

DESCRIPTION

Storage Container For Use In Refrigerator

Technical Field

The present invention generally relates to refrigerators and, more particularly, to a storage container for use in the refrigerators.

Background Art

A refrigerator for home use generally comprises a box-like housing having an interior which may be either dedicated in its entirety only to a refrigerating chamber, or divided into a refrigerator chamber and a freezer chamber. The refrigerator housing generally has at least one opening leading into and out of the housing interior and adapted to be selectively opened and closed by a hingedly supported door. Depending on the design, the refrigerator housing may have two openings associated with the refrigerator and freezer chambers, respectively, in which case a hingedly supported door is employed for each of those openings.

Whichever the refrigerator has only the refrigerator capability or both of the refrigerator and freezer capabilities, the refrigerator chamber is generally divided by one or more partition plates into two or more compartments that are fluid-communicated with each other. One of those compartments in the refrigerator is usually utilized to accommodate a crisper or storage container for storage of vegetables, fruits and/or any other food materials necessary to be kept crisp.

The crisper container for use in the refrigerator is disclosed in, for example, the Japanese Laid-open Patent Publication No. 61-6579, published January 13, 1986, and is schematically reproduced in Fig. 6. According to this publication, the storage container 1 is of a generally rectangular box-like configuration opening upwardly and includes a rigid top lid 2 made of glass or a

moisture-permeable microporous material. The top lid is adapted for placement on the container to close the upwardly oriented opening of the crisper container.

The publication referred to above is silent as to the use of the partition plate within the refrigerator chamber. However, it has been found that if
5 the known crisper container is placed within a dedicated compartment above the bottom of the housing and immediately below the partition plate such as shown by P in Fig. 6, the access opening available at the frontage of the crisper container for placement or removal of, for example, vegetables into or out of the crisper container is limited in size. More specifically, when it comes to removal of
10 the vegetables or any other food materials stored in the crisper container 1, one has to pull the crisper container a distance frontward towards the hingedly supported door and then to lift a front side of the top lid 2 to allow the top lid 2 to pivot generally about a line of contact between a rear edge of the top lid 2 and a top edge of a rear wall defining the crisper container.

15 The extent to which the top lid 2 can be pivoted to form the access opening is limited by a front side of the partition plate P which is then brought into contact with the lid 2 when the latter is pivoted to open the crisper container in readiness for removal or placement of vegetables and/or food materials from or into the crisper container. The access opening has its size limited accordingly,
20 and relatively bulky vegetables and/or food materials would not be placed in the crisper container unless the latter is removed out of the refrigerator for that purpose. Also, with the access opening so limited, difficulty has often been encountered to secure a satisfactory viewability with which one can look into the crisper container to ascertain what it is that is contained there.

25 The present invention has therefore been devised to substantially eliminate the problems encountered with the prior art storage container of the kind discussed above and is intended to provide an improved storage container

that can provide an increased access opening at the frontage of the storage container so that even relatively bulky food material can be placed or removed into or out of the storage container.

Another important object of the present invention is to provide an improved storage container of the type referred to above, which is effective to provide an increased viewability to allow the user to look with no substantial difficulty into the storage container to ascertain what it is that is contained there.

A further important object of the present invention is to provide an improved storage container of the type referred to above, which is easy to handle, ready for use in any existing refrigerators and inexpensive to manufacture.

Disclosure Of The Invention

In order to accomplish these objects, the present invention provides a storage container for use in a refrigerator which comprises an open-topped box having a top opening oriented upwardly and a forward opening oriented in a direction perpendicular to a plane of the top opening and communicated with the top opening, and a movable hatch mounted on the box for movement between lifted and lowered positions, said movable hatch when in the lifted position closing the forward opening of the box.

Preferably, at least one camming mechanism is provided which includes a pivot lever pivotally connected at one end to one of side walls of the box at a location remote from the front opening, the opposite end of said pivot lever being engaged with the movable hatch, and a cam element along which the pivot lever moves to move the movable hatch between the lifted and lowered positions.

Also preferably, the movable hatch comprises a generally elongated hatch body and arms protruding from opposite ends of the hatch body in a direction perpendicular to the hatch body and in that there is provided a

guide means provided for each of the arms of the movable hatch for guiding the movement of the movable hatch between the lifted and lowered positions.

In any event, the storage container of the present invention includes other advantageous features which will become clear from the subsequent description.

Brief Description Of The Drawings

The present invention will become readily understood from the following description of preferred embodiments thereof made with reference to the accompanying drawings, in which like parts are designated by like reference numeral and in which:

Fig. 1 is a fragmentary side sectional view of a portion of a refrigerator showing a crisper container accommodated therein according to a first preferred embodiment of the present invention;

Fig. 2 is a schematic perspective view of the crisper container shown in Fig. 1;

Fig. 3 is a fragmentary side sectional view of that portion of the refrigerator showing the crisper container accommodated therein according to a second preferred embodiment of the present invention;

Fig. 4 is a schematic perspective view of the crisper container shown in Fig. 3;

Fig. 5 is a schematic perspective view of a top lid used in association of the crisper container according to any one of the first and second embodiments of the present invention;

Fig. 6 is a fragmentary side sectional view of that portion of the refrigerator showing the prior art crisper container accommodated therein.

Best Mode for Carrying Out The Invention

The best mode for carrying out the present invention will hereinafter

be described in connection with some preferred embodiments thereof shown in and with reference to the accompanying drawings. Although in describing those embodiments of the present invention reference will be made to the crisper container used in a home-use refrigerator for accommodating vegetables, fruits and/or any other food materials that are to be kept crisp, those skilled in the art will, upon reading of the disclosure herein made, readily understand that the crisper container of the present invention can be equally used in association with any other storage box that may be used inside or outside the refrigerator and for accommodating any other materials than the food items.

10 (First Preferred Embodiment)

Referring to Figs. 1 and 2, a refrigerator R, only a portion of which is shown in a side sectional representation in Fig. 1, is of a generally rectangular box-like configuration having a refrigerator chamber 10 defined therein and also having a front access opening opening in one direction perpendicular to the longitudinal axis of the refrigerator R. The access opening of the refrigerator R is selectively opened or closed by a hingedly supported refrigerator door 11. The refrigerator R of the structure so far described may be of any known construction and, therefore, the details thereof will not be reiterated for the sake of brevity.

The refrigerator chamber 10 is delimited by the refrigerator door 11 in its closed position, a bottom adiabatic wall 10a, a top adiabatic wall (not shown) opposite to the bottom wall 10a, opposite side adiabatic walls generally identified by 10b, and a rear adiabatic wall 10c opposite to the refrigerator door 11. This refrigerator chamber 10 has an effective depth D as measured from a front edge of the bottom adiabatic wall 10a adjacent the refrigerator door 11 to a rear edge of the bottom adiabatic wall 10a adjacent the rear adiabatic wall 10c, and also has a partition plate 12 removably or rigidly accommodated within the refrigerator chamber 10 and positioned a distance above the bottom adiabatic wall 10a to

define a container compartment C. This partition plate 12 has a depth smaller than the effective depth D of the refrigerator chamber 10 and may be in the form of a grid-patterned or grille shelf or a robust rigid pane made of glass or any suitable synthetic resin.

5 A crisper container 13 comprises a open-topped, generally rectangular box 14 including generally rectangular opposite side walls 14a, a generally rectangular front wall 14b, a generally rectangular rear wall 14d and a bottom wall 14d, all assembled together to render the box 14 to open upwardly in a direction away from the bottom wall 14d, as clearly shown in Fig. 2. Although
10 not essential, the illustrated crisper container 13 comprises a generally rectangular top lid 15 detachably used to close the top opening of the open-topped box 14 as will be described in detail later.

 All of the walls 14a to 14d forming the open-topped box 14 are preferably made of any suitable synthetic resin and, more preferably, a white-
15 colored or opaque plastics, and the box 14 including those walls 14a to 14d can be made by the use of any known plastics molding technique. In a preferred embodiment of the present invention, the front wall 14b is a member separate from the box 14 and is firmly bonded to the bottom wall 14d while having been
20 fixedly received in a space between parallel upright banks 14e integral with the bottom wall 14d so as to lie perpendicular to the bottom wall 14d. One of the upright banks 14e, that is, the front upright bank is formed integrally with a handle
16 protruding therefrom a distance frontward towards the refrigerator door 11 so that the user can hold the handle 16 with his or her hand to pull or push the crisper container 13 forward or backward with respect to the access opening when the
25 refrigerator door 11 is opened.

 It is to be noted that the front wall 14b has a height, as measured in a direction conforming to the longitudinal direction of the refrigerator R, which is

smaller than the similarly measured height of the rear wall 14c so that in the assembled condition as shown in Fig. 2, the box 14 can have a front access opening AO communicated with the top opening thereof and opening in a direction opposite to the rear wall 14c. As will become clear from the subsequent description, the front access opening AO is adapted to be selectively closed and opened by a generally transversely extending movable hatch 17 preferably made of a transparent plastics.

The movable hatch 17 is movable up and down relative to the box 14, i.e., between lifted and lowered positions to close and open the front access opening AO of the box 14, respectively. This movable hatch 17 comprises a generally rectangular hatch body 17a and arms 17b formed integrally with respective opposite ends of the hatch body 17a so as to extend perpendicular thereto. As clearly shown in Fig. 2, each of the arms 17b of the movable hatch 17 has an inner surface formed with a respective guide groove 17c extending in a direction perpendicular to the longitudinal axis of the hatch body 17a.

A front outer surface portion of each of the side walls 14a of the box 14 is formed with a guide protrusion 18 protruding laterally outwardly therefrom, and the movable hatch 17 is mounted on the box 14 with the guide grooves 17c receiving therein the corresponding guide protrusions 18. Thus, it will readily be seen that the movable hatch 17 is guided between the lifted and lowered positions with the guide grooves 17c receiving therein the associated guide protrusions 18 integral with the side walls 14a of the box 14. Preferably, the height of the hatch body 17a referred to above is so selected that when the movable hatch 17 is in the lifted position as shown in Fig. 1, a lower edge 17d of the hatch body 17a will overlap an upper edge 14f of the front wall 14b of the box 14 with no possibility of resting on that upper edge 14f of the front wall 14b so that when the movable hatch 17 is to be moved to the lowered position as shown in

Fig. 2, the hatch body 17a can move downwardly along the front wall 14b with the guide protrusions 18 guided along the respective guide grooves 17c.

It is to be noted that the overlapping between the lower edge 17d of the hatch body 17a and the upper edge 14f of the front wall 14b of the box 14 is particularly advantageous in that in an assembled condition with the movable hatch 17 held in the lifted position, a seal can be obtained to allow the food materials to be stored crisp.

When the movable hatch 17 is in the lowered position, the lower edge 17d of the hatch body 17a rests on an upper edge 14g of the front upright bank 14e, at which time an upper edge of the hatch body 17a opposite to the lower edge 17d may be in flush with, or spaced slightly downward from, the level of the upper edge 14f of the front wall 14b of the box 14. In an alternative embodiment of the present invention, the front wall 14b of the box 14 may be an integral part of the box 14, in which case one or more transversely extending stays may be secured to, or formed integrally with, the front wall 14b to define the lowered position for the movable hatch 17.

Movement of the movable hatch 17 between the lifted and lowered positions takes place automatically in response to movement of the crisper container 13 between forwardly drawn and retracted positions. Specifically, when the crisper container 13 is pulled forward towards the refrigerator opening to assume the forwardly drawn position, the movable hatch 17 is moved towards the lowered position, but when the crisper container 13 is pushed towards the rear adiabatic wall 10c to assume the retracted position as shown in Fig. 1, the movable hatch 17 is moved towards the lifted position. For this purpose, at least one camming mechanism is employed to allow the pull and push of the crisper container 13 to be translated into lowering and lifting of the movable hatch 17, respectively, and is disposed on one of opposite sides of the crisper container 13.

The camming mechanism employed in the embodiment shown in Figs. 1 and 2 comprises a generally elongated pivot lever 19 positioned externally of the box 14 and connected to one of the side walls 14a for pivotal movement about a pivot pin 20 that is secured to a portion of the side wall 14a adjacent the rear wall 14c of the box 14. One end of the pivot lever 19 remote from the pivot pin 20 has a slot 19a defined therein so as to extend inwardly thereof. The pivot lever 19 is drivingly coupled with the movable hatch 17 through an engagement pin 2 that is formed integrally with the adjacent one of the arms 17b of the movable hatch 17 and is loosely engaged in the slot 19a in the pivot lever 19.

10 The camming mechanism also comprises a generally triangular camming heel 19b that is formed integrally with the pivot lever 19 so as to protrude laterally outwardly and downwardly from a lower side edge of the pivot lever 19, and a cam plate 22 fixedly secured to the adjacent one of the side adiabatic walls 10b of the refrigerator chamber 10. The cam plate 22 has a cam edge 22a on which the camming heel 19b rests as clearly shown by the dotted lines in Fig. 1. This cam edge 22a is so shaped and so contoured that as the crisper container 13 is pulled towards the forwardly drawn position or pushed towards the retracted position, the pivot lever 19 with the camming heel 19b resting on the cam edge 22a can pivot counterclockwise or clockwise about the pivot pin 20, accompanied by downward or upward shift of the movable hatch 17, respectively.

In any event, the camming mechanism employed in the illustrated embodiment is so designed and so structured that so long as the crisper container 13 is in the retracted position as shown in Fig. 1, the camming heel 19b rests on a top portion of the cam edge 22a with the pivot lever 19 holding the movable hatch 17 at the lifted position through the engagement of the pin 21 in the slot 19a, but as the crisper container 13 is pulled towards the forwardly drawn

position, the cam heel 19b slides down the cam edge 22a, accompanied by a counterclockwise pivot of the pivot lever 19 which consequently results in downward shift of the movable hatch 17 towards the lowered position.

In order for the contents within the crisper container 13 to be readily viewable from outside even though the crisper container 13 is held in the retracted position, at least the front wall 14b of the box 14 and at least the hatch body 17a are made of a transparent synthetic resin. In addition, except for the front wall 14b, the box 14 is preferably made of a white-colored synthetic resin so that not only the guide grooves 17c and the guide projections 18, both intervening between the side walls 14a of the box 14 and the adjacent side adiabatic walls 10b of the refrigerator chamber 10, but also the camming mechanism and its associated component parts, all intervening between the side wall 14a of the box 14 and the adjacent side adiabatic wall 10b of the refrigerator chamber 10 can be concealed from the sight of the user. The viewability afforded by the use of the transparent material for at least the movable hatch 17 is effective to minimize the possibility of the crisper container 13 to be frequently opened unnecessarily and, hence, to keep the food materials crisp and clean.

In addition, the refrigerator door 11 used in most refrigerators currently available in the market has a plurality of trays or shelves, one of which is shown by 11a in Fig. 1, for accommodating eggs, beer cans, a butter case and others. Since the door tray 11a protrudes a distance inwardly of the refrigerator chamber 10, a space of a depth A as measured from a tip of the handle 16 and an inner surface of the refrigerator door 11 in the closed position is secured within the refrigerator chamber 10. This depth A is preferably smaller than the depth B of the crisper container 13, as measured from the tip of the handle 16 to the rear wall 14c of the box 14. The space of the depth A is also necessitated to provide an apron for support of the crisper container 13 when the latter is moved to the

forwardly drawn position. As a matter of course, when the refrigerator door 11 is pivoted to the opened position, the door tray 11a is clear of the space represented by the depth A and, therefore, the crisper container 13 can be pulled onto the apron in readiness for placement or removal of food materials into or from the crisper container 13.

Referring now to Fig. 5, the top lid 15 used to close the top opening of the box 14 and, hence, the crisper container 13, although shown schematically therein, has four sides so configured as to tightly contact top edges of the walls 14a and 14c and a top edge of the hatch body 17a, respectively, when the top lid 15 is placed atop the crisper container 13. The top lid 15 may have a portion thereof perforated to accommodate a moisture permeable layer 15a or may be of a structure having a moisture-permeable microporous material such as disclosed in the previously discussed Japanese Laid-open Patent Publication No. 61-6579. In any event, the use of the moisture permeable material in the top lid 15 does effectively allow the vegetables and/or fruits within the crisper container 13 to breathe and, hence, to keep them crisp and clean for a substantial long time.

The crisper container 13 embodying the present invention can be used in the following manner.

Assuming that the crisper container 13 is in the retracted position with the refrigerator door 11 held in the closed position as shown in Fig. 1, the user attempting to place or remove vegetables to be stored into or out of the crisper container 13 will first open the refrigerator door 11 and then draw the crisper container 13 from the retracted position towards the forwardly drawn position by holding the handle 16. As the crisper container 13 is pulled towards the forwardly drawn position, the pivot lever 19 starts its counterclockwise pivot about the pivot pin 20 with the camming heel 19b sliding downwardly along the cam edge 22a. As the pivot lever 19 is pivoted counterclockwise in this way, the

engagement pin 21 fast with the arm 17b and trapped in the slot 19a in the pivot lever 19 is drawn downwards, allowing the movable hatch 17 to be moved from the lifted position towards the lowered position with the guide protrusions 18 guided within and along the guide grooves 17c. The counterclockwise pivot of
5 the pivot lever 19 continues until the movable hatch 17 arrives at the lowered position, completely clearing of the front access opening AO of the crisper container 13 as shown in Fig. 2.

Thus, it is clear that with the crisper container 13 according to the present invention, the access opening available at the frontage of the crisper
10 container 13 for placement or removal of the vegetables into or out of the crisper container 13 is larger than that discussed in connection with the prior art crisper container shown in Fig. 6. Specifically, the access opening available at the frontage of the crisper container 13 corresponds to the sum of the opening
15 available when the top lid 15 is lifted until it is brought into contact with a front side of the partition plate 12, plus the opening afforded by the front access opening AO cleared by the movable hatch 17. Accordingly, even relatively bulky vegetables and/or food materials can be placed in or removed out of the crisper container 13 while the latter is held at the forwardly drawn position above the apron represented by the depth A.

20 When the crisper container 13 in the forwardly drawn position is pushed towards the retracted position, the pivot lever 19 undergoes a movement substantially reverse to that described above. More specifically, as the crisper container 13 is pushed towards the retracted position, the camming heel 19b slides upwardly along the cam edge 22a onto the top thereof with the pivot lever
25 19 consequently pivoted clockwise about the pivot pin 20, accompanied by upward movement of the movable hatch 17 from the lowered position towards the lifted position at which the front access opening AO is closed by the movable

hatch 17.

So long as the movable hatch 17 is held in the lowered position, a sufficient distance is secured between the handle 16 and a portion of the hatch body 17a adjacent the lower edge 17d thereof, such that the user's hand then
5 holding the handle will neither interfere with nor wounded by the movement of the movable hatch 17. For this purpose, the lowered position for the movable hatch 17 at which the lower edge 17d thereof is held in abutment with the upper edge 14g of the front upright bank 14e is defined at a level spaced a distance upwardly from the handle 16.

10 Although in the foregoing embodiment of the present invention, the single camming mechanism has been described as used on one side of the crisper container 13, the two camming mechanisms of an identical construction may be employed on respective sides of the crisper container 13 and this is particularly advantageous where the crisper container 13 has a substantial width.

15 Also, the guide grooves 17c which have been described as formed in the corresponding arms 17b of the movable hatch 17 may be formed on the respective side walls 14a of the crisper container 13, in which case the guide protrusions 18 should be formed in the arms 17b.

In a second preferred embodiment of the present invention shown
20 in Figs. 3 and 4, a simplified camming mechanism is employed. Referring now to Figs. 3 and 4, the camming mechanism comprises a camming heel 17c defined at a lower corner of a free end of the arm 17b of the movable hatch 17. This camming heel 17c when the crisper container 13 is in the retracted position within the refrigerator chamber 10, rests atop the cam edge 22a of the cam plate 22 as
25 shown by the dotted line in Fig. 3.

The guide grooves 17c which has been described as formed in the inner surfaces of the respective arms 17b of the movable hatch 17 in the

foregoing embodiment is, in the embodiment shown in Figs. 3 and 4, formed in respective outer surfaces of the side walls 14a of the crisper container 13 and, correspondingly, the guide protrusions 18 slidably engaged in the associated guide grooves 17c are formed with the corresponding arms 17b of the movable hatch 17 so as to protrude towards the adjacent side walls 14a.

Even in this embodiment of Figs. 3 and 4, the two camming mechanisms of an identical structure may be employed on respective sides of the crisper container 13.

In any event, it will readily be understood that as the crisper container 13 in the retracted position is pulled forwards, i.e., towards the forwardly drawn position, the camming heel 17c slides down along the cam edge 22a with the movable hatch 17 consequently moved downwardly towards the lowered position. On the other hand, when the crisper container 13 in the forwardly drawn position is pushed towards the retracted position, the camming heel 17c slides upwardly along the cam edge 22a with the movable hatch 17 consequently moved upwardly to assume the lifted position.

The crisper container 13 utilizing the camming mechanism or mechanisms according to second embodiment of the present invention is advantageously inexpensive to manufacture and simple in structure as compared with that utilizing the camming mechanism or mechanisms according to the previously described embodiment of the present invention.

Although the present invention has been described in connection with the preferred embodiments thereof with reference to the accompanying drawings, it is to be noted that various changes and modifications are apparent to those skilled in the art. Such changes and modifications are to be understood as included within the scope of the present invention as defined by the appended claims, unless they depart therefrom.



CLAIMS

1. A storage container for use in a refrigerator, which is characterized by comprising:

an open-topped box having a top opening oriented upwardly and a forward opening oriented in a direction perpendicular to a plane of the top opening and communicated with the top opening; and

a movable hatch mounted on the box for movement between lifted and lowered positions, said movable hatch when in the lifted position closing the forward opening of the box.

2. The storage container as defined in Claim 1, characterized in that there is provided at least one camming mechanism including a pivot lever pivotally connected at one end to one of side walls of the box at a location remote from the front opening, the opposite end of said pivot lever being engaged with the movable hatch, and a cam element along which the pivot lever moves to move the movable hatch between the lifted and lowered positions.

3. The storage container as defined in Claim 1 or 2, characterized in that the movable hatch comprises a generally elongated hatch body and arms protruding from opposite ends of the hatch body in a direction perpendicular to the hatch body and in that there is provided a guide means provided for each of the arms of the movable hatch for guiding the movement of the movable hatch between the lifted and lowered positions.

4. The storage container as defined in any one of Claims 1 to 3, characterized in that there is provided a handle secured to a front wall of the box at a location below the front opening, said movable hatch having a lower edge portion positioned above the handle.

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5. The storage container as defined in any one of Claims 1 to 4, characterized in that the box is made of a white-colored material and the movable hatch is made of a transparent material.

6. The storage container as claimed in Claim 6, characterized in that a front wall of the box is made of a transparent material.

7. The storage container as defined in any one of Claims 1 to 6, characterized in that there is provided a top lid for tightly closing the top opening of the box, said top lid having a moisture permeable layer.

8. The storage container as defined in Claim 7, characterized in that a lower edge portion of the movable latch overlaps with an upper edge portion of a front wall of the box below the forward opening when the container is accommodated.

9. A storage container for use in a refrigerator, characterized by comprising:

an open-topped box placed inside a refrigerator chamber in the refrigerator and having a top opening oriented upwardly and a forward opening oriented in a direction perpendicular to a plane of the top opening and communicated with the top opening, said box having a depth as measured in a direction conforming to a direction in which the box is pulled from or pushed into the refrigerator chamber, said box being adapted to be moved between a forwardly drawn position and a retracted position within the refrigerator chamber;

a movable hatch mounted on the box for movement between lifted and lowered positions, said movable hatch when in the lifted position closing the forward opening of the box;

said refrigerator chamber having an apron for supporting the box when the latter is pulled from the retracted position to the forwardly drawn position, said apron having a depth smaller than the depth of the box; and





at least one camming mechanism including a pivot lever pivotally connected at one end to one of side walls of the box at a location remote from the front opening, the opposite end of said pivot lever being engaged with the movable hatch, and a cam element along which the pivot lever moves to move the movable hatch between the lifted position and the lowered position in response to movement of the box between the retracted position and the forwardly drawn position, respectively.

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