaces between the door and compartment.

[0011] The heating elements are typically composed of a portion of the refrigeration system pipe, appropriately shaped, within which flows the high-temperature liquid refrigerant.

[0012] A refrigeration apparatus provided with an anti-condensation system of a known type is shown in Figures 1A and 1B.

[0013] Such apparatus of known type has a product storage compartment defined within a casing or main body, comprising an inner case I and an outer case O, in which the compartment is defined by the inner case I appropriately shaped and provided with an open side for access thereto.

[0014] The inner case I is typically made of a plastics (polystyrene) material and the outer case O is typically made of a metallic material.

[0015] A door, not shown, is appropriately coupled, usually rotatably by means of hinges, to the outer case O in order to close the compartment and as much as possible maintain the temperature in its interior S.

[0016] The compartment is appropriately cooled by means of one or more evaporator elements, not shown, belonging to a refrigeration system.

[0017] A refrigeration system of known type is typically composed of a compressor, a condenser, an expansion valve and one or more evaporators. These elements are connected together by means of appropriate tubes within which the liquid refrigerant flows. As is known, in the refrigeration system there is a branch in which the liquid refrigerant that flows within the pipes is at low temperature, the branch comprising the evaporator, and a branch in which the temperature of the liquid refrigerant that flows within the tubes is at a higher temperature, the branch comprising the condenser downstream of the compressor.

[0018] In order to help maintain the temperature in the interior S of the compartment, the space of predetermined thickness W defined between the inner case I and the outer case O is filled with an insulating material such as foam (see Fig. 1 B). The outer case O is externally coupled to the inner case I at one of its edges OE that connects to a front edge (IE) of the inner case I. This front edge IE extends around the open side of the inner case I.

[0019] In this area, which also corresponds to the supporting area of the door when the latter is closed, is accommodated a heating element H that is fixed to the front edge IE of the inner case I. The heating element H corresponds to the tube of the cooling circuit in which the

liquid refrigerant flows at high temperature.

[0020] The heating element H is positioned externally to the front edge IE of the inner case I and as close as possible to the edge IE of the outer case O. In this way, the formation of condensation water on the outer surface of the outer case O is prevented, particularly on the outer surface of its edge OE.

[0021] A refrigeration apparatus provided with an anti-condensation system of this type is also described in US2015192347A1.

[0022] The applicant has pointed out that such a state-of-the-art apparatus has a few drawbacks.

[0023] One of the drawbacks found with this solution is represented by the fact that part of the heat produced by the heating element spreads along the edge of the outer case, reaching the interior of the compartment.

[0024] This spread is then further encouraged by the fact that the outer case is made of a metallic material that therefore has a good level of thermal conductivity. The heat that reaches the interior of the compartment reduces the energy efficiency of the apparatus or, in other words, requires a larger amount of energy to maintain the desired temperature value inside the compartment.

[0025] This reduction in efficiency is even more obvious in built-in apparatuses because the space between the inner and outer case has a smaller thickness than the free-standing solutions and so the heating element is accommodated in a closer position to the compartment.

[0026] The situation is then particularly critical due to the difficulty of controlling the temperature of the liquid refrigerant inside the heating element, which can reach high levels making the above-mentioned drawback more obvious.

[0027] The aim of the present invention is therefore to resolve the drawbacks of the known art.

[0028] One aim of the present invention is to produce a refrigeration apparatus, particularly a built-in apparatus, provided with an anti-condensation system that has a higher energy efficiency than the apparatuses of known type, while maintaining the advantages that said system affords.

SUMMARY OF THE PRESENT INVENTION

[0029] The applicant has found that by producing a refrigeration apparatus having a compartment for storing goods comprising an inner case and an outer case externally coupled to the inner case in which a heating element is accommodated at an inner side of the inner case, it is possible to improve the energy efficiency of the apparatus compared to the apparatuses of known type. In its first aspect, the present invention therefore refers to a refrigeration apparatus comprising:

- a casing or body comprising an inner case with an access aperture adapted to define a compartment for storing goods to be cooled or frozen, and an outer

case that is externally coupled to said inner case so as to define an insulating space therebetween, which is filled with an insulating material, said inner case comprising a front edge extending around said access aperture, said front edge having an outer side and an inner side facing said insulating space, wherein said outer case comprises an edge which is coupled at said outer side of said front edge of said inner case;

- a door for the hermetic closure of said access aperture of said compartment, said door being adapted to be disposed in abutment against said edge of said outer case;
- a heating element associated to said body and adapted to prevent the formation of condensation between said body and said door;

wherein said heating element is accommodated at said inner side of said front edge of said inner case and inside said insulating space.

[0030] According to a first preferred embodiment, the heating element is embedded in the insulating material.

[0031] Preferably, the heating element is arranged in contact with the inner side of the front edge of the inner case.

[0032] In a preferred embodiment, the door is associated to said body, preferably to the outer case.

[0033] According to a preferred embodiment of the invention, the apparatus comprises a refrigeration system comprising a compressor, a condenser, a lamination element and one or more evaporators, said elements of the refrigeration system being coupled by means of tubes within which flows a liquid refrigerant.

[0034] Preferably, the heating element is composed of a portion of the tubes of said refrigeration system arranged downstream of the compressor and upstream of the lamination element.

[0035] More preferably, the heating element is composed of a portion of the tubes of said refrigeration system arranged downstream of the condenser and upstream of the lamination element.

[0036] In a preferred embodiment, the front edge comprises one or more indented areas adapted to define a housing area for the heating element, more preferably adapted to define a supporting surface for the heating element.

[0037] According to a preferred embodiment of the invention, the apparatus comprises a fixing device for fixing the heating element to the inner case.

[0038] Preferably, the fixing device allows the fixing of the heating element to the front edge of the inner case.

[0039] In a preferred embodiment, the fixing device comprises at least one clip.

[0040] Preferably, the clip comprises a first portion adapted to be disposed in abutment with the outer side of the front edge and a second portion adapted to contact at least partially the heating element. More preferably, the first portion of the clip comprises a bent portion adapt-

ed to be inserted in snap-in manner and in abutment to the outer side of the front edge and/or the second portion comprises a bent portion adapted to be engage in a snap-in manner the inner side of the front edge.

[0041] In a preferred embodiment, the inner case is made of a plastics material and/or the outer case is made of a metallic material.

[0042] Preferably, the apparatus of the invention is a built-in apparatus and the outer case is shaped to be received in a containment structure.

[0043] In a second of its aspects, the present invention relates to an assembly comprising a containment structure and a refrigeration apparatus, wherein said apparatus is made in accordance with that described above.

BRIEF DESCRIPTION OF THE FIGURES

[0044] Further features and advantages of the present invention will be explained below by means of one of the preferred but not exclusive embodiments thereof illustrated, by way of non-limiting example, with reference to the accompanying drawings.

[0045] In the drawings, characteristics and/or corresponding or equivalent component parts of the present invention are identified by the same reference numerals. In particular, in the Figures:

- Fig. 1A shows in an axonometric view of a component of a refrigeration apparatus according to the known art;
- Fig. 1B shows a cross-sectional view of a detail of the component in Fig. 1 A Aalong section plane I°-I°;
- Fig. 2 is an axonometric view of a built-in refrigeration apparatus inserted in a containment structure according to a preferred embodiment of the invention;
- Fig. 3 shows the assembly in Figure 2 with the doors of the refrigeration apparatus open;
- Fig. 4 is a partially exploded view of the assembly in Figure 3;
- Fig. 5 shows the refrigeration apparatus in Figure 4 isolated from the rest and with some elements removed from its interior;
- Fig. 6 shows a plan view from the back of the refrigeration apparatus in Figure 5;
- Fig. 7 shows an exploded view from the back of the refrigeration apparatus in Figure 5;
- Fig. 8 shows the refrigeration apparatus in Fig. 7 partially assembled and with some elements removed;
- Fig. 8a shows an enlarged detail of Figure 8;
- Fig. 9 shows an exploded view of some of the parts in Figure 8;
- Fig. 10 shows a detail of the cross-sectional view in Fig. 5 along section plane X°-X°;
- Fig. 11 shows an enlarged detail of an element in Figure 9.

DETAILED DESCRIPTION OF AN EMBODIMENT

OF THE PRESENT INVENTION

[0046] Despite the fact that the present invention is described below with reference to its preferred embodiment shown in the drawings, the present invention is not limited to the embodiment described below and shown in the Figures. On the contrary, the embodiment described and shown clarifies a few aspects of the present invention, the scope of which is defined by the claims.

[0047] The present invention has proved to be particularly advantageous in the production of a built-in refrigeration apparatus, described below, comprising a casing equipped with a freezer compartment and a refrigerator compartment opening frontally, arranged one above the other, and provided with corresponding vertical closing doors. It should be noted, however, that the present invention is not limited to this embodiment. On the contrary, the application of the present invention is advantageous in refrigeration apparatuses in general comprising a casing comprising at least one refrigeration compartment and/or at least one freezer compartment with a closing door appropriately associated to said compartment, of any shape and/or position.

[0048] Figure 1 shows a built-in refrigeration apparatus assembled within a containment structure 100 according to a preferred embodiment of the invention.

[0049] In the embodiment shown here, the containment structure 100 is composed of a unit element, better illustrated in Figure 4, preferably comprising a box-shaped structure having two parallel side walls 101 a, 101 b, one top wall 101 c and one bottom wall 101 d. The space defined by these walls preferably corresponds to the external shape of the refrigeration apparatus 1 to be contained.

[0050] The refrigeration device 1 is preferably fixed to the structure 100 by means of appropriate connection means (not shown).

[0051] It is obvious that in variations, the containment structure may be differently produced, either on the basis of the actual shape of the refrigeration apparatus to be received, or on the basis of the different aesthetic and/or assembly requirements.

[0052] The built-in refrigeration apparatus 1, hereinafter for the sake of simplicity indicated only as apparatus 1, preferably comprises a casing or body 10 in which are preferably identified a refrigerator compartment 30 and a freezer compartment 60.

[0053] The apparatus 1 shown and described here refers therefore to a combined solution in which the refrigeration compartment 30 is preferably positioned above the freezer compartment 60.

[0054] In variations, not shown, different solutions can be envisaged comprising a different number of refrigerator and/or freezer compartments, possibly even just one.

[0055] The refrigerator compartment 30, as is known,

is preferably adapted to keep the goods stored therein at a cooling temperature typically within a temperature range of between 1° and 10°C.

[0056] The freezer compartment 60, as is known, is capable preferably of freezing the goods stored therein at a freezing temperature typically within a temperature range of between -16°C and -28°C.

[0057] As shown in Figure 5, the casing or body 10 comprises an inner case 32 with a corresponding access aperture 34 adapted to define said refrigerator compartment 30, and an inner case 62 with respective access aperture 64 adapted to define said freezer compartment 60.

[0058] Inside the refrigerator compartment 30 and freezer compartment 60, appropriate supporting shelves and/or drawers are arranged.

[0059] In the view in Figure 5, the compartments 30, 60 are shown empty, in other words without said shelves and/or drawers.

[0060] The inner cases 32, 62 are preferably made of a polymer plastics material, such as polystyrene PS.

[0061] The inner cases 32, 62 are also normally referred to as inner liners.

[0062] In the preferred embodiment shown and described here, the two inner cases that define the refrigerator compartment and freezer compartment respectively are composed of two separate elements. In variations, not shown, the two inner cases may belong to the same monolithic body.

[0063] The body 10 comprises an outer case 80 externally coupled to the inner cases 32, 62 in order to define in relation to these inner cases 32 a space 82.

[0064] The outer case 80 also defines the visible outer part, before its insertion into the structure 100, of the apparatus 1.

[0065] The outer case 80 is preferably made, at least partially, of a metallic material, such as magnetic steel or magnetic enameled sheet metal.

[0066] The outer case 80 preferably comprises two side walls 84, 86, a top wall 88, a bottom wall 90 and a back wall 92.

[0067] The apparatus 1 preferably comprises a top door 120 associated to the access aperture 34 of the refrigerator compartment 30 and a bottom door 140 associated to the access aperture 64 of the freezer compartment 60 that enables the hermetic closure of the respective compartments 30, 60. In a variation, a single door adapted to close both compartments could be envisaged.

[0068] The doors 120, 140 are preferably connected rotatably to the body 10, more preferably to the outer case 80.

[0069] The doors 120, 140 are preferably connected rotatably by means of hinges.

[0070] In order to enable the hermetic closure of compartments 30, 60, the doors 120, 140 are preferably provided with seals 122, 144 arranged around their inner

surface facing said compartments 30, 60 and in a position such as to create a hermetic closure of the doors 120, 140 against an edge 85 of the outer case 80, as better described below.

[0071] Furthermore, preferably, each seal 122, 144 is provided with magnetic elements, not visible in the Figures, adapted to perform a magnetic action in order to keep the door shut when the seals 122, 144 rest on the edge 85 of the outer case 80. Clearly, such an arrangement presupposes that the outer case 80, or at least its edge 85 or part thereof, is made of a ferromagnetic material. The apparatus 1 also comprises a refrigeration system 160 for cooling the compartments 30, 60, preferably comprising a compressor 162, a condenser 164, a lamination element (not shown) and one or more evaporators 166, 168, preferably associated to the refrigerator compartment 30 and to the freezer compartment respectively, visible for example in Figures 6 and 7.

[0072] The elements of the refrigeration system 160 are connected together by means of appropriate tubes within which flows the liquid refrigerant.

[0073] The evaporators 166, 168 are preferably composed of a tube made of a material having good thermal conductivity (for example metals such as aluminum or copper), which is appropriately shaped to interact with the respective compartment to be cooled or frozen.

[0074] In some embodiments, for example, the tube that constitutes the evaporator winds externally round the inner case that defines the compartment, as in the present embodiment. In variations, the evaporator or evaporators can be associated to the respective compartment in a different way, for example housed partially or totally inside the compartment itself. Ventilation systems may also be present, capable of appropriately conveying cold air generated by said evaporators into the compartments.

[0075] The compressor 162 is preferably accommodated in the back part of the apparatus, preferably outside the outer case 80.

[0076] The refrigeration system 160 comprises a heating element 142 comprising a portion of tube inside which flows the liquid refrigerant.

[0077] This heating element 142 preferably comprises a portion of the tube located downstream of the compressor 162 and upstream of the lamination element.

[0078] In the embodiment of the present invention shown in the accompanying Figures, the heating element 142 preferably comprises a portion of the tube downstream of the compressor 162 that connects the condenser 164 to the lamination element.

[0079] The heating element 142 is used in an anti-condensation system 200 preferably associated to the freezer compartment 60, as shown and described in detail below.

[0080] As previously said, the outer case 80 is externally coupled to the inner cases 32, 62 so as to define a space (82) therebetween.

[0081] This space 82 advantageously defines and in-

insulating space and is preferably filled with an insulating material that facilitates as much as possible the maintenance of the temperature inside the compartments 30, 60. The insulating material preferably comprises an expanded material, more preferably a polyurethane foam.

[0082] In particular, the side walls 84, 86 of the outer case are coupled at the front, and at least partially, to the inner cases 32, 62.

[0083] Figure 10 shows the detail of the coupling area between the left side wall 84 and the inner case 62 of the freezer compartment 60.

[0084] The inner case 62 preferably comprises a front edge 66 that extends around the access aperture 64. The front edge 66 is preferably arranged, in operating conditions, i.e. when the apparatus 1 is switched on, on a vertical plane and substantially defines a frame for said access aperture 64.

[0085] The front edge 66 has an outer side 68 and an inner side 69, the latter facing the insulating space 82.

[0086] To the outer side 68 of the front edge 66 is coupled the edge 85 of the outer case 80.

[0087] The edge 85 is preferably made by means of a bent profile of the side part 84. As previously stated, on the edge 85 of the outer case 80 rests the seal 122, 144 of the door 120, 140 when the latter is in its closed position.

[0088] According to one aspect of the present invention, associated to said coupling area between the inner case 62 and the outer case 80, or side wall 84, is the anti-condensation system 200.

[0089] In particular, the heating element 142 of the anti-condensation system 200 is accommodated at the inner side 69 of the front edge 66, inside the insulating space 82. Preferably, the heating element 142 is embedded in the insulating material.

[0090] In the embodiment shown here, the heating element 142 preferably extends substantially along the entire front edge 66 of the inner case 62 (on its inner side 69) of the freezer compartment 60, as can be appreciated from the view shown in Fig. 9.

[0091] In alternative variations, the heating element could include lower sections of the front edge.

[0092] In other variations, the front edge too of the inner case that defines the refrigerator compartment could be equipped with a similar heating element. However, the need for an anti-condensation system is particularly strong in respect of the freezer compartment.

[0093] In fact, due to the difference in temperature between the inside and outside of the compartment 60, particularly at the edge 85 of the outer case 80 where the seal 122, 144 of the door 120, 140 rests, condensation water tends to form.

[0094] The presence of the heating element 142 allows thermal energy to be transmitted towards these areas in order to evaporate the humidity which is the cause of condensation water and in general to heat these areas so as to bring their temperature closer to ambient temperature and thus discourage the buildup of condensa-

tion thereon.

[0095] Advantageously in the present solution, compared to the known art, in the route of transmission of the heat between the heating element 142 and the edge 85 of the outer case 80 is also located the front edge 66 of the inner case 62, which, being made of a plastics material (such as polystyrene), presents a certain thermal resistance and in general a thermal resistance greater than the metal of which the edge 85 is composed. Consequently, the heat generated by the heating element 142 is partly shielded by the inner case 62 and reaches at a lower percentage the edge 85 of the outer case 80. The applicant has found that the amount of heat that reaches the edge 85 is however sufficient to fulfill the desired anti-condensation purpose. It has also been found that at the same time the amount of heat produced by the heating element 142 that is instead spread along the edge 85 of the outer case 80 towards the inside of the compartment 60 is reduced compared to the known art, and has a minimal or no influence on the increase in temperature inside the compartment 60. Thus, advantageously, the problem found in the know art is overcome because a smaller amount of heat, substantially negligible for the purposes of increasing the temperature inside the compartment 60, reaches the inside of the compartment 60.

[0096] The energy efficiency of the apparatus 1 is therefore higher than the systems of know type previously described.

[0097] In the embodiment shown here, the heating element 142 is preferably in contact with the inner side 69 of the front edge 66.

[0098] In advantageous variations, however, the heating element need not necessarily be placed in contact with the front edge but arranged inside the insulating space at a certain distance from the front edge. This distance will be appropriately chosen so that the heat generated by the heating element that reaches the edge of the outer case is sufficient to fulfill the desired anti-condensation purpose.

[0099] In order to ease the positioning of heating element 142 along the front edge 66 of the inner case 62, the front edge 66 comprises one or more indented areas 67 adapted to define a housing area for the heating element 142 and preferably to define a supporting surface 67a for the heating element 142.

[0100] In the embodiment shown here, there are preferably four indented areas 67, one for each side of the front edge.

[0101] In advantageous variations, these areas can extend differently and comprise one or more sections along the front edge. In other variations, these indented areas might not be present.

[0102] According to a second aspect of the present invention, the heating element 142 of the anti-condensation system is fixed to the front edge 66 of the inner case 62 and preferably to its inner edge 69, by means of a fixing device preferably comprising one or more clips 150.

[0103] The clip 150, preferably two or more per side (two per side in the embodiment shown), preferably comprises a first portion 152 adapted to be disposed in abutment with said outer side 68 of said front edge 66 and a second portion 154 adapted to contact at least partially said heating element 142 and to hold it preferably in abutment against the supporting surface 67a of the indented portions 67.

[0104] The clip 150 is substantially U-shaped.

[0105] The first portion 152 of the clip 150 then preferably has a bent portion 152a adapted to be inserted in a snap-in manner into the rib 67b defined externally by the indented portion 67. The second portion 154 of the clip 150 then preferably has a bent portion 154a adapted to engage in a snap-in manner onto the indented portion 67. This encourages the hold of the clip 150 on the front edge 66.

[0106] Preferably, the clips 150 keep the heating element 142 in contact with the inner surface 69 of the front edge 66, particularly during the production phases when the insulating material is injected into the insulating space 82.

[0107] Advantageously, the clips 150 encourage the automation of the phases of production of the apparatus 1, more particularly the phases of fitting the heating element 142 to the front edge 66. In fact, after having positioned, by means of a robot for example, the heating element 142 in contact with the front edge 66, said heating element 142 can be fixed by automatic positioning of the clips 150, by manipulator robots, for example, or some other automatic device.

[0108] Furthermore, preferably, a portion of the outer case 80, more particularly preferably a portion of the side wall 84, comprises an internally projecting wing 89 adapted to wrap at least partially round the heating element 142 and the fitting clips 150.

[0109] In the embodiment shown here, the wing 89 is preferably composed of an extension of the bent edge 85.

[0110] Advantageously, this projecting wing 89 allows the reciprocal connection of the side wall 84 of the outer case 80 to the front edge 66 of the inner case 62 and allows them to be held in the correct mutual position, particularly during the production phases when the insulating material is injected into the insulating space 82.

[0111] Furthermore, this projecting wing 89 advantageously encourages the heating element 142 to be held in place, particularly during the production phases when the insulating material is injected into the insulating space 82.

[0112] Again advantageously, during the reciprocal phases of fitting the side wall 84 of the outer case 80 to the front edge 66 of the inner case 62, fitting the side wall 84 and positioning the projecting wing 89 in the desired position, i.e. as shown in Figure 10, clips 150 are preferred that act as an invitation for the wing 89 during the movement of the side wall 84 towards the front edge 66.

[0113] The clips 150 also encourage automation of the phases of production of the apparatus 1, more particu-

larly the phases of fitting the side wall 84 to the front edge 66 of the inner case 62.

[0114] In advantageous variations, however, this wing need not necessarily be present.

[0115] It has therefore been shown that the present invention allows the preestablished aims to be achieved. In particular, it allows a refrigeration apparatus with a higher energy efficiency than the apparatuses of known type to be produced.

[0116] Although this invention has been described with reference to the particular embodiment shown in the Figures, it should be noted that the present invention is not limited to the particular embodiment represented and described. On the contrary, additional variations of the embodiment described fall within the scope of the present invention, a scope defined by the claims.

Claims

1. A refrigerating apparatus (1) comprising:

- a casing or body (10) comprising an inner case (32) with an access aperture (34) adapted to define a compartment for storing goods to be cooled or frozen, and an outer case (80, 84, 86, 88, 90) that is externally coupled to said inner case (32) so as to define an insulating space (82) therebetween, which is filled with an insulating material, said inner case (32) comprising a front edge (66) extending around said access aperture (34), said front edge (66) having an outer side (68) and an inner side (69) facing said insulating space (82), wherein said outer case (80, 84, 86, 88, 90) comprises an edge (85) which is coupled at said outer side (68) of said front edge (66) of said inner case (32);
- a door (140) for the hermetic closure of said access aperture (34) of said compartment, said door (140) being adapted to be disposed in abutment against said edge (85) of said outer case (80, 84, 86, 88, 90);
- a heating element (142) associated to said body (10) and adapted to prevent the formation of dew condensation between said body (10) and said door (140);

characterized in that said heating element (142) is accommodated at said inner side (69) of said front edge (66) and inside said insulating space (82).

2. Apparatus (1) according to claim 1), **characterized in that** said heating element (142) is embedded in said insulating material.

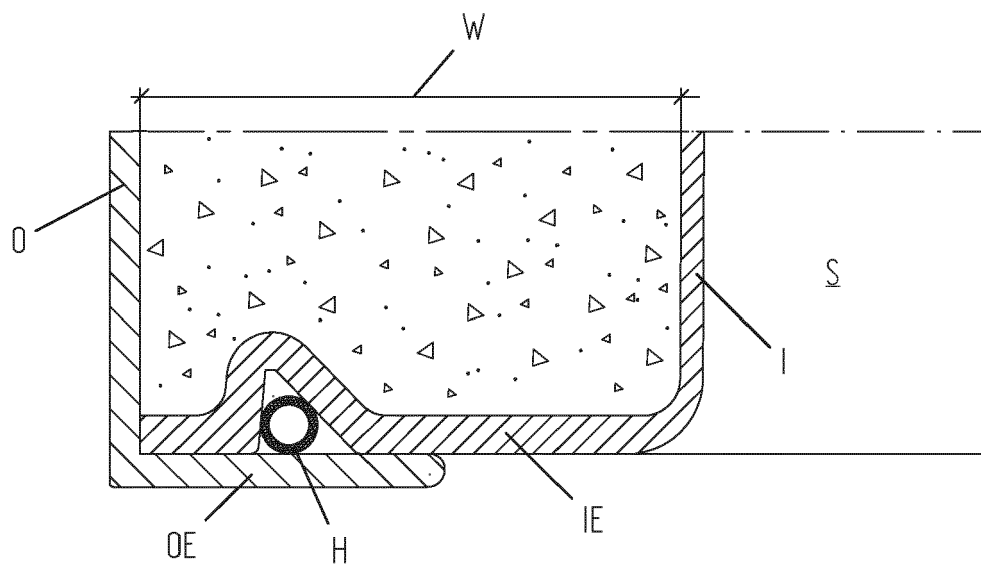
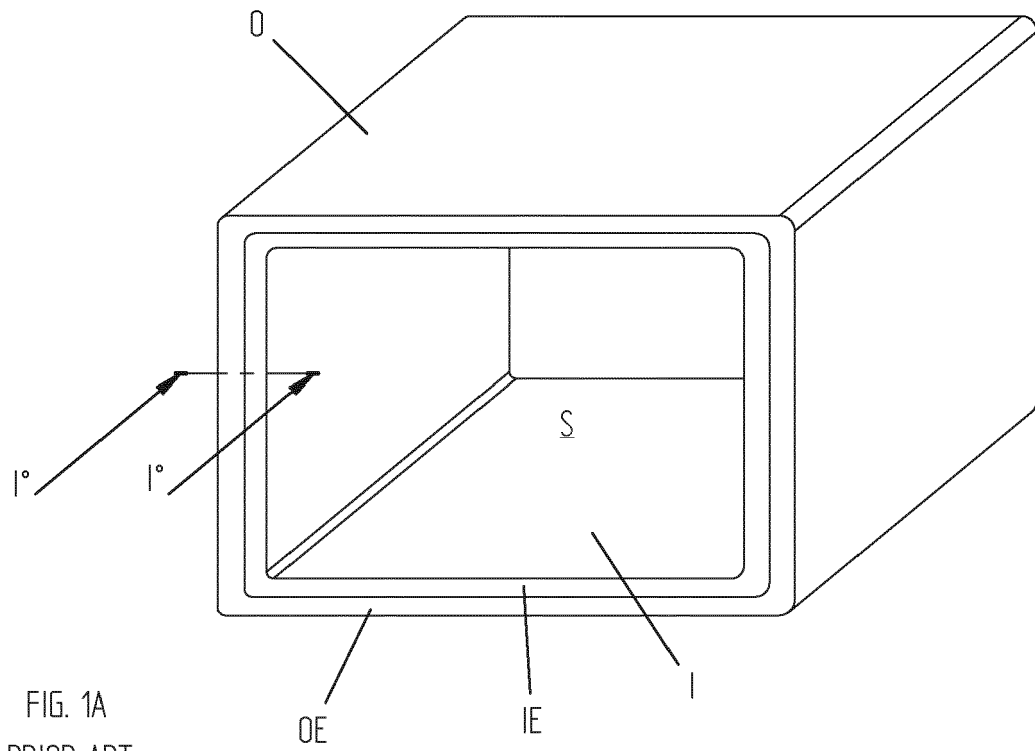
3. Apparatus (1) according to any one of the preceding claims, **characterized in that** said heating element (142) is arranged in contact with said inner side (69)

of said front edge (66) of said inner case (32).

4. Apparatus (1) according to any one of the preceding claim, **characterized in that** said front edge (66) comprises one or more indented areas (67) adapted to define a housing area for said heating element (142), more preferably adapted to define a supporting surface (67a) for said heating element (142). 5
5. Apparatus (1) according to any one of the preceding claims, **characterized in that** it comprises a fixing device for fixing said heating element (142) to said inner case (32). 10
6. Apparatus (1) according to claim 5), **characterized in that** said fixing device allows the fixing of said heating element (142) to said front edge (66) of said inner case (32). 15
7. Apparatus (1) according to claim 5) or 6), **characterized in that** said fixing device comprises at least one clip (150). 20
8. Apparatus (1) according to claim 7), **characterized in that** said clip (150) comprises a first portion (152) adapted to be disposed in abutment with said outer side (68) of said front edge (66) and a second portion (154) adapted to contact at least partially said heating element (142). 25
30
9. Apparatus (1) according to claim 8), **characterized in that** said first portion (152) of said clip (150) comprises a bent portion (152a) adapted to be inserted in snap-in manner and in abutment to said outer side (68) of said front edge (66) and/or said second portion (154) comprises a bent portion (154a) adapted to engage in a snap-in manner said inner side (69) of said front edge (66). 35
10. Apparatus (1) according to any one of the preceding claim, **characterized in that** it is a built-in apparatus (1) and **in that** said outer case (80, 84, 86, 88, 90) is shaped to be received in a containment structure (100). 40
45

50

55



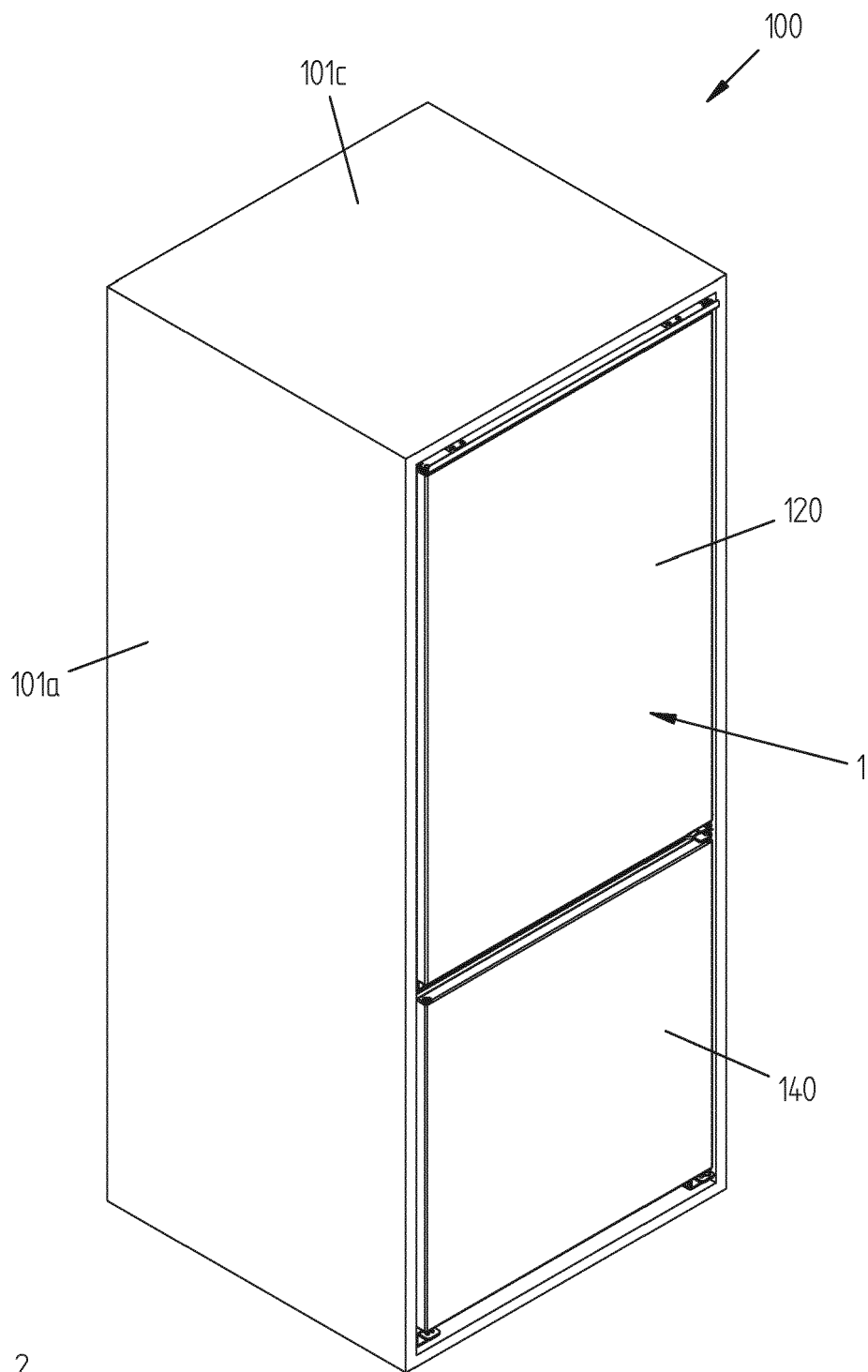
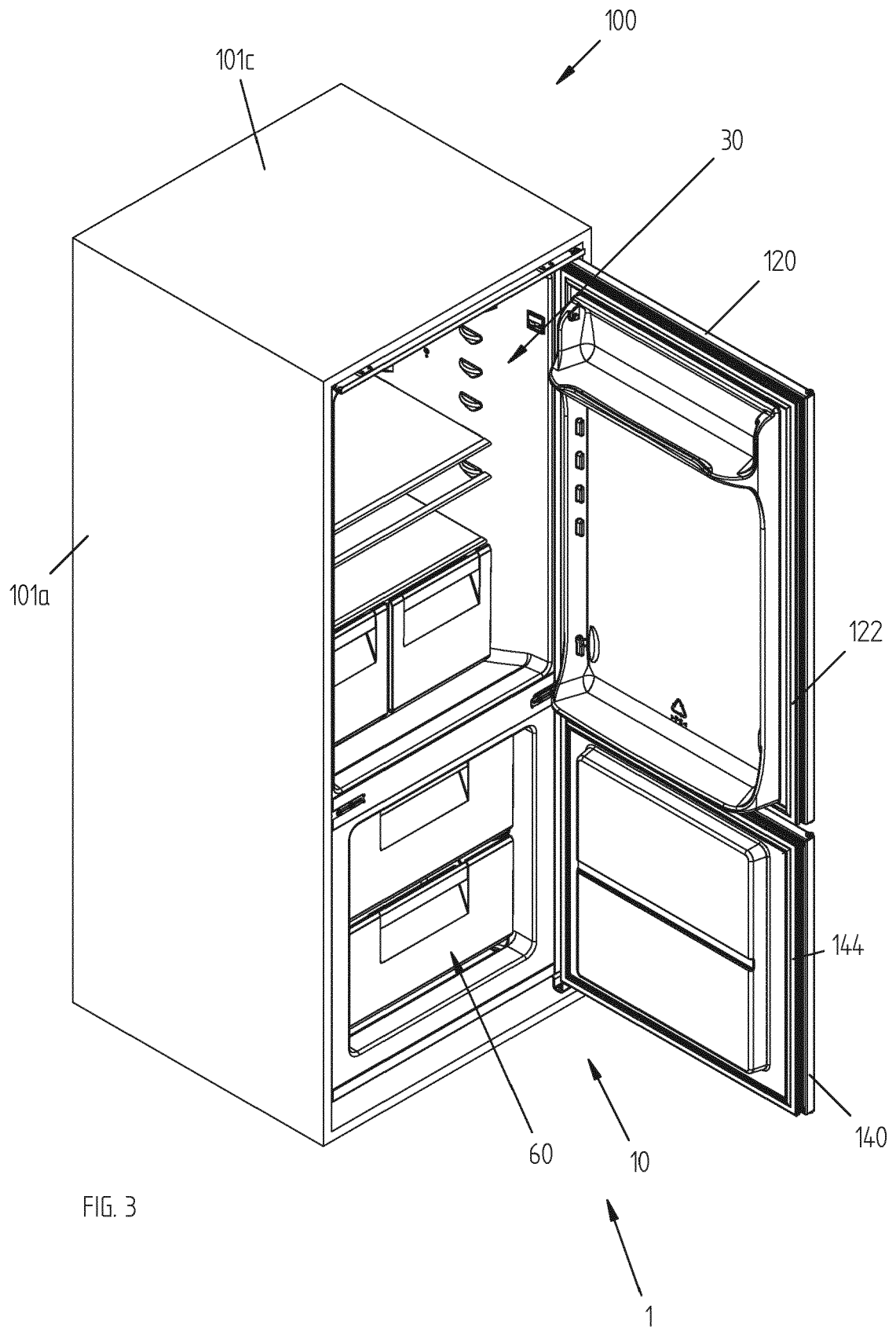
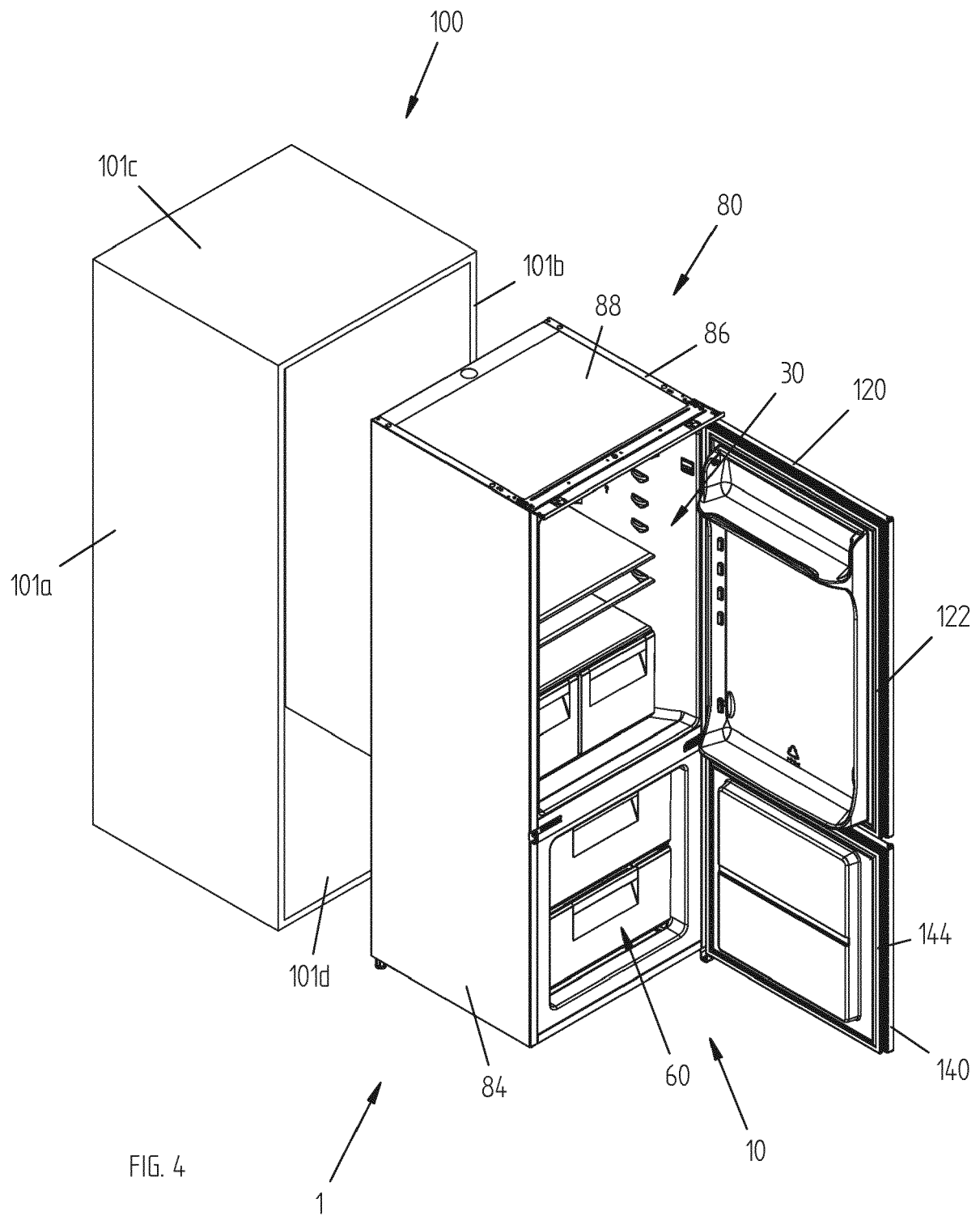


FIG. 2





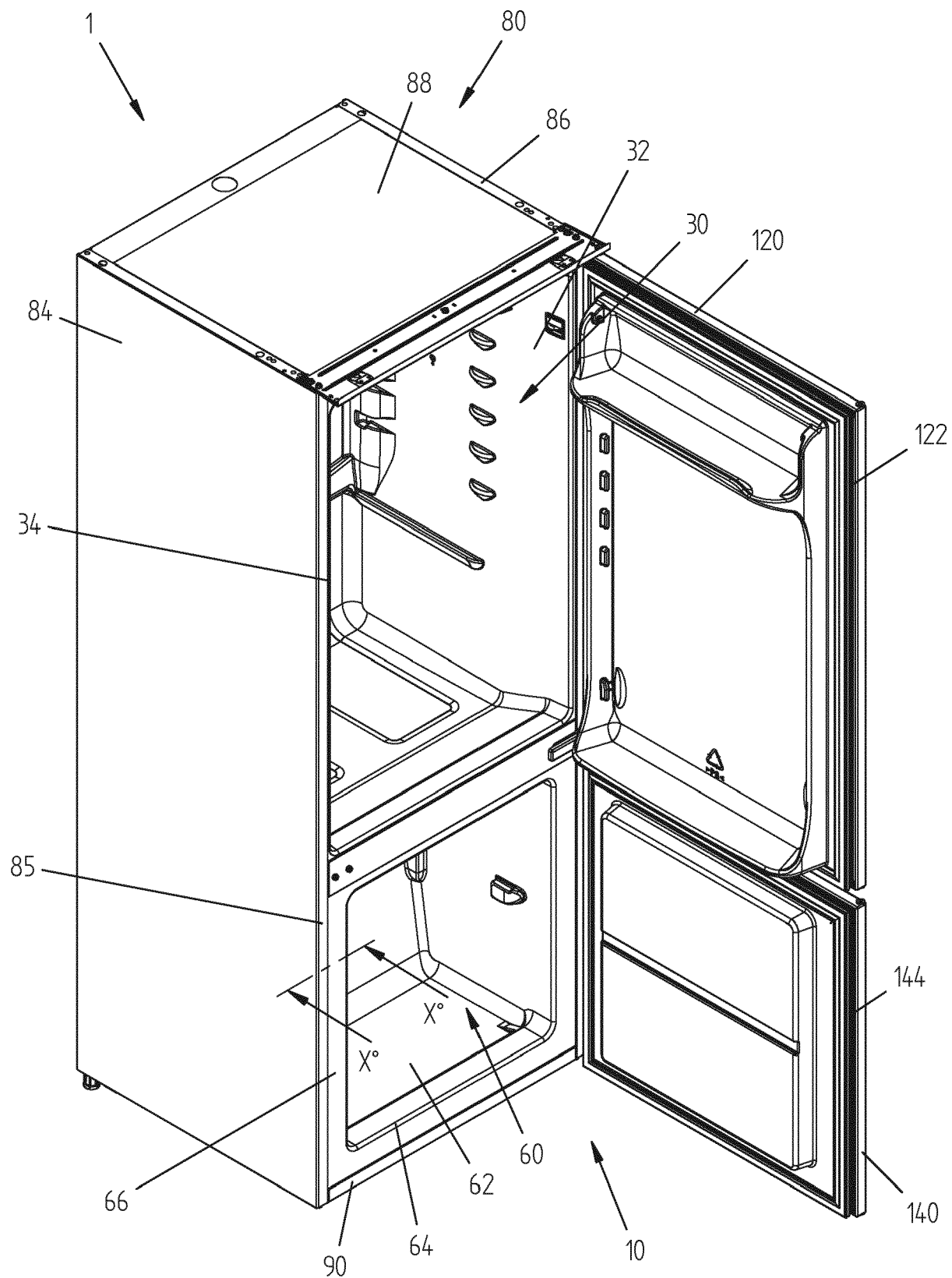


FIG. 5

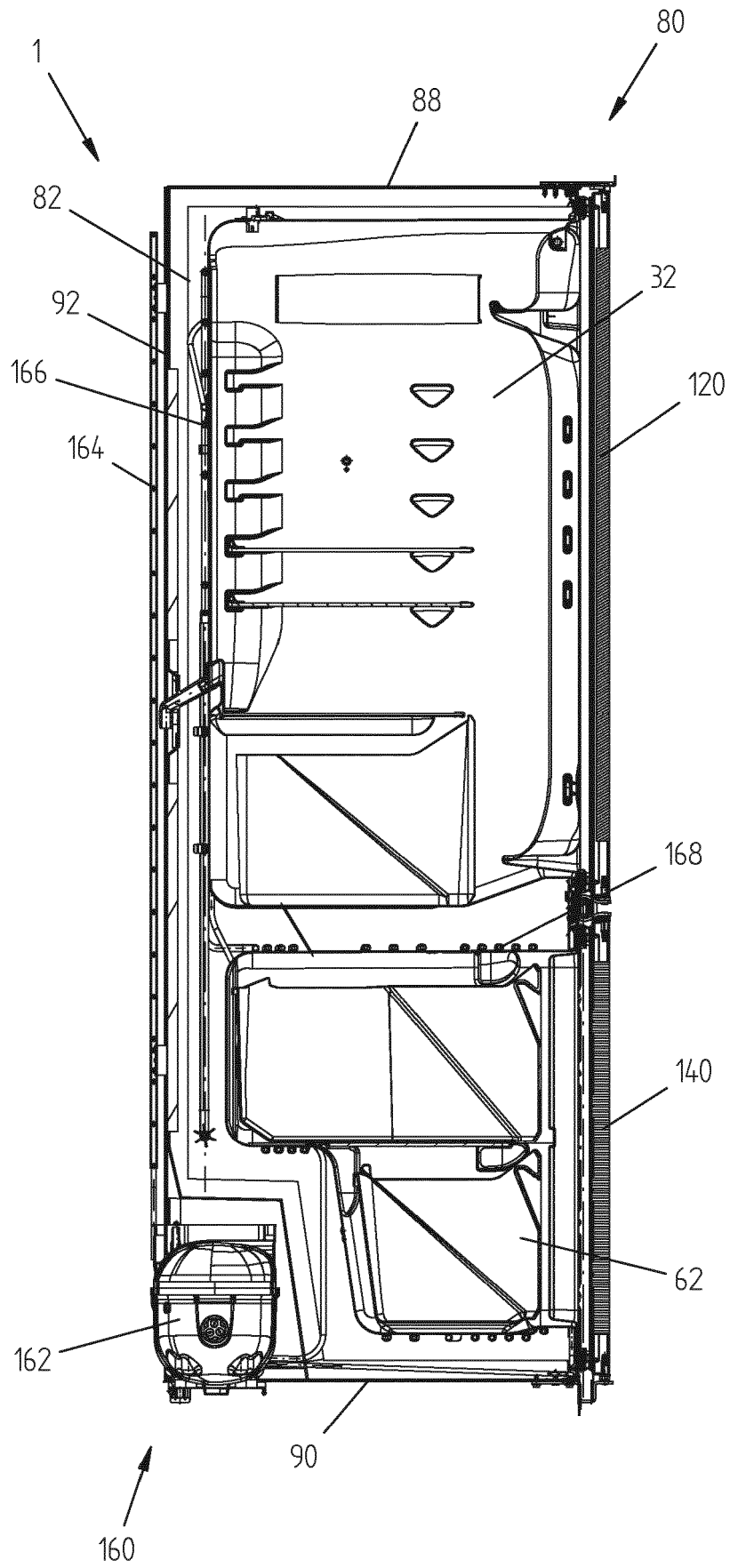


FIG. 6

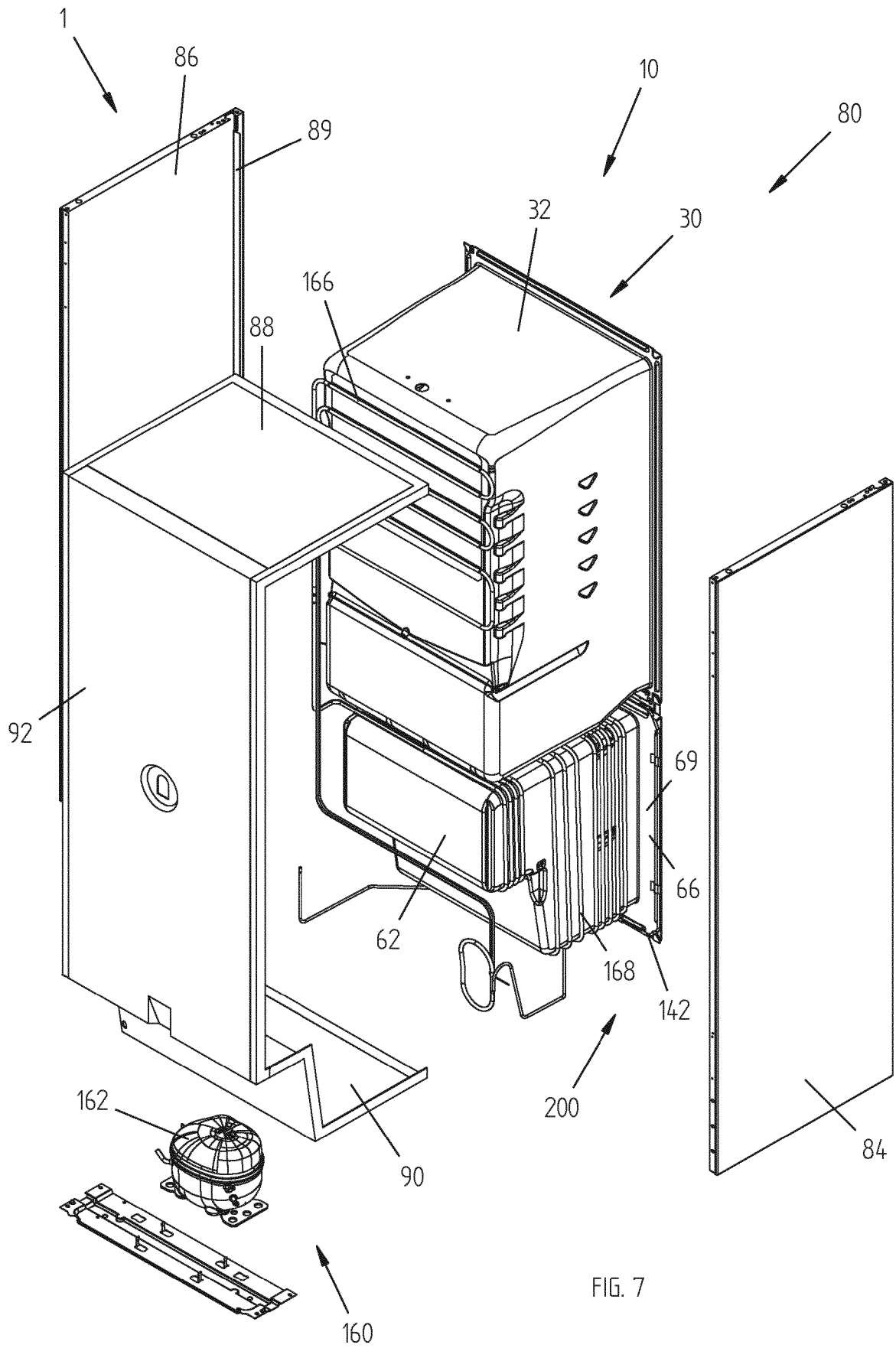


FIG. 7

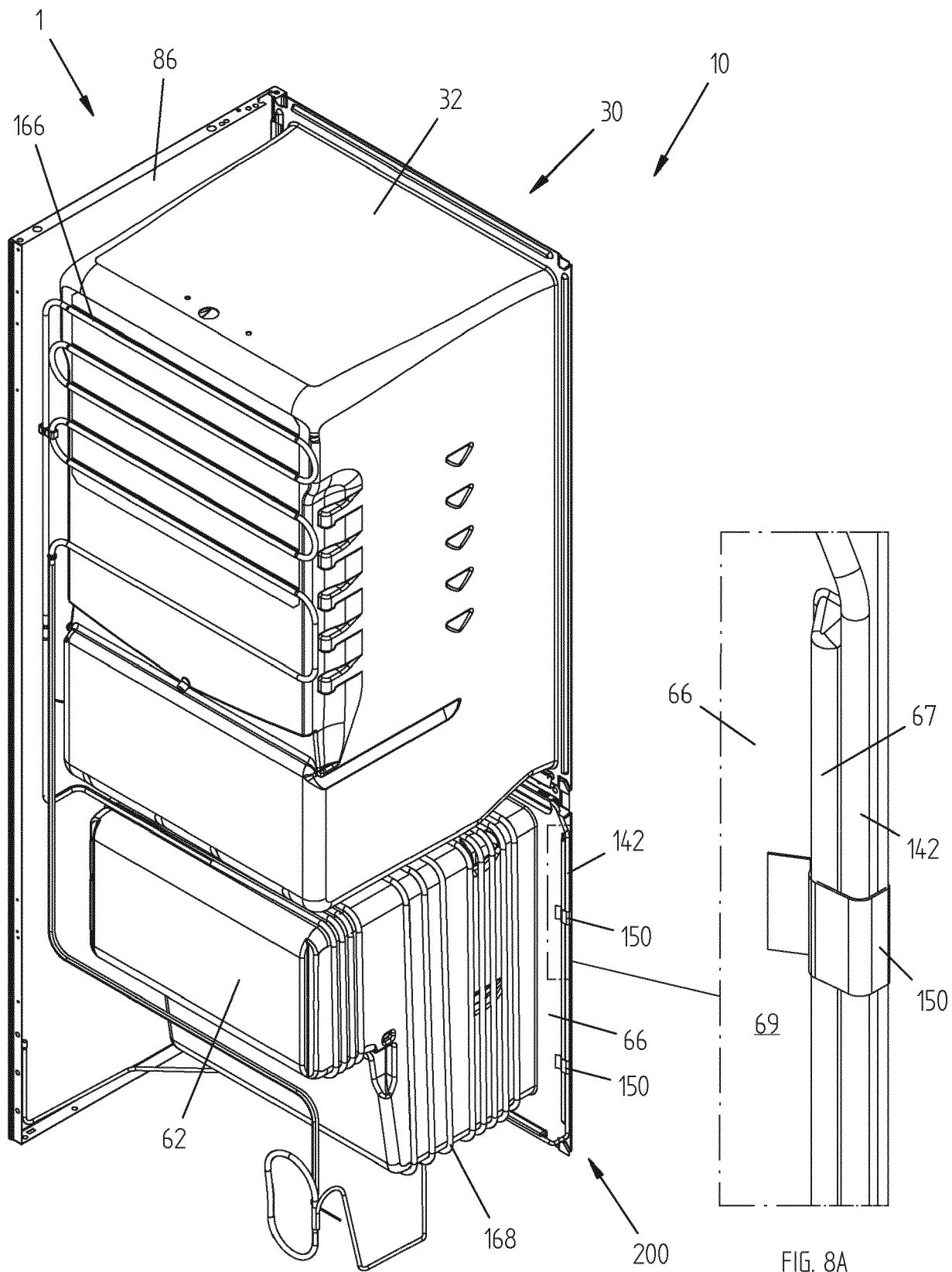


FIG. 8

FIG. 8A

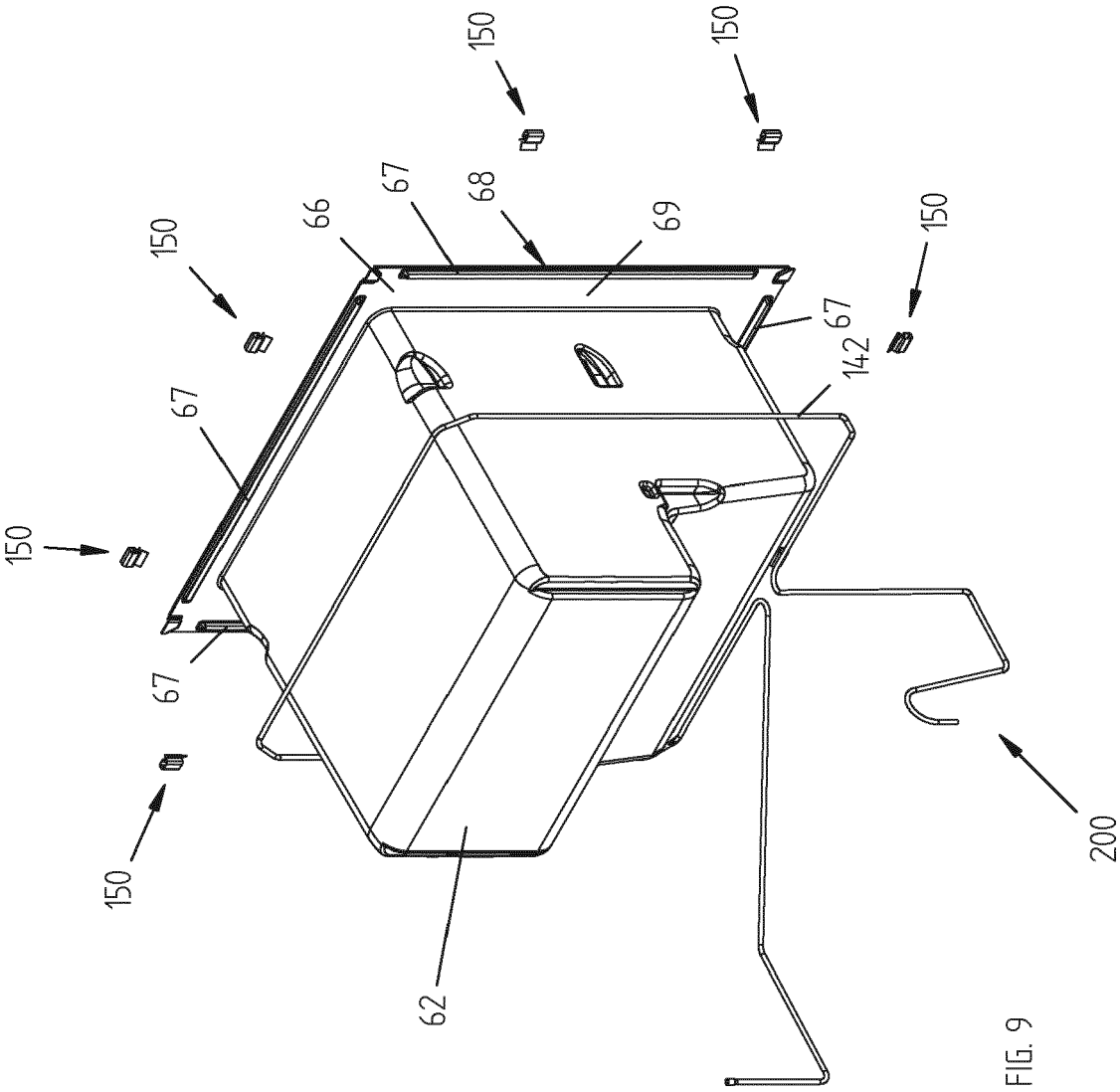
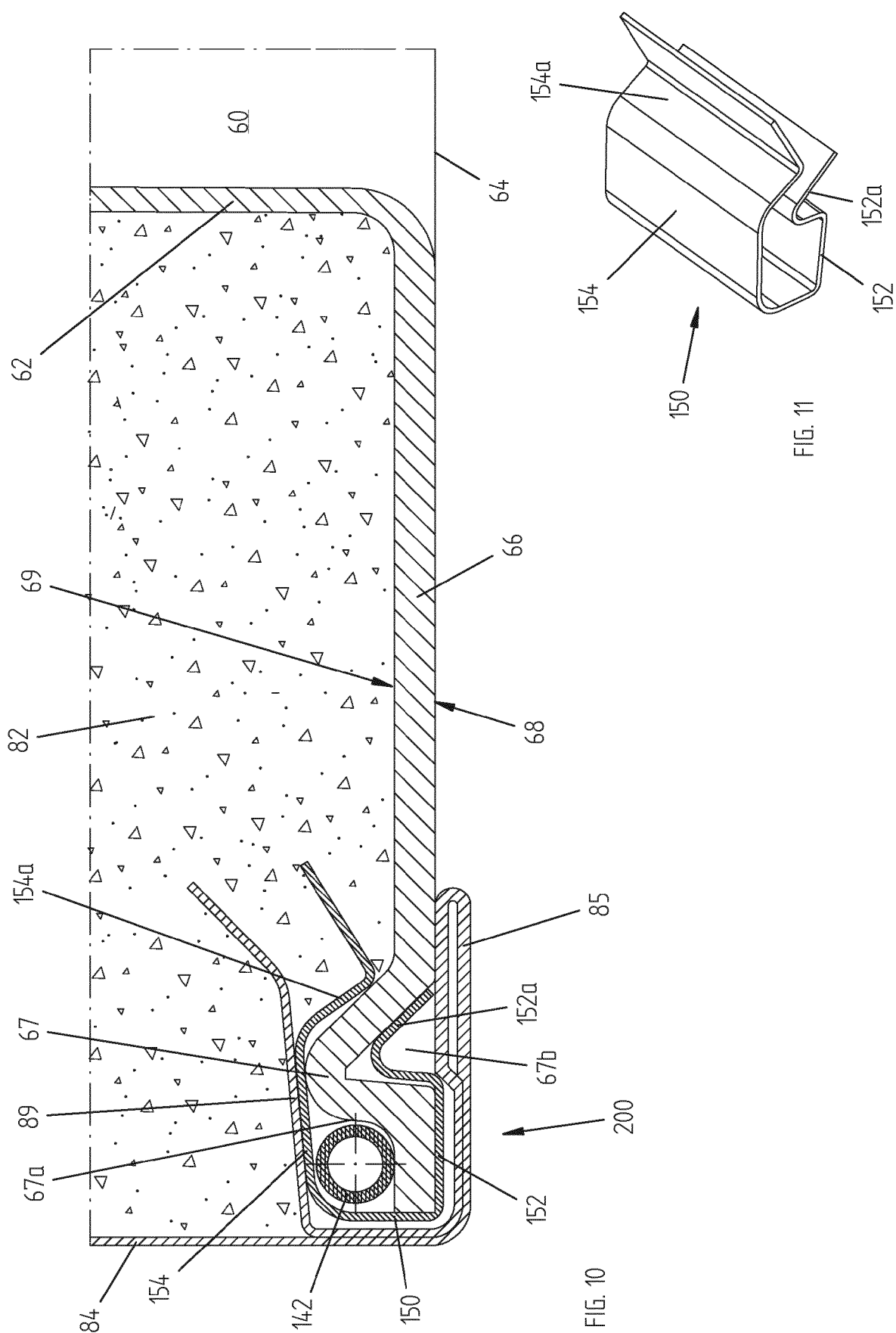


FIG. 9





EUROPEAN SEARCH REPORT

Application Number
EP 17 19 8919

5

10

15

20

25

30

35

40

45

50

55

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	JP S57 108068 U (N.N.) 3 July 1982 (1982-07-03)	1-7,10	INV. F25D21/04
A	* the whole document *	8,9	
X	JP S53 36562 U (N.N.) 31 March 1978 (1978-03-31)	1-3,5-8,10	
Y	* figure 2 *	9	
A		4	
Y	US 2015/192347 A1 (CHO BYOUNG JAE [KR] ET AL) 9 July 2015 (2015-07-09)	9	
A	* figure 19 *	1-8,10	TECHNICAL FIELDS SEARCHED (IPC) F25D
X	JP S57 83388 U (N.N.) 22 May 1982 (1982-05-22)	1-5,10	
X	DE 10 2015 203147 A1 (BSH HAUSGERÄTE GMBH [DE]) 25 August 2016 (2016-08-25)	1-4,10	
X	JP S57 108069 U (N.N.) 3 July 1982 (1982-07-03)	1,10	
	* figures 1,2,3 *		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 March 2018	Examiner de Graaf, Jan Douwe
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			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 19 8919

5

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-03-2018

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP S57108068 U	03-07-1982	NONE	
JP S5336562 U	31-03-1978	NONE	
US 2015192347 A1	09-07-2015	NONE	
JP S5783388 U	22-05-1982	JP S5783388 U	22-05-1982
		JP S5930376 Y2	30-08-1984
DE 102015203147 A1	25-08-2016	DE 102015203147 A1	25-08-2016
		WO 2016134910 A1	01-09-2016
JP S57108069 U	03-07-1982	NONE	

25

30

35

40

45

50

55

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 2015192347 A1 [0021]