A freezer-refrigerator is provided with exterior ice service through the front of the cabinet. Three versions are disclosed, each having a panel forming a portion of the front closure of the freezer compartment and hinged at its lower edge to swing outwardly. Behind the panel in two of the versions is an ice tray and in one of those the panel is connected to the tray so that when opened it pulls the tray forwardly part way out of the freezer compartment. In the third version, a removable ice bin is mounted on the inner face of the panel. In all three versions, the tray or the bin, as the case may be, is supplied with ice cubes from an automatic ice maker located in the freezer compartment.

2 Claims, 8 Drawing Figures
EXTERIOR ICE SERVICE FOR FREEZER-REFRIGERATORS

BACKGROUND OF THE INVENTION

There are numerous current methods of rendering ice or ice cubes accessible at the front of a freezer-refrigerator, for example, without need to open one of its main doors. This is helpful, because the door of the freezer compartment is relatively large, and when opened much cold air is lost and warm air introduced, all when merely a few pieces of ice are desired at the time. In some contemporary arrangements, power driven means dispense the ice piece-by-piece from an interior reservoir directly through the freezer door, or through a fixed front panel between a pair of freezer doors as in the co-pending application of John J. Pink et al., Ser. No. 271,797, filed July 14, 1972, now U.S. Pat. No. 3,798,923. In still others, an entrance is formed through the freezer door and closed by a separate panel hinged to the door. On the inner face of the panel is hung a bin which serves as the reservoir for ice from an ice maker. Or instead of a bin, a drawer-like reservoir is engaged with the panel only when the freezer door is closed so that when the panel is then swung open, the drawer is drawn partway out through the door for access to the ice. In yet another approach, the panel is located between a pair of vertically spaced freezer doors and is independent of them, the panel forming the front of a drawer-like reservoir which is pulled out to get at the ice much as in those arrangements where a crisper drawer itself forms part of the front of the cabinet between a pair of main doors.

When a bin or drawer is used which opens through the door itself, as in U.S. Pat. Nos. 3,602,007 or 3,643,464, obviously a separate entrance must be formed in the door and closed by a separate hinged panel. This tends to be expensive, as compared with the cost of a plain door, and in the case of the drawer some means, as shown in U.S. Pat. No. 3,643,464, must be included in order to disconnect the panel from the drawer when the door is closed so that the latter can be opened without disturbing the drawer. If a drawer between two doors is employed, as in U.S. Pat. No. 3,744,270, a rather elaborate suspension for the drawer is required as indicated in that patent. The present invention, on the other hand, combines the advantages of the prior art constructions referred to, each of the three alternate arrangements of the invention set forth reducing cost and complexity while providing direct access to ice from the front of the cabinet without need to open a main door.

SUMMARY OF THE INVENTION

Essentially, the present invention utilizes the panel-intermediate-a-pair-of-main-doors approach and so avoids the expense and complexity of going through one of the doors itself. The side edges of the panel seal against the vertical cabinet edges while its horizontal edges, as well as the adjacent edges of the doors above and below the panel, seal against a pair of horizontal Mullions across the freezer opening, the panel being hinged to the lower mullion so that it can swing outwards. In one version, the panel opens to disclose a tray sitting freely on an interior shelf. The tray, which is filled from an automatic ice maker, can then be grasped and slid forward for access to the ice. In a second, similar version the tray is releasably connected to the panel so that as the latter is opened the tray is pulled forward on the shelf. A third version incorporates a removable bin suspended on the inner face of the panel, the bin being supplied from an automatic ice maker and tilting outwards when the panel is swung open. Each version incorporates a mechanism which shuts off the ice maker when the panel is open or when the tray or bin, as the case may be, is not in place. Other and further features and advantages of the present invention will become apparent from the more detailed description which follows and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a typical side-by-side freezer-refrigerator incorporating the invention.

FIG. 2A is a vertical sectional view approximately along the line 2—2 of FIG. 1 illustrating one version of the invention utilizing a simple ice tray.

FIG. 2B is a vertical sectional view approximately along the line 2—2 of FIG. 1 illustrating a second version of the invention utilizing an ice tray connected to the panel.

FIG. 2C is a vertical sectional view approximately along the line 2—2 of FIG. 1 illustrating a third version of the invention utilizing a bin mounted on the interior face of the panel.

FIG. 3 is a partial plan view taken along the line 3—3 of FIG. 2B.

FIGS. 4 and 5 are detail views illustrating the mechanism utilized in versions of FIGS. 2A and 2B for shutting off the ice maker when the tray is either absent or the panel is open and the tray is in its forward position.

FIG. 6 is a detail plan view of the mechanism for shutting off the ice maker in the case of the version of FIG. 2C where the panel and bin are open or the bin is absent, the view being taken approximately along the line 6—6 of FIG. 2C.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A typical freezer-refrigerator cabinet is shown at 10 having a door 11 closing the food compartment and a pair of vertically spaced doors 12 and 13 partially closing the freezing compartment 14, the remainder of which is closed by a panel 15 between the doors 12 and 13. The top and bottom edges of the panel 15 and the adjacent edges of the doors 12 and 13 overlap a pair of spaced horizontal mullions 16 spanning the width of the freezer compartment 14, the front faces of the mullions 16 being flush with those of the side edges 17 of the cabinet 10. The panel 15 is hinged at 18 along its lower edge to the lower mullion 16, and includes a pull 19 by which the panel 15 may be opened against the force of magnetic gaskets 20 by which the doors 12 and 13 and the panel 15 are sealed against the mullions 16, like gaskets also sealing the same against the faces of the cabinet edges 17. A shelf 21 extends rearwardly through the freezer compartment 14 from the top edge of the upper mullion 16, and below the rear portion of the shelf 21 a typical automatic ice maker 22 is positioned transversely of the freezer compartment 14 between its side walls 23. The ice maker 22 is equipped with a typical ice level sensing arm 24, extending forwardly from the ice maker 22, which swings up and down to turn the ice maker off and on depending upon the height of the arm 24. To this extent, the three em-
bodiments shown in Figs. 2A, 2B and 2C are identical and identical reference numerals have been used in each.

In the case of the two versions in Figs. 2A and 2B, a second shelf 25 extends rearwardly from the top of the lower Mullion 16 and at its back end is bent upwardly and then reversely to provide a ledge 26 under the ice maker 22 and a rear wall 27 to which it is attached, the rear ends of the shelves 21 and 25 being joined at 28. On the shelf 25 is disposed a rectangular ice tray 30 having a dropped front 31, side walls 32, and a rear wall 33. The tray 30 is provided with a pull in the form of a lip 34 along the top of its front wall 31 and is slidable on the shelf 25 at least part way out the exterior of the cabinet 10 when the panel 15 is swung open. The rear wall 33 of the tray 30 is located below the ice maker 22 so that the latter empties into it upon each harvest of ice cubes. In order to shut off the ice maker 22 when the tray 30 is pulled forwardly on the shelf 25, or is entirely removed from the cabinet 10, a mechanism is provided which automatically raises the sensing arm 24 to its shutoff position in those instances, the arm 24 normally extending down into the tray 30 to sense the level of the ice in it and to shut off the ice maker 22 when the tray 30 is full. That mechanism comprises a pin 35 extending from adjacent the top of the tray side walls near the tray rear wall 33 laterally towards the adjacent cabinet side wall 25 and in turn a shaped lever 36 of plate material is pivoted at 37. When the tray 30 is in location beneath the ice maker 22, the pin 35 resides in an inverted U-shaped seat 38 formed in the lever 36 below the level of the pivot 37. The sides of the seat 38 diverge to form a pair of opposing cam faces 39 and 40 along a pair of divergent arms 41 and 42, constituting the remainder of the lever 36. The upper end of the arm 42 is provided with an ear forward of the pin 35 and pivot 37 which is fitted with a second pin 43 extending over the top of the tray side wall 32 and laterally inwardly of the tray 30 to support the sensing arm 24 at its lowermost position (see Figs. 4 and 5). When the tray 30 is pulled forward, its pin 35 acts against the cam face 42 to swing the lever arm 36 about the pivot 37, causing the pin 43 in turn to raise the sensing arm 24 to its uppermost position where it and the lever 36 are retained by a seat 44 formed by an offset bend in the arm 24. The tray 30 can thus be removed, the pin 35 passing forwardly beneath the arm 42. When the tray is replaced, the pin 35 engages the cam face 39 on the other arm 41 and rotates the lever 36 about its pivot 37 in the opposite direction, forcing the pin 43 from the seat 44 and allowing it to lower the sensing arm 24.

In the first version of the invention shown in Fig. 2A the tray 30 must be manually pulled forward by the pin 34 after the panel 15 is opened. The second version of the invention shown in Figs. 2B and 3 is essentially identical, except that the exterior of the tray side walls 32 just behind the front wall 31 are provided with a pair of open ended, vertical channels 45. The upper ends of the latter receive a pair of opposing pins 46 extending laterally from rearward extensions 47 of the sides of the panel 15 which embrace the forward end of the tray 30 when the panel 15 is closed. Hence, when the latter is opened and then closed, the pins 46 engage and slide along the respective sides of the channels 45 to pull the tray 30 forwardly and then return it. When the panel 15 is open the tray 30 can be removed entirely simply by lifting it until the pins 46 are free of the channels 45.

Turning now to the third version of the invention shown in Fig. 2C, the ice maker 22 is transversely mounted forward in the freezer compartment 14 on a bracket 48 so that it discharges into an open top bin 50 which is hooked at 51 over the inner structure of the panel 15 and provided with an inset step 52 at the lower end of its front wall 53 to accommodate the lower Mullion 16. The top edges of the bin side walls 54 slope downwardly to the rear wall 55 so that when the panel 15 is swung open for access to ice, the rear of the bin 50 will clear the upper Mullion 16. The sensing arm 24 normally extends down into the bin 50 in order to sense the ice level in the latter and to shut off the ice maker 22 when the bin 50 is full. So that the ice maker 22 will be shut off when the bin 50 is not in position beneath the former, adjacent the forward edge of the ice maker 22 a long, depending lever 56 is pivoted at its upper end at 57 to the adjacent compartment side wall 23. The lever 56 extends between the adjacent compartment and bin side walls 23 and 54, its lower end being provided with a laterally offset roller 58 which rides against the bin rear wall 55 owing to a spring 59 biasing the arm 56 forwardly. Partway down the latter, a pin 60 extends laterally from a tang 61 projecting forwardly from the lever 56, the pin 60 passing under the sensing arm 24 when the latter is in its lowermost position. Accordingly, when the panel 15 is swung open, or should the bin 50 be removed entirely, the lever 56 moves forwardly, causing the pin 60 to lift the sensing arm 24 to its uppermost position and shutting off the ice maker 22.

Though the invention has been shown and described in terms of particular embodiments, being the best modes known of carrying out the invention, it is not limited to those embodiments along. Instead, the following claims are to be read as encompassing all adaptations and modifications of the invention falling within its spirit and scope.

We claim:

1. In a refrigeration unit having a food storage cabinet including freezing portions normally maintained at below freezing temperatures with vertically disposed front access openings, and ice apparatus disposed in one of the freezing portions, the ice apparatus including an automatic ice maker and an ice storage receptacle receiving ice manufactured by the ice maker, the combination therewith of a pair of vertically spaced, horizontally extending Mullions forming a fixed part of the cabinet and defining one of said access openings, the storage receptacle being accessible through said one access opening; a cabinet having a lower edge portion hingedly secured along the lower Mullion for swingable movement between a normally closed position in which the cabinet cooperates with the cabinet including the Mullions to close said one access opening and an open position outwardly of the cabinet for access to the storage receptacle, the storage receptacle comprising a tray having a pair of side walls, each side wall including an outwardly opening channel therein extending between its upper and lower edges, the panel including means carried thereby normally received in the channels and engaging respective side walls thereof effective to provide slidable movement of the tray on a shelf in said one freezing portion from a normal position therewithin out through said one access opening when the panel is swung to its open position and to re-
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5 turn the tray to its normal position when the panel is swung to its closed position; and hinged door means having a normally closed position in which the door means cooperate with the cabinet including the mullions to close the remainder of the access openings and movable to an open position for access to the remainder of the freezing portions.

2. The apparatus of claim 1 wherein the ice maker includes an ice level sensing arm movable from a lower position in the tray when in its normal position to an upper position above the tray, and including means to deactivate the ice maker when the tray is moved to said outside position, the deactivating means comprising a first pin carried by the exterior of a tray side wall and extending laterally toward an adjacent portion of the cabinet, a plate-like disposed between said tray side wall and said portion of the cabinet and pivoted to the latter about a horizontal axis normal to the plane of the lever, the lever including a seat in an edge thereof below the level of the pivot and receiving the first pin when the tray is in its normal position, the seat opening generally downwards through said edge to provide a pair of opposed, diverging cam faces straddling the first pin, the first pin and one of the cam surfaces being effective to rotate the lever about its pivot when the tray is moved toward said outside position, the first pin and the other of the cam surfaces being effective to rotate the lever about its pivot in a second direction when the tray is returned to its normal position, and a second pin extending from the lever laterally across the top of said tray side wall and beneath the sensing arm when in its lower position, the second pin being disposed to engage and lift the sensing arm to its upper position when the lever is rotated in its first direction and to allow return of the sensing arm to its lower position when the lever is rotated in its second direction.

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