

REFRIGERATOR

Technical Field

[0001] The present invention relates to a refrigerator. In particular, it relates to
5 technique to improve the usability of a food storage shelf of storage chambers such as a
refrigerating chamber, etc.

Background Art

[0002] In general, it is strongly desired to improve the usability to be able to pull out
10 foods stored on the food storage shelf of a refrigerating chamber having a food storage
shelf mounting foods in a refrigerator, in particular, at the rear space of the uppermost
stage.

[0003] Then, for instance, a shelf device of the refrigerator has been proposed, which
causes the food stored at the rear space move to adjacent to the user according to the
15 rotation of the food storage shelf, thereby improving the usability and minimizing
ineffective space (for instance, refer to Patent Literature 1).

[0004] The above refrigerator includes a food storage chamber having an opening part
at the front face, a door opening/closing the food storage chamber, a shelf supporting
rack provided at a side wall of the food storage chamber, an auxiliary shelf supported by
20 the shelf supporting rack, and a rotating shelf attached to the upper part of the auxiliary
shelf and swinging so that the back face approaches the front face opening part.

Citation List

Patent Literature

25 [0005] Patent Literature 1: JP10-153382A

Summary of Invention

Technical Problem

[0006] However, although the shelf device of the refrigerator disclosed in the above

5 Patent Literature 1 has the effect to facilitate pulling-out of the food, etc. stored at the rear space; since a nut is fixed to a screw of the shaft part from the lower part for rotating, it is difficult to assemble, and further the appearance is degraded. Further, since it is difficult for the user to detach the rotating shelf, there is a problem that the cleaning is not easy.

10 [0007] Also, the shelf device of the refrigerator disclosed in the above Patent Literature 1 also has a problem that, since a rotation shaft moves forward to rotate within a groove of the fixed auxiliary shelf, the projected amount of the rotating shelf to the forward is large at the position of rotating with 90 degrees, which causes a large load to the shaft part and increases the fear of falling-down of the stored goods given to the
15 user.

[0008] To solve the above problems, the present invention is to provide a refrigerator having a shelf mechanism which facilitates pulling-out of the food, etc. stored at the rear space by rotating operation, thereby minimizing the ineffective space, further, improving the appearance and the easiness to detach and clean, and improving safety at
20 the time of operation.

Solution to Problem

[0009] According to the present invention, a refrigerator includes a rotating shelf device having:

25 (1) a pair of rails provided at left and right side walls of a storage chamber;

(2) a supporting shelf provided on the pair of rails slidably in a back and forth direction and having a shaft supporting hole at an almost center;

(3) a rotating tray, at four corners of which notches are formed by arc shapes having a center at a rotation supporting point, and at an almost center of which a

5 rotating tray shaft is formed; and

(4) a fixing ring fixed to the rotating tray shaft and as well fitted slidably to the shaft supporting hole of the supporting shelf,

and the rotating tray shaft is structured to pass through the shaft supporting hole of the supporting shelf only at a predetermined rotating angle, and not to pass
10 through the shaft supporting hole of the supporting shelf at a rotating angle other than the predetermined rotating angle.

Advantageous Effects of Invention

[0010] According to the refrigerator relevant to the present invention, the ineffective
15 space can be minimized, further, the appearance and easiness to detach and clean is improved, and further safety at the time of operation is improved.

Brief Description of Drawings

[0011] Fig. 1 shows the first embodiment, which is an exploded perspective view of a rotating shelf device 10.

20 Fig. 2 shows the first embodiment, which is a conceptional plan view of the rotating shelf device 10 in its original position.

Fig. 3 shows the first embodiment, which is a conceptional perspective view of the rotating shelf device 10 in its original position.

Fig. 4 shows the first embodiment, which is a conceptional perspective view of
25 the rotating shelf device 10 at the forward position.

Fig. 5 shows the first embodiment, which is a conceptional perspective view of the rotating shelf device 10 at the forward rotated position.

Fig. 6 shows the first embodiment, which is a conceptional perspective view of the rotating shelf device 10 at the forward rotated position.

5 Fig. 7 shows the first embodiment, which is a conceptional perspective view of the rotating shelf device 10 at the original position after rotation.

Fig. 8 shows the first embodiment, showing a fitting structure of a rotating tray shaft 11a of a rotating tray 11 and a shaft supporting hole 12c of a supporting shelf 12.

10 Fig. 9 shows the first embodiment, showing a shaft fitting structure of the rotating shelf device 10.

Fig. 10 shows the first embodiment, which is an enlarged perspective view of a fixing ring 13.

Fig. 11 shows the first embodiment, which is a plan view of the rotating shelf device 10.

15 Fig. 12 is a Y-Y cross-sectional view of Fig. 11.

Fig. 13 shows the first embodiment, which is a side view of the rail 20, viewed from the storage chamber side.

Fig. 14 shows the second embodiment, which is a conceptional front view showing a refrigerating chamber 101 of a refrigerator 100.

20 Fig. 15 shows the second embodiment, which is an exploded perspective view showing a structure of an inside light of the refrigerating chamber 101 of the refrigerator 100.

Description of Embodiments

25 [0012] Embodiment 1.

Fig. 1 shows the first embodiment, which is an exploded perspective view of a rotating shelf device 10 of a refrigerator. The rotating shelf device 10 includes at least a rotating tray 11 mounting food, etc., a supporting shelf 12 supporting rotatably the rotating tray 11, a fixing ring 13 fitting the rotating tray 11 and the supporting shelf 12, a pair of rails 20 provided at left and right side walls of a storage chamber (for instance, a refrigerating chamber), along which the supporting shelf 12 slides in a back and forth direction. A rotating tray shaft 11a and a shaft supporting hole 12c will be discussed later.

[0013] The structure of the refrigerator (not shown) except the rotating shelf device 10 is a commonly-used one, and thus a detailed explanation will be omitted. In the refrigerator, a heat insulated box body formed by an outer box made of steel plate, an inner box made of resin, and foam insulation filled between them is partitioned into plural chambers, each having a door body which closes openably an opening part of each chamber.

[0014] The heat insulated box body of the refrigerator is partitioned into, for instance, a refrigerating chamber, ice making and switching chambers, a vegetable chamber, and a freezing chamber in an order from the above. These chambers are called as storage chambers. Then, these chambers include a refrigerating chamber door body, an ice making chamber door body, a switching chamber door body, a vegetable chamber door body, and a freezing chamber door body, each of which closes openably its opening part.

[0015] Partitioning members partitioning the heat insulated box body into plural chambers include: the first partitioning member partitioning between the refrigerating chamber and the ice making and switching chambers; the second partitioning member partitioning between the ice making chamber and the switching chamber; the third

partitioning member partitioning between the ice making and switching chambers and the vegetable chamber; and the forth partitioning member partitioning between the vegetable chamber and the freezing chamber.

[0016] First, a basic structure of the rotating shelf device 10 will be explained with

5 reference to Figs. 2 to 7. Figs. 2 to 7 show the first embodiment: Fig. 2 is a conceptional plan view of the rotating shelf device 10 in its original position; Fig. 3 is a conceptional perspective view of the rotating shelf device 10 in its original position; Fig. 4 is a conceptional perspective view of the rotating shelf device 10 at the forward position; Fig. 5 is a conceptional perspective view of the rotating shelf device 10 at the
10 forward rotated position; Fig. 6 is a conceptional perspective view of the rotating shelf device 10 at the forward rotated position; and Fig. 7 is a conceptional perspective view of the rotating shelf device 10 at the original position after rotation.

[0017] A pair of rails 20 (a guide guiding the supporting shelf 12 in the back and forth direction) shown in the figure is provided at both side wall surfaces of the storage

15 chamber in the refrigerator (both side wall surfaces of the inner box), supporting the supporting shelf 12 slidably in the back and forth direction. A rotating tray 11 is provided on the supporting shelf 12, and the supporting shelf 12 and the rotating tray 11 are connected with one supporting point which allows respective free rotation (this point will be discussed later). The rotating tray 11 is supported by the supporting shelf
20 12 at the freely rotatable supporting point, and four corners of the rotating tray 11 have notches of an arc shape having a center at the rotation supporting point, which allows the rotating tray 11 to pivot.

[0018] In the rotating shelf device 10 in its original position shown in Figs. 2 and 3, the rotating tray 11 is stored in the storage chamber (for instance, the refrigerating

25 chamber) of the refrigerator without rotating. Then, the supporting shelf 12 which is

slidable in the back and forth direction along the rails 20 is located at the remotest part of the storage chamber. At this time, the user can slide the supporting shelf 12 back and forth along the rails 20 according to the necessity. Figs. 2 and 3 show the status in which food 30 is placed at the right remotest part of the rotating tray 11.

5 [0019] For instance, as shown in Fig. 4, by pulling out the rotating tray 11 to the front along the rails 20, it is easy to put the food (not shown) on or out from the near side or around the center of the rotating tray 11.

[0020] However, it is not easy to take out the food 30 placed at, for instance, the right remotest part of the rotating tray 11 by pulling out the rotating tray 11 to the front along
10 the rails 20 as shown in Fig. 4. It is especially difficult when there is another food at the nearer side than the food 30 placed at the right remotest part of the rotating tray 11.

[0021] In the rotating shelf device 10 of the present embodiment, the rotating tray 11 is supported by the supporting shelf 12 at the freely rotatable supporting point, and four corners of the rotating tray 11 have notches of an arc shape having a center at the
15 rotation supporting point, which allows the rotating tray 11 to pivot. Therefore, for instance, when the food 30 placed at the right remotest part of the rotating tray 11 is taken out, first, the rotating tray 11 located at the remotest part is pulled out to the front (the status of Fig. 4). Next, as shown in Fig. 5, the rotating tray 11 is rotated in either direction (clockwise or counterclockwise, Fig. 5 shows a case of rotating clockwise).

20 [0022] Fig. 6 shows the status in which the rotating tray 11 is rotated by 180 degrees from its original position shown in Figs. 2 and 3. In the status in which the rotating tray 11 placed at the remotest part is pulled out to the front (Fig. 4), the back and forth position of the food placed on the rotating tray 11 can be reversed.

[0023] In particular, the food 30 placed at the right remotest part of the rotating tray 11
25 in its original position shown in Figs. 2 and 3 is now placed in the front of the rotating

tray 11. Therefore, the user can easily take out the food 30.

[0024] Furthermore, it is possible to move the supporting shelf 12 with that status (the food 30 is placed in the front of the rotating tray 11) to the back and store the rotating tray 11 at the remotest part of the storage chamber as shown in Fig. 7. The food, etc., of which the best-before date tends to come near, stored at the space of the remotest part of the refrigerator can be also refrigerated in the status in which the location of the food is switched to the front space of the refrigerator, and thus in addition to the convenience of the user, it is possible to reduce the waste of food because of the expiration of best-before date.

[0025] In the foregoing explanation, the food 30 placed at the right remotest part of the rotating tray 11 is taken out; and the same procedure can be adapted to, for instance, a case when there is a storage space at the right remotest part of the rotating tray 11 to store the food, etc., to the contrary.

[0026] Here, when plural shelves exist in the storage chamber located at the uppermost part of the refrigerator, and the rotating shelf device 10 of the present embodiment is used for the uppermost shelf, it is possible to improve the easiness to take out the food placed at the rear of the uppermost shelf, which is particularly useful.

[0027] The rotating shelf device 10 of the present embodiment is characterized in that it is easy to assemble/disassemble the rotating shelf device 10 structured by the rotating tray 11, the supporting shelf 12 and the fixing ring 13 in the rotating shelf device 10 which improves the easiness to take out the food stored at the rear of the storage chamber.

[0028] Also, the rotating shelf device 10 of the present embodiment is characterized in that even if the fixing ring 13 is not firmly attached or the fixing ring 13 is detached during the use, there is little fear that the rotating tray 11 is fallen down from the

supporting shelf 12.

[0029] Hereinafter, the feature of the rotating shelf device 10 of the present embodiment will be explained specifically. As already described, the rotating tray 11 is an almost rectangle in planar view (the short side is the depth direction of the storage chamber, and the long side is the width direction of the storage chamber), and the four corners have notches of an arc shape having a center at the rotation supporting point. Then, a rotating tray shaft 11a (refer to Figs. 1 and 8) is provided at an almost center part of the rotating tray 11.

[0030] Figs. 8 to 13 show the first embodiment: Fig. 8 is a diagram showing a fitting structure of the rotating tray shaft 11a of the rotating tray 11 and the shaft supporting hole 12c of the supporting shelf 12; Fig. 9 is a diagram showing a shaft fitting structure of the rotating shelf device 10; Fig. 10 is an enlarged perspective view of the fixing ring 13; Fig. 11 is a plan view of the rotating shelf device 10; Fig. 12 is a Y-Y cross-sectional view of Fig. 11; and Fig. 13 is a side view of the rail 20, viewed from the storage chamber side.

[0031] In Fig. 8, for components of the rotating tray 11 except the rotating tray shaft 11a (including a fitting claw 11b), the illustration is omitted. As shown in Figs. 8 and 9, the rotating tray shaft 11a is, for instance, projected downwardly from the back surface of the rotating tray 11 (a surface opposite to the surface on which the food is mounted) with a predetermined length, forming an almost cylindrical shape. Then, a pair of fitting claws 11b is formed at the outer circumference adjacent to the lower end part of the rotating tray shaft 11a, having a predetermined width in the circumferential direction and projected outwardly in a radial direction with a predetermined length. For instance, the pair of fitting claws 11b is provided with an interval of almost 180 degrees in the circumferential direction. Here, the distance between the ends of the

pair of fitting claws 11b is defined as D1 (Fig. 8). Also, an outer diameter of the rotating tray shaft 11a is defined as D4 (Fig. 8).

[0032] The whole shape of the supporting shelf 12 is a rectangle having an almost same size as the rotating tray 11. Then, a shaft supporting hole 12c (circle) is opened at an almost center part for inserting the rotating tray shaft 11a of the rotating tray 11. A diameter of the shaft supporting hole 12c is defined as D2 (Fig. 8).

[0033] A pair of almost semi-circular ribs 12a is formed along the edge part of the shaft supporting hole 12c for inserting the rotating tray shaft 11a. The pair of ribs 12a is formed in almost parallel with the surface for mounting the rotating tray 11 of the supporting shelf 12. Intervals of the pair of almost semi-circular ribs 12a becomes a pair of notch parts 12b. The distance between the pair of notch parts 12b is defined as D3 (Fig. 8).

[0034] Then, the distance between the ends of D1 of the pair of fitting claws 11b, the diameter D2 of the shaft supporting hole 12c, the distance between D3 of the pair of notch parts 12b, and the outer diameter D4 of the rotating tray shaft 11a satisfy the following relation.

[0035] $D4 < D2 < D1 < D3$

In the rotating tray 11, when the pair of fitting claws 11b of the rotating tray shaft 11a reaches the position of the pair of notch parts 12b of the shaft supporting hole 12c of the supporting shelf 12, the relation becomes $D1 < D3$, and $D4 < D2$, and thus insertion becomes possible to the shaft supporting hole 12c of the supporting shelf 12.

[0036] The position at which the pair of fitting claws 11b of the rotating tray shaft 11a almost matches the pair of notch parts 12b of the shaft supporting hole 12c of the supporting shelf 12 is the position where the straight-lined side of the rotating tray 11 and the long side of the supporting shelf 12 are in parallel (the rotating angle is 0 degree

or 180 degrees).

[0037] At the position where the straight-lined side of the rotating tray 11 and the long side of the supporting shelf 12 are in parallel (the rotating angle is 0 degree or 180 degrees), the rotating tray shaft 11a of the rotating tray 11 is inserted to the shaft

5 supporting hole 12c of the supporting shelf 12, thereby fitting the fixing ring 13 to the rotating tray shaft 11a.

[0038] The fixing ring 13 has an almost circular plate shape as a whole, and a pair of semi-circular ribs 13a is provided in a standing manner with a predetermined height at the inner side of the outer circumferential edge of the surface of the rotating tray 11 side.

10 When the fixing ring 13 is fitted to the rotating tray 11, the fitting claws 11b of the rotating tray 11 are set to the notch parts 13c between the pair of semi-circular ribs 13a, then the fixing ring 13 is rotated, and thereby the fitting claws 11b of the rotating tray 11 are stored in claw storing units 13b. A handle 13d is formed at an almost center part of the fixing ring 13 for fixing the fixing ring 13 to the rotating tray shaft 11a (Figs. 10 to
15 12).

[0039] After the rotating tray shaft 11a of the rotating tray 11 is inserted into the shaft supporting hole 12c of the supporting shelf 12, the fixing ring 13 is fixed to the rotating tray shaft 11a of the rotating tray 11 using the elastic force of resin. First, the pair of fitting claws 11b of the rotating tray shaft 11a inserted to the shaft supporting hole 12c
20 of the supporting shelf 12 is set to the notch parts 13c of the fixing ring 13. Then, for instance, when the fixing ring 13 is rotated clockwise, the pair of fitting claws 11b exceeds one end parts (the opening side) of the pair of claw storing units 13b of the fixing ring 13 in the circumferential direction by the elastic force of resin to move into the inside of the claw storing units 13b, and thereby the rotating tray 11 and the fixing
25 ring 13 are fitted and fixed (Figs. 10 to 12).

[0040] The material of the fixing ring 13 is POM (polyacetal). POM (polyacetal) is polymer having a unit structure of oxymethylene structure. Polyacetal includes amorphous portion and crystal portion mixedly, and accordingly is engineering plastic having excellent strength, elastic modulus, and crashworthiness. Further, because of the excellent slidability, polyacetal is also used for bearing components.

[0041] Since the fixing ring 13 slides along the shaft supporting hole 12c of the supporting shelf 12 using the ribs 13a as a shaft, it is preferable to use POM (polyacetal) with the excellent slidability (Figs. 11 and 12).

[0042] The material of the rotating tray 11 and the supporting shelf 12 is PS (polystyrene resin). PS (polystyrene resin) has excellent transparency. In the storage chamber of the refrigerator, when plural shelves exist and the lighting device is located at the upper part, in order to light the whole storage chamber, the transparency of the shelves to transmit the light of the lighting device is important. Therefore, it is preferable to use PS (polystyrene resin) having excellent transparency for the material of the rotating tray 11 and the supporting shelf 12.

[0043] As for a pair of rails 20 provided at the left and right side faces of the storage chamber, along which the supporting shelf 12 slides, a stopper 20a is formed at a front part of each of the rails 20 so as to keep the rotating shelf device 10 from falling out of the storage chamber when the rotating shelf device 10 (the supporting shelf 12) is pulled out to the front as shown in Fig. 13.

[0044] As discussed above, the rotating shelf device 10 of the present embodiment includes: the rotating tray 11 mounting the food, etc.; the supporting shelf 12 supporting rotatably the rotating tray 11; the fixing ring 13 for fitting the rotating tray 11 to the supporting shelf 12; and the pair of rails 20 provided at the left and right side faces of the storage chamber, along which the supporting shelf 12 slides. The rotation center

for rotating the rotating tray 11 is formed at the almost center of the supporting shelf 12, and as well the rotating tray 11 has an almost quadrangular shape, in which the four corners of the rotating tray 11 are notched by circular arc shapes, each having a center at the rotation supporting point, and thus ineffective space of the corner parts can be
5 minimized.

[0045] Also, the rotating shelf device 10 of the present embodiment has a structure, in which the fitting claw 11b provided at the rotating tray shaft 11a of the rotating tray 11 is fitted and fixed to the ribs 13a of the fixing ring 13 using the elastic force of resin.

Therefore, it is easy to assemble the rotating shelf device 10, and also, the user can
10 easily detach (disassemble) the rotating shelf device 10. Further, since the fixing ring 13 is formed by resin (POM), the degree of freedom such as a shape, color, etc, is increased, and thus there is an advantageous effect that the appearance is improved.

[0046] Also, the rotating shelf device 10 of the present embodiment has a fitting structure, in which the rotating tray shaft 11a of the rotating tray 11 cannot pass through
15 the shaft supporting hole 12c of the supporting shelf 12 at an angle except the predetermined rotating angle (the rotating angle 0 degree or 180 degrees). Therefore, if the fixing ring 13 is not firmly attached, or the fitting claw 11b is detached during the use, the rotating tray 11 cannot fall down easily, which improves the safety.

20 [0047] Embodiment 2.

Figs. 14 and 15 show the second embodiment: Fig. 14 is a conceptional front view showing a refrigerating chamber 101 of a refrigerator 100; and Fig. 15 is an exploded perspective view showing a structure of an inside light in the refrigerating chamber 101 of the refrigerator 100.

25 [0048] In the refrigerator 100, for instance, the refrigerating chamber 101 is provided

at the uppermost part of the heat insulated box body. Although the refrigerating chamber 101 (the storage chamber) includes plural shelves, here, an example will be explained in which the rotating shelf device 10 of the first embodiment is installed at the uppermost part.

5 [0049] In the refrigerating chamber 101 (the storage chamber), a lighting device 200 for lighting the inside of the refrigerating chamber 101 is installed at the ceiling of the refrigerating chamber 101. In the lighting device 200, as shown in Fig. 14, two LED mounting boards 202 on each of which plural LEDs 201 (light-emitting diode) having single-wavelength or a combination of plural wavelengths are aligned in the back and
10 forth direction of the refrigerating chamber 101 are provided almost symmetrically; one for each of the both left and right sides of the center line, for instance, when the refrigerating chamber 101 is viewed from the front. Then, the LED mounting board 202 mounting plural LEDs 201 is arranged and fixed to the ceiling surface of the refrigerating chamber 101 by a light cover 203 and a cover attaching member 204.
15 The distance between the left and right LED mounting boards 202 is defined as L2 (Fig. 14).

[0050] POM (polyacetal) which is the material of the fixing ring 13 has a good slidability; however, the transparency is inferior to that of PS (polystyrene resin). Therefore, the fixed ring 13 blocks the light from the LED 201 of which the
20 straight-line stability of lightwave is high. Therefore, it is necessary to arrange the LED mounting boards 202 (here, two) in the lighting device 200 so as not to darken the whole refrigerating chamber 101 by blocking the light from the LED 201 by the fixing ring 13.

[0051] For instance, when the LED mounting board 202 is located at around the center
25 of the refrigerating chamber 101, the light from the LED 201 is blocked by the fixing

ring 13 located directly below the LED mounting board 202, thereby darkening the space below the rotating shelf device 10.

[0052] The outer diameter of the fixing ring 13 is defined as L1. The outer diameter L1 of the fixing ring 13 is, for an example, around 70 mm to 100 mm. Then, the

5 interval L2 of the LED mounting boards 202 provided symmetrically with respect to the center line (the refrigerating chamber) of the ceiling surface of the refrigerating chamber 101 is preferably at least three times of the outer diameter L1 of the fixing ring 13 of the rotating shelf device 10. That is,

$$3 \times L1 \leq L2$$

10 The LED mounting boards 202 are provided in this manner, and thereby it is possible to reduce the rate of blocking the light from the LED 201 of which the straight-line stability of lightwave is high by the fixing ring 13. Therefore, the illuminance of the other shelves located below the rotating shelf device 10 can be secured, and thus the outer appearance is improved.

15 [0053] Also, the outer diameter L1 of the fixing ring 13 is made 70 mm to 100 mm, and thereby even if the food is mounted on the rotating tray 11 with biased load arrangement, or even if the rotating tray 11 is at the position of angle 90 degrees during the rotation, the stress generated at the shaft part (the rotating tray shaft 11a) can be reduced, and the structure is made to have sufficient likelihood for the deconstruction
20 limit of the resin material (PS, POM) which forms the rotating tray 11 and the fixing ring 13, and thus the safety can be improved.

Reference Signs List

[0054] 10: a rotating shelf device; 11: a rotating tray; 11a: a rotating tray shaft; 11b: a
25 fitting claw; 12: a supporting shelf; 12a: a rib; 12b: a notch part; 12c: a shaft supporting

hole; 13: a fixing ring; 13a: a rib; 13b: a claw storing unit; 13c: a notch part; 13d: a handle; 20: a rail; 20a: a stopper; 100: a refrigerator; 101: a refrigerating chamber; 200: a lighting device; 201: LED; 202: a LED mounting board; 203: a lighting cover; and 204: a cover attaching member.

Claims

1. A refrigerator comprising a rotating shelf device having:

(1) a pair of rails provided at left and right side walls of a storage chamber;

(2) a supporting shelf provided on the pair of rails slidably in a back and forth
5 direction and having a shaft supporting hole at an almost center;

(3) a rotating tray, at four corners of which notches are formed by arc shapes
having a center at a rotation supporting point, and at an almost center of which a
rotating tray shaft is formed; and

(4) a fixing ring fixed to the rotating tray shaft and as well fitted slidably to the
10 shaft supporting hole of the supporting shelf,

wherein the rotating tray shaft is structured to pass through the shaft supporting
hole of the supporting shelf only at a predetermined rotating angle, and not to pass
through the shaft supporting hole of the supporting shelf at a rotating angle other than
the predetermined rotating angle.

15 2. The refrigerator of claim 1,

wherein the rotating tray shaft is provided with a plurality of fitting claws
having a predetermined width in a circumferential direction and projected outwardly
with a predetermined length in a radial direction at an outer circumference adjacent to a
lower end part, and

20 wherein the shaft supporting hole of the supporting shelf has notch parts which
allow the plurality of fitting claws at the predetermined rotating angle.

3. The refrigerator of claim 2, wherein the plurality of fitting claws and the notch
parts are formed in a circumferential direction with an interval of 180 degrees.

4. The refrigerator of one of claims 1 to 3, wherein the fixing ring is fitted and
25 fixed to the rotating tray shaft by elastic force of resin.

5. A refrigerator comprising a rotating shelf device having:

(1) a pair of rails provided at left and right side walls of a storage chamber;

(2) a supporting shelf provided on the pair of rails slidably in a back and forth direction and having a shaft supporting hole at an almost center;

5 (3) a rotating tray, at four corners of which notches are formed by arc shapes having a center at a rotation supporting point, and at an almost center of which a rotating tray shaft is formed; and

(4) a fixing ring fixed to the rotating tray shaft and as well fitted slidably to the shaft supporting hole of the supporting shelf, and

10 wherein the refrigerator further comprises LED mounting boards provided at a ceiling surface of the storage chamber in a width direction of the storage chamber with a predetermined interval and mounting a LED (light-emitting diode).

6. The refrigerator of claim 5, wherein the LED mounting boards are provided horizontally with an interval being at least three times of the outer diameter of the fixing
15 ring.

7. The refrigerator of claim 6, wherein a pair of the LED mounting boards are provided horizontally with an interval being at least three times of the outer diameter of the fixing ring.

8. The refrigerator of one of claims 1 to 3, wherein the refrigerator further
20 comprises LED mounting boards provided at a ceiling surface of the storage chamber in a width direction of the storage chamber with a predetermined interval and mounting a LED (light-emitting diode).

9. The refrigerator of one of claims 1 to 8, wherein an outer diameter of the fixing ring is made 70 mm to 100 mm.