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O. V. SAUNDERS

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REMOVABLE UNIT IN REFRIGERATING APPARATUS

Filed March 18, 1952

2 Sheets-Sheet 1

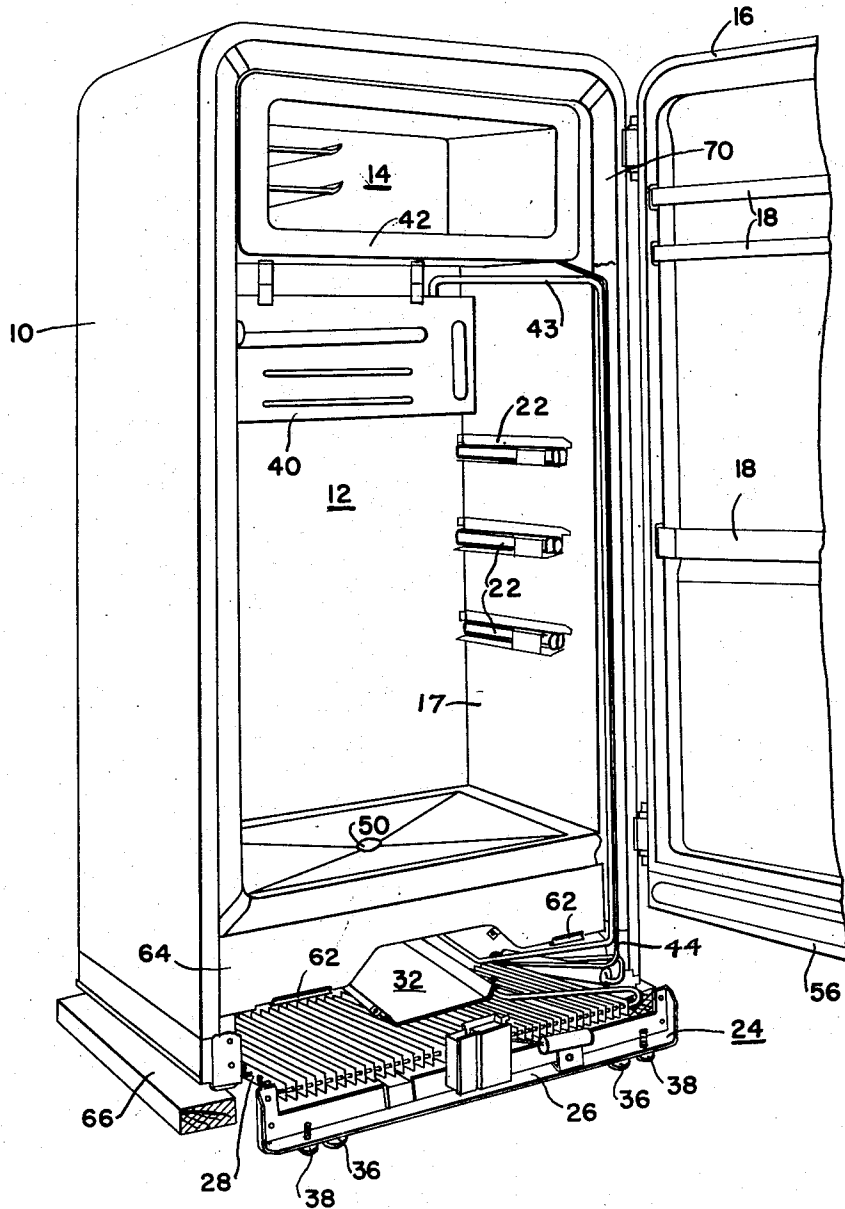


Fig. 1

INVENTOR.
Orson V. Saunders.

BY

Willits, Hardman & Fehr.
ATTORNEYS

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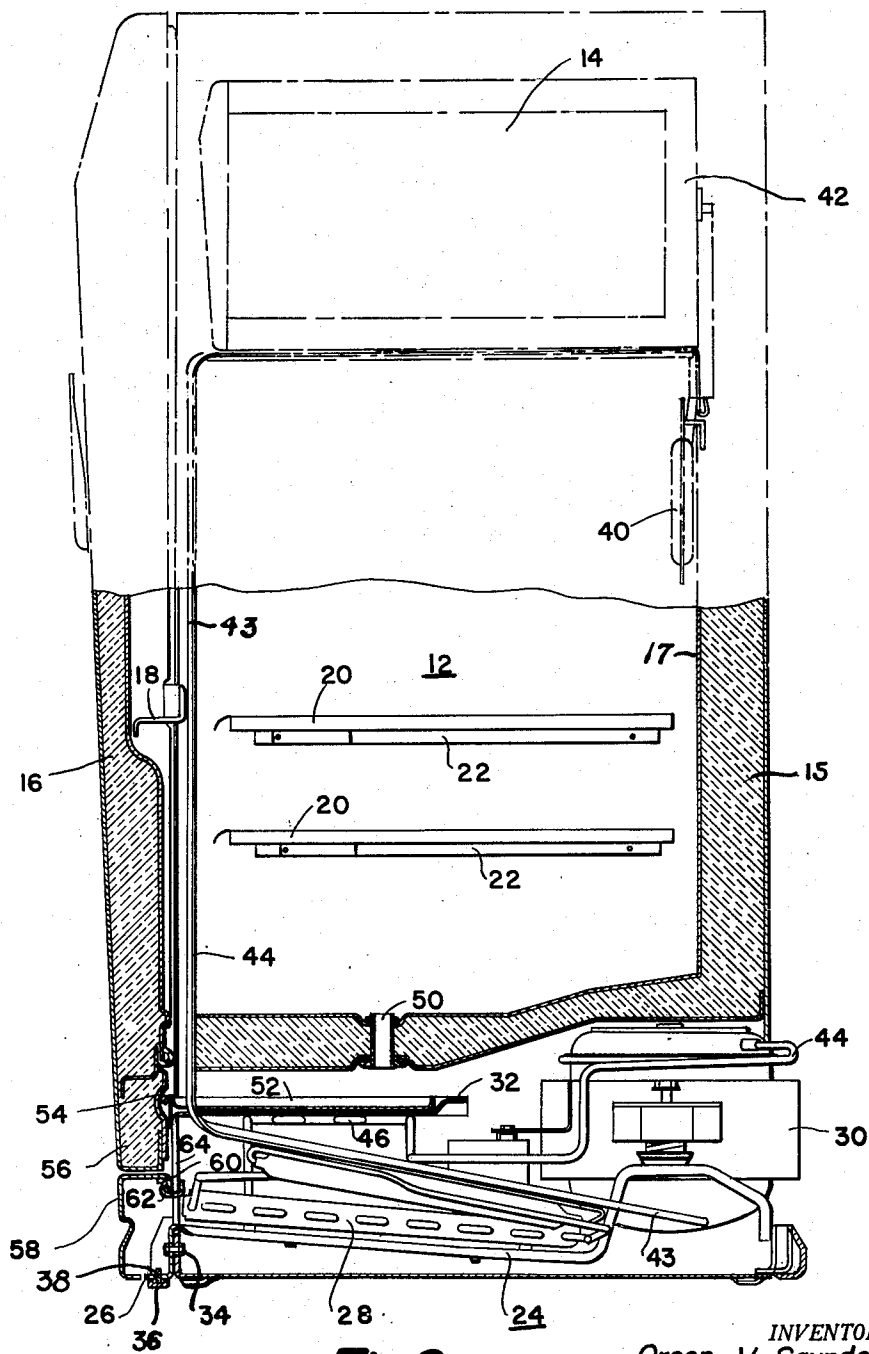


Fig. 2

INVENTOR.
Orson V. Saunders.

BY
Willits, Hardman & Gehl.
ATTORNEYS

UNITED STATES PATENT OFFICE

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REMOVABLE UNIT IN REFRIGERATING APPARATUS

Orson V. Saunders, Dayton, Ohio, assignor to
General Motors Corporation, Dayton, Ohio, a
corporation of Delaware

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6 Claims. (Cl. 62-117.2)

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This invention relates to refrigerating apparatus and more particularly to an improved structural arrangement including means for supporting the refrigerating mechanism within the cabinet of a household refrigerator.

It is an object of this invention to provide a simplified frame construction for supporting the motor compressor and condenser mechanism in the lower portion of a household refrigerator.

It is desirable practice to provide household refrigerators with slidable shelves within the main food storage compartment whereby it is possible to slide each of the loaded shelves forwardly to a point outside the usual food storage chamber but this forward movement of the shelves presents a problem in that the center of gravity of the refrigerator can then be shifted forwardly a dangerous amount. Thus if a housewife were to load all of the shelves with foods and slide all of the shelves out at the same time, the center of gravity would be close to the forward edge of the refrigerator, with the result that it would not take much extra force to tip the refrigerator over onto its face. This is particularly true of refrigerators in which a single outer door is provided and in which shelves are provided on the inner wall of this door. The extra weight of articles on the door shelves, when the door is in its open position, further tends to move the center of gravity of the entire assembly forwardly. Modern styling and cabinet construction do not permit one to construct the cabinet per se with feet which project out in front of the door jamb. It is an object of this invention to provide simple and inexpensive means for furnishing additional supporting means out in front of the front face of the main refrigerator housing without extending the main cabinet.

More particularly it is an object of this invention to provide a forwardly extending floor engaging projection on the condenser supporting frame for the purpose of providing extra vertical support for the main cabinet.

Another object of this invention is to locate the motor-compressor unit at the extreme lower rear portion of the cabinet.

Still another object of this invention is to provide a refrigerator construction wherein the refrigeration system is readily insertable or removable as a unit from the front of the cabinet.

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 form of the present invention is clearly shown.

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In the drawings:

Figure 1 is a perspective view of a refrigerator with parts broken away and showing the condenser mounting frame partially removed from the cabinet.

Figure 2 is an elevational view partly in section and partly schematic showing the relationship between the refrigeration system per se and the main housing.

Referring now to the drawings wherein a preferred embodiment of the invention has been shown reference numeral 10 designates a conventional housing or cabinet of a refrigerator of the type which is provided with a main food storage compartment 12 and a frozen food compartment 14. Insulation 15 is provided between the outer wall of the cabinet and the inner lining 17 in accordance with conventional practice. An outer door 16 is provided for closing the front openings to the compartments 12 and 14. This door is of the type which is provided with a plurality of shelves 18 for storing various foods and condiments directly on the door. A plurality of shelves 20 which are slidably supported on extensible tracks 22 are provided in the main food storage compartment 12. These shelves are of the type which slide out to a point in front of the main food storage compartment so as to render the foods on the back part of the shelves accessible. In a refrigerator of this type wherein the shelves can all be moved out in front of the main housing and wherein some of the foods are stored on the door the center of gravity of the entire unit can at times be very close to the front face of the main cabinet.

In order to provide an additional vertical support for the refrigerator at a point out in front of the front face of the refrigerator, the frame 24 which serves to support the refrigerant condenser 28, the motor-compressor unit 30 and the condensate pan support 32 has been provided which has a forwardly extending projection 26. The frame 24 is removably secured to the main cabinet such as by bolts 34 so that in the event it is desirable to repair or replace any portion of the volatile refrigerant system, the frame and the apparatus supported thereon may be readily removed from the main cabinet.

The forwardly projecting portion 26 of the frame is provided with a first pair of fixed floor engaging feet 36 and a second pair of adjustable feet 38. The feet 36 are purposely made slightly short and may never contact the floor unless the cabinet begins to tilt forwardly in which case the feet 36 provide vertical support for the refrig-

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erator at a point out in front of the main cabinet so as to add stability to the cabinet until the feet 38 have been lowered into contact with the floor. The adjustable feet 38 are adapted to be adjusted to the right height when the refrigerator is installed in the home so as to compensate for any unevenness in the floor on which the refrigerator stands. The motor-compressor unit 30 is mounted adjacent the lower rear corner of the cabinet where it is the most effective in preventing the cabinet from falling forward. In fact a portion of the unit 30 projects slightly beyond the rear face of the cabinet 10 as shown in Figure 2. This projecting portion serves the further purpose of preventing one from placing the cabinet against a wall so as to prevent air circulation through the machinery compartment.

For purposes of illustration there is shown a refrigerating system which includes a plate type of evaporator section 40 mounted in the main food storage compartment 12 and a relatively low temperature evaporator section 42 for use in preserving frozen foods in the compartment 14. These two evaporator sections are connected in series with one another. A conventional sealed motor-compressor unit 30 withdraws vaporized refrigerant from the evaporator sections 42 and 40 through the suction line 43 which connects the outlet of the evaporator section 40 to the inlet of the compressor. The compressed refrigerant leaves the compressor through the line 44 which discharges the relatively hot compressed refrigerant vapor into a condensate heating coil 46 fastened to the bottom side of the condensate pan supporting shelf 32. The refrigerant leaving the coil 46 enters the main condenser 28 where it is condensed before being returned to the evaporator section 42 through the fixed restrictor 44. Inasmuch as the construction and arrangement of the evaporator sections 40 and 42 may be varied they will not be described in greater detail. The evaporator section 40 is allowed to warm up enough during each off portion of the cycle to defrost the same.

Condensate or defrost water from the defrosting evaporator 40 will drain into the lower part of the food compartment 12 where it is directed to a drain 50 which conveys the condensate into a removable drain pan 52 which is adapted to be supported by the shelf 32. The door 16 is provided with a downwardly extending projection 56 which extends considerably below the opening to the food compartments. It will be noted that when the main refrigerator door 16 is in the closed position, this extending portion of the door conceals the handle 54 of the condensate drain pan 52 (see Figure 2).

A removable sheet metal strip 58 is provided directly beneath the door 16 and conceals the projecting portion 26 of the frame 24. The strip 58 is provided with a downwardly extending flange 60 which releasably engages a resilient clip 62 carried by the lower edge of the front panel 54 of the main refrigerator housing.

Referring to Figure 2 of the drawings, it will be observed that the overall height of the motor-compressor unit 30 is greater than the clearance between the bottom wall of the compartment 12 and the floor (not shown) on which the refrigerator would stand with the result that in order to install or remove the motor-compressor unit it is first necessary to block up the refrigerator on some supporting means, such as the support-

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ing means 66 shown in Figure 1. Once the frame 24 and the parts carried thereby are installed in the machinery compartment of the refrigerator the supports 66 may be removed. This arrangement allows the factory to install the mechanism from the front without needlessly adding height to the cabinet but would discourage the user from removing and tampering with the condensing mechanism.

As best shown in Figure 1 of the drawings the refrigerant lines which connect the refrigerant liquefying means and the evaporators 40 and 42 are located adjacent the front edge of the casing 10 directly beneath a trim strip 70 which has been partly broken away in Figure 1 so as to show the refrigerant lines exposed. By virtue of this construction it is obvious that the entire refrigerating system may be installed or removed from the front.

By virtue of the above described construction and arrangement it is obvious that extra vertical support is provided by the condenser mounting frame at a point ahead of the main cabinet without the need for changing the main cabinet design or shape and without the need for adding expensive legs at the front of the cabinet. Furthermore the motor-compressor unit is mounted at the extreme lower rear corner where it will be most effective in preventing the cabinet from tilting forwardly.

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, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In a refrigerator assembly, a sheet metal outer cabinet member having a front opening, a door for said front opening, an inner liner forming a food storage chamber within said cabinet, insulating means between said outer cabinet and said inner liner, evaporator means for cooling the contents of said inner liner, a refrigerant liquefying means for supplying liquid refrigerant to said evaporator, means including a frame for removably supporting said refrigerant liquefying means on said outer cabinet member beneath said food storage chamber, a plurality of shelves slidably mounted within said inner liner for movement forwardly of said cabinet whereby the center of gravity of the assembly is adapted to be shifted forwardly upon forward movement of one or more of said shelves, said frame including floor engaging means extending out in front of said cabinet member so as to provide a vertical support for said cabinet in front of said front opening.

2. In a refrigerator, a cabinet having insulated walls forming a first compartment for storing frozen foods and a second compartment for storing foods at temperatures above freezing, slidable shelf means in said second compartment whereby said shelf means and the foods mounted thereon may be shifted forwardly of the front wall of said cabinet, refrigerating means for cooling the contents of said compartments, said refrigerating means including a compressor and a condenser, a frame for supporting said compressor and condenser beneath said compartments with the compressor mounted towards the rear of said cabinet so as to counterbalance said shelf means when in the forward position, said frame including a portion projecting forwardly from the front wall of said cabinet to afford vertical support for

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said cabinet at a point in front of the front face of said cabinet.

3. In a refrigerator, a cabinet having insulated walls forming a first compartment for storing frozen foods and a second compartment for storing foods at temperatures above freezing, slidable shelf means in said second compartment whereby said shelf means and the foods mounted thereon may be shifted forwardly of the front wall of said cabinet, refrigerating means for cooling the contents of said compartments, said refrigerating means including a compressor and a condenser, a frame for supporting said compressor and condenser beneath said compartments with the compressor mounted towards the rear of said cabinet so as to counterbalance said shelf means when in the forward position, said frame including a portion projecting forwardly from the front wall of said cabinet to afford vertical support for said cabinet at a point in front of the front face of said cabinet, and a panel removably secured to the front face of said cabinet to conceal the projecting portion of said frame.

4. In a refrigerator assembly, a cabinet having insulated walls including a partition separating the cabinet into a food storage compartment and a machinery compartment, food storage shelves, means for slidably supporting said shelves on said food storage compartment for movement forwardly of said cabinet, a refrigerant liquefying device, means for removably supporting said refrigerant liquefying device in said machinery compartment including a support having a portion projecting forwardly from the front face of said food storage compartment and arranged to contact the floor, a refrigerant evaporator supported in said food storage compartment, refrigerant flow connections between said evaporator and said refrigerant liquefying means, and a door for closing said food storage compartment, said door having a portion swingable forwardly relative to said cabinet.

5. In a refrigerator assembly, a cabinet having insulated walls including a partition separating the cabinet into a food storage compartment and a machinery compartment, food storage shelves, means for slidably supporting said shelves on said food storage compartment for movement forwardly of said cabinet, a refrigerant liquefying device, means for removably supporting said refrigerant liquefying device in said ma-

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chinery compartment including a support having a portion projecting forwardly from the front face of said food storage compartment and arranged to contact the floor, a refrigerant evaporator supported in said food storage compartment, refrigerant flow connections between said evaporator and said refrigerant liquefying means, and a door for closing said food storage compartment, said door having a portion swingable forwardly relative to said cabinet, said evaporator comprising a vertical plate type evaporator mounted adjacent the rear wall of said food storage compartment and said refrigerant liquefying device comprising a motor-compressor unit mounted adjacent the lower rear portion of said cabinet so as to locate the center of gravity of the refrigerator assembly towards the rear of the cabinet.

6. In a refrigerator assembly, a cabinet having insulated walls including a partition separating the cabinet into a food storage compartment and a machinery compartment, food storage shelves, means for slidably supporting said shelves on said food storage compartment for movement forwardly of said cabinet, a refrigerant liquefying device, means for removably supporting said refrigerant liquefying device in said machinery compartment including a support having a portion projecting forwardly from the front face of said food storage compartment and arranged to contact the floor, a refrigerant evaporator supported in said food storage compartment, refrigerant flow connections between said evaporator and said refrigerant liquefying means, and a door for closing said food storage compartment, said door having a portion swingable forwardly relative to said cabinet, said floor contacting portion comprising vertically adjustable means for leveling the cabinet.

ORSON V. SAUNDERS.

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