United States Patent

Hilliker et al.

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[54] EXTERNAL ICE SERVICE

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[73] Assignee: General Electric Company

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[52] U.S. Cl. 62/344, 62/377, 312/292

[51] Int. Cl. F25c 5/18

[58] Field of Search 62/377, 344, 459, 382; 312/292

[56] References Cited

UNITED STATES PATENTS

659,105	10/1900	Sander	62/382 X
2,136,558	11/1938	Manshel	62/377 X
3,218,111	11/1965	Steiner	312/229 X

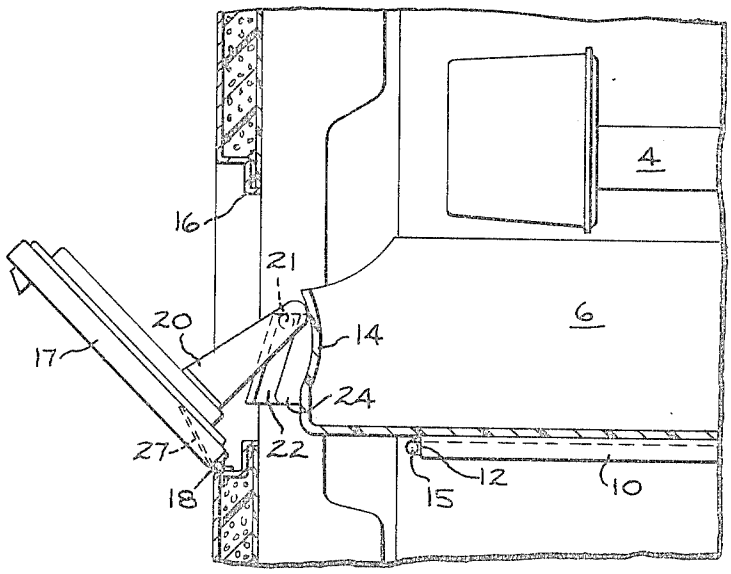
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[57] ABSTRACT

A refrigerator including a freezer compartment, a freezer door having an ice access opening therein normally closed by an ice access door and an ice receptacle slideably supported within the freezer compartment. The ice access door and the receptacle are provided with means for sliding the receptacle forwardly to an accessible position when the ice access door is opened.

8 Claims, 4 Drawing Figures



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SHEET 1 OF 2

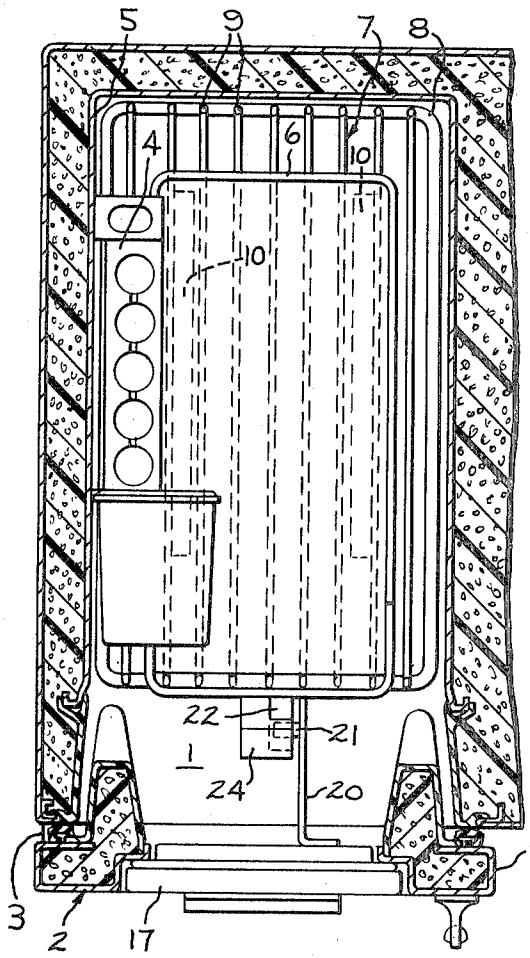


FIG. 2

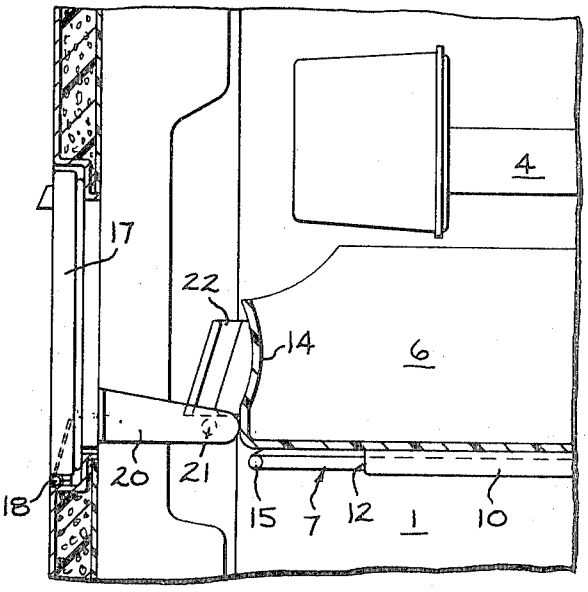


FIG. 1

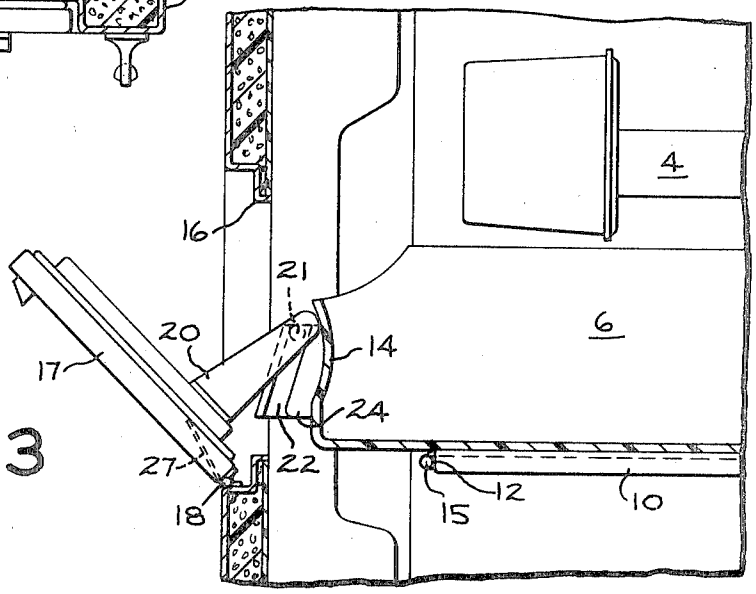


FIG. 3

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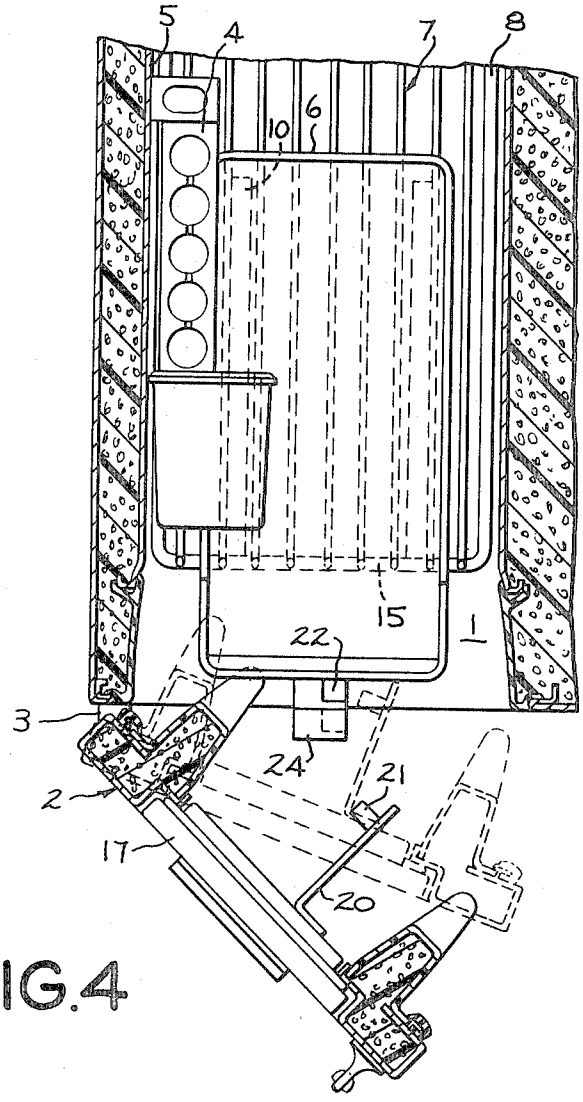


FIG. 4

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EXTERNAL ICE SERVICE

BACKGROUND OF THE INVENTION

A number of modern household refrigerators containing automatic ice makers include a receptacle for receiving and storing a supply of ice pieces in a freezer compartment at below freezing temperatures. Most of the commercially available refrigerators including this ice service require opening of the freezer compartment door whenever the user desires to obtain ice pieces from the receptacle. Each door opening results in entrance of moist air into the freezer compartment and a loss of refrigerated air therefrom. There is presently available on the market one refrigerator featuring a relatively small ice access door in the main freezer door and an ice storage receptacle supported on the inner surface thereof so that access to ice pieces stored in the receptacle can be obtained merely by opening of the ice access door. This refrigerator is described and claimed in the copending application Ser. No. 866,832, filed Oct. 16, 1969, now U.S. Pat. No. 3,602,007, in the name of Philip J. Drieci and assigned to the same assignee as the present invention.

The mounting of the ice receptacle on the ice access door limits its total storage volume to the dimensions of the ice access door and to the usual depth of the door shelf storage recess normally provided on the inner surface of the freezer door.

SUMMARY OF THE INVENTION

The present invention is directed to an ice service including a relatively small ice access door and an ice storage receptacle so constructed and arranged as to permit the use of a relatively large storage receptacle.

In accordance with the present invention, there is provided a household refrigerator including a freezer compartment having an access opening at the front thereof, a main insulated door for closing that opening and a small secondary or ice service door in the main freezer door. An ice storage receptacle which may be much larger than a receptacle mounted on the ice service door, is slideably supported within the freezer compartment adjacent the ice access door and the ice access door and the receptacle are provided with operating means adapted to slide the receptacle forwardly from its normal recessed position upon opening of the ice access door with the freezer door closed. Preferably this operating means comprises a vertically extending slot on the front surface of the ice receptacle and an arm including slot-engaging means on the inner surface of the ice access door adapted upon opening the ice access door to engage the slot and slide the receptacle forwardly to a position in which access can be obtained to the contents of the receptacle.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawings:

FIG. 1 is a vertical sectional view of a portion of a household refrigerator including the ice service of the present invention;

FIG. 2 is a plan view, partly in section, of the portion of the refrigerator shown in FIG. 1;

FIG. 3 is a view similar to FIG. 1 illustrating the ice service components in their ice access position; and

FIG. 4 is a view similar to FIG. 2 showing the operation of certain components of the invention when the main freezer door is opened.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention will be described in its adaptation to a refrigerator of the side-by-side type, that is of the type comprising a freezer compartment and a fresh food compartment in side-by-side relationship. The accompanying drawing illustrates the portion of such a refrigerator cabinet including a freezer compartment 1 having an access opening at the front thereof which is closed by a closure structure including a main

freezer door 2. The door 2 is supported on the face of the cabinet by hinge means 3 for pivotal movement about an axis adjacent the outer or left vertical edge of the door as viewed in FIG. 2 of the drawing.

The freezer compartment 1 contains an automatic ice maker 4 which may be supported for example on a sidewall 5 of the freezer compartment. This ice maker may be any of the well-known types supplied in household refrigerators for the automatic production of ice pieces to be stored at below freezing temperature until used.

The ice pieces produced by the ice maker 4 are stored in a receptacle 6 slideably supported blow the ice maker 4 on a supporting shelf structure 7 which in the illustrated embodiment of the invention comprises a relatively heavy wire frame member 8 and a plurality of lighter wire members 9 parallel to the sidewalls of the freezer compartment. The receptacle 6 is provided with a plurality of spaced guides 10 extending downwardly from the bottom wall 11 of the receptacle between adjacent wires 9. These guides 10 laterally position the receptacle 6 on the shelf 7 and guide the sliding movement of the receptacle. Their front ends 12 are spaced rearwardly from the front wall 14 of the receptacle as illustrated in FIG. 1 of the drawing and thereby form stops for contacting the front cross portion 15 of the shelf frame as shown in FIG. 3 of the drawing thereby limiting forward sliding movement of the receptacle 6 on the shelf 7. Preferably the receptacle 6 in its recessed position extends substantially the full length of the shelf 7 or in other words the full depth of the shelf area portion of the freezer compartment to provide maximum storage capacity for ice pieces.

The door 2 includes an ice access opening 16 adjacent or opposite the front wall 14 of receptacle 6, the opening 16 being normally closed by means of a secondary or ice access door 17 hingedly supported at its lower edge as indicated at 18 for tilting movement about a horizontal hinge axis from a closed position as illustrated in FIG. 1 of the drawing to a tilted or open position as illustrated in FIG. 3 of the drawing. This ice access opening 16 is preferably at about counter height.

The primary purpose of the ice access door 17 is to provide means for removing ice pieces from the receptacle 6 without opening the main freezer door 2. However with the receptacle 6 resting in its normal recess position on the supporting shelf 7, that is with the front end thereof in line with the shelf front so that it does not interfere with the visibility of items on shelves below the receptacle, it can be seen that there is a space of several inches between the inner face of the access opening 16 and the front of the receptacle making it somewhat awkward to reach the ice pieces stored in the receptacle 6.

In accordance with the present invention, there is provided simple nonpowered mechanical means for moving the receptacle forward to a more accessible position upon opening of the ice access door 17 and moving it back to its normal recessed position upon closing of this ice access door. This means is so constructed and arranged that the receptacle does not move as the main freezer door 2 is opened and closed.

This receptacle operating means comprises an arm 20 extending into the compartment from the inner surface of the ice access door 17 having adjacent to the free end thereof means such as a finger 21 adapted to be received in a vertically extending slot 22.

In the illustrated embodiment of the invention, the slot 22 is part of a projection 24 on the front wall 14 of the receptacle and more specifically is provided in the side of the projection 24 away from the hinge edge of the main door 2, or in other words, on the side of the projection facing the free edge 25 of the door 2.

Also as illustrated particularly in FIGS. 1 and 3 of the drawings, the slot 22 is open at its lower end, and preferably also at its upper end, and is so positioned relative to the arm 20 that when the main door 2 and ice access door 17 are both closed, the slot engaging finger 21 is below and not actually in

engagement with the slot 22. By this arrangement, the main door 2 can swing open without moving the receptacle 6. However, when the main door is closed, opening of the ice access door 17 causes the finger 21, in pivoting or rotating about the hinge axis 18, to move upwardly into the slot 22. Further opening of the door 17 after engagement of finger 21 with the slot 22 pulls the bucket forwardly to its access position as illustrated in FIG. 3 of the drawing. When the slot 22 is also open at its upper end, the door 17 can be opened to a 90° angle or beyond even though the finger 21 leaves the upper end of the slot 22 during the latter part of such movement.

As the door 17 is moved to its closed position, the finger 21 after first reentering the slot 22, pushes the receptacle 6 rearwardly to its original or recessed position as it travels downwardly through the slot and leaves the lower end of the slot as the door 17 approaches its closed position.

Engagement of the forward ends 12 of the guides 10 with the crossmember 15 of the supporting shelf prevents the receptacle from being pulled from the supporting shelf in the event that the main door 2 is opened while the ice access door 17 is also open with the finger 21 within the slot 22. More specifically, with the forward travel of the receptacle limited by the stop means, the open access door 17 will be pulled closed during initial opening movement of the main door 2 in addition as illustrated in FIG. 4 of the drawing, further opening movement of the main door 2 will cause the arm 20 to rotate laterally about the hinge axis 3 in a clockwise direction thereby removing the pin 21 from the slot 22.

Subsequent closing of the main door 2 with the ice access door 17 closed and the receptacle 6 in its forward or access position will, when the door reaches its dotted-line position as illustrated in FIG. 4, cause the arm 20 to contact the front surface or wall 15 of the receptacle and as the arm 20 thereafter slides across this front wall 15 will cam the receptacle 6 rearwardly to its recessed position. When the main door is finally closed, the arm 20 is again in the position illustrated in FIG. 2 of the drawing, that is in its normal position below the slot 22.

As a further safeguard against damaging the receptacle or operating means under certain door positioning conditions, the access door 17 may be provided with a counterbalancing spring 27 which tends to bias the door 17 to its closed position. Preferably this spring has a force such that the spring in combination with the weight distribution of the door 17 automatically shuts the door from any angle of opening less than about 30°.

It is also desirable that the slots 22 have a slight rearward slope so that the finger 21 can more easily slide downwardly along the slot 22 as it is pulling the ice access door 17 shut when the main door is opened. This angle also has the added useful effect of amplifying the motion of the bucket as the ice access door 17 is opened.

It will be obvious, of course, that the total forward travel of the receptacle 6 as the ice access door 17 is opened can be controlled by the length of the slot 22 up to a point at which any portion of the receptacle 6 contacts any portion of the main door adjacent the ice access opening 16.

When only a few ice pieces are required, these pieces can be more conveniently removed with less loss of refrigeration by opening only the access door 17. However, the contents of the receptacle 6 are, of course, also accessible upon opening of the main freezer door 2 even though the receptacle 6 is in its recessed position. The receptacle operating means does not interfere with the normal opening and closing of the main freezer door 2 while the ice access door 17 is closed since the arm 20 and the finger 21 are below and out of engagement with the slot 22. Also, as has previously been described, if the main freezer door 2 is closed at any time when the receptacle 6 is in its forward or access position, engagement of the free end of the arm 20 with the lower edge of the receptacle 6 cams the receptacle back to its recessed position.

Where there has been shown and described a specific embodiment of the present invention, it is to be understood that it is not limited thereto. For example, the same movements of the receptacle 6 by the door 17 may be obtained if the slot 22 extends horizontally rather than vertically and the ice access door is hinged along one vertical edge instead of along the bottom edge. Accordingly, it is intended by the appended claims to cover all such modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a refrigerator cabinet comprising a refrigerated storage compartment having a main access opening at the front thereof;

a main closure member for closing said main access opening and having a secondary access opening therein;

a secondary closure member pivotally mounted on said main closure member for closing said secondary access opening;

a storage receptacle and support means for supporting said receptacle in said compartment opposite said secondary access opening for movement between a recessed position and a forward position;

said secondary closure member and said receptacle including operating means for moving said receptacle between its recessed and forward positions operative only upon movement of said secondary closure member when said main closure member is closed.

2. A refrigerator cabinet according to claim 1 in which said operating means comprises a vertically extending slot on the front of said receptacle and an arm on the inner surface of said secondary closure member including slot engaging means slideably receivable in said slot.

3. A refrigerator cabinet according to claim 2 in which the lower end of said slot is open and said slot engaging means is positioned below said slot when said secondary door is closed.

4. A refrigerator cabinet according to claim 3 in which said arm is positioned to engage a front portion of said receptacle upon closing of said main closure member with said secondary closure member closed and said receptacle is in a forward position to thereby move said receptacle to its recessed position.

5. In a refrigerator cabinet comprising a refrigerated storage compartment having a main access opening at the front thereof;

a door for closing said access opening mounted on said cabinet for pivotal movement about a vertical axis adjacent one edge thereof, said door having a secondary access opening therein;

a second door pivotally mounted on said main door for pivotal movement about the lower edge thereof between a position closing said secondary access opening and an open position;

an ice storage receptacle slideably supported within said compartment opposite said secondary door for sliding movement between a recessed and a forward position;

said secondary door and said receptacle including operating means operative only upon opening movement of said secondary closure member when said main closure member is closed for moving said receptacle from its recessed position to its access position.

6. A refrigerator cabinet according to claim 5 in which said operating means comprises an open-ended slot on said receptacle and an arm on said secondary door engageable with said slot only after initial movement of said secondary door from its closed position.

7. A refrigerator cabinet according to claim 5 in which said operating means comprises a projection on the front of said receptacle having a slot on one side thereof and an arm on said secondary door having a laterally extending member receivable in said slot upon opening movement of said secondary door when said main door is closed.

8. A refrigerator cabinet according to claim 7 in which said laterally extending member is out of engagement with said slot when said secondary door is closed.

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