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(54) **REFRIGERATOR SHELF**

(57) A refrigerator variable-size shelf (200) comprises a U-shaped frame (210) on which a first shelf portion (220) and a second shelf portion (230) are assembled. The first shelf portion (220) is hinged proximate a rear member (211) of the U-shaped frame (210), said rear member (211) being intended to be arranged at a back wall of a refrigerator compartment of a refrigerator appliance, and can be rotated between a horizontal position and a vertical position, while the second shelf portion (230) is slidably arranged on side members (212, 213) of the U-shaped frame (210) and can be moved from an extracted position, where it is substantially co-planar with the first shelf portion (220), and a retracted position, where it is received under the first shelf portion (220) and is coupled thereto by way of guides formed in its trim pieces (221, 222). The rear member (211) and the side members (212, 213) of the U-shaped frame (210) are manufactured as individual members and are assembled to one another by way of coupling means.

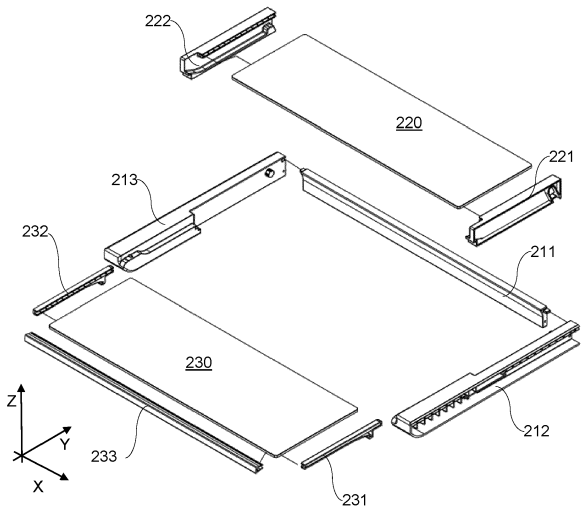

Fig.3

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Description

Technical field of the invention

[0001] The present invention generally relates to refrigerator appliances and more particularly to a refrigerator shelf of the variable-size type.

Background

[0002] Refrigerating appliances typically comprise a cabinet wherein two or more inner compartments separated by one or more thermally insulating walls are formed. The compartments are kept at different temperatures, thereby allowing to store food under different conditions. More particularly, a refrigerator compartment is typically operated at a temperature comprised between 1°C and 10°C, which is suitable to preserve fresh food, while a freezer compartment generally operates at temperatures ranging between -15°C and -30°C to preserve food in a frozen condition.

[0003] A refrigerator compartment typically comprises a plurality of shelves on which food items can be arranged. The shelves are supported on guides or ribs formed on the side walls of the refrigerator compartment and are spaced apart in a vertical direction. For instance the shelves can be spaced apart at a same distance from one another.

[0004] In order to receive food items that are taller than the space available in the vertical direction between subsequent shelves, special shelves have been developed, the size of which can be varied, more particularly reduced with respect to a full size. These shelves are generally known as "variable-size" shelves or "tuck" shelves.

[0005] A variable-size shelf typically includes a U-shaped frame on which a first shelf portion and a second shelf portion are assembled. Both shelf portions feature respective frame members in the form of trim pieces that are configured to allow their assembly with the U-shaped frame.

[0006] The first shelf portion is hinged close to a rear portion of the U-shaped frame intended to be arranged at the back wall of the refrigerator compartment, while the second shelf portion is slidably arranged on side portions of the U-shaped frame. The second shelf portion can be moved from an extracted position where it is substantially co-planar with the first shelf portion and a retracted position where it is received under the first shelf portion and coupled thereto by way of suitable guides formed in its trim pieces.

[0007] In the retracted position, the size of the shelf is substantially half its full size, which means that only half of the surface area of the shelf is available to store food items. In this configuration the second portion can be rotated with the first shelf portion, thus substantially completely clearing the space in the vertical direction, as if the variable-size shelf were not present.

[0008] In either one of these two configurations, objects and food items whose height exceeds the distance in the vertical direction between a shelf placed under the variable-size shelf and the latter can be arranged on the shelf placed under the variable-size shelf without interfering with it. In other words, variable-size shelves allow to customize the interior space of the refrigerator compartment based on a user's needs in order to receive tall objects and food items such as e.g. bottles without forcing a user to modify the mutual distance between subsequent shelves.

[0009] The U-shaped frame of variable-size shelf must be carefully designed in order to minimize warpage, namely distortions resulting from molded-in residual stresses, which, in turn, are caused by differential shrinkage of e.g. plastic material in a molded part. This results in complex and expensive moulds and manufacturing processes.

[0010] Therefore a need exists for an improved design for frame structures of variable-size refrigerator shelves allowing to avoid warpage and reduce tooling costs.

Summary of the invention

[0011] The technical problem underlying and solved by the present invention is therefore to provide a refrigerator variable-size shelf whose frame structure allows to overcome the drawbacks mentioned above with reference to the prior art.

[0012] This problem is solved by a variable-size shelf according to the independent claim 1. Preferred features of the present invention are set forth in the dependent claims.

[0013] An idea of solution underlying the invention is to manufacture the U-shaped frame of a refrigerator variable-size shelf as a composable, modular structure made up of different straight members, namely a rear member and a right and left side members having the same size and a mirrored configuration.

[0014] Thanks to their substantially straight shape, the individual members forming the U-shaped frame are easier and cheaper to manufacture than a single-piece U-shaped frame, and thereby much less prone to warpage problems compared to prior art frames of variable-size refrigerator shelves.

[0015] The coupling means may advantageously comprise locating features allowing to precisely align the rear member and the side members for assembly purposes. Thanks to these features assembly of the U-shaped frame can be accomplished in an easy and quick manner.

[0016] Further advantages, features and operation modes of the present invention will become clear from the following detailed description of embodiments thereof, which are given for illustrative and not-limiting purposes.

Brief description of the drawings

[0017] Reference will be made to the figures of the ac-

companying drawings, in which:

- figure 1 is a perspective view showing a refrigerating appliance comprising a variable-size shelf according to the present invention;
- figure 2 is a perspective view showing the variable-size shelf according to the present invention;
- figure 3 is a perspective, exploded view of the variable-size shelf according to the present invention;
- figure 4 is a perspective view showing a U-shaped frame of the variable-size shelf according to the present invention;
- figures 5 and 6 show a rear member and a side member of the U-shaped frame of the variable-size shelf of the invention, respectively;
- figures 7 and 8 are detail views showing coupling means of the members of the U-shaped frame of the variable-size shelf of the invention;
- figure 9 shows a detail of figure 6;
- figure 10 shows a trim piece of a second shelf portion of the U-shaped frame of the variable-size shelf of the invention.

Detailed description of preferred embodiments

[0018] Figure 1 shows a refrigerating appliance according to the invention, which is generally indicated by reference number 100. The refrigerating appliance 100 is shown with reference to a three-dimensional coordinate system. A first axis X and a second axis Y that are mutually perpendicular define a horizontal plane, while a third axis Z, perpendicular to said horizontal plane, defines a vertical direction corresponding to the direction along which the force of gravity acts.

[0019] The refrigerating appliance 100, hereinafter also referred to as refrigerator appliance or refrigerator, comprises a cabinet 110 whose cavity is configured to store food items. The appliance shown in the drawings is e.g. a "bottom mount" refrigerating appliance, where a refrigerator compartment 111 is formed above a freezer compartment 112 in the vertical direction and are separated from each other by an insulating wall 113, also known as "mullion" to those skilled in the art.

[0020] It will be appreciated that neither the type of refrigerating appliance, nor the arrangement of its compartments are limiting features of the invention.

[0021] The cabinet 110 comprises an inner casing or liner 114 that is made e.g. of a polymeric material, where the refrigerator compartment 111 and the freezer compartment 112 are formed, and an outer casing 115. The outer casing 115 is spaced apart from the inner casing 114 so as to define a cavity that is typically filled with a thermally insulating material such as e.g. polyurethane foam.

[0022] The outer casing 115 has a parallelepiped shape and comprises a pair of spaced apart side walls, a top wall, a bottom wall and a back wall. These walls may e.g. be made of sheet metal or a plastic material.

[0023] The refrigerator compartment 111 and the freezer compartment 112 are selectively accessible through respective doors that are not shown in the drawings.

[0024] As shown in figure 1, the refrigerating appliance 100 also comprises a plurality of shelves arranged in the refrigerator compartment 111 and mutually spaced apart in the vertical direction Z. At least one of these shelves is a variable-size shelf 200, as it will be explained in greater detail in the following.

[0025] Now referring to figures 2-6, the variable-size shelf 200 comprises a U-shaped frame 210 on which a first shelf portion 220 and a second shelf portion 230 are assembled.

[0026] The first shelf portion 220 and the second shelf portion 230 comprise respective trim pieces 221, 222 and 231, 232 that are mounted along their side edges and are configured to allow their assembly with the U-shaped frame 210. The second shelf portion 230 further comprises an additional trim piece 233 mounted on a front edge thereof for aesthetical purposes.

[0027] The U-shaped frame 210 comprises a rear member 211, which is intended to be arranged at a back wall of the refrigerator compartment 111, and side members 212, 213.

[0028] The first shelf portion 220 is hinged on the side members 212, 213 of the U-shaped frame 210 close to the rear member 211 thereof. The first shelf portion 220 can be rotated relative to the U-shaped frame 210 between a substantially horizontal position and a substantially vertical position.

[0029] The second shelf portion 230 is instead slidably arranged on the side members 212, 213 of the U-shaped frame 210 and can be moved horizontally from an extracted position, where it is substantially co-planar with the first shelf portion 220, and a retracted position where it is received under the first shelf portion 220. As it is known in the field, in the retracted position the second shelf portion 230 is coupled to the first shelf portion 220 by way of suitable guides formed in its trim pieces 221, 222, and can therefore be rotated together with it.

[0030] According to the invention, the rear member 211 and the side members 212, 213 of the U-shaped frame 210 are manufactured as individual members that are configured to be assembled to one another by way of coupling means.

[0031] Thanks to these features, the U-shaped frame 210 has a composable structure made up of different, substantially straight members, namely the rear member 211 and the right and the left side members 212, 213, the side members 212, 213 having the same size and a

mirrored configuration. Thanks to their substantially straight shape, the individual members forming the U-shaped frame 210 are easier to manufacture than a single-piece U-shaped frame, and thereby much less prone to warpage problems compared to prior art frames of variable-size refrigerator shelves.

[0032] With particular reference to figures 7 and 8, the coupling means may advantageously be formed on the side members 212, 213, and comprise locating features allowing to precisely align them with the rear member 211 for assembly purposes. Thanks to these features, assembly of the U-shaped frame can be accomplished in an easy and quick manner.

[0033] As shown in the drawings, the locating features may comprise e.g. at least one rib 214 formed on one between the rear member 211 and the side members 212, 213, and a matching recess 215 formed on the other one between the rear member 211 and the side members 212, 213. One or more pins can alternatively be used in place of the ribs.

[0034] The locating features may also comprise at least one screw hole 216 formed at either end of the rear member 211 and a corresponding through hole 217 formed in each side member 212, 213.

[0035] Now referring to figures 6, 9 and 10, a front half 240 of each side member 212, 213 of the U-shaped frame 210 comprises a longitudinal protruding rib 241 configured to slidably receive and support an edge of the second shelf portion 230 in the extracted position. Reference will be made in the following to the front half 240 of the right side member 212, but it will be appreciated that the same applies to the left side member 213, which has a mirrored configuration.

[0036] The protruding rib 241 comprises a stop member 242 formed close to the free end of the side member 212. The stop member 242 is shaped e.g. as a bump configured to engage a corresponding recess 231a formed in the trim piece 231 of the second shelf portion 230 in the extracted position.

[0037] Moreover, the end of the protruding rib 241 facing the rear member 211 of the U-shaped frame 210 in an assembled configuration comprises a notch 243 configured to receive a hook 231b formed in the trim piece 231 of the second shelf portion 220.

[0038] The stop member 242 and the notch 243 advantageously allow to hold the second shelf portion 230 in a stable manner in its extracted position, thereby preventing objects from undesirably falling onto lower shelves.

[0039] It will be appreciated that stop member 242 and the notch 243, as well as the recess 231a and the hook 231b can be formed on either or both side members 212, 213 and the respective trim pieces 231, 232 of the second shelf portion 230.

[0040] Furthermore, the end of the protruding rib 241 facing the rear member 211 of the U-shaped frame 210 in an assembled configuration comprises a step-like portion 244 configured to support a front edge of the first shelf portion 220 in the horizontal position.

[0041] It will be appreciated that the above-described configuration of the side members 212, 213, and of their front half 240 in particular, might change depending on the design of the second shelf portion 230 of the variable-size shelf 200. Thanks to its modular configuration, the U-shaped frame 210 can be easily adapted to a different second shelf portion 230 by simply changing the side members 212, 213. This allows to exploit the same structure for different variable-size shelves and refrigerating appliances.

[0042] The present invention has been disclosed with reference to preferred embodiments thereof. It will be appreciated that there may be other embodiments relating to the same inventive idea, all of which are included in the scope of protection defined by the claims set out below.

Claims

1. A variable-size shelf (200) for a refrigerating appliance, said variable-size shelf (200) comprising a U-shaped frame (210) on which a first shelf portion (220) and a second shelf portion (230) are assembled, wherein:

   - said first shelf portion (220) and said second shelf portion (230) comprise respective trim pieces (221, 222, 231, 232) mounted along their side edges and configured to allow their assembly with said U-shaped frame (210), and
   - the first shelf portion (220) is hinged on side members (212, 213) of the U-shaped frame (210) close to a rear member (211) thereof, said rear member (211) being intended to be arranged at a back wall of a refrigerator compartment of a refrigerator appliance,
   - the first shelf portion (220) can be rotated between a horizontal position and a vertical position,
   - the second shelf portion (230) is slidably arranged on the side members (212, 213) of the U-shaped frame (210) and can be moved from an extracted position, where it is substantially co-planar with the first shelf portion (220), and a retracted position, where it is received under the first shelf portion (220) and is coupled thereto by way of guides formed in its trim pieces (221, 222),

   characterized in that

   - the rear member (211) and the side members (212, 213) of the U-shaped frame (210) are manufactured as individual members
   and **in that**
   - the rear member (211) and the side members

(212, 213) of the U-shaped frame (210) are assembled to one another by way of coupling means.

2. The variable-size shelf (200) of claim 1, wherein said coupling means comprise locating features (214, 215, 216, 217) allowing to align the rear member (211) and the side members (212, 213).

3. The variable-size shelf (200) of claim 2, wherein said locating features comprise at least one rib (214) formed on one between the rear member (211) and the side members (212, 213), and a matching recess (215) formed on the other one between the rear member (211) and the side members (212, 213).

4. The variable-size shelf (200) of claim 2 or 3, wherein said locating features comprise at least at least one screw hole (216) formed at either end of the rear member (211) and a corresponding through hole (217) formed in each side member (212, 213).

5. The variable-size shelf (200) of anyone of the preceding claims, wherein a front half (240) of each side member (212, 213) of the U-shaped frame (210) comprises a longitudinal protruding rib (241) configured to slidably receive and support an edge of the second shelf portion (230) in the extracted position.

6. The variable-size shelf (200) of claim 5, wherein said protruding rib (241) comprises a stop member (242) formed close to the free end of the side member (212), said stop member (242) being configured to engage and hold a recess (231a) formed in the trim piece (231) of the second shelf portion (230) in the extracted position.

7. The variable-size shelf (200) of claim 5 or 6, wherein the end of the protruding rib (241) facing the rear member (211) of the U-shaped frame (210) in an assembled configuration comprises a notch (243) configured to receive a hook (231b) formed in the trim piece (231) of the second shelf portion (230).

8. The variable-size shelf of anyone of claims 5 to 7, wherein the end of protruding rib (241) facing the rear member (211) of the U-shaped frame (210) in an assembled configuration comprises a step-like portion (244) configured to support a front edge of the first shelf portion (220) in the horizontal position.

9. A refrigerating appliance (100) comprising a variable-size shelf according to anyone of the preceding claims.

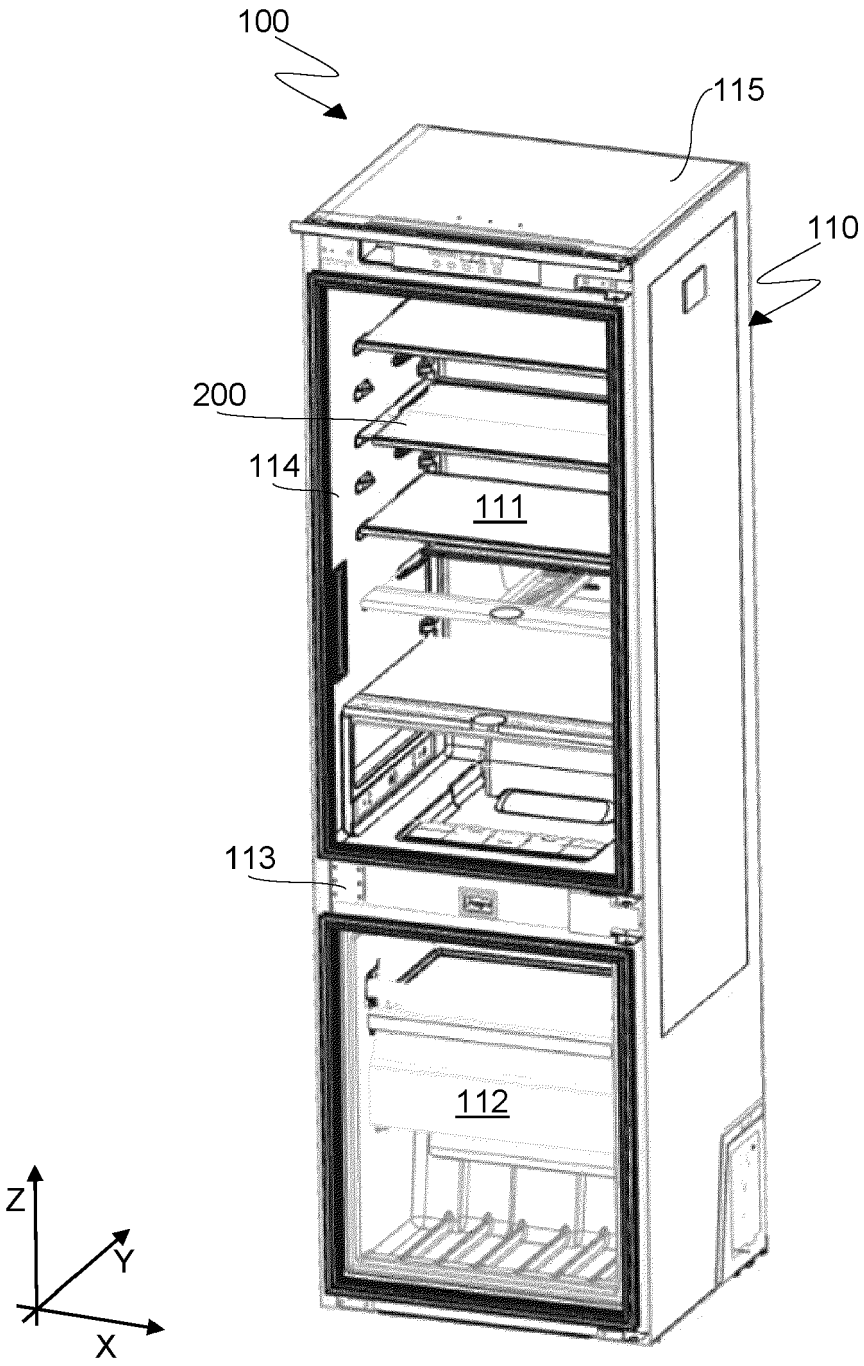

Fig.1

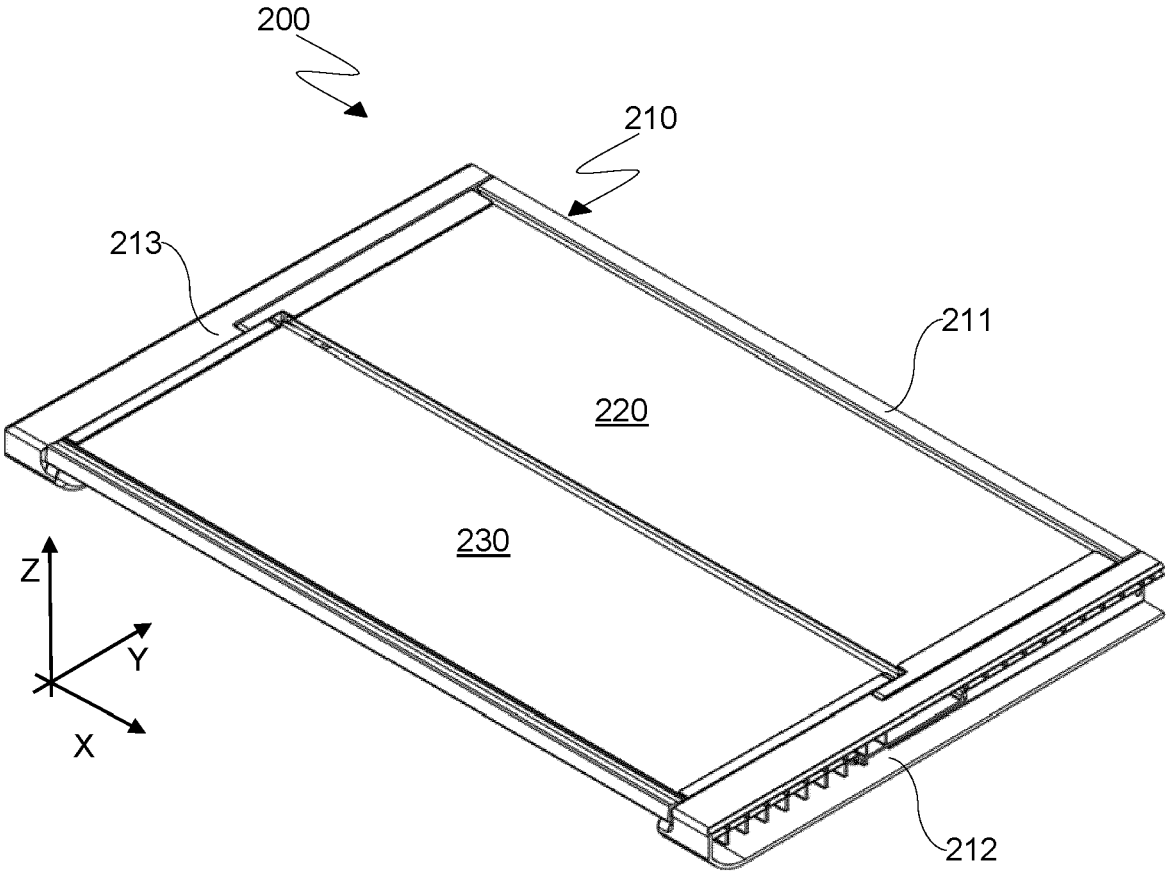

Fig.2

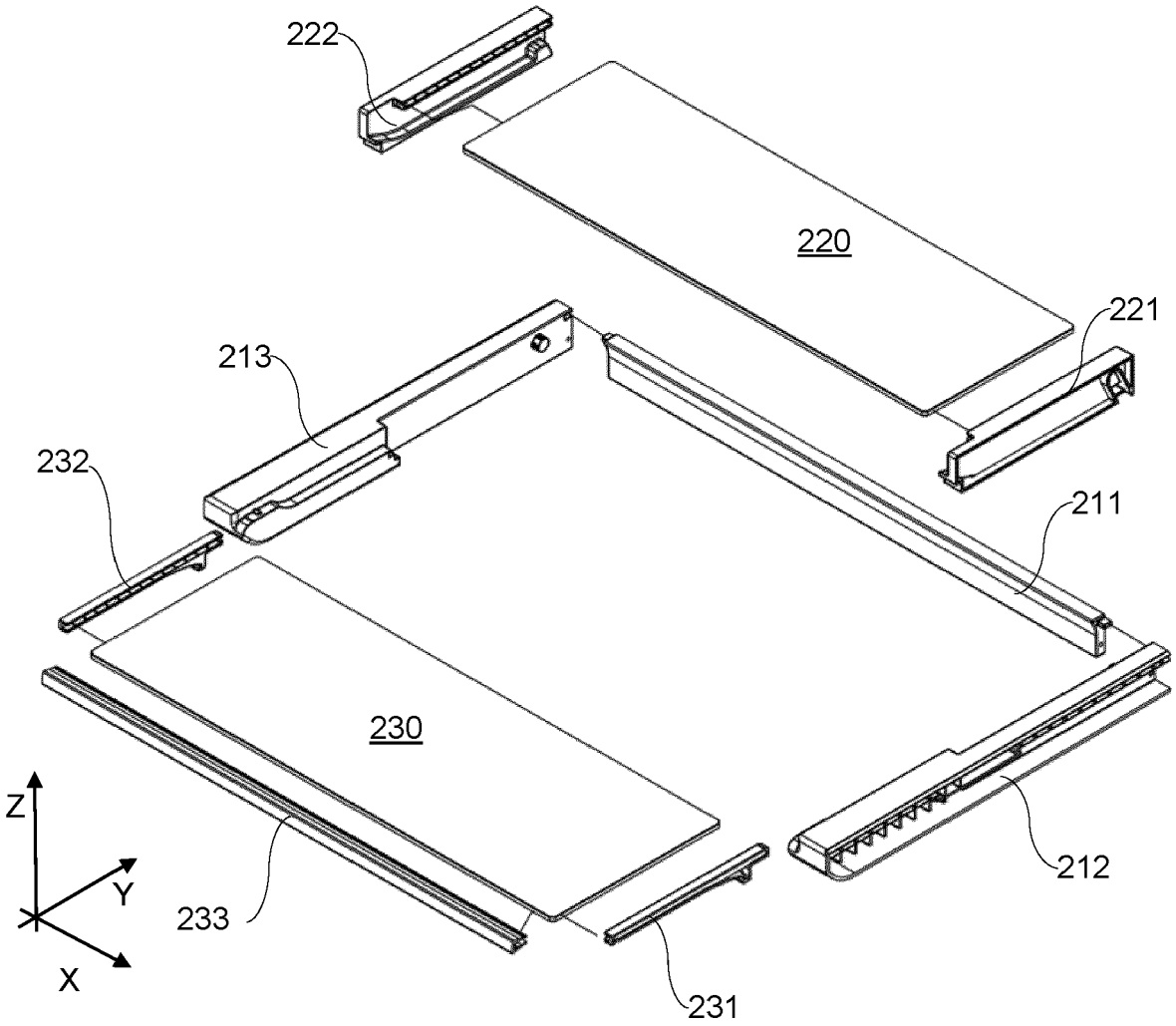

Fig.3

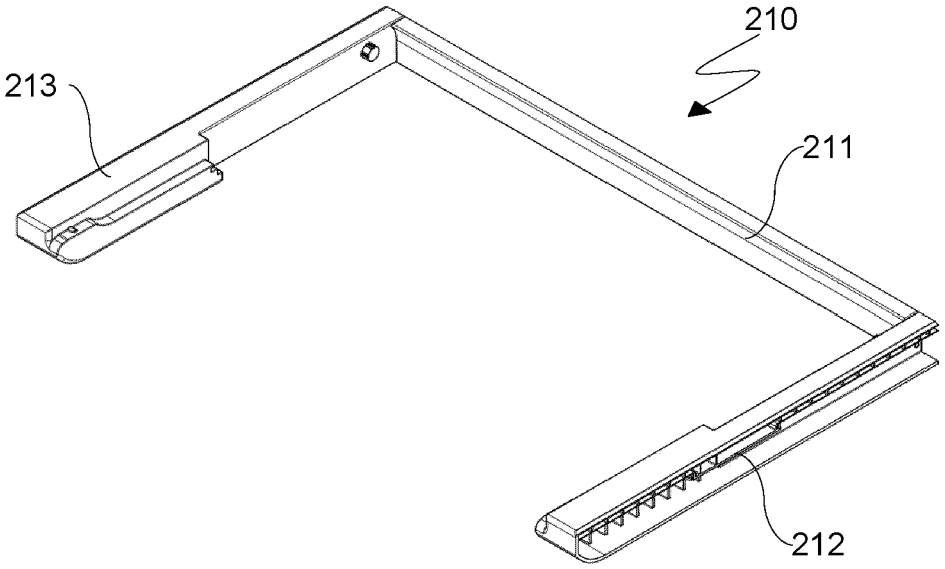

Fig.4

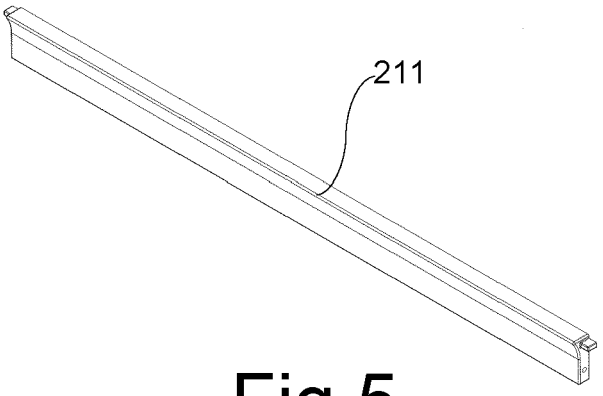

Fig.5

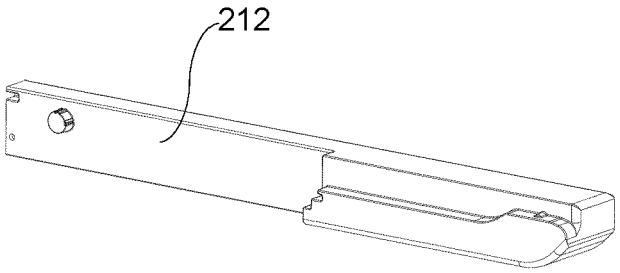

Fig.6

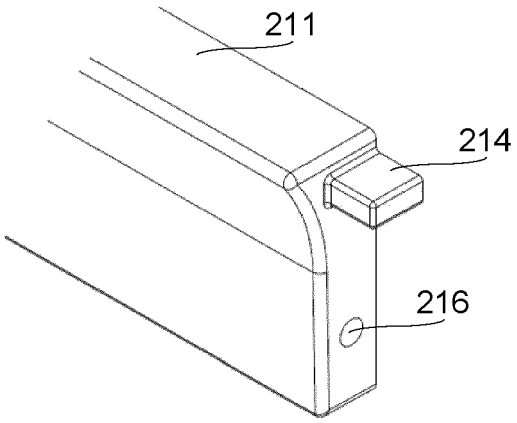

Fig.7

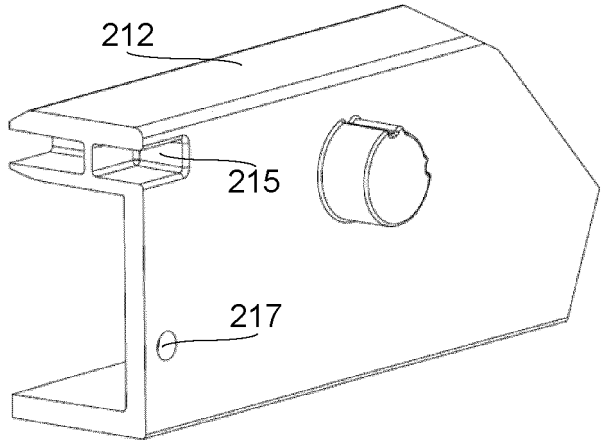

Fig.8

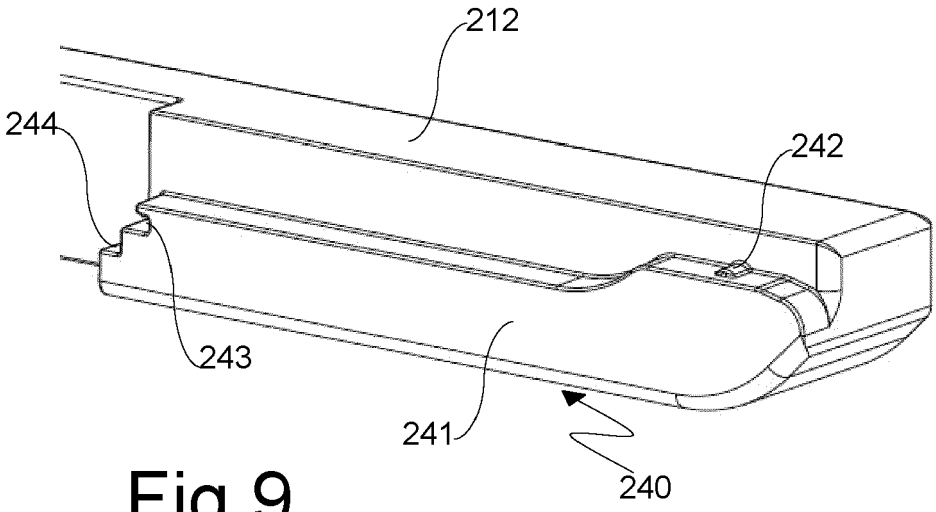

Fig.9

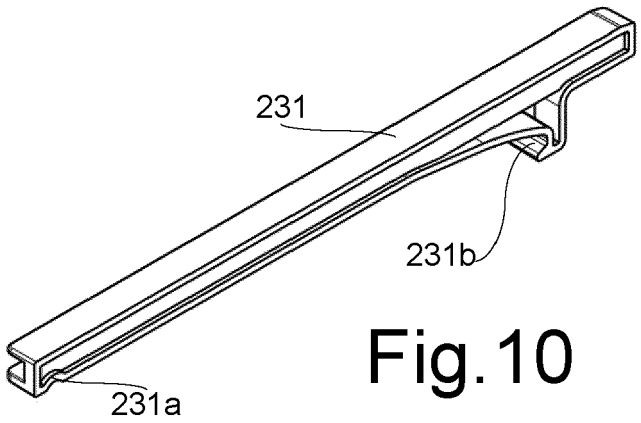

Fig.10

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EUROPEAN SEARCH REPORT

Application Number
EP 20 19 3889

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TECHNICAL FIELDS SEARCHED (IPC)

F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 February 2021	Bejaoui, Amin

CATEGORY OF CITED DOCUMENTS

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