

Oct. 19, 1937.

E. H. MITCHELL

2,096,256

REFRIGERATING APPARATUS

Filed Jan. 25, 1935

3 Sheets-Sheet 1

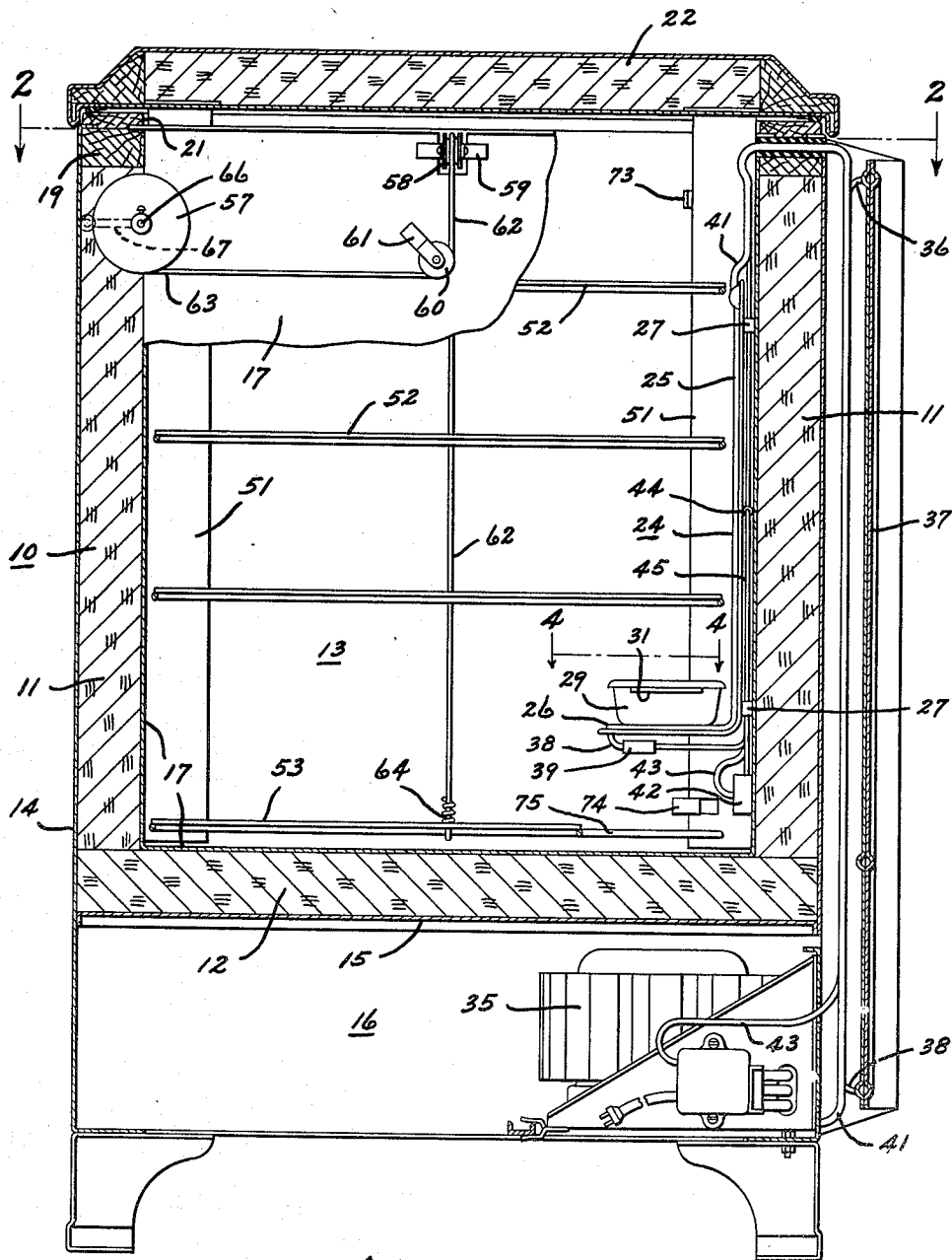


Fig. 1

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3 Sheets-Sheet 2

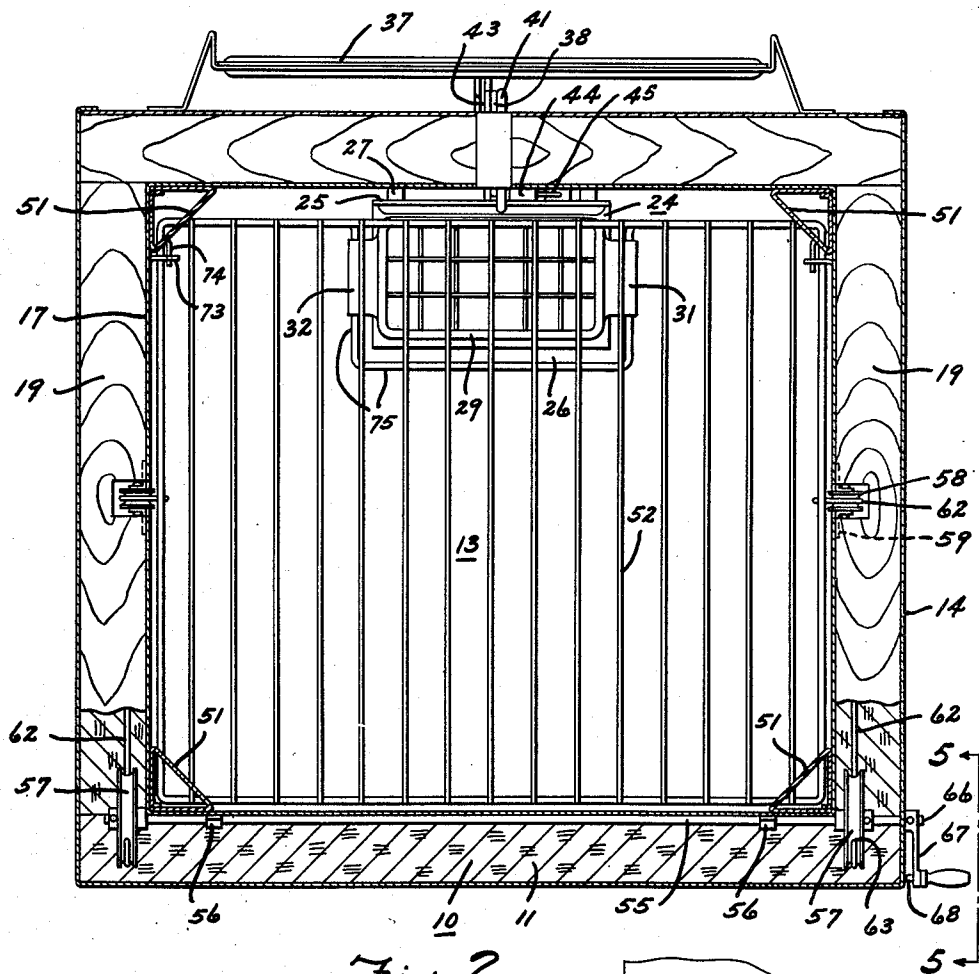


Fig. 2

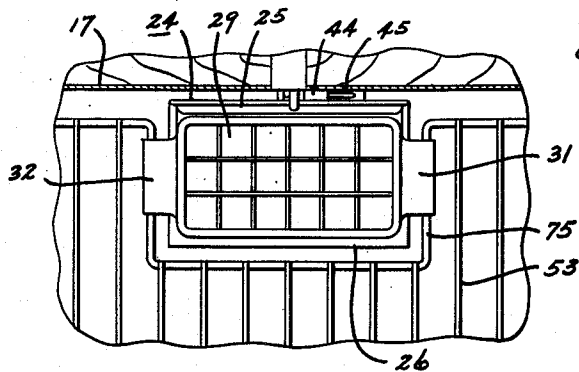


Fig. 4

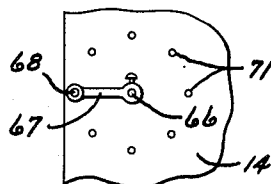


Fig. 5

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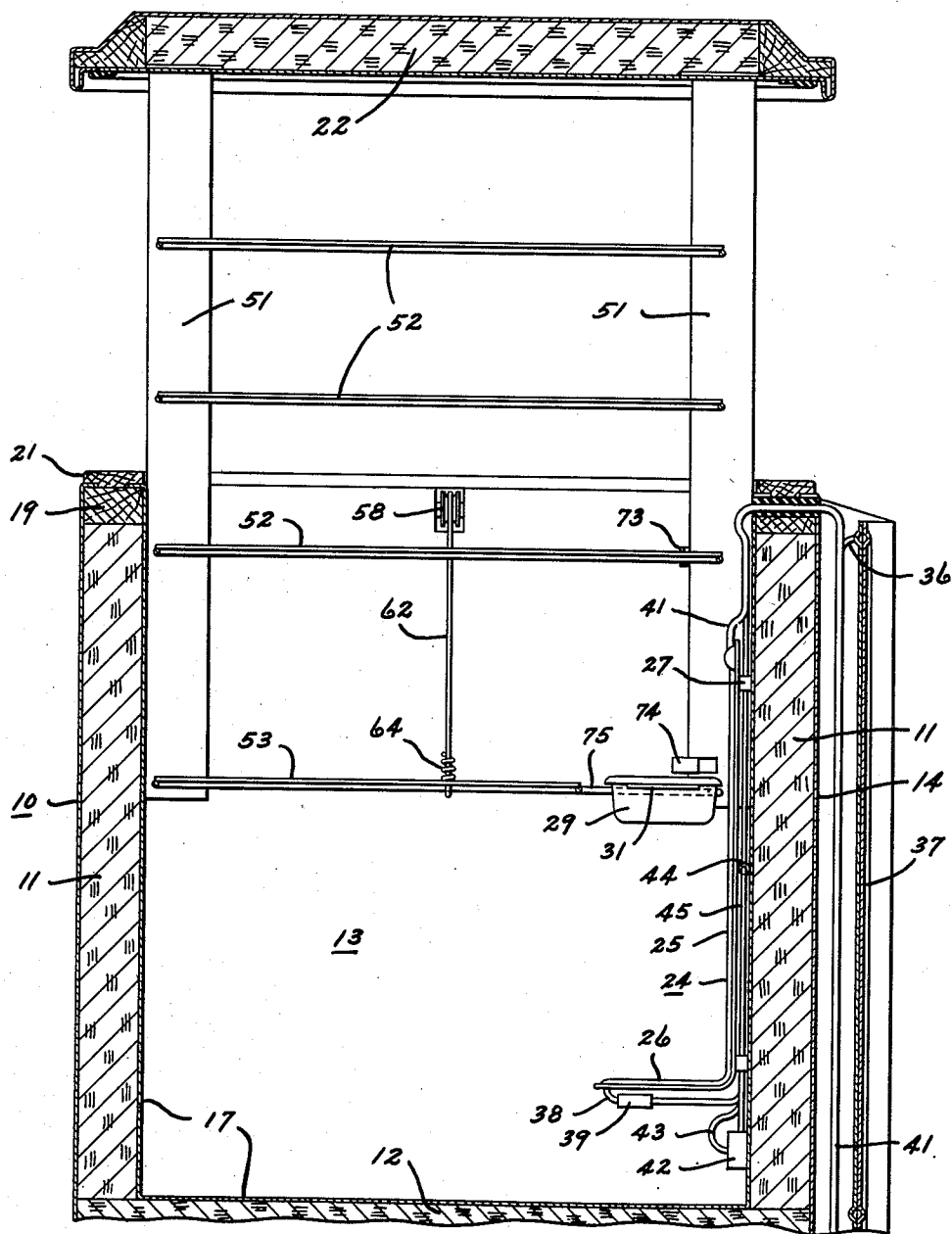


Fig. 3

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UNITED STATES PATENT OFFICE

2,096,256

REFRIGERATING APPARATUS

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10 Claims. (Cl. 62-89)

The present invention relates to refrigerating apparatus and particularly to refrigerator cabinets of the household food storage type.

Recently refrigerator cabinets for household food storage purposes of the so-called lift or open-top type have been put on the market. These cabinets include a food storage compartment having a single access opening provided in the top thereof which opening is closed by a pivotally mounted door. Certain objections have been raised in the use of these cabinets which has resulted in decreased popularity thereof. These objections are forthcoming because of the inconvenience of removing food from the shelf arrangement employed in the cabinets and because of the structure and location of the cooling element mounted in the food compartment. My invention is directed to an improved shelf arrangement which facilitates removal of food products from the food storage compartment of a refrigerator of the open-top type thereby eliminating objections to the use thereof.

One of the objects of the present invention is to provide an improved household refrigerator cabinet of the top opening type.

Another object of the present invention is to provide a top opening type household refrigerator cabinet with an improved shelf arrangement for facilitating the placing of food products in the storage compartment thereof and for providing selective removal of the products from the compartment.

A further object of the present invention is to provide a household refrigerator cabinet of the type having an access opening in the top wall of the food storage compartment formed therein with a food supporting shelf arrangement which includes a plurality of shelves spaced vertically apart throughout the height of the compartment and movable relative to the compartment simultaneously with movement of the compartment opening closure member to a point above or on substantially the same horizontal plane with the open-top of the food compartment.

In carrying out the foregoing objects it is a still further object of the invention to provide a refrigerating apparatus wherein movement of a door, employed for closing an opening leading to a food storage compartment in a cabinet, removes an ice tray from its support on a cooling element, disposed in the compartment, and moves the tray toward the compartment opening.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accom-

panying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a vertical sectional view partly fragmentary and partly in elevation of a refrigerating apparatus constructed in accordance with my invention;

Fig. 2 is a sectional view of the refrigerating apparatus taken on the lines 2-2 of Fig. 1;

Fig. 3 is a fragmentary vertical sectional view of the refrigerating apparatus disclosed in Fig. 1 and showing the food storage compartment door of the refrigerator cabinet in open position;

Fig. 4 is a fragmentary view taken on the line 4-4 of Fig. 1 and showing a means for engaging an ice tray supported on a cooling element within the food storage compartment of the refrigerator cabinet for removing the tray from its support; and

Fig. 5 is a fragmentary elevational view taken in the direction of the lines 5-5 in Fig. 2 and disclosing a portion of an elevating means.

Referring to the drawings, for the purpose of illustrating my invention, I have shown in Fig. 1 thereof a refrigerating apparatus including a cabinet of the household food storage type generally represented by the reference character 10. Cabinet 10 has a plurality of upright insulating walls 11 and a horizontal insulating wall 12 forming an open-top food storage compartment 13 in the cabinet. A metal shell or panel 14 is placed over the insulating walls 11 for providing the cabinet with a metallic outer wall surface and for providing a support for the cabinet. A metal plate 15 is welded or otherwise secured to shell 14 above the bottom thereof to support the horizontal insulating wall 12 and to provide a machine compartment 16 in the lower portion of the cabinet 10. The food compartment 13 is lined with a metallic lining member 17. A door 40 opening wood frame member 19 surrounds the open top of the compartment 13. The upper edges of the metal shell 14 and the upper edges of the compartment liner 17 are turned over upon and may be secured to the wood frame member 19 in any suitable and well-known manner. A molding 21 of insulating material is placed over and secured to the wood frame 19 and forms the top surface of the walls 11. A door or closure member 22 having suitable gasket or sealing means thereon engages the molding 21 at the top of the walls 11 and seals the compartment 13 from air externally of the cabinet 10. A cooling element or evaporator 24 preferably of the corrugated sheet metal variety comprising a ver-

tically extending or cooling portion 25, disposed adjacent one wall 11 of compartment 13, and a substantially horizontal extending receptacle supporting portion 26 is mounted by brackets 27 within compartment 13. The receptacle supporting portion 26 of evaporator 24 is spaced from the bottom wall 12 of cabinet 10 and has a tray or receptacle 29, adapted to contain water or other substance to be congealed or frozen by the cooling effect of the evaporator, disposed thereon. The tray 29 includes a pair of handles 31 and 32 extending outwardly from walls thereof and beyond the edges of the evaporator 24. The purpose and function of the handles 31 and 32 on tray 29 will be more fully described hereinafter.

The evaporator 24 is connected with a closed refrigerating system. The refrigerating system includes a motor-compressor unit 35 supported in any suitable manner in the machine compartment 16. A pipe 36 extends from the compressor of the unit 35 to the upper end of a condenser-receiver 37, preferably of the corrugated sheet metal variety, mounted on the back wall of cabinet 10 and is adapted to conduct refrigerant compressed by the compressor to the condenser. A pipe 38 extends from the lower portion of condenser-receiver 37 to the lower or tray supporting portion 26 of evaporator 24 and is adapted to conduct refrigerant condensed and liquefied in condenser-receiver 37 to the evaporator. An expansion device or valve 39, of any suitable or conventional design, is interposed in the pipe line 38 for controlling flow of liquid refrigerant to the evaporator 24. Refrigerant enters the lower portion 26 of evaporator 24, vaporizes upon absorbing heat from the tray 29 and compartment 13, and flows to the upper portion 25 of the evaporator. A pipe 41 connected to the upper portion 25 of evaporator 24 conducts gaseous refrigerant back to the compressor of the motor-compressor unit 35. The motor of the motor-compressor unit 35 is connected with a suitable source of electrical supply through the switch means 42 disposed in compartment 13. Operation of the electric motor of the motor-compressor unit 35 is controlled by the switch means 42 which has a wire connection 43 with the motor. The switch means 42 is actuated by a suitable diaphragm or bellows caused to be moved by pressure of a volatile fluid sealed within a thermostatic bulb 44 connected with the switch 42 by the pipe 45. Refrigerating systems of the type herein disclosed and their operation or function are well-known to those skilled in the art and need no further description.

Since, as before stated, there are certain objections to the use of open or lift-top refrigerator cabinets now on the market I have provided an improved shelving arrangement for such cabinets which eliminates the objections and facilitates removal of food products from the food storage compartment. The improved shelving arrangement herein disclosed comprises a plurality of legs or supporting standards 51 having their upper ends secured to the door or closure member 22, in any suitable manner, and extending at the corners of compartment 13 to a point closely adjacent the bottom wall of the food storage compartment. The four legs or supporting standards 51 are, in the present disclosure, guided by abutment thereof with the corners of the food compartment 13. It is to be understood, however, that other arrangements such as tracks or the like could be provided for guiding the supporting members 51 if desired. A plu-

rality of horizontally disposed and vertically spaced apart shelves 52 are welded or otherwise secured at their corners to the standards 51. The lowermost shelf 53, of the plurality of shelves 52, is normally positioned below the horizontal portion 26 of evaporator 24 for a purpose to be hereinafter more fully described. The standards 51 and shelves 52 and 53 secured thereto are, by virtue of the standards being carried by and secured to the door or closure member 22, movable simultaneously with movement of the door 22. When the door or closure member 22 is elevated the shelves 52 and 53 will also be elevated and this elevation is for the purpose of bringing or raising any selected one of the shelves to a position closely adjacent or into substantially horizontal alignment with the open top of cabinet 10 to facilitate removal of food products supported on the shelf therefrom.

In order to lift the door or closure member 22 and shelves 52 and 53 there may be a counterbalance cable or the like arrangement provided to permit elevation with a minimum of force. A crank and suitable shaft, cable and pulley means associated with the crank are provided in the present disclosure for elevating the door 22 and shelves 52 and 53. The elevating means herein disclosed includes a shaft 55 secured to the outer surface of the compartment liner 17 close to the top thereof by clamps or other securing means 56. A pair of large pulleys 57 are stationarily mounted upon shaft 55, one on each side of compartment 13 and within the insulated walls 11. A second pair of pulleys 58 are secured by suitable brackets 59 to the outer surface of compartment liner 17 on opposite sides of compartment 13. A third pair of pulleys, one of which is indicated by the reference character 60 in Fig. 1 of the drawings, are also stationarily mounted by brackets 61 upon the outer surface of liner member 17. A cable 62 has its one end 63 secured to the wheel or pulley 57 in any suitable manner and extends over pulleys 58 and 60. The other end 64 of cable 62 is stationarily secured to the rim or edge of the lowermost shelf 53 of the shelf arrangement carried by the door or closure member 22. A second cable similar to the cable 62 is of course provided for association with the other pulleys of the pairs thereof on the opposite side of cabinet 10. The shaft 55 has its one end 66 extending outwardly of the cabinet beyond the outer shell or panel 14 thereof. A crank member 67 is stationarily mounted upon the end 60 of shaft 55. The crank member 67 is preferably of the well-known and so-called spring pressed handle type and includes a projecting pin 68 (see Fig. 2) which is movable toward or away from the outer surface of the cabinet exterior shell or panel 14 upon horizontal movement of the handle. The cabinet shell or panel 14 is provided with a plurality of openings or indentations 71 (see Fig. 5) arranged in a circle adjacent the path of rotation of the handle of crank 67. These openings or indentations 71 may be provided in a separate plate attached to the wall of cabinet 10 if desired and are adapted to receive the pin 68 which extends from crank 67 for the purpose of holding the elevator shelf arrangement in any desired elevated position. A projection 73 may be provided in the compartment liner 17 near the top of the cabinet and another similar or corresponding vertically aligned projection 74, extending outwardly from one of the legs or supporting members 51, prevents the shelf arrangement from being moved too far outwardly of the compart-

ment 13. It will be seen that by rotating the crank means 67 in a clockwise direction (see Figs. 1 and 5) each of the pair of cables 62 will move about the pulleys 58 and 60 and will be wound upon each of the pair of wheels or pulleys 57 to thereby simultaneously elevate the door or closure member 22, standards 51 and shelves 52 and 53 from the position shown in Fig. 1 of the drawings to any elevated position such as shown in Fig. 3 thereof. After the shelf arrangement has been raised by rotation of the crank 67, to a predetermined position, the handle of crank 67 may then be moved horizontally toward the wall surface 14 of cabinet 10 so that the pin 68 will enter one of the plurality of openings or indentations 71 to hold the shelf arrangement in an elevated position. This manipulation of the crank handle is of course reversed upon operating the crank to lower the shelf arrangement and to close the door 22 upon the cabinet 10.

Referring now to Fig. 4 of the drawings it will be noted that the edge of shelf 53 is cut away or has its rim 75 formed through a certain predetermined contour to permit the food supporting surface thereof to be moved beyond the horizontally disposed receptacle supporting portion 26 of evaporator 24 in either vertical direction without striking the evaporator. However, the handles 31 and 32 on tray 29 extend outwardly beyond the evaporator 24 in the path of movement of shelf 53. Therefore when the shelf arrangement is moved upwardly, in the manner previously described, rim 75 of shelf 53 engages the underside of the handles 31 and 32 of tray 29 to lift the tray from the supporting portion 26 of evaporator 24 and to move the tray in the same direction of movement of the door 22 and toward the open top of cabinet 10 (see Fig. 3). The tray 29 may be moved to a point slightly below the top surface of cabinet 10 to permit the operator to remove the tray from the shelf 53 and food compartment 13 by reaching between shelf 53 and the shelf 52 thereabove. The outer ends of the tray handles 31 and 32 may be curved downwardly so as to prevent the tray 29 from slipping off of the rim 75 of shelf 53 during movement of the shelf. It is to be understood that in order to provide easy removal of tray 29 from its support 26 the tray or the tray support may be tilted so as to cause the rim 75 of shelf 53 to engage one of the tray handles before engagement thereof with the other tray handle. This will permit an ice bond formed between the tray and its support to be readily broken whereby the tray is substantially peeled from its support 26. During the act of moving the shelf arrangement into its normal position, within compartment 13 to cause the door 22 to seal the tray 29 and compartment 13 from atmosphere externally of cabinet 10, rim 75 of shelf 53 will move downwardly of the portion 26 of evaporator 24 and the tray 29 will again rest or be positioned on the supporting portion 26 of evaporator 24 to permit continued cooling or freezing of the contents of the tray by the evaporator. Thus I have provided means for removing the tray 29 from a normally inaccessible position within compartment 13 to a readily accessible position relative to the open top of compartment 13.

From the foregoing it will be seen that I have provided an improved household refrigerating apparatus of the top opening type and that I have also provided an improved shelf arrangement for such refrigerators. Bending over and reaching to the bottom of the food compartment

of open-top refrigerators by the user is eliminated by my improved apparatus. My apparatus also permits selective removal of food products from the storage compartment. In addition the improved apparatus permits the tray, utilized for congealing or freezing a substance, to be positioned in the lowermost or coldest part of the food compartment, normally out of contact with relatively warm air in the upper part of the food compartment, and the contents of the tray will therefore be quickly congealed or frozen. My improved apparatus and the construction and arrangement of the cooling element or evaporator therein provides efficient refrigeration for the food storage compartment while at the same time facilitating removal of food products and an ice tray from the refrigerated compartment of the cabinet.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A refrigerating apparatus comprising in combination, a cabinet having a plurality of insulating walls forming an open-top food storage compartment therein, a cooling element of a refrigerating system mounted within said compartment for cooling the interior thereof, means for closing the open top of said compartment means carried by said closing means and normally depending a substantial distance into said compartment from the open top thereof, a plurality of vertically spaced apart and horizontally disposed food supporting shelves secured to said depending means within said compartment, said cooling element including a substantially horizontally disposed receptacle supporting portion located between a certain pair of said food supporting shelves, a receptacle adapted to contain a substance to be congealed or frozen disposed on and having a portion thereof extending outwardly of said supporting portion of said cooling element, means for simultaneously elevating said compartment opening closing means and said plurality of shelves, and the lowermost shelf of the pair thereof between which the receptacle supporting portion of the cooling element is located being arranged to engage the outwardly extending portion of said receptacle to elevate said receptacle above said supporting portion of said cooling element when said compartment closing means is elevated.

2. A refrigerating apparatus comprising in combination, a cabinet having a plurality of insulating walls forming a food storage compartment having an access opening therein, a closure member for closing the access opening in said compartment, a cooling element of a refrigerating system mounted within said compartment for cooling the interior thereof, said cooling element including a receptacle supporting portion, a receptacle adapted to contain a substance to be congealed or frozen disposed on said supporting portion of said cooling element, and means associated with and actuated by movement of said closure member for moving said receptacle away from its support on said cooling element and toward said compartment opening.

3. A refrigerating apparatus comprising in combination, a cabinet having a plurality of insulating walls forming a food storage compartment having an access opening therein, a closure member for closing the access opening in

said compartment, a cooling element of a refrigerating system mounted within said compartment for cooling the interior thereof, said cooling element including a receptacle supporting portion, a receptacle adapted to contain a substance to be congealed or frozen disposed on said supporting portion of said cooling element, means associated with and actuated by movement of said closure member for moving said receptacle away from its support on said cooling element and toward said compartment opening, and portions of said means forming a plurality of food supporting shelves within said compartment.

4. A refrigerating apparatus comprising in combination, a cabinet having a plurality of insulating walls forming a food storage compartment having an access opening therein, a closure member for closing the access opening in said compartment, a cooling element of a refrigerating system mounted within said compartment for cooling the interior thereof, said cooling element including a receptacle supporting portion, a receptacle adapted to contain a substance to be congealed or frozen disposed on said supporting portion of said cooling element, said supporting portion of said cooling element and said receptacle thereon normally being in an inaccessible position within said compartment relative to the opening therein, and means associated with and actuated by movement of said closure member for moving said receptacle away from its support on said cooling element and toward said compartment opening into an accessible position relative to said opening.

5. A refrigerating apparatus comprising in combination, a cabinet having a plurality of insulating walls forming an open-top food storage compartment therein, a closure member for closing the open top of said compartment, a cooling element of a refrigerating system mounted within said compartment for cooling the interior thereof, said cooling element including a substantially horizontally disposed receptacle supporting portion located a substantial distance inwardly of the open top of said compartment, a receptacle adapted to contain a substance to be congealed or frozen disposed on said supporting portion of said cooling element, and means associated with and actuated by movement of said closure member for removing said receptacle from its support on said cooling element and for moving the receptacle toward the open top of said compartment.

6. A refrigerating apparatus comprising in combination, a cabinet having a plurality of insulating walls forming an open-top food storage compartment therein, a closure member for closing the open top of said compartment, a cooling element of a refrigerating system mounted within said compartment for cooling the interior thereof, said cooling element including a substantially horizontally disposed receptacle supporting portion located a substantial distance inwardly

of the open top of said compartment, a receptacle adapted to contain a substance to be congealed or frozen disposed on said supporting portion of said cooling element, means associated with and actuated by movement of said closure member for lifting said receptacle from its support on said cooling element and for moving the receptacle toward the open top of said compartment, and certain portions of said means forming a plurality of horizontally disposed food supporting shelves within said compartment.

7. A refrigerating apparatus comprising in combination, a cabinet having a food storage compartment therein, a cooling element of a refrigerating system disposed in said compartment for cooling the interior thereof, said cooling element including a receptacle supporting portion, a receptacle adapted to contain a substance to be congealed or frozen disposed on said supporting portion of said cooling element, movable means for sealing said compartment from atmosphere externally of said cabinet, and means associated with and actuated by movement of said sealing means for moving said receptacle in the direction of movement of the sealing means.

8. A refrigerator comprising an insulated compartment, a closure therefor, an ice making tray in said compartment and a vaporizer adapted to support said tray, means connected with said closure to remove said tray to a point remote from said vaporizer, as and when said closure is opened.

9. A refrigerating apparatus comprising in combination, an insulated compartment having an opening therein, a closure member for said compartment opening, a cooling element of a refrigerating system exposed to air within said compartment for cooling and causing circulation of the air, a receptacle adapted to contain a substance to be congealed or frozen supported within said compartment in intimate thermal contact with said cooling element, means cooperating with said closure member for moving said receptacle relative to said cooling element into a position accessible through said compartment opening as and when said member is opened.

10. A refrigerating apparatus comprising in combination, an insulated compartment having an opening in its top wall, a movable closure member for said compartment opening, a cooling element of a refrigerating system exposed to air within said compartment for cooling and causing circulation of the air, a receptacle adapted to contain a substance to be congealed or frozen supported within said compartment in intimate thermal contact with said cooling element, means depending from said closure member to a point below a portion of said receptacle for moving the receptacle upwardly relative to said cooling element into a position closely adjacent the opening in the compartment top wall as and when said member is opened.

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