July 12, 1955

R. E. KING

2,712,733

FREEZER COMPARTMENT IN REFRIGERATOR DOOR

Filed March 22, 1954

FIG. 1

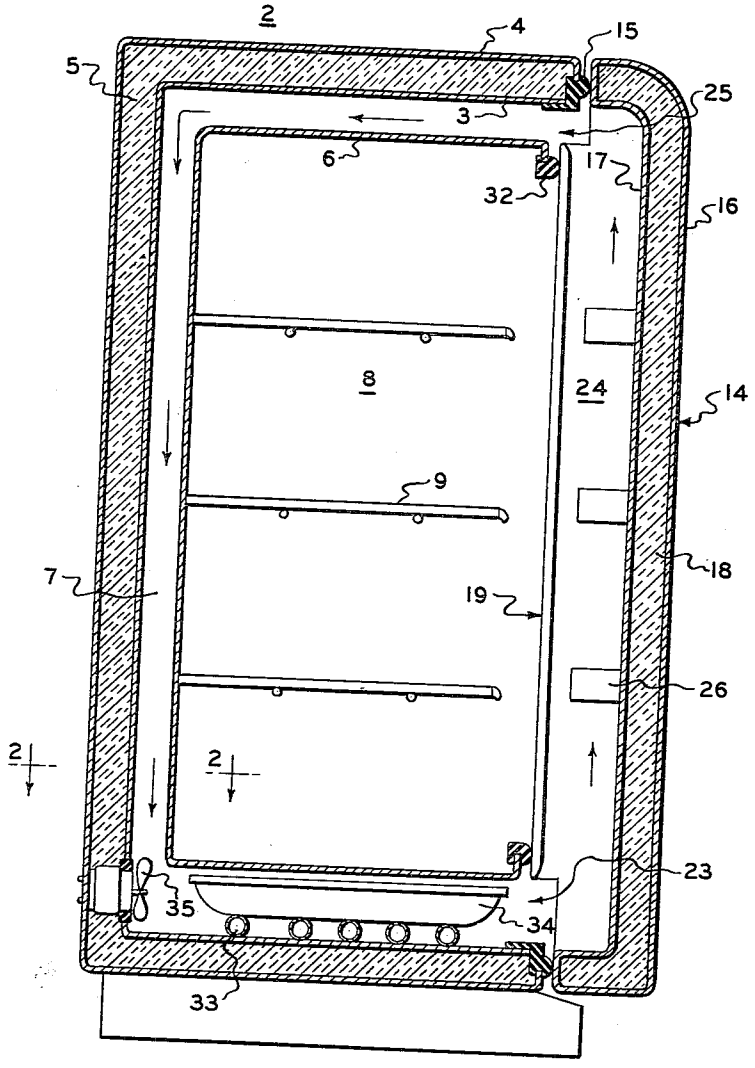
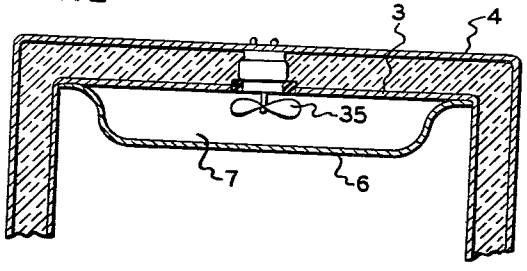


FIG. 2



INVENTOR.
RALPH E. KING
BY Abendanle Bros
HIS ATTORNEY

United States Patent Office 2,712,733 Patented July 12, 1955

2,712,733

FREEZER COMPARTMENT IN REFRIGERATOR DOOR

Ralph E. King, Erie, Pa., assignor to General Electric Company, a corporation of New York

Application March 22, 1954, Serial No. 417,639

5 Claims. (Cl. 62—102)

This invention relates to household refrigerators and, more particularly, to refrigerators having both a fresh food compartment and a freezer compartment.

Household refrigerators of the two compartment type presently have the freezer compartment and the fresh food compartment arranged in vertical spaced relation with each compartment being insulated from the other compartment. Insulating of the compartments from each other results in the need of two evaporator sections operating at different temperatures. In addition, positioning of the fresh food compartment and the freezer compartment in vertically spaced relationship results in one of the compartments having easier access thereto than the other compartment.

This invention contemplates a freezer compartment disposed within the door of the refrigerator; a single evaporator cools both compartments, thereby eliminating the necessity of two evaporator sections. Moreover, the present invention provides both freezer and fresh food compartments which have portions that are equally readily accessible, and portions that are not as easily accessible so that articles may be stored according to the expected use thereof.

A primary object of the present invention is to provide a freezer compartment in the door of a household refrigerator.

An object of the invention is to provide a refrigerator of the two compartment type with a fresh food compartment isolated from the evaporator to maintain high relative humidity in the fresh food compartment.

Another object of the invention is to provide a refrigerator of the two compartment type with an evaporator disposed outside both the fresh food and freezer compartments.

A further object of this invention is to provide a positive air path for cooling both the fresh food and freezer compartments of a two compartment refrigerator.

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

This invention relates to a refrigerator having a cabinet providing a fresh food storage compartment and a duct or passage disposed about the top, back and bottom walls of the food storage compartment. A door provides access to the front of the food storage compartment and has an inner door spaced therefrom to provide a second compartment therebetween. The inner door is spaced from the upper and lower edges of the first mentioned door to provide upper and lower openings for the second compartment, with the lower opening in communication with the portion of the duct or passage disposed beneath the bottom wall of the food storage compartment and the upper opening being in communication with the portion of the duct or passage disposed above the top wall of the food storage compartment. A closed circuit is provided which includes the passage,

the openings, and the second compartment. An evaporator is disposed in this closed circuit. Also a fan is disposed in the closed circuit to circulate air through the closed circuit and over the evaporator to maintain the second compartment at sub-freezing temperatures so the second compartment will function as a freezer compartment, and to cool the walls of and maintain the food storage compartment at above freezing temperatures.

For a better understanding of the invention reference may be had to the accompanying drawing, in which:

Fig. 1 is a sectional view of a household refrigerator embodying the present invention; and

Fig. 2 is a sectional view taken substantially along the line 2—2 of Fig. 1.

Referring to the drawing and particularly Fig. 1, there is shown a refrigerator cabinet 2 having an inner liner 3 and an outer casing 4 with suitable insulation 5 disposed therebetween. A wall 6 is spaced from the inner liner 3 to provide a duct or passage 7 therebetween, the relationship of the wall 6 to the inner liner 3 being clearly shown in Fig. 2. The wall 6 also serves as the wall for the fresh food storage compartment 8, which is provided with suitable shelves 9 for holding the contents of the fresh food compartment. A door 14 provides access to the fresh food compartment 8 and the duct 7. A suitable gasket 15 is disposed on the cabinet 2 to prevent air leakage therefrom. The door 14 is composed of an outer panel or wall 16 and an inner panel or wall 17 with suitable insulation 18 disposed therebetween. As shown, the inner panel 17 is dished inwardly.

An insulated inner door 19 is spaced from the door 14, as clearly shown in Fig. 1, and secured thereto by suitable hinging means (not shown). The lower edge of the inner door 19 is spaced from the lower edge of the door 14 to provide a lower opening 23 that permits communication between the portion of the duct 7 disposed beneath the bottom wall of the storage compartment 8 and the compartment 24 formed between the door 14 and the inner door 19. An upper opening 25 is disposed between the upper edge of the inner door 19 and the upper edge of the door 14 to provide communication between the compartment 24 and the portion of the duct 7 that is disposed above the top wall of the storage compartment 8. Suitable shelves 26 are disposed in the compartment 24 and supported from the door 14 to hold the contents desired to be stored in the compartment. A gasket 32 is disposed on the edges of the wall 6 to cooperate with the inner door 19 to prevent air leakage between the storage compartment 8 and the duct 7.

An evaporator 33, which is part of the usual well-known refrigerating system, is disposed in the lower portion of the duct 7, as clearly shown in Fig. 1. An ice tray 34 is shown disposed above the evaporator 33 in heat exchange relation therewith so that ice cubes may be formed therein by freezing water in the ice tray 34. A fan 35 is positioned in the duct in the lower portion thereof to direct air over the evaporator 33 through the lower opening 23 to the compartment 24 and then through the opening 25 back through the duct 7 to the fan 35.

It will be seen that a closed circuit is provided from the duct 7 through the lower opening 23 to the compartment 24 and through the upper opening 25 back to the duct 7. Thus, the compartment 24 receives the initial refrigeration effect of the evaporator 33 so that the compartment 24 may be maintained at sub-freezing temperatures to keep the contents thereof in a frozen condition. The food storage compartment 8 is refrigerated by conduction through the wall 6. A part of the initial refrigeration effect of the evaporator 33 is transmitted directly through the bottom wall of the food storage

compartment 8, especially if there are no ice cubes to be frozen in the ice tray 34. The remainder of the refrigeration by conduction is effected by the air circulating through the duct 7. The insulation of the inner door 19 prevents any substantial transfer of heat from the food storage compartment 8 to the compartment 24. The gasket 32 cooperates with the inner door 19 to prevent any leakage of air from the closed circuit.

It will be understood that the evaporator 33 could be disposed in the upper portion of the duct 7 provided that the fan 35 were disposed so as to permit the flow of air to be over the evaporator through the upper opening 25, then through the compartment 24 and the lower opening 23 back to the duct 7. Thus, the compartment 24 would still be receiving the refrigeration effect of the evaporator 33 first so that it could be maintained at a temperature below freezing. The fan 35 could be disposed in any portion of the closed circuit as long as it circulated the air in the desired direction. It will be understood that the inner door 19 could be hinged to the wall 6 rather than the door 14, if desired.

While the present invention has been described by reference to a particular embodiment thereof, it will be understood the modifications may be made by those skilled in the art without actually departing from the invention. I, therefore, aim in the appended claims to cover all such variations as come within the true spirit and scope of the foregoing disclosure.

I claim:

1. A refrigerator having a cabinet providing a food storage compartment, a door providing access to said compartment, an inner door spaced from said first-mentioned door to provide a freezer compartment between said doors, an evaporator disposed adjacent the lower portion of the storage compartment, said inner door being spaced from the upper and lower edges of said first-mentioned door to provide air openings to and from said freezer compartment, means to circulate air over said evaporator through one of said openings, said freezer compartment and said other opening to return to said evaporator, said circulation of air through said freezer compartment maintaining said freezer compartment at sub-freezing temperatures to preserve the contents of the freezer compartment in their frozen condition.

2. A refrigerator having a cabinet providing a food storage compartment, a passage disposed about the top, the back, and bottom walls of said food storage compartment, a door providing access to the front of said food storage compartment, an inner door spaced from said first door to provide a second compartment therebetween, said inner door being spaced from the upper and lower edges of said first door to provide openings, said lower opening being in communication with the portion of said passage disposed beneath the bottom wall of said food storage compartment, said upper opening being in communication with the portion of said passage disposed above the top wall of said food storage compartment, a closed circuit being provided through said passage, one of said openings, said second compartment, and the other of said openings, an evaporator disposed in the portion of the passage disposed below the bottom wall of said food storage compartment, and means to circulate air through the closed circuit and over the evaporator to maintain the second compartment at sub-freezing temperatures so that the second compartment will function as a freezer compartment and to maintain the food storage compartment at above freezing temperatures.

3. A refrigerator having a cabinet providing a food storage compartment, a passage disposed about the top, the back, and bottom walls of said food storage compartment, a door providing access to the front of said food storage compartment, an inner door spaced from said first door to provide a second compartment therebetween, said inner door being spaced from the upper and lower edges of said first door to provide openings, said lower opening being in communication with the portion of said passage disposed beneath the bottom wall of said food storage compartment, said upper opening being in communication with the portion of said passage disposed above the top wall of said food storage compartment, a closed circuit being provided through said passage, one of said openings, said second compartment, and the other of said openings, an evaporator disposed in the portion of the passage disposed below the bottom wall of said food storage compartment, a fan disposed in said passage, said fan circulating air from said evaporator directly to said second compartment and then through the remainder of the closed circuit to maintain the second compartment at sub-freezing temperatures so that the second compartment will function as a freezer compartment and to maintain the food storage compartment at above freezing temperatures.

4. A refrigerator having a cabinet providing a food storage compartment, a passage disposed about the top, the back, and bottom walls of said food storage compartment, a door providing access to the front of said food storage compartment, an inner door spaced from said first door to provide a second compartment therebetween, said inner door being spaced from the upper and lower edges of said first door to provide openings, said lower opening being in communication with the portion of said passage disposed beneath the bottom wall of said food storage compartment, said upper opening being in communication with the portion of said passage disposed above the top wall of said food storage compartment, a closed circuit being provided through said passage, one of said openings, said second compartment, and the other of said openings, an evaporator disposed in the portion of said passage disposed below the bottom wall of said food storage compartment, and a fan disposed in said passage, said fan circulating air from said evaporator directly to said second compartment through said lower opening and then through the remainder of the closed circuit to maintain the second compartment at sub-freezing temperatures so that the second compartment will function as a freezer compartment and to maintain the food storage compartment at above freezing temperatures.

5. A refrigerator having a cabinet providing a food storage compartment, a passage disposed about the top, the back, and bottom walls of said food storage compartment, a door providing access to the front of said food storage compartment, an inner door spaced from said first door to provide a second compartment therebetween, said inner door being spaced from the upper and lower edges of said first door to provide openings, said lower opening being in communication with the portion of said passage disposed beneath the bottom wall of said food storage compartment, said upper opening being in communication with the portion of said passage disposed above the top wall of said food storage compartment, a closed circuit being provided through said passage, one of said openings, said second compartment, and the other of said openings, an evaporator disposed in the portion of the passage disposed below the bottom wall of said food storage compartment, an ice tray disposed in heat exchange relation with said evaporator, and means to circulate air through the closed circuit and over the evaporator to mainmtain the second compartment at sub-freezing temperatures so that the second compartment will function as a freezer compartment and to maintain the food storage compartment at above freezing temperatures.

References Cited in the file of this patent

UNITED STATES PATENTS

2,028,046	Calatroni	Jan. 14, 1936
2,165,480	Hastings	July 11, 1939
2,297,581	Poltier	Sept. 29, 1942
2,373,618	Tobey	Apr. 10, 1945