Nov. 3, 1970 R. J. ALVAREZ 3,537,273

HOUSEHOLD REFRIGERATOR INCLUDING EXTERIOR ICE SERVICE

Filed Feb. 28, 1969 2 Sheets-Sheet 1

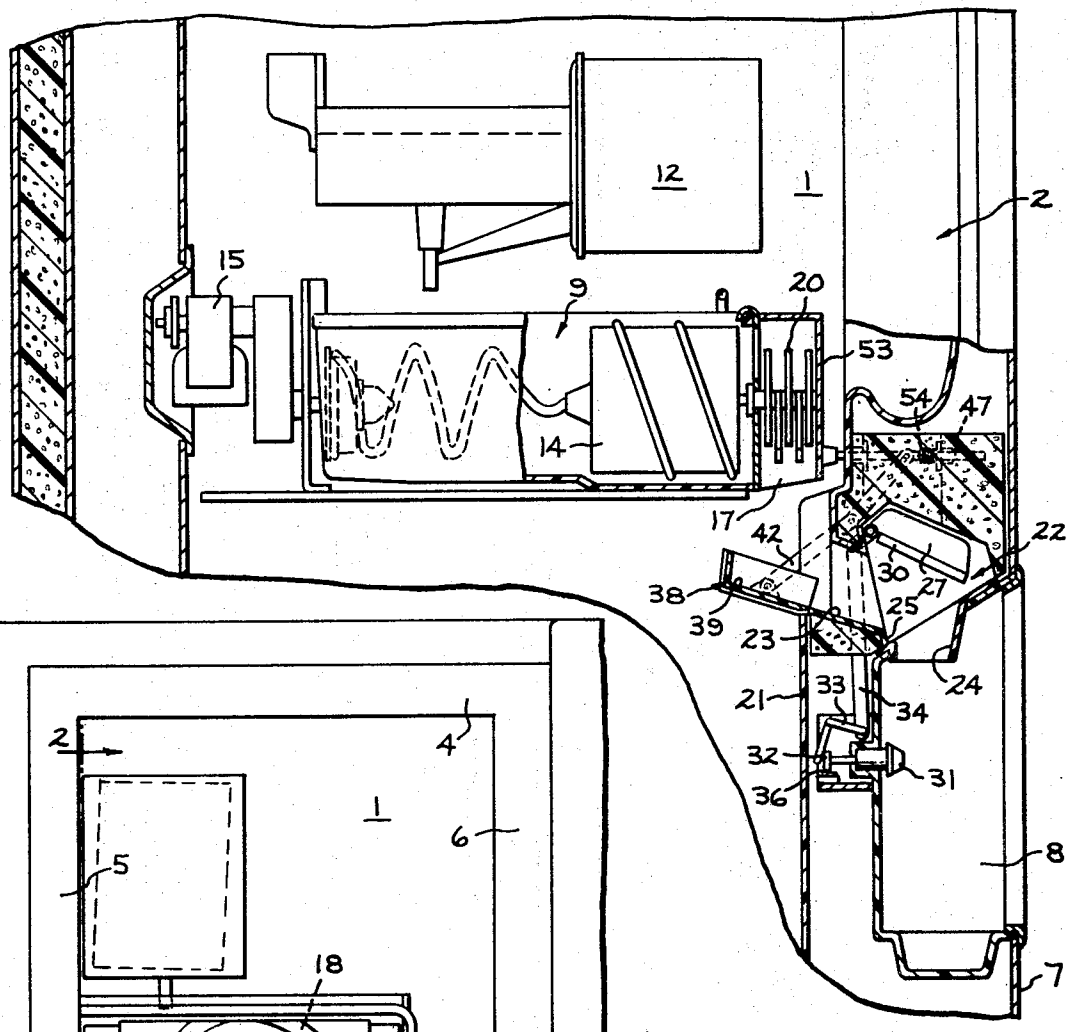


FIG. 2

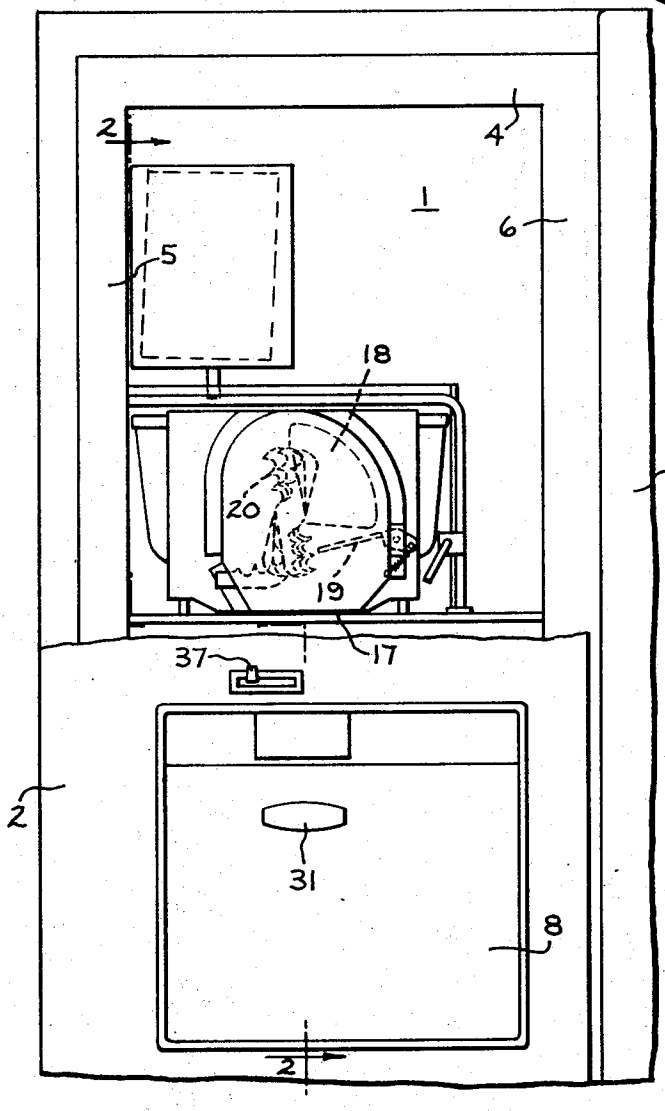


FIG. 1

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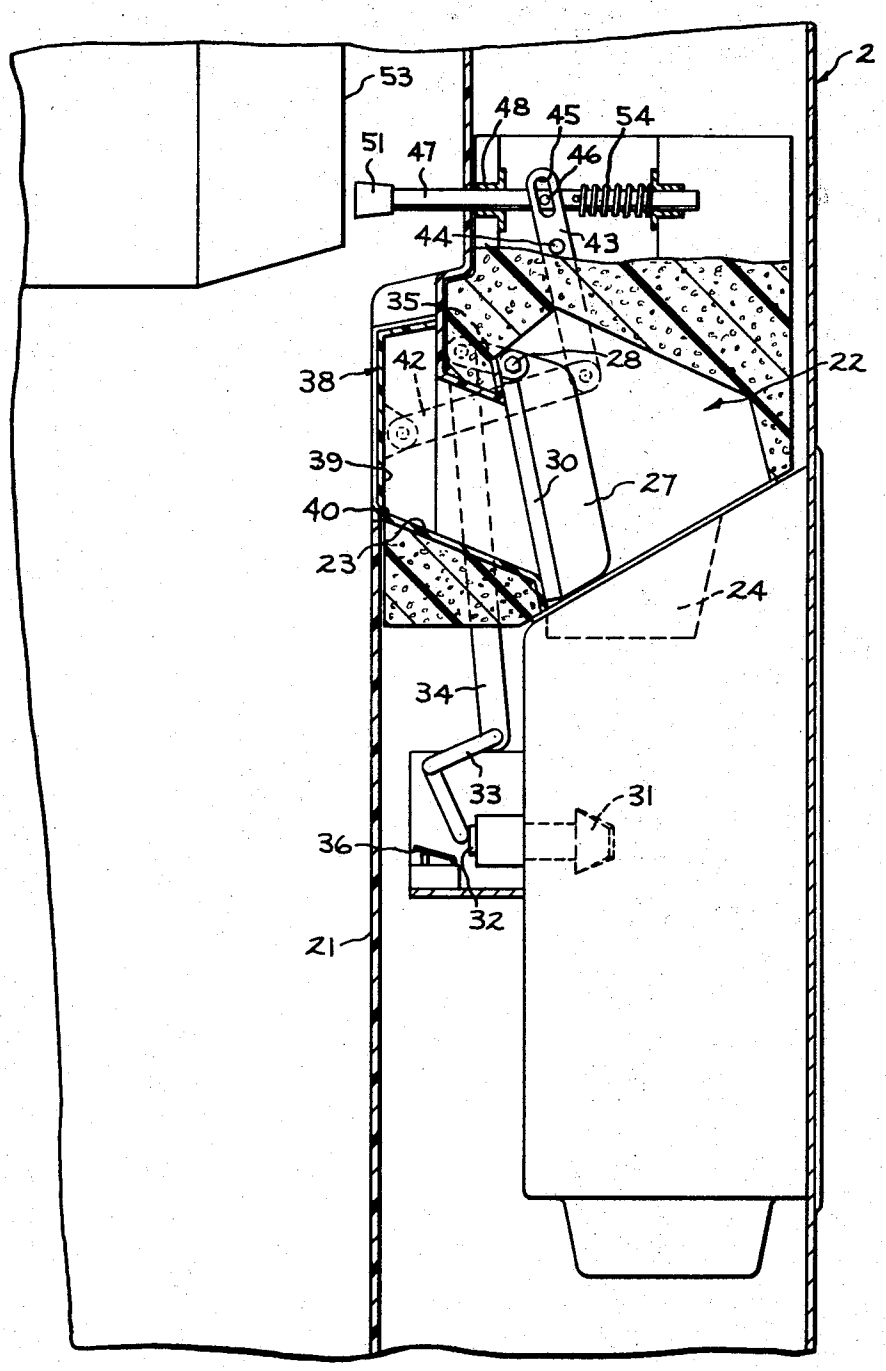


FIG.3

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HOUSEHOLD REFRIGERATOR INCLUDING EXTERIOR ICE SERVICE

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Filed Feb. 28, 1969, Ser. No. 803,316
Int. Cl. F25d 25/00
U.S. Cl. 62—266 14 Claims

ABSTRACT OF THE DISCLOSURE

A refrigerator including a freezer compartment, an ice dispenser in that compartment and an ice delivery passage for delivering ice exterior of the cabinet includes a chute normally positioned to receive ice from the dispenser and direct it into the passage when the freezer door is closed and movable to position closing the passage inlet when the door is opened.

BACKGROUND OF THE INVENTION

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

A number of modern household refrigerators include automatic ice makers and receptacles for receiving and storing ice pieces in the freezer compartments. One commerically available refrigerator, as described and claimed in the copending application, Ser. No. 669,234, filed Sept. 20, 1967, in the names of D. W. Jacobus and W. C. Bodong and assigned to the same assignee as the present invention, includes means for dispensing the stored ice pieces exteriorly of the refrigerator cabinet. This refrigerator comprises a freezer compartment containing an automatic dispenser for receiving ice pieces manufactured by an ice maker and having a discharge opening adjacent the freezer door. An ice delivery passage extending through the door has its inlet end positioned on the inner door surface. The inlet end of the passage is normally closed by an insulated closure member having an ice chute mounted thereon for receiving ice pieces from the dispenser and directing them into the passage when the closure member is opened. The chute is normally positioned in the passage but is movable with the closure member to a position for receiving ice pieces from the dispenser when the closure member is opened. In this construction, the chute is separated from the freezer compartment by the insulated closure member and therefore normally operates at a temperature above freezing. While the operating temperature of the chute is immaterial in the dispensing of relatively large ice pieces, normally referred to as ice cubes, it has been found that a relatively warm chute is not satisfactory for the dispensing of crushed ice. The crushed ice sticks to and as a result accumulates in the ice chute rather than passing into the delivery passage, and this accumulation or sticking problem has been found to be due mainly to the fact that the temperature of the chute is above freezing and increases with increase in temperature of the chute.

SUMMARY OF THE INVENTION

The present invention has as its general object the provision of a household refrigerator including an ice dispensing passage for exterior ice service which is particularly adapted to prevent crushed ice from sticking to or accumulating on the portion of the passage during the dispensing thereof.

More specifically there is provided a refrigerator including insulated walls, including an insulated door defining a normally closed freezer compartment containing an ice dispenser having a discharge opening adjacent the

inner surface of one of the compartment walls, preferably the inner surface of the door, and this wall includes a passage having its inlet on the inner surface of the wall below the ice dispenser discharge opening. This passage is normally closed by an insulated closure member within the passage and space from the passage inlet. An ice chute is movably supported on the inner surface of the wall for receiving ice from the dispenser and directing it into the passage. The chute normally extends inwardly from the wall to a receiving position below the ice dispenser discharge opening and is therefore maintained at the same below freezing temperature prevailing in the freezer compartment. In order to prevent the chute as well as the adjacent inlet portion of the ice passage from being warmed to above freezing temperatures when the freezer compartment door is opened, means are provided for automatically moving the chute to a position overlying, and preferably closing, the passage inlet during such periods.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing:

FIG. 1 is a front elevational view of a household refrigerator, partly in section, including the ice dispensing service of the present invention;

FIG. 2 is a vertical sectional view taken generally along line 2—2 of FIG. 1; and

FIG. 3 is an enlarged view of a portion of the structure shown in the FIG. 2 with the door partly open.

DESCRIPTION OF THE PREFERRED EMBODIMENT

While the exterior ice service of the present invention may be provided in any exteriorly accessible insulated wall portion of the freezer compartment of a household refrigerator, it will be specifically described in its application to a cabinet in which the front or accessible wall portion is formed by a door closing the access opening to the freezer compartment.

More specifically the invention will be described in its application to a cabinet containing, in side-by-side relationship, a freezer compartment **1** closed by a freezer door **2** and a fresh food compartment (not shown) by a fresh food door **3**.

The normally closed freezer compartment **1** is defined by a plurality of insulated walls including an insulated top wall **4**, insulated side walls **5** and **6** and an insulated front wall comprising the door **2**. The door **2** includes an outer panel **7** forming the outer face of the door and having a recess **8** generally defining a service center or area to which ice is delivered exteriorly of the cabinet from an ice dispenser **9** disposed in the upper portion of the freezer compartment **1**, that is above the level of the recess **8**. The ice dispenser **9** is of a type designed to dispense crushed ice or selectively, crushed or cube ice. The illustrated ice dispenser is more fully described and claimed in the copending application of Robert J. Alvarez, Ser. No. 756,934, filed Sept. 3, 1968 and assigned to the same assignee as the present invention. Briefly described, it includes a receptacle **11** for receiving and storing ice pieces produced by an automatic ice maker **12** and rotatable dispensing means **14** positioned in the receptacle and driven by a speed reduction drive means including a motor **15**. Upon rotation of the dispensing means **14**, ice pieces stored in the receptacle are advanced by the dispensing means for discharge through an opening **18** in the front wall of the receptacle. These ice pieces may either fall directly through the discharge opening **17** or by a proper positioning of an interceptor means **19** will first be crushed to form crushed ice by a crusher including crusher arms **20** whereupon the crushed ice will be discharged through the discharge opening **17**. The ice dispenser **9** is positioned

within the freezer compartment 1 with the front end including the discharge opening 17 adjacent the inner panel or surface 21 of the door 2.

In accordance with the present invention the means for conducting ice discharged from the discharge opening 17 to the recess 8 comprises a passage generally indicated by the numeral 22 extending through the door. This passage includes a slanting inlet portion 23 and a substantially vertical portion 24 opening into the top of the recess 8. The inlet portion 23 at its junction with the outlet portion 24 is provided with a peripheral shoulder 25 forming a sealing surface for engagement by a pivoted and insulated closure member 27 pivotally mounted as indicated at 28 within the passage 22. This closure member 27 which includes a sealing gasket 30 for sealing engagement with the shoulder 25 is normally closed as indicated in FIG. 3 of the drawing. Exteriorly operable means for moving the closure member 27 to its open position illustrated in FIG. 2 comprises a push rod 31 mounted in the rear wall of the recess and having a pad 32 on the inner end thereof for engagement with a crank arm 33. The crank arm 33 is connected through a member 34 to lever arm 35 on the closure member 27 in such a manner that inward or rearward movement of the rod 31 moves the closure member 27 to its open position. Switch means including a switch arm 36 adapted to be contacted by pad 32 is provided for energizing the dispenser motor 15 when the closure member 27 is open. In addition to this switch means, the controls also include control means (not shown) operated by a selector arm 37 for selectively positioning the interceptor means 19 so in the position shown in FIG. 1 for dispensing crushed ice or in an inoperative position for dispensing the ice pieces stored in the receptacle directly to the opening 17.

A chute 38 pivotally supported on the inner surface 21 of the door 2 below the discharge opening 17 is adapted to receive the ice discharged from the discharge opening 17 and to direct this ice into the passage 22. The chute is preferably composed of or lined with a plastic material such as polypropylene and normally extends inwardly and upwardly from the inner surface 21 to provide a sloping bottom wall 39 in substantial alignment with the bottom wall of the passage inlet 23. In the illustrated embodiment of the invention the chute 38 has its forward edge 40 pivotally secured adjacent the inlet end of the passage and when the door 2 is closed, the chute 38 is positioned in its slanting position as illustrated in FIG. 2 of the drawing for receiving ice from the discharge opening 17 and directing it into the passage. In this position, all portions of the chute 38 as well as the inlet portion 23 of the passage 22 are directly exposed to the below freezing temperatures of the freezer compartment 1 and are thereby maintained at temperatures below freezing. As a result, the ice discharged from the discharge opening 17, whether in cube or crushed form, will not stick to either the chute 38 or to the inlet portion of the passage 22 with the result that all the ice is readily delivered through the passage 22 to a receptacle positioned within the recess 8. The ice does not collect on the surfaces of the outlet portion 24 of the passage 22 since these surfaces are substantially vertical and are at room temperature or at least at a temperature above freezing so that only very small pieces can cling to this portion and these quickly melt and fall into the sump at the bottom of the recess 8.

As an aid in preventing the chute 38 and the inlet portion 23 of the passage 22 from being quickly warmed to above freezing temperatures when the door 2 is opened, means are provided for automatically moving the chute 38 to a position flush with the inner surface of the door and overlying the inlet end of the passage 22 each time the door 2 is opened. This means includes the pivotal mounting of the chute 38 on the inner surface of the door and the linkage arms 42 and 43 pivotally connected to one another with the arm 42 also pivotally connected to the chute 38.

The arm 43 is designed to pivot above the pivot point 44 intermediate the ends thereof and the free end of the arm 43 is provided with a slot 45 for receiving a pin 46 carried by a push rod 47. The push rod 47 as illustrated in FIG. 3 of the drawing is slidably supported in slides 48 provided in the door 2 and this mechanism plus the linkage arms 42 and 43 and the actuator rod 47 are designed to position the chute 38 in its open or ice receiving position when the door 2 is closed and to move the chute to its position overlying and closing the inlet end of passage portion 23 whenever the door 2 is opened.

To this end, the head 51 of the push rod 47 extending beyond the inner first surface of the door 21 is designed to engage a front wall portion 53 of the ice dispenser 9 when the door is closed thereby depressing the push rod 47 to move the chute to its open or normal position as illustrated in FIG. 2 of the drawing. When the door is opened the head 51 is disengaged from the surface 53 so that the rod 47 is free to move inwardly relative to the door 2 under the biasing action of a spring 54 which may be conveniently mounted on the rod 47 as illustrated in FIG. 3 of the drawing. This inward movement of the rod 47 pivots the linkage arm 43 in a counterclockwise direction about its pivot point 44 thereby moving the chute 38 in its closed position as illustrated in FIG. 3 of the drawing.

Thus when the door 2 is open the chute 38 is flush with the cold inner surface 21 of the door which minimizes the warming of the chute to the above freezing ambient temperatures. The chute then also substantially closes or seals the inner end of the passage portion 23 to protect this below freezing portion of the passage 22 from the warming effect of the ambient atmosphere. In addition the closed chute 38 hides the inlet end of the passage 22 from view when the door is opened and prevents any foodstuffs or other foreign materials from accidentally falling into the passage 22 during door opening periods. As soon as the door is closed, contact of the push rod 47 with the surface 53 automatically returns the chute 38 to its normal position in which both chute and the inlet portion 23 of the passage 22 are exposed to the below freezing temperatures of the freezing compartment 1.

While there has been shown and described a particular embodiment of the present invention, it will be understood that it is not limited thereto and 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 including insulated walls including a door defining a normally closed freezer compartment;
   - an ice dispenser in said compartment having a discharge opening adjacent the inner surface of one wall;
   - said one wall including a passage therethrough having its inlet on the inner surface of said one wall below said discharge opening;
   - a closure member within and spaced from said passage inlet for closing said passage except when ice is being dispensed through said passage.
   - a chute movably supported on the inner surface of said one wall and normally extending from said one wall to a position below said discharge opening for receiving ice from said discharge opening and directing it into said passage; and
   - means operable when said door is opened to move said chute to a position adjacent said inner surface of said wall and overlying said passage inlet.

2. The refrigerator of claim 1 in which said passage is in said door.

3. The refrigerator of claim 1 in which said passage inlet is closed by said chute when said door is opened.

4. 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 the inner surface of said door;

said door including a passage therethrough having its inlet on the inner surface of said door below said discharge opening;

a closure member pivotally mounted within said passage for closing said passage except when ice is being dispensed through said passage;

a chute movably supported on the inner surface of said door and normally extending rearwardly from said door below said discharge opening when said door is closed for receiving ice from said discharge opening and directing it into said passage; and

means operable when said door is opened to move said chute to a position overlying said passage inlet.

5. The refrigerator of claim **4** wherein said chute and passage are composed of a plastic material.

6. The refrigerator of claim **4** in which said chute is pivotally supported on said door and is pivotally movable to a position closing said passage inlet when said door is opened.

7. In a refrigerator comprising insulated walls including a door defining a normally closed freezer compartment;

an ice dispenser in said compartment having a discharge opening adjacent the inner surface of one of said walls;

said one wall including a passage therethrough having inlet means on the inner surface of said one wall below said discharge opening; and

a closure member within said passage and spaced from said passage inlet means for closing said passage except when ice is being dispensed through said passage;

said inlet means on the inner surface of said one wall being movable from a position beneath said discharge opening for receiving ice from said discharge opening and directing it into said passage to a position closing said passage when said door is open.

8. The refrigerator of claim **7** including a recess on the outer surface of said one wall, said passage having its outlet in said recess.

9. In a refrigerator including a freezer compartment having an access opening and a door for normally closing said access opening;

an ice dispenser in said compartment having a discharge opening adjacent the inner surface of said door;

a passage through said door having a slanting inlet portion positioned beneath said discharge opening when said door is closed for receiving ice from said discharge opening and conducted it exteriorly of said door; and

a closure member spaced from the inlet and outlet ends of said passage for closing said passage except when ice is being dispensed by said dispenser;

said closure member being disposed relative to said passage in a position exposing said slanting inlet portion to the below freezing temperature of said freezer compartment.

10. The refrigerator of claim **9** in which said slanting inlet portion of said passage is composed of a plastic material.

11. The refrigerator of claim **9** in which said slanting inlet portion extends inwardly from the inner surface of said door into said freezer compartment.

12. The refrigerator of claim **10** including a recess on the outer surface of said door, said passage opening into said recess.

13. In a refrigerator comprising a freezer compartment having an access opening, closure means for normally closing said access opening:

an ice dispenser in said compartment having a discharge opening adjacent the inner surface of said closure means;

said closure means including a passage therethrough for conducting ice from said dispenser through said closure means;

said passage comprising a slanting inlet portion having an inlet for receiving ice from said dispenser discharge opening and a vertical outlet portion; and

a closure member for closing said passage except when ice is passing therethrough;

said closure member being positioned adjacent the outer end of said slanting inlet portion of said passage whereby said slanting inlet portion is maintained at a below freezing temperature by exposure to the temperature of said freezer compartment to prevent ice passing through said passage from sticking to the walls of said slanting inlet portion.

14. The refrigerator of claim **13** in which said closure means includes a recess in the outer surface thereof below said closure member and the outer end of said passage opens into said recess.

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WILLIAM E. WAYNER, Primary Examiner

U.S. Cl. X.R.

62—344, 377; 222—233