

Feb. 13, 1962

E. F. HUBACKER ET AL

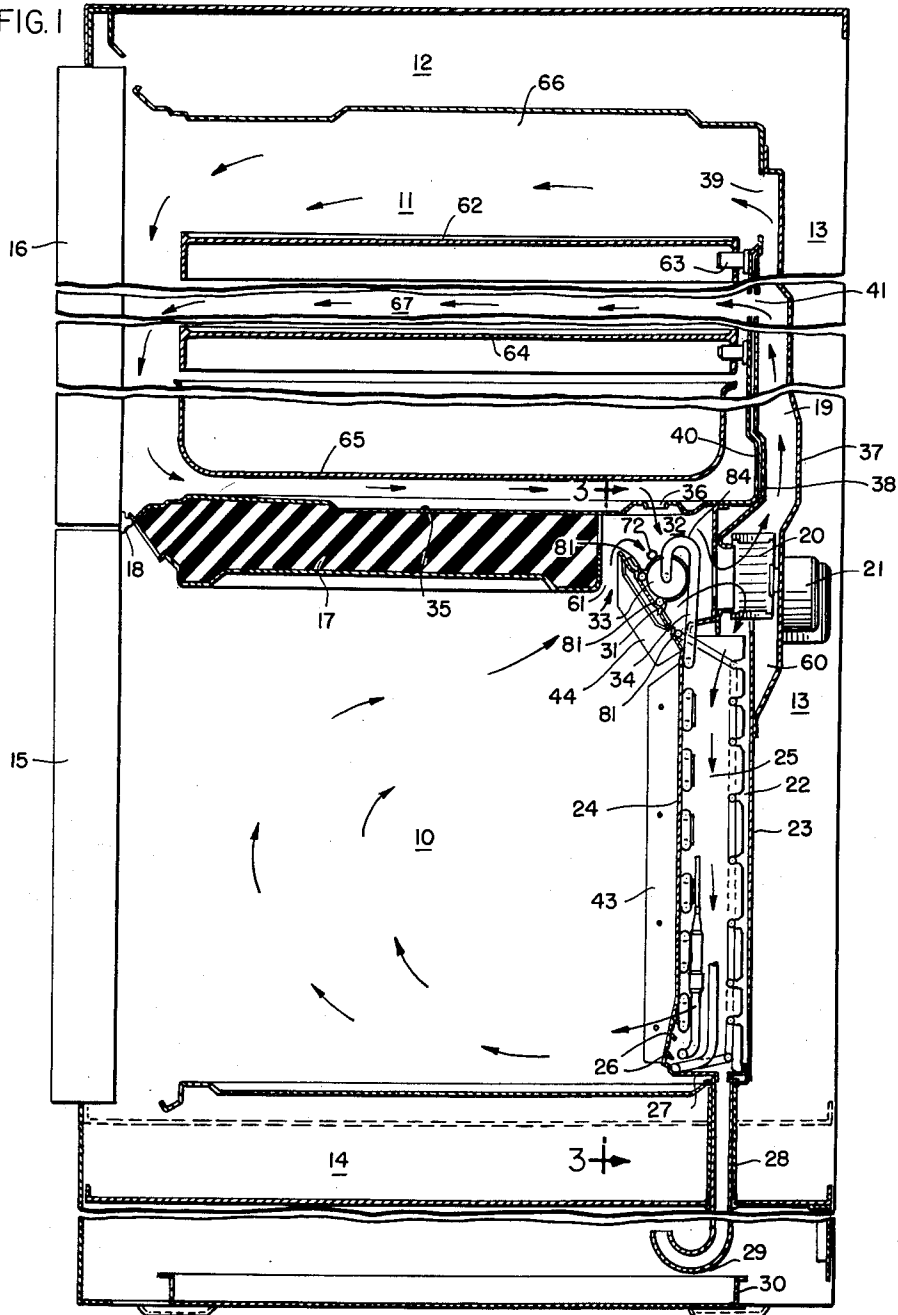
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HOME APPLIANCE

Filed April 20, 1959

3 Sheets-Sheet 1

FIG. 1



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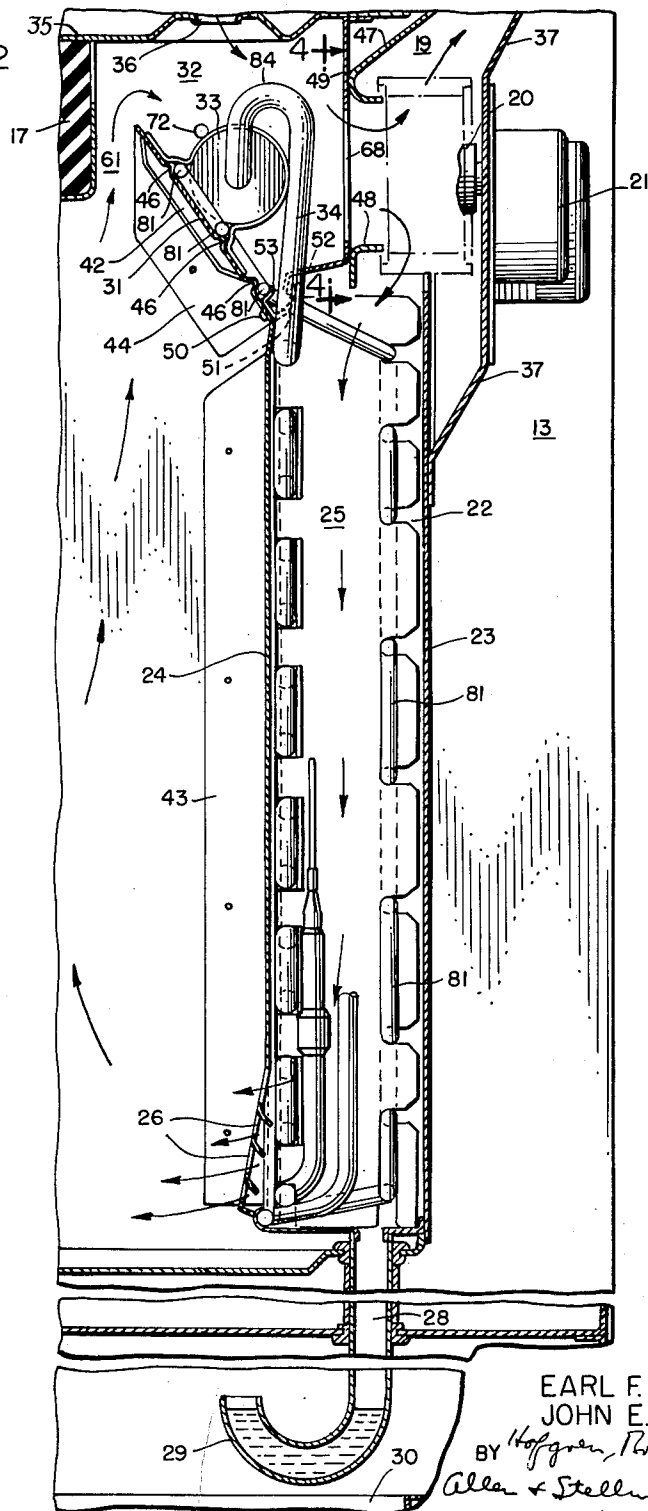
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FIG. 2



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3 Sheets-Sheet 3

FIG. 3

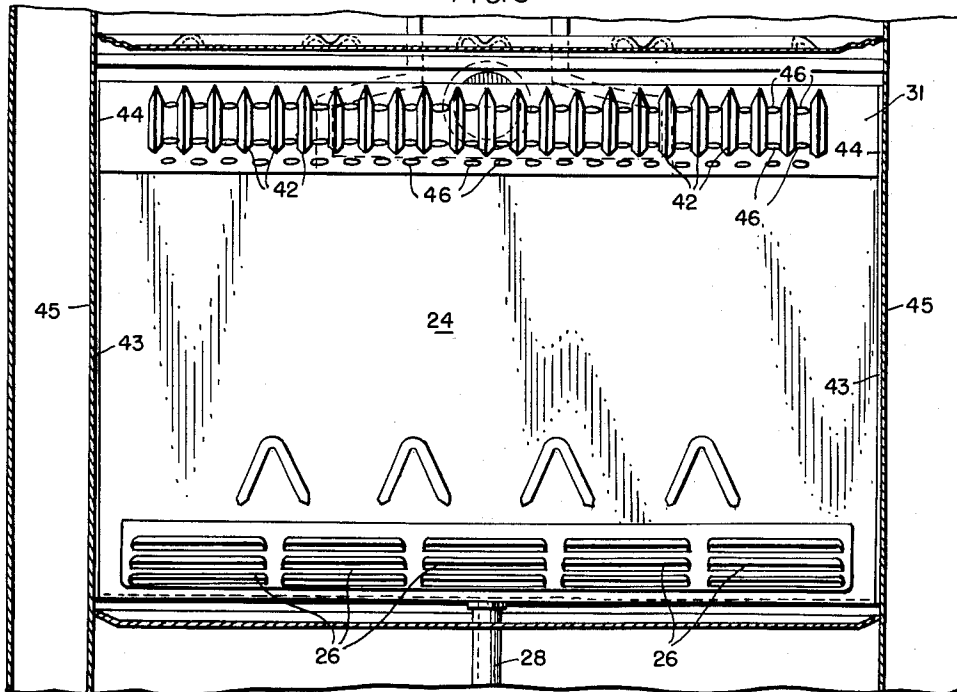


FIG. 4

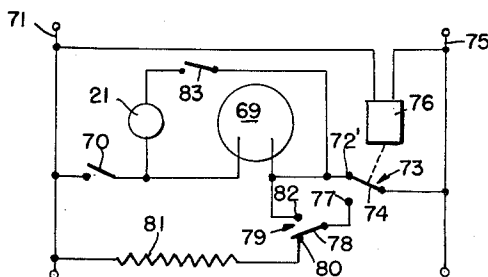
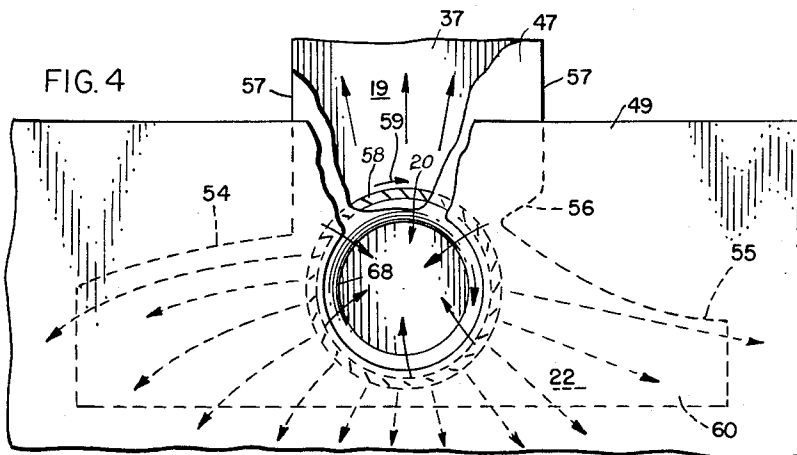


FIG. 5

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3,020,733

HOME APPLIANCE

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This invention relates to a refrigerating apparatus and to methods of cooling.

The refrigerating apparatus of this invention provides separate chambers as in a domestic refrigerator of the type in which one chamber is used for storing fresh foods at above freezing temperatures and another chamber is used for storing frozen foods at below freezing temperatures. In the apparatus of this invention means are provided for forcing separate air streams through the two chambers, means for intermingling the separate streams, means for dividing the intermingled air into the two separate streams and means for cooling the low temperature chamber air stream only after the separation of the air into the two streams. With this arrangement the air stream through the storage or relatively higher temperature chamber is cooled primarily by the intermingling of the two streams although air cooling means may be provided as desired in the area of intermingling.

One of the features of this invention is to provide an improved method of cooling first and second chambers comprising simultaneously circulating air through said chambers in first and second streams, mingling the air streams at a common juncture followed by separating the air into said first and second streams, and cooling one of said streams only subsequent to its passage through said juncture.

Another feature of the invention is to provide an improved method of cooling first and second chambers comprising simultaneously circulating air through said chambers in first and second streams, isolating said first stream from the first chamber prior to passing the stream into the first chamber, mingling the air streams at a common juncture followed by separating the air into said first and second streams, cooling said first stream during said isolation and cooling said mingled streams at said common juncture.

A further feature of the invention is to provide an improved refrigerating apparatus comprising means forming a relatively low temperature first chamber, means forming a relatively high temperature second chamber, means forming a mixing chamber, means for circulating a first air stream through the first chamber and a second air stream through the second chamber, means directing both air streams through the mixing chamber for intermingling therein, and means for cooling said first air stream only at a point downstream from said mixing chamber.

Yet another feature of the invention is to provide an improved refrigerating apparatus comprising means forming a relatively low temperature first chamber, means forming a relatively high temperature second chamber, means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber, a blower adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet, means forming a first air passage communicating with said first outlet and emptying into the first chamber, means forming a second air passage adjacent said second chamber communicating with said second outlet, means forming an outlet from the second passage to the second chamber, the blower thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and

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in a second stream through the second passage, second chamber and mixing chamber, and cooling means for the air in said first passage.

Another feature is to provide an improved refrigerating apparatus comprising means forming a relatively low temperature first chamber, means forming a relatively high temperature second chamber, means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber, a blower adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet, means forming a first air passage communicating with said first outlet and emptying into the first chamber, means forming a second air passage adjacent said second chamber communicating with said second outlet, means forming a plurality of outlets from the second passage to the second chamber, means in said second chamber for maintaining the air flow from said plurality of outlets substantially parallel, the blower thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber, a first refrigerant evaporator means in said first passage, and a second refrigerant evaporator means in said mixing chamber.

Other features and advantages of the invention will be apparent from the following description of one embodiment of the invention considered in conjunction with the accompanying drawings. Of the drawings:

FIGURE 1 is a semi-diagrammatic vertical sectional view through an embodiment of the invention.

FIGURE 2 is an enlarged sectional detail view of the embodiment of FIGURE 1.

FIGURE 3 is a sectional elevational view taken substantially along the line 3-3 of FIGURE 1.

FIGURE 4 is a sectional elevational view partially broken away for clarity of illustration and taken substantially along line 4-4 of FIGURE 2.

FIGURE 5 is a wiring diagram of the embodiment of the preceding figures.

The refrigerator of this invention comprises a lower relatively low temperature first chamber 10 for storing frozen foods and the like and a relatively high temperature second chamber 11 for storing fresh foods and the like. The refrigerator is formed of the customary insulated walls including top wall 12, a rear wall 13 and a bottom wall 14 and is provided with a pair of access doors to the first and second chambers with these doors being shown diagrammatically at 15 and 16. It is of course to be understood that any type door closures desired may be used including those of the customary type provided with the usual sealing gaskets. The doors may contain inner shelves of the customary type adapted to hold and support articles. The two chambers 10 and 11 are separated from each other by an insulated transverse wall 17 sealed at the front as by a gasket 18.

At the rear of the upper chamber 11 there is provided an upwardly extending air passage, or flow chamber 19, extending upwardly from a blower 20 which is operated by an electric motor 21 located in the insulation of the rear wall 13. Extending downwardly from the blower 20 at the rear of the lower chamber 10 is a second air passage, or flow chamber, 22 defined by a rear wall 23 and a forward evaporator cover plate 24. Between this rear wall 23 and cover plate 24 there is located a refrigerant evaporator 25 of customary construction. In order to provide for exit of air at the bottom of the cover plate 24 this plate is provided with a plurality of bottom louvers 26.

A bottom plate 27 is provided at the bottom of the evaporator 25 and this plate is provided with an opening communicating with a downward extending drain pipe 28

upturned at its lower end as indicated at 29 to provide a trap. This end 29 of the drain pipe spills into a bottom pan 30 so that condensate from the evaporator 25 when the evaporator and associated structure is defrosted will flow down through the pipe 28 and into the pan 30 for evaporation therefrom in the customary manner.

The upper end 31 of the cover plate 24 is angled to extend upwardly and forwardly toward but spaced from the rear of the transverse insulated wall 17. This upper end 31 is spaced from the blower 20 to provide a chamber 32 in front of the blower and behind the end 31. Mounted on the cover plate end 31 within the chamber 32 is a refrigerant accumulator 33 which is interconnected in the refrigerant circuit in the usual manner by means including the tube 34.

The bottom of the upper refrigerated chamber 11 is defined by a bottom plate 35 which forms the upper surface of the insulated wall 17. This bottom plate 35 is provided with a plurality of apertures 36 at its rear to provide communication between the chamber 32 and the second chamber 11.

The upwardly extending air passage 19 is defined at its rear by the front surface 37 of the rear wall 13 and a forwardly spaced upwardly extending wall 38. This wall 38 extends upwardly but terminates short of the upper end of surface wall 37 to provide a relatively large opening 39 at the top of chamber 11. The bottom plate 35 at the rear of the apertures 36 extends upwardly in front of the wall 38 and is attached thereto. This front wall portion 40 is closely spaced to the wall 38 and is attached thereto. The walls 38 and 40 contain aligned apertures to form air flow openings 41.

The evaporator cover plate 24 is provided with vertical ribs 42 at the upper end 31 and the plate is provided with side flanges 43 and 44 for attachment to the side plates 45 that form the sides of the lower chamber 10. Between the ribs 42 are provided spaced sets of inwardly extending deformations 45 which in conjunction with the ribs 42 serve to strengthen the upper end 31.

As is shown most clearly in FIGURE 2 the bottom end 47 of the wall 38 extends forwardly and downwardly in front of the blower 20 and is provided with an inwardly extending cylindrical flange 48 at the entrance to the blower 20. In front of this flange 48 is provided a baffle plate 49 which is attached to the rear of the plate 35 and extends downwardly in front of the flange 48 and then slopes forwardly and downwardly to the bottom of the upper end 31 of the cover plate 24. The lower end of this plate 49 is attached to the cover plate as by a plurality of screws 50. From the point of attachment of the lower end of the plate 49 the plate is bent upwardly and rearwardly to provide a lip 51 which has an edge 52 above the point of attachment at the screws 50. The portion of the plate 49 above the screws 50 but beneath this upper end 52 is provided with a series of horizontally aligned openings as indicated at 53 in FIGURE 2.

The construction of the air passages 19 and 22 is shown most clearly in FIGURE 4. These air passages are preferably formed of rigid plastic and the motor 21 is attached to the rear side of the rear wall 37 as shown in FIGURE 2. The rearward duct housing 37 is shaped to divide the air leaving the blower 20 so that the proper ratios of air are delivered to the lower chamber 10 and the upper chamber 11. Thus beginning at a point to the left of the blower 20 in FIGURE 4 and above the center line thereof there is provided a substantially horizontal partition 54 extending outwardly and curving downwardly in a long radius of curvature.

On the other side of the blower 20 approximately the reverse condition is true. Thus beginning at the opposite side another partition 55 curves upwardly and toward the blower 20 to within the righthand edge of the air passage 19 and then is reversed and extends upwardly and outwardly as indicated at 56 to join the sidewall 57 forming the lateral sides of the passage 19.

The blower 20 is of the conventional type having inclined blades 58. However the blower is rotated in a direction opposite to its normal direction of rotation as indicated by the arrow 59 in FIGURE 4 so that the blades 58 "push" the air outwardly in a generally radial direction as illustrated diagrammatically by the air flow arrows in FIGURE 4. Thus there is a good distribution of air throughout the upper air passage 19 and the lower air passage 60 at the bottom of the wall 37. This air passage 60 of course empties into passage 22 for air flow and heat transfer relationship to the evaporator 25.

The above described arrangement of blower and air passages provides the desired distribution of air into the two chambers 10 and 11. In the preferred construction a major portion or more than 50% of the air flow is directed downwardly through the air passage 22 over the evaporator 25 and through the lower low temperature chamber 10. In one embodiment of the invention this percentage was 60% of the total air flow. The remainder of the air then of course is directed upwardly through the passage 19 and through the upper relatively higher temperature chamber 11. The air from this upper chamber 11 returns through the spaced openings 36 into the mixing chamber 32 while the air from the lower chamber 10 flows in the passage 61 between the upper end 31 of the plate 24 and the rear of the insulated wall 17 into the mixing chamber 32.

The air from the passage 19 is directed into the upper refrigerator chamber 11 through the upper opening 39 and intermediate openings 41. Immediately beneath the upper opening 39 is a solid sealed shelf 62 which is sealingly supported at the supports 63 and extends toward but short of the door 16. This first shelf 62 is above the openings 41 but beneath the opening 39. Beneath the openings 41 there is provided another similar solid sealed shelf 64 similarly supported and also extending toward but short of the door 16. This shelf 64 may also serve as the top for the crisper pans 65. Between the two solid shelves 62 and 64 may be provided open type wire shelves of conventional construction or similar supports that will not interfere with air flow. The solid upper shelf 62 not only provides storage space but also provides a space 66 of minimum temperature (which may be about 33° F.) and also directs the air forwardly. The openings 41 provide the correct amount of air in the center area 67 of the chamber 11. These two streams of air flow are directed forwardly and downwardly and then pass rearwardly along the sides of and beneath the crisper pan 65 to flow through the openings 36 into the mixing chamber 32. These openings 36 are preferably long and narrow. In the mixing chamber the air passes over and around the accumulator 33 before entering the blower inlet in the baffle plate 49. This provides the additional function of depositing moisture contained in the air in the mixing chamber onto the accumulator surface so that "frosting" of the blower wheel is eliminated.

This mixing of air from the chambers 10 and 11 in the mixing chamber 32 provides the proper temperature of air for the upper storage chamber 11 as is indicated by the following example of one embodiment of the invention.

Thus in this embodiment the air leaving the evaporator bottom through the louvered openings 26 was approximately -10° F. The air leaving the freezer chamber 10 through the opening 61 was approximately 0° F. The air entering the upper passage 19 from blower 20 was approximately 12-15° F. and the air leaving the upper chamber 11 through the openings 36 was approximately 35° F. Thus air at approximately 35° F. was mixed in the mixing chamber 32 with air at approximately 0° F. and a portion of the resulting air was then directed upwardly through the passage 19 to provide for cooling the upper or fresh food storage chamber 11 while the major portion of the air was directed downwardly over the evaporator where it was again cooled to approximately

-10° F. Some cooling is also achieved in the mixing chamber 32 by air flow over and around the accumulator 33.

FIGURE 5 illustrates an electrical circuit for the operation of the entire apparatus. The ordinary compressor 69 is connected through switch 70 to one side of the source of electricity which is a line 71. This switch 70 may be a conventional thermostatic control switch with its capillary bulb mounted as indicated at 72 to the top of the accumulator 33. The other side of the compressor 69 is connected to contact 72' of the switch 73, the arm 74 of which is connected to the other side of the source of electric power which is the line 75. The arm 74 of switch 73 is normally held to the contact 72' by a defrost timing clock 76 which is connected between the electric lines 71 and 75. Thus the clock runs continuously. At periodic intervals which may be every 12 hours the defrost clock mechanism is arranged to break the compressor circuit by turning the arm 74 of the switch 73 to engage a contact 77. Since the arm 78 of a switch 79 is normally held to engage a contact 80 this places the heater wire 81 directly across the lines 71 and 75.

When all the frost on the evaporator surfaces has been melted, switch 79 is caused to reverse its contacts. This switch is a bimetal type which also is mounted on the accumulator 33 because it is normally the last point to be free of frost. When the accumulator has reached an above freezing temperature showing that it is substantially free of frost, switch arm 79 closes on contact 82 to start the operation of the compressor 69. This arrangement which is conventional in refrigeration circuits starts the operation of the compressor even though the arm 74 of the defrost switch 73 may still be in engagement with the contact 77. This arrangement assures that the defrost heating cycle is terminated by temperature after all ice from condensed moisture has been removed, rather than having the defrost cycle terminated by time.

The fan motor 21 is arranged in series with a switch 83 so that under normal operating conditions the fan motor runs at all times that the compressor is running. After a defrost cycle, when the evaporator surfaces have been warmed to remove accumulated frost, it is preferable not to begin operation of the fan and circulation of air immediately. In order to provide for this operation the switch 83 is preferably a bimetal switch and is preferably mounted on the uppermost point 84 of the tube 34 that connects the outlet of the evaporator 25 to the inlet of the accumulator 33. Thus after a defrost cycle the blower 20 is not energized until the refrigerant reaches the inlet to the accumulator. This provides for the proper temperature in the evaporator so that only cold air is circulated.

The defrost heater wire 81 extends along the evaporator 25 in passes in the customary manner to melt frost deposited thereon. In addition two passes of the heater wire (FIG. 2) are arranged on the upper end 31 of the cover plate 24 adjacent the accumulator 33 and one pass is arranged adjacent the openings 53 to quickly melt the ice frozen in the openings. During the defrost operation frost melts from the accumulator 33 and from the evaporator 25 substantially simultaneously. The water from the accumulator frost passes down through the series of openings 53 at the bottom of the mixing chamber 32 and fills the trough formed by the lip 51 and then flows over the edge 52 of this lip to join the evaporator condensate water and eventually down through the pipe 28 into the bottom pan 30. The trough formed by the lip 51 is thus always full of condensate water into which the lower edge of the baffle plate 49 extends as shown most clearly in FIG. 2. Then during the freezing cycle this water in the trough freezes to seal the openings 53 and prevent air flow from the mixing chamber 32 through these openings 53 into the air passage 22. During the next defrost cycle this ice melts.

As can be seen from the above description of the em-

bodiment of the invention, the invention achieves a number of important advantages. Thus only a single evaporator need be used and this evaporator cools both the freezer chamber and storage chamber air to proper temperatures. Furthermore, air flow is achieved by means of a single blower and as the conventional blower is rotated in a direction opposite to the conventional direction a greater static pressure differential is created within the rotary portion of the blower to aid in more efficient air distribution. A very important advantage of this structure is that the storage chambers, the shelves and the food and other articles stored therein are maintained free of frost. All of the frost gathers on the evaporator and on the accumulator and these are readily defrosted in the manner previously described. The structure of the invention is relatively inexpensive to build and is efficient and trouble-free in its operation.

Having described our invention as related to the embodiment shown in the accompanying drawings, it is our intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber; means for circulating a first air stream in a closed circuit through the first chamber and a second air stream in a closed circuit through the second chamber; means directing both air streams through the mixing chamber for intermingling therein; and means for cooling only said first air stream at a point downstream from said mixing chamber, the means for circulating the second stream being free of cooling means downstream from said mixing chamber.

2. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber; means forming an air passage; means for circulating a first air stream in a closed circuit from the mixing chamber, through the air passage and through the first chamber into the mixing chamber and a second air stream in a closed circuit from the mixing chamber through the second chamber into the mixing chamber; and means for cooling only said first air stream in said air passage, the means for circulating the second stream being free of cooling means downstream from said mixing chamber.

3. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating with the mixing chamber, a first outlet communicating with the first chamber for circulating a first air stream therethrough in a closed circuit and into the mixing chamber and a second outlet communicating with the second chamber for circulating a second air stream therethrough in a closed circuit and into the mixing chamber; and means for cooling only said first air stream at a point downstream from said mixing chamber, the means for circulating the second stream being free of cooling means downstream from said mixing chamber.

4. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a

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first air passage communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means forming an outlet from the second passage to the second chamber, the air moving means thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; and means for cooling the first air stream only in said first passage, the second passage being free of cooling means downstream from said mixing chamber.

5. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a first air passage communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means forming a plurality of outlets from the second passage to the second chamber; means in said second chamber for maintaining the air flow from said plurality of outlets substantially parallel, the air moving means thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; a first refrigerant evaporator means in said first passage; and a second refrigerant evaporator means in said mixing chamber, the second passage being free of cooling means downstream from said mixing chamber.

6. The apparatus of claim 5 wherein means are provided for directing a major portion of the total air flow through said first air moving means outlet.

7. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber adjacent the top of said first chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a first air passage extending downwardly from said mixing chamber communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means forming an outlet from the second passage to the second chamber, the air moving means thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; a first refrigerant evaporator means in said first passage; a second refrigerant evaporator means in said mixing chamber; means forming a condensate passage between the mixing chamber and first passage for flow therethrough of condensate from said second refrigerant evaporator means; and a trap in said condensate passage to prevent the flow of air therethrough.

8. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating with the mixing chamber, a first outlet communicating with the first chamber for circulating air in a first stream therethrough and into the mixing chamber and a second outlet communicating with the second chamber

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for circulating air therethrough in a second stream and into the mixing chamber; means associated with said air moving means for directing a major portion of the air from the air moving means through the first outlet, the air moving means having a rotor with a plurality of inclined blades circularly arranged and pushing the air outwardly generally radially upon rotation of the rotor; and means for cooling only said first air stream of said first and second streams at a point downstream from said mixing chamber.

9. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber adjacent the top of said first chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a first air passage extending downwardly from said mixing chamber communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means associated with said air moving means for directing a major portion of the air from the air moving means into the first passage, the air moving means having a rotor with a plurality of inclined blades circularly arranged and pushing the air outwardly generally radially upon rotation of the rotor; means forming an outlet from the second passage to the second chamber, the air moving means thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; a first refrigerant evaporator means in said first passage; and a second refrigerant evaporator means in said mixing chamber.

10. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber adjacent the top of said first chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a first air passage extending downwardly from said mixing chamber communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means associated with said air moving means for directing a major portion of the air from the air moving means into the first passage, the air moving means having a rotor with a plurality of inclined blades circularly arranged and pushing the air outwardly generally radially upon rotation of the rotor; means forming a plurality of outlets from the second passage to the second chamber; means in said second chamber for maintaining the air flow from said plurality of outlets substantially parallel, the air moving means thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; a first refrigerant evaporator means in said first passage; a second refrigerant evaporator means in said mixing chamber; means forming a condensate passage between the mixing chamber and first passage for flow therethrough of condensate from said second refrigerant evaporator means; and a trap in said condensate passage to prevent the flow of air therethrough.

11. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; a movable closure for said second chamber; means forming a mixing chamber having a first inlet communicating with

the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a first air passage communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means forming a plurality of outlets from the second passage to the second chamber, said plurality of outlets and said closure being on opposite sides of the second chamber; means in said second chamber for maintaining the air flow from said plurality of outlets substantially parallel toward said closure and then merging for flow along said closure, the air moving means thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; and means for cooling said first air stream.

12. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; a blower adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a first air passage communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means forming an outlet from the second passage to the second chamber, the blower thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; means for cooling said first air stream at a point downstream from said mixing chamber; and sub-freezing cooling means associated with said mixing chamber in the path of air flowing through said second inlet into said mixing chamber.

13. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber adjacent the top of said first chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; a blower adjacent said mixing chamber having an inlet communicating therewith, a first outlet and a second outlet; means forming a first air passage extending downwardly from said mixing chamber communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means forming an outlet from the second passage to the second chamber, the blower thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; a first refrigerant evaporator means in said first passage; a second refrigerant evaporator means in said mixing chamber normally operating at a sub-freezing temperature and located in the path of air flowing through said second inlet into the mixing chamber; means forming a condensate passage between the mixing chamber and first passage for flow therethrough of condensate from said second refrigerant evaporator means; and a trap in said condensate passage to prevent the flow of air therethrough.

14. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber adjacent the top of said first chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; a blower adjacent said mixing chamber having an inlet communicating therewith, a

first outlet and a second outlet; means forming a first air passage extending downwardly from said mixing chamber communicating with said first outlet and emptying into the first chamber; means forming a second air passage adjacent said second chamber communicating with said second outlet; means associated with said blower for directing a major portion of the air from the blower into the first passage, the blower having a rotor with a plurality of inclined blades circularly arranged and pushing the air outwardly generally radially upon rotation of the rotor; means forming an outlet from the second passage to the second chamber, the blower thereby circulating air in a first stream through the first passage, first chamber and mixing chamber and in a second stream through the second passage, second chamber and mixing chamber; a first refrigerant evaporator means in said first passage; and a second refrigerant evaporator means in said mixing chamber normally operating at a sub-freezing temperature and located in the path of air flowing through said second inlet into the mixing chamber.

15. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber; means for circulating a first air stream in a closed circuit through the first chamber and a second air stream in a closed circuit through the second chamber; means directing both air streams through the mixing chamber for intermingling therein; means for cooling only said first air stream at a point downstream from said mixing chamber, the means for circulating the second stream being free of cooling means downstream from said mixing chamber; and additional means for cooling said mixing chamber.

16. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber having a first inlet communicating with the first chamber and a second inlet communicating with the second chamber; air moving means adjacent said mixing chamber having an inlet communicating with the mixing chamber, a first outlet communicating with the first chamber for circulating a first air stream therethrough in a closed circuit and into the mixing chamber and a second outlet communicating with the second chamber for circulating a second air stream therethrough in a closed circuit and into the mixing chamber; means for cooling only said first air stream at a point downstream from said mixing chamber, the means for circulating the second stream being free of cooling means downstream from said mixing chamber; and means for directing a major portion of the air from said mixing chamber through said first outlet.

17. Refrigerating apparatus, comprising: means forming a relatively low temperature first chamber; means forming a relatively high temperature second chamber; means forming a mixing chamber; means for circulating a first air stream in a closed circuit through the first chamber and a second air stream in a closed circuit through the second chamber, said air circulating means providing a larger volume rate of flow in said first stream than in said second stream; means directing both air streams through the mixing chamber for intermingling therein; and means for cooling only said first air stream at a point downstream from said mixing chamber, the means for circulating the second stream being free of cooling means downstream from said mixing chamber.

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