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REFRIGERATOR UNIT

2,466,876

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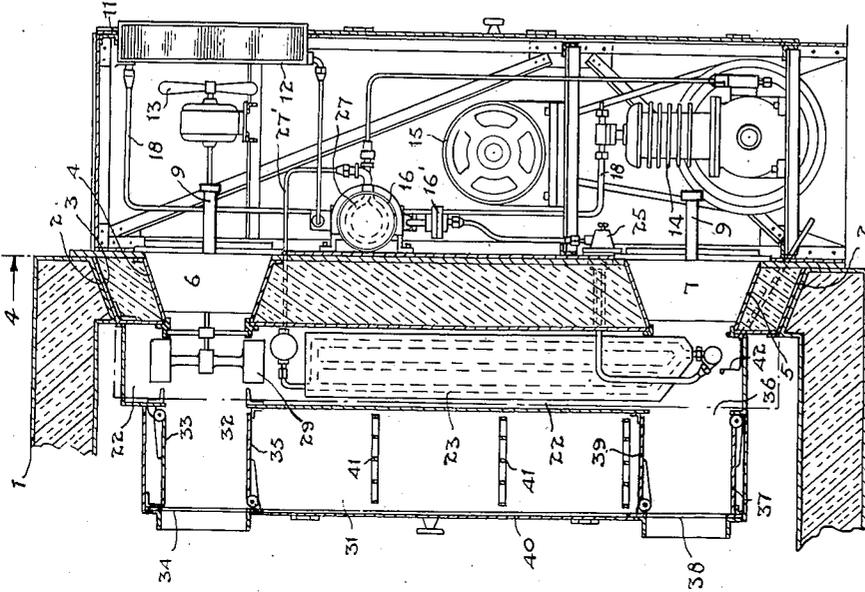


Fig. 1.

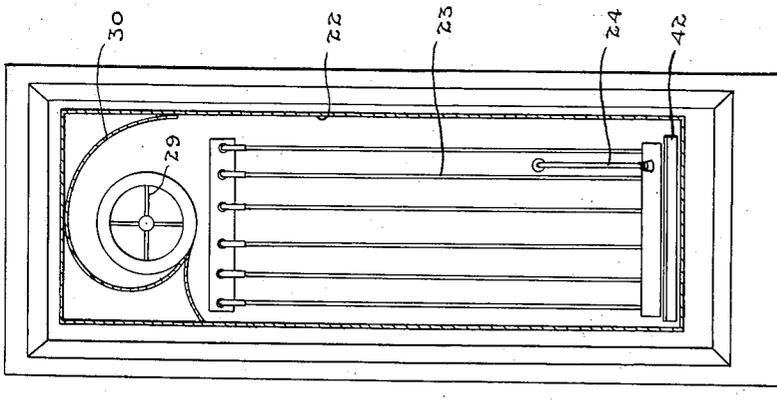


Fig. 4.

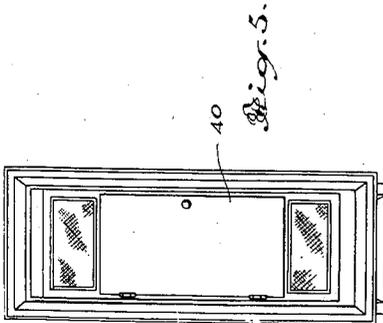


Fig. 5.

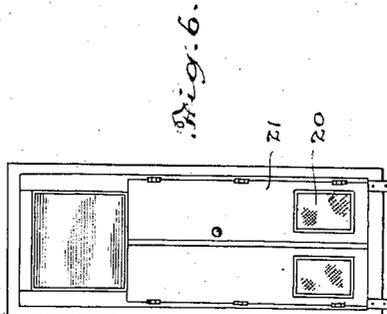


Fig. 6.

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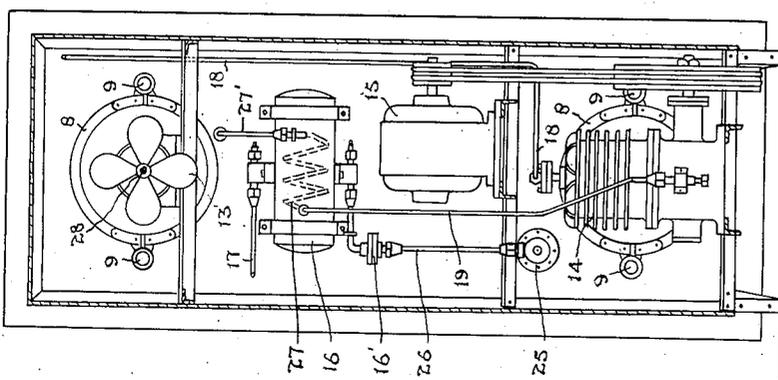
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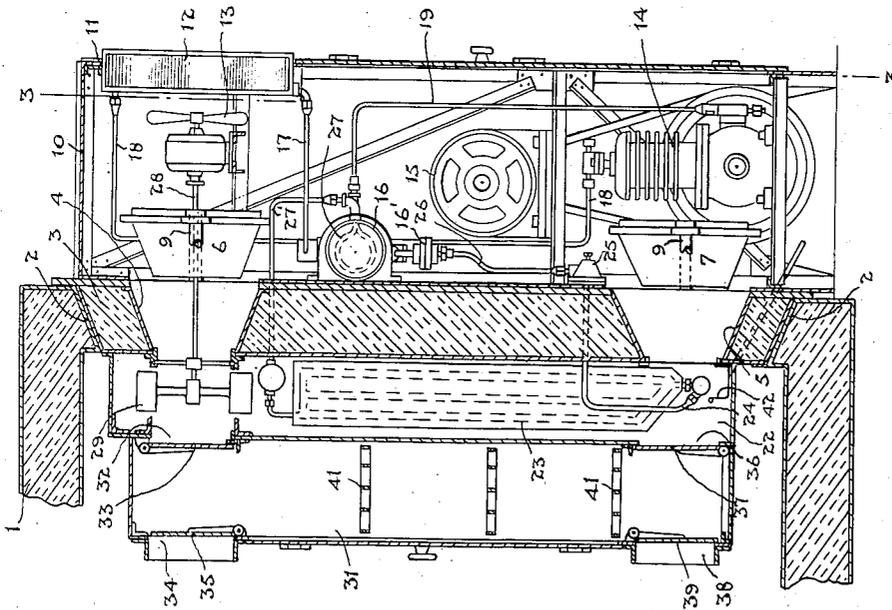
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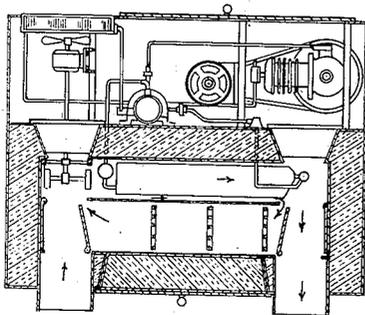
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*Fig. 3.*



*Fig. 2.*



*Fig. 7.*

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# UNITED STATES PATENT OFFICE

2,466,876

## REFRIGERATOR UNIT

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4 Claims. (Cl. 62-116.)

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This invention relates to improvements in mechanical refrigerating devices particularly adapted for use in connection with refrigerating compartments built into a building and the principal object is to provide a unitary structure which may be set into an opening in the wall of the refrigeration compartment and which comprises an arrangement of air refrigeration circulating media adapted to circulate and cool the air of the refrigeration compartment and to bypass the refrigerated air through a quick freezing compartment.

A further object is to provide a structure which will enable the defrosting of the refrigeration coils without materially raising the temperature in the refrigeration compartments.

A further object is to devise a unit in which the operating mechanism is readily accessible for repair or interchange.

The principal feature of the invention consists in the novel arrangement of a motor, compressor and condenser on the outward side of an insulating panel with an evaporator and a quick freezing compartment on the inward side and means for controlling the flow of air through the evaporator for normal refrigeration of a refrigeration compartment, or for quick freezing in the freezing compartment, or to effect the defrosting of the evaporator.

In the accompanying drawings Figure 1 is a vertical sectional elevational view of my improved refrigerator unit showing the air circulation control members in the positions assumed in the normal refrigeration circulation of air through a large refrigeration compartment.

Figure 2 is a view similar to Figure 1 showing the air circulation control members in position for effecting defrosting of the evaporator.

Figure 3 is a front vertical sectional elevation of the mechanical compartment of the device taken on the line 3-3 of Figure 2.

Figure 4 is a vertical sectional view taken on the line 4-4 of Figure 1.

Figure 5 is a reduced elevational view of the inner face of the quick freezing compartment.

Figure 6 is a reduced elevational view of the outer or front face of the mechanical compartment.

Figure 7 is a reduced sectional view showing an alternative form of a freezing unit.

In the form of the invention illustrated in the accompanying drawings 1 represents the insulated walls of a refrigeration compartment which may be of any desirable dimensions, the end wall having a bevel edged opening 2 therein.

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Within the opening 2 is arranged a bevelled edged insulated closure member 3 which may be supported on suitable hinges or otherwise secured as may be desired. This closure member is formed with openings 4 and 5 arranged adjacent to the top and bottom thereof respectively and these openings are bevelled and flare outwardly.

Insulated closure members 6 and 7 are preferably bevelled to fit the openings 4 and 5 respectively and these are provided with brackets 8 (as shown in Figure 3) which are mounted on rigid horizontal studs or rods 9 to slide outwardly to permit the free passage of air through the openings 4 and 5 and to slide inwardly to seal the said openings.

A rigid frame 10 with an enclosing casing is mounted on the outward side of the main closure member 3 and opposite to the opening 4 in the member 3 is an opening 11 in which is arranged a suitable condenser grid 12 which permits the passage of air therethrough.

Suitably mounted within the casing 10 opposite the condenser 12 is a motor-driven fan 13 adapted to force air outwardly through the condenser.

Mounted in the casing 10 adjacent to the bottom is compressor 14, here shown driven by a motor 15 supported thereabove.

A liquid receiver and heat exchanger 16 of suitable construction is mounted within the casing 10 and is connected by a tube 17 leading from the condenser to which gaseous refrigerant is conducted from the compressor by a tube 18.

A fluid return tube 19 connects the receiver 16 with the crank case of the compressor.

Screen openings 20 are arranged in the lower portion of the casing 10 and a suitable door 21 to allow access to the refrigerating machinery is arranged above the screens 20.

Arranged on the inner side of the closure 3 is an enclosed chamber 22 in which is vertically mounted a suitable evaporator 23.

The upper head of the evaporator is connected with a heat exchange coil 27 in the receiver 16 by a tube 27' and from thence to the suction of the compressor through the tube 19.

The compressor 14 delivers compressed refrigerant through the tube 18 to the condenser 12 where the refrigerant is condensed. The flow from the condenser is through the tube 17 to the receiver 16 which contains the heat exchanger coil 27 referred to. The refrigerant flows then from the receiver 16 through the screen 16' and tube 26 to the expansion valve 25 which discharges through pipe 24 to the lower head of the evaporator.

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The evaporator, which receives the expanded refrigeration medium produces an extremely low temperature within the chamber 22.

It will be noted that the upper end of the evaporator chamber 22 is connected directly with the opening 4 and the lower end is connected with the opening 5 leading outwardly through the main chamber wall 1.

The shaft 28 of the fan 13 extends centrally through the upper closure member 6 and carries a fan 29 which operates in the upper end of the evaporator chamber 22 and the air delivered from said latter fan is directed downwardly between the evaporator elements by a convolute partition wall 30.

An extension of the casing enclosing the evaporator chamber 22 encloses a chamber 31 which has an opening 32 at the top connecting same with the chamber 22, said opening being controlled by a damper 33 which is shown hinged at the top to swing downwardly. Another opening 34 is arranged opposite the opening 32 and is controlled by a damper 35 shown hinged at the bottom and which closes the top of the chamber 31 or may be swung up to close the opening 34.

At the bottom of the chamber 31 an opening 36 connects said chamber with the evaporator chamber 22 and is controlled by a damper 37 hinged at the bottom and an aligned opening 38 is controlled by a damper 39 hinged at the top to close the bottom of the chamber 31 or to close the opening 38. Suitable damper rods may be connected for operating these dampers either from the inside of the main refrigeration chamber enclosed by the walls 1 or from the outside of the closure member 3.

A suitable door 40 is arranged in the inner wall of the chamber 31 to give access to the interior thereof from the main refrigeration chamber and suitable grid shelves 41 are arranged in the chamber 31 for the placing of goods which it may be desired to freeze and hold frozen.

In the operation of this refrigeration unit the compressed refrigerant is liberated to the evaporator through the expansion valve 25 thereby producing a low temperature condition in the vertical chamber 22. With the upper damper 33 raised and the damper 35 lowered and the lower damper 37 lowered and the damper 39 raised, as shown in Figure 1, the fan 29 draws air from the top of the main refrigeration chamber enclosed by the walls 3 inwardly and forces it downwardly past the evaporator elements and then outwardly through the aligned bottom openings 36 and 38 back into the bottom of said refrigeration chamber, thereby maintaining the desired temperature in said chamber.

When it is desired to quick-freeze certain commodities these are placed on the grid shelves 41 and the upper damper 35 is raised and the lower damper 39 is closed, thereby directing the full flow of low temperature air through the chamber 31. When the desired temperature has been retained in the chamber 31 for the required period to freeze the contents thereof the dampers 35 and 39 may be adjusted to allow a portion of the air flow to be drawn from the top of the main refrigeration chamber and the quick-freezing chamber and likewise the lower dampers may be regulated to direct part of the cold air into both refrigeration chambers, thereby maintaining the desired temperature in both. The control of these dampers may be effected thermostatically if desired.

When it becomes desirable to defrost the

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evaporator the compressor machine is first stopped then the dampers 33 and 37 will be operated to close the openings 32 and 36, thereby closing off the refrigeration chambers from the evaporator chamber. When this is done the closure members 6 and 7 are operated to open the top and bottom respectively of the evaporator chamber to the interior of the casing 10. The fan 29 then draws warm air from the compartment 10 and circulates it through the opening 6, the chamber 22 and the opening 7. This rapid passage of warm air, with the refrigeration compressor stopped quickly defrosts the evaporator, the water being carried away by a suitable drain trough 42.

It will be appreciated that if the temperature within the quick-freezing chamber should be kept within certain ranges it may be found desirable to operate the dampers 35 and 39 to close the openings between the quick-freezing chamber and the main chamber and this can be done with the dampers 33 and 37 closed.

When the evaporator has been defrosted the closure members 6 and 7 will be returned to the closed positions and the refrigeration mechanism again put into operation.

During the defrosting operation the temperatures in the refrigeration chambers will not alter materially and the goods stored will not be subjected to detrimental conditions.

A structure such as described will be manufactured as a self-contained unit and can be readily installed in any structure desired at very low installation cost.

It will be understood that suitable well known automatic temperature controls may be utilized to maintain the desired temperatures in the main refrigeration chamber when not fast freezing in compartment 31, or depositing the evaporator.

It will also be understood that the device described comprising a quick-freezing compartment and an evaporator compartment may be enclosed within an insulating casing as illustrated in miniature in Figure 7 with the machine compartment arranged on the outer side of the evaporator compartment so that the device may be constructed as a unit and refrigerated air may be conducted therefrom by suitable ducts connected with the refrigerating compartment.

What I claim as my invention is:

1. In a refrigerator unit, a refrigerating compartment, having a removable insulating panel forming part of a wall thereof, said panel having openings therethrough at the top and bottom thereof, means for opening and closing said openings, an evaporator compartment mounted on said panel and extending into said refrigerating compartment, openings at the top and bottom of said evaporator compartment, a freezing compartment extending from said evaporator compartment into said refrigerating compartment, openings at the top and bottom of said freezing compartment, means for controlling the openings from the evaporator compartment, and means for independently controlling the flow of air through the freezing compartment.

2. In a refrigerator unit, having an open side, a removable refrigerating compartment, of an insulating panel forming a closure for said open side and having openings therethrough at the top and bottom thereof, means for opening and closing said openings, an evaporator compartment mounted on said panel and extending into said refrigerating compartment and communicating with said openings in said panel and having open-

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ings at the top and bottom on the side adjacent to the refrigerating compartment, a freezing compartment extending into said refrigerating compartment and communicating with the top and bottom openings thereof and having top and bottom openings leading into said refrigerating compartment, dampers arranged in the openings leading from the evaporator compartment to the freezing compartment, and dampers adapted to control the flow of refrigerated air through the freezing compartment and to control the size of the openings from the freezing compartment to the refrigerating compartment.

3. A device as claimed in claim 2 in which the dampers controlling the size of the openings between the evaporator compartment and the freezing compartment are hinged to swing away from the passage through the freezing compartment and to swing to close the openings between said freezing and evaporating compartments, and the dampers controlling the size of the openings between the freezing compartment and the refrigerating compartment are adapted to close the top and bottom of the freezing compartment and to regulate the size of the openings between the freezing compartment and the refrigerating compartment.

4. A refrigerator unit comprising an insulating panel forming a wall of said unit and having openings therethrough adjacent to the top and bottom thereof, closure members movable from one side of said panel, an evaporator compartment on the side of said panel opposed to said closure members and enclosing said openings, an evaporator

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mounted in said evaporator compartment, a freezing compartment adjacent said evaporator compartment having openings at the top and bottom communicating with the evaporator compartment and openings arranged opposite said last-mentioned openings, dampers controlling the size of the openings at the top of said freezing compartment, a casing mounted on said panel and enclosing the panel closure members and having openings at the top and bottom, a condenser connected in series with said evaporator and arranged in the top opening of the latter casing, motor operated fan means for drawing air into said casing and driving air through said condenser and fan means for drawing said indrawn air through the upper panel opening and said evaporator compartment, and means for circulating a refrigerant through said evaporator.

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