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(54) **A cooling device comprising a container that is movable**

(57) The invention is a cooling appliance (1) comprising an inner chamber (10) defined by an inner liner (20); a container (30) movably disposed in the inner chamber (10); a support element (40) provided on a bottom wall (32) of the container (30) for carrying the container (30) on the inner liner (20); and a sliding surface (21) on the inner liner (20) where the support element (40) moves on by contacting during the movement of the container (30); and that the support element (40) comprises a contact element (41) being in superficial contact with the sliding surface (21).

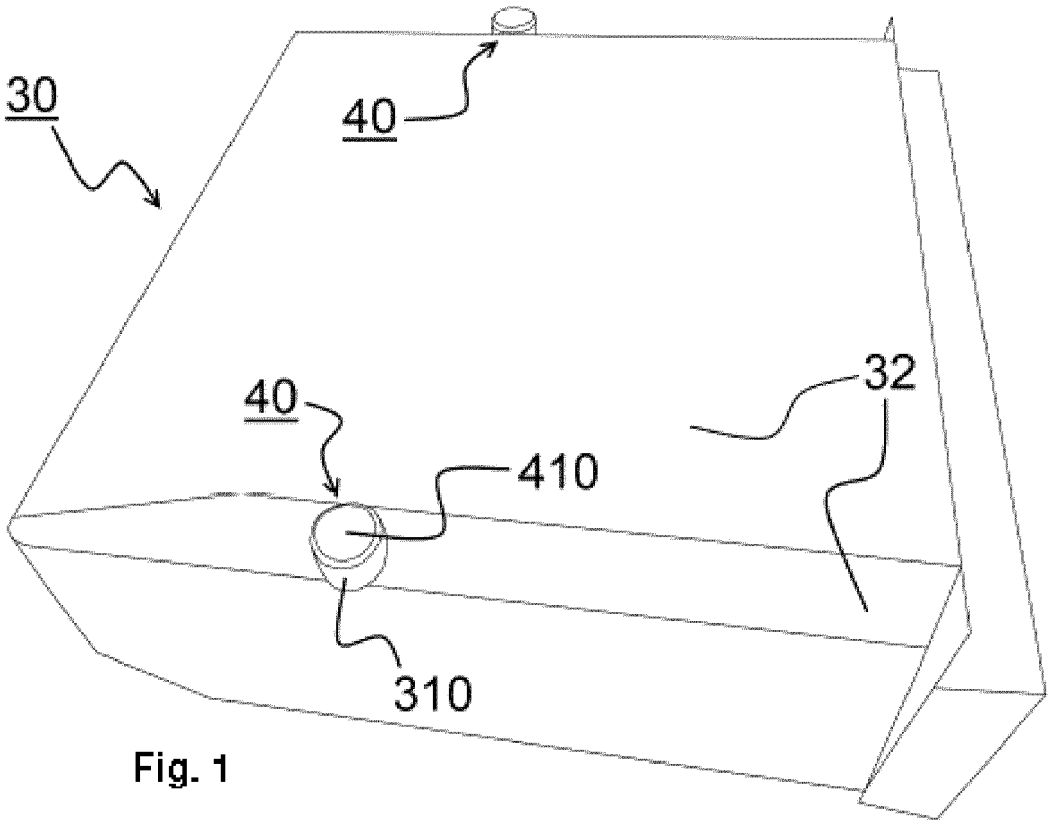

Fig. 1

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Description

Technical Field of the Invention

[0001] The invention relates to a cooling device, particularly a household refrigerator, having a container which is movable on the inner liner forming the inner chamber of said cooling device.

Prior Art

[0002] Cooling devices, particularly household cooling devices comprise container in the form of a drawer. Said container is usually used as a crisper. In some cases, the container is movable on plastic or glass surfaces. Some containers are movable in direct contact with the inner liner which is generally made of plastic derivative materials. In the latter case, the container is carried directly by the inner liner. The container is generally located on the bottom surface of the inner chamber formed by the inner liner. Thus, the container is movable on the inner liner forming the bottom surface.

[0003] Containers described in the publication WO2012025382 are available in the state of the art. Accordingly, a container has bearing elements which are located in its two reciprocal sides, and which carry the same on the inner liner and which serve as support members. Each bearing element comprises at least one cylinder/wheel rolling on a sliding surface of the inner liner. The cylinder/wheel is rotatably mounted on an intermediate bearing element. The intermediate bearing element is removably mounted to the container.

[0004] The bearing elements given in the above example and serving to the purpose of moving the container on an inner liner are in linear and/or punctual contact with the inner liner.

[0005] The invention provides an additional improvement, an additional advantage or an alternative to the prior art described above.

The object of the invention

[0006] The main object of the invention is to provide a cooling appliance having an inner liner with a longer lifespan with regards to state of the art.

[0007] For achieving said objective, the invention is a cooling appliance comprising an inner chamber defined with an inner liner, a container movably located in the inner chamber, a support element provided on the bottom wall of the container for carrying the container on the inner liner; and a sliding surface on the inner liner where the support element moves on by contacting during the movement of the container. The invention is characterized by the fact that the support element comprises a contact element being in superficial contact with the sliding surface. Hence, the invention provides low pressure on the inner liner by a superficial contact on a wide surface area instead of the high pressure based on said linear and/or punctual contact available in the prior art. This eliminates or minimizes possible physical deformations on the inner liner due to high pressure.

[0008] The cooling appliance disclosed by the present invention may be a household refrigerator. The inner chamber may be defined as the inner volume of the cooling appliance. The inner liner forming the walls of the inner chamber may be the member known as a tub in the state of the art. The container may be a receptacle used in refrigerators such as a crisper or a rapid cooling drawer. The container may be made of materials known in the state of the art and particularly, of plastics derivatives. The sliding surface may be any of the surfaces the inner liner which is in direct contact with the support element.

[0009] In a possible embodiment of the present invention, the support element may comprise a connection element extending from the contact element towards the container. Thus, a support element which can be removed for maintenance and replacement when necessary can be obtained. In a possible embodiment of the present invention, the contact element and the connection element of the support element may be configured as one-piece. In this way, the support element can be manufactured at a single step. This can minimize the production costs, and particularly the labor cost. In another embodiment of the present invention, the connection element can be embodied configured as about perpendicular to a lower face of the contact element which is in contact with the inner liner. Thus, the force applied by the container to the support element may be homogeneously distributed to the contact element. Particularly, a completely even pressure distribution can be established by mounting the connection element perpendicularly on the center point of the contact element.

[0010] In a possible embodiment of the present invention, the container may comprise a housing for the support element. Thus, the support element can be positioned on the container in a more stable and durable manner. In a possible embodiment according to the present invention, the container and the housing for the support element can be configured as a single piece. Thus the container can be manufactured at a time. This may keep the production costs, especially the labor costs low. The housing may be formed on each the left and right sides of the bottom wall. Additionally, the bottom wall of the container may be provided with any desired number of housings at desired locations. The number of support elements can be decided in accordance with the number of housings.

[0011] In another possible embodiment of the present invention, the container may comprise a wall defining the housing and having a bottom edge contacting to an upper surface of the contact element. In this way, the contact element can be supported by a wall of the housing against high weight of the container or a different physical effect. This may prolong the useful lifetime of the embodiment according to the present invention. In a possible embod-

iment of the present invention, the wall of the housing and the contact element are in form corresponding each other, particularly in a circular form. In this way, the contact element can be supported by the wall uniformly at a plurality of points. As an example, the contact element may be a plate in the form of a disc. The wall of the housing may constitute a cylinder having a base with an area which is near or equal to the area of the contact element. The base of the cylinder facing the contact element may be left as an opening and the inside of the cylinder may be used as a housing. The lower side of the cylinder may support the contact element by contacting points in the proximity of the periphery of the upper surface of the contact element. Furthermore, the possibility of damage from the support element and/or from the housing to the inner liner during movement of the container can be minimized or completely eliminated by a geometric form without corners. The reason is the fact that contact with the inner liner can be minimized. Additionally, a rounded form may help facilitated movement of the container.

[0012] In a possible embodiment of the present invention, the housing may comprise a connection element securing the connection element of the supporting element to the container. Thus, the engagement of the support element into the housing concealing the connection element when the support element is located into the housing, may be facilitated. Because otherwise, the support element would require a connection element which shall be accessed from outside the housing. However, this may also be utilized in another possible embodiment of the present invention. In a possible embodiment of the present invention, the connection element of the housing may be configured as about perpendicular to the lower face of the contact element contacting the inner liner. Thus, the force applied to the support element by the container can be uniformly distributed to the contact member. Since the connection would be established only in the vertical direction, the labor work can be facilitated.

[0013] In a possible embodiment of the present invention, either of the connection element of the support element or the connection element of the housing may comprise a connection housing for the connection element of other. In this way, a stronger connection can be obtained by positioning the two connection elements within each other. The connection elements can be connected to each other by using a connection tab or a screw in addition to snap-on systems.

[0014] In a possible embodiment of the present invention, either of the connection element of the support element or the connection element of the housing may be in the form of a pin disposed in the connection housing, particularly a pin composed of three walls having a longitudinal common edge and positioned as having an about 120-degree angle between each two of the walls around the common edge. In this way, a connection element can be obtained corresponding to a snap on system which is the easiest in terms of its manufacture and use. Furthermore, the three wall embodiment may provide a pin which has sufficient strength and which is inexpensive in material cost. The number of walls and the angle among the same may vary as long as sufficient strength is provided. The free end of the pin proximal to support element may be thinner compared to the rest of said pin. Hence, the initial entry of the pin into the connection housing may be facilitated. The corners on the edges of the free ends of walls which are distal to the common edge may be formed with an inclination in the embodiment having walls. In this way, the thickness of the pin may be reduced towards its free end.

[0015] In a possible embodiment of the present invention, the inner liner may comprise a contact element at a position on the inner liner ensuring contact with the container and preventing to block the support element during the movement of the container. The contact element of the inner liner may contact with the lower front part of the container, for instance, in a passive situation when there is no need for accessing to the inside of the container. The contact element of the container may contact the sliding surface on the left or right part of the inner liner. Any positioning combination may be established in between the container and the inner liner provided that the contact occurs only over the contact elements. Thus, contact points of the container with the inner liner and the inner liner with the container may only be at contact elements. This may reduce the risk of physical damage on the inner liner to a minimum.

[0016] In a possible embodiment of the invention, the contact element may be made of a material whose friction coefficient is lower than that of the inner liner, and particularly is made of polyoxymethylene. Hence, the support element may be manufactured by a method which is easy to implement and relatively inexpensive, such as plastic injection. On the other hand, since its friction coefficient is lower, physical damage resulting from friction can be reduced. In addition to the friction advantage, the life limit of the product according to the present invention may be improved as the contact element has a high hardness and endurance under load. Furthermore, the less the friction takes place helps to obtain a more facilitated movement of the container.

[0017] In a possible embodiment of the invention, the support element may comprise a strength rib on a face of the support element except the face of the contact element contacting to the sliding surface of the inner liner. Hence, the walls of the support element may be obtained with a relatively thin wall thickness without jeopardizing its strength. This could provide an advantage in the costs. As an example, the contact element may particularly be in the form of a plate and the aforementioned strength ribs may be provided on its upper surface. Furthermore, the connection element may be provided with strength ribs. Hence, the contact element and/or the connection element may be obtained with less material.

Description of the Figures

[0018]

Fig. 1 is an isometric view showing a representative view of the container from its lower left side.

Fig. 2 is an isometric view showing a representative view of the housing of container accommodating the support element from its lower left side.

Fig. 3 shows representatively an isometric view of the support element form the lower side.

Fig. 4 shows an isometric view showing representatively the sliding surface of the inner liner from an upper side.

Fig. 5 shows an isometric view of a possible cooling appliance representatively from front. The front door is depicted as open in order to show the inner chamber and the container of the appliance.

Detailed Description of the Invention

[0019] Direction terms such as front, top, bottom mentioned in this text are used with reference to Fig. 3 in which the visible part of the cooling appliance (1) is accepted as front and the side having the door is accepted as the right side of the appliance. Hereinafter, one or more possible embodiments of the invention will be exemplified in detail.

[0020] The present invention relates to a cooling appliance (1) comprising a movable container (30) within the same. The present invention particularly relates to household refrigerator having a drawer as a container (30).

[0021] The container (30) may be a drawer slidably moving back and forth. When a user intends to place e. g. a food or to remove a previously placed food within the volume defined by the container, the user pulls the container (30) towards the front and the container is then brought into the operational position. When the container (30) is not to be used, it shall be pushed back to its rest position.

[0022] The container (30) slides on a horizontal wall of an inner liner (20) defining the inner chamber (10) of a cooling appliance (1). Said wall may be the bottom wall of the inner liner (20). A sliding surface (21) is defined on the bottom wall. A support element (40) of the container (30) bears the container (30) on the sliding surface (21) and maintains that the container (30) moves as described.

[0023] The support element (40) is formed of a contact element (41) and a connection element (42) extending from the center of the contact element (41) as perpendicularly to the contact element (41).

[0024] The contact element (41) is provided in the form of a plate and at least the surface contacting the inner liner (20) is made flat. The contact element (41) is in the form of a disc. As mentioned, the lower face (410) of the disc is flat. However, the upper face (415) may comprise one or more strength ribs (43). A strength rib (43) is embodied extending from the periphery line of the contact element (41) towards its center, i.e. extending along a radius line of the disc. Furthermore, a peripheral strength rib (43) is provided along the periphery line of the upper face (415) of the contact element (41). Additionally, a further peripheral strength rib (43) having a smaller diameter and in parallel to the first peripheral strength rib (43) is formed in between the center and the outer periphery of the contact element (41).

[0025] The connection element (42) extending perpendicularly from the contact element (41) is integral with the contact element (41). Most preferred embodiment of the connection element (42) is in the form of a tube. In other words, it is in the form of a cylinder whose upper part is open and the inside is empty. The inner cavity of the connection element (42) functions as a connection housing (420) for a connection element (315) which is part of a housing (31) as described below. One or more strength ribs (43) are located on the outer lateral wall of the connection element (42). The strength rib (43) extends from the contact element (41) towards the upper end of the connection element (42) perpendicularly to the contact element (41) like the connection element (42).

[0026] A possible embodiment of the support element (40) is made of polyoxymethylene, commonly known as POM.

[0027] The container (30) includes a housing (31) for the support element (40). The housing (31) is manufactured integrally with the container (30). The container (30) and the housing (31) are made of a plastic derivative material. There are two housings (31) on the left and right sides on the bottom wall (32) of the container (30).

[0028] The housing (31) comprises a connection element (315) located in a connection housing (420) of the connection element (42) of the support element (40). The connection element (315) extends perpendicular to the lower face (410) of the contact element (41) contacting the inner liner (20). The connection element (315) of the housing (31) is in the form of a pin and is firmly inserted in the connection housing (420) of the support element (40). In this way, it fixes the support element (40) in the housing (31). The connection element (315) of the housing (31) is formed of three walls (316) having a common vertical edge (317). When the connection element (315) is viewed from its bottom and the common edge (317) is located as the center, there appears approximately 120 degrees angle between the walls (316). In other words, the three walls (316) are angularly in equal distance to each other. The width of each of the walls (316) is equal to or less than the radius of the connection housing (420). Hence, connection element (315) of the housing (31) is obtained such that its width can fit into connection housing (420). The connection element (315) is made thinner towards its free end proximal to the support element (40). This is achieved by making the corner distal to the common edge (317) of the free edges of each of the walls (316) inclined. The tip of the connection element (315)

is not sharp. However, the invention would still work even if it would be sharp.

[0029] The housing (31) has a wall (310) defining the housing itself. The wall (310) extends from the container (30) towards support element (40). The wall (310) is circular in shape when seen from its bottom. In other words, the wall (310) is like a hollow cylinder whose base proximal to the support element (40) is open. In brief words, it can be said that it is in the form of a tube. The connection element (315) of the housing (31) extends along the center of the cylinder defined by the wall (310).

[0030] When the support element (40) is mounted on the container (30) such that the connection element (315) of the housing (31) enters the connection housing (420), the connection element (42) of the support element (40) is located inside the wall (310) of the housing (31) and cannot be seen from outside. The bottom wall (311) of the wall (310) contacts the upper face (415) of the contact element (41). Hence, the support element (40) and the housing (31) appear as an integral single piece.

[0031] The container (30) as exploited by the invention may be manufactured integrally with the housing (31) through plastic injection. The support element (40) may be manufactured likewise. Subsequently, the support element (40) is located in the housing (31). In order to do so, the connection element (315) of the housing (31) is firmly inserted into the connection housing (420) of the support element (40). However, the support element (40) may be extracted from inside the housing (31) by exerting a certain force. On the other hand, it would not normally be pulled away from the housing (31) by forces which could occur during operation of the invention. The frictional force in between the connection elements (315, 42) is sufficient for keeping the support element (40) inside the housing (31) during use.

[0032] Two contact elements (22) are located on certain point or points of the inner liner (20) carrying the container (30) and particularly, points corresponding to the lower front portion of the container (30). Briefly, these are provided on the end of the sliding surface (21) proximal to the user or around its vicinity. The contact in between the inner liner (20) and the container (30) which is pulled or pushed by a user is established only through contact elements (22, 41). The contact element (22) provided on the inner liner (20) may be made of polyoxymethylene material like the contact element (41) of the support element (40). Furthermore, the contact element (22) provided on the inner liner (20) may feature structural characteristics of the contact element (41) of the support element (40).

List of reference numerals:

[0033]

1. Cooling appliance

10. Inner chamber
20. Inner liner
21. Sliding surface
22. Contact element

30. Container
31. Housing
310. Wall
311. Bottom edge
315. Connection element
316. Wall
317. Common edge
32. Bottom wall
40. Support element
41. Contact element
410. Lower face
415. Upper face
42. Connection element
420. Connection housing
43. Strength rib

Claims

1. A cooling appliance (1) comprising an inner chamber (10) defined by an inner liner (20); a container (30) movably disposed in the inner chamber (10); a support element (40) provided on a bottom wall (32) of the container (30) for carrying the container (30) on the inner liner (20); and a sliding surface (21) on the inner liner (20) where the support element (40) moves on by contacting during the movement of the container (30); and **characterized in that** the support element (40) comprises a contact element (41) being in superficial contact with the sliding surface (21).

2. A cooling appliance (1) according to claim 1; wherein the support element (40) comprises a connection element (42) extending from the contact element (41) to the container (30).

3. A cooling appliance (1) according to claim 2; wherein the contact element (41) and the connection element (42) of the support element (40) are configured as one-piece.

4. A cooling appliance (1) according to claim 2 or 3; wherein the connection element (42) is configured as about perpendicular to a lower face (410) of the contact element (41) contacting to the inner liner (20).

5. A cooling appliance (1) according to anyone of the preceding claims; wherein the container (30) comprises a housing (31) for the support element (40).

6. A cooling appliance (1) according to claim 5; wherein the container (30) and the housing (31) for the sup-

port element (40) are configured as one-piece.

7. A cooling appliance (1) according to claim 5 or 6; wherein the container (30) comprises a wall (310) defining the housing (31) and having a bottom edge (311) contacting to an upper face (415) of the contact element (41).

8. A cooling appliance (1) according to claim 7; wherein the wall (310) of the housing (31) and the contact element (41) are in form corresponding each other, especially in circular form.

9. A cooling appliance (1) according to anyone of claims 5-8; wherein the housing (31) comprises a connection element (315) secures the connection element (42) of the support element (40) to the container (30).

10. A cooling appliance (1) according to claim 9; wherein the connection element (315) of the housing (31) is configured as about perpendicular to the lower face (410) of the contact element (41) contacting to the inner liner (20).

11. A cooling appliance (1) according to claim 9 or 10; wherein one of the connection element (42) of the support element (40) and the connection element (315) of the housing (31) comprises a connection housing (420) for the connection element (315) of other.

12. A cooling appliance (1) according to anyone of claims 11; wherein one of the connection element (42) of the support element (40) and the connection element (315) of the housing (31) is a pin disposed in the connection housing (31), especially a pin composed of three walls (316) having a longitudinal common edge (317) and positioned as having an about 120-degree angle between each two of the walls (316) around the common edge (317).

13. A home appliance (1) according to anyone of the preceding claims; wherein the inner liner (20) also comprises a contact element (22) at a position on the inner liner (20) ensuring contact with the container (30) and preventing to block the support element (40) during the movement of the container (30).

14. A cooling appliance (1) according to anyone of the preceding claims; wherein the contact element (22, 41) is made of a material having less friction coefficient compared to the inner liner (20), especially polyoxymethylene.

15. A cooling appliance (1) according to anyone of the preceding claims; wherein the support element (40) comprises a strength rib (43) on a face of the support element (40) except the face of the contact element (41) contacting to the sliding surface (21) of the inner liner (20).

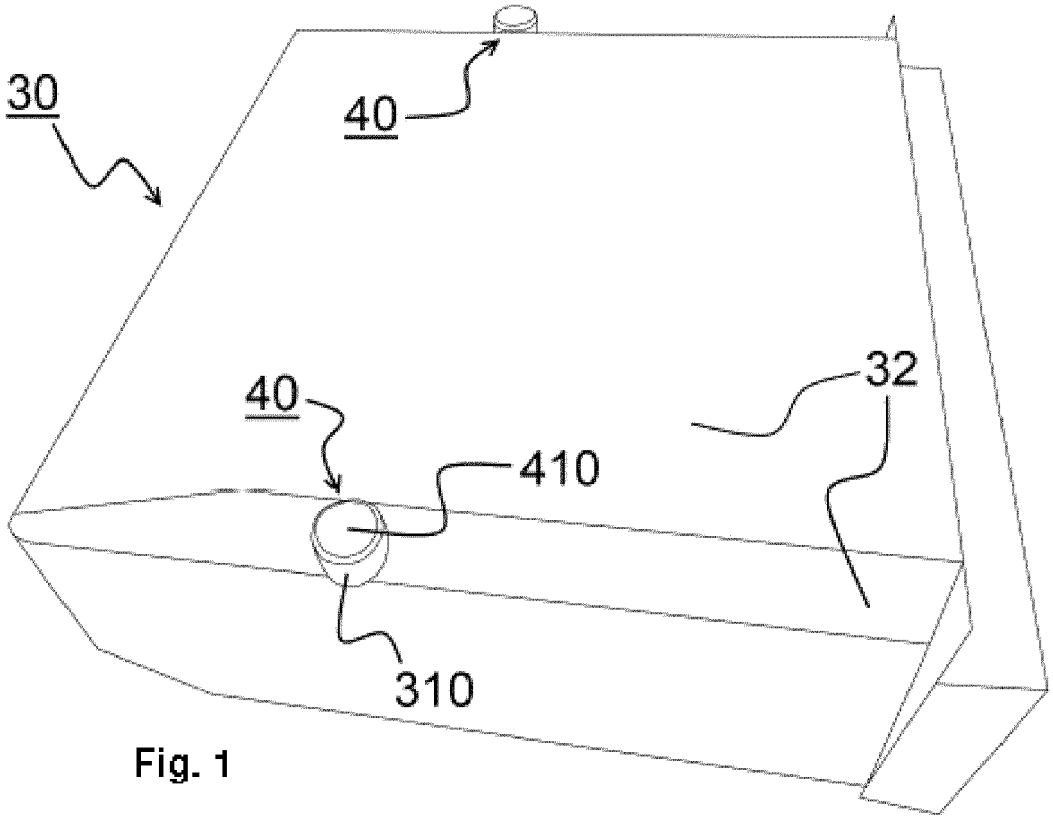

Fig. 1

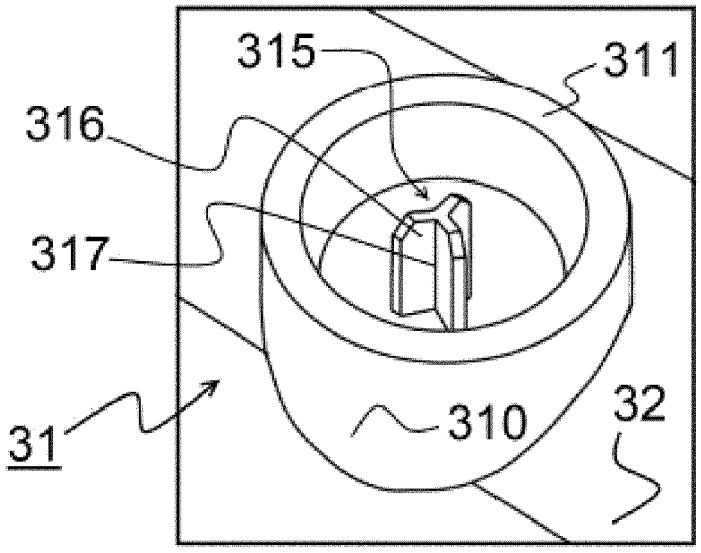

Fig. 2

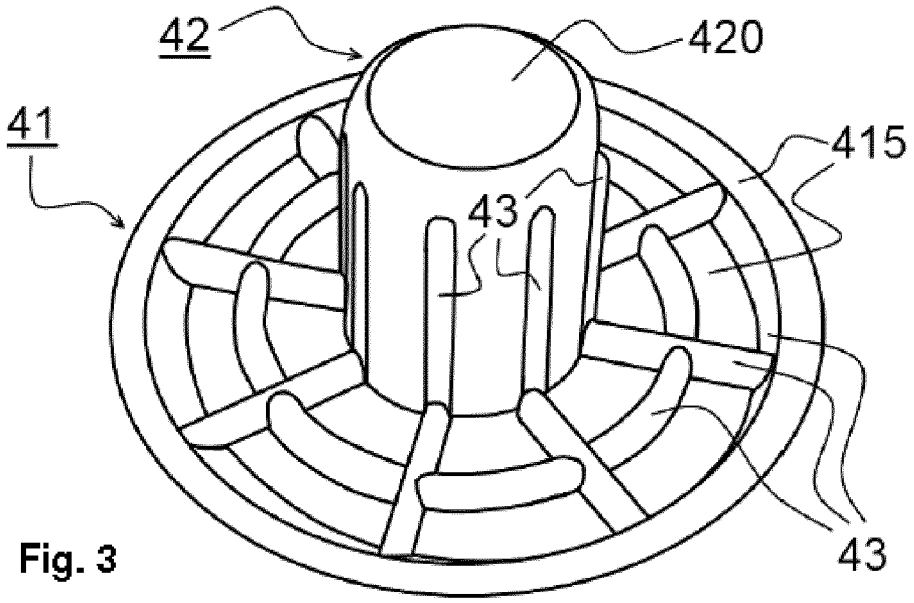

Fig. 3

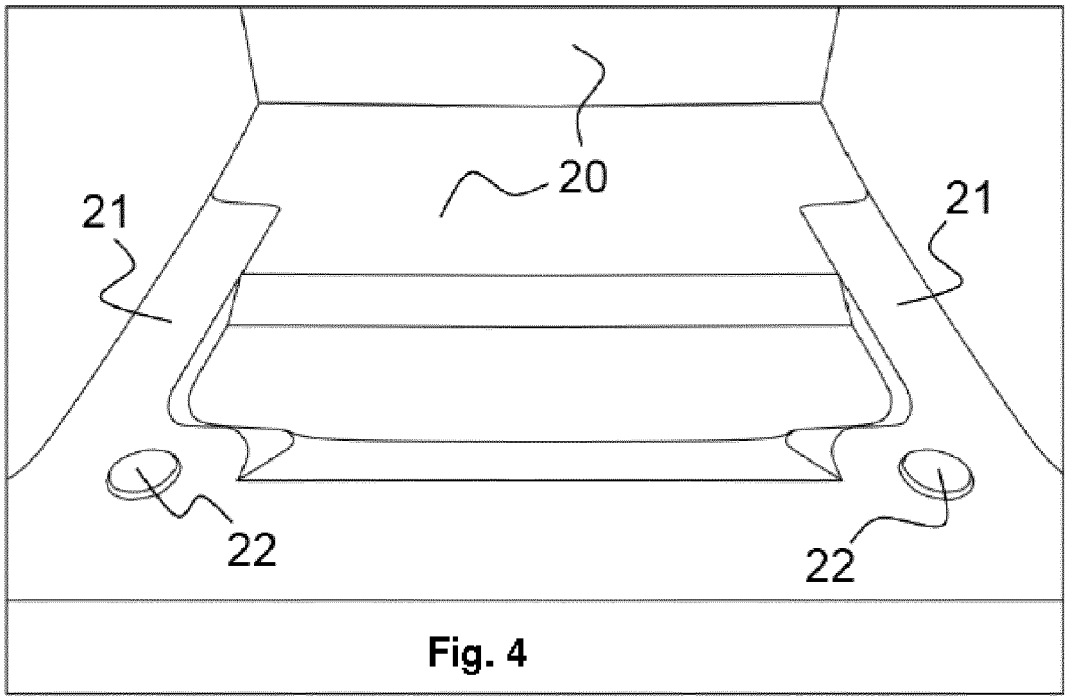

Fig. 4

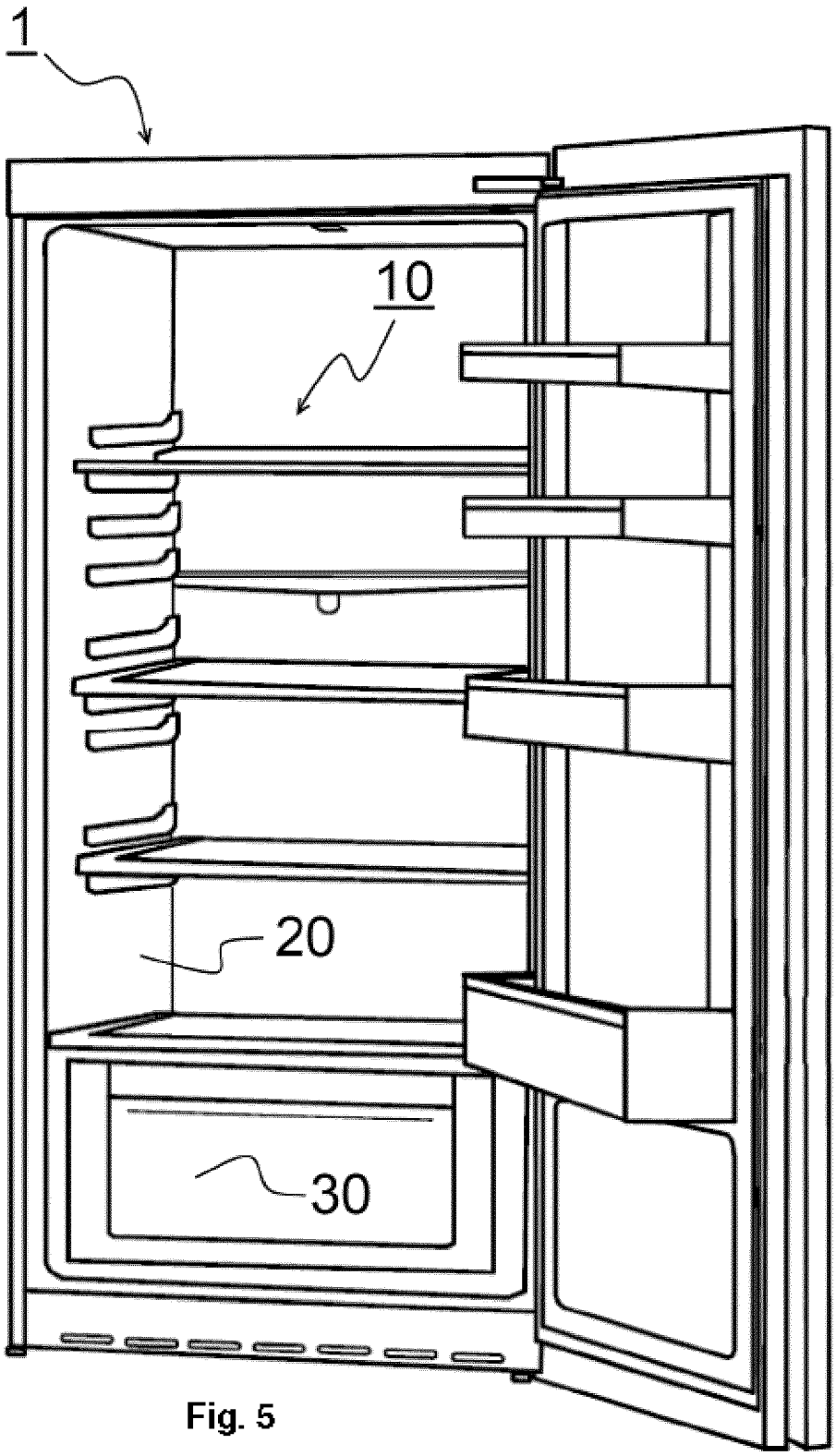

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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