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## (54) Shelf assembly for refrigerator and refrigerator

(57) Disclosed are a shelf assembly for a refrigerator and a refrigerator. The shelf assembly (3) includes a rear shelf (30) and a front shelf (40) movable with respect to the rear shelf (30), where the front shelf is selectively located at an overlapping position where the front shelf at least most partially overlaps the rear shelf in a vertical direction and projects at an extending position in front of the rear shelf, the rear shelf includes a rear glass plate (301) and a first frame portion (302) connected to a front edge portion of the rear glass plate, the first frame portion includes an extending portion (3025) extending forward and having a hook portion (3026) at a distal end thereof, the front shelf includes a front glass plate (401) and a second frame portion (402) connected to a rear edge portion of the front glass plate, and the second frame portion includes a second edge covering portion (4021) extending along a lower surface of the front glass plate. According to the present invention, when the front shelf is located at the extending position, the extending portion overlaps the front glass plate in the vertical direction, and the hook portion is clamped to a front end surface of the second edge covering portion. Therefore, the second frame portion may have a simple structure.

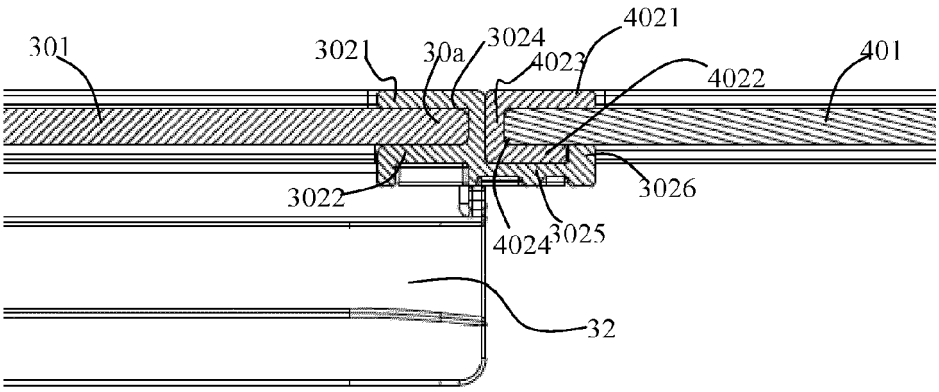



FIG. 4

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## Description

### BACKGROUND OF THE INVENTION

#### Field of the Invention

**[0001]** The present invention relates to a shelf assembly for a refrigerator, and in particular, to a shelf assembly including a front shelf and a rear shelf and a household refrigerator having such a shelf assembly.

#### Related Art

**[0002]** In order to better utilize the storage chamber of the refrigerator, a known practice is to dispose a rotatable shelf in the refrigerator. For example, in Utility Model Patent CN2316611Y, an adjustable shelf assembly of a refrigerator is disclosed, where the adjustable shelf assembly includes a rear shelf and a front shelf mounted on a fixed rotation shaft, and the front shelf may be inserted into and supported below the rear shelf or pulled from below the rear shelf to the front of the rear shelf.

**[0003]** In the case of storing food of normal size, the front shelf may be withdrawn from below the rear shelf and horizontally placed with the rear shelf, and the adjustable shelf assembly together with the ordinary shelf below form a two-layer shelving space; when it is necessary to store larger articles, the front shelf may be inserted into the rear shelf to form a one-and-a-half-layer shelving space; in the case of storing more and larger-size articles, after the front shelf is retracted below the rear shelf, the adjustable shelf assembly is rotated backward to approximately stand on one side of the storage chamber, and the large-size articles may be stored on the ordinary shelf below the adjustable shelf.

**[0004]** In order to prevent the front shelf from flaking off forward when the front shelf is horizontally placed in front of the rear shelf, in CN101495827B, a refrigerator having a shelf assembly including a front shelf and a rear shelf is disclosed, where one of a rear frame portion of the front shelf and a front frame portion of the rear shelf is provided with a recess towards an approximately horizontal direction and a first clamping portion and a second clamping portion respectively disposed in a protruding manner on an upper surface and a lower surface in an inner side of the recess, and a protrusion capable of inserting into the recess and towards an approximately horizontal direction and a third clamping portion disposed in the protruding manner on the upper surface and the lower surface of the recess are formed on the other one of the rear frame portion of the front shelf and the front frame portion of the rear shelf. The third clamping portion coordinates with the first clamping portion or the second clamping portion to clamp the front shelf to the rear shelf. This requires that the frame portions of the front shelf and the rear shelf should have a relatively complicated structure.

### SUMMARY OF THE INVENTION

**[0005]** An objective of the present invention is to solve at least one of the above technical problems, so as to provide a shelf assembly whose front shelf and rear shelf may be reliably clamped without significantly complicating frame portion structures of the front shelf or the rear shelf.

**[0006]** Another objective of the invention is to provide a refrigerator having such a shelf assembly.

**[0007]** Therefore, one aspect of the present invention relates to a shelf assembly for a refrigerator. The shelf assembly includes a rear shelf and a front shelf capable of moving with respect to the rear shelf, wherein the front shelf is selectively located at an overlapping position where the front shelf at least most partially overlaps the rear shelf in a vertical direction and projects at an extending position in front of the rear shelf, the rear shelf includes a rear glass plate and a first frame portion connected to a front edge portion of the rear glass plate, the first frame portion includes an extending portion extending forward and having a hook portion at a distal end, the front shelf includes a front glass plate and a second frame portion connected to a rear edge portion of the front glass plate, and the second frame portion includes a second edge covering portion extending along a horizontal surface of the front glass plate, and the shelf assembly is characterized in that, when the front shelf is located at the extending position, the extending portion overlaps the front glass plate in the vertical direction, and the hook portion is clamped to a front end surface of the second edge covering portion.

**[0008]** As the front end surface of the second edge covering portion extending along a horizontal surface of the front glass plate is utilized to clamp the hook portion, the frame portion structure of the front shelf may not be significantly complicated.

**[0009]** Other individual features or features combined with other features to be regarded as characteristics of the present invention are described below in the following claims.

**[0010]** Although it is also impossible that the second edge covering portion is extending along an upper surface of the front glass plate, according to a preferred embodiment of the present invention, the second edge covering portion is extending along a lower surface of the front glass plate, and the second edge covering portion laps on the extending portion, which helps to conceal the extending portion below the front glass plate not easily seen by a user, and the extending portion may be used for supporting a rear end of the front glass plate.

**[0011]** According to a preferred embodiment of the present invention, the second frame portion includes a second upper edge covering portion extending along an upper surface of the front glass plate, and in the vertical direction, the extending portion clamped to the second edge covering portion is fully covered by the second upper edge covering portion. Therefore, it is not easy for

the user to see the extending portion from above the shelf assembly for supporting articles, which helps to improve neatness impression of the shelf assembly having multiple components.

**[0012]** According to a preferred embodiment of the present invention, the extending portion extends forward from a bottom portion of the first frame portion and includes a horizontal plate portion for supporting the second frame portion, and a step is formed between an upper surface of the horizontal plate portion and a top surface of the first frame portion, so as to help to reduce a height difference between the front shelf and the rear shelf supported on the extending portion. In a preferred embodiment, top surfaces of the first frame portion and the second frame portion may be on the same plane as long as a height difference between the horizontal plate portion and the top surface of the first frame portion is appropriately defined.

**[0013]** According to a preferred embodiment of the present invention, the first frame portion includes a first edge covering portion extending along a lower surface of the rear glass plate, and the upper surface of the horizontal plate portion is lower than an inner surface of the first edge covering portion.

**[0014]** According to a preferred embodiment of the present invention, the first frame portion includes multiple spaced extending portions, a front end surface of the second edge covering portion forms multiple notches, and each hook portion is located inside the corresponding notch and is hooked to the front end surface, adjacent to the notches, of the second edge covering portion.

**[0015]** Another aspect of the present invention relates to a shelf assembly for a refrigerator. The shelf assembly includes a rear shelf and a front shelf movable with respect to the rear shelf, wherein the front shelf is selectively located at an overlapping position where the front shelf at least most partially overlaps the rear shelf in a vertical direction and projects at an extending position in front of the rear shelf, the rear shelf includes a rear glass plate and a first frame portion fixed to a front edge portion of the rear glass plate, the first frame portion includes a first edge covering portion extending along a horizontal surface of the rear glass plate, the front shelf includes a front glass plate and a second frame portion connected to a rear edge portion of the front glass plate, and the second frame portion includes an extending portion extending backward and having a hook portion at a distal end; the shelf assembly is characterized in that, when the front shelf is located at the extending position, the extending portion overlaps the rear glass plate in the vertical direction, and the hook portion is clamped to a rear end surface of the first edge covering portion.

**[0016]** As the rear end surface of the first edge covering portion extending along a horizontal surface of the rear glass plate is utilized to clamp the hook portion, the frame portion structure of the rear shelf may not be significantly complicated.

**[0017]** According to a preferred embodiment of the present invention, when the front shelf is located at the extending position, a front end surface of the first frame portion is in face-to-face contact with a rear end surface of the second frame portion.

**[0018]** A further another aspect of the present invention relates to a refrigerator, including a heat-insulating storage chamber and a shelf assembly according to any one of the preceding claims and located in the storage chamber.

**[0019]** The structure and other invention objectives as well as beneficial effects of the present invention will be more comprehensible with reference to the accompanying drawings and the description about the preferred embodiments.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0020]** As a part of the specification and for facilitating further comprehension of the present invention, the following accompanying drawings illustrate specific implementation manners of the present invention, and describe the principle of the present invention together with the specification.

FIG. 1 is a schematic perspective view of a refrigerator in a non-fully assembled state according to a preferred embodiment of the present invention;

FIG. 2 is a schematic perspective view of a shelf assembly according to a preferred embodiment of the present invention, where the shelf assembly is in an extending state and one side thereof is connected to a support member;

FIG. 3 is a schematic perspective view of a shelf assembly according to a preferred embodiment of the present invention, where the shelf assembly is retracted below the rear shelf;

FIG. 4 is a schematic partial sectional view of a shelf assembly along an A-A line in FIG. 2 according to a preferred embodiment of the present invention, where the shelf assembly is in an extending state; and

FIG. 5 is a schematic partial sectional view of a shelf assembly according to another preferred embodiment of the present invention, where the shelf assembly is in an extending state.

## DETAILED DESCRIPTION OF THE EMBODIMENTS

**[0021]** Referring to the accompanying drawings, and first particularly referring to FIG. 1, a refrigerator 1 has a heat-insulating storage chamber 2 for storing articles. The storage chamber 2 is defined by an inner liner 20. The refrigerator further includes a heat-insulating layer (not shown) between the inner liner 20 and a housing

(not shown). The storage chamber 2 may be closed or opened through a heat-insulating door (not shown).

**[0022]** The storage chamber 2 is provided with a retractable shelf assembly 3 and ordinary shelves 8 above and below the shelf assembly 3.

**[0023]** The shelf assembly 3 is supported in the storage chamber 2 through a pair of support members 4 located on two sides of the storage chamber 2. In this embodiment, the support members 4 are formed by separate supporting means connected to the inner liner 20. In this embodiment, the support members 4 are unmovably fixed onto a box 20. However, in an alternative embodiment, the support members 4 may also be mounted in the storage chamber 2 together with the shelf assembly 3 or removed from the storage chamber 2 together with the shelf assembly 3.

**[0024]** In another alternative embodiment, the support members 4 may also be at least partially formed by the inner liner 20 directly.

**[0025]** Referring to FIG. 2 to FIG. 4, the shelf assembly 3 includes a rear shelf 30 and a front shelf 40 capable of moving with respect to the rear shelf 30. The front shelf 40 may selectively move to an extending position protruding in front of the rear shelf 30 or retract to a retraction position where the front shelf 40 overlaps the rear shelf 30.

**[0026]** In this embodiment, the front shelf 40 may be pushed backward to the rear shelf 30 to be placed below the rear shelf 30, and the front shelf 40 overlaps the rear shelf 30. At the retraction position, the front shelf 40 is received and supported in a pair of rail slots 32 below a rear glass plate 301 of the rear shelf 30, as shown in FIG. 3.

**[0027]** The front shelf 40 may slide to the front of the rear shelf 30 and is approximately on the same horizontal plane with the rear shelf 30, and articles to be cooled may be stored on the front shelf 40 and the rear shelf 30. Here, the shelf assembly 3 is in an extending state, as shown in FIG. 1 and FIG. 2.

**[0028]** Further, the shelf assembly 3 may also rotate from a horizontal position and retract to one side of the storage chamber 2, so as to be in a rest position. In this embodiment, at the rest position, the shelf assembly 3 extends longitudinally to stand at the rear side of the storage chamber 2, so that the shelf 8 below the shelf assembly 3 may store articles with higher dimensions.

**[0029]** The rear shelf 30 includes a rear glass plate 301 and a first frame portion 302 connected to at least part of edges of the rear glass plate 301. In this embodiment, the first frame portion 302 is connected to a front edge portion 30a, a rear edge portion 30b, and a pair of side edge portions 30c of the rear glass plate 301. In an alternative embodiment, the first frame portion 302 may also be disposed only along one or some edge portions of the rear glass plate 301.

**[0030]** The first frame portion 302 includes a first upper edge covering portion 3021 and a first lower edge covering portion 3022 extending along a horizontal upper surface and a lower surface of the front edge portion 30a of the rear glass plate 301 respectively. The first frame portion 302 further includes a first connection portion 3023 connecting the first upper edge covering portion 3021 and the first lower edge covering portion 3022. Therefore, the first frame portion 302 may have a approximately U-shaped cross section, and the front edge portion 30a of the rear glass plate 301 is received in a receiving slot 3024 formed by the first upper edge covering portion 3021, the first lower edge covering portion 3022, and the first connection portion 3023.

**[0031]** The first frame portion 302 includes two extending portions 3025 extending forward, spaced, and with a claw-shaped cross section. A hook portion 3026 is formed at a free end of the extending portion 3025, and the hook portion 3026 bends upward from a horizontal plate portion 3027 of the extending portion 3025.

**[0032]** In this embodiment, as shown in FIG. 4, the extending portion 3025 extends forward from a bottom portion of the first connection portion 3023, and a step is formed between an upper surface of the horizontal plate portion 3027 of the extending portion 3023 and an upper surface of the first frame portion 302. Preferably, the upper surface of the plate portion 3027 is lower than an inner surface of the first edge covering portion 3022 (that is, the surface facing the lower surface of the rear glass plate 301).

**[0033]** The front shelf 40 includes a front glass plate 401 and a second frame portion 402 connected to at least part of edges of the front glass plate 401. In this embodiment, the second frame portion 402 is connected to a front edge portion 40a, a rear edge portion 40b, and a pair of side edge portions 40c of the front glass plate 401. In an alternative embodiment, the second frame portion 402 may also be disposed only along one or some edge portions of the front glass plate 401.

**[0034]** The second frame portion 402 includes a second upper edge covering portion 4021 and a second lower edge covering portion 4022 respectively extending along an upper surface and a lower surface of the rear edge portion 40b of the front glass plate 401. The second frame portion 402 further includes a second connection portion 4023 connecting the second upper edge covering portion 4021 and the second lower edge covering portion 4022. Therefore, the second frame portion 402 may have a U-shaped cross section, and the rear edge portion 40b of the front glass plate 401 is received in a receiving slot 4024 formed by the second upper edge covering portion 4021, the second lower edge covering portion 4022, and the second connection portion 4023.

**[0035]** A pair of side portions, disposed along the side edge portions 40c of the front glass plate 401, of the second frame portion 402 are respectively provided with a first protruding portion 4026 protruding outward and a second protruding portion 4027 at a rear side of the corresponding first protruding portion 4026. The second protruding portion 4027 is used for guiding the front shelf 40 to be pushed backward into the rail slots 32.

**[0036]** In this embodiment, a front end surface of the second lower edge covering portion 4022 forms multiple notches 4025, and in a horizontal direction, positions of the notches 4025 correspond to corresponding hook portions 3026. When the front shelf 40 is at the extending position, the first protruding portion 4026 in the front end of the front shelf 40 is supported on the support member 4, the second protruding portion 4027 may be in a suspended state, and the second lower edge covering portion 4022 laps on the plate portion 3027 of the extending portion 3025 to be supported on the rear shelf 30. At this position, the hook portion 3026 is clamped to a front end surface of an adjacent notch 4025 of the second lower edge covering portion 4022, thereby clamping the front shelf 40 in the extending state to the rear shelf 30.

**[0037]** The cross sections of the second upper edge covering portion 4021 are uniform on its entire horizontal width, and when the hook portion 3026 of the extending portion 3025 is located in the notch 4025 and is hooked to the front end surface of the second lower edge covering portion 4022, the hook portion 3026 is covered by the second upper edge covering portion 4021 extending along the upper surface of the front glass plate 401. This helps to avoid that the user sees the hook portion 3026 from above the front shelf 40, so as to render neatness impression of the shelf assembly 3.

**[0038]** When the front shelf 40 is at the extending position, an outer surface of the first connection portion 3023 contacts an outer surface of the second connection portion 4023, that is, a front end surface of the first frame portion 302 contacts a rear end surface of the second frame portion 402. This helps to reduce a gap between the front shelf 40 and the rear shelf 30.

**[0039]** In the above embodiment, the first frame portion 302 includes two spaced extending portions 3025. However, in another embodiment, the first frame portion 302 may also include more spaced extending portions or one extending portion 3025 having a larger horizontal length (for example, having a length approximately identical to that of the first frame portion 302).

**[0040]** As a preferred embodiment of the present invention, the extending portion 3025 extends forward from the lower portion of the first connection portion 3023, and the hook portion 3026 bends upward and hooks the second lower edge covering portion 4022 of the front shelf 40, but the present invention should not be limited thereto. For example, in an alternative embodiment, the rear shelf 30 may include an extending portion extending forward from the upper portion of the first connection portion 3023, and it is also possible that such an extending portion includes a hook portion bending downwards and hooking the front end surface of the second upper edge covering portion 4021 of the front shelf 40.

**[0041]** FIG. 5 is a schematic partial sectional view of a shelf assembly 3' according to another preferred embodiment of the present invention. Different from the above embodiments, in this embodiment, a second frame portion 402', connected to a rear edge portion 40b' of a front glass plate 401', of a front shelf 40' includes an extending portion 4029' extending backward and having a hook portion 4028' at a distal end thereof. A first frame portion 302', connected to a front edge portion 30a' of a rear glass plate 301', of a rear shelf 30' includes a first upper edge covering portion 3021' and a first lower edge covering portion 3022' respectively extending along an upper surface and a lower surface of the rear glass plate 301'. When the front shelf 40' is at an extending position, the extending portion 4029' overlaps the rear glass plate 301' in a vertical direction, and the hook portion 4028' is clamped to a rear end surface of the first lower edge covering portion 3022'.

## Claims

1. A shelf assembly (3) for a refrigerator (1), comprising a rear shelf (30) and a front shelf (40) movable with respect to the rear shelf (30), wherein the front shelf (40) is selectively located at an overlapping position where the front shelf (40) at least most partially overlaps the rear shelf (30) in a vertical direction and projects at an extending position in front of the rear shelf (30), the rear shelf (30) comprises a rear glass plate (301) and a first frame portion (302) connected to a front edge portion (30a) of the rear glass plate (301), the first frame portion (302) comprises an extending portion (3025) extending forward and having a hook portion (3026) at a distal end thereof, the front shelf (40) comprises a front glass plate (401) and a second frame portion (402) connected to a rear edge portion (40b) of the front glass plate (401), and the second frame portion (402) comprises a second edge covering portion (4022) extending along a horizontal surface of the front glass plate (401); **characterized in that**, when the front shelf is located at the extending position, the extending portion (3025) overlaps the front glass plate (401) in the vertical direction, and the hook portion is clamped to a front end surface of the second edge covering portion (4022).

2. The shelf assembly according to claim 1, **characterized in that**, the second edge covering portion (4022) extends along a lower surface of the front glass plate (401), and the second edge covering portion (4022) rests on the extending portion (3025).

3. The shelf assembly according to claim 1 or 2, **characterized in that**, the second frame portion (402) comprises a second upper edge covering portion (4021) extending along an upper surface of the front glass plate (401), and in the vertical direction, the extending portion (3025) clamped to the second edge covering portion (4022) is fully covered by the second upper edge covering portion (4021).

4. The shelf assembly according to claim 1 or 2, **characterized in that**, the extending portion (3025) extends forward from a bottom portion of the first frame portion (302) and comprises a horizontal plate portion (3027) for supporting the second frame portion (402), and a step is formed between an upper surface of the horizontal plate portion (3027) and a top surface of the first frame portion (302).

5. The shelf assembly according to claim 4, **characterized in that**, the first frame portion (302) comprises a first edge covering portion (3022) extending along a lower surface of the rear glass plate (301), and the upper surface of the horizontal plate portion (3027) is lower than an inner surface of the first edge covering portion (3022).

6. The shelf assembly according to any one of claims 1 to 5, **characterized in that**, the first frame portion (302) comprises multiple spaced extending portions (3025), a front end surface of the second edge covering portion (4022) forms multiple notches (4025), each hook portion (3026) is located inside the corresponding notch (4025) and is hooked to the front end surface, adjacent to the notches (4025), of the second edge covering portion (4022).

7. A shelf assembly (3') for a refrigerator (1), comprising a rear shelf (30') and a front shelf (40') movable with respect to the rear shelf (30'), wherein the front shelf (40') is selectively located at an overlapping position where the front shelf (40') at least most partially overlaps the rear shelf (30') in a vertical direction and projects at an extending position in front of the rear shelf (30'), the rear shelf (30') comprises a rear glass plate (301') and a first frame portion (302') fixed to a front edge portion (30a') of the rear glass plate (301'), the first frame portion (302') comprises a first edge covering portion (3022') extending along a horizontal surface of the rear glass plate (301'), the front shelf (40') comprises a front glass plate (401') and a second frame portion (402') connected to a rear edge portion (40b') of the front glass plate (401'), and the second frame portion (402') comprises an extending portion (4029') extending backward and having a hook portion (4028') at a distal end thereof; **characterized in that**, when the front shelf (40') is located at the extending position, the extending portion (4029') overlaps the rear glass plate (301) in the vertical direction, and the hook portion (4028') is clamped to a rear end surface of the first edge covering portion (3022').

8. The shelf assembly according to claim 1 or 7, **characterized in that**, when the front shelf (40, 40') is located at the extending position, a front end surface of the first frame portion (302, 302') is in face-to-face contact with a rear end surface of the second frame portion (402, 402').

9. A refrigerator (1), comprising a heat-insulating storage chamber (2) and a shelf assembly (3) according to any one of claims 1 to 8 and located in the storage chamber (2).

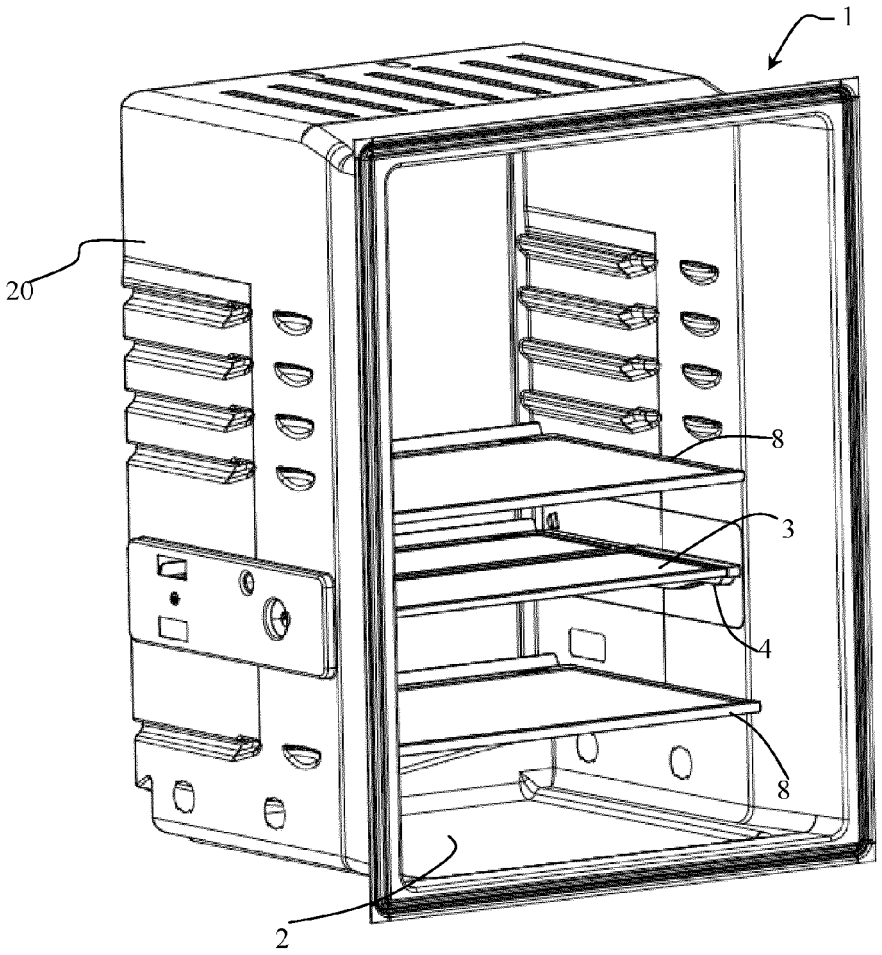



FIG. 1

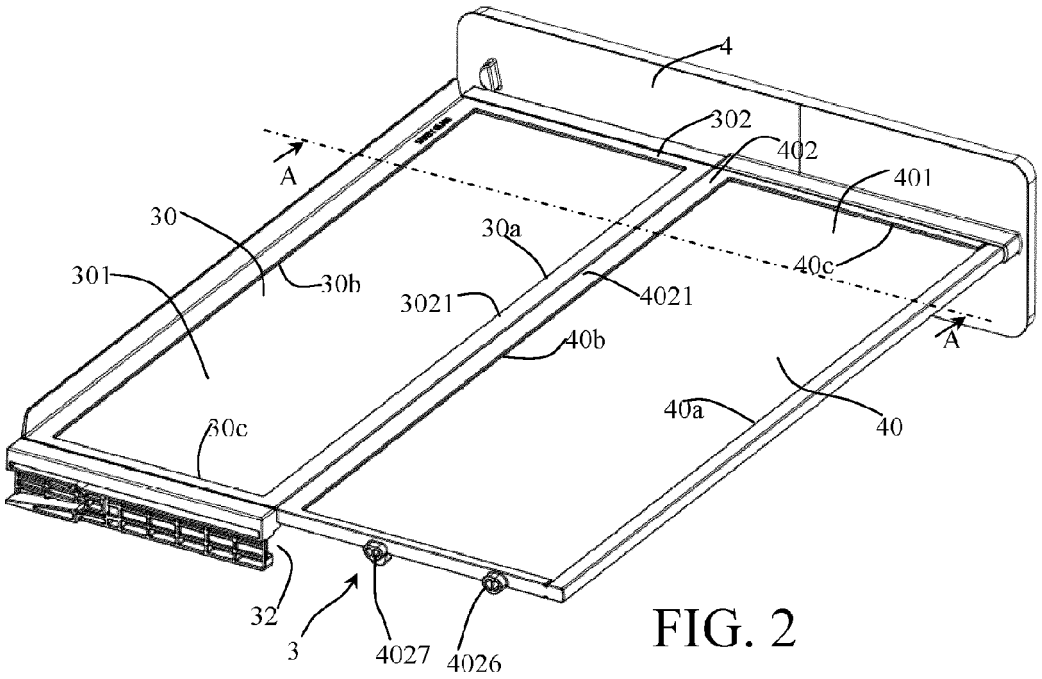

4
302
402
401
A
30
30a
40c
301
30b
3021
4021
40b
A
40a
40
30c
32
3
4027
4026

FIG. 2

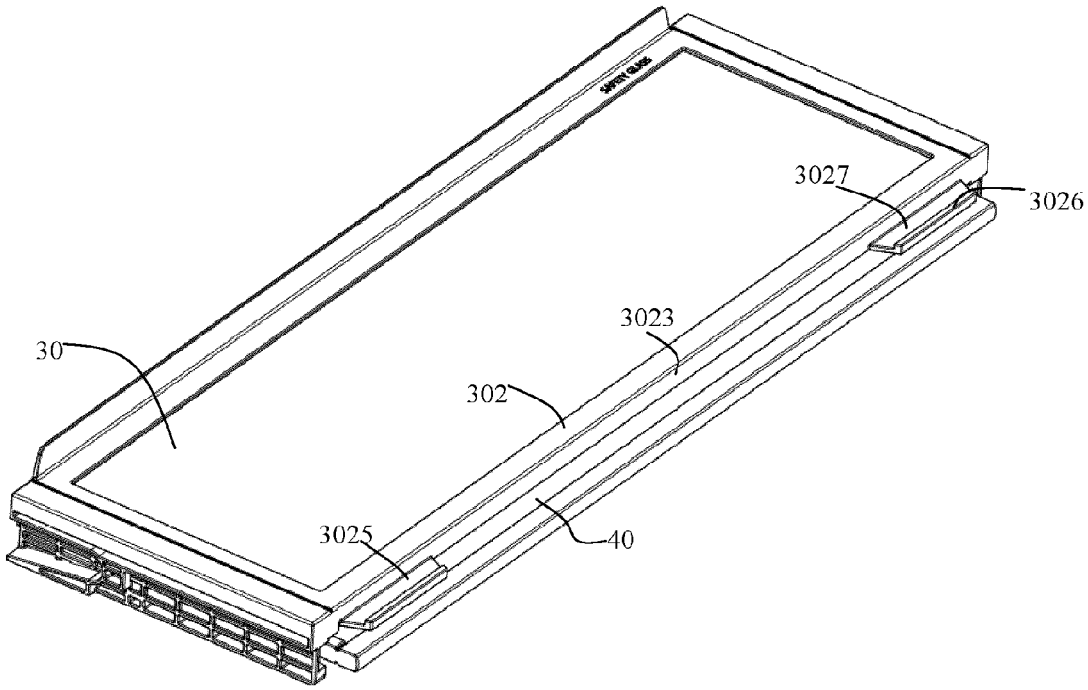

3027
3026
3023
30
302
3025
40

FIG. 3

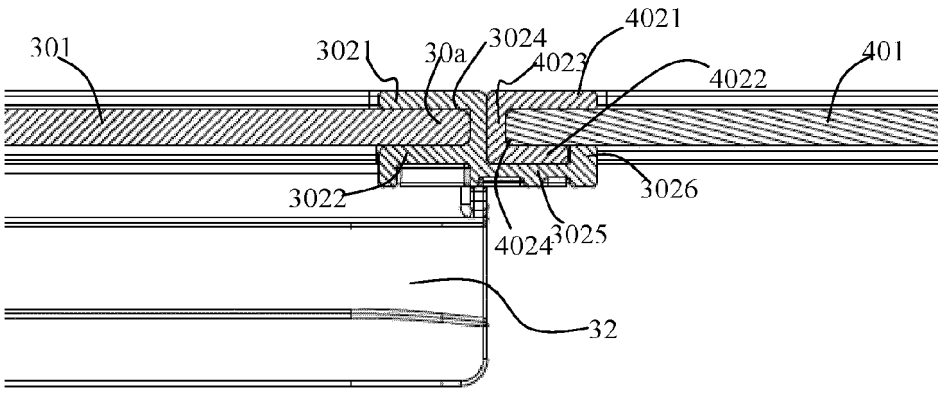

301
3021
30a
3024
4021
4023
4022
401
3022
3026
4024
3025
32

FIG. 4

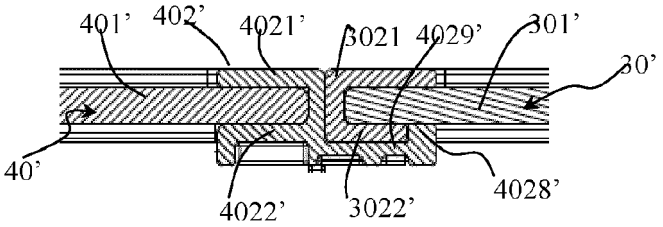

401'
402'
4021'
3021
4029'
301'
30'
40'
4022'
3022'
4028'

FIG. 5

## REFERENCES CITED IN THE DESCRIPTION

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- CN 101495827 B **[0004]**