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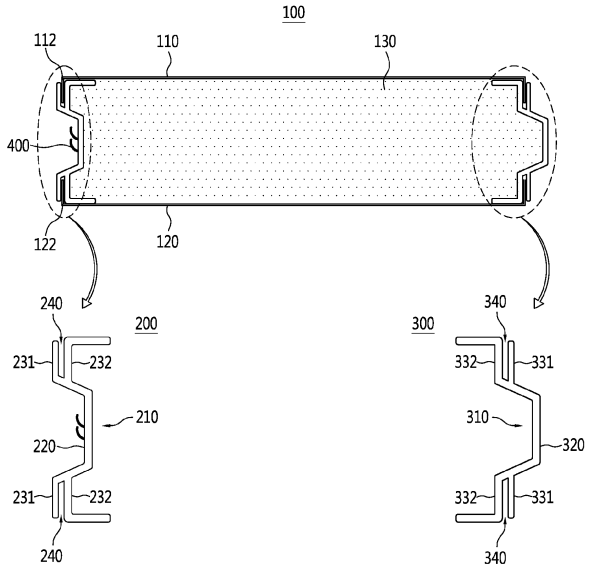
(54) LIP SEAL PANEL FOR AIR CONDITIONING EQUIPMENT AND HOUSING CASE MANUFACTURED USING THE SAME

(57) The present description relates to a lip seal panel structure for air conditioning equipment capable of manufacturing a housing case for air conditioning equipment without using an intermediate frame. The lip seal panel according to the present disclosure includes a first iron plate and a second iron plate of a same size; a brim located at both ends of the first iron plate and the second iron plate. The brim includes a concave brim and a convex brim in an uneven shape. A lip seal is formed on at least one uneven surface of the concave brim and the convex brim. In this configuration, the concave brim of one lip seal panel and the convex brim of another lip seal panel are coupled and assembled, and when coupled, the lip seal which is a soft elastic material is pressed and maintained in close contact. Therefore, according to the present disclosure, a housing case for air conditioning equipment capable of preventing leakage can be manufactured without using an intermediate frame and a separate gasket for preventing leakage.

FIG. 5



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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit under 35 U.S.C. 119(a) of Korean Patent Application No. 10-2022-0185778 filed on December 27, 2022 in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference for all purposes.

BACKGROUND

1. Field

[0002] The following disclosure relates to a lip seal panel for air conditioning equipment that can be used to manufacture a housing case for air conditioning, which can maintain sufficient strength and sealing effect without installing an intermediate frame, and to a housing case manufactured using the same.

2. Description of Related Art

[0003] The housing case for air conditioning equipment such as air handling units and Desiccant dehumidifiers is manufactured using a plurality of casing panels 10 with a shape shown in FIG. 1. The casing panel 10 includes two iron plates 11, 12 spaced apart at a predetermined interval and a brim 13 attached to the ends of the iron plates 11, 12. The space between the two iron plates 11, 12 formed by the brim 13 is filled with a heat-insulating material 14 such as urethane using an injection method like foaming.

[0004] Traditionally, in order to complete the housing case, it was necessary to assemble the casing panels 10 using intermediate frames 20 made of aluminum as a medium.

[0005] FIG. 2 illustrates a sectional view of the assembly of casing panels. FIG. 3 illustrates a perspective view of a housing case manufactured according to the prior art. FIG. 4 illustrates an exploded perspective view for explaining an assembly process of the housing case.

[0006] Referring to these drawings, it can be seen that intermediate frames 20 are positioned and assembled between the casing panels 10 to assemble a housing case 1. In other words, the intermediate frames 20 are used for fixing and supporting the casing panels 10. Therefore, the housing case 1 shown in FIG. 3 requires intermediate frames 20 without exception, and without these intermediate frames 20, the production of the housing case 1 was challenging. Additionally, reference numeral 40 refers to corner frames that support the corners of the housing case 1.

[0007] As a result, the conventional method of manufacturing the housing case 1 incurs high material costs due to the necessity of using intermediate frames 20 to connect casing panels 10. Additionally, there is a separate process involved in installing gaskets (not shown) on the joint surfaces between the casing panels 10 and the intermediate frames 20 to prevent leaks, which consequently increases the labor required for the process. Moreover, despite performing gasket installation, a complete seal may not be achieved based on the proficiency of the worker, leading to potential rework in certain instances.

[0008] In the past, there were discussions about producing the housing case 1 without employing these intermediate frames 20. However, sealing effect achieved through the use of intermediate frame 20 and the gasket could not be ensured, resulting in a leakage issue at the connection junction between the casing panels 10.

SUMMARY

[0009] This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

[0010] The present disclosure aims to address the aforementioned issues and introduces a lip seal panel for air conditioning equipment with an improved structure allowing for the production of a housing case for air conditioning equipment without the need for intermediate frames.

[0011] Another objective of the present disclosure is to provide a housing case for air conditioning equipment that is manufactured by assembling only the lip seal panels.

[0012] The technical problems of the present disclosure are not limited to the technical problems mentioned above, and other technical problems not mentioned will be clearly understood by those skilled in the art from the following description.

[0013] In one general aspect, a lip seal panel for air conditioning equipment includes a first iron plate and a second iron plate of a same size; a brim located at both ends of the first iron plate and the second iron plate; and a heat-insulating material between the first iron plate and the second iron plate. The brim includes a concave brim and a convex brim. A lip seal is formed on surface of at least one of the concave brim and the convex brim.

[0014] A concave brim and a convex brim may be formed at both ends of the lip seal panel.

[0015] Concave brims only may be formed at both ends of the lip seal panel.

[0016] The concave brim may include a center bracket with a concave surface; an upper bracket and a lower bracket extending in both directions around the center bracket; a fixing groove formed between the upper bracket and the lower bracket; and the lip seal formed on the concave surface of the center bracket. The center bracket may be located within internal space between the first

iron plate and the second iron plate.

[0017] The convex brim may include a center bracket with a convex surface; an upper bracket and a lower bracket extending in both directions around the center bracket; and a fixing groove formed between the upper bracket and the lower bracket. The center bracket may be located on the outer side of the lateral end portion between the first iron plate and the second iron plate.

[0018] A lip seal may be further formed on the convex surface of the center bracket.

[0019] The upper bracket and the lower bracket may have differing lengths. The upper bracket may be formed to have a length of contact with a top surface of bending portions of the first iron plate and the second iron plate to be inserted into the fixing groove. The lower bracket may be formed to have a length of contact from a bottom surface of the bending portions to an inner portion of the first iron plate and the second iron plate.

[0020] The lip seal may be formed of a soft elastic material. It may be one of polyvinyl chloride, polyethylene, polyurethane, or silicone.

[0021] The lip seal may be one of a linear protrusion, a tubular protrusion with an empty inside, or a convex protrusion with a filled interior. The lip seal may be formed in one or more on the surface of at least one of the concave brim and the convex brim.

[0022] The lip seal may be formed either integrally with the brim through a dualextrusion method or adhered to the brim's concave-convex surface.

[0023] The lip seal may be formed in the brim using a fitting protrusion formed at an end of the lip seal and a fitting groove formed on the concave-convex surface of the brim.

[0024] In another general aspect, a housing case for air conditioning equipment includes a plurality of lip seal panels for air conditioning equipment according to any one of claims 1 to 6 and claims 8 to 11, and being manufactured through continuous assembly of the plurality of lip seal panels. The continuous assembly includes connecting a concave brim of one lip seal panel with a convex brim of another lip seal panel.

[0025] Corner frames supporting the corners of the housing case are assembled at the ends of the sequentially assembled lip seal panels.

[0026] According to the present disclosure, a concave brim and a convex brim are provided at both ends of a lip seal panel, and direct coupling between lip seal panels is possible by forming lip seals on concave-convex surfaces of each brim. This results in the elasticity of the lip seal itself minimizing air leakage due to close contact between lip seal panels when they are coupled.

[0027] According to the present disclosure, it is possible to manufacture the housing case for air conditioning equipment by assembling only the lip seal panels, thus excluding the need for intermediate frames and gasket, which simplifies the process and reduces production costs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

FIG. 1 illustrates a sectional view of a casing panel according to the prior art.

FIG. 2 illustrates a sectional view of the assembly of casing panels in which intermediate frames are used according to the prior art.

FIG. 3 illustrates a perspective view of a housing case for air conditioning equipment manufactured according to the prior art.

FIG. 4 illustrates an exploded perspective view for explaining an assembly process of the housing case of FIG. 2.

FIGS. 5 and 6 illustrate sectional views of a lip seal panel according to one example of the present disclosure.

FIG. 7 illustrates a sectional view of brims with lip seals of various patterns in a lip seal panel according to the present disclosure.

FIG. 8 illustrates a view for explaining an example of a process of forming a lip seal in a brim in a lip seal panel according to the present disclosure.

FIG. 9 illustrates a sectional view of lip seal panels assembled according to the present disclosure.

DETAILED DESCRIPTION

[0029] The following detailed description is provided to assist the reader in gaining a comprehensive understanding of the methods, apparatuses, and/or systems described herein. However, various changes, modifications, and equivalents of the methods, apparatuses, and/or systems described herein will be apparent after an understanding of the disclosure of this application. For example, the sequences of operations described herein are merely examples, and are not limited to those set forth herein, but may be changed as will be apparent after an understanding of the disclosure of this application, with the exception of operations necessarily occurring in a certain order. Also, descriptions of features that are known in the art may be omitted for increased clarity and conciseness.

[0030] Although terms such as "first," "second," and "third" may be used herein to describe various members, components, regions, layers, or sections, these members, components, regions, layers, or sections are not to be limited by these terms. Rather, these terms are only used to distinguish one member, component, region, layer, or section from another member, component, region,

layer, or section. Thus, a first member, component, region, layer, or section referred to in examples described herein may also be referred to as a second member, component, region, layer, or section without departing from the teachings of the examples.

[0031] The terminology used herein is for describing various examples only, and is not to be used to limit the disclosure. The articles "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. The terms "comprises," "includes," and "has" specify the presence of stated features, numbers, operations, members, elements, and/or combinations thereof, but do not preclude the presence or addition of one or more other features, numbers, operations, members, elements, and/or combinations thereof.

[0032] Spatially relative terms such as "above," "upper," "below," and "lower" may be used herein for ease of description to describe one element's relationship to another element as shown in the figures. Such spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, an element described as being "above" or "upper" relative to another element will then be "below" or "lower" relative to the other element. Thus, the term "above" encompasses both the above and below orientations depending on the spatial orientation of the device. The device may also be oriented in other ways (for example, rotated 90 degrees or at other orientations), and the spatially relative terms used herein are to be interpreted accordingly.

[0033] The features of the examples described herein may be combined in various ways as will be apparent after an understanding of the disclosure of this application. Further, although the examples described herein have a variety of configurations, other configurations are possible as will be apparent after an understanding of the disclosure of this application.

[0034] Hereinafter, the present disclosure is described in more detail based on the example illustrated in the drawings.

[0035] FIGS. 5 and 6 illustrate sectional views of a lip seal panel according to one example of the present disclosure.

[0036] According to the present disclosure, a lip seal panel 100 is used in the production of housing cases for air conditioning equipment, such as air handling units and Desiccant dehumidifiers.

[0037] The lip seal panel 100 forms a brim shape on one side that may be either convex or concave depending on the assembly sequence of a housing case (see reference numeral 1 in FIG. 3). The lip seal panel in FIG. 5 may be a lip seal panel applied at the assembly starting position and intermediate position, while the lip seal panel in FIG. 6 may be a lip seal panel applied at the assembly final position. Furthermore, lip seal panels in FIGS. 5 and 6 have the same configuration for all other parts except the arrangement of the brim on one side, as shown in the diagram. To avoid repetitive explanations of duplicated configurations, only the components present in a single lip seal panel will be explained.

[0038] As illustrated in the drawings, the lip seal panel 100 is formed with an inner iron plate (first iron plate) 110 and an outer iron plate (second iron plate) 120, along with brims 200, 300 installed between the first iron plate 110 and the second iron plate 120. The width and thickness of the lip seal panel 100 may be designed in a wide range of variations. That is because different sizes of lip seal panels 100 may be required depending on the size of the housing case 1 that is being produced. The thickness of the lip seal panel 100 is determined by the size of the brims 200, 300 located between the first iron plate 110 and the second iron plate 120.

[0039] Between the first iron plate and the second iron plate 120, a heat-insulating material 130 such as urethane is filled. The heat-insulating material 130 may be filled by simply filling the materials of insulation or through methods such as foaming.

[0040] Brims may be classified into the concave brim 200 and the convex brim 300. The lip seal panel 100 in FIG. 5 is equipped with the concave brim 200 at one side and the convex brim 300 at the opposite side. On the other hand, the lip seal panel 100' in FIG. 6 is equipped with concave brims 200 at both side ends. Therefore, the concave brim 200 of one lip seal panel is assembled by coupling it with the convex brim 300 of another lip seal panel. For example, the lip seal panel 100' in FIG. 6 is designed such that the concave brim 200 on the left is formed with a lip seal, while the concave brim 200' on the right is designed without a lip seal. However, it is evident that a lip seal may also be formed on the concave brim 200' on the right as on the concave brim 200' on the left, if desired.

[0041] The structure of brims 200, 300 can be comprehended by referring to the magnified view shown in FIG. 5.

[0042] Referring to FIG. 5, in the concave brim 200, a center bracket 210 with a concave surface is formed in the center, and fixing grooves 240 each are formed by an upper bracket 231 and a lower bracket 232 at both sides with respect to the center bracket 210. The upper bracket 231 and the lower bracket 232 are extended in one direction while being spaced apart from the center bracket 210 by a predetermined interval and are integrally formed. A bending portion 112 of the first iron plate 110 and a bending portion of the 122 of the second iron plate 120 are fitted and fixed to the fixing groove 240.

[0043] The upper bracket 231 and the lower bracket 232 have different lengths. The upper bracket 231 is formed to have a length that contacts only the upper surfaces of the bending portion 112 and the bending portion 122, and the lower bracket 232 is formed to have a length that contacts the bottom surfaces of the bending portion 122 and the bending portion 123 and a portion of the inner surfaces of the first iron plate 110 and the second

iron plate 120. The length of the lower bracket 232 is formed longer than the length of the upper bracket 231 to support the inner surface of the iron plates. According to this structure, the iron plates 110, 120 and the brim 200 mutually support each other.

[0044] In FIG. 5, the convex brim 300 is the same as the concave brim 200, and as described above, only the shape of the center bracket 310 is formed convex. The center bracket 310 of the convex brim 300 and the center bracket 210 of the concave brim 200 coupled thereto should be formed to correspond in size.

[0045] According to the present disclosure, lip seals 400 are formed on a concave surface 220 of the brim 200 and on a convex surface 320 of the brim 300.

[0046] The lip seal 400 is formed of a soft material and is for airtightness of the housing case 1 by assembling the concave brim 200 and the convex brim 300. The lip seal 400 may be provided on both the concave brim 200 and the convex brim 300, but in this embodiment, for the purpose of explaining with an example, it is described as being provided on the concave surface 220 of the concave brim 220, which is determined to have the greatest sealing effect.

[0047] Forming the lip seal 400 with a soft, elastic material can improve sealing effect. Table 1 below shows the material of the lip seal.

[Table 1]

Lip Seal Material
PVC-Poly vinylchloride
PE-Polyethylene
PU (Polyurethane)
Silicone (Silicone resin)

[0048] Certainly, the lip seal 400 can be formed from soft, elastic materials not limited to those listed in Table 1, to prevent any internal leakage when the concave brim 200 and the convex brim 300 are combined and in contact.

[0049] The lip seal 400 according to the present disclosure may be formed in various shapes. FIG. 7 illustrates a sectional view of brims with lip seals of various patterns in a lip seal panel according to the present disclosure.

[0050] As illustrates in FIG. 7, the lip seal 400 may be formed into various patterns beyond a specific shape. (a) and (b) of FIG. 7 provide examples of lip seals with linear protrusions. Linear protrusions may be formed in one or more, with their thickness or length being uniform or varying.

[0051] (c) to (h) of FIG. 7 provide examples of lip seals with tubular protrusions. Tubular protrusions have an empty interior and may take various shapes such as semi-circular, rectangular, triangular, and so on. Moreover, these semi-circular, rectangular, and triangular lip seals are formed at least once. Additionally, if lip seals are formed in more than two, their sizes may be uniform or varying. Furthermore, semi-circular, rectangular, and triangular lip seals all may be formed on a single brim. For example, a semi-circular lip seal may be formed at the center on one side of the brim's center bracket, and rectangular and triangular lip seals may be combined and formed in the left and right directions.

[0052] (i) to (n) of FIG. 7 represent examples of lip seals with convex protrusions that are filled on the inside. Compared to the tubular protrusions described earlier, the only difference lies in whether the interior is empty or filled. However, the composition of different shapes, sizes, and quantities remains the same.

[0053] FIG. 8 illustrates a view for explaining an example of a process of forming a lip seal on a brim in a lip seal panel according to the present disclosure.

[0054] There are various methods to form a lip seal on the brim.

(a) of FIG. 8 illustrates the formation of a lip seal 400 on a brim 200 using a dual extrusion method. In other words, during the manufacturing of the brim 200, the lip seal 400 with a different material is extrusion-molded onto one side of the brim 200. As the lip seal 400 is formed integrally on one side of the brim 200, there is no need for separate adhesive means.

(b) of FIG. 8 illustrates an adhesive method. As illustrated, it involves adhering the lip seal 400 onto the concave surface of the brim 200. In this case, the lip seal 400 may be individually adhered one by one or may be a method of adhering the rear surface of an adhesive film 410 to which the lip seal 400 is attached to the concave surface 220.

(c) and (d) of FIG. 8 represent the fitting methods. In (c), as shown, a fitting groove 222 is formed on a concave surface of the brim 200, and the lip seal 400 is fitted and secured into each fitting groove 222. In (d), a plurality of fitting protrusions 420 are formed on one side of the lip seal 400 in an elliptical shape, and these fitting protrusions 420 are fitted and secured into the fitting grooves 222 formed on the concave surface 220. Furthermore, when employing the fitting method shown in FIG. 8, the lip seal 400 may also be more securely affixed by providing adhesive or other materials at the ends of the lip seal 400 or within the fitting groove 222.

[0055] FIG. 9 illustrates a sectional view of lip seal panels assembled according to the present disclosure. Referring to FIG. 9, a method of manufacturing a housing case 1 can be described. Prior to the description, the lip seal panel 100 shown in FIG. 5 will be referred to as a first lip seal panel, and the lip seal panel 100' shown in FIG. 6 will be referred to as a second lip seal panel.

[0056] As illustrated in FIG. 9, in a state where a corner

frame 40 forming the corner of a housing case 1 to be manufactured is located, a first main lip seal panel 100-1 is connected and assembled.

[0057] In that state, a first sub-lip seal panel 100-2 is assembled to the first main lip seal panel 100-1. In other words, the convex brim of the first main lip seal panel 100-1 and the concave brim of the first sub-lip seal panel 100-2 are combined and assembled. As a result of this assembly, the lip seal formed on the concave brim of the first sub-lip seal panel 100-2 becomes passed and adhered by the convex brim of the first main lip seal panel 100-1, achieving a tightly secured state.

[0058] Subsequently, other first lip seal panels (100-3, 100-4, ...) are sequentially assembled onto the first sub-lip seal panel 100-2, with the appropriate number of these first lip seal panels 100 being assembled based on the size of the housing case 1 to be manufactured.

[0059] After assembling all the first lip seal panels 100, the second lip seal panel 100' is assembled last. The second lip seal panel 100' is a panel with concave brims on both sides, where the concave brim on one side end is fitted with the convex brim of the adjacent first sub-lie seal panel 100-2. The concave brim on the other end is assembled with the side bracket of the corner frame 40.

[0060] According to this assembly method, the housing case 1 may be manufactured by continuously assembling the lip seal panels 100, 100' between the corner frames 40. Because of this ability to form the housing case (1) solely using the lip seal panels (100, 100'), there is no need for the intermediate frame (20) mentioned in the prior art of FIG. 2. Thus, referring to the housing case 1 of FIG. 3, only the lip seal panels will be assembled without the intermediate frame (20).

[0061] While this disclosure includes specific examples, it will be apparent after an understanding of the disclosure of this application that various changes in form and details may be made in these examples without departing from the spirit and scope of the claims and their equivalents. The examples described herein are to be considered in a descriptive sense only, and not for purposes of limitation. Descriptions of features or aspects in each example are to be considered as being applicable to similar features or aspects in other examples. Suitable results may be achieved if the described techniques are performed in a different order, and/or if components in a described system, architecture, device, or circuit are combined in a different manner, and/or replaced or supplemented by other components or their equivalents. Therefore, the scope of the disclosure is defined not by the detailed description, but by the claims and their equivalents, and all variations within the scope of the claims and their equivalents are to be construed as being included in the disclosure.

Claims

1. A lip seal panel for air conditioning equipment, comprising:

a first iron plate and a second iron plate of a same size;
a brim located at both ends of the first iron plate and the second iron plate; and
a heat-insulating material between the first iron plate and the second iron plate,
wherein the brim includes a concave brim and a convex brim, and
wherein a lip seal is formed on surface of at least one of the concave brim and the convex brim.

2. The lip seal panel for air conditioning equipment of claim 1,
wherein the concave brim and the convex brim are formed at both ends of the lip seal panel.

3. The lip seal panel for air conditioning equipment of claim 1,
Wherein the concave brims only are formed at both ends of the lip seal panel.

4. The lip seal panel for air conditioning equipment of claim 1,

wherein the concave brim comprises:

a center bracket with a concave surface;
an upper bracket and a lower bracket extending in both directions around the center bracket;
a fixing groove formed between the upper bracket and the lower bracket; and
the lip seal formed on the concave surface of the center bracket;

wherein the center bracket is located within internal space between the first iron plate and the second iron plate.

5. The lip seal panel for air conditioning equipment of claim 1,

wherein the convex brim comprises:

a center bracket with a convex surface;
an upper bracket and a lower bracket extending in both directions around the center bracket; and
a fixing groove formed between the upper bracket and the lower bracket,

wherein the center bracket is located on an outer side of a lateral end portion between the first iron plate and the second iron plate.

6. The lip seal panel for air conditioning equipment of

claim 1,
wherein a lip seal is further formed on the convex surface of the center bracket.

7. The lip seal panel for air conditioning equipment of claim 4 or 5,

wherein the upper bracket and the lower bracket have differing lengths,
wherein the upper bracket is formed to have a length of contact with a top surface of bending portions of the first iron plate and the second iron plate to be inserted into the fixing groove,
wherein the lower bracket is formed to have a length of contact from a bottom surface of the bending portions to an inner portion of the first iron plate and the second iron plate.

8. The lip seal panel for air conditioning equipment of claim 1,

wherein the lip seal is formed of a soft elastic material, and
wherein the elastic material is one of polyvinyl chloride, polyethylene, polyurethane, or silicone.

9. The lip seal panel for air conditioning equipment of claim 1,

wherein the lip seal is one of a linear protrusion shape, a tubular protrusion shape with an empty inside, or a convex protrusion shape with a filled interior, and
wherein the lip seal is formed in one or more on the surface of at least one of the concave brim and the convex brim.

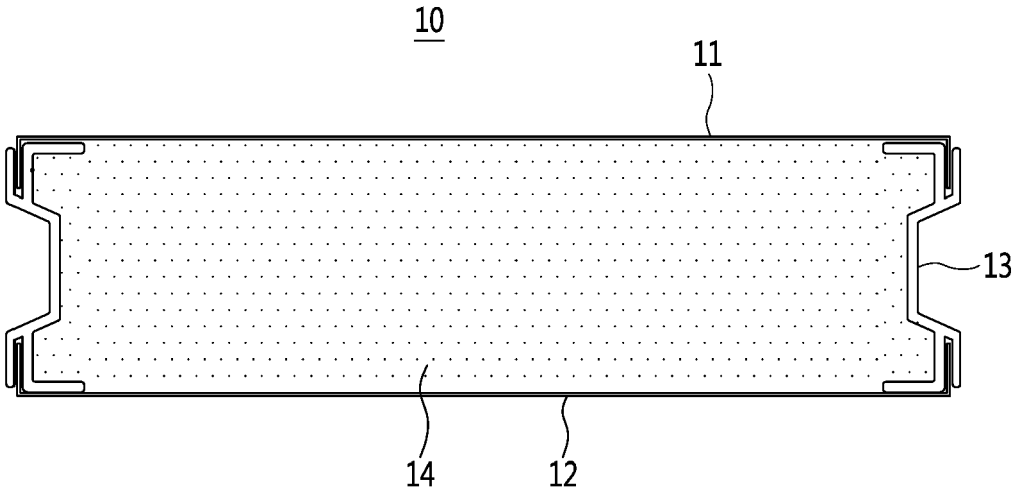
10. The lip seal panel for air conditioning equipment of claim 1,
wherein the lip seal is formed either integrally with the brim through a dualextrusion method or adhered to the brim's concave-convex surface.

11. The lip seal panel for air conditioning equipment of claim 1,
wherein the lip seal is formed in the brim using a fitting protrusion formed at an end of the lip seal and a fitting groove formed on the concave-convex surface of the brim.

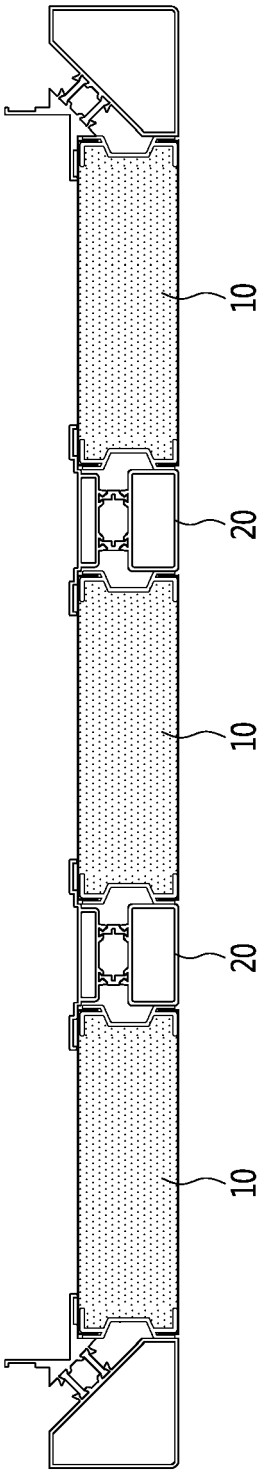
12. A housing case for air conditioning equipment, comprising:

a plurality of lip seal panels for air conditioning equipment according to any one of claims 1 to 6 and claims 8 to 11, and being manufactured through continuous assembly of the plurality of lip seal panels,
wherein the continuous assembly includes connecting a concave brim of one lip seal panel with a convex brim of another lip seal panel.

FIG. 1



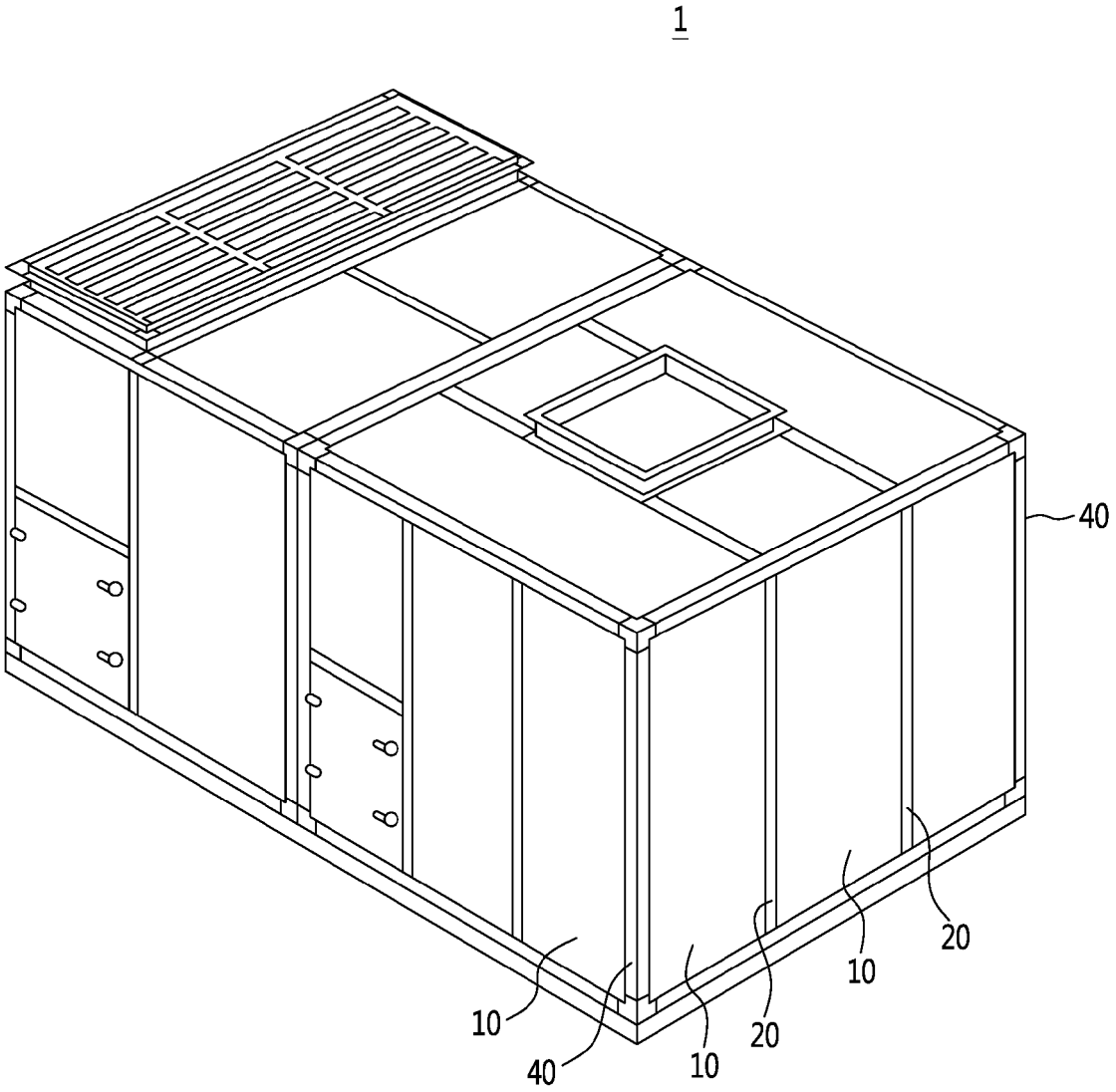
Prior Art



Prior Art

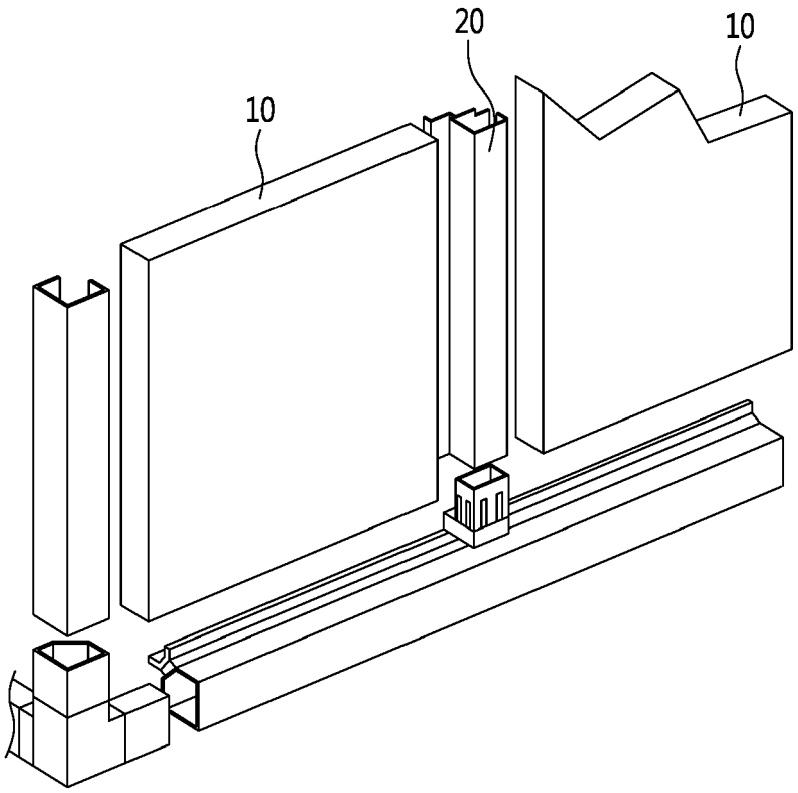
FIG. 2

FIG. 3



Prior Art

FIG. 4



Prior Art

FIG. 5

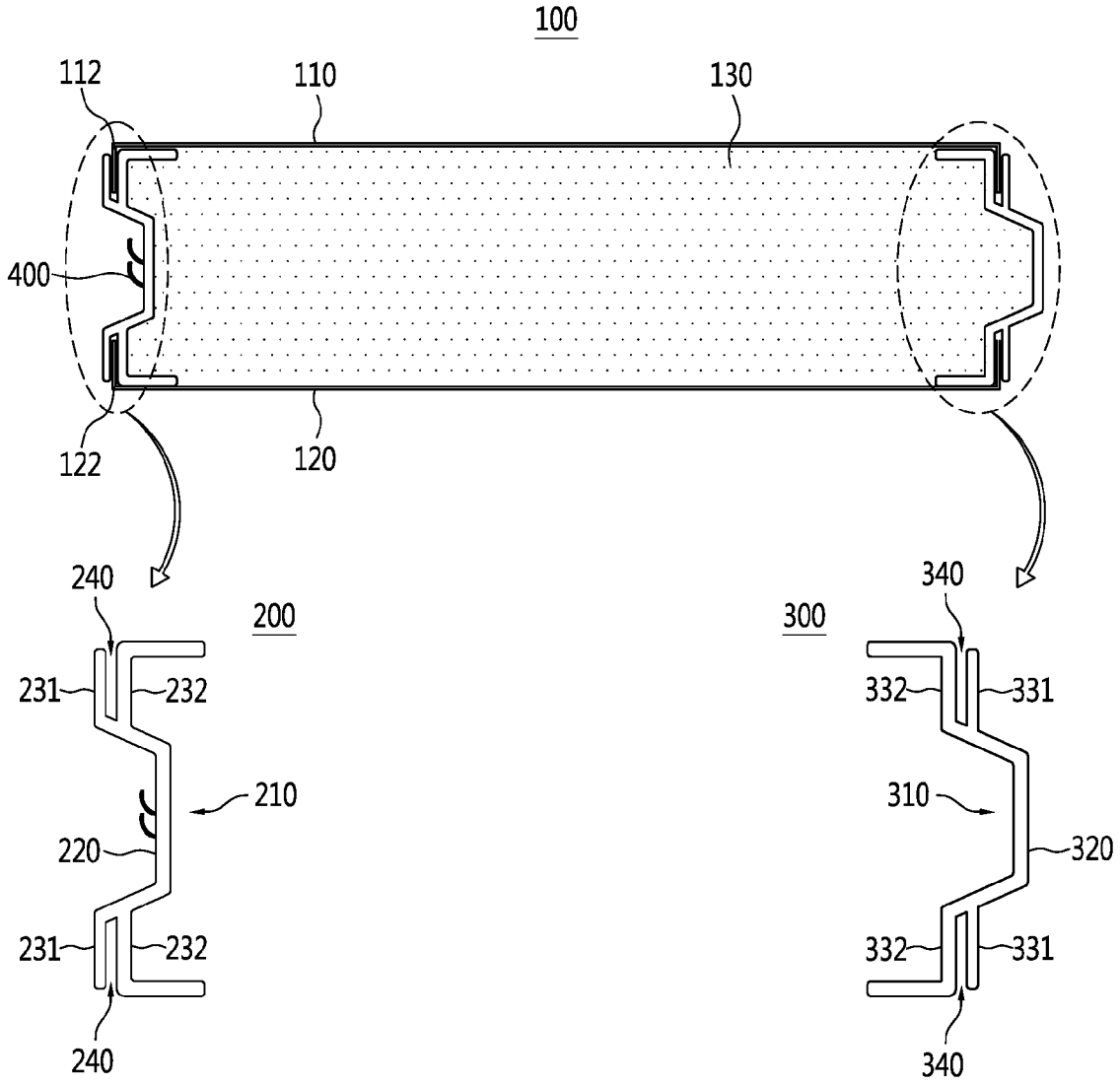

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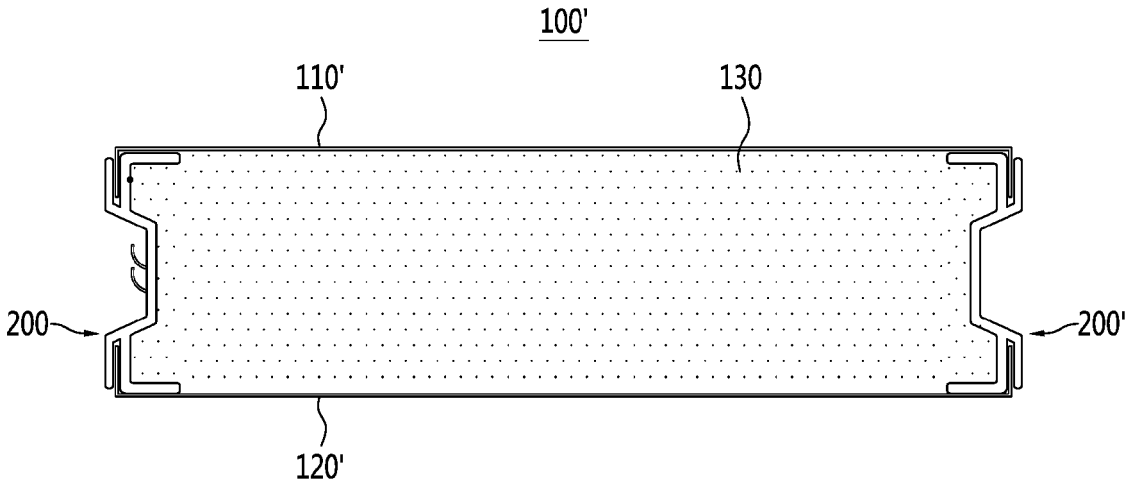
FIG. 6



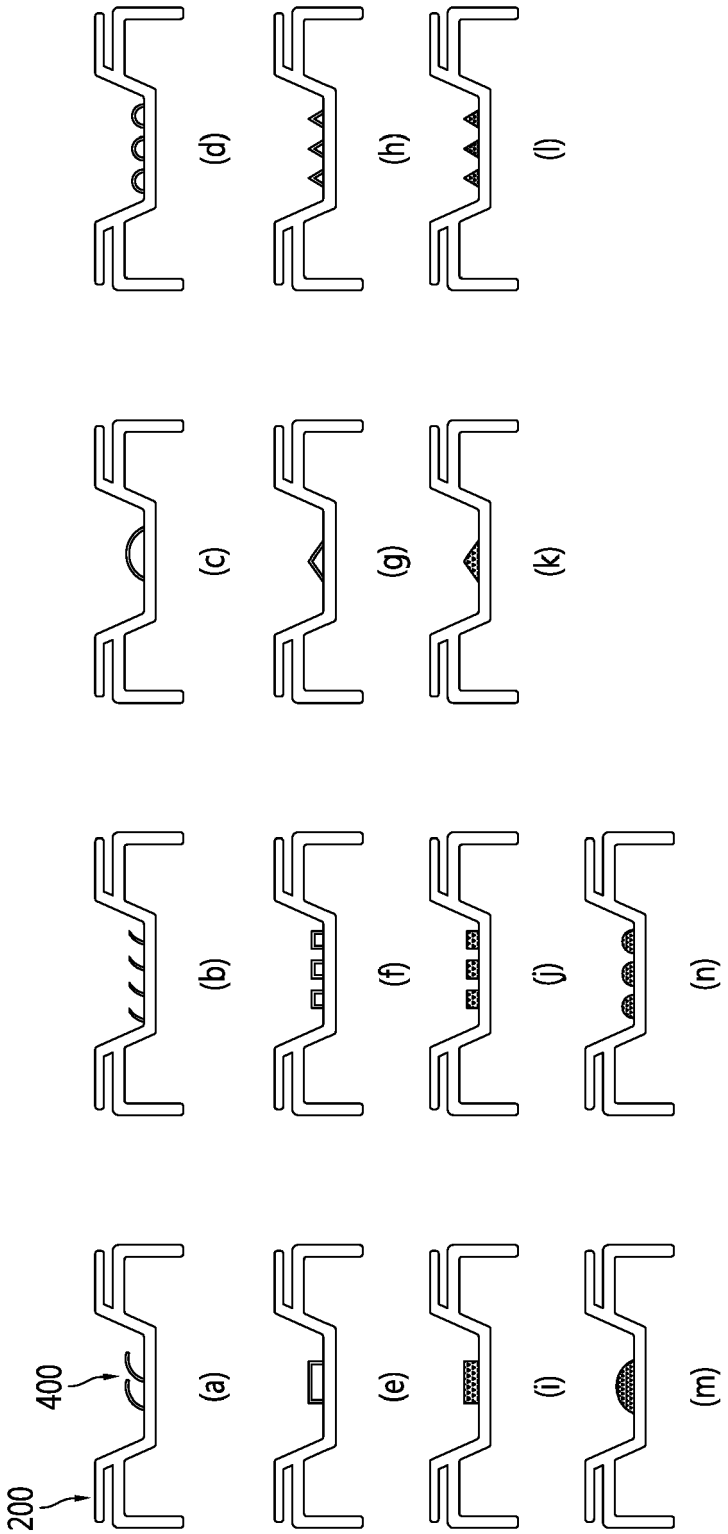
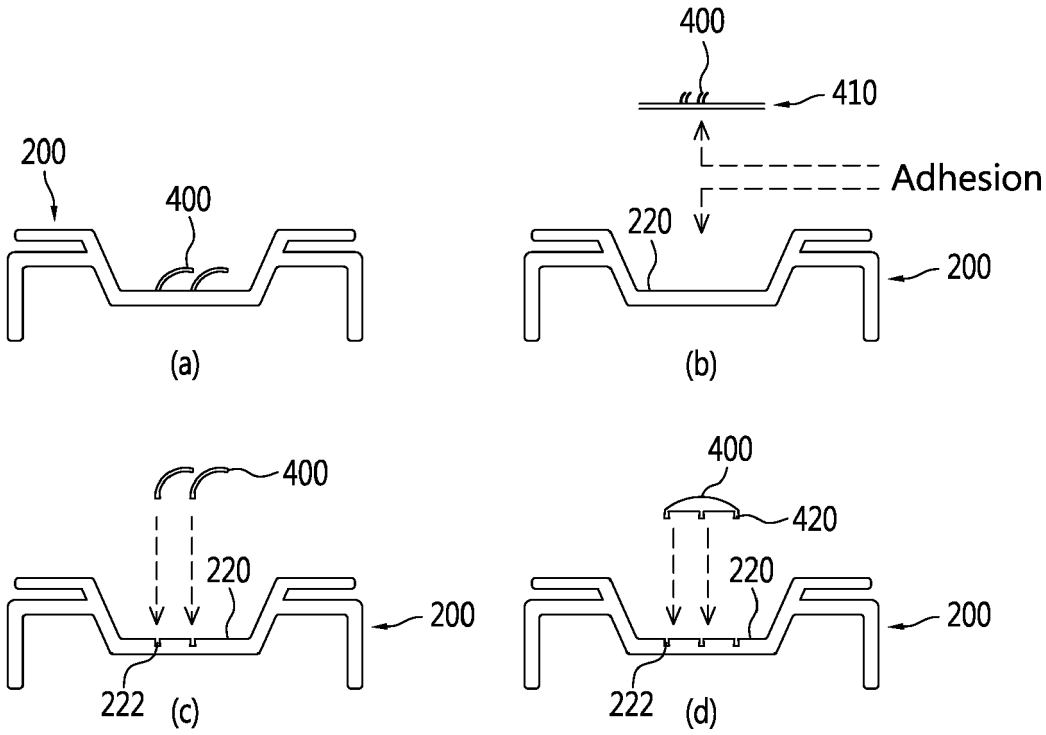


FIG. 7

FIG. 8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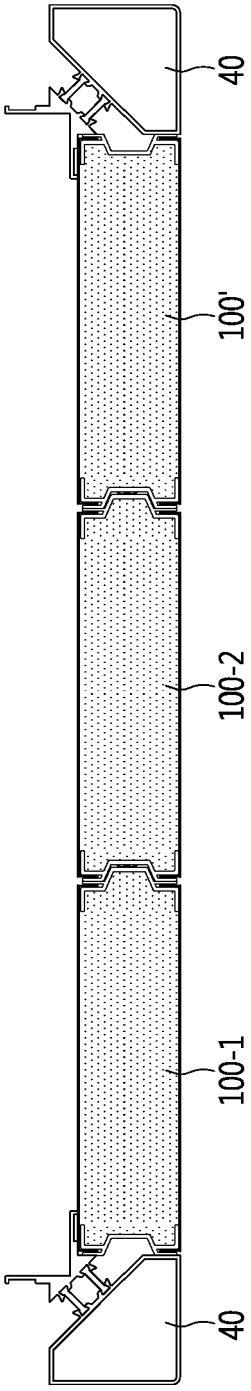

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 23 20 9118

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Place of search	Date of completion of the search	Examiner
Munich	8 April 2024	Blot, Pierre-Edouard

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