Jan. 28, 1947. V. CIVKIN 2,414,929

COMBINED CLOSURE AND RACK FOR REFRIGERATORS

Filed Dec. 14, 1943 2 Sheets-Sheet 1

Fig. 1.

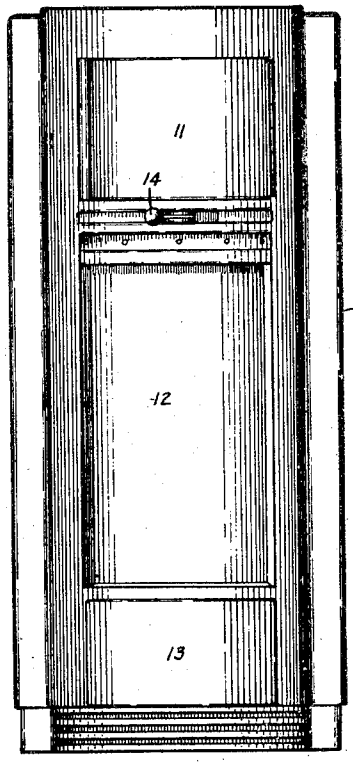
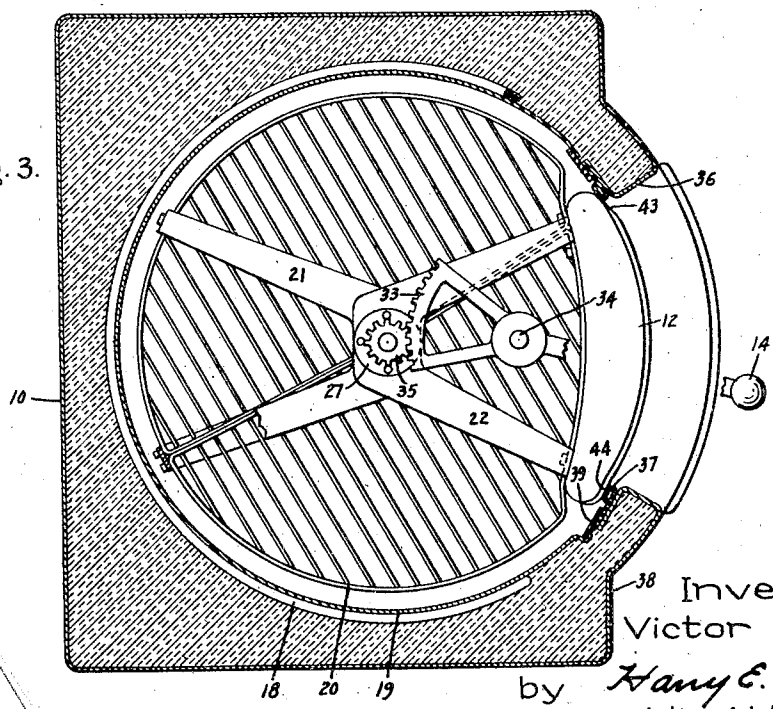


Fig. 3.



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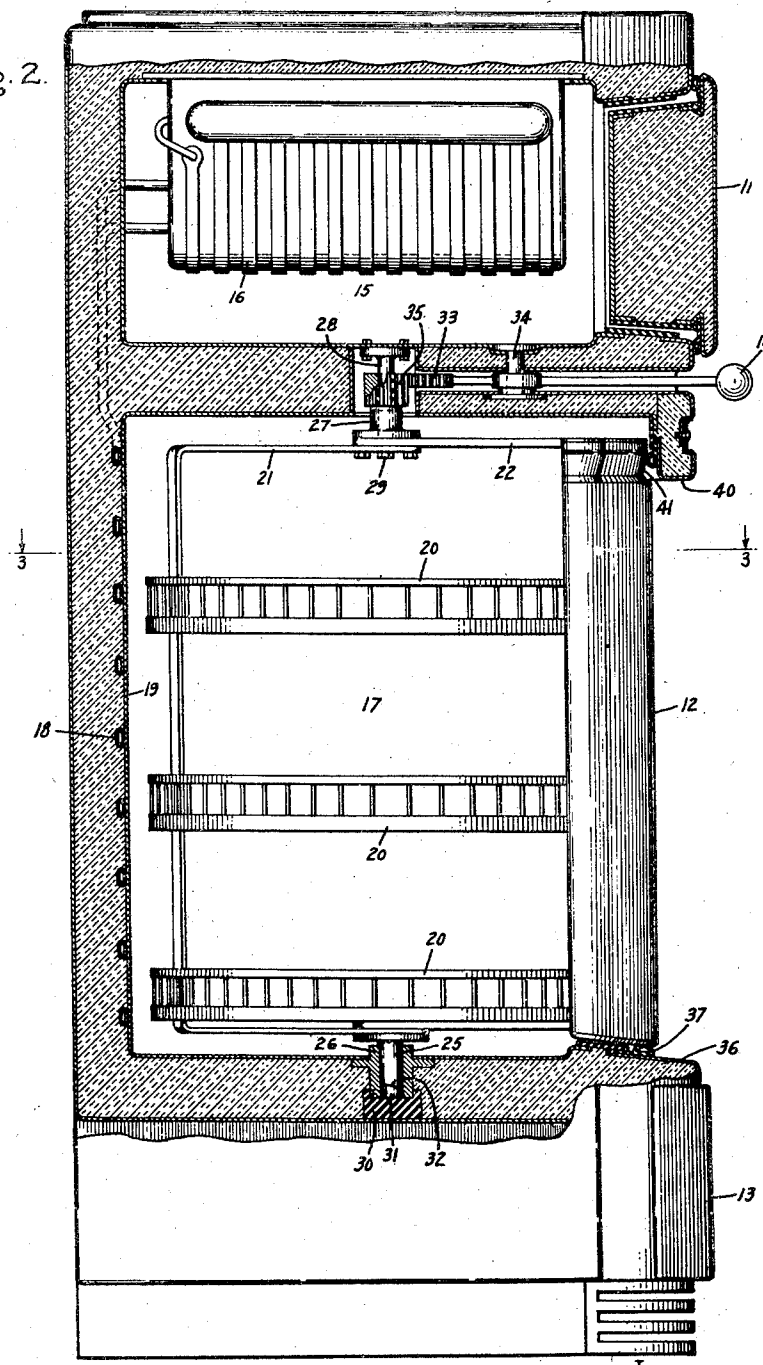
Filed Dec. 14, 1943 2 Sheets-Sheet 2

Fig. 2.



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UNITED STATES PATENT OFFICE

2,414,929

COMBINED CLOSURE AND RACK FOR REFRIGERATORS

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5 Claims. (Cl. 312—186)

1

My invention relates to refrigerators and the like and particularly to cabinet structures for refrigerators of the type provided with rotating shelves within the food storage compartment.

It has been proposed frequently to construct refrigerator cabinets with food compartments of circular cross-section provided with rotating shelves so that the shelves may be rotated in order to bring food on any portion thereof to a position adjacent the door opening. In refrigerators of this type certain saving of space may be obtained by proper arrangement of the refrigerating mechanism; however, the usual swinging door is not convenient and requires considerable area in front of the refrigerator for a full opening movement. Accordingly, it is an object of my invention to provide a cabinet for refrigerators arranged to provide a rotatable shelf supporting structure together with a door for closing the door opening which shall not require additional space in front of the refrigerator when it is open.

It is another object of my invention to provide a simple and easily operated door for refrigerators of the rotating shelf type and which shall not require mounting of the door on the outer wall of the cabinet.

Further objects and advantages of my invention will become apparent as the following description proceeds, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention reference may be had to the accompanying drawings in which Fig. 1 is a front view of a refrigerator having a cabinet embodying my invention; Fig. 2 is an enlarged side elevation of the cabinet, parts thereof being shown in section; and Fig. 3 is a sectional plan view of the cabinet along the line 3—3 of Fig. 2, with the rotating structure shown in full with parts broken away for purposes of illustration.

Briefly, the refrigerator shown in the drawings comprises a thermally insulated cabinet provided with the usual mechanical refrigerating system and including a primary evaporator for cooling a freezing compartment in the top portion of the cabinet and a second evaporator for cooling the food storage compartment in the central portion. Within the food storage compartment is arranged a rotating shelf supporting structure and the door for the food storage compartment is rigidly mounted on the shelf supporting structure and biased to its closed position, the door being opened by rotation of the

2

structure and being out of the way of the operator when placing articles on or removing them from the shelves.

Referring now to the drawings the refrigerator shown in Fig. 1 comprises a thermally insulated cabinet 10 divided into an upper freezing compartment closed by a door 11, a central or food storage compartment closed by a door 12, and a lower or machinery compartment closed by a removable panel 13. An operating handle 14 is provided for opening the door 12 which is rotatable within the food compartment. The details of construction of the refrigerator are more clearly shown in Figs. 2 and 3. The freezing compartment indicated at 15 and closed by the door 11 is provided with an evaporator or cooling unit 16 which is supplied with refrigerant in the usual manner from a compressing unit (not shown) which is arranged in the lower or machinery compartment closed by the panel 13. In order to cool the food storage compartment, indicated at 17, a secondary refrigerant coil or evaporator 18 is arranged on the metal liner 19 of the compartment 17. The secondary evaporator or coil 18 is of the type well known in the art and comprises a closed conduit having a number of turns in heat exchange relation with the primary evaporator 16. The conduit 18 is partially filled with a vaporizable refrigerant liquid, and heat absorbed from the compartment 17 vaporizes the liquid, the vapor rising until it comes into heat exchange with the evaporator 16 where it is condensed and returns as a liquid to the lower portion of the secondary system. The upper portion of the conduit 18 which is in contact with the primary evaporator 16 constitutes a condenser and the lower portion in contact with the liner 19 constitutes an evaporator.

In order to locate food articles throughout the volume of the compartment 17 a plurality of shelves 20 are mounted within the compartment on a rotatable supporting structure including supporting members 21 and 22. The structure is mounted at the bottom on a journal member 25 fitted in a stationary bearing member 26, and at the top is secured to a sleeve bearing member 27 engaging a stationary journal or pin 28. The supporting members 21 and 22 are removably secured to the journal 25 and bearing 27 by suitable bolts such as indicated at 29 connecting the members 21 and 22 and the sleeve 27, similar bolts (not shown) being provided for the connection to the journal 25. The bearing 26 is secured to the inner liner 19 by welding or some other suitable method and is supported rigidly on a cross

member 30 in order to support adequately the weight of the rotating structure and articles placed thereon. The journal 25 engages a thrust bearing 31 having an inclined upper surface, the journal being provided with an inclined bottom thrust bearing surface indicated generally at 32 so that when the structure is rotated it is lifted along its vertical axis.

In order to rotate the shelf supporting structure a segment 33 secured on the handle 14 and rotatable about a bearing 34 by operation of the handle is arranged to engage a pinion 35 on the sleeve 27, a relatively small movement of the handle 14 producing the necessary amount of rotation of the supporting structure.

The food storage compartment is provided with a door opening 36 in the thermally insulated walls of the cabinet and which is closed by the door 12. The door 12 is rigidly and preferably removably secured on the supporting structure for rotation therewith, it being bolted or otherwise suitably fastened to the member 22 of the structure. The members 21 and 22 and the door 12 are so arranged that by removing the bolts 29 and the bolts securing the structure to the journal member 25, the several parts may be removed through the door opening 36. In order to seal the door opening a resilient gasket 37 of rubber or other suitable material is secured about the opening 36. In the construction shown the gasket 37 comprises a bead portion and a tongue, the gasket being secured in place by clamping the tongue between the outer metal liner of the cabinet 10 indicated at 38 and an insulating strip 39 which connects the outer liner and the inner liner 19 and minimizes the transfer of heat between the liners. To facilitate the removal of the door, a portion of the cabinet at the top of the opening 36 and indicated at 40 is made removable. In its closed position the door rests against the gasket 37 along the sides of the opening 36 and on the gasket 37 at the bottom of the opening; the door is also provided with an inclined portion 41 at its upper end which engages the top part of the gasket 37. The portion 41 and the bottom of the door both present downwardly facing surfaces which compress horizontal portions of the gasket 37 when the door is closed. The inclined plane provided by the thrust bearing surface 32, as has already been mentioned, lifts the supporting structure when it is rotated and, consequently, the initial movement of the structure lifts the door from the top and bottom portions of the gasket 37 and facilitates the release of the sealing engagement. This prevents rubbing of the door along the gasket when it is being opened. In order to assure the sealing of the door against the gasket 37 along its vertical sides the door is arranged so that in its closed position an inclined surface 43 rests against the gasket at the right-hand edge of the door and a surface 44 rests against the gasket at the left hand edge of the door. The door is opened by moving the handle 14 to the right which produces clockwise rotation of the supporting structure as viewed in Fig. 3. This rotation moves both the surfaces 43 and 44 away from the gasket 37. The outer surface of the door is so shaped that when it is rotated in a counterclockwise direction it will clear the gasket 37 along the left-hand edge of the door and will rotate with the supporting structure to any desired position so that access may be had to articles on the shelves 20. The inclined bearing surface 32 urges the supporting structure by gravity to its position as shown in Fig. 3 so that the door is biased closed. From the foregoing it is readily apparent that the door 12 remains within the compartment 17 at all times and is never required to be moved into the way of a person placing articles on or removing them from the shelves 20. The arrangement for biasing the door to its closed position insures adequate sealing of the bearing opening.

While I have shown my invention as applied to a household refrigerator, modifications and other applications will readily be apparent to those skilled in the art. I do not, therefore, desire my invention to be limited to the particular construction shown and described and I intend by the appended claims to cover all modifications within the spirit and scope of my invention.

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

1. A cabinet comprising walls forming a storage compartment and having a door opening therethrough, a supporting structure arranged in said compartment, means including a bearing member and a journal member for mounting said structure for rotation about a central axis in said compartment, one of said members being secured to said cabinet and the other of said members being secured on said structure, a door for said door opening arranged within said compartment and mounted on said structure for rotation therewith and being constructed and arranged for limited vertical movement, and a sealing gasket for said door arranged about said door opening and having a horizontal portion arranged to engage said door along a downwardly facing portion thereof, one of said members having an inclined plane formed thereon and arranged to engage a portion of the other of said members for biasing said door by the action of gravity into engagement with said gasket and for lifting said door upon initiation of the opening movement thereof to facilitate the movement of said door.

2. A cabinet comprising walls forming a storage compartment and having a door opening therethrough, a supporting structure arranged in said compartment, means including a bearing member and a journal member for mounting said structure for rotation about a central axis in said compartment, one of said members being secured to said cabinet and the other of said members being secured on said structure, a door for said door opening arranged within said compartment and mounted on said structure for rotation therewith and being constructed and arranged for limited vertical movement, a sealing gasket for said door arranged about said door opening and having a horizontal portion arranged to engage said door along a downwardly facing portion thereof, one of said members having an inclined plane formed thereon and arranged to engage a portion of the other of said members for biasing said door by the action of gravity into engagement with said gasket and for lifting said door upon initiation of the opening movement thereof to facilitate the movement of said door, and means engaging said supporting structure independently of said door for rotating said structure to open and close said door.

3. A cabinet comprising walls forming a storage compartment and having a door opening therethrough, a shelf supporting structure arranged in said compartment and mounted for rotation about a central axis therein, a door for said door opening arranged within said compartment and mounted on said structure for rotation there-

with, a sealing means for said door arranged about said door opening, said door in its closed position engaging said sealing means, and means constructed and arranged to be effective upon initiation of the opening movement of said door for releasing said door from engagement with said sealing means to prevent rubbing of said door along said sealing means and thereby to facilitate movement of said door away from said door opening.

4. A cabinet comprising walls forming a storage compartment and having a door opening therethrough, a shelf supporting structure arranged in said compartment and mounted for rotation about a central axis therein, a door for said door opening arranged within said compartment and mounted on said structure for rotation therewith, means whereby said door is biased to its closed position by the action of gravity, a sealing means for said door arranged about said door opening, said biasing means being constructed and arranged to be effective upon

initiation of the opening movement of said door for releasing said door from engagement with said sealing means to facilitate movement of said door away from said door opening.

5. A cabinet comprising walls forming a storage compartment and having a door opening therethrough, a supporting structure arranged in said compartment and mounted for rotation about a central axis therein, means whereby said structure is mounted and arranged for limited vertical movement, a door for said door opening arranged within said compartment and mounted on said structure for rotation and limited vertical movement therewith, a sealing means for said door arranged about said door opening and having a horizontal portion arranged to engage said door along a downwardly facing portion thereof, and means effective upon initiation of the opening movement of said door to lift said door for facilitating the disengagement of said door from said horizontal portion of said sealing means.

VICTOR CIVKIN.