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(71) Applicant: **LG ELECTRONICS INC.**
Seoul (KR)

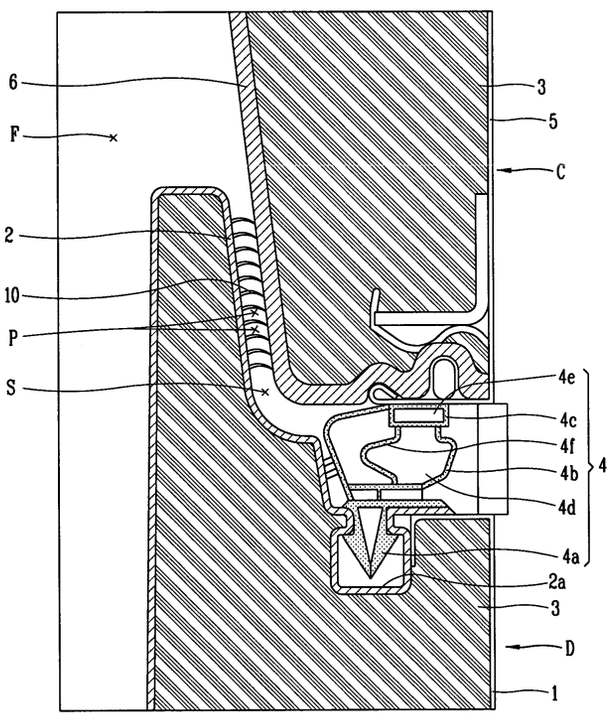
(72) Inventors:
- **Kim, yang-Gyu**
  Yeongdeungpo-Gu Seoul (KR)
- **Lee, Youn-Seok**
  Deokyang-Gu Goyang, Gyeonggi-Do (KR)
- **Kim, Se-Young**
  Yeongdeungpo-Gu Seoul (KR)

(74) Representative: **Loisel, Bertrand**
Cabinet Plasseraud
65/67 rue de la Victoire
75440 Paris Cedex 09 (FR)

(54) Sealing structure for refrigerator

(57) A sealing structure for a refrigerator comprises a blocking member provided inside an air dam having a predetermined width between a refrigerator cabinet and a door liner of a door, for preventing convection in the air dam, so that convection in the air dam is prevented and thus external heat is prevented from being introduced into a storage compartment through the air dam.

FIG. 3



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a refrigerator, and particularly, to a sealing structure for a refrigerator capable of effectively preventing external heat from being introduced into a storage compartment by being provided between a refrigerator cabinet and a door.

2. Description of the Background Art

[0002] In general, a refrigerator is a device for chilling or freezing items stored in a storage compartment by circulating cool air, generated by a refrigerating cycle, inside the storage compartment. The refrigerator includes a cabinet having a storage compartment; and a door installed at the cabinet, for opening and closing the storage compartment, and a gasket installed between the cabinet and the door, for preventing introduction of external heat into the storage compartment.

[0003] As shown in Figs. 1 and 2, the conventional refrigerator includes a cabinet (C) forming a storage compartment (F) therein, comprised of an outer panel 5 of a metallic material, an inner panel 6 and a foamed insulation 3 filled between the outer panel 5 and the inner panel 6; and a door (D) connected to the cabinet (C), for opening and closing the storage compartment (F).

[0004] The door (D) includes an outer panel 1 of a metallic material; a door liner 2 made of a synthetic resin such as an ABS resin and coupled to the outer panel 1; a foamed insulation 3 interposed between the outer panel 1 and the door liner 2; and a gasket 4 made of a synthetic resin, for sealing a gap between the door (D) and the cabinet (C).

[0005] The gasket 4 includes a fixing portion 4a formed as an anchor shape and fixed by being pressingly inserted into a fixing groove 2a recessed in the door (D); a connection portion 4b integrally formed from the fixing portion 4a and having therein a plurality of air pockets 4d formed by dividing an inner space thereof with a plurality of partitions; and an attached portion 4c formed as a single body with the connection portion 4b and separably attached to the outer panel 5 of the cabinet (C) by a magnet 4e mounted therein.

[0006] A space having a predetermined width is formed between the inner panel 6 of the cabinet (C) and the door liner 2, and this space is commonly called an air dam (S). Such an air dam (S) functions as a kind of damper for preventing heat having passed through the gasket 4 from being introduced into the storage compartment (F).

[0007] As for the refrigerator constructed in such a manner, when the door (D) is closed, the attached portion 4c of the gasket 4 is attached to the outer panel 5 of the cabinet (C) by a magnetism of the magnet 4e, so that the storage compartment (F) is sealed from the exterior. At this time, the storage compartment (F) is insulated by the air pocket 4d of the gasket 4 and the air dam (S).

[0008] When the door (D) is opened, the connection portion 4b of the gasket elastically stretches by being pulled, thereby separating the attached portion 4c from the outer panel 5 of the cabinet (C). Accordingly, the storage compartment (F) is opened.

[0009] However, in such a conventional refrigerator, in spite of the gasket 4 installed to prevent external air and heat from being introduced between the cabinet (C) and the door (D), a temperature of a portion adjacent to the gasket 4 in the air dam (S) is higher than that in the storage compartment (F).

[0010] Accordingly, in case that the cool air circulates in the storage compartment (F), convection occurs in the air dam (S) because of the flow of the cool air, and thus the air in the air dam (S), which has a higher temperature than the inside of the storage compartment (F), flows into the storage compartment (F). For this reason, the refrigerating performance of the refrigerator is deteriorated.

SUMMARY OF THE INVENTION

[0011] Therefore, an object of the present invention is to provide a sealing structure for a refrigerator capable of preventing introduction of heat into a storage compartment by preventing convection in an air dam formed between a cabinet and a door liner of a refrigerator.

[0012] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a refrigerator comprising a convection preventing device provided inside an air dam having a predetermined width between a refrigerator cabinet and a door liner of a door, for preventing convection in the air dam.

[0013] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a unit of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0015] In the drawings:

Fig. 1 is a sectional view showing a cabinet and a door of a conventional refrigerator;

Fig. 2 is an enlarged sectional view partially show-

ing the cabinet and the door liner of the door of the conventional refrigerator;

Fig. 3 is an enlarged sectional view partially showing a cabinet and a door for a refrigerator in accordance with a first embodiment of the present invention;

Fig. 4 is a perspective view showing one example of a convection preventing device of Fig. 3;

Fig. 5 is a sectional view taken along line V-V of Fig. 4;

Fig. 6 is a perspective view showing another example of a convection preventing device of Fig. 3;

Fig. 7 is an enlarged sectional view partially showing a cabinet and a door for a refrigerator in accordance with a second embodiment of the present invention;

Fig. 8 is a perspective view showing one example of a convection preventing device of Fig. 7;

Fig. 9 is a sectional view taken along line IX-IX line of Fig. 8;

Fig. 10 is a perspective view showing another example of a convection preventing device of Fig. 7;

Fig. 11 is an enlarged sectional view partially showing a cabinet and a door for a refrigerator in accordance with a third embodiment of the present invention;

Fig. 12 is a perspective view showing one example of a convection preventing device of Fig. 11;

Fig. 13 is a sectional view taken along line XIII-XIII of Fig. 12; and

Fig. 14 is a perspective view showing another example of a convection preventing device of Fig. 11.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0017] As shown in Fig. 3, a refrigerator in accordance with the present invention comprises a cabinet (C) including an outer panel 5 of a metallic material, an inner panel 6 and a foamed insulation 3 filled between the outer panel 5 and the inner panel 6; and a door (D) connected to the cabinet (C), for opening and closing a storage compartment (F).

[0018] The door (D) includes an outer panel 1 of a metallic material; a door liner 2 made of a synthetic resin such as an ABS resin and coupled to the outer panel 1; a foamed insulation 3 interposed between the outer panel 1 and the door liner 2; and a gasket 4 made of a synthetic resin material, for sealing a gap between the cabinet (C) and the door (D).

[0019] The gasket 4 includes a fixing portion 4a formed as an anchor shape and fixed by being pressingly inserted in a fixing groove 2a recessed in the door (D); a connection portion 4b foldably extended from the fixing portion 4a and having therein a plurality of air pockets 4d formed by dividing an inner space thereof with a plurality of partitions 4f; and an attached portion 4c formed as a single body with the connection portion 4b and separably attached to the outer panel 5 of the cabinet (C) by having a magnet 4e therein.

[0020] An air dam (S) with a predetermined width is formed between the inner panel 6 of the cabinet (C) and the door liner 2.

[0021] Meanwhile, in case that cool air flows inside the storage compartment (F), convection occurs in the air dam (S) due to the flow of the cool air. Accordingly, the air in the air dam (S), which has a temperature higher than that in the storage compartment (F), may be introduced into the storage compartment (F).

[0022] Therefore, in the present invention, a sealing structure for a refrigerator capable of preventing convection in the air dam (S) is presented through the following embodiments.

First embodiment

[0023] As shown in Fig. 3, the sealing structure for the refrigerator in accordance with the first embodiment of the present invention includes a convection preventing device 10 installed inside the air dam (S), for preventing convection in the air dam (S).

[0024] As shown in Figs. 4 and 5, the convection preventing device 10 includes a supporting portion 11 formed as a plate shape which is substantially parallel with a surface of the door liner 2, and closely attached to the surface of the door liner 2; a fixing portion 12 protruding from the supporting portion 11 and fixed by being pressingly inserted in a fixing groove 2b recessed in the door liner 2; and a plurality of blocking members 13 extended from the supporting portion 11 toward the inner panel 6 of the cabinet (C), for blocking between the door liner 2 and the inner panel 6 of the cabinet (C). The blocking member 13 is formed in a plate shape and curved at a predetermined curvature.

[0025] The blocking member 13 is made of a flexible material such as a rubber and is extended in a longitudinal direction of the door (D). Preferably, a thickness of the blocking member 13 becomes thinner toward an end in a width direction thereof so that the blocking member 13 can be easily curved when being pushed by the inner panel 6 of the cabinet (C) in case that the door (D) is closed.

[0026] Preferably, a plurality of blocking members 13 are formed to be curved in the same direction, and the curved angle of the blocking member 13 is approximately perpendicular to a flowing direction of the cool air.

[0027] In addition, effectively, the blocking member 13 is curved in a direction opposite to a direction that the door (D) moves when the door (D) is closed, so that the air resistance and the friction resistance can be reduced when the door (D) closes the storage compartment (F).

[0028] In addition, a width of the blocking member 13 is substantially similar to or larger than that of the air

dam (S). Accordingly, when the door completely closes the storage compartment (F), an end of the blocking member 13 is in contact with the inner panel 6 of the cabinet (C), and an air pocket (P) is formed by the blocking members 13 and the door liner 2 as the blocking member 13 is curved by the inner panel 6 of the cabinet (C).

[0029] Installation intervals between the blocking members 13 are preferably about from 5mm to 10mm in case that the width of the air dam (S) is about 10mm or less. Optimum intervals between the blocking members 13 for minimizing convection are about 8mm. Namely, it is preferable that the width of the air pocket (P) is about 10mm or less.

[0030] As shown in Fig. 6, a plurality of grooves 13a are preferably formed on the blocking member 13 at predetermined intervals in a longitudinal direction of the blocking member 13, namely, in a direction that the blocking member 13 is elongated in a longitudinal direction of the door (D), so that the air resistance and the friction resistance can be reduced, and thus the door (D) can be smoothly opened or closed.

[0031] The operation and effect of the sealing structure for the refrigerator in accordance with the first embodiment of the present invention will now be described.

[0032] When the door (D) is closed, the attached portion 4c of the gasket 4 is attached to the outer panel 5 of the cabinet (C) by a magnetism of the magnet 4e, and accordingly, the storage compartment (F) is blocked from the exterior. And, introduction of the external heat into the storage compartment (F) is prevented by the air pocket 4d of the gasket 4.

[0033] In addition, convection in the air dam (S) is prevented by the convection preventing device 10, and the heat having passed through the gasket 4 is completely blocked by the insulation effect of the air pocket (P) between the blocking members 13.

[0034] Meanwhile, because the blocking member 13 of the convection preventing device 10 is curved toward the end in a width direction thereof, the door (D) can be easily closed. In case of forming the groove 13a on the blocking member 13, the door (D) can be more easily closed.

[0035] In addition, when the door (D) is closed, a kind of air eddy in the air dam (S) is prevented by the air pocket (P) between the blocking members 13, and the external heat can be more effectively blocked by the air pocket (P) which performs as an insulator.

[0036] Meanwhile, the blocking member 13 can be fixed to the inner panel 6 of the cabinet (C) without being limited to be fixed to the door liner 2.

Second embodiment

[0037] Hereinafter, a sealing structure for a refrigerator in accordance with the second embodiment of the present invention will now be described with reference to Figs. 7 to 10.

[0038] As shown in Fig. 7, the sealing structure for the refrigerator in accordance with the second embodiment of the present invention includes a convection preventing device 20 installed inside the air dam (S) formed between a door liner 2 of the door (D) and the inner panel 6 of the cabinet (C), for preventing the cool air from flowing in the air dam (S).

[0039] As shown in Figs. 8 and 9, the convection preventing device 20 includes a supporting portion 21 formed as a plate shape substantially parallel to a surface of the door liner 2, and closely attached to the surface of the door liner 2; a fixing portion 22 protruding from the supporting portion 21 and pressingly inserted in a fixing groove 2c recessed in the door liner 2; and at least one blocking member 23 extended from the supporting portion 21 toward the inner panel 6 of the cabinet (C), for blocking between the door liner 2 and the inner panel 6 of the cabinet (C). The blocking member 23 is formed in a plate shape and is elongated in a longitudinal direction of the door (D).

[0040] The blocking member 23 is made of a flexible material such as a rubber and is extended in a 'S' shape by being curved plural times along a longitudinal direction of the door (D), thereby having a concave portion 24 and a convex portion 25 sequentially formed in a longitudinal direction of the blocking member 23.

[0041] Preferably, the concave portion 24 and the convex portion 25 are formed at regular and constant intervals and have the same curvature to each other in order to effectively block introduction of external heat. Meanwhile, a plurality of blocking members 23 may be installed.

[0042] In addition, a width of the blocking member 23 is substantially similar to or larger than that of the air dam (S). Therefore, when the door (D) completely closes the storage compartment (F), an end of the blocking member 23 is in contact with the inner panel 6 of the cabinet (C).

[0043] As shown in Fig. 10, a plurality of grooves 23a are preferably formed on the blocking member 23 at predetermined intervals in a longitudinal direction of the blocking member 23, that is, in a direction that the blocking member 23 is elongated in a longitudinal direction of the door (D), so that the air resistance and the friction resistance can be reduced, and the door (D) can be smoothly opened or closed. The groove 23a is preferably formed in a wedge shape.

[0044] In the sealing structure for the refrigerator in accordance with the second embodiment of the present invention, because the blocking member 23 of the convection preventing device 20 is curved in a rough 'S' shape along a longitudinal direction thereof, the external heat is prevented from flowing into the refrigerator in the x-direction of Fig. 8 as well as in the y-direction of Fig. 8. Accordingly, the heat introduced into the refrigerator can be more effectively blocked.

[0045] Meanwhile, the blocking member 23 can be fixed to the inner panel 6 of the cabinet (C) without being

limited to be fixed to the door liner 2.

[0046] Hereinafter, the effect of the sealing structure of the refrigerator in accordance with the second embodiment of the present invention is substantially the same as that of the first embodiment.

Third embodiment

[0047] Hereinafter, a sealing structure for a refrigerator in accordance with the third embodiment of the present invention will now be described with reference to Figs. 11 to 14. The same reference numerals are given to the parts explained in the above-described embodiments, and explanation thereon will be omitted.

[0048] As shown in Fig. 11, the sealing structure for the refrigerator in accordance with the second embodiment of the present invention includes a convection preventing device 30 installed inside the air dam (S) formed between the door liner 2 of the door (D) and the inner panel 6 of the cabinet (C), for preventing the cool air from flowing in the air dam (S).

[0049] As shown in Figs. 12 and 13, the convection preventing device 30 includes a fixing portion 32 pressingly inserted in a fixing groove 2d recessed in the door liner 2; and a blocking member 33 extended from the fixing portion 32 toward the inner panel 6 of the cabinet (C), for blocking between the door liner 2 and the inner panel 6 of the cabinet (C). The blocking member 33 is formed in a plate shape and curved at a predetermined curvature.

[0050] The blocking member 33 is made of a flexible material such as a rubber and is extended in a longitudinal direction of the door (D). Preferably, a thickness of the blocking member 33 becomes thinner toward an end in a width direction thereof so that the blocking member 33 is easily curved when being pushed by the inner panel 6 of the cabinet (C) in case that the door (D) is closed.

[0051] Preferably, the curved angle of the blocking member 33 is approximately perpendicular to a flowing direction of the cool air. In addition, effectively, the blocking member 33 is curved in a direction opposite to a direction that the door (D) moves when the door (D) closes the storage compartment (F), so that the air resistance and the friction resistance can be reduced.

[0052] In addition, a width (L) of the blocking member 33 is substantially similar to or larger than that of the air dam (S). Accordingly, when the door (D) closes the storage compartment (F), the end of the blocking member 33 is curved by the inner panel 6 of the cabinet (C) and is in contact with the door liner 2, thereby forming an air pocket (P) together with the door liner 2.

[0053] For a common refrigerator, a width (L) of the blocking member 33 is preferably within about 8~12mm in a state that the door (D) is opened.

[0054] Meanwhile, as shown in Fig. 14, a plurality of grooves 33a are preferably formed on the blocking member 33 at predetermined intervals in a longitudinal direction of the blocking member 33, namely, in a direction that the blocking member 33 is elongated in a longitudinal direction of the door (D), so that the air resistance and the friction resistance can be reduced, and thus the door (D) can be smoothly opened or closed.

[0055] In the sealing structure for the refrigerator in accordance with the third embodiment of the present invention, the blocking member 33 of the convection preventing device 30 blocks the air dam (S) to thereby prevent convection in the air dam (S). Also, in case that the door (D) is closed, an end of the blocking member 33 is curved by the inner panel 6 of the cabinet (C), thereby forming an air pocket (P) between the blocking member 33 and the door liner 22. Accordingly, the sealing structure for the refrigerator can more effectively prevent the introduction of the external heat into the refrigerator.

[0056] Meanwhile, the blocking member 33 can be fixed to the inner panel 6 of the cabinet (C) without being limited to be fixed to the door liner 2.

[0057] The effect of the sealing structure of the refrigerator in accordance with the third embodiment of the present invention is substantially the same as the above described embodiments.

[0058] As so far described, a sealing structure for a refrigerator in accordance with the present invention can advantageously and effectively prevent the heat from being introduced into a storage compartment (F) through an air dam (S) formed between a door liner 2 of a door (D) and an inner panel 6 of a cabinet (C), by providing a convection preventing device 10, 20, 30 for preventing convection due to the flow of the cool air in the air dam (S).

[0059] As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalence of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A sealing structure for a refrigerator, comprising a convection preventing device provided inside an air dam having a predetermined width between a refrigerator cabinet and a door liner of a door, for preventing convection in the air dam.

2. The structure of claim 1, wherein the convection preventing device comprises at least one blocking member formed in a plate shape, for blocking between the door liner and the cabinet.

3. The structure of claim 2, wherein the blocking mem-

ber is fixed to the door liner, is extended toward the cabinet, and is elongated in a longitudinal direction of the door.

4. The structure of claim 2, wherein cut-off grooves are formed on the blocking member at predetermined intervals in a longitudinal direction of the blocking member.

5. The structure of claim 2, wherein the blocking member has a width which is substantially similar to or larger than a width between the door liner and the cabinet.

6. The structure of claim 5, wherein the blocking member is formed to have a width enough that an end of the blocking member can be in contact with the door liner when the door is closed.

7. The structure of claim 5, wherein the blocking member is curved at a predetermined curvature.

8. The structure of claim 7, wherein the blocking member is curved in an opposite direction to a direction that the door is closed.

9. The structure of claim 7, wherein a plurality of the blocking members are curved in the same direction.

10. The structure of claim 2, wherein a thickness of the blocking member becomes thinner toward an end in a width direction thereof.

11. The structure of claim 2, wherein a plurality of the blocking members are installed at intervals of about 5mm to 10mm.

12. The structure of claim 2, wherein the blocking member is extended with being curved plural times along a longitudinal direction of the door.

13. The structure of claim 12, wherein a concave portion and a convex portion of the blocking member which are formed by curving the blocking member are disposed at regular intervals.

14. The structure of claim 13, wherein the concave portion and the convex portion of the blocking member have the same curvature.

15. The structure of claim 12, wherein cut-off grooves are formed on the blocking member at regular intervals.

16. The structure of claim 2, wherein the convection preventing device comprises a supporting portion formed as a plate shape which is substantially parallel to the surface of the door liner and closely attached to the surface of the door liner; and a fixing portion protruding from the supporting portion and inserted in a fixing groove recessed in the door liner, and the blocking member is extended from the flat panel portion toward the cabinet.

FIG. 1
CONVENTIONAL ART

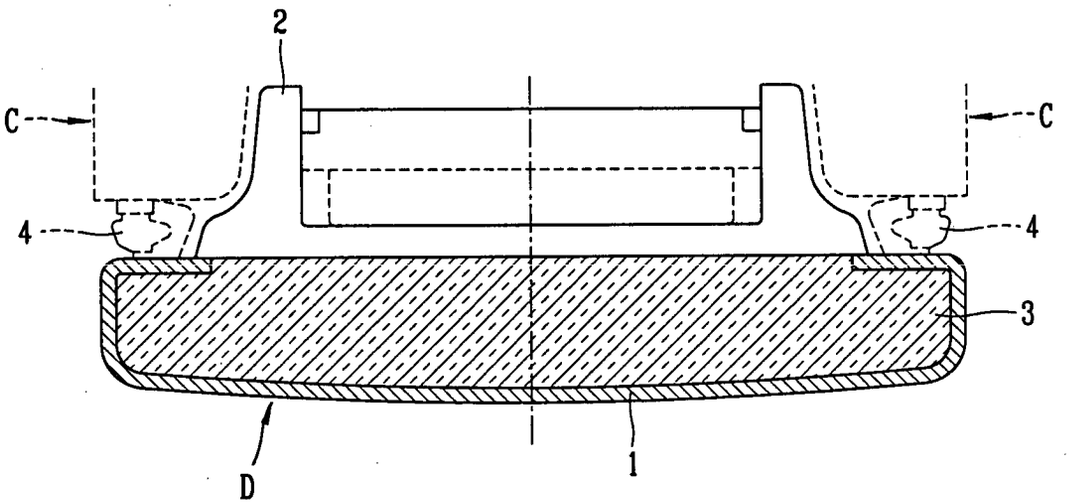

FIG. 2
CONVENTIONAL ART

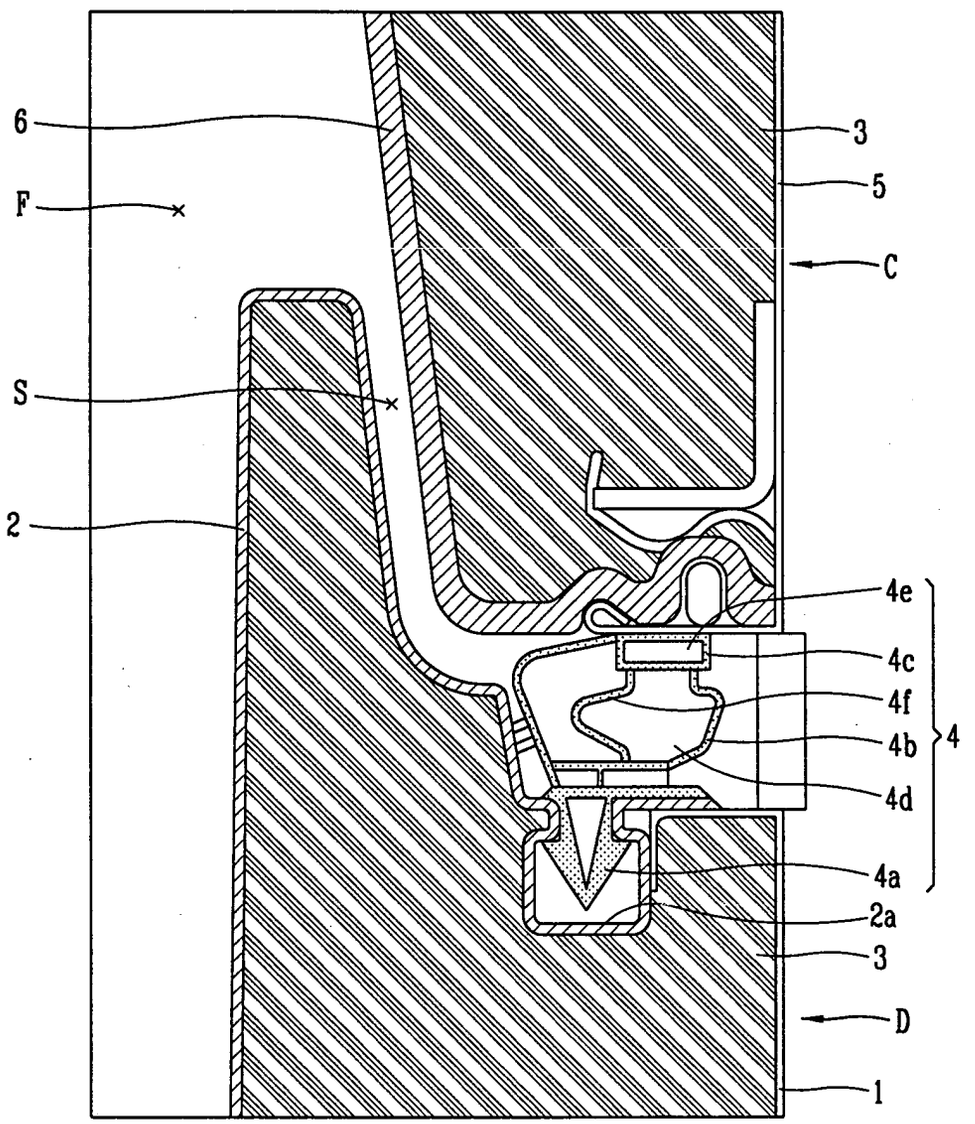

FIG. 3

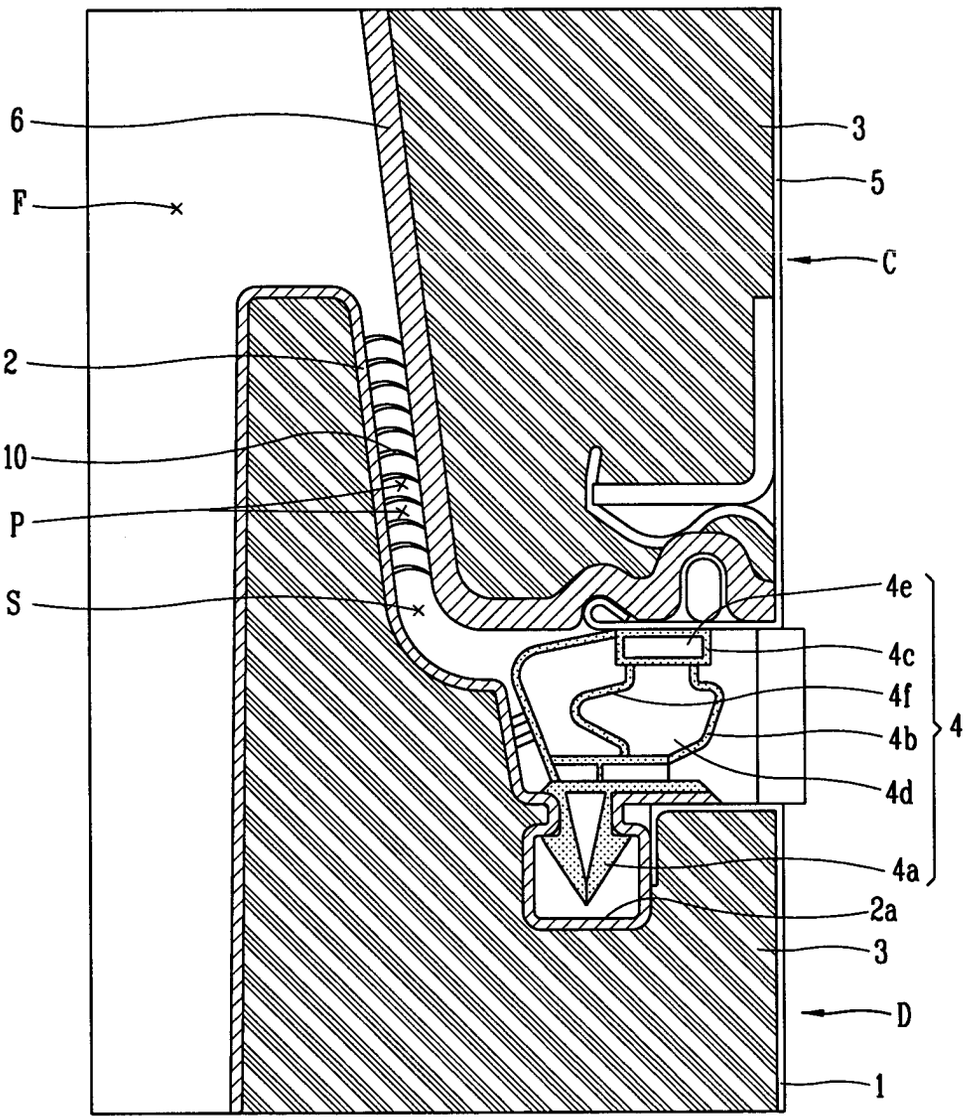

FIG. 4

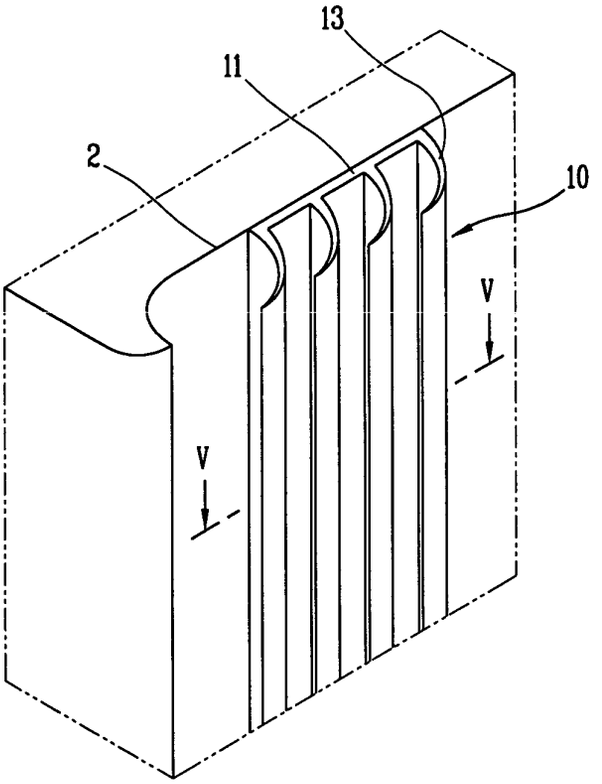

FIG. 5

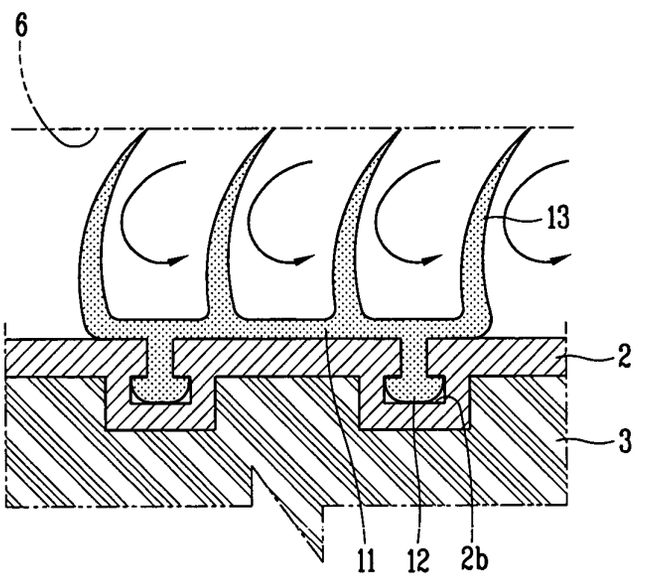

FIG. 6

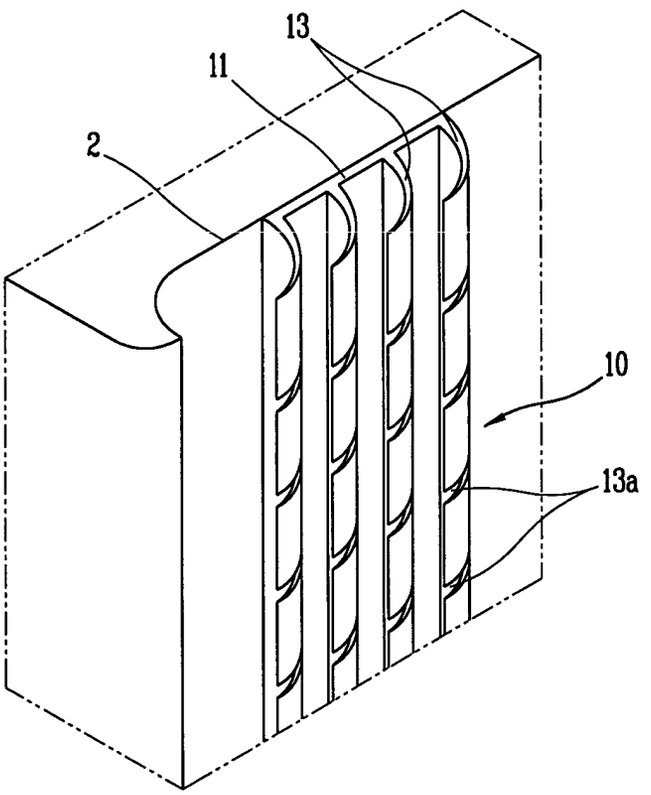

FIG. 7

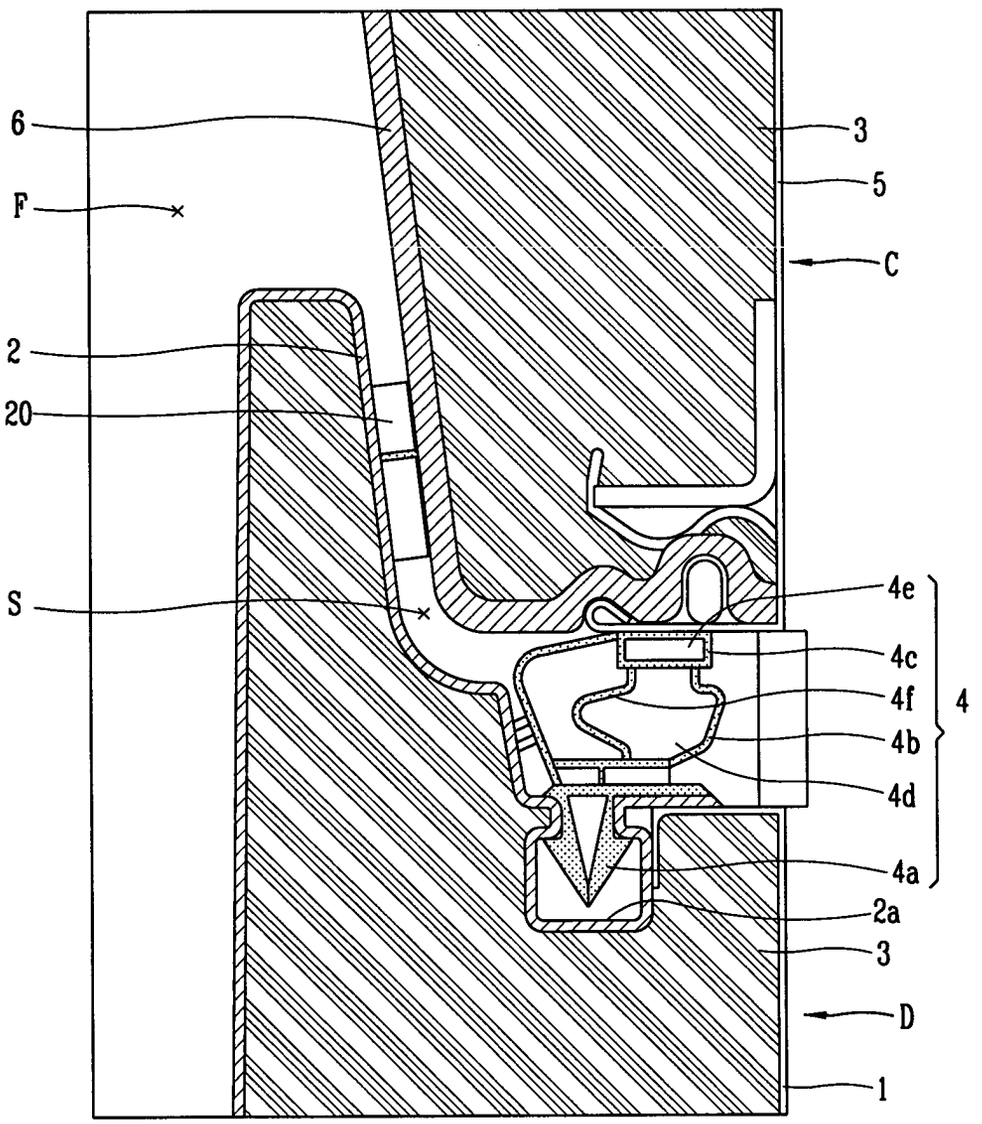

FIG. 8

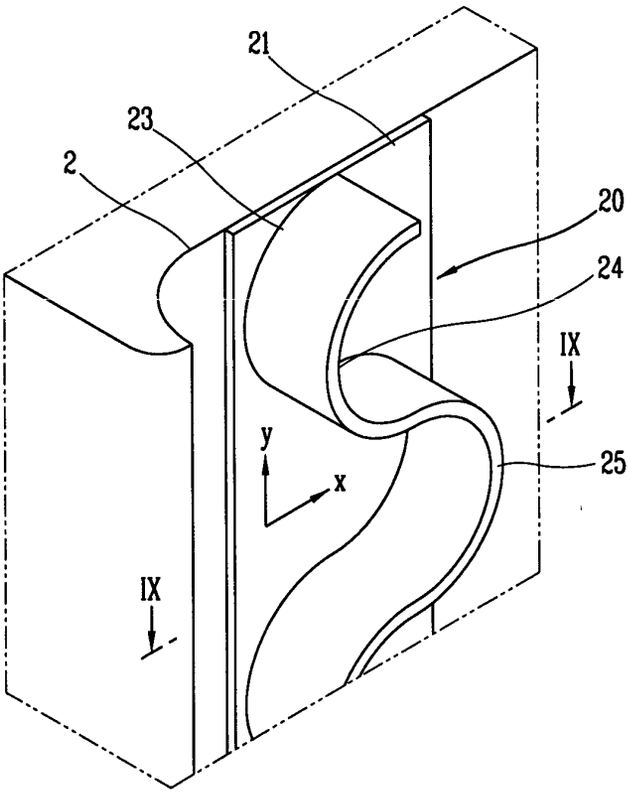

FIG. 9

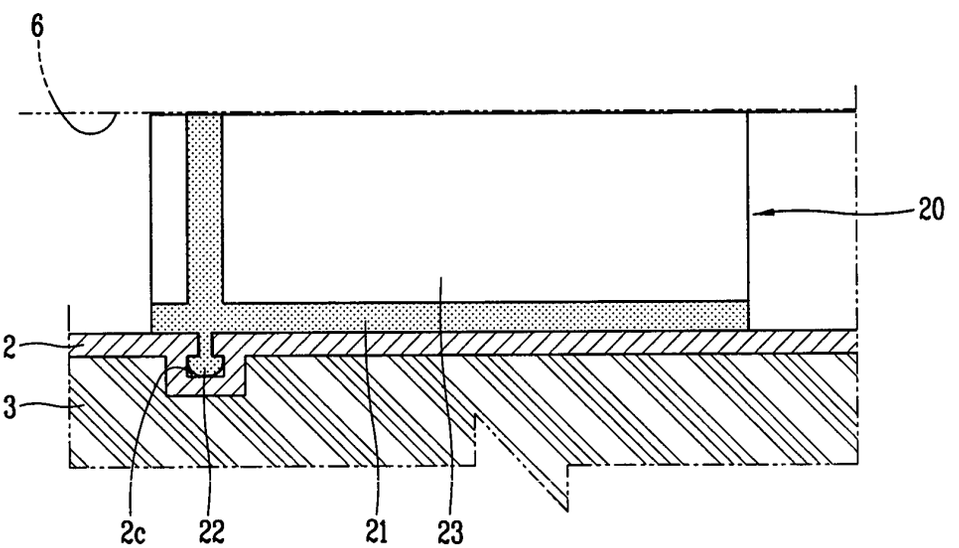

FIG. 10

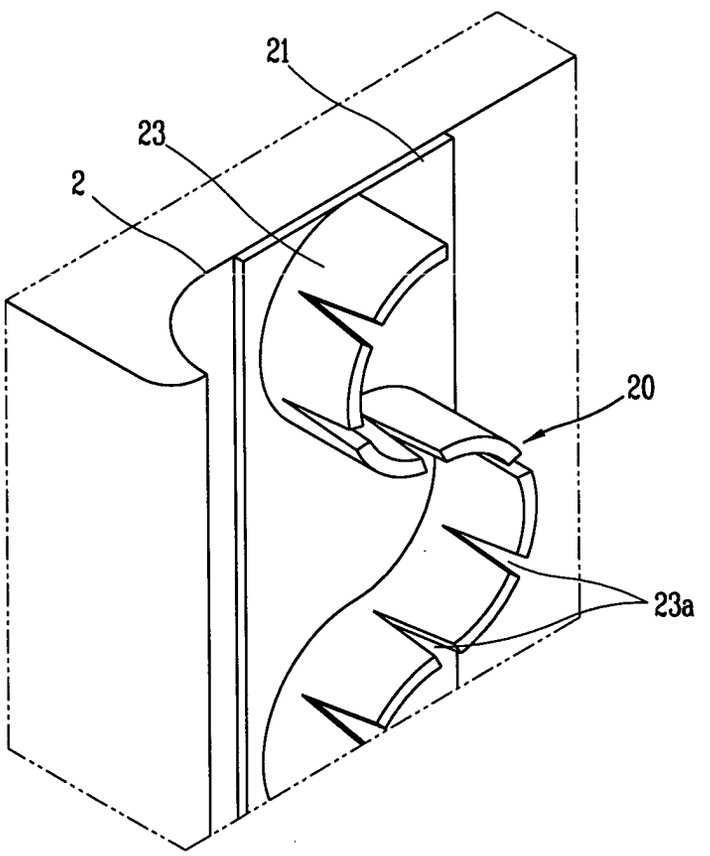

FIG. 11

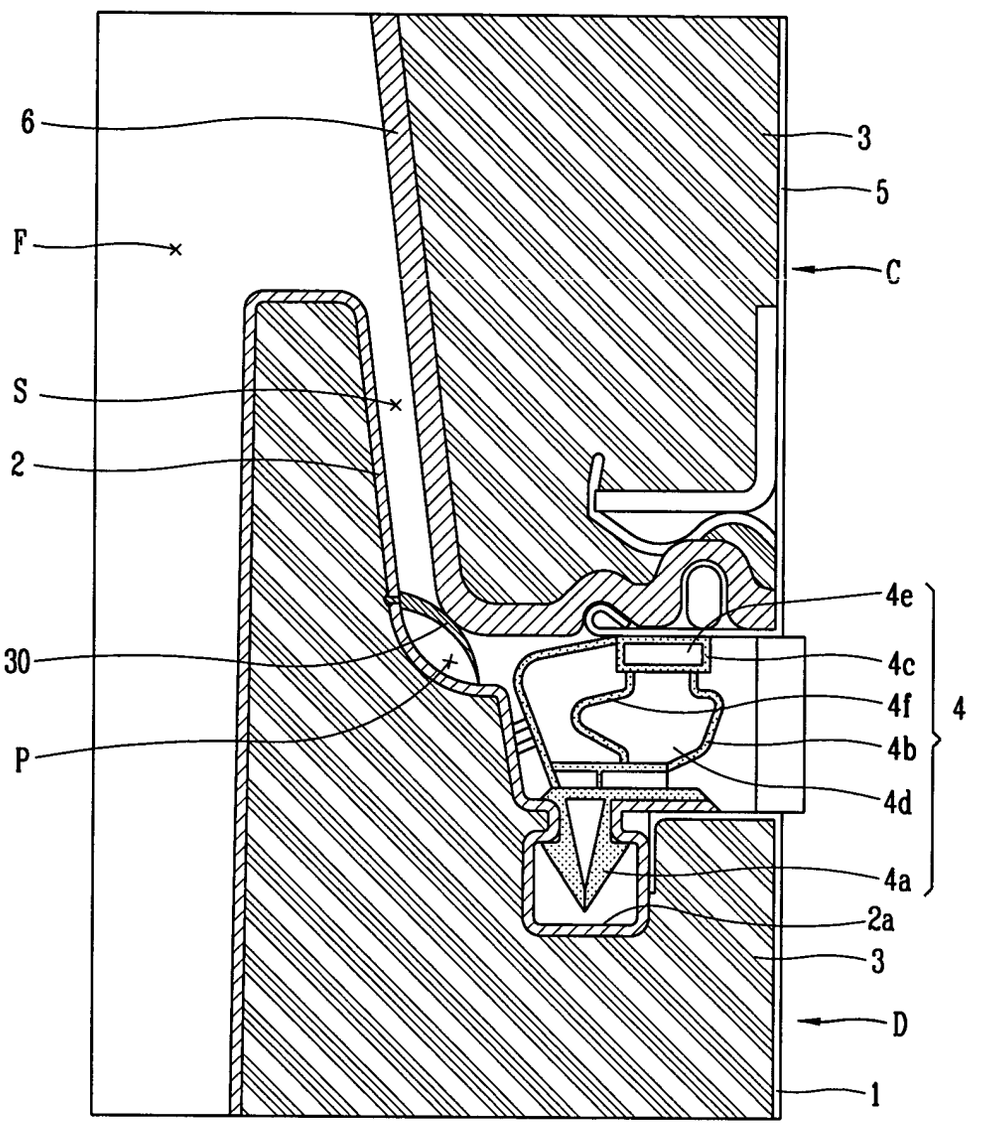

FIG. 12

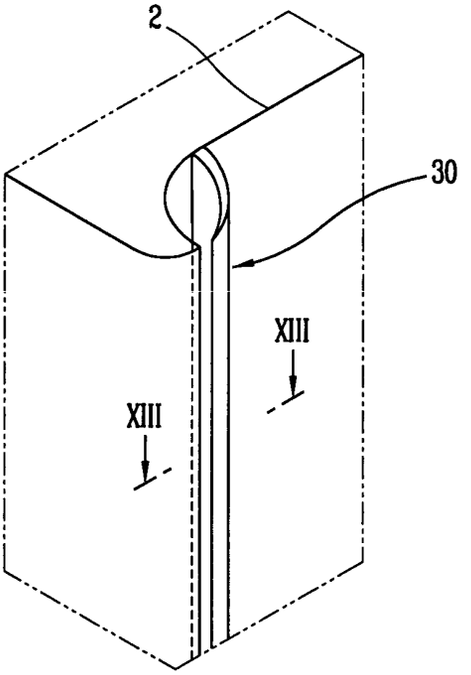

FIG. 13

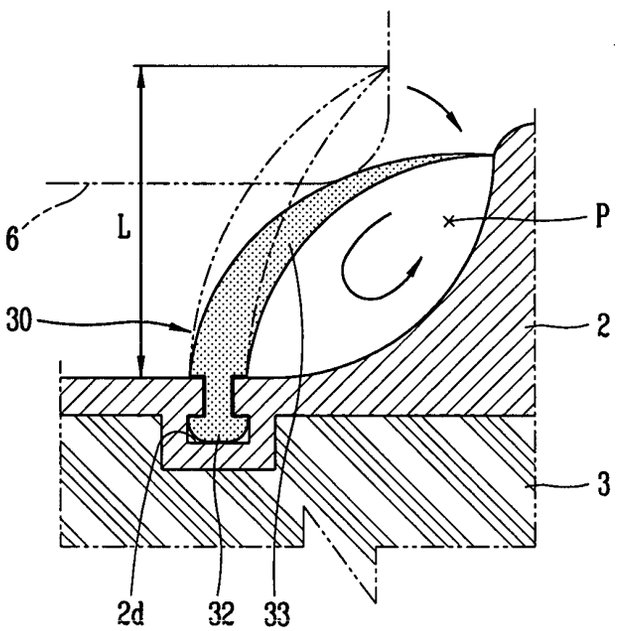

FIG. 14