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(54) **Barrier structure and refrigeration appliance equipped with the barrier structure**

(57) A barrier structure (2) and a refrigeration appliance equipped with the barrier structure are disclosed. The barrier structure comprises: a seat (21) adapted to be mounted to the bottom of a cabinet of the refrigeration appliance, the seat having a bottom surface and a mounting surface adjoining the bottom surface, with an edge portion of the bottom surface which adjoining the mounting surface being provided with at least one first retention

portion; and a barrier plate member (22) having a barrier plate body (220) and a side flap (221) connected to the barrier plate body, the side flap being provided with a second retention portion for engaging with the first retention portion on the bottom surface of the seat. The barrier structure of the present invention provides advantages such as high structural strength, precise positioning and firm assembling.

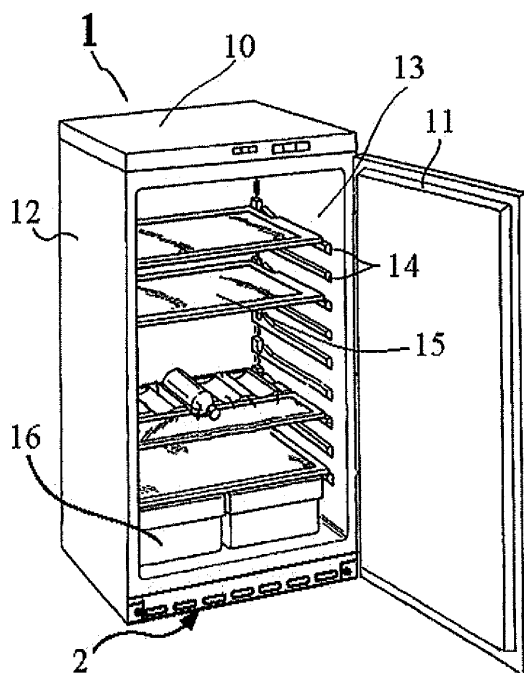


Figure 1

Description

Technical Field

[0001] The present invention relates to refrigeration field and, in particular, to a barrier structure and a refrigeration appliance equipped with the barrier structure.

Background Art

[0002] In order to reduce heat exchange between the inside and outside of a refrigeration appliance, for example, a generally known refrigerator, the cabinet of the refrigerator is often provided as having thermal insulating ability. A traditional cabinet comprises an outer shell and an inner shell disposed by a distance from the outer shell. A foaming process should be performed between the outer shell and the inner shell to inject a foam material into the gap between them for forming a thermal insulating layer, so as to block or reduce heat exchange between the inside and outside of the refrigerator.

[0003] In general, the refrigerator is provided with many structural members. For example, Chinese patent No. CN1119604C discloses a barrier structure for refrigerator, the barrier structure of the refrigerator being arranged inside the cabinet of the refrigerator to divide a freezing compartment and a refrigerating compartment therein.

[0004] Further, due to manufacturing techniques (for example, foaming process) as well as supporting feet mounted to the bottom of the refrigerator, it is common to design and arrange a barrier structural member in the refrigerator, such as in an open lower part of the cabinet of the refrigerator. The barrier structural member comprises a seat body and a barrier plate mounted to the seat body. The seat body is mounted to a lower front portion of the cabinet of the refrigerator (i.e. an adjoining portion between the front portion and the bottom portion of the cabinet of the refrigerator). The seat body has a generally prism shape, having a length corresponding to the width of the cabinet of the refrigerator. The barrier plate has a flat shape and comprises several mounting holes in its opposite short sides and a flange on a long side of it. When assembling, the flange of the barrier plate is attached to the seat body, to align the mounting holes of the barrier plate with corresponding mounting holes formed in the seat body. Then, the barrier plate is assembled to the seat body by using fasteners such as screws, bolts, rivets or the like.

[0005] The above described barrier structural member has defects as listed below. First, the mounting holes of the barrier plate are arranged at opposite sides of the barrier plate and are separated from each other by a relatively long distance, and the assembling of the barrier plate to the seat body is achieved only by fastening and locking effects of fasteners such as screws, bolts, rivets or the like. Thus, in the foaming process, the barrier plate is liable to bulge out under the pressure imparted by foam

material. As a result, the barrier plate becomes uneven, which will affect the structural strength and the appearance of the barrier plate. Second, in some circumstances, the mounting holes of the barrier plate are not exactly aligned with the mounting holes of the seat body due to manufacturing techniques, so that there are misalignments between them. This is undesirable for fastening the screws, bolts, rivets or the like. Some times, it needs to form new mounting holes or to broaden original mounting holes, which increases operation steps and also affects the assembling quality and the finished outer appearance.

Summary of the Invention

[0006] An object of the present invention is to provide a barrier structure and a refrigeration appliance equipped with the barrier structure to eliminate the disadvantages of the prior art, such as low structural strength of the barrier structure and low positioning accuracy in assembling.

[0007] To this end, the present invention provides a barrier structure for a refrigeration appliance which comprises: a seat adapted to be mounted to the bottom of a cabinet of the refrigeration appliance, the seat having a bottom surface and a mounting surface adjoining the bottom surface, with an edge portion of the bottom surface which adjoining the mounting surface being provided with at least one first retention portion; and a barrier plate member having a barrier plate body adapted to be fitted to the mounting surface and a side flap connected to the barrier plate body, the side flap being provided with a second retention portion for engaging with the first retention portion on the bottom surface of the seat.

[0008] Optionally, the first retention portion is provided in the middle area of the edge portion of the bottom surface which adjoining the mounting surface, and the second retention portion is provided in the middle area of the side flap of the barrier plate member.

[0009] Optionally, the first retention portion is a boss, and the second retention portion is a catch hole which is inserted into by the boss.

[0010] Optionally, the catch hole has a crescent shape which is narrowed from its middle section towards its opposite lateral sides, and the height of the boss corresponds to the height of the middle section of the catch hole.

[0011] Optionally, a first mounting portion is provided on each of opposite sides of the barrier plate body in its lengthwise direction, and a second mounting portion is provided on each of opposite sides of the mounting surface of the seat in its lengthwise direction, corresponding to the first mounting portion of the barrier plate body.

[0012] Optionally, the first mounting portion is a through hole which has an aperture dimension in the lengthwise direction of the barrier plate body larger than the aperture dimension of the through hole in the widthwise direction of the barrier plate body, and the second

mounting portion is a mounting hole.

[0013] Optionally, the through hole is an oblong hole, an oval hole or a rectangular hole.

[0014] Optionally, the barrier plate member further comprises two lateral flaps extending in the lengthwise direction of the barrier plate body, with each lateral flap being provided with a third mounting portion, and the opposite sides of the seat are provided with fourth mounting portions corresponding to the third mounting portions of the barrier plate body respectively.

[0015] Optionally, the third mounting portion is a through hole, and the fourth mounting portion is a mounting hole.

[0016] The present invention also provides a refrigeration appliance equipped with a barrier structure as described above.

[0017] The barrier structure and the refrigeration appliance equipped with the barrier structure of the present invention have the following advantages:

First, a first retention portion is provided in an edge portion of the bottom surface of the seat of the barrier structure, and correspondingly a second retention portion for engaging with the first retention portion is provided in a side flap of the barrier plate member of the barrier structure. By the engagement of the first retention portion and the second retention portion, the joining strength of the barrier plate member to the seat body is increased, and thus the whole structural strength of the barrier structure is also increased. The bulging of barrier plate member under pressure force during the subsequent foaming process, which would otherwise affect structural strength and appearance, can be avoided, and the subsequent foaming process can be performed successfully.

Second, first mounting portions are provided on opposite sides of the barrier plate member, and second mounting portions are provided on opposite sides of the seat corresponding to the first mounting portions of the barrier plate body. In an embodiment, each first mounting portion is designed as an oblong hole. Thus, the oblong hole can provide a certain redundancy for ensuring the alignment of the barrier plate body with the seat, which facilitates subsequent assembling and locking by fasteners, by which the assembling quality of the barrier plate member with the seat is increased.

Brief Description of the Drawings

[0018]

Figure 1 shows a schematic view of a refrigeration appliance of the present invention, which in an embodiment is designed as a refrigerator;

Figure 2 shows a schematic structural view of the barrier structure shown in Figure 1;

Figure 3 and Figure 4 show schematic structural views of the seat of the barrier structure shown in Figure 2; and

Figure 5 shows a schematic structural view of the barrier plate member of the barrier structure shown in Figure 2.

Detailed Description of Preferred Embodiments

[0019] The inventor of the present invention inventively discovered that, in the barrier structure of the prior art, the barrier plate is mounted to seat body by means of the mounting holes formed on opposite short sides of the barrier plate. Since the barrier plate is relatively long, and thus the distance between the mounting holes is too large, the barrier plate (especially the middle area of it) lacks effective protective retention or fixation in the foaming process. As a result, the barrier plate is liable to bulge or warp in the foaming process under pressure force imparted by foam material. Thus, the barrier plate becomes uneven, which affects the joining between the barrier plate and the seat body as well as the whole structural strength of the barrier structure.

[0020] To solve the above problem, the present invention provides a barrier structure and a refrigeration appliance equipped with the barrier structure. The barrier structure comprises: a seat adapted to be mounted to the bottom of a cabinet of the refrigeration appliance, the seat having a bottom surface and a mounting surface adjoining the bottom surface, with an edge portion of the bottom surface which adjoining the mounting surface being provided with at least one first retention portion; and a barrier plate member having a barrier plate body adapted to be fitted to the mounting surface and a side flap connected to the barrier plate body, the side flap being provided with a second retention portion for engaging with the first retention portion on the bottom surface of the seat.

[0021] The claimed barrier structure and refrigeration appliance equipped with the barrier structure has advantages, such as having high structural strength.

[0022] In order that the above objects, features and advantages of the present invention can be easily understood, some embodiments of the present invention will be described with reference to the drawings.

[0023] In the detailed description below, many details have been disclosed for better understanding the present invention. However, the invention can be implemented by various manners except those disclosed here, and thus, the present invention is not limited to the embodiments disclosed below.

[0024] Figure 1 shows a schematic structural view of a refrigeration appliance. An upright refrigerator is described here as an example of the refrigeration appliance,

but the refrigeration appliance is not limited to that, and other appliances having item refrigerating functions are also applicable. As shown in Figure 1, the refrigerator 1 comprises a cabinet 10 and a door 11 for forming a storage volume with the cabinet 10 in a door closed state. The cabinet 10 comprises an outer shell 12, an inner shell 13 separated by a distance from the outer shell 12, and a thermal insulating layer (not shown in Figure 1) filled between the outer shell 12 and the inner shell 13. Actually, the door 11 is similar to the cabinet 10 in that it also comprises an outer shell, an inner shell and a thermal insulating layer between them. A plurality of supporting elements 14 are provided on the side wall of the inner shell 13 and aligned in a vertical direction, for supporting shelves 15 or drawers 16.

[0025] In general, the refrigerator is equipped with various components, such as a barrier structure (not shown in Figure 1) inside the cabinet of the refrigerator for dividing a freezing compartment and a refrigerating compartment; and a barrier structure 2 mounted in a lower front portion of the cabinet of the refrigerator (i.e. an adjoining portion between the front portion and the bottom portion of the cabinet of the refrigerator). The barrier structure 2 not only acts to connect the inner shell of the refrigerator with the bottom of the refrigerator, but also acts as a supporting seat for mounting supporting feet of the refrigerator.

[0026] Now the barrier structure 2 of the present invention will be described in details.

[0027] Now turn to Figure 2 which shows a schematic structural view of the barrier structure 2 of the refrigerator 1. As shown in Figure 2, the barrier structure 2 comprises a seat 21 and a barrier plate member 22 mounted to the seat 21.

[0028] Figure 3 and Figure 4 show schematic structural views of the seat 21 of the barrier structure 2 shown in Figure 2, wherein Figure 4 is a schematic structural view formed by rotating Figure 3 around an axis which is perpendicular to the bottom surface 210 of the seat 21, by 180°. With reference to Figure 2, Figure 3 and Figure 4 in combination, the seat 21 is adapted to be mounted to the bottom of the cabinet 10 of the refrigerator 1. In this embodiment, the seat 21 is formed of a plastic material of high strength and has a generally prism shape, with the length of the seat 21 corresponding to the width of the cabinet 10 of the refrigerator 1. For facilitating the assembling process, the seat 21 has a bottom surface 210 and a mounting surface 212 adjoining the bottom surface 210. Opposite sides of the bottom surface 210 in the lengthwise direction of the seat 21 are each provided with a mounting portion 213 (for example, a threaded hole), for mounting and carrying one of two front supporting feet of the refrigerator 1. The setting height of the refrigerator 1 can be changed by adjusting the inserting depth of the two front supporting feet into the mounting portions 213, so that the refrigerator is adapted to be set on various supporting surface for it. Further, the bottom surface 210 is provided with a plurality of reinforcing ribs

214, which are separated with each other, for increasing the structural strength of the seat 21. In addition, on an edge portion of the bottom surface 210 adjoining the mounting surface 212, there are provided with a plurality of ventilation openings 215, which are separated with each other, for providing heat exchange between heat generating elements (for example, the compressor) inside the refrigerator 1 with outside, so that air ventilation and heat dissipation effects are achieved.

[0029] Figure 5 shows a schematic structural view of the barrier plate member 22 of the barrier structure 2 shown in Figure 2. With reference to Figure 2 and Figure 5 in combination, the barrier plate member 22 is adapted to be mounted to the seat 21. In this embodiment, the barrier plate member 22 is formed of a metal (for example, aluminum alloy) and comprises a barrier plate body 220, and a side flap 221 and two lateral flaps 222, all connected with the barrier plate body 220. The barrier plate body 220 is in a substantially plate shape and has long sides and short sides, with the length of the long sides corresponding to the length of the seat 21. The side flap 221 is connected to a long side of the barrier plate body 220 and is adapted to be attached to the bottom surface 210 of the seat 21. The lateral flaps 222 are connected to the short sides of the barrier plate body 220 respectively, or in other words, protrudes in the lengthwise direction of the barrier plate body 220, wherein the lengthwise direction of the barrier plate body 220 is parallel to the long sides of the barrier plate body, and the widthwise direction of the barrier plate body is parallel to the short sides of the barrier plate body. The barrier plate body 220 is further provided with a plurality of ventilation openings 223, which are separated with each other, for providing heat exchange between heat generating elements (for example, the compressor) inside the refrigerator 1 with outside, so that air ventilation and heat dissipation effects are achieved. In actual practice, the side flap 221 is a flange formed by bending an edge portion of the barrier plate body 220. Alternatively, the side flap 221 is an individual element formed separately from the barrier plate body 220 and is then connected to the barrier plate body 220 when use.

[0030] With reference to Figure 3, Figure 4 and Figure 5 in combination, for improving the assembling of the barrier plate member 22 to the seat 2 (such as for achieving precise positioning and firm joining), in this embodiment, two bosses 216 (see the enlarged partial view in Figure 4) are provided as first retention portions in the middle area of an edge portion of the bottom surface 210 of the seat 21 adjoining the mounting surface 212, and correspondingly two catch holes 224 (see the enlarged partial view in Figure 5) are provided as second retention portions in the middle area of the side flap 221 of the barrier plate member 22 and adapted to be engaged with the two bosses 216 as the first retention portions. Preferably, the catch holes 224 are formed by punching, each having a crescent shape that is narrowed towards its opposite lateral sides from its middle section. The height of

each boss 216 corresponds to the height in the middle section of the catch hole 224, such that the permitted moving space of the barrier plate member 22 is limited once the catch hole 224 catches the out periphery of the boss 216, and thereby a retention effect to the barrier plate member 22 is provided. In practice, the bosses 216 as the first retention portions and the catch holes 224 as the second retention portions as disclosed in the above embodiment may be modified by their number and positions. For example, in an alternative embodiment, there may be only one boss and one catch hole provided on the exact middle point of the edge portion of the bottom surface of the seat and the exact the middle point of the side flap of the barrier plate member respectively. Alternatively, there may be provided with more than two (for example, three) bosses and corresponding catch holes, which are arranged by a distance from each other in the middle area of the bottom surface of the seat and the middle area of the side flap of the barrier plate member respectively. Further, the first retention portions and the second retention portions as disclosed above may have other changes, only if they can provide retention effect. For example, in another embodiment, the first retention portion may be in a form of a stub, and the second retention portion may be in a form of a positioning hole, the retention effect being achieved by the engagement of the stub with the positioning hole. In yet another embodiment, the first retention portion may be in a form of a catch hole provided in the seat, and the second retention portion may be in a form of a boss provided in the barrier plate member, the same good retention effect being achieved by the engagement of the catch hole of the seat with the boss of the barrier plate member.

[0031] Furthermore, opposite sides of the barrier plate body 220 are each provided with an oblong hole 225 as a first mounting portion, and correspondingly, opposite sides of the mounting surface 212 of the seat 21 are each provided with a mounting hole 217 as a second mounting portion for engaging with the oblong hole 225 of the barrier plate body 220 as the first mounting portion. Since the first mounting portion is designed as an oblong hole 225, the oblong hole 225 has an aperture dimension in the lengthwise direction of the barrier plate body 220 larger than an aperture dimension of the oblong hole 225 in the widthwise direction of the barrier plate body 220. In this way, the alignment precision requirement between the first mounting portion and the second mounting portion is reduced, and the barrier plate body 220 has an increased redundancy in the permitted moving space in its lengthwise direction. In this embodiment, the first mounting portion is disclosed as an oblong hole 225 as a preferred example, but the invention is not limited to this. In actual practice, as a principle, it only needs that the through hole as the first mounting portion has an aperture dimension in the lengthwise direction of the barrier plate body larger than an aperture dimension of the through hole in the widthwise direction of the barrier plate body. Therefore, the through hole may have different var-

iants, for example, the through hole may be an oval hole, a rectangular hole or the like.

[0032] In addition, each lateral flap 222 of the barrier plate member 22 may be provided with a through hole 226 as a third mounting portion, and correspondingly, opposite sides of the mounting surface 212 of the seat 21 may each be provided with a mounting hole 218 as a fourth mounting portion corresponding to the through hole 226 of the barrier plate body 220 as the third mounting portion. By means of the engagement between the through hole 226 and the mounting hole 218, the assembling of the barrier plate member 22 to the seat 21 is reinforced.

[0033] In a process for mounting the barrier plate member 22 to the seat 21, first, the side flap 221 of the barrier plate member 22 and the barrier plate body 220 of the barrier plate member 22 are attached to the bottom surface 210 and the mounting surface 212 of the seat 21 respectively. Then, the bosses 216 are inserted into the catch holes 224 of the side flap 221. Then, the position of the barrier plate member 22 is adjusted so that the oblong hole 225 and the through hole 226 of the barrier plate member 22 are aligned with the mounting holes of 217 and 218 of the seat 21 respectively. Then, assembling of the barrier plate member 22 is finished by fastening and fixing effects of fasteners such as screws, bolts, rivets or the like. After that, the assembled barrier structure 2 can be mounted to the cabinet 10 of the refrigerator 1. Preferably, after the barrier structure 2 has been mounted to the cabinet 10 of the refrigerator 1, the barrier plate member 22 is exposed to the outside, so that the exposed surface of the barrier plate member 22 can subject to surface treatment, such as polishing, brushed finishing or the like, to obtain a pleasing and neatness appearance.

[0034] The barrier structure and the refrigeration appliance equipped with the barrier structure of the present invention have the following advantages:

First, a first retention portion is provided in an edge portion of the bottom surface of the seat of the barrier structure adjoining the mounting surface of the seat, and correspondingly a second retention portion engaging with the first retention portion is provided in a side flap of the barrier plate member of the barrier structure. By the engagement of the first retention portion and the second retention portion, the joining strength of the barrier plate member to the seat body is increased, in particular the middle area of the barrier plate member is provided with relatively stable protective retention and fixation. The bulging and warping of barrier plate member, in particular the middle area of it, under the pressure force during the subsequent foaming process, which would otherwise affect structural strength and appearance, can be avoided, and the subsequent foaming process can be performed successfully.

Second, first mounting portions are provided on opposite sides of the barrier plate member, and second mounting portions are provided on opposite sides of the seat corresponding to the first mounting portions of the barrier plate body. In an embodiment, each first mounting portion is designed as an oblong hole. Thus, the oblong hole can provide a certain redundancy for ensuring the alignment of the barrier plate body with the seat, which facilitates subsequent assembling and locking by fasteners, and thus the assembling quality of the barrier plate member with the seat is increased.

[0035] While certain preferred embodiments of the present invention have been described above, these embodiments can be improved and modified by those skilled in the art without departing from the principle of the invention, and all such improvements and modifications would be deemed as fall within the scope and spirit of the invention.

Claims

1. A barrier structure for a refrigeration appliance, **characterized in that** it comprises:

a seat adapted to be mounted to the bottom of a cabinet of the refrigeration appliance, the seat having a bottom surface and a mounting surface adjoining the bottom surface, with an edge portion of the bottom surface which adjoining the mounting surface being provided with at least one first retention portion; and
a barrier plate member having a barrier plate body adapted to be fitted to the mounting surface and a side flap connected to the barrier plate body, the side flap being provided with a second retention portion for engaging with the first retention portion on the bottom surface of the seat.

2. The barrier structure of claim 1, **characterized in that** the first retention portion is provided in the middle area of the edge portion of the bottom surface which adjoining the mounting surface, and the second retention portion is provided in the middle area of the side flap of the barrier plate member.

3. The barrier structure of claim 1, **characterized in that** the first retention portion is a boss, and the second retention portion is a catch hole which is inserted into by the boss.

4. The barrier structure of claim 3, **characterized in that** the catch hole has a crescent shape which is narrowed from its middle section towards its opposite lateral sides, and the height of the boss corresponds to the height of the middle section of the catch hole.

5. The barrier structure of claim 1, **characterized in that** a first mounting portion is provided on each of opposite sides of the barrier plate body in its lengthwise direction, and a second mounting portion is provided on each of opposite sides of the mounting surface of the seat in its lengthwise direction, corresponding to the first mounting portion of the barrier plate body.

6. The barrier structure of claim 5, **characterized in that** the first mounting portion is a through hole which has an aperture dimension in the lengthwise direction of the barrier plate body larger than the aperture dimension of the through hole in the widthwise direction of the barrier plate body, and the second mounting portion is a mounting hole.

7. The barrier structure of claim 6, **characterized in that** the through hole is an oblong hole, an oval hole or a rectangular hole.

8. The barrier structure of claim 1, **characterized in that** the barrier plate member further comprises two lateral flaps protruding in the lengthwise direction of the barrier plate body, with each lateral flap being provided with a third mounting portion, and the opposite sides of the seat are provided with fourth mounting portions corresponding to the third mounting portions of the barrier plate body respectively.

9. The barrier structure of claim 8, **characterized in that** the third mounting portion is a through hole, and the fourth mounting portion is a mounting hole.

10. A refrigeration appliance comprising a barrier structure of any one of claims 1 to 9.

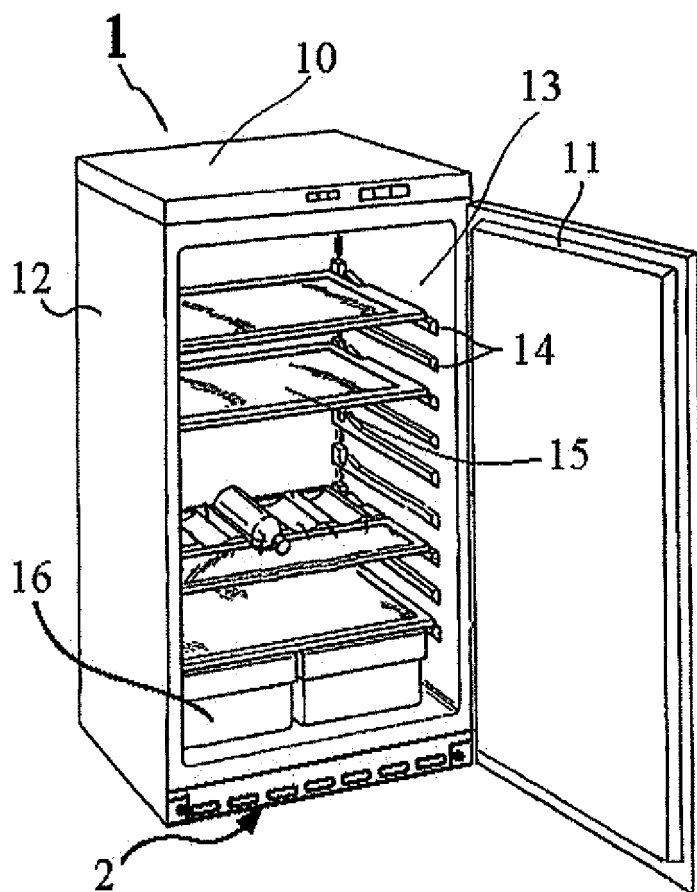


Figure 1

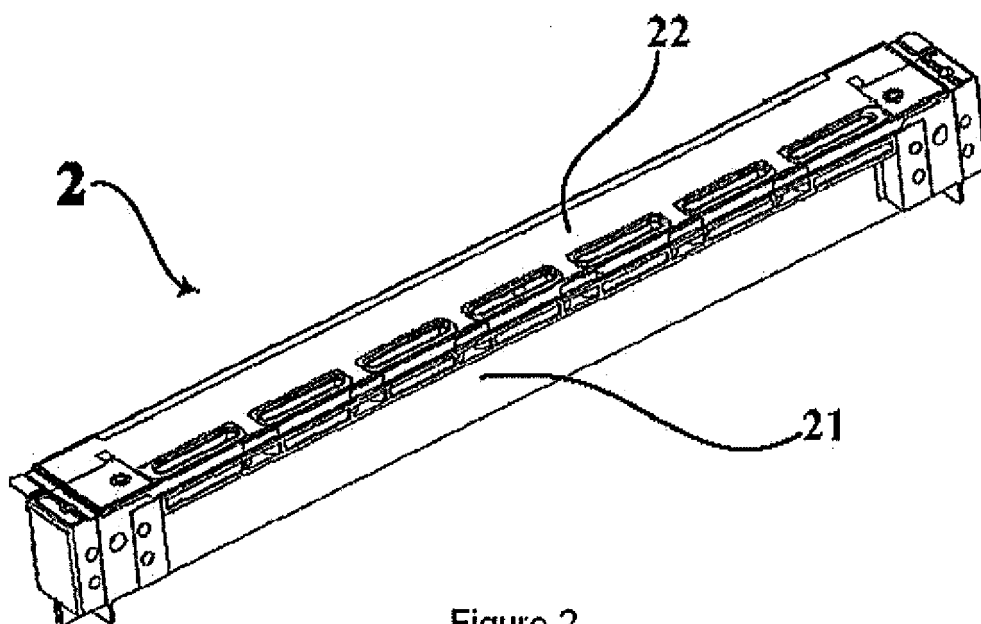


Figure 2

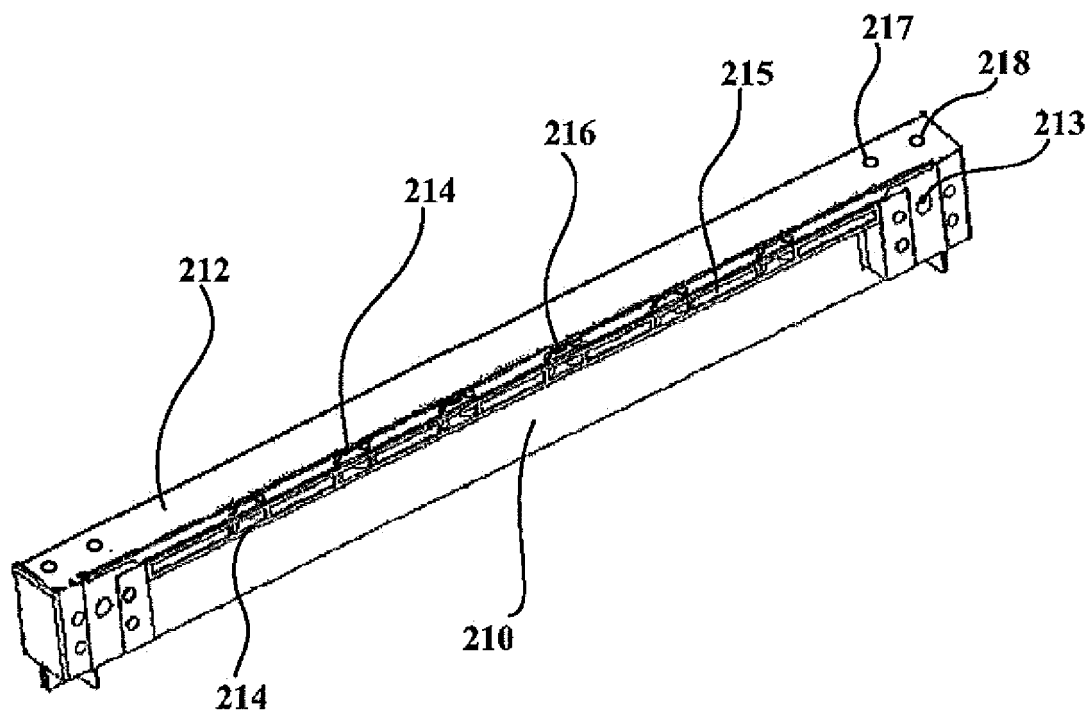


Figure 3

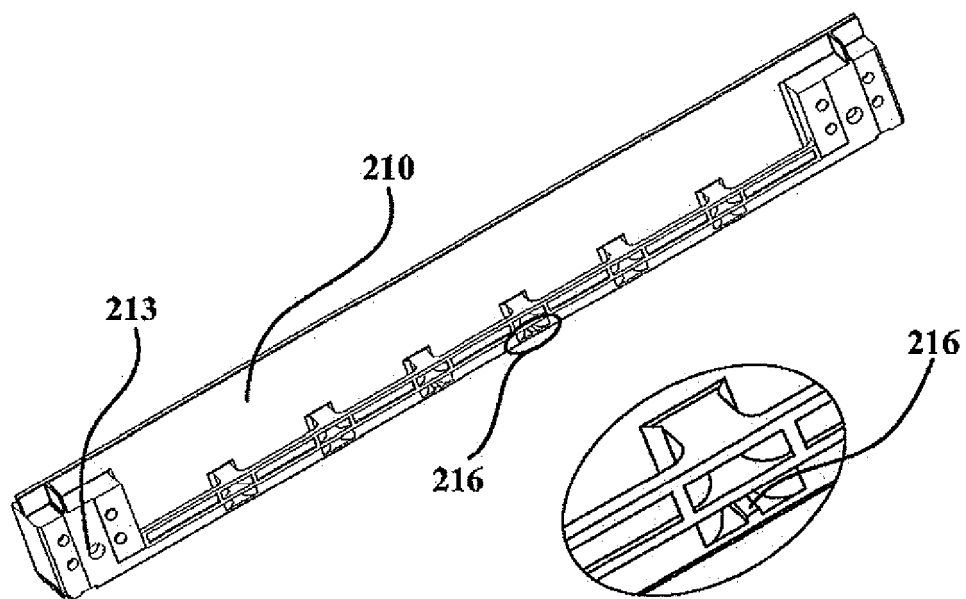


Figure 4

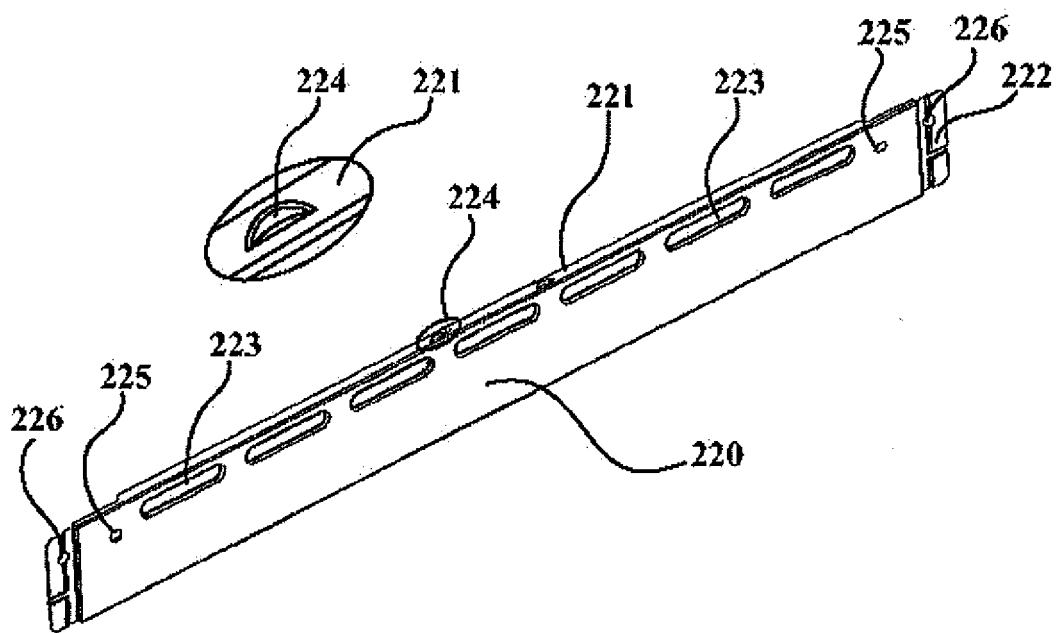


Figure 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 1119604 C [0003]