

May 19, 1964

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3,133,427

REFRIGERATOR WITH DOOR MOUNTED HYDRATOR

Filed Nov. 13, 1961

5 Sheets-Sheet 1

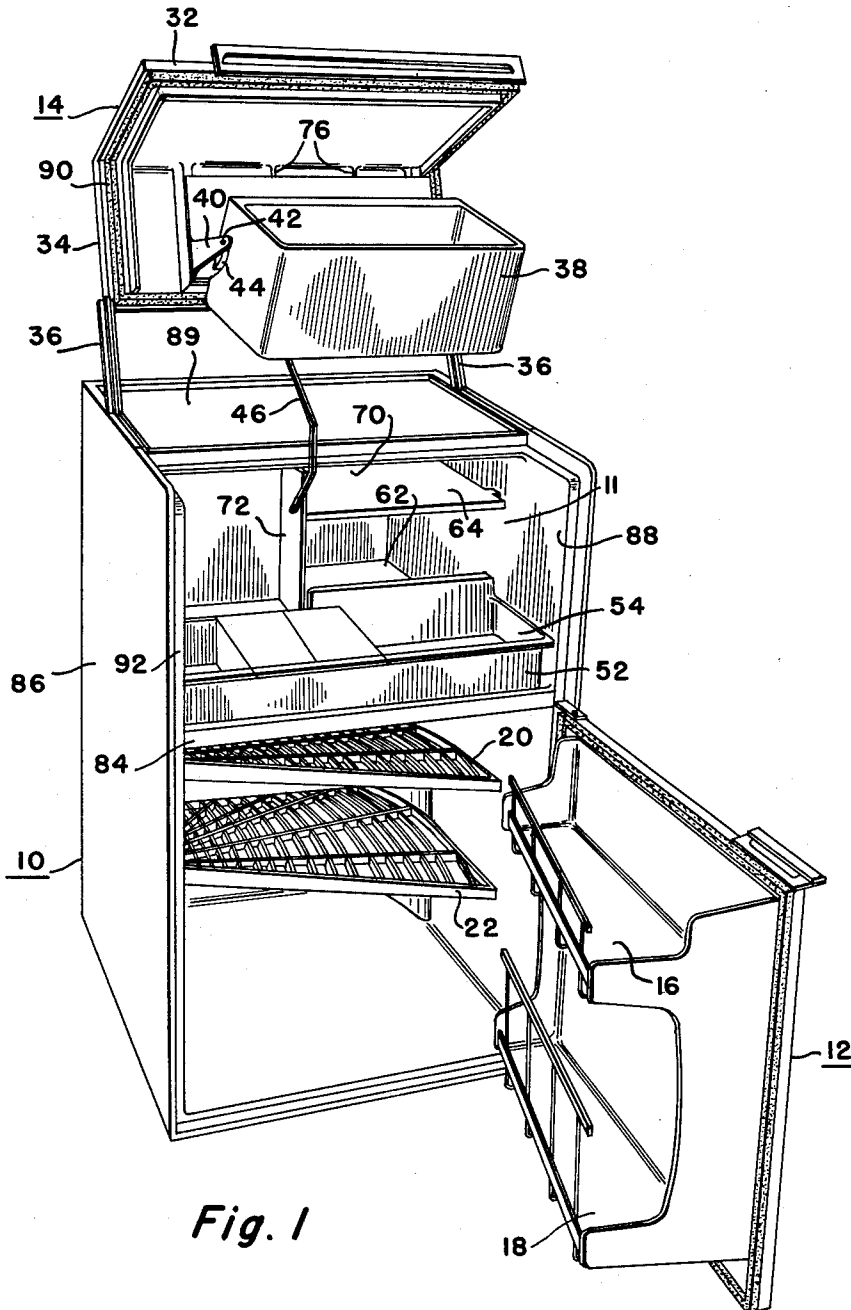


Fig. 1

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5 Sheets-Sheet 2

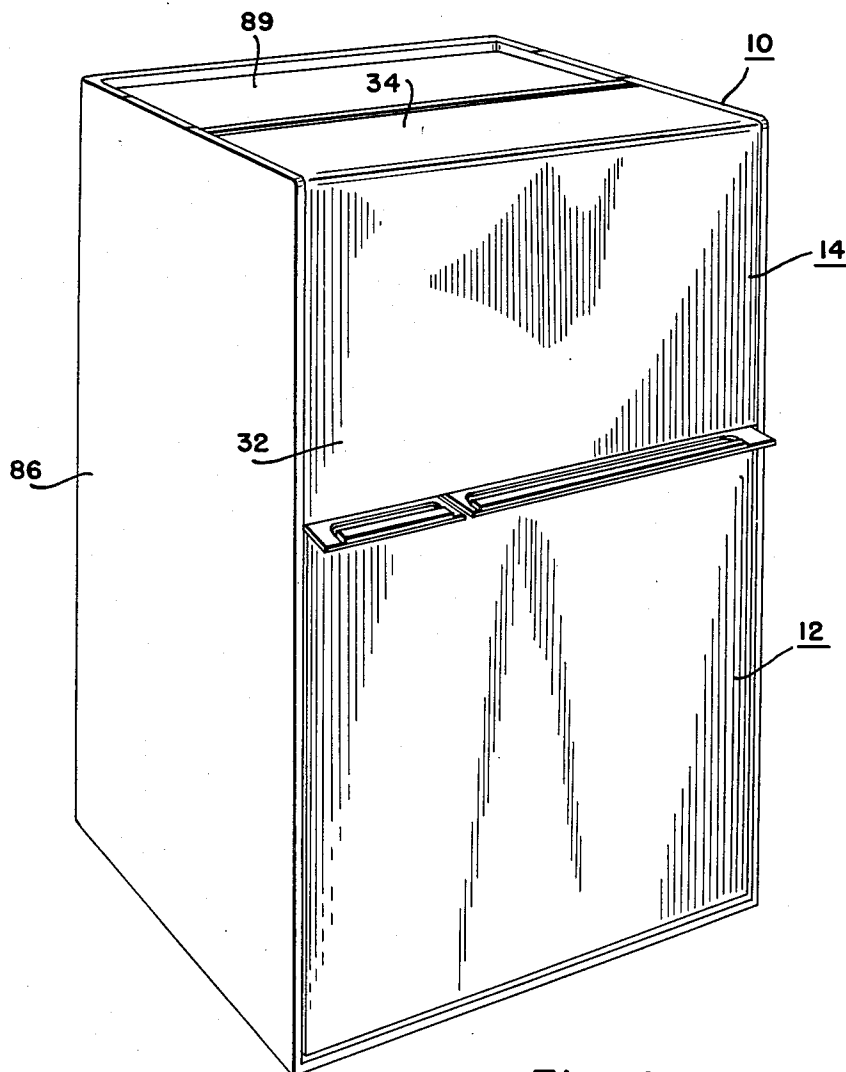


Fig. 2

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5 Sheets-Sheet 4

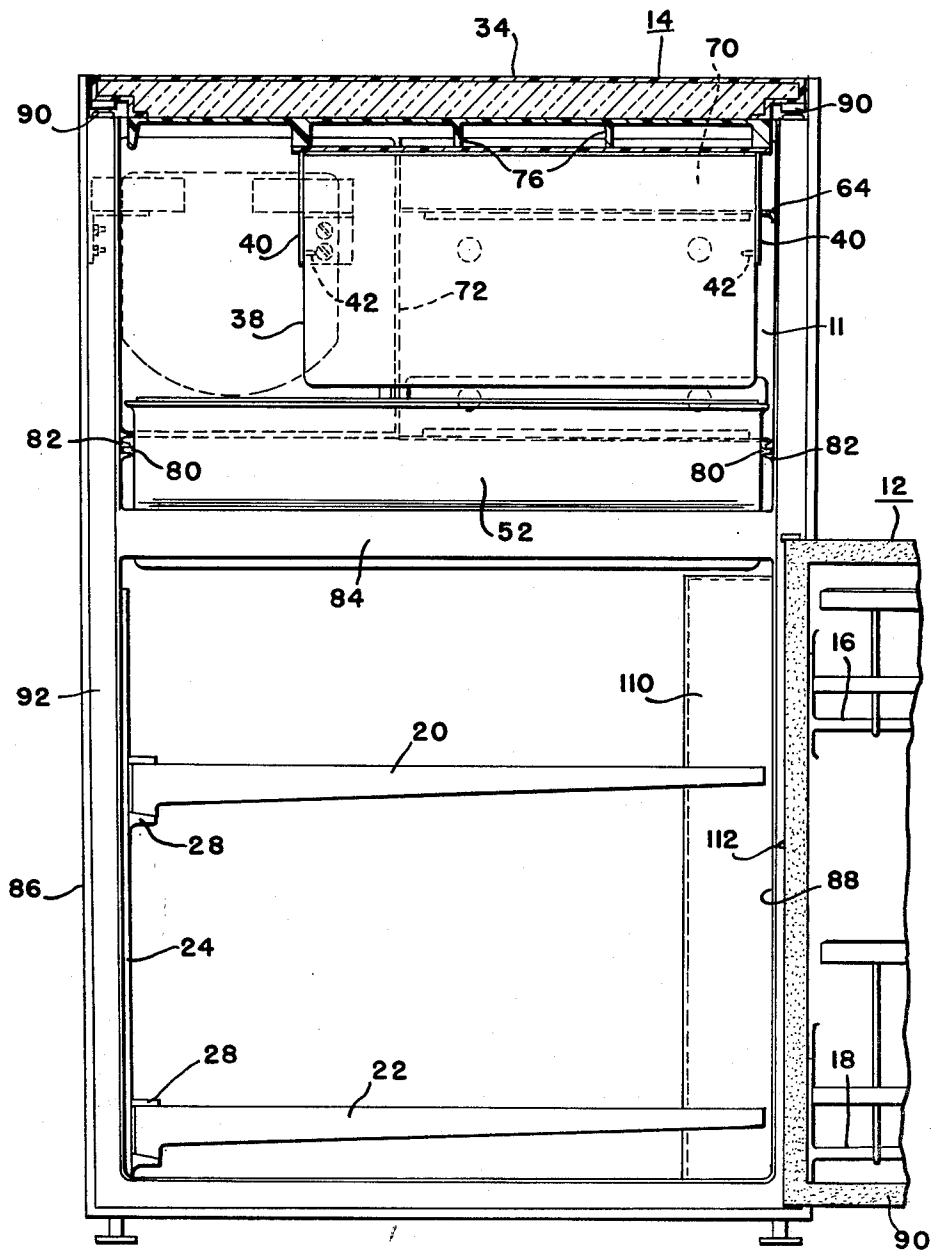


Fig. 4

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5 Sheets-Sheet 5

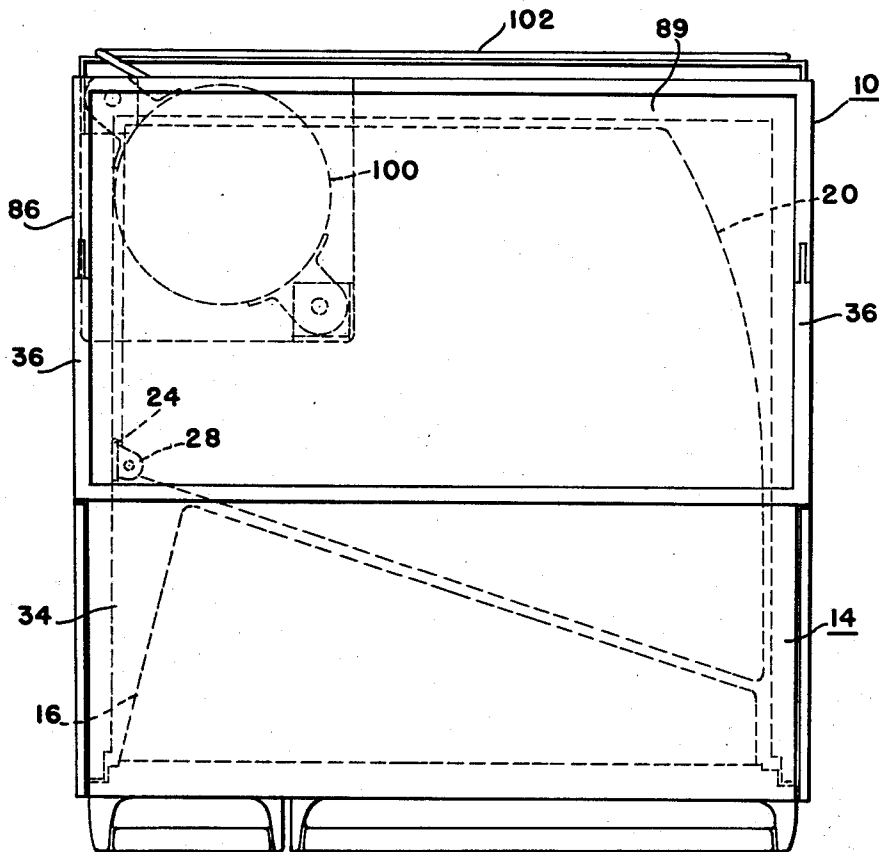


Fig. 5

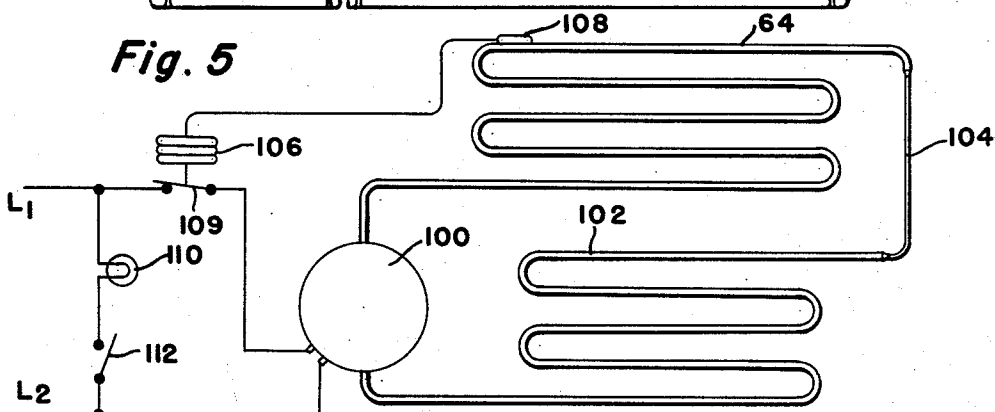


Fig. 6

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3,133,427 REFRIGERATOR WITH DOOR MOUNTED HYDRATOR

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9 Claims. (Cl. 62-227)

This invention relates to refrigerating apparatus and more particularly to an improved form of household refrigerator.

One of the big problems in a household refrigerator is that of being able to reach in and remove various articles from the refrigerator and the hydrator within the refrigerator without either opening an inner door or rearranging other items in the refrigerator. It is an object of this invention to provide a small compact refrigerator in which an outer door serves as the closure for the hydrator and in which the hydrator, in turn, serves to close the freezer compartment and the meat drawer and in which opening the refrigerator door automatically shifts the location of the hydrator so as to provide access to the hydrator and other parts of the refrigerator.

It is another object of this invention to provide a small sized refrigerator cabinet having a plurality of food compartments cooled by a single refrigerant evaporator and having a top hinged refrigerator door which has one portion arranged at the front of the food compartments and another portion arranged at the top thereof whereby opening the door opens both a portion of the front and top of the cabinet.

Still another object of this invention is to provide an improved evaporator and shelf arrangement so as to make all items in the refrigerator readily accessible and so as to provide the proper temperature in various portions of the refrigerator.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIGURE 1 is a perspective view of the refrigerator showing the doors open;

FIGURE 2 is a perspective view of the refrigerator showing the doors closed;

FIGURE 3 is a vertical sectional view;

FIGURE 4 is a front elevational view with parts broken away;

FIGURE 5 is a top view; and

FIGURE 6 is a schematic view showing the refrigerant circuit and the controls for the refrigeration system.

Referring now to the drawings wherein a preferred embodiment of my invention has been shown, reference numeral 10 designates an insulated refrigerator cabinet having a freezer compartment 11 in an upper corner of the main food storage compartment and reference numerals 12 and 14 designate the refrigerator doors. The door 12 provides access to the lower portion of the main food compartment and is pivotally secured to the cabinet 10 adjacent its one edge so as to swing outwardly from the cabinet and thereby expose the contents of the lower portion of the cabinet. Opening the door 14 provides access to the upper portion of the cabinet including the freezer compartment 11 and the hydrator 38.

As best shown in FIGURE 1 of the drawings, the door 12 is provided with a pair of tapered shelves 16 and 18 for storing foods on the inner side of the door. It will be noted that the shelves 16 and 18 are narrowest at the hinge edge of the door and are complementary to the tapered shelves 20 and 22 disposed within the lower por-

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tion of the cabinet. The shelves 20 and 22 are pivotally supported adjacent the one side wall of the refrigerator by means of a vertically extending support 24. The support 24 is provided with a vertically extending slot 26 for adjustably receiving the shelf support elements 28 at various heights. The shelves 20 and 22 pivot on the support elements 28 so as to swing outwardly. The pivotal point of the shelves 20 and 22 is located far enough back from the front edge of the cabinet so that the shelves on the door do not obstruct pivotal movement of shelves 20 and 22. Furthermore, the weight of the food supplies on the shelf 20 or 22 when swung out will have less tendency to topple the refrigerator.

As best shown in FIGURES 1, 2 and 3 of the drawings, the upper door 14 includes a front portion 32 and a top portion 34 so that upon opening the door 14, one can reach in from either the top or front of the cabinet. The door 14 is supported on the arms 36 which are hinged to the cabinet and serve to elevate the door above the main cabinet 10 when the door is in the open position. A hydrator element 38 is pivotally supported on pins 42 carried by a pair of arms 40 which depend from the bottom side of the door section 34. The arrangement is such that upon opening of the door 14, the hydrator element 38 is lifted upwardly so as to make the contents of the upper portion of the refrigerator cabinet readily accessible. The hydrator 38 is removably supported on the pins 42 which extend into slots 44 formed in the end walls of the hydrator 38. With such an arrangement the hydrator can be lifted off from its support and carried around if desired. A guide arm 46 which has its one end 48 removably secured to the bottom of the hydrator 38 assists in holding the hydrator in the proper upright position during the opening and closing movement of the main door 14.

It will be noted that the hydrator 38 serves to close the front opening to the main freezer chest 11 and that the bottom wall of the hydrator 38 serves to cover contents of the meat compartment 54 formed in the slidably mounted drawer 52. The drawer 52 separates the main refrigerator into a lower relatively high temperature food storage compartment and upper food storage compartments including the freezer compartment 11 as shown. A plate type refrigerant evaporator 64, which is substantially U-shaped in cross section (see FIGURE 3), serves to provide refrigeration for the contents of the refrigerator. The space 70 between the top surface of the evaporator 64 and the top wall of the refrigerator can be used for storing frozen food packages or for freezing ice in ice trays (not shown).

The evaporator is preferably of the roll bonded type and is substantially C-shaped in cross section with the front of the C disposed towards the front of the cabinet. A vertically extending partition element 72 cooperates with the C-shaped evaporator to complete the freezer compartment 11. An evaporator of this general type is more fully disclosed in the United States patent to Wurtz et al. 2,712,736 to which reference may be made for details of the evaporator construction and the method of making evaporators of this type.

As best shown in FIGURE 3 of the drawings, the evaporator is spaced slightly from the rear wall of the cabinet so as to provide for air circulation between the evaporator and the rear wall of the cabinet. It will also be noted that the hydrator 38 which serves as a door for the freezer compartment formed by the evaporator 64 has a double rear wall so as to form an insulating air space between the hydrator proper and the freezer compartment 11. The bottom side of the horizontal portion 34 of the door 14 is provided with a plurality of ribs 76 so as to provide air passages across the top of the hydrator 38.

The food storage drawer 52 is provided with integrally formed side ribs 30 which are slidably mounted on the tracks 32 formed integrally with the side walls of the refrigerator liner. A horizontal mullion 34 is provided at the front of the cabinet along the line of juncture between the doors 12 and 14. This mullion serves to limit the outward movement of the storage drawer 52. The main cabinet includes an outer shell 36 which can be formed of any suitable material such as plastic or cold rolled steel and an inner liner 38 which is preferably injection molded acrylonitrile butadiene styrene copolymer. The outer surface of the door 14 and the top surface element 39 of the cabinet are preferably made of compression molded melamine so as to provide a surface which would not be damaged in the event that something hot should be placed on the top of the refrigerator. It will also be noted that the top surface element 39 is dished downwardly slightly so as to catch anything which might be spilled onto the top of the refrigerator.

Magnetic door seals 90 are carried by the doors 12 and 14 and serve to hold the doors closed and to provide a good airtight seal between the cabinet and the doors. Metallic strips 92 carried by the stationary part of the cabinet serve as armatures for the magnetic door seal strips. For more detailed description of the magnetic door seal, reference may be had to the door seal disclosed in copending United States application, Serial No. 833,166, filed August 12, 1959 and now Patent No. 3,075,258.

The space between the inner liner 38 and the outer shell 36 is filled with a polyurethane type of foam insulation of the type capable of permanently retaining an insulating gas, such as monofluoro trichloro methane. This foam insulation is formed in situ and adheres to both the outer and inner walls of the refrigerator so as to provide a strong unitary cabinet. Insulation of this type is disclosed in copending United States application, Serial No. 809,702, filed April 29, 1959.

The evaporator 64 is connected in series refrigerant flow relationship with a conventional compressor 100, condenser 102 and capillary tube type restrictor 104, as diagrammatically shown in FIGURE 6 of the drawings. The compressor 100 may be cycled in any conventional manner so as to maintain the desired temperature within the refrigerator. For purposes of illustration, a thermostat 106 has been shown which includes a bulb 108 responsive to the temperature of the evaporator 64 and which serves to operate a motor control switch 109. The motor compressor unit 100 is preferably mounted in the upper left rear corner of the refrigerator cabinet as shown. The condenser 102 has been shown disposed adjacent the rear wall of the cabinet whereas any other arrangement of the condenser could be used. Reference numeral 110 designates a light which is adapted to be controlled by door switch 112 in accordance with conventional practice.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In a refrigerator, an insulated cabinet, an evaporator located in an upper rear corner of said cabinet, a condenser, a compressor located in the other upper rear corner of said cabinet, refrigerant flow connections between said evaporator, condenser and compressor, said cabinet having a top opening, a door for said opening, a hydrator in the upper front portion of said cabinet and carried by said door, said hydrator having a top opening arranged to be closed by said door when said door is closed.

2. In a refrigerator, an insulated cabinet having a food storage compartment therein, an evaporator located in said cabinet and forming with walls of said cabinet a freezer compartment, means for supplying liquid refrigerant to said evaporator, said cabinet having an opening for access to said compartment, a door for said opening, a hydrator carried by said door, means for pivotally supporting said hydrator on said door, and means for causing pivotal

movement of said hydrator relative to said door in response to movement of said door, said hydrator having a top opening arranged to be closed by a portion of said door when said door is closed, said evaporator comprising a sheet metal evaporator substantially C-shaped in cross section, the open side of said C being arranged to be closed by said hydrator when said door is in the closed position.

3. In a refrigerator, an insulated cabinet, an evaporator located in the upper rear portion of said cabinet, a condenser, a compressor, refrigerant flow connections between said evaporator, condenser and compressor, said cabinet having an opening, a door for said opening, a hydrator carried by said door, means for pivotally supporting said hydrator on said door, said hydrator having a top opening arranged to be closed by a portion of said door when said door is closed, said evaporator comprising a sheet metal evaporator substantially C-shaped in cross section, the open side of said C being arranged to be closed by said hydrator when said door is in the closed position, food storage drawer means slidably supported within said cabinet, one portion of said drawer means being arranged to slide beneath said evaporator, and another portion of said drawer means being arranged adjacent the bottom of said hydrator, and means controlling the operation of said compressor including a thermostat responsive to changes in the temperature of said evaporator.

4. In a refrigerator, an insulated cabinet, an evaporator located in said cabinet, means supplying liquid refrigerant to said evaporator, said cabinet having a door opening subtending a portion of the top and front of said cabinet, an inverted L-shaped door for said opening, a magnetic door seal secured to said door, a door jamb for said opening and including a metallic armature for attracting said magnetic door seal in the closed position of said door, a hydrator having a top opening arranged to be closed by a portion of said door when said door is closed, said evaporator comprising a sheet metal evaporator cooperating with walls of said cabinet to form a freezer compartment in said cabinet, a food storage drawer slidably supported within said cabinet, one portion of said drawer being arranged to slide beneath said evaporator, and another portion of said drawer being arranged adjacent the bottom of said hydrator.

5. In a refrigerator, an insulated cabinet having a plurality of food storage compartments therein, an evaporator located in said cabinet and forming walls of a freezer compartment, means supplying liquid refrigerant to said evaporator, said cabinet having a plurality of door openings, a first of said door openings subtending a portion of the top and front of said cabinet, an inverted L-shaped door for said first opening, a second of said door openings being arranged below said first door opening, a horizontal mullion separating said openings, a hydrator carried by said first door, said hydrator having a top opening arranged to be closed by a portion of said first door when said door is closed, said freezer compartment having an opening arranged to be closed by said hydrator when said door is in the closed position, and a food storage drawer slidably supported within said cabinet, one portion of said drawer being arranged beneath said evaporator, and another portion of said drawer being arranged beneath said hydrator, said drawer having a portion arranged to engage said mullion so as to limit the outward movement of said drawer.

6. In a refrigerator, an insulated cabinet, an evaporator located in the upper rear portion of said cabinet, a condenser, a compressor, refrigerant flow connections between said evaporator, condenser and compressor, said cabinet having a first opening subtending a portion of the top and front of said cabinet, a door for said opening having a first portion substantially in alignment with the front of said cabinet and having a second portion substantially in alignment with the top of said cabinet, a hydrator carried by said door, means for pivotally sup-

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porting said hydrator on said door, means for causing pivotal movement of said hydrator relative to said door in response to movement of said door, said hydrator having a top opening arranged to be closed by a portion of said door when said door is in the closed position, said evaporator comprising a sheet metal evaporator substantially C-shaped in cross section, the open side of said C being arranged to be closed by said hydrator when said door is in the closed position, food storage drawer means slidably supported within said cabinet, one portion of said drawer means being arranged to slide beneath said evaporator, another portion of said drawer means being arranged beneath said hydrator, said cabinet having a second opening in the front wall thereof beneath said first opening and beneath said drawer, a second door pivotally carried by said cabinet for closing said second opening, said second door having shelf means thereon, said shelf means being narrower at the hinge edge of said door, a plurality of shelves pivotally secured to a wall of said cabinet opposite said hinge edge for swinging movement from a position within said cabinet to a position towards the front of said cabinet, and means for adjusting the height of said shelves.

7. In a refrigerator, an insulated cabinet, an evaporator located in said cabinet, a condenser, a compressor, refrigerant flow connections between said evaporator, condenser and compressor, said cabinet having an opening, a door for said opening, a hydrator carried by said door, means for causing pivotal movement of said hydrator relative to said door in response to movement of said door, said hydrator having a top opening arranged to be closed by a portion of said door when said door is closed, said evaporator comprising a sheet metal evaporator which forms at least one wall of a freezer compartment within said cabinet, said freezer compartment having an access opening arranged to be closed by said hydrator when said door is in the closed position, a food storage drawer slidably supported within said cabinet, one portion of said drawer being arranged beneath said evapo-

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rator, and another portion of said drawer being arranged beneath said hydrator.

8. In a refrigerator, an insulated cabinet, an evaporator located in said cabinet, a condenser, a compressor, refrigerant flow connections between said evaporator, condenser and compressor, said cabinet having an opening, a door for said opening, a hydrator carried by said door, said evaporator comprising a sheet metal evaporator which forms at least one wall of a freezer compartment within said cabinet, said freezer compartment having an access opening arranged to be closed by said hydrator when said door is in the closed position, a food storage drawer slidably supported within said cabinet, one portion of said drawer being arranged beneath said evaporator, and another portion of said drawer being arranged beneath said hydrator.

9. In a refrigerator, an insulated cabinet having a food storage compartment therein, an evaporator located in said cabinet and forming with walls of said cabinet a freezer compartment having an access opening, means for supplying liquid refrigerant to said evaporator, said cabinet having an opening for access to said compartment, a door for said opening, a hydrator carried by said door, means for pivotally supporting said hydrator on said door, and means for causing pivotal movement of said hydrator relative to said door in response to movement of said door, said hydrator having a top opening arranged to be closed by a portion of said door when said door is closed, said access opening of said freezer compartment being arranged to be closed by said hydrator when said door is in the closed position.

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