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(54) CABINET FOR A REFRIGERATION UNIT

(57) A refrigeration unit (10) includes a cabinet (12) that includes a wrapper (14) that includes a first glass panel (16), a liner (18) that includes a second glass panel (20), and insulation material (22) disposed between the liner (18) and the wrapper (14). The refrigeration unit (10) also includes a compressor (23) positioned within a machine compartment (21) at least partially defined by the cabinet (12).

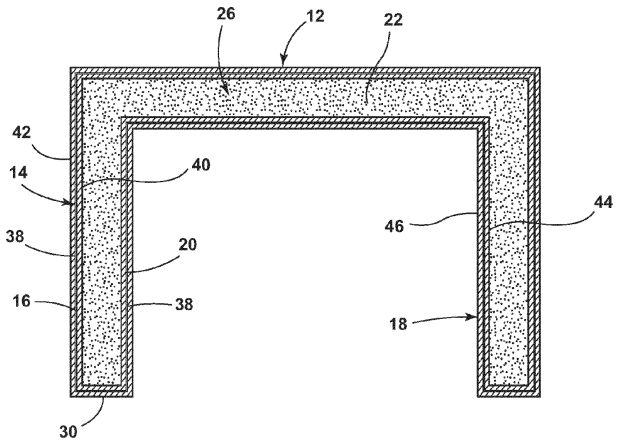

FIG. 3

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Description

BACKGROUND OF THE DISCLOSURE

[0001] The present disclosure generally relates to a cabinet for a refrigeration unit. More specifically, the present disclosure relates to a vacuum insulated cabinet for a refrigeration unit that includes a glass panel.

SUMMARY OF THE DISCLOSURE

[0002] According to one aspect of the present disclosure, a refrigeration unit includes a cabinet that includes a wrapper that includes a first glass panel, a liner that includes a second glass panel, and insulation material disposed between the liner and the wrapper. The refrigeration unit also includes a compressor positioned within a machine compartment at least partially defined by the cabinet.

[0003] These and other features, advantages, and objects of the present disclosure will be further understood and appreciated by those skilled in the art by reference to the following specification, claims, and appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] In the drawings:

FIG. 1 is a front perspective view of a refrigeration unit illustrating a cabinet that includes a wrapper and a liner with a portion of the liner in phantom;

FIG. 2 is a front elevational view of a cabinet of a refrigeration unit that defines a storage compartment of the refrigeration unit;

FIG. 3 is a cross-sectional view of the cabinet of FIG. 2 taken at line III-III illustrating an overmolded glass panel that forms a liner and a wrapper of the cabinet and defines an interior volume of the cabinet;

FIG. 4 is a front elevational view of a cabinet of a refrigeration unit illustrating a liner, a wrapper, and a trim breaker of the cabinet;

FIG. 5 is a cross-sectional view of the cabinet of FIG. 4 taken at line V-V illustrating the liner, the wrapper, and the trim breaker of the cabinet defining an interior volume; and

FIG. 6 is a block diagram of a method of manufacturing an insulated cabinet for a refrigeration unit.

[0005] The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles described herein.

DETAILED DESCRIPTION

[0006] The present illustrated embodiments reside primarily in combinations of method steps and apparatus components related to a cabinet for a refrigeration unit. Accordingly, the apparatus components and method steps have been represented, where appropriate, by conventional symbols in the drawings, showing only those specific details that are pertinent to understanding the embodiments of the present disclosure so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein. Further, like numerals in the description and drawings represent like elements.

[0007] For purposes of description herein, the terms "upper," "lower," "right," "left," "rear," "front," "vertical," "horizontal," and derivatives thereof shall relate to the disclosure as oriented in FIG. 2. Unless stated otherwise, the term "front" shall refer to the surface of the element closer to an intended viewer, and the term "rear" shall refer to the surface of the element further from the intended viewer. However, it is to be understood that the disclosure may assume various alternative orientations, except where expressly specified to the contrary. It is also to be understood that the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

[0008] The terms "including," "comprises," "comprising," or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element preceded by "comprises a ... " does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that comprises the element. Referring now to FIGS. 1-6, a refrigeration unit 10 includes a cabinet 12. The cabinet 12 includes a wrapper 14. The wrapper 14 includes a first glass panel 16. The cabinet 12 further includes a liner 18 that includes a second glass panel 20. Insulation material 22 is disposed between the liner 18 and the wrapper 14 of the cabinet 12. The cabinet 12 at least partially defines a machine compartment 21 of the refrigeration unit 10. A compressor 23 is positioned within the machine compartment 21. The compressor 23 is a component of a refrigerant circuit that cools the refrigeration unit 10. The refrigerant circuit can include a variety of other components (e.g., evaporator, capillary tube, condenser, etc.).

[0009] Referring now to FIGS. 1-3, the cabinet 12 of the refrigeration unit 10 can be an insulated cabinet 12. For example, the cabinet 12 can be a vacuum insulated cabinet 12, as described further herein. The cabinet 12 can include the wrapper 14 and the liner 18. The liner 18 can be positioned inboard of the wrapper 14. For example, in the embodiment illustrated in FIG. 4, the liner 18

defines a storage compartment 24 of the refrigeration unit 10 and the wrapper 14 is positioned outboard of the liner 18. It is contemplated that the refrigeration unit 10 can include a plurality of storage compartments 24, such as a freezer compartment and a refrigerator compartment, in various embodiments. The cabinet 12 defines an interior volume 26. As illustrated in FIG. 3, the liner 18 and the wrapper 14 of the cabinet 12 define the interior volume 26 which is disposed between the liner 18 and the wrapper 14 of the cabinet 12. Insulation material 22 (e.g., powder, foam, panels, etc.) can be disposed within the interior volume 26 defined by the liner 18 and wrapper 14. For example, as illustrated in FIG. 3, the insulation material 22 is disposed between the liner 18 and the wrapper 14 within the interior volume 26 of the cabinet 12.

[0010] Referring now to FIGS. 4 and 5, the cabinet 12 of the refrigeration unit 10 can include a trim breaker 28. As illustrated in FIG. 4, the trim breaker 28 can be positioned at a front perimeter 30 of the cabinet 12 that extends about an opening 32 to the storage compartment 24 defined by the liner 18 of the cabinet 12. In various embodiments, the trim breaker 28 can partially define the interior volume 26 of the cabinet 12. For example, the trim breaker 28 can define the interior volume 26 of the cabinet 12 together with the liner 18 and the wrapper 14 of the cabinet 12. As illustrated in FIG. 5, the wrapper 14 terminates at a terminal end 34 of the wrapper 14 proximate to the front perimeter 30 of the cabinet 12, and the liner 18 terminates at a terminal end 36 of the liner 18 proximate to the front perimeter 30 of the cabinet 12. In the illustrated embodiment, the trim breaker 28 is coupled to the terminal end 34 of the wrapper 14 and the terminal end 36 of the liner 18 and spans the gap between the respective terminal ends 34, 36 of the wrapper 14 and liner 18 to enclose the interior volume 26 defined by the cabinet 12. The trim breaker 28 can be coupled to the wrapper 14 and liner 18 in a variety of manners, such as via an adhesive.

[0011] Referring now to FIGS. 2-5, the cabinet 12 includes a glass panel 38. In various embodiments, the cabinet 12 includes a plurality of glass panels 38. For example, the cabinet 12 can include the first glass panel 16 and the second glass panel 20. The glass panel 38 can have a thickness of less than 1 millimeter (mm). For example, the glass panel can have a thickness between about 0.4 millimeters and 1 millimeter. In some implementations, the wrapper 14 includes the glass panel 38. In some examples, the liner 18 includes the glass panel 38. In an exemplary embodiment, the wrapper 14 includes the first glass panel 16 and the liner 18 includes the second glass panel 20. The glass panel 38 of the cabinet 12 can be substantially impermeable with respect to air, such that the interior volume 26 of the cabinet 12 may be evacuated to form a vacuum insulated cabinet 12.

[0012] Referring still to FIGS. 2-5, in various embodiments, the glass panel 38 of the cabinet 12 can be a plastic overmolded glass panel 38. In other words, the glass panel 38 can be overmolded with plastic. It is contemplated that the glass panel 38 can be overmolded with plastic in a variety of manners (e.g., cast overmolding, injection overmolding, etc.). In the embodiment illustrated in FIG. 5, the wrapper 14 includes the first plastic overmolded glass panel 16, and the liner 18 includes the second plastic overmolded glass panel 20. As illustrated in FIG. 5, the wrapper 14 includes a plastic inner wrapper layer 40 that is positioned between the insulation material 22 disposed within the interior volume 26 of the cabinet 12 and the first glass panel 16 of the wrapper 14. The wrapper 14 further includes a plastic outer wrapper layer 42 that is positioned outboard of the first glass panel 16 such that the first glass panel 16 is positioned between the plastic inner and outer wrapper layers 40, 42. The liner 18 illustrated in FIG. 5 includes a plastic outer liner layer 44. The plastic outer liner layer 44 is positioned between insulation material 22 disposed within the interior volume 26 defined by the cabinet 12 and the second glass panel 20. The liner 18 further includes a plastic inner liner layer 46 that is positioned inboard of the second glass panel 20 such that the second glass panel 20 is positioned between the plastic inner and outer liner layers 46, 44. As illustrated in FIG. 5, the plastic inner liner layer 46 defines the storage compartment 24 of the refrigeration unit 10.

[0013] In some embodiments, the plastic inner liner layer 46 is coupled to the plastic outer wrapper layer 42. For example, as illustrated in FIG. 3, wherein at least one glass panel 38 is disposed within the wrapper 14, the liner 18, and along the front perimeter 30 of the cabinet 12, the plastic inner liner layer 46 and the plastic outer wrapper layer 42 are integrally molded. In the illustrated embodiment, the plastic inner liner layer 46 and the plastic outer wrapper layer 42 converge proximate to the front perimeter 30 of the cabinet 12. In various embodiments, the plastic outer liner layer 44 can be coupled to the plastic inner wrapper layer 40. For example, as illustrated in FIG. 3, the plastic outer liner layer 44 and the plastic inner wrapper layer 40 are integrally molded. In the embodiment illustrated in FIG. 3, wherein the at least one glass panel 38 of the cabinet 12 extends along the front perimeter 30 of the cabinet 12 and the plastic inner and outer liner layers 46, 44 are integrally molded with the plastic outer and inner wrapper layers 40, 42, respectively, the cabinet 12 may define the interior volume 26 without the trim breaker 28, as illustrated in FIG. 3.

[0014] Referring now to FIG. 6, a method 100 of manufacturing an insulated cabinet 12 for a refrigeration unit 10 includes a step 110 of overmolding a glass panel 38 of the cabinet 12 with plastic. In various embodiments, the glass panel 38 of the cabinet 12 can form a portion of the wrapper 14 of the cabinet 12 and/or a portion of the liner 18 of the cabinet 12. It is contemplated that the step 110 of overmolding the glass panel 38 of the cabinet 12 with plastic may be executed in a variety of manners, such as injection overmolding or cast overmolding. Further the step 110 of overmolding the glass panel 38 of the cabinet 12 with plastic may include overmolding the

first glass panel 16 to form at least a portion of the wrapper 14 and/or overmolding the second glass panel 20 to form at least a portion of the liner 18.

[0015] The method 100 of manufacturing the insulated cabinet 12 for the refrigeration unit 10 may include a step 120 of installing the trim breaker 28 of the cabinet 12. In various embodiments, the trim breaker 28 may be installed at the front perimeter 30 of the cabinet 12. The step 120 can entail coupling the trim breaker 28 to the terminal ends 34, 36 of the wrapper 14 and liner 18, respectively, as illustrated in FIG. 5, wherein the trim breaker 28 spans the gap between the terminal ends 34, 36 of the wrapper 14 and the liner 18. In the embodiment illustrated in FIG. 5, the interior volume 26 defined by the cabinet 12 is partially defined by the trim breaker 28 of the cabinet 12.

[0016] The method 100 of manufacturing the insulated cabinet 12 for the refrigeration unit 10 can further include a step 130 of depositing insulation material 22 within the interior volume 26 defined by the cabinet 12. The insulation material 22 can be deposited within the interior volume 26 defined by the cabinet 12 in a variety of manners. For example, the insulation material 22 may be an insulated powder that is delivered into the interior volume 26 through an aperture defined by the cabinet 12. In another example, the insulation material 22 may include insulation panels that are fitted with a portion of the cabinet 12, such as the liner 18 or wrapper 14, prior to assembly of the liner 18 and wrapper 14 of the cabinet 12.

[0017] The method 100 of manufacturing the insulated cabinet 12 for the refrigeration unit 10 may include a step 140 of evacuating air from the interior volume 26 defined by the cabinet 12 to form a vacuum sealed environment. In various embodiments, the insulation material 22 deposited within the interior volume 26 remains within the interior volume 26 as the interior volume 26 is evacuated of air. Evacuation may occur, in an exemplary embodiment, by utilizing a vacuum operably coupled with a conduit (not shown) that extends outside of the interior volume 26 yet is in fluid communication with the interior volume 26. The conduit may be crimped upon completion of the evacuation process to seal the interior volume 26 of the cabinet 12.

[0018] The cabinet 12 of the present disclosure may provide a variety of advantages. First, the glass panel 38 of the cabinet 12 being impermeable with respect to air can allow for an interior environment of the cabinet 12 to be evacuated and sealed in a generally airtight manner. Second, the cabinet 12 being formed of one or more relatively thin and lightweight glass panels 38 that are overmolded with plastic rather than a metal panel may reduce the weight of the cabinet 12, which may allow for convenient handling of the refrigeration unit 10 by a user. Third, the cabinet 12 including the glass panel 38 that extends along the front perimeter 30 of the cabinet 12 and not including metal may allow for the trim breaker 28 to be omitted from the cabinet 12, which may reduce the complexity of assembling and the number of parts required to manufacture the cabinet 12.

[0019] It is finally pointed out that, even though in above description reference is made to the cabinet 12 of the refrigeration unit 10, the invention as defined in the appended claims can be also applied to each of the doors of the refrigeration unit 10 (coupled to the cabinet 12 generally by means of one or more hinges). In particular, the invention as defined in the appended claims (in addition, or as an alternative, to the application to the cabinet 12) may be also applied to the door associated to the refrigeration compartment (shown in figure 1 in the respective open position) and/or to the door associated to the freezer compartment (shown in figure 1 in the respective closed position). When applied to the door(s) of the refrigeration unit 10, the technical advantage of the reduction of the weight of the insulation structure (if compared with vacuum insulated structures having wrapper and liner made of metal) becomes still more significant, as a heavy door is prone to affect usability, safety and durability of the entire refrigeration unit 10.

[0020] According to one aspect of the present disclosure, a refrigeration unit includes a cabinet and a compressor positioned within a machine compartment at least partially defined by the cabinet. The cabinet includes a wrapper that includes a first glass panel, a liner that includes a second glass panel, and insulation material disposed between the liner and the wrapper.

[0021] According to another aspect, the wrapper further includes a plastic inner wrapper layer positioned between the insulation material and the first glass panel, and a plastic outer wrapper layer positioned outboard of the first glass panel such that the first glass panel is positioned between the plastic inner and outer wrapper layers.

[0022] According to another aspect, the liner further includes a plastic outer liner layer positioned between the insulation material and the second glass panel, and a plastic inner liner layer positioned inboard of the second glass panel such that the second glass panel is positioned between the plastic inner and outer liner layers.

[0023] According to another aspect, the plastic inner liner layer defines a storage compartment.

[0024] According to another aspect, the plastic inner liner layer is coupled to the plastic outer wrapper layer.

[0025] According to another aspect, the plastic inner liner layer and the plastic outer wrapper layer are integrally molded.

[0026] According to another aspect, the plastic outer liner layer is coupled to the plastic inner wrapper layer.

[0027] According to another aspect, the plastic outer liner layer and the plastic inner wrapper layer are integrally molded.

[0028] According to another aspect, a trim breaker is coupled to a terminal end of the wrapper and a terminal end of the liner.

[0029] According to another aspect, the trim breaker is positioned at a front perimeter of the cabinet that extends about an opening to a storage compartment of the

cabinet.

[0030] According to another aspect, the first glass panel is overmolded with plastic.

[0031] According to another aspect, the second glass panel is overmolded with plastic.

[0032] According to another aspect, the cabinet is a vacuum insulated cabinet.

[0033] According to another aspect of the present disclosure, a vacuum insulated cabinet of a refrigeration unit includes a liner that defines a storage compartment of the refrigeration unit, a wrapper, and insulation material disposed within an interior volume defined by the liner and the wrapper, wherein at least one of the liner and the wrapper includes a plastic overmolded glass panel.

[0034] According to another aspect, a trim breaker is coupled to a terminal end of the liner and a terminal end of the wrapper at a front perimeter of the cabinet that surrounds an opening to the storage compartment.

[0035] According to another aspect, the liner includes the plastic overmolded glass panel.

[0036] According to yet another aspect of the present disclosure, a method of manufacturing an insulated cabinet for a refrigeration unit comprises the steps of overmolding a glass panel of the cabinet with plastic, depositing insulation material within an interior volume defined by the cabinet, and evacuating air from the interior volume defined by the cabinet to form a vacuum sealed environment.

[0037] According to another aspect, the glass panel forms a portion of a wrapper of the cabinet.

[0038] According to another aspect, the glass panel forms a portion of a liner of the cabinet.

[0039] According to another aspect, the method further includes the step of installing a trim breaker of the cabinet. The interior volume defined by the cabinet is partially defined by the trim breaker.

[0040] According to another aspect, a refrigeration unit includes a cabinet that comprises a wrapper that includes a first glass panel, a liner that includes a second glass panel, and insulation material disposed between the liner and the wrapper. The refrigeration unit also includes a compressor positioned within a machine compartment at least partially defined by the cabinet.

[0041] According to another aspect, the wrapper further includes a plastic inner wrapper layer positioned between the insulation material and the first glass panel, and a plastic outer wrapper layer positioned outboard of the first glass panel such that the first glass panel is positioned between the plastic inner and outer wrapper layers.

[0042] According to another aspect, the liner further includes a plastic outer liner layer positioned between the insulation material and the second glass panel, and a plastic inner liner layer positioned inboard of the second glass panel such that the second glass panel is positioned between the plastic inner and outer liner layers.

[0043] According to another aspect, the plastic inner liner layer defines a storage compartment.

[0044] According to another aspect, the plastic inner liner layer is coupled to the plastic outer wrapper layer.

[0045] According to another aspect, the plastic inner liner layer and the plastic outer wrapper layer are integrally molded.

[0046] According to another aspect, the plastic outer liner layer is coupled to the plastic inner wrapper layer.

[0047] According to another aspect, the plastic outer liner layer and the plastic inner wrapper layer are integrally molded.

[0048] According to another aspect, a trim breaker is coupled to a terminal end of the wrapper and a terminal end of the liner.

[0049] According to another aspect, the trim breaker is positioned at a front perimeter of the cabinet that extends about an opening to a storage compartment of the cabinet.

[0050] According to another aspect, the first glass panel is overmolded with plastic.

[0051] According to another aspect, the second glass panel is overmolded with plastic.

[0052] According to another aspect, the cabinet is a vacuum insulated cabinet.

[0053] According to yet another aspect, a method of manufacturing an insulated cabinet for a refrigeration unit includes the steps of overmolding a glass panel of the cabinet with plastic, depositing insulation material within an interior volume defined by the cabinet, and evacuating air from the interior volume defined by the cabinet to form a vacuum sealed environment.

[0054] According to another aspect, the method further includes the step of installing a trim breaker of the cabinet. The interior volume defined by the cabinet is partially defined by the trim breaker.

[0055] It will be understood by one having ordinary skill in the art that construction of the described disclosure and other components is not limited to any specific material. Other exemplary embodiments of the disclosure disclosed herein may be formed from a wide variety of materials, unless described otherwise herein.

[0056] For purposes of this disclosure, the term "coupled" (in all of its forms, couple, coupling, coupled, etc.) generally means the joining of two components (electrical or mechanical) directly or indirectly to one another. Such joining may be stationary in nature or movable in nature. Such joining may be achieved with the two components (electrical or mechanical) and any additional intermediate members being integrally formed as a single unitary body with one another or with the two components. Such joining may be permanent in nature or may be removable or releasable in nature unless otherwise stated.

[0057] It is also important to note that the construction and arrangement of the elements of the disclosure as shown in the exemplary embodiments is illustrative only. Although only a few embodiments of the present innovations have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible

(e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter recited. For example, elements shown as integrally formed may be constructed of multiple parts or elements shown as multiple parts may be integrally formed, the operation of the interfaces may be reversed or otherwise varied, the length or width of the structures and/or members or connectors or other elements of the system may be varied, the nature or number of adjustment positions provided between the elements may be varied. It should be noted that the elements and/or assemblies of the system may be constructed from any of a wide variety of materials that provide sufficient strength or durability, in any of a wide variety of colors, textures, and combinations. Accordingly, all such modifications are intended to be included within the scope of the present innovations. Other substitutions, modifications, changes, and omissions may be made in the design, operating conditions, and arrangement of the desired and other exemplary embodiments without departing from the spirit of the present innovations.

[0058] It will be understood that any described processes or steps within described processes may be combined with other disclosed processes or steps to form structures within the scope of the present disclosure. The exemplary structures and processes disclosed herein are for illustrative purposes and are not to be construed as limiting.

Claims

1. An insulation structure for a refrigeration unit (10), the insulation structure comprising a wrapper (14) and a liner (18),
characterised in that the wrapper (14) includes a first glass panel (16) and/or the liner (18) includes a second glass panel (20).

2. The insulation structure of claim 1, wherein the insulation structure is a cabinet (12) for a refrigeration unit (10).

3. The insulation structure of claim 1 or claim 2, wherein the insulation structure is a door for a refrigeration unit (10).

4. The insulation structure of any one of the previous claims, wherein the wrapper (14) further comprises:

    a plastic inner wrapper layer (40) positioned between the insulation material (22) and the first glass panel (16); and
    a plastic outer wrapper layer (42) positioned outboard of the first glass panel (16) such that the first glass panel (16) is positioned between the plastic inner and outer wrapper layers (40, 42).

5. The insulation structure of any one of the previous claims, wherein the liner (18) further comprises:

    a plastic outer liner layer (44) positioned between the insulation material (22) and the second glass panel (20); and
    a plastic inner liner layer (46) positioned inboard of the second glass panel (20) such that the second glass panel (20) is positioned between the plastic inner and outer liner layers (46, 44),

    optionally wherein the plastic inner liner layer (46) defines a storage compartment (24).

6. The insulation structure of claims 4 and 5, wherein the plastic inner liner layer (46) is coupled to the plastic outer wrapper layer (42) and/or wherein the plastic outer liner layer (44) is coupled to the plastic inner wrapper layer (40),
optionally wherein the plastic inner liner layer (46) and the plastic outer wrapper layer (42) are integrally molded and/or optionally wherein the plastic outer liner layer (44) and the plastic inner wrapper layer (40) are integrally molded.

7. The insulation structure of any one of the previous claims, wherein the first glass panel (16) has a thickness of less than 1 mm, in particular a thickness between 0.4 mm and 1 mm or a thickness of less than 0.4 mm, and/or wherein the second glass panel (20) has a thickness of less than 1 mm, in particular a thickness between 0.4 mm and 1 mm or a thickness of less than 0.4 mm.

8. The insulation structure of any one of the previous claims, further comprising a trim breaker (28) coupled, in particular glued, to a terminal end (34) of the wrapper (14) and to a terminal end (36) of the liner (18), optionally wherein the trim breaker (28) is positioned at a front perimeter (30) of the insulation structure that extends about an opening (32) to a storage compartment (24).

9. The insulation structure of any one of the previous claims, wherein the first glass panel (16) is overmolded with plastic and/or wherein the second glass panel (20) is overmolded with plastic.

10. The insulation structure of any one of the previous claims, wherein the wrapper (14) and the liner (18) define an interior volume (26) and wherein a filling material is disposed within the interior volume (26), the filling material being in particular an insulation material (22),
optionally wherein the liner (18) is positioned inboard

of the wrapper (14).

11. The insulation structure of any one of the previous claims, wherein the insulation structure is vacuum insulated.

12. A refrigeration unit (10) comprising:

a cabinet (12) defining at least one storage compartment (24); and
at least one door coupled to the cabinet (12), in particular hinged to the cabinet (12), said at least one door being configured to be toggled between a closed position and at least one open position, wherein accesses to said at least one storage compartment (24) are allowed in said at least one open position and are not allowed in said closed position,

wherein said cabinet (12) is formed by an insulation structure according to any one of the previous claims and/or wherein said at least one door is formed by an insulation structure according to any one of the previous claims.

13. The refrigeration unit (10) of claim 12, wherein the cabinet (12) at least partially defines a machine compartment (21) and wherein a compressor (23) is positioned within the machine compartment (21).

14. A method of manufacturing an insulation structure for a refrigeration unit (10), the insulation structure being in particular a cabinet (12) for a refrigeration unit (10) or a door for a refrigeration unit (10), the method comprising the steps of:

overmolding a glass panel (38) of the insulation structure with plastic;
depositing insulation material (22) within an interior volume (26) defined by the insulation structure; and
evacuating air from the interior volume (26) defined by the insulation structure (12) to form a vacuum sealed environment.

15. The method of claim 14, further comprising the step of installing a trim breaker (28) of the insulation structure, wherein the interior volume (26) defined by the insulation structure is partially defined by the trim breaker (28).

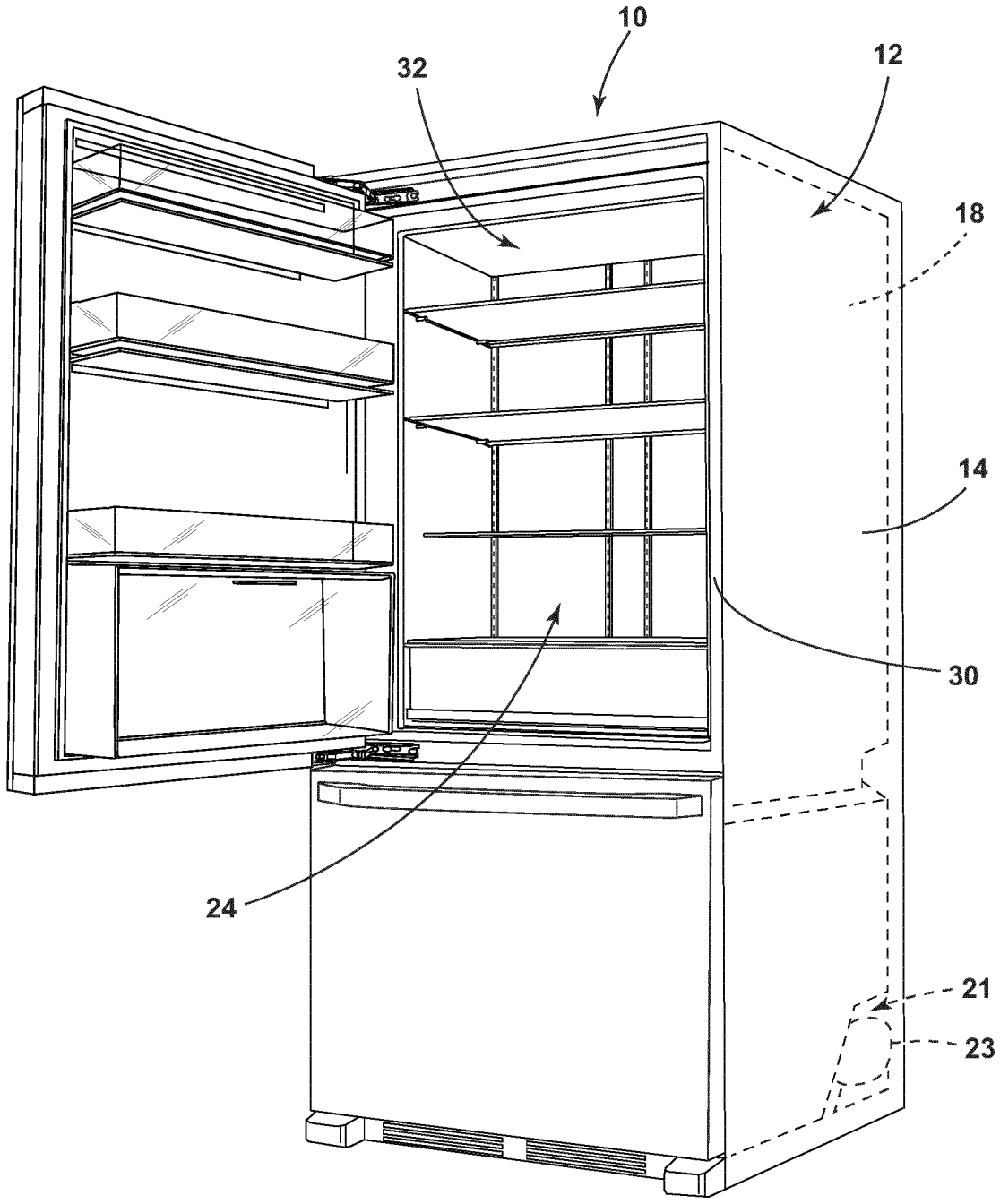

FIG. 1

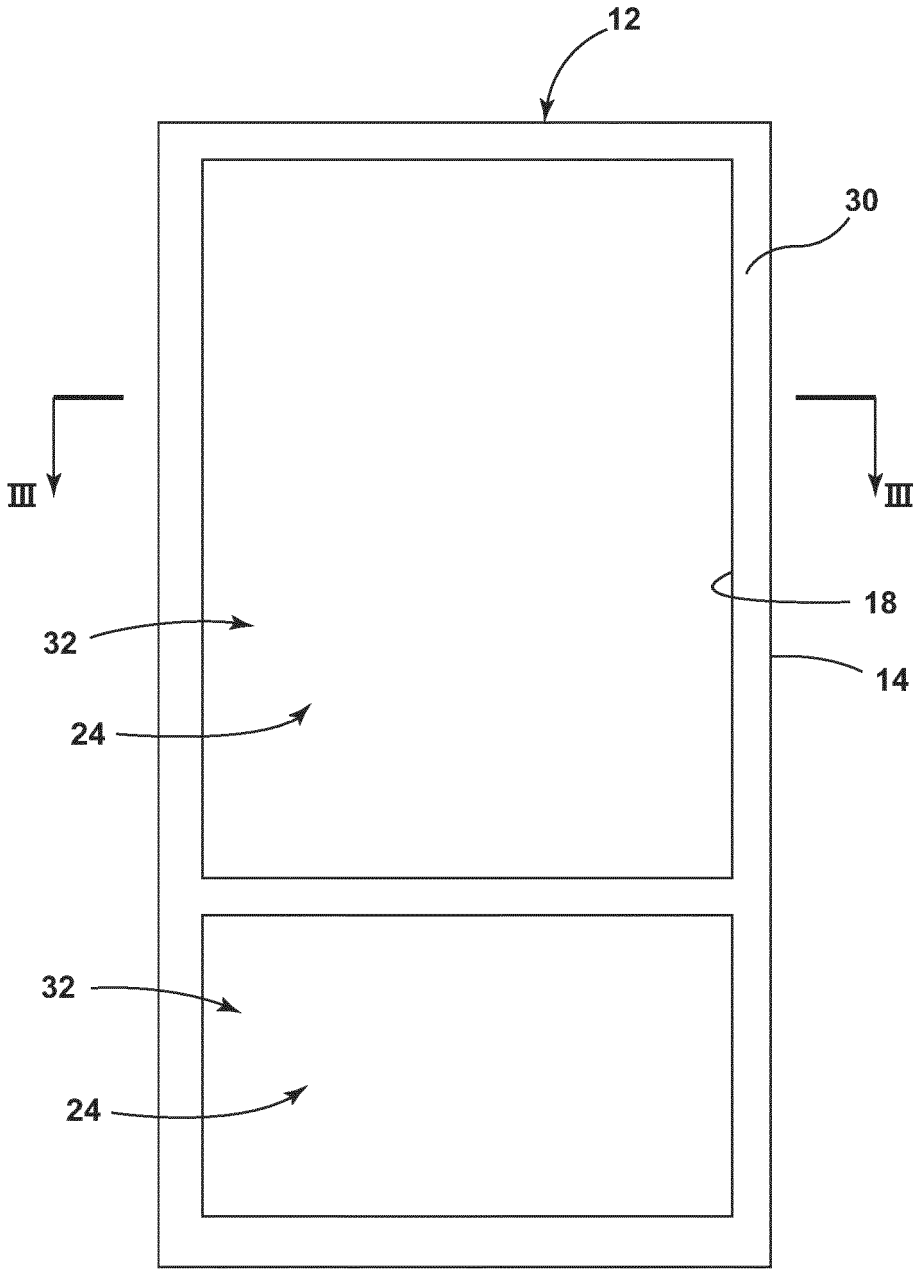

FIG. 2

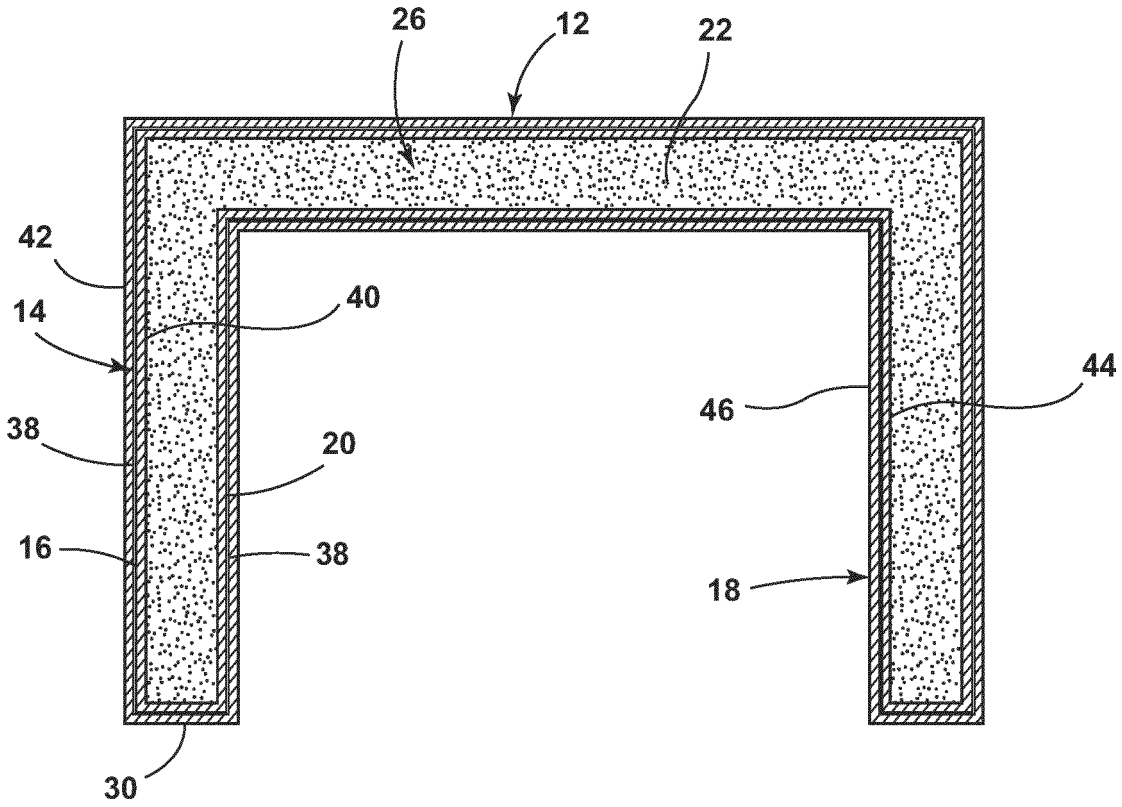

FIG. 3

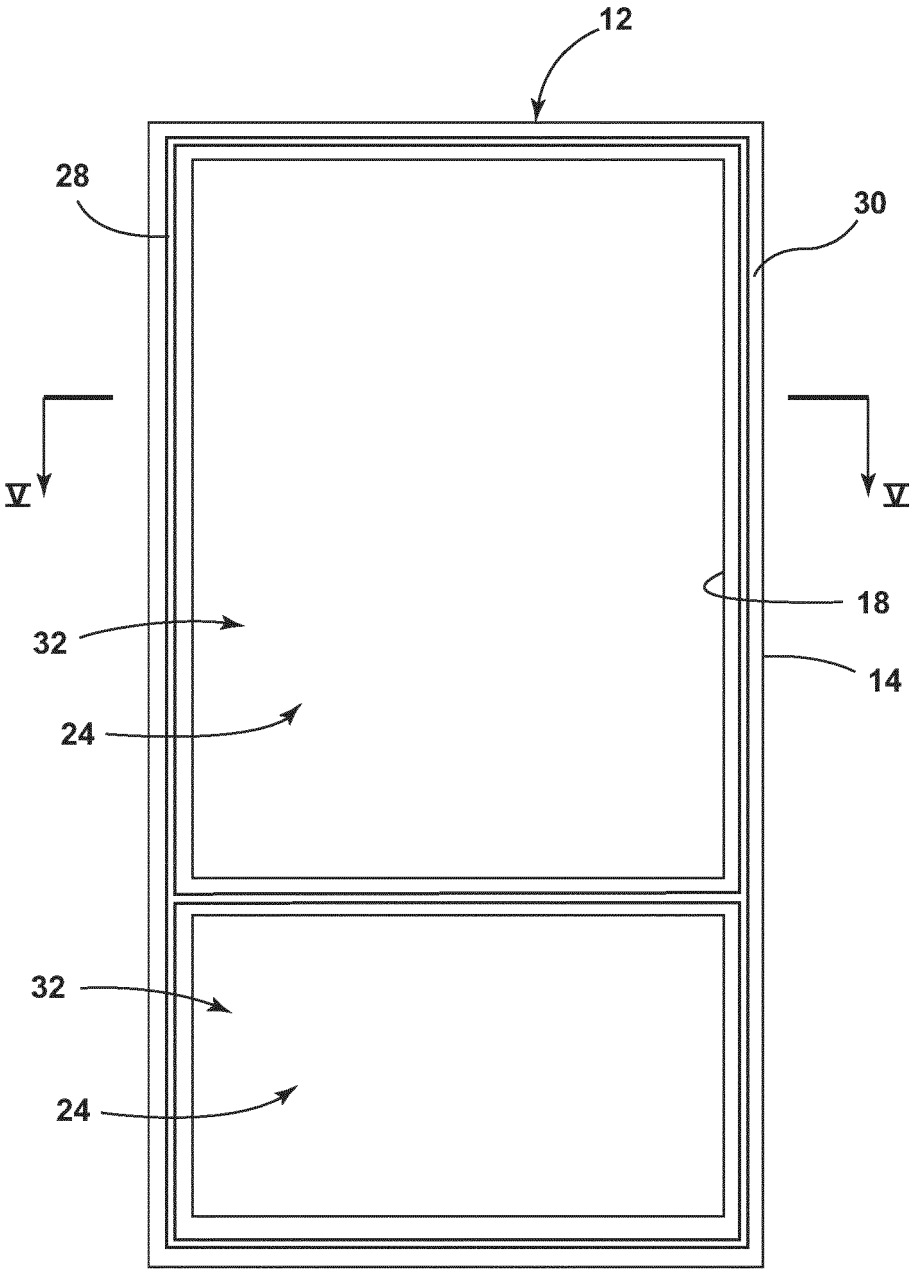

FIG. 4

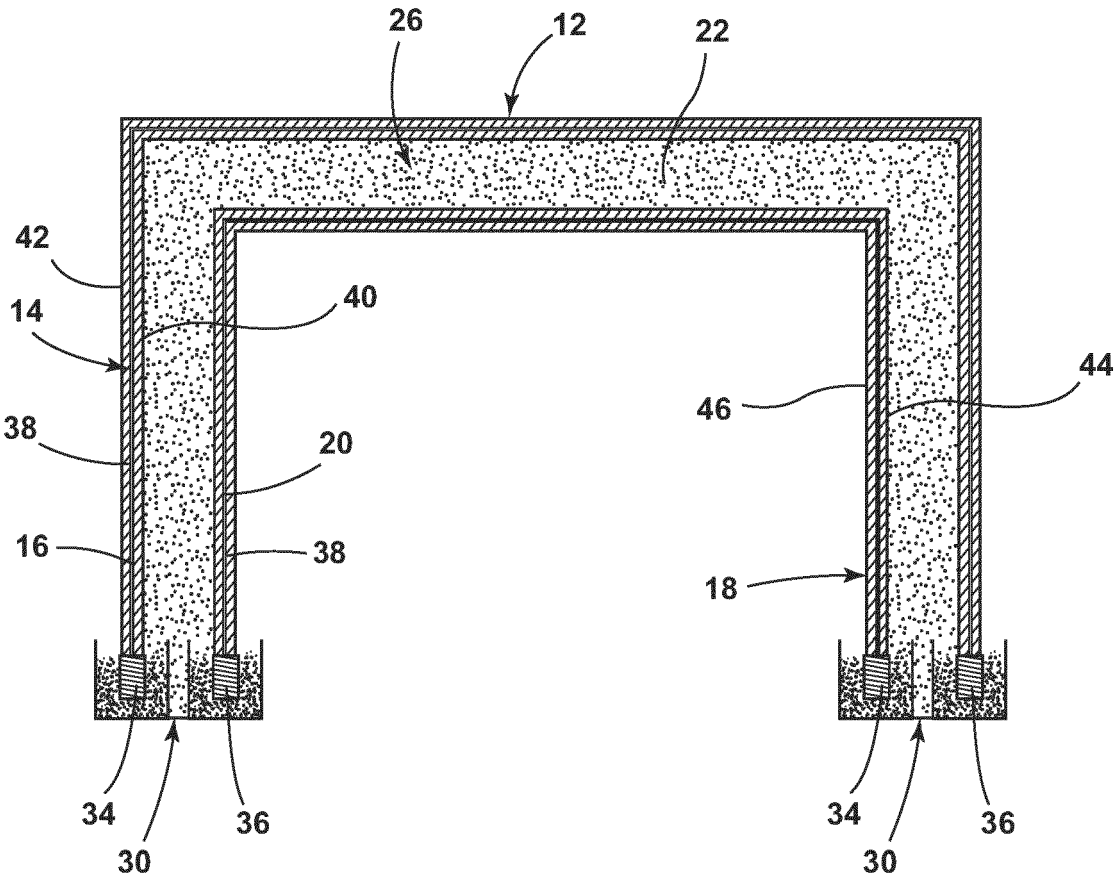

FIG. 5

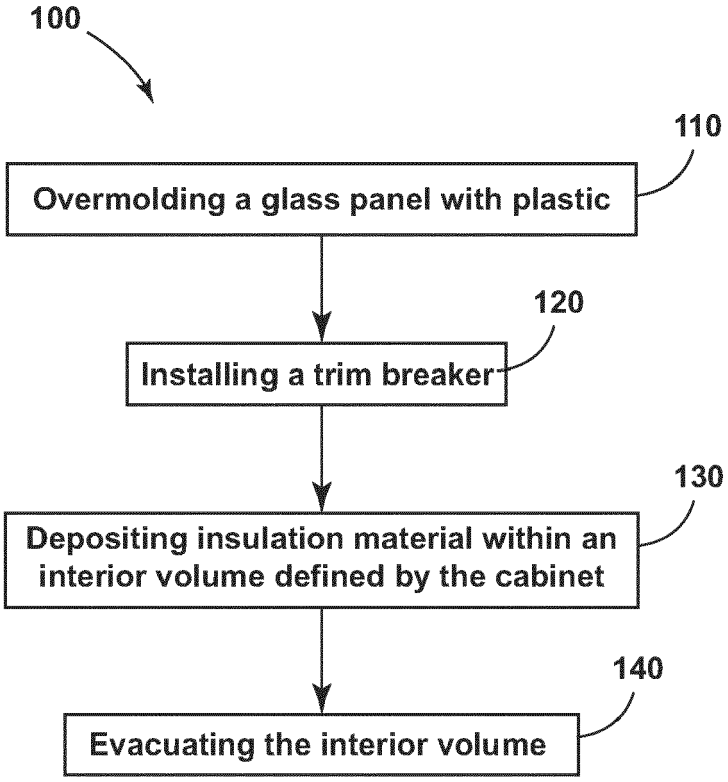
100
110
Overmolding a glass panel with plastic
120
Installing a trim breaker
130
Depositing insulation material within an interior volume defined by the cabinet
140
Evacuating the interior volume

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 15 3316

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	WO 2010/127947 A2 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; KOHN SANDRO [DE] ET AL.) 11 November 2010 (2010-11-11) * figures 1-19 * * paragraphs [0007], [0010], [0026], [0042] *	1-15	INV. F25D23/02 F25D23/06
X	CN 207 487 227 U (MITSUBISHI ELECTRIC CORP) 12 June 2018 (2018-06-12) * figures 1-17 *	1,12	
X	CN 203 421 886 U (HEFEI MEILING CO LTD) 5 February 2014 (2014-02-05) * figures 1-4 *	1,12	
X	US 2 617 551 A (HOPKINS CECIL D) 11 November 1952 (1952-11-11) * figures 1-8 *	1,12	
A	CN 102 126 315 A (SUZHOU HESHENG SPECIAL MATERIAL CO LTD) 20 July 2011 (2011-07-20) * figure 1 *	4,5	

TECHNICAL FIELDS SEARCHED (IPC)

F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 May 2024	Dezso, Gabor

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08-05-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010127947 A2	11-11-2010	CN 102414526 A	11-04-2012
		DE 102009002800 A1	18-11-2010
		EP 2427708 A2	14-03-2012
		PL 2427708 T3	28-02-2019
		WO 2010127947 A2	11-11-2010
CN 207487227 U	12-06-2018	CN 207487227 U	12-06-2018
		JP 6567075 B2	28-08-2019
		JP WO2017098614 A1	19-07-2018
		WO 2017098614 A1	15-06-2017
CN 203421886 U	05-02-2014	NONE	
US 2617551 A	11-11-1952	NONE	
CN 102126315 A	20-07-2011	NONE	

EPO FORM P0459

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