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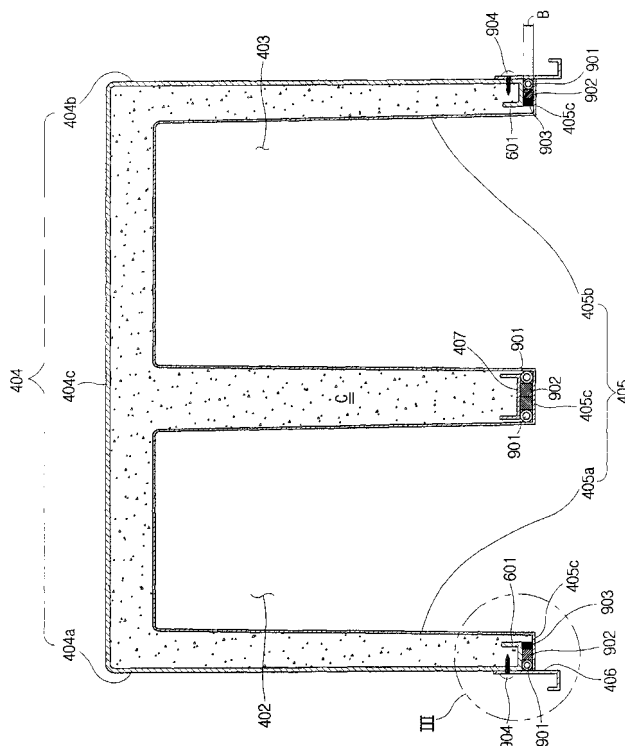
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### (54) Frame of a wall-embedded refrigerator

(57) A frame of a wall-embedded refrigerator capable of providing a good appearance while simplifying its assembly process. The frame includes an outer case (404), and an integrated inner case (405) received in the outer case (404) while being spaced apart therefrom by a desired distance. The integrated inner case (405) de-

fines freezing and refrigerating chambers (402, 403) respectively, and a front surface of a partition wall formed between the freezing and refrigerating chambers. The frame simplifies the assembly process, thereby achieving an improvement in productivity, a reduction in manufacturing costs, and a good refrigerator appearance.

FIG.5



## Description

**[0001]** The present invention relates to a wall-embedded refrigerator, and more particularly to a frame of such a wall-embedded refrigerator which has a simplified structure.

**[0002]** In order to efficiently install refrigerators of a large capacity as compared to that of general refrigerators for domestic use, a proposal has been made in which a building wall is recessed to define a space to receive or embed a refrigerator. Such a refrigerator, which is designed to meet this proposal, is called a "wall-embedded refrigerator".

**[0003]** However, there are problems involved with a frame of a conventional wall-mounted refrigerator, and the assembly process of that frame. The first problem is a poor appearance in that steps and gaps are formed at regions where first and second inner cases are assembled with a cabinet flange. Second, the assembly process is complex because it is achieved by caulking adjacent inner surfaces of the first and second inner cases. For this reason, there are a degradation in productivity and an increase in manufacturing costs. Third, seal members provided at respective corners of the first and second inner cases cause a poor appearance.

**[0004]** Accordingly, it is an aim of the present invention is to provide a frame of a wall-embedded refrigerator which can provide a good appearance while simplifying its assembly process.

**[0005]** Additional aims and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

**[0006]** According to the present invention there is provided an apparatus and method as set forth in the appended claims. Preferred features of the invention will be apparent from the dependent claims, and the description which follows.

**[0007]** In one aspect of the present invention there is provided a frame of a refrigerator embedded in a recessed wall, the frame including an outer case having a pair of side plates respectively forming opposite outer side surfaces, and a rear plate forming an outer rear surface, a pair of inner cases received in the outer case while being spaced apart from an inner surface of the outer case by a desired distance, the inner cases defining freezing and refrigerating chambers, respectively, and a cabinet flange to cover front surfaces of the outer and inner cases, and a front surface of a partition wall formed between the freezing and refrigerating chambers, wherein the inner cases and the cabinet flange are integrally formed as an integrated inner case.

**[0008]** For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 is a perspective view illustrating the appearance of a wall-embedded refrigerator;

Figure 2 is a cross-sectional view taken along the line A - A of Figure 1;

Figure 3 is a perspective view illustrating a cabinet flange partially taken along the line A - A of Figure 1;

Figure 4 is a perspective view illustrating the appearance of a wall-embedded refrigerator according to an embodiment of the present invention;

Figure 5 is a cross-sectional view taken along the line B - B of Figure 4;

Figure 6 is a perspective view illustrating an outer case included in the wall-embedded refrigerator of Figure 4, the outer case being partially taken along the line B - B of Figure 4;

Figure 7 is a perspective view illustrating an integrated inner case included in the wall-embedded refrigerator of Figure 4, the integrated inner case being partially taken along the line B - B of Figure 4;

Figure 8A is a perspective view illustrating a cabinet chassis included in the wall-embedded refrigerator of Figure 4, the cabinet chassis being partially taken along the line B - B of Figure 4;

Figure 8B is a perspective view illustrating a cabinet chassis according to another embodiment of the present invention; and

Figure 9 is an enlarged exploded perspective view corresponding to a portion "III" of Figure 4.

**[0009]** As background to the present invention, the frame of a wall-embedded refrigerator will first be described with reference to Figures 1 and 2. In Figures 1 and 2, elements having the same function are denoted by the same reference numeral.

**[0010]** Figure 1 is a perspective view illustrating a conventional wall-embedded refrigerator 100. Arranged at the rear of the wall-embedded refrigerator 100 in Figure 1 is a building wall 10 defined with a space in which the wall-embedded refrigerator 100 can be embedded. The wall-embedded refrigerator 100 shown in Figure 1 includes a machine chamber 101 formed at an upper portion of the refrigerator 100, and freezing and refrigerating chambers 102 and 103 formed beneath the machine chamber 101. In order to conveniently show the freezing and refrigerating chambers 102 and 103, the illustration of their doors are eliminated. Now, the frame of the wall-embedded refrigerator 100 will be briefly described under the condition in which the doors of the freezing and refrigerating chambers 102 and 103 are removed. As

shown in Figure 1, the refrigerator frame includes an outer case 104 forming the outer surface of the refrigerator 100, a first inner case 105 defining the freezing chamber 102, a second inner case 106 defining the refrigerating chamber 103, and a cabinet flange 107 to finish the front surfaces of the cases 104, 105, and 106, and the front surface between the inner cases 105 and 106.

**[0011]** Figure 2 is a cross-sectional view of a refrigerator taken along the line A - A of Figure 1. The frame of the conventional wall-embedded refrigerator will be described in more detail with reference to Figure 2.

**[0012]** The outer case 104, which forms the outer surface of the wall-embedded refrigerator 100, includes a pair of side plates, that is, left and right plates 104A and 104B, respectively forming opposite outer side surfaces, that is, outer left and right surfaces, and a rear plate 104C forming an outer rear surface. Although the outer case 104 includes a top plate forming an outer top surface, and a bottom plate forming an outer bottom surface, these plates are removed for convenience of illustration. The inner cases, that is, the first and second inner cases 105 and 106, form inner surfaces of the wall-embedded refrigerator 100 respectively defining the freezing chamber 102 and the refrigerating chamber 103. The first inner case 105 forming the freezing chamber 102 includes a first inner left surface 105A facing the left plate 104A, a first inner rear surface 105B facing the rear plate 104C, and a first inner right surface 105C forming one side surface of a partition wall A formed between the first and second inner cases 105 and 106. Although the first inner case 105 includes top and bottom plates associated with the freezing chamber 102, these plates are removed for convenience of illustration. The second inner case 106 forming the refrigerating chamber 103 includes a second inner right surface 106A facing the right plate 104B, a second inner rear surface 106B facing the rear plate 104C, and a second inner left surface 106C forming the other side surface of the partition wall A. Although the second inner case 105 includes top and bottom plates associated with the refrigerating chamber 103, these plates are removed for convenience of illustration. The cabinet flange 107 is coupled to the front surface of the refrigerator frame, that is, the front surface formed between the outer case 104 and the inner case 105, the front surface formed between the outer case 104 and the inner case 106, and the front surface of the partition wall A, in order to cover or finish those surfaces. Referring to Figure 3, the cabinet flange 107 is clearly shown. The coupling among the first inner left surface 105A, first inner rear surface 105B, and first inner right surface 105C of the first inner case 105 forming the freezing chamber 102, and the coupling among the second inner right surface 106A, second inner rear surface 106B, and second inner left surface 106C of the second inner case 106 forming the refrigerating chamber 103 are achieved using a caulking process, as shown by a portion "I" in Figure 2. A seal

member 204 is provided at each corner of each inner case where adjacent inner surfaces are in contact with each other, in order to prevent urethane from being leaked from the space defined between the outer and inner cases when the urethane is subsequently foamed in that space.

**[0013]** Meanwhile, hot pipes 201 and magnets 202 are installed at the front surface of the refrigerator frame including the outer case 104, first and second inner cases 105 and 106, and the cabinet flange 107 such that they are covered by the cabinet flange 107. Each hot pipe 201 serves to prevent a dewing phenomenon from occurring at the front end of the wall-embedded refrigerator 100. The hot pipe 201 is attached to the cabinet flange 107 by means of a clip pipe 203, and a double-sided tape. The magnets 202 serve to magnetically couple the magnet-attached doors of the wall-embedded refrigerator 100 to the cabinet flange 107. Each magnet 202 is attached to the cabinet flange 107 by means of a double-sided tape.

**[0014]** The process of assembling the above described frame of the wall-embedded refrigerator 100 is carried out as follows:

- (1) The first inner case 105 forming the freezing chamber and the second inner case 106 forming the refrigerating chamber are assembled in accordance with a caulking process;
- (2) Magnets 202 are attached to the rear surface of the cabinet flange 107 by means of double-sided tapes;
- (3) Hot pipes 201 are fixed to the rear surface of the cabinet flange 107 by means of clip pipes 203 attached with double-sided tapes, respectively;
- (4) The first and second inner cases 105 and 106 are coupled in a fitting fashion to the cabinet flange 107 carrying the hot pipes 201 and magnets 202; and
- (5) The resultant assembly obtained in accordance with the assembly process of step (4) is assembled with the outer case 104.

**[0015]** Figure 4 is a perspective view illustrating the appearance of a wall-embedded refrigerator 400 according to an embodiment of the present invention.

**[0016]** Arranged at the rear of the wall-embedded refrigerator 400 in Figure 4 is a building wall 40 defined with a space in which the wall-embedded refrigerator 400 can be embedded. As shown in Figure 4, the wall-embedded refrigerator 400 includes a machine chamber 401 formed at an upper portion of the refrigerator 400, and freezing and refrigerating chambers 402 and 403 formed beneath the machine chamber 401. In order to conveniently show the freezing and refrigerating

chamber 402 and 403, their doors are not illustrated. Now, the frame of the wall-embedded refrigerator 400 will be briefly described under the condition in which the doors of the freezing and refrigerating chambers 402 and 403 are removed. As shown in Figure 4, the refrigerator frame includes an outer case 404 forming the outer surface of the refrigerator 400, an integrated inner case 405 defining both the freezing and refrigerating chambers 402 and 403, and a cabinet chassis 406 to finish the front surface edges of the outer and inner cases 404 and 405.

**[0017]** Figure 5 is a cross-sectional view taken along the line B - B of Figure 4. Referring to Figure 5, the frame of the wall-embedded refrigerator according to this embodiment is more clearly illustrated.

**[0018]** The outer case 404, which forms the outer surface of the wall-embedded refrigerator 400, includes a pair of side plates, that is, left and right plates 404A and 404B, respectively forming opposite outer side surfaces, that is, outer left and right surfaces, and a rear plate 404C forming an outer rear surface. Although the outer case 404 includes a top plate forming an outer top surface, and a bottom plate forming an outer bottom surface, these plates are removed for convenience of illustration. This structure of the outer case 404 is more clearly illustrated in Figure 6. The structure of the outer case 404 will be described in more detail with reference to Figures 5 and 6. The side plates 404a and 404b of the outer case 404 is provided at respective front ends thereof with extensions 601 each extending from an associated one of the front ends toward the integral inner case 405 while being bent. These extensions 601 serve to support hot pipes and magnets, as described herein-after. In accordance with the illustrated embodiment of Figure 6, each extension 601 has a double-bent structure primarily bent toward the inner case 405, and then secondarily bent toward the rear plate 404C of the outer case 404.

**[0019]** Referring to Figure 7, the structure of the integral inner case 405, which forms the inner and front surfaces of the wall-embedded refrigerator 400, is clearly illustrated. As shown in Figure 7, the integral inner case 405 includes a freezing chamber surface section 405A defining the freezing chamber 402, a refrigerating chamber surface section 405B defining the refrigerating chamber 403, and a front surface section 405C forming the front surface of the wall-embedded refrigerator 400.

**[0020]** The cabinet chassis 406 to finish the front surface edges of the wall-embedded refrigerator 400 is clearly illustrated in Figures 8A and 8B. Figure 8A is a perspective view illustrating the cabinet chassis 406 of Figure 5. The structure of the cabinet chassis 406 will be described in detail with reference to Figures 5 and 8A. The cabinet chassis 406 is provided at its front end with a bent portion 801 primarily bent outwardly to extend along the front surface of the refrigerator 400, and then secondarily bent toward the rear portion of the refrigerator 400. The bent portion 801 of the cabinet chassis

406 serves to hide gaps possibly formed between the building wall 40 and the cabinet chassis 406 when the refrigerator 400 is embedded in the space formed in the building wall 40, thereby providing a good appearance.

**[0021]** Referring to Figure 8B, a cabinet chassis according to another embodiment of the present invention is illustrated. The cabinet chassis of Figure 8B further has a support rim 802 to support the front surface edge of the integrated inner case 405 in a state in which the frame of the wall-embedded refrigerator is completely assembled, thereby preventing the front surface edge of the integrated inner case 405 from being protruded.

**[0022]** The detailed configuration of the refrigerator frame according to Figure 5 will now be described with reference to Figure 9, which is an enlarged view corresponding to a portion "III" of Figure 5.

**[0023]** The front surface section 405C of the inner case 405 and the extension 601 of the outer case 404 are uniformly spaced apart from each other by a distance B (Figure 5). This space receives hot pipes 901 to prevent a dewing phenomenon from occurring at the front end of the wall-embedded refrigerator 400, and magnets 902 to magnetically couple the magnet-attached doors of the wall-embedded refrigerator 400 to the front surface section 405C of the inner case 405. The extension 601 of the outer case 404 serves to support the hot pipes 901 and magnets 902 such that the hot pipes 901 and magnets 902 are in close contact with the front surface section 405C of the inner case 405. Seal members 903 are disposed in the space defined by the distance B in order to sealably isolate the hot pipes 901 and magnets 902 from the freezing chamber surface section 405A or refrigerating chamber surface section 406B of the inner case 405, thereby preventing urethane from being leaked from the space when the urethane is foamed in the space. The cabinet chassis 406 is fixed to the outer case 404 by means of set screws 904.

**[0024]** Referring to Figure 5, it can be seen that a partition wall C is formed by the freezing chamber surface section 405A, refrigerating chamber surface section 405B, and front surface section 405C. As shown in Figure 5, two hot pipes 901 and one magnet 902 are provided at the partition wall C so that they are in close contact with the front surface section 405C. In order to make the hot pipes 901 and magnet 902 be in close contact with the front surface section 405C, a support member 407 is arranged in the space defined by the partition wall C while being fixedly mounted to the outer case 404.

**[0025]** The process of assembling the frame of the wall-embedded refrigerator 400 having the above described configuration is carried out as follows:

- (1) Hot pipes 901, magnets 902, and seal members 903 are installed at the extension 601 of the outer case 404 and the support member 407 is fixedly mounted to the outer case 404;

(2) The integral inner case 405 is fitted in the outer case 404, and urethane is foamed in a space defined between the outer case 404 and the inner case 405; and

(3) The cabinet chassis 406 is fixedly mounted to the outer case 404 by means of set screws after completion of the foaming.

**[0026]** As is apparent from the above description, the preferred frame of the wall-embedded refrigerator provides a superior appearance in that there is no step or gap formed by the inner case, and that the cabinet chassis is used to finish the frame. In addition, loss of cold air is reduced, thereby reducing the consumption of electric power. Since the inner case has an integrated structure, it is possible to achieve an improvement in assembling workability and productivity, and a reduction in manufacturing costs.

**[0027]** Although a few preferred embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

**[0028]** Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

**[0029]** All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

**[0030]** Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

**[0031]** The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

## Claims

1. A frame for a refrigerator embedded in a recessed wall (40), the frame comprising:

an outer case (404) having a pair of side plates (404a, 404b) respectively forming opposite outer side surfaces, and a rear plate (404c) forming an outer rear surface ;

an inner case (105, 106) received in the outer case while being spaced apart from an inner surface of the outer case by a desired distance, the inner case being divided by a partition wall and defining freezing and refrigerating chambers (402, 403), respectively; and

a cabinet flange (107) to cover front surfaces of the outer and inner cases, and a front surface of the partition wall formed between the freezing and refrigerating chambers, wherein the inner case (105, 106) and the cabinet flange (107) are integrally formed as an integrated inner case (405).

2. The frame according to claim 1, further comprising:

extensions (601) provided at respective front ends of the side plates (404a, 404b) of the outer case (404) each extending from an associated one of the front ends toward the integral inner case (405) while being bent, thereby maintaining a desired space between the extension (601) and a front surface (405c) of the integral inner case (405) such that the space receives at least one hot pipe (901) to prevent a dewing phenomenon from occurring at a front end of the wall-embedded refrigerator.

3. The frame according to claim 2, further comprising at least one magnet (902) provided in the space to magnetically couple a magnet-attached door of the wall-embedded refrigerator to the front surface (405c) of the integrated inner case (405).

4. The frame according to claim 3, further comprising a seal member (903) provided in the space to sealably isolate the hot pipe (901) and the magnet (902) from the integrated inner case (405), thereby preventing an insulation foam from being leaked from the space when the insulation foam is foamed in the space.

5. The frame according to any preceding claim, further comprising:

a cabinet chassis (406) to finish a front surface edge of the outer case (404) and a front surface edge of the integrated inner case (405); and

6. The frame according to claim 5, further comprising a bent portion (801) provided at a front end of the cabinet chassis extending toward the front end of

the wall-embedded refrigerator while being bent toward the wall (40), and adapted to hide a gap defined between the outer case (404) and the wall (40).

7. The frame according to claim 5 or 6, comprising a fixing unit (404) to fix the cabinet chassis (406) to the outer case (404).

8. The frame according to claim 5, 6 or 7, further comprising a support rim (802) provided at the cabinet chassis (406) to support the front surface edge (405c) of the integrated inner case (405).

9. The frame according to any preceding claim, wherein the partition wall formed between the freezing and refrigerating chambers (402, 403) in the integrated inner case (405) defines a space to receive at least one hot pipe (901) to prevent a dewing phenomenon from occurring at a front end of the wall-embedded refrigerator, and at least one magnet (902) to magnetically couple a magnet-attached door of the wall-embedded refrigerator to a front surface (405c) of the integrated inner case (405).

10. The frame according to claim 9, further comprising a support member (407) arranged in the space defined by the partition wall while being fixedly mounted to the outer case (404) to maintain the hot pipe (901) and the magnet (902) in close contact with the front surface (405c) of the integrated inner case (405).

11. A frame of a refrigerator to be embedded within a recessed wall (40), comprising:

an outer case (404);

an inner case (405) received in the outer case and separated by a partition wall into a freezing chamber (402) and a refrigerating chamber (403); and

a cabinet chassis (406) to finish the front surface edges of the outer and inner cases (404, 405).

12. The frame according to claim 11, wherein the outer case (404) further comprises:

a pair of side plates (404a, 404b) forming opposite outer side surfaces; and

a rear plate (404c) forming an outer rear surface; and

13. The frame according to claim 12, further comprising extensions (601) provided at a front end of each

side plate (404a, 404b) toward the inner case (405) and having a double-bent structure to extend back toward the rear plate (404c).

14. The frame according to claim 13, wherein the inner case (405) further comprises front surfaces (405c) to cover the respective extensions (601).

15. The frame according to claim 14, further comprising at least one magnet (902) and a hot pipe (901) fitted between each extension (601) and a respective covering inner case front surface (405c) such that the at least one magnet (902) and the hot pipe (901) are surrounded by an extension (601), and an inner front surface (405c) of the inner case (405).

16. The frame according to any of claims 11 to 15, wherein the inner case (405) has an integrated structure.

17. The frame according to any preceding claim, further comprising urethane foamed between the outer case (404) and the inner case (405).

FIG. 1  
(PRIOR ART)

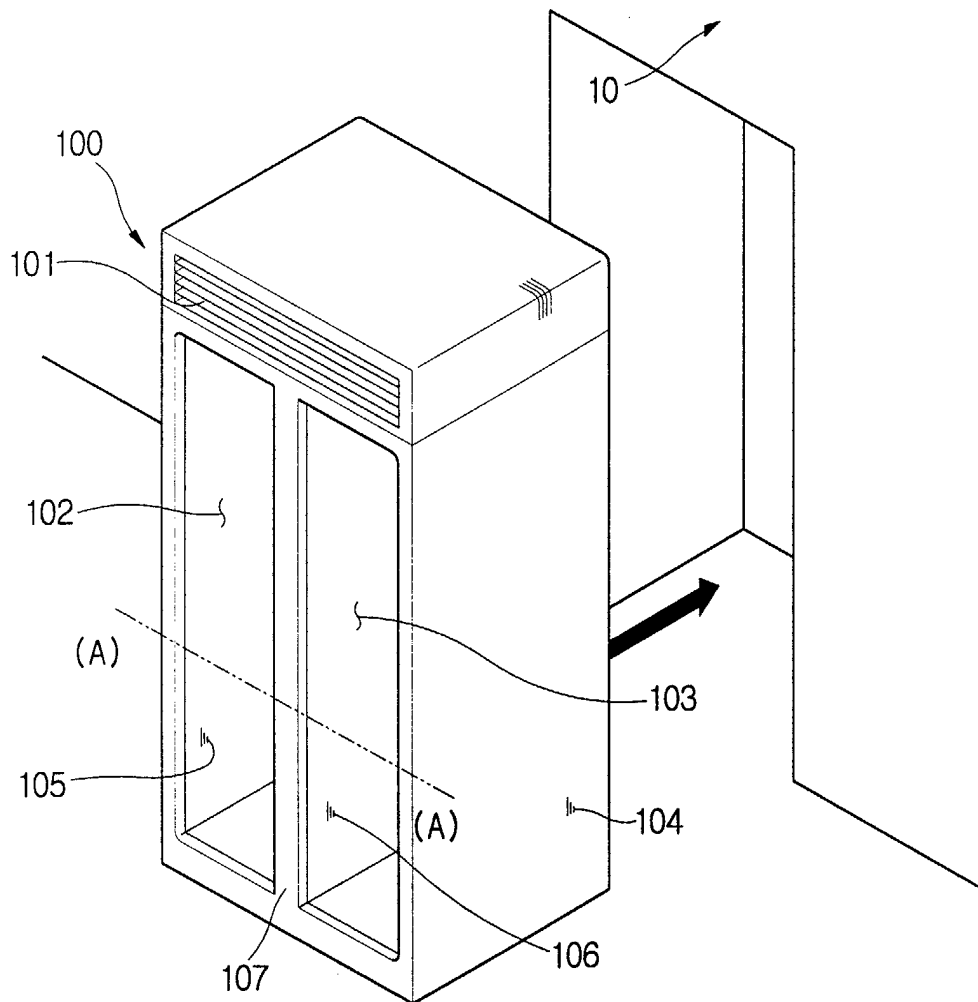


FIG.2  
(PRIOR ART)

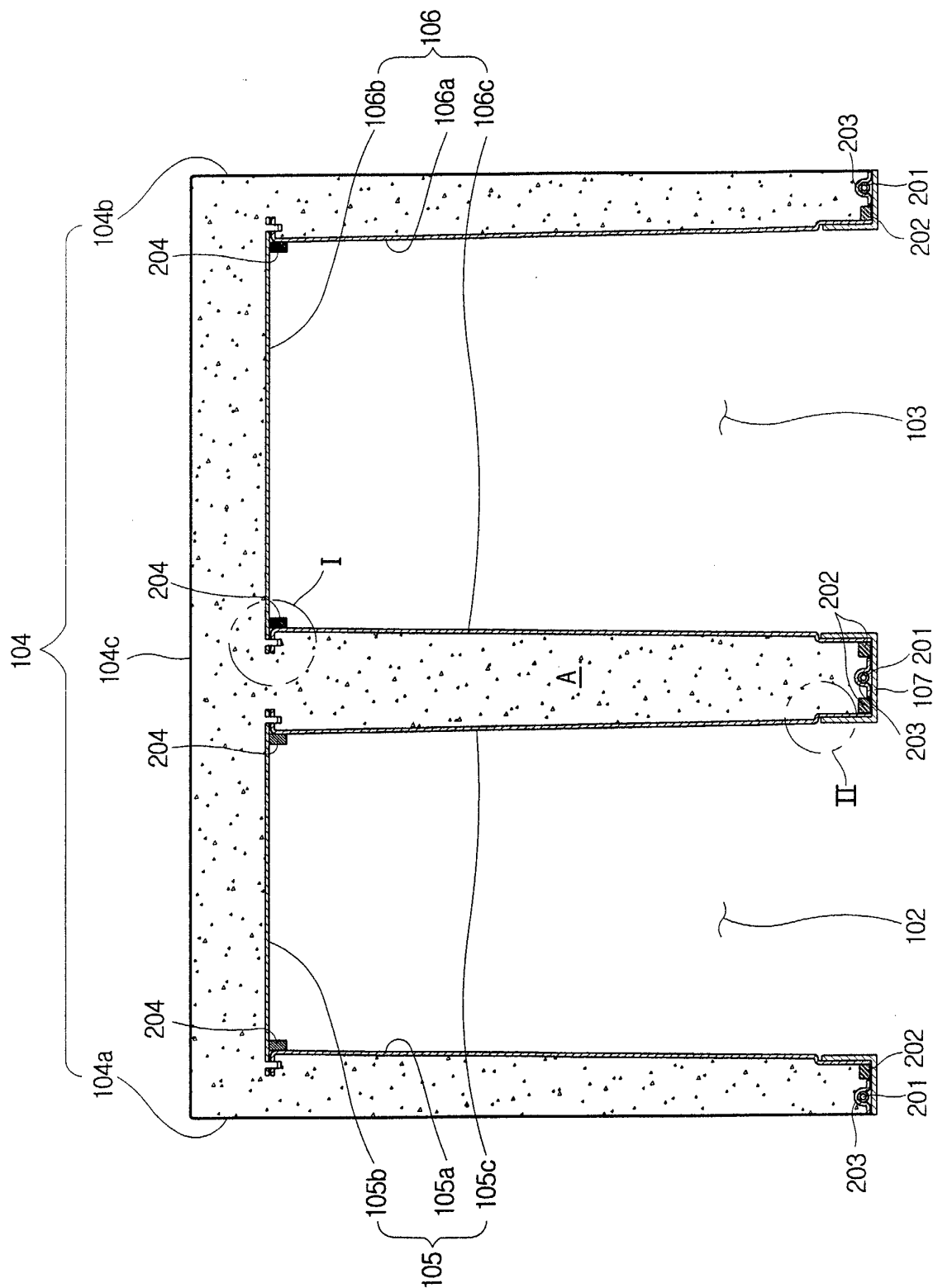


FIG.3  
(PRIOR ART)

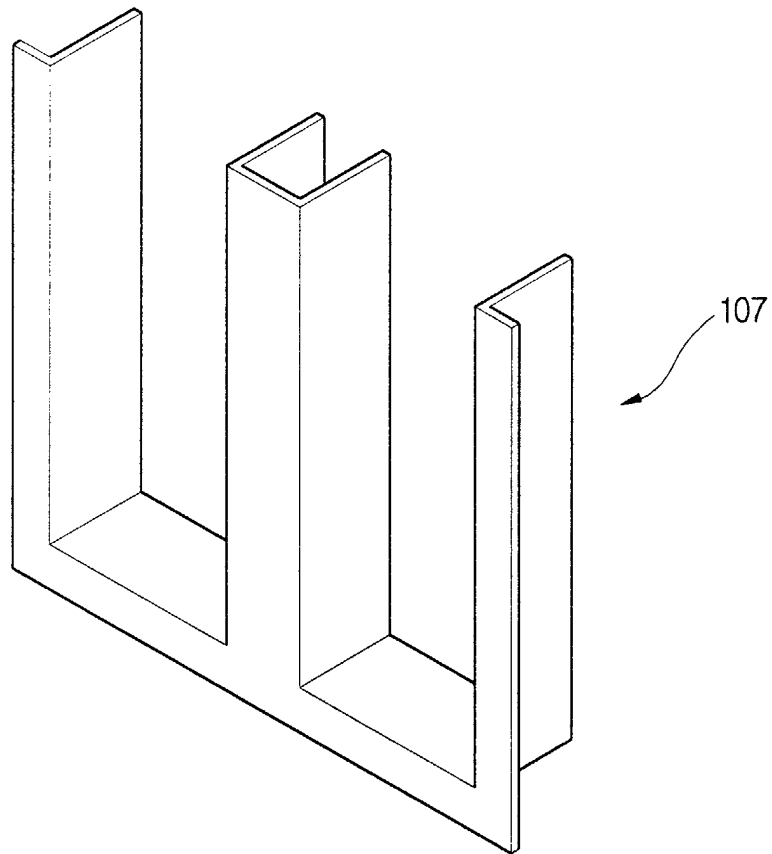


FIG. 4

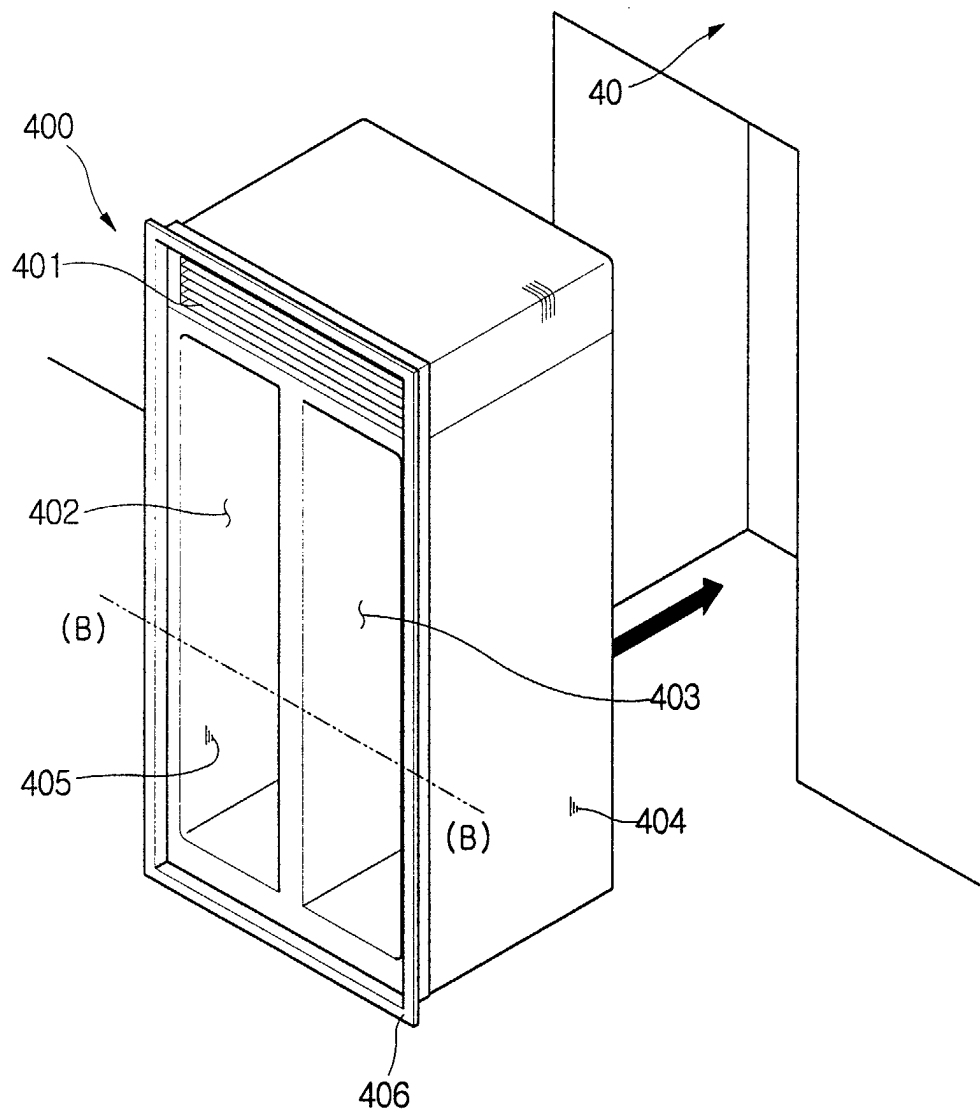


FIG.5

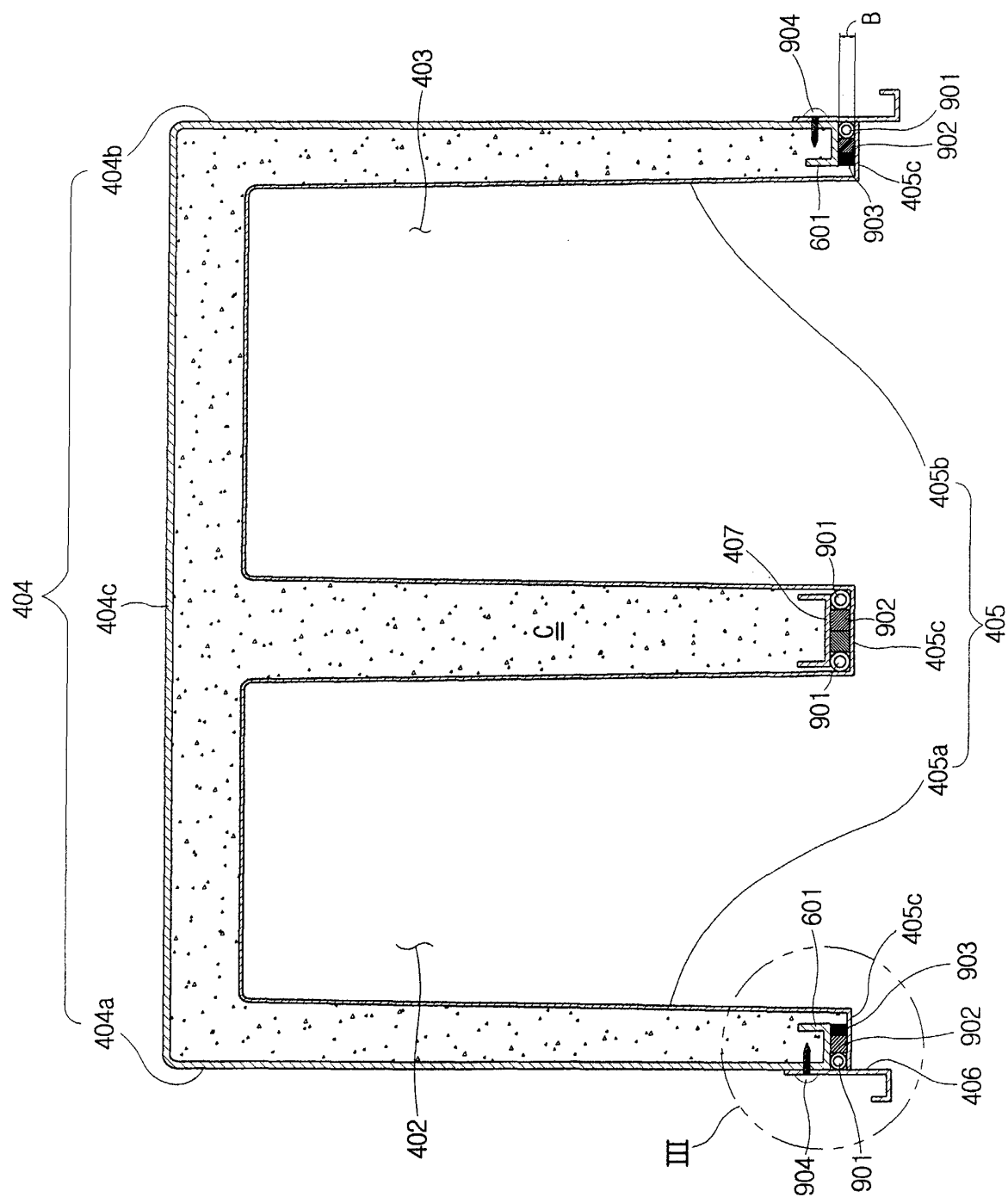


FIG.6

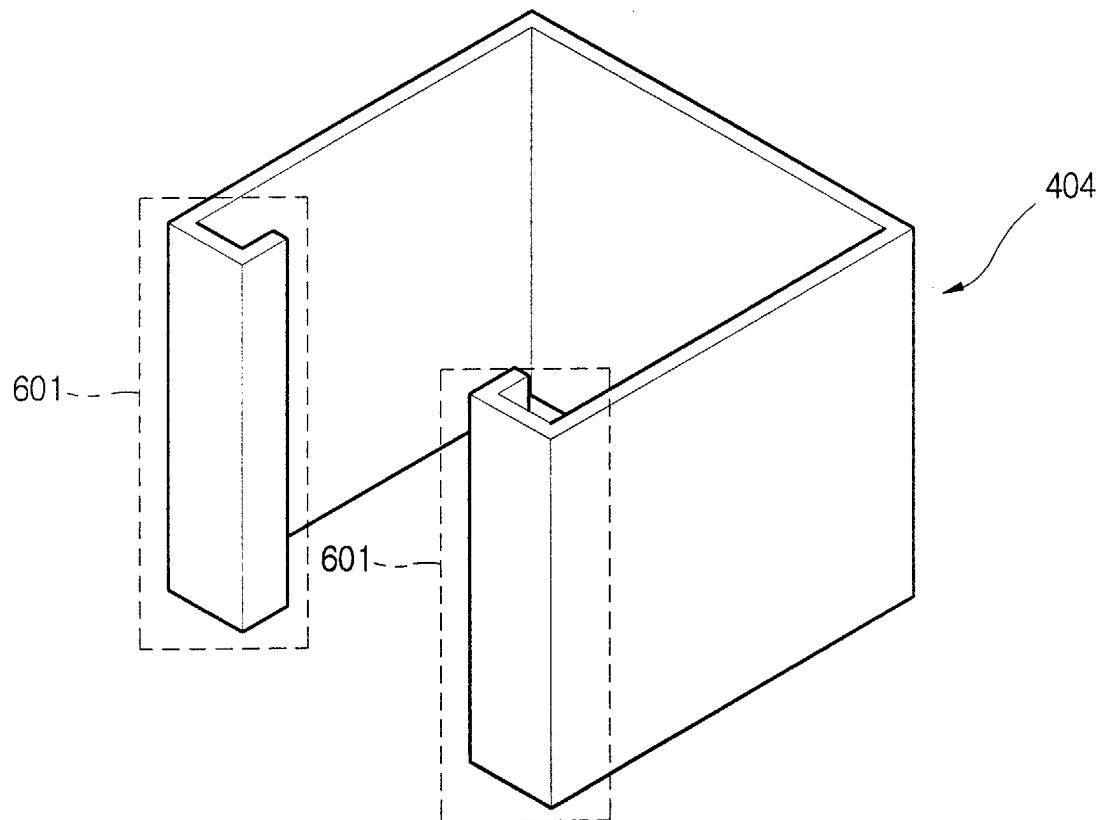


FIG.7

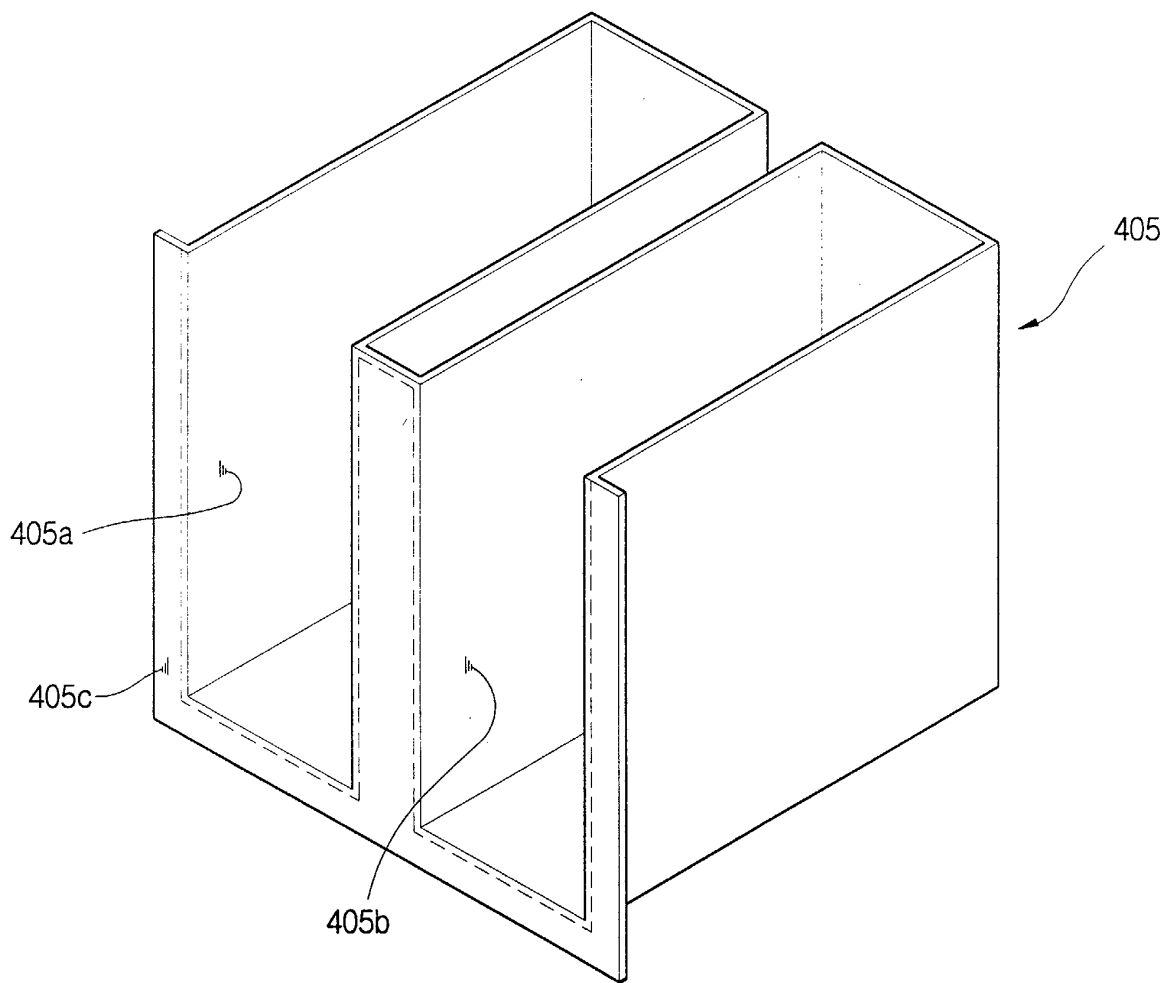


FIG.8A

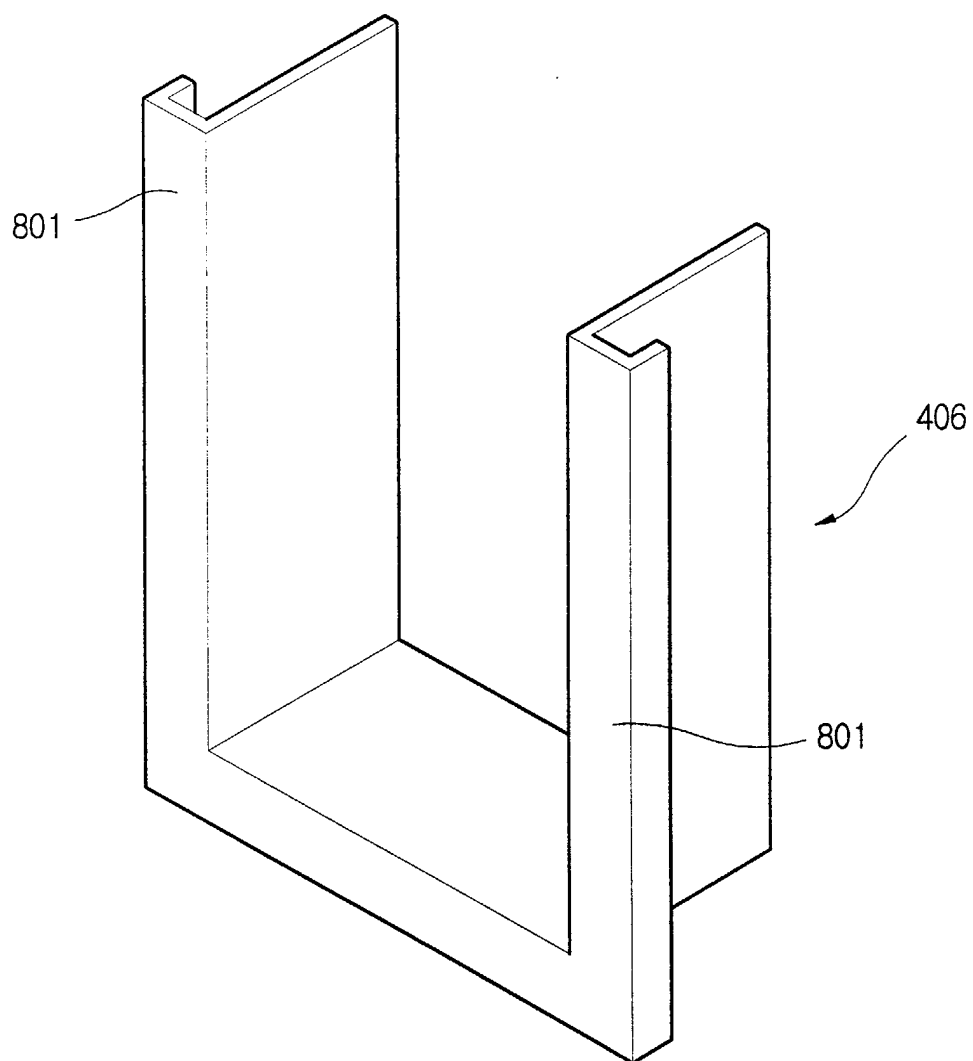


FIG. 8B

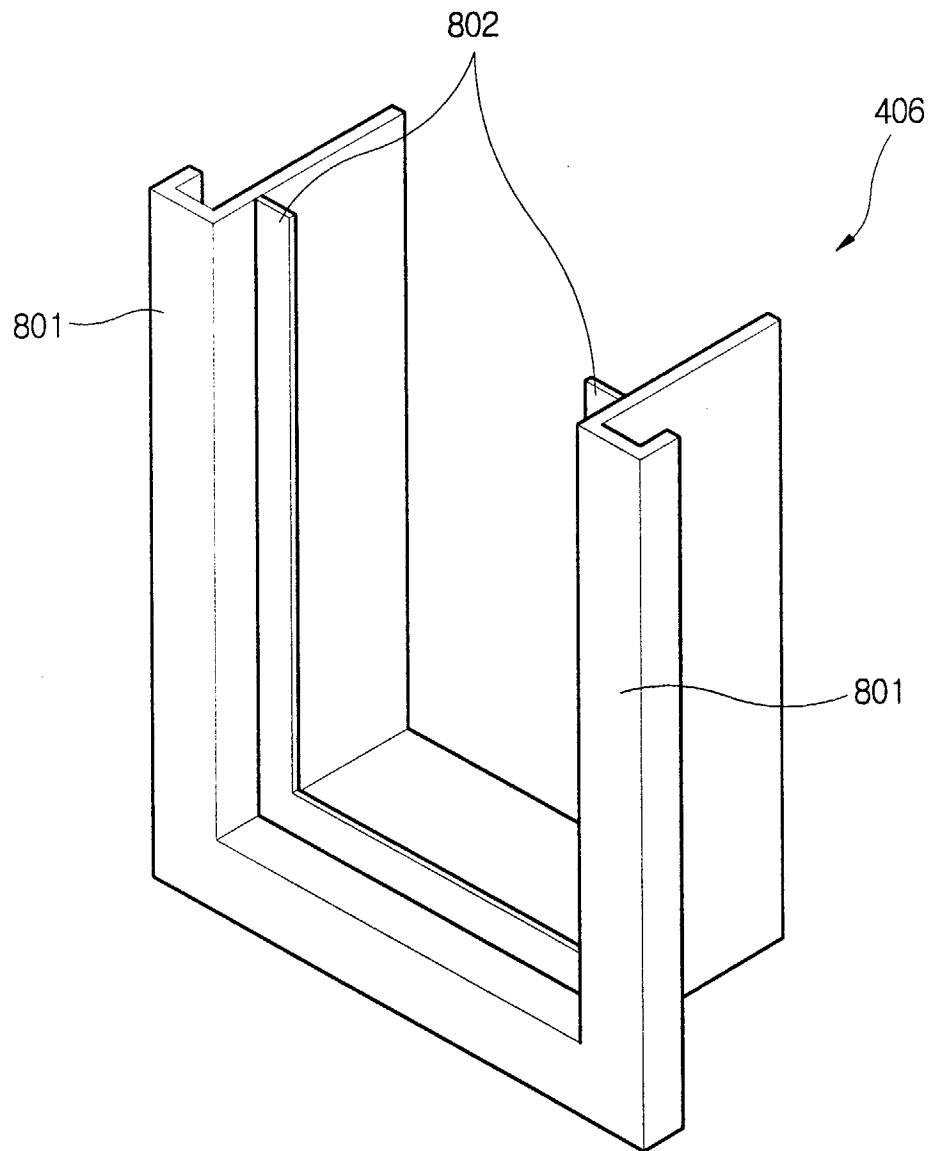


FIG. 9

