ABSTRACT: A refrigerator cabinet including a freezer compartment containing an icemaker, an ice storage receptacle and dispenser for storing and dispensing ice pieces made by the ice maker, a passage in the freezer door for delivering ice pieces from the dispenser to a service area on the outer surface of the door, and operating means including an actuating means on the outer surface of the door for energizing the dispenser. Preferably, means are provided for closing the passage when the dispenser is not energized and the receptacle and dispenser are removable as a unit from the cabinet. A door-operated switch prevents operation of the dispenser when the door is open.
FIG. 8
HOUSEHOLD REFRIGERATOR INCLUDING THROUGH-THE-DOOR ICE SERVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of our copending application, Ser. No. 824,728 filed Apr. 29, 1969 (now abandoned) which is a continuation of application Ser. No. 669,234 filed Sept. 20, 1967 (now abandoned).

BACKGROUND OF THE INVENTION

The present invention is directed to a household refrigerator cabinet including means for dispensing ice pieces exteriorly of the refrigerator cabinet.

Many modern household refrigerators feature automatic icemakers including a receptacle in the freezer compartment for receiving and storing a supply of ice pieces at below freezing temperatures.

The usefulness of an automatic icemaker is measured by the amount of ice available on short notice, or in other words, it is not determined by the icemaking capacity of the icemaker. Thus for maximum convenience, the present-day icemakers include a storage receptacle for receiving and storing the few ice pieces periodically discharged by the icemaker so that a much larger amount of ice produced over a period of time and stored in the receptacle is available for use within a relatively short period of time.

As added customer convenience, it is desirable to provide means for dispensing ice pieces exteriorly of the refrigerator cabinet. Prior U.S. Pat. No. 2,212,405 — Rose et al. issued Aug. 20, 1940 and U.S. Pat. No. 2,697,918 — Comstock issued Dec. 28, 1954, both disclose exterior ice services in which the ice is dispensed directly from an icemaker through a cabinet wall or the cabinet door. In each of these services, the passages leading to the exterior of the cabinet are sloping or slanted and the ice pieces are dispensed directly through the outer surface of the cabinet structure. In such ice service, the amount of ice available at any one time is limited by the capacity of the icemaker.

SUMMARY OF THE INVENTION

A refrigerator including a freezer compartment having an access opening and a door for closing the access opening contains an icemaker and an ice storage receptacle and ice dispenser in the freezer compartment. The receptacle receives and stores ice pieces produced by the icemaker and has an outlet adjacent the freezer door. The door has a passage through which ice pieces discharged from the outlet when the door is closed and delivering the ice pieces to a service area on the exterior surface of the door. The dispenser is controlled by operating means including actuating means exterior of said cabinet. Preferably the refrigerator also includes means for preventing energization of the dispenser when the door is opened and a normally closed closure member for the ice passage which is opened during energization of the dispenser. The receptacle and dispenser components associated therewith preferably form a unitary structure removable as a unit through the access opening.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing:

FIG. 1 is a vertical sectional view of a household refrigerator freezer compartment including one embodiment of a through-the-door ice service of the present invention, this view being taken generally along line 1-1 of FIG. 2;

FIG. 2 is a vertical sectional view of the combination receptacle and dispensing means of FIG. 1 taken generally along line 2-2 of FIG. 1;

FIG. 3 is a vertical sectional view similar to FIG. 1 showing the dispensing means positioned to discharge ice pieces from the receptacle;

FIG. 4 is a circuit diagram for controlling the operation of the subject ice service;

FIG. 5 is a front elevational view of a household refrigerator including a second embodiment of the ice-dispensing service of the present invention;

FIG. 6 is a vertical sectional view taken generally along line 6-6 of FIG. 5;

FIG. 7 is an enlarged view of a portion of the door structure shown in FIG. 6;

FIG. 8 is a rear elevational view of the door structure illustrating additional structural details thereof; and

FIG. 9 is a sectional view of a portion of a door structure illustrating a preferred arrangement.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention will be specifically described in its application to a household refrigerator cabinet comprising a vertically extending freezer compartment 1 having a front access opening closed by a door 2. The door 2 is of the usual construction including an outer or face panel 3 and an inner panel 4 which are spaced from one another with most or all the space between the two panels being filled with suitable heat insulating material 5. The freezer compartment 1 contains an automatic icemaker 6 in an upper portion thereof adapted to automatically manufacture and periodically dispense ice pieces or "cubes" for storage in a combination receptacle and ice dispenser unit generally indicated by numeral 7, this unit being removable supported on a shelf 8 below the ice maker 6.

Any suitable icemaker may be used. The illustrated icemaker is that disclosed in U.S. Pat. No. 3,331,215 Shaw.

The storage receptacle and dispensing means illustrated in FIGS. 1 – 3 broadly includes a storage receptacle or bin 10 for storing ice pieces produced by the icemaker 6 and a motor driven shuttle 11 positioned in the bottom portion of the receptacle 10 and adapted to intermittently discharge or dispense batches of ice pieces through a discharge opening 12 into a guide member 14 mounted on the front of the receptacle and having a downwardly directed or facing outlet or discharge 15, the member 14 serving to guide the ice pieces or in other words to define the path of the ice pieces discharged through the opening 12.

The receptacle 10 is of a generally box shape construction including a transversely sloping bottom wall 17 (FIG. 2) extending from one of its sidewalls 18 and terminating in a downwardly projecting portion 19 spaced from the opposite sidewalk 20. The dispensing shuttle 11 is positioned between the bottom wall portion 19 and the sidewalk 20. The shuttle 11, as illustrated in FIG. 1 of the drawing, preferably extends substantially the full length of the receptacle 10 and is pivotally supported adjacent its midsection on the downwardly extending bottom wall portion 19 by a pin 22 so that by the use of suitable drive means, this shuttle can be oscillated or rocked about this pivot point. The shuttle includes an ice duct 23 extending substantially the full length thereof and having an inlet opening 24 at the rear end of the shuttle and an outlet opening 25 at the forward end of the shuttle. The bottom wall of the duct 23 is divided into an inlet bottom wall portion 28 and an outlet or dispensing bottom wall portion 29 by means of a stationary plane 30 forming part of the duct structure but not movable with the shuttle 11. Specifically, plane 30 extends from and is integral with sidewalk 20. The top wall 31 of the duct is formed as part of the shuttle 11 and moves therewithin in its entirety.

As is shown particularly in FIGS. 1 and 2 of the drawing, only the top wall 31, the bottom walls 28 and 29 and one sidewalk 32 of the duct 23 are formed integrally with the shuttle 11 and the shuttle 11 is positioned adjacent the one bin sidewalk 20 so that this sidewalk 20 in effect forms the fourth side of the duct.

The illustrated means for oscillating or rocking the shuttle 11 between its one extreme position illustrated in FIG. 1 of the drawing and its other extreme position illustrated in FIG. 3 of the drawing includes a drive motor 35 suitably supported below the slanting bottom wall 17. The motor 35 is connected
through a suitable gear reduction (not shown) and an eccentric drive pin 37 to a yoke 38 connected to shuttle 11. More particularly, the yoke 38 includes a slot 39 for receiving the pin 37. As the member 40 carrying the pin 37 is rotated by the motor 35, the pin slides back and forth within the slot 39 and effectuates oscillating movement of the shuttle 11 between its two extreme positions.

The additional features of construction of the duct 23 can best be described in connection with its intended mode of operation. As the shuttle oscillates from its position shown in FIG. 3 to the position shown in FIG. 4, the rear end of the shutter moves upwardly through the ice pieces stored in the receptacle 10 during which time properly oriented ice pieces in the bin drop through the inlet 24 and slide downwardly along the bottom wall 28 which is then in a sloping position. The ice pieces slide onto the stationary plane 30 which is integral with the sidewall 20, and if no ice pieces are in the forward or discharge end of the duct these ice pieces will slide from the stationary plane 30 onto the sloping bottom wall portion 29 of the duct. These ice pieces are then stopped by engagement with the accurate dam or stop 41 which closes the outlet end 25 of the duct when the shuttle 11 is in the position shown in FIG. 1.

As the shutter 11 pivots from its position shown in FIG. 1 to the position shown in FIG. 3, the outlet end portion of the duct 23 moves upwardly until the duct outlet 25 communicates with the opening 12. At that time, any ice pieces in the outlet or discharge end portion of the duct, that is that portion of the duct including the bottom wall portion 29, slide through the opening 12 for discharge through the discharge outlet 15. To obtain this result, the duct bottom wall portion 29 should have a forward slope sufficient to cause these ice pieces to slide through the opening 12 when the shuttle 11 is in the position shown in FIG. 3.

During movement of the shuttle to this discharge position, a shoulder 42 on the inner or rear end of the duct bottom wall 29 moves upwardly relative to the stationary plane 30 to a position in which it blocks any ice pieces stored on the stationary plane 30 and prevents them from entering the outlet portion of the duct. Thus the number of ice pieces discharged during each cycle of operation of the shuttle 11 is determined by the number of ice pieces which can be contained within the forward portion of the duct extending from the stationary plane 30 to the dam 41. The preferred cross-sectional area of the duct is dependent to some extent upon the size and shape of the cubes or ice pieces produced by the icemaker 6. Preferably, it has cross-sectional area large enough so that the largest ice pieces can pass freely through the duct but not so large that two or more smaller ice pieces may wedge within the duct.

Upon return movement of the shuttle to its position shown in FIG. 1 of the drawing, ice pieces stored on or upstream from the stationary plane 30 are freed to slide forwardly into the outlet portion of the duct while at the same time additional ice pieces are caused to enter the duct inlet 24. If desired, a "stuffer" means in the form of a finger or ledge 44 overhanging the duct inlet 24 may be provided to aid in forcing ice pieces to enter the inlet 24 and also to break up pairs or clusters of ice pieces with the receptacle 10.

In addition to its dispensing action, the shuttle 11 also serves to agitate the ice pieces contained in the receptacle 10 so as to break up clusters of ice pieces and to prevent the formation thereof which may take place even though the ice pieces are continuously maintained or stored at below freezing temperatures. To this end, the shuttle is preferably provided with a continuous and somewhat V-shaped top wall 46 disposed above the top wall 31 of the duct 23. As the shuttle oscillates or rocks, the front portion and rear portion of the top wall 46 alternately pass upwardly through the stored ice pieces so that ice pieces stored on the top of the shuttle are moved relative to, and cause movement of, the ice pieces to one side of the shuttle. This agitation of substantially all of the stored ice pieces aids in preventing the formation of clusters of ice pieces and breaks the ice bonds in any clusters which may have been formed in the receptacle. At the same time the V-shaped construction of this wall 46 aids in effecting a back and forth or longitudinal movement of the ice pieces above the shuttle and helps assure the presence of ice pieces at the loading or inlet end 24 of the duct 23.

In accordance with the present invention, means are provided for delivering ice pieces discharged from a dispenser, such as the dispenser unit 7, exteriorly of the freezer door 3. This means is preferably so constructed and arranged within the door and relative to the ice dispenser as to permit the use of a storage receptacle and ice dispenser having a substantial storage capacity and to provide a minimum flow path for the ice after it leaves the dispenser.

In the embodiment of the invention illustrated in FIGS. 1 and 3, the outer panel 3 of the door includes an exterior ice service recess 47 extending into the plane of the door, that is, into the space between the outer panel 3 and the inner panel 4, and the inner panel 4 is formed with a second recess 48 extending into the plane of the door above and in at least partially overlapping relationship with the service recess 47. More specifically, the inner recess 48 includes a bottom area 49 forming a ledge which partially overlaps the outer door recess 47. A substantially vertical passage 50 is provided within the body of the door passing through the inner panels 3 and 4 and leading from the interior of the door to the exterior thereof. This passage is generally above recess 47. Its inlet 51 is positioned in the area 49 to receive ice from the member 14, and its outlet 52 opens into the top wall of the service recess 47.

With this construction, the receptacle an dispensing means or more specifically the guide member 14 is positioned in the compartment 1 so that the outlet 15 overlies the passage inlet 51 when the door is closed whereby ice pieces freely drop from the outlet 15 into the inlet 51. Since the passage 50 is of a relative short length and is substantially vertical, the ice can fall freely from the dispenser outlet 15 and through the passage without clinging to the surfaces thereof.

Exteriorly operable means for operating the ice dispenser 7 comprises a pushrod 53 supported in the rear wall 56 of the recess 47 below the passage 50 and having a knob or cradle 57 on the forward end thereof. This actuating member is designed to operate switch means 59 mounted within the door 2 for normally controlling the energization of the ice dispenser motor 35. Thus, when a glass or other receptacle is pressed into engagement with the cradle 57 while the door 2 is closed, batches of ice pieces are periodically discharged by the dispenser through the passage 50 into the glass.

When the door is opened, passage 50 is not in position to receive ice pieces from the outlet 15. To prevent operation of the dispenser under such conditions, there is provided a normally closed door-operated switch 61 connected in series with switch 59 as shown in FIG. 4. When switch 61 is opened upon opening of the door 3, the switch 59 cannot energize the dispenser motor 35.

If desired, means may also be provided for limiting air circulation between the exterior and the interior of the cabinet. In the embodiment of the invention illustrated in FIGS. 1—3, this means comprises a telescopic seal generally indicated by numeral 60 mounted on the front of the ice dispenser 7 and encircling the member 14. This seal 60 may be of any suitable telescopic construction, its purpose being to adjust for varying door clearances and engage the periphery of recess 48 so as to bridge the space between the front of the dispenser 7 and the portion of the inner panel 4 surrounding the recess 48 for all clearances. With this seal spaced, any flow of air between the cabinet and the ambient atmosphere is restricted to a path through the ice dispenser or more specifically through the dispensing means of this 23. This path is closed by stop 41 when the shuttle is in the position shown in FIG. 1. Since the receptacle is normally filled with ice to at least the level of the duct inlet 24, this stored ice plus the ice within the duct 23 substantially restricts the airflow path when the shuttle is in the position shown in FIG. 3.
Considering now the operation of this embodiment of the invention, it will be seen that when the door is closed and pressure is applied to the pushrod 55 to close the switch 59, the motor 35 is energized to oscillate or rock the shuttle 11 about its pivot support 22. During each portion of its oscillating cycle that the duct outlet 25 is aligned with the opening 12, the ice pieces within the duct forwardly from the stationary plane 30 slide downwardly through the sloping member 14 and fall freely from the outlet 15 through the passage 50 and into a glass or other receptacle placed within the recess 47. This intermittent or batch discharge of ice pieces will continue so long as the switches 59 and 61 are closed. Since the dispenser refills itself from the receptacle 10, the amount of ice delivered may be as much as the total capacity of the receptacle.

As soon as pressure is removed from pushrod 55, the switch 59 opens to stop the dispensing shuttle 11. Because of the short path the ice pieces travel from outlet 12 to the recess 47, under normal use conditions ice pieces which have already passed through opening 12 at the moment the switch 59 is opened will reach the glass or other receptacle before it can be removed from its position below the passage outlet 52.

Under certain conditions, an ice piece may be trapped half way through the return stroke of the shuttle to its position shown in FIG. 1. In order to prevent the motor from stalling under such conditions, the connection of the drive motor to the shuttle includes means for permitting continued operation of the motor 35 even though the shuttle is prevented from completing its return movement by the stalling ice piece. To this end, the yoke 38 is pivotally connected to the shuttle by a pivot pin 64 and includes a bearing surface 65 normally engaging a cooperating bearing surface 66 on a depending portion of the shuttle. A spring 67 connecting an extreme portion of the yoke 38 with the shuttle has sufficient tension to normally maintain the yoke surface 65 in contact with the shuttle surface 66. However, in the event that an ice piece jams the shuttle to stop downward movement of the forward end of the shuttle, the spring 67 permits pivoting of the yoke about its pivotal connection 64 and thus allows continued rotation of the motor 35. As the drive pin 37 again pivots the yoke 38 to a point where it reengages the shuttle surface 66, the forward end of the shuttle will again be raised to its upper position illustrated in FIG. 3 of the drawing whereupon the stalled ice piece and any ice pieces contained within the outlet portion of the duct 23 will pass through the outlet 12 into member 14. Thus the dispensing mechanism is self-cleaning during the cycle of operation following the stalled cycle.

Occasionally ice chips discharged with the ice pieces may miss the glass or other receptacle positioned in the recess 47 and fall to the bottom of the recess. In order to dispose of the water formed when this ice melts, the bottom of the recess 47 is provided with an open sump 68. The sump receives this water and prevents it from flowing from the recess onto the floor in front of the refrigerator. The sump is preferably provided with an electric heater 69 for warming the sump to a temperature such that the water collecting therein will be evaporated. Alternatively, the sump 68 may be connected through a suitable drain tube to the usual defrost water drain pan contained in the machinery compartment at the lower end of the refrigerator cabinet in heat exchange relationship with the refrigerant-condensing unit. The heated sump of our invention is preferred, however, since it does not require drain tube connections from the door to the machinery compartment.

Preferably also, the receptacle-dispensing unit 7 is removable supported on the shelf 8 so that it can be removed from the cabinet for periodic cleaning. For this purpose, since motor 35 is part of the removable unit (FIG. 2) the latter may be provided with a plug releasably engageable in a fixed socket (not shown) and through which the motor is adapted to be energized. In addition, as the user may occasionally desire to obtain access to the receptacle for the manual removal of ice pieces therefrom, the front wall thereof is provided with a service door 71 pivotally mounted as indicated at its lower end by the numeral 72 and spring biased by means (not shown) to a closed position. Under normal conditions door 71 can be tilted to a forward position so that the stored ice is easily accessible when the main refrigerator door is open.

FIGS. 5 through 8, in which the same reference numerals have generally been used to indicate the same or similar elements, illustrate a second embodiment of the present invention.

FIG. 5 is a front view of a cabinet containing in side-by-side relationship a freezer compartment 1 and a fresh food compartment 73. The front access openings to these compartments are respectively closed by a freezer door 2 and a fresh food door 74.

The freezer door 2 comprises spaced outer and inner panels 3 and 4. The outer panel 3 forms the face of the door 2 and includes the recess 47 generally defining a service center or area at which ice pieces are delivered exteriorly of the cabinet from an ice receptacle and dispenser 79 disposed in the upper portion of the compartment 1, i.e., above the level of the recess 47.

The illustrated ice receptacle and dispenser 79 is of the type more fully described and claimed in U.S. Pat. No. 3,422,994 issued Jan. 1, 1969 in the name of Robert J. Alvarez and assigned to the same assignee as the present invention. Briefly described, it includes, as is shown in FIG. 6, a receptacle 81 for receiving and storing ice pieces produced by an automatic icemaker 6 and rotatable dispensing means 84 positioned in the receptacle and driven through a separable coupling 86 by a speed reduction drive means including a motor 85. The receptacle includes a discharge opening 87. Upon rotation of the dispensing means 84, ice pieces stored in receptacle 81 are advanced by a screw conveyor 88 to the opening 87 through which batches of one or more ice pieces are periodically discharged at the end of each half cycle or full cycle of rotation of the dispensing means depending respectively upon whether the screw 88 is a double or a single blade screw.

The batches of ice pieces periodically discharged from the opening 87 are delivered directly to the recess 47. To this end, the door 2 includes a passage 90 (FIG. 7) having its inlet 91 in the inner door panel 4 and its outlet end 93 in the upper or top wall portion 94 of recess 47.

The inlet end 91 is normally closed by an insulating closure member 96 adapted to seat against a sealing gasket 97 surrounding the inlet 91.

As shown in FIGS. 7 and 8, the closure 96 is pivotally mounted on the inner panel 4 by means of a pair of legs 98 extending downwardly from the side edges thereof and pivotally secured to the panel 4 by pivot pins 100 whereby the closure 96 is movable from its closed position of FIG. 6 to an open position rearward of the discharge opening 87 as shown in FIG. 7. One or more springs 103 bias the closure 96 to its normally closed position.

Means for directing ice pieces into the passage 90 comprises a chute 104 mounted on and movable with the closure 96. The chute is positioned below the discharge opening 87. It is preferably formed of polypropylene and includes a hinge portion 105 at one end secured to the member 96. The other or outlet end 106 of the chute extends into the passage 90 where it is slidingly supported on the slanting bottom wall 107 of that passage.

Exteriorly operable means for opening the closure 96 comprises a pushrod 109 extending through the door 3 from the recess 47 and having a knob or pushbutton 110 on the forward or exterior end thereof. This rod, normally biased to its forward position by spring means (not shown), includes a pad 111 on the rear end thereof adapted to engage the offset or crank portion 112 of drive member 113 pivotally supported on the panel 4. The drive member 113 also includes arms 114 adapted upon rotation of member 113 to engage legs 98 and thereby move the closure member 96 to its open position.
Inward movement of the pushrod 109 is also employed to operate the ice-dispensing means 84. When the rod approaches its innermost position, pad 111, as shown in FIG. 8, is adapted to contact switch arm 116 of a switch 117 which controls the energization of the dier comparator 85.

The closure member and switch operating means are so designed that when pressure is applied to the knob 110 by a glass or other receptacle inserted into the recess 47, the closure member operating mechanism moves the closure member 96 to its open position before switch 117 closes to operate the ice-dispenser. Thus the closure member and the chute 104 are in proper position to direct ice pieces discharged through opening 87 into the passage 90. Batches of ice pieces will be dispensed into the glass until the pressure on knob 110 is released. In order to prevent ice pieces which have just been discharged through opening 87 from being trapped between the closure 96 and the seal 97 following release of the pressure on knob 110, there is preferably provided a time delay means for keeping the closure 96 open a few seconds after the rod 109 returns to its forward position. Any suitable device may be employed for this purpose. The illustrated means, generally indicated by numeral 120, comprises a dashpot means pivotally mounted within the door 2. The dashpot is connected to the closure 96 by a rod 122 and is designed to bias the door to an open position i.e., to retard the closing movement of the closure 96, thereby delaying movement of the door to its closed position by the spring 103. Also to prevent any ice pieces missing chute 104 from holding the closure 96 open, the bottom edge of the closure when open is spaced a sufficient distance from panel 4 to permit such ice pieces to fall through this gap.

The service area represented by recess 47 may also include means for dispensing cold water. Such cold water supply means may be of the type more fully described and claimed in U.S. Pat. No. 3,427,140 issued Feb. 25, 1969 in the name of Frederick M. White and assigned to the same assignee as the present invention. Briefly, it includes a coolant tank 125 positioned in the fresh food compartment and connected through a solenoid valve 126 to a water supply line. Water from the tank 125 is conducted into the door 3 through a line 27 terminating in the top portion of recess 47. The valve 126 is controlled by a switch 192 operated by a pushrod 130 in the same manner as pushrod 109. The drip sump or trough 68 and associated heater 69 takes care of any spilled water or water dripping.

Additional elements designed to provide trouble-free operation of the ice service include a heater 132 adjacent the passage inlet 91 and gasket 97 to maintain this area above freezing so that any moisture collecting in this area or in passage 90 will remain liquid.

FIG. 9 illustrates what is presently considered to be a preferred passage means for conveying ice pieces through the freeter door 3 to the service recess 47. In this embodiment, the passage 140 through the door 2, like passage 50 of FIG. 3, is substantially vertical with its inlet end 141 positioned to receive the ice pieces falling from the dispenser outlet 142. As in the other embodiments, the dispenser is associated with a receptacle which collects the ice pieces periodically produced by the icecaker. The dispenser of FIGS. 6—8 is preferred and feeds into the outlet 142.

A passage closure member 143 is pivotally supported adjacent the outlet end of the passage 140 and is connected through suitable operating closure mechanism (not shown) to pushrod 109. The closure member 143 can be pivotally rotated to a position opening passage 140 when pressure is applied to rod 109 to energize the icecaker. A heater 145, comparable to heater 132, may be provided adjacent the outlet end of passage 140 to maintain this area adjacent the member 143 at above freezing temperatures.

While there has been shown and described a number of embodiments of the present invention, it is to be understood that the invention is not limited thereto and it is intended by the appended claims to cover all modifications falling within the spirit and scope of the invention.

We claim:
1. In a refrigerated cabinet comprising insulated walls having an access opening and including a door for closing said opening, said walls and door defining a normally closed driven motor-operated means for moving said door; an ice dispenser in said cabinet;
2. an ice storage receptacle and ice dispenser in said compartment for receiving and storing ice pieces produced by said icemaker and having an outlet adjacent said door for discharging ice pieces;
3. said door having a passage therethrough for receiving ice pieces from said outlet when said door is closed and delivering said ice pieces to a service area on the exterior surface of the door;
4. operating means including actuating means exterior of said cabinet for energizing said dispenser; and means for normally closing said passage and means responsive to the operation of said actuating means for opening said closing means upon energization of said dispensor and closing said closing means after deenergization of said dispenser.
5. A refrigerated cabinet according to claim 1 in which said motor-driven means, during operation thereof, agitates ice pieces stored in said receptacle and includes means for intermitently discharging ice pieces during operation thereof.
6. In a refrigerator including a freezer compartment and a door for closing the access opening to said compartment; an ice dispenser in said compartment having a discharge opening adjacent said door;
said door including a passage therethrough having its inlet positioned on the inner surface of said door below said discharge opening;
said closure member mounted on the inner surface of said door for normally closing said inlet, said closure member being movable to a position rearward of said discharge opening to open said inlet;
operating means including an actuating means exterior of said cabinet for moving said closure member to open said inlet and thereafter energizing said dispenser; and said chute means connected to said closure member and extending into said passage when said closure member is in said rearward position for directing ice pieces from said discharge opening into said passage.
7. The refrigerator of claim 3 in which said actuating means is operable by a receptacle positioned to receive ice pieces from said passage.
8. In a refrigerator including a freezer compartment having an access opening and a door comprising spaced inner and outer panels for closing said access opening; said outer panel having a recess therein;
an ice dispenser in said compartment including a discharge opening adjacent said door;
said door including means defining a passage therein having its inlet in said inner panel below said discharge opening and its outlet in said recess;
a closure member for said inlet and means for pivotally supporting said closure member on said inner panel for pivotal movement of said member about a pivot axis below said closure member from a normal position closing said inlet to an open position rearwardly of said discharge opening of FIG. 6, said closure member including an ice chute having one end mounted on said closure member and the other end extending into said passage for directing ice pieces from said dispenser into said passage when said closure member is in its open position;
operating means for operating said dispenser and said closure member comprising a pushrod extending through said door;
crank means between said rod and said closure member for moving said closure member to its open position by pressure on said pushrod;
switch means actuated by said operating means when said closure member is in its open position for energizing said dispenser; and
means for biasing said closure member to its closed position.
7. The refrigerator of claim 6 in which said passage outlet is in the upper portion of said recess.
8. The refrigerator of claim 6 in which said pushrod is in said recess.
9. The refrigerator of claim 6 including means for delaying movement of said closure member to its closed position after release of pressure on said pushrod and deenergization of said dispenser for a time sufficient to permit the ice pieces discharged by said dispenser to enter said passage.
10. In a refrigerator including a freezer compartment and a closure means for closing the access opening to said compartment:
an ice dispenser in said compartment having a discharge opening adjacent said closure means;
said closure means including a passage therethrough having its inlet positioned on the inner surface of said closure means below said discharge opening;
a closure member for normally closing said passage and movable to a position to open said passage;
a chute member normally disposed within said passage and movable to a position projecting rearwardly from said inner surface of said closure means for receiving ice pieces from said discharge opening and directing them through said passage; and
operating means including an actuating means exterior of said cabinet for moving said closure member to open said passage and said chute to its ice receiving position and thereafter energizing said dispenser.
11. The refrigerator of claim 10 including means for delaying closing of said closure member following deenergization of said dispenser.
12. In a refrigerator including a freezer compartment and a door for closing the access opening to said compartment:
an ice dispenser in said compartment having a discharge opening adjacent said door;
said door including a passage therethrough having its inlet positioned on the inner surface of said door below said discharge opening;
a closure member for normally closing said inlet, said closure member being movable to a position rearward of said discharge opening to open said inlet;
operating means including an actuating means exterior of said cabinet for moving said closure member to open said inlet and thereafter energizing said dispenser; and
a chute means connected to said closure member and extending into said passage when said closure member is in said rearward position for directing ice pieces from said discharge opening into said passage.
13. The refrigerator of claim 12 comprising a recess in the outer surface of said door with said passage opening into said recess and with said actuating means disposed in said recess.
14. In a refrigerator including a freezer compartment and a door for closing the access opening to said compartment:
an icemaker in said compartment;
an ice receptacle and dispenser in said compartment for receiving and storing ice pieces produced by said icemaker and having a discharge opening adjacent said door for dispensing stored ice pieces;
said door including a passage therethrough having its inlet positioned on the inner surface of said door below said discharge opening for receiving ice pieces from said opening and conveying them to a service area on the outer surface of said door;
a closure member for normally closing said passage and movable to a position to open said passage;
operating means including an actuating means exterior of said cabinet for moving said closure member to open said passage and thereafter energizing said dispenser, and
means for delaying closing of said closure member following deenergization of said dispenser.
15. A refrigerator according to claim 14 in which said service area comprises a recess in the outer surface of said door and said actuating means is disposed in said recess.
16. A refrigerator according to claim 14 including means for rendering said operating means inoperable when said door is opened.
17. In a refrigerated cabinet comprising insulated walls having an access opening and including a door for closing said opening, said walls and door defining a normally closed freezer compartment:
an icemaker in said compartment;
an ice storage receptacle including motor-operated dispenser means for receiving, storing and dispensing ice pieces produced by said icemaker and having an outlet adjacent said door for discharging ice pieces;
said door having a passage therethrough for receiving ice pieces from said outlet when said door is closed and delivering said ice pieces to a service area on the exterior surface of the door;
operating means including manually operated means exterior of said cabinet and switch means operated thereby for energizing said dispenser means;
means operable when said door is opened for preventing operation of said dispenser means by said operating means;
means for closing said passage and means mechanically operated by said manually operated means for opening said closing means; and
means for delaying the closing of said closing means after deenergization of said dispensing means.