Oct. 29, 1963 F. P. CROTSER 3,108,450

REFRIGERATION APPARATUS

Filed Sept. 2, 1960 3 Sheets-Sheet 1

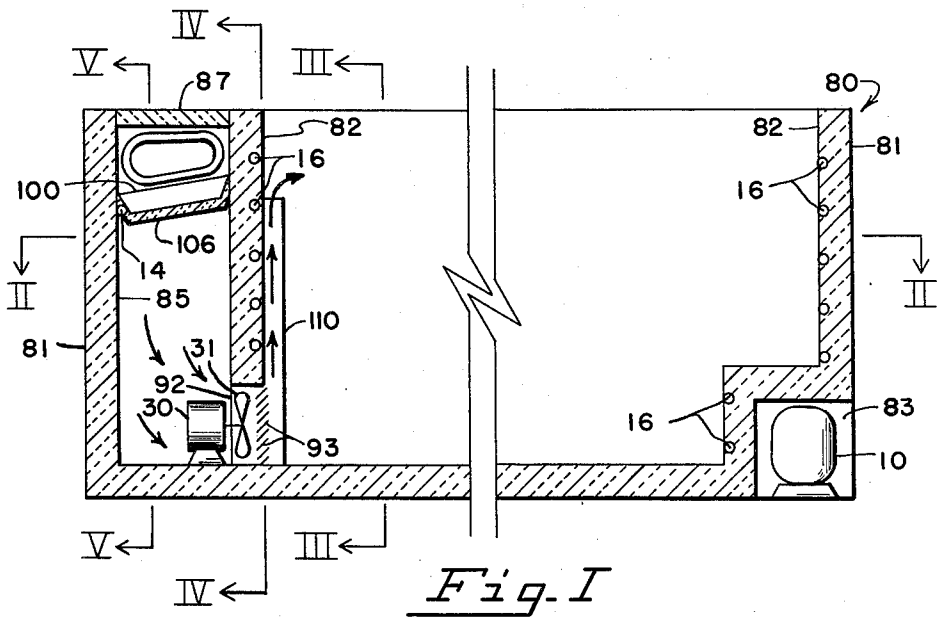


Fig. I

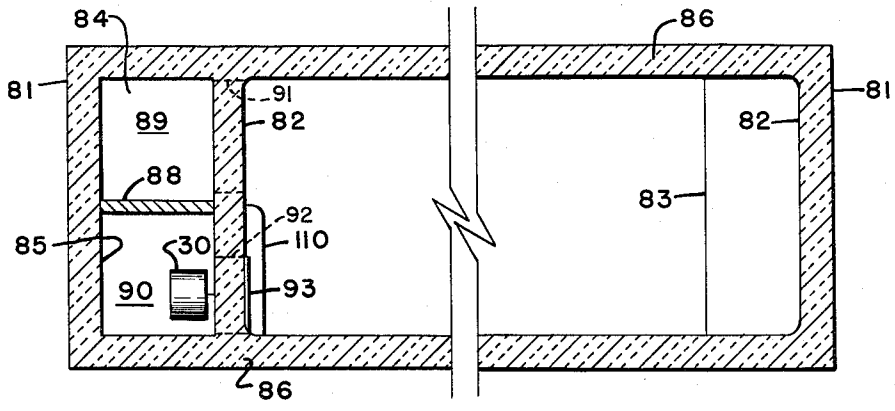


Fig. II

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REFRIGERATION APPARATUS

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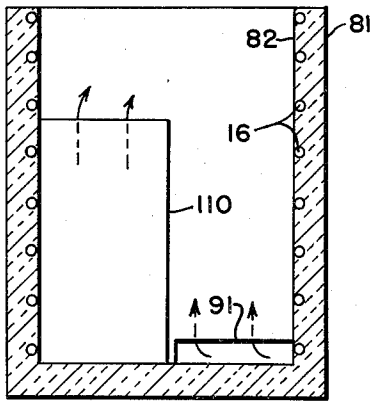


Fig. III

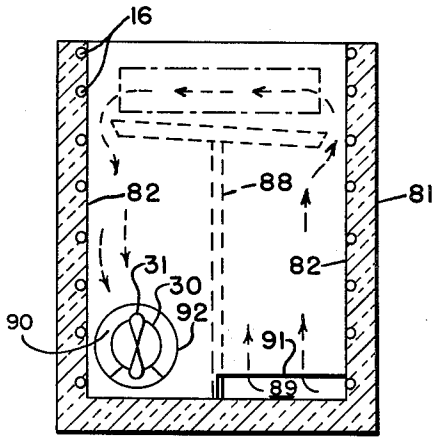


Fig. IV

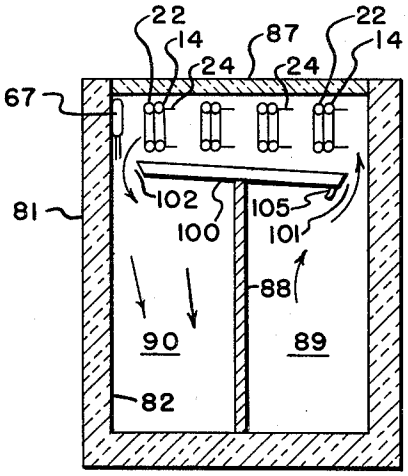


Fig. V

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REFRIGERATION APPARATUS

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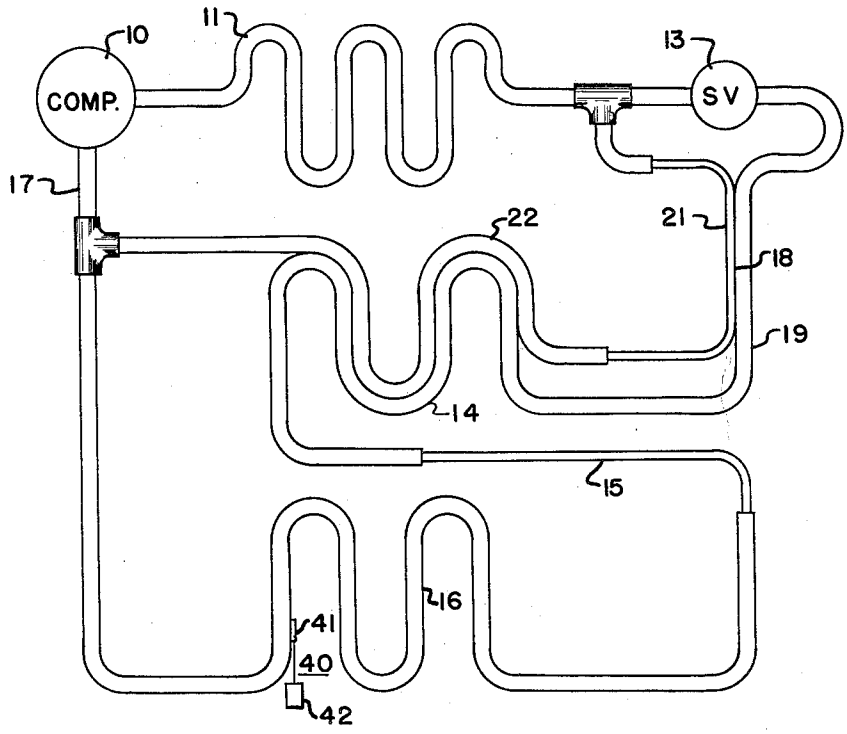


Fig. VI

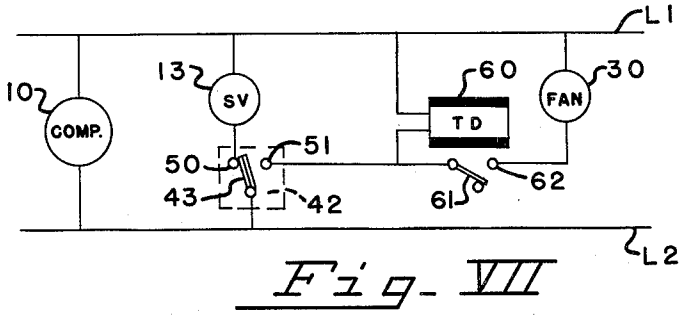


Fig. VII

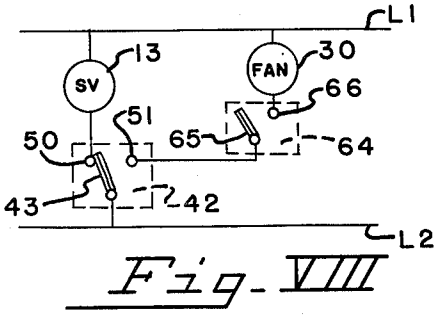


Fig. VIII

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3,108,450

REFRIGERATION APPARATUS

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Filed Sept. 2, 1960, Ser. No. 53,840
24 Claims. (Cl. 62—156)

This invention relates to refrigeration apparatus in general and in particular to refrigeration apparatus in which a collection of frost within a refrigerated storage cabinet is prevented or removed after collection.

A great deal of research in the recent years has been directed toward avoiding one of the initial difficulties in utilizing refrigeration systems. That is, after refrigerators came into wide-spread use one of the main tasks that confronted the user was the removal of a collection of frost from the interior of the refrigerated cabinet and/or the evaporator coil within that interior. This was first accomplished manually by allowing the door to the refrigerated storage cabinet to remain open and shutting the refrigerating mechanism off so that the collected frost and ice melted and was removed as a liquid through a drain tube to a drain pan or, when the foods or other items under refrigeration could not be allowed to warm up a great deal, scraping means were utilized to remove the collection of frost and ice before the food stuffs had risen to a predetermined temperature and spoiled. Through research in the recent years a number of self-defrosting schemes have been placed on the market, some of which accomplish the purpose satisfactorily, but which in general are expensive to construct initially and to maintain in operation.

It is accordingly an object of this invention to provide an improved refrigeration system.

It is a further object of this invention to provide an improved refrigeration system wherein novel defrosting means are utilized.

It is a still further object of this invention to provide an improved refrigeration system in which a frost attracting coil may be utilized to remove the moisture from the air on the interior of a refrigeration chamber and then be cyclically defrosted to remove the collected frost and ice to an external drain pan.

It is a further object of this invention to provide a refrigeration circuit in which a frost attracting coil may be disposed to remove moisture from the air within a refrigerated chamber and collect frost on its coils through either a natural stratification of air within a refrigerated chamber or through the use of a forced air circulating system.

Other objects, advantages and features of this invention will become apparent when the following description is taken in conjunction with the accompanying drawings. In the drawings:

FIG. I is a cross-sectional view of a chest freezer in which the teachings of this invention have been embodied;

FIG. II is a cross-sectional plan view of FIG. I taken at lines II—II of FIG. I;

FIG. III is a cross sectional end view of FIG. I taken at lines III—III of FIG. I;

FIG. IV is a cross-sectional end view of FIG. I taken at lines IV—IV of FIG. I;

FIG. V is a cross-sectional end view of FIG. I taken at the lines V—V of FIG. I;

FIG. VI is a schematic diagram of a refrigeration circuit embodying the teachings of this invention;

FIG. VII is a schematic diagram of the control circuit which may be utilized with the refrigeration circuit illustrated in FIG. VI; and

FIG. VIII is a schematic diagram of an alternative control circuit which may be utilized with the refrigeration circuit of FIG. VI.

A chest freezer has been chosen to illustrate the preferred embodiment of this invention since chest freezers in general have presented more of a problem in competitive economics in providing an interior free of frost through economical constructions of both the cabinet and the refrigeration circuit. However, it is to be understood that the refrigeration circuit and other principles disclosed herein may well be used with an upright type refrigeration system having a front opening door in both the above and below freezing categories.

Referring to FIG. I there is illustrated a chest freezer (the top lid covering not being shown) designated generally at **80** having an outer liner or wall **81** and a first inner liner **82**. An apparatus compartment **83** is shown at the right side of FIG. I to provide space for a compressor **10** and other elements of a refrigeration circuit to be discussed hereinafter. Coils **16** of a tank evaporator are disposed in thermal relationship with the first inner liner **82**. As may be best seen in FIG. II the inner liner **82** is designed to provide or leave a space **84** at the left side of FIG. II. A second inner liner **85** may be inserted into the space **84** between the inner shell **82** and the outer shell **81**. The spaces remaining between the outer shell **81** and the two inner shells **82** and **85** is filled with a suitable insulation material **86**.

As best seen in FIG. IV both the inner liner **82** and the inner liner **85** have formed therein slot-like apertures **91** and circular apertures **92** near the bottom of the liners. As best seen in FIGS. I and V access to the space provided by the inner liner **85** is provided by a removable insulated panel **87** at the top. As best seen in FIGS. II, IV and V a baffle **88** extending from the bottom of the chest in the space provided by the inner liner **85** to almost the top divides the space provided by the inner liner **85** into two compartments **89** and **90**. The compartment **89** as best seen in FIG. IV communicates with the interior of the space formed by the inner liner **82** through the slot-like apertures **91** formed in the inner liners **82** and inner liners **85**. The compartment **90** communicates to the space provided by the inner liner **82** through the circular apertures **92** provided or formed in both the inner liner **82** and the inner liner **85**.

Disposed within the space formed by the inner liner **85** and on top of the baffle **88** is a drip pan **100**. The drip pan may be shaped as shown to channel the melted frost and ice to the right of FIG. V or the drip pan **100** may be shaped to drain the melted ice and water to the middle and through the baffle **88** to the bottom of the box. The drip pan **100** may either rest upon the baffle **88** or be secured to the baffle **88** in a manner which prevents circulation of air between the compartments **89** and **90** between the drip pan and the baffle. Insulation **106** (as provided in FIG. I) may be placed beneath the drip pan **100** to prevent condensation of moisture on the lower side of the drip pan. A drain tube **105** (best seen in FIG. V) may be connected to the drip pan to conduct collected melt water to an external disposition point. As best seen in FIG. V spaces **101** and **102** are provided at each end of the drip pan **100** such that air may circulate up through the space **101** and down through the space **102**. Disposed above the drip pan **100** filling the space between the drip pan **100** and the access insulated panel **87** are frost attracting coils **22** and a defrost loop **14** of the refrigerating circuit to be discussed hereinafter. As will be noted the frost attracting coil **22** and the defrost loop **14** are disposed in heat exchange relationship with each other and with a dependent heat fin **24**.

As best seen in FIGS. I, II and IV the fan assembly comprising a fan motor **30** and a fan blade **31** is disposed to direct air from compartment **90** through the circular

aperture 92 formed in the inner liners 85 and 82. In order to insure a good circulation of air a shroud 110 is placed in front of the circular aperture 92 extending upward almost to the top of the freezer chest and extending halfway across the left end of the liner 82. To facilitate the circulation of air upward louvers 93 may be placed in front of the fan blade 31 to direct the air upward. An air circulation path has thus been established which, when the fan motor 30 is running provides circulation from the interior of the inner liner 82 in through the slot 91, located at the lower left-hand portion of the liner 82, up through compartment 89, through the space 101 past the edge of the drain pan 100, across the frost attracting coil 22, down through the space 102 provided at the other end of the drip pan 100, down through the compartment 90, through the circular aperture 92, through the louvers 93, up through the space between the shroud 110 and the end of the inner liner 82 out over the top of the storage space provided by the inner liner 82. It is to be noted that other air circulation paths or ducts may be provided from the circular aperture 92 such that the air will be circulated completely throughout the interior of the storage space provided by the inner liner 82. For example, louvers may be utilized at the top of the shroud 110 to direct the air flow in specific directions.

In reviewing the construction at the left side of the chest freezer cabinet 80 it will be noted that the baffle 88, the downwardly extending insulated portion between the inner liner 82 and the inner liner 85, and the access insulated panel 87 placed over the top of the space provided by the inner liner 85 cooperate to form an air trap that will collect warm air at the top thereof, when the fan 30 is not running, preventing warm air which collects around the frost attracting coil 22-defrost loop 14 assembly from mixing with the much cooler air in the storage compartment of the chest freezer.

Referring to FIGS. VI and VII there is shown a schematic diagram of a refrigeration circuit embodying the teachings of this invention and a control circuit for determining operation of the refrigeration circuit.

In FIG. VI a compressor 10 pumps compressed refrigerant into a condenser 11. The condenser 11 is connected through a normally-open solenoid valve 13 through a defrost loop 14, a normal refrigeration restriction 15 and a tank evaporator 16 to a suction line 17 connected to the low pressure side of the compressor 10. An auxiliary circuit comprising a frost-attracting or auxiliary restriction means 21 and a frost-attracting coil 22 is connected between the high pressure side of the compressor 10 and the suction line 17. In FIG. VI the inlet to the auxiliary circuit is shown connected specifically between the condenser 11 and the normally-open solenoid valve 13. The frost-attracting capillary restriction 21 is placed in heat exchange at 18 with conduit 19 which conducts hot compressed refrigerant from the high pressure side of the compressor 10 to the normal refrigeration restriction 13. The conduit 19 in heat exchange at 18 with the capillary line 21 is disposed in heat exchange relationship with the capillary line 21 at a point after the normally-open solenoid valve 13 is inserted in the circuit.

In FIG. VII a schematic diagram illustrates the electrical operation of components determining the operation of the refrigeration circuit shown in FIG. VI. The compressor 10 is connected between power leads L1 and L2. In this particular embodiment the compressor 10 is shown as running 100% of the time. A thermostatic control assembly designated generally at 40 shown in FIG. VI sensing the temperature at the outlet of tank evaporator 16 comprises a contact assembly 42 whose operation is controlled by a thermo-sensitive bulb 41 disposed near the outlet of the tank evaporator 16. The contact assembly 42 is shown in FIG. VII as comprising an over-center contact element 43 which may make contact with either terminal 50 or terminal 51. The terminal 50 is connected to power lead L1 through solenoid valve 13. The terminal 51 is connected to power lead L1 through a time delay relay 60. Terminal 51 is also connected to an armature 61 of the time delay 60. The time delay relay 60 is operative to pull in its armature 61 causing it to make contact with a terminal 62 a predetermined time interval after the time delay relay coil has been energized. The terminal 62 is connected through the fan motor 30 to the power lead L1. The overcenter contact arm 43 of the contact assembly 42 is connected to the power lead L2.

When the storage space within the inner liner 82 of the freezer chest 80 is in need of refrigeration, as detected by the thermo-sensitive element 41 of the thermostatic control 40, the over-center contact arm 43 is in contact with terminal 50 thereby energizing the solenoid valve 13. This is a normal process of operation for the normal refrigeration cycle. During normal operation with the over-center contact arm 43 touching terminal 50 the solenoid valve 13 is energized open and the compressor 10 forces compressed hot refrigerant gas into condenser 11, through conduit 19, through defrost loop 14, through normal refrigeration restriction 15, the tank evaporator 16, and the suction line 17 back to the compressor 10. The storage compartment area within the inner liner 82 is thus cooled and maintained at a predetermined low temperature by the thermostatic control 40 as is well known by those skilled in the art. When the thermostatic control 40 senses a predetermined temperature which is operative to stop the normal refrigeration cycle, the over-center contact arm 43 makes contact with the terminal 51. The solenoid valve 13 is thus closed. The time delay relay 60 is energized. After a predetermined time interval of perhaps 60 seconds the armature 61 is pulled in by the time delay relay 60 and makes contact with the terminal 62. Thus, contact by the armature 61 with the terminal 62 energizes the fan 30. Air is then immediately started circulating through the air path described hereinbefore.

While the time delay relay 60 is timing out before pulling in the armature 61 the closure of the solenoid valve 13 has forced the hot compressed refrigerant in condenser 11 to be channeled through the auxiliary restriction 21, expanding the refrigerant in the frost attracting coil 22 disposed within the frost collecting chamber hereinbefore described. The frost attracting coil 22 cools rapidly and in so doing cools the defrost loop 14 which formerly had the hot compressed refrigerant going therethrough and also the surrounding ambient atmosphere in the frost attracting chamber formed by the inner liner 85. Therefore, when the fan 30 is finally actuated by the closure of the armature 61 of the time delay relay 60 the air within the frost attracting chamber is as cold or colder than the air within the storage compartment surrounded by the inner liner 82. The frost attracting coil 22 will reach a lower temperature than any of the surfaces exposed to the path of the air circulating in the cabinet. Therefore, the moisture in the air within the storage compartment defined by the inner liner 82 will migrate and be deposited upon the frost attracting coil 22. Further, any frost that has formed on the surface of the inner liner 82 will migrate to the frost attracting coil 22 because of the lower temperature of the frost attracting coil 22 and the circulation of the air over the coil 22 from the surfaces of the inner liner 82.

The frost-attracting cycle is terminated by the thermostatic control 40 which causes the contact arm 43 to return to the terminal 50. The solenoid valve 13 is thus energized open while the time delay relay 60 and the fan 30 are deenergized. The passage of hot compressed refrigerant through the conduit 19 after the solenoid valve 13 is opened will heat the auxiliary capillary line 21 at the heat exchange point 18 and will retard the passage of refrigerant through the capillary line 21 such that little or no refrigerant will pass through the capillary line 21 during the normal refrigerating cycle. Further, the passage of hot compressed refrigerant through the defrost loop 14 will defrost the frost attracting coil 22 melting

the frost and ice collected on the coil **22** during the frost collecting cycle. The melted frost and ice will gather in the drip pan **100** and will be drained from the drip pan **100** through the drain tube **105** to an external evaporating or drain pan which may be located beneath the chest freezer as is well known in the art. To insure the passage of the melted frost and ice along the drip pan **100** one loop of the defrost coil **14**, as best seen in FIG. V is disposed beneath the drip pan such that the run-off channel of the drip pan will be warmed and frost or ice will not block passage of the water from the drip pan **100** or through the drain tube **105**.

As discussed hereinbefore the heating of the defrost coil **14** and of the frost attracting coil **22** during the normal refrigeration cycle will not interfere with the temperature being maintained in the storage compartment defined by the inner liner **42**. Since the fan **30** is not running air will not be circulated in the air path discussed hereinbefore. Therefore, the frost attracting compartment defined by the inner liner **85** and the insulated access panel **87** will act as a trap to hold the air heated by the defrosting action such that it will not interfere with the normal refrigerating within the storage compartment of the chest freezer.

Referring to FIG. VIII there is illustrated an alternative control scheme for the refrigeration circuit shown in FIG. VI.

The solenoid valve **13** is controlled by the contact assembly **42** in the same manner as before. The compressor **10** (not shown) may be connected to run as previously shown. The modification lies in another method of insuring that the ambient air in the heat trap has been cooled sufficiently before the air circulation means is actuated. To accomplish this a thermo-sensitive bulb **67** is disposed in the upper portion of the heat trap (as best seen in FIG. V). The thermo-sensitive bulb controls a contact assembly **64** illustrated in FIG. VIII. The contact assembly **64** comprises an over-center switch arm **65**, connected to terminal **51**, which is adapted to contact a terminal **66** when the ambient air within the heat trap reaches a predetermined low temperature. The terminal **66** is connected through the fan motor **30** to power lead **L1**.

In operation when the solenoid valve **13** is deenergized and thus closed by the removal of switch arm **43** from contact **50** to contact **51**, the auxiliary circuit starts to receive refrigerant through the auxiliary restriction **21** thereby cooling the frost-attracting coil **22**. This, in turn, cools the ambient air within the heat trap and when the ambient air reaches a predetermined temperature the switch arm **65** of the contact assembly makes contact with terminal **66** actuating the air circulating fan means **30**, initiating the frost attracting cycle described hereinbefore.

It is to be noted that although a solenoid valve **13** has been described which is energized to be maintained open, a valve may be utilized that is energized to be maintained closed by merely connecting the solenoid valve **13** to terminal **51**, instead of terminal **50**. It is to be also noted that control circuits for time-initiated, temperature-terminated frost-attracting cycles may be utilized to operate the novel refrigeration circuit instead of the novel control circuits herein described. However, the circuits as described present preferred embodiments of the most economical approaches to control.

Thus, there has been provided an economical system which is inexpensively constructed and maintained which provides a chest freezer or upright freezer with self-defrosting without causing the temperature within the storage compartment to rise above a predetermined point.

Heretofore, frostless freezing systems have utilized the following components which may be eliminated or reduced in size by the invention disclosed herein, particularly in the frozen food storage field:

(1) No expensive time-initiated, time-terminated or temperature-terminated control devices are needed.

(2) Auxiliary heating equipment or construction which is ordinarily utilized to speed up defrosting or re-evaporate the hot-gas refrigerant, that has been condensed by the cooling effect of the evaporator being defrosted, is not needed.

(3) No accumulator is required in the novel system herein.

(4) A cost-reduction is realized because the size of the frost-attracting coil is smaller than similar coils used in other systems. Further, the use of a smaller frost-attracting coil reduces the load on the compressor.

(5) The thickness of the insulation between the inner and outer shells may be reduced since the storage compartment is actually receiving refrigeration on both cycles. Further, since the air circulating means is actuated only during the frost-attracting cycle the heat-leakage normally associated with forced-air circulation systems is reduced. Therefore, a compressor unit with smaller horse-power than would normally be expected may be utilized.

In addition to the elimination or reduction in size of the above items it is to be noted that only a single control device is needed to perform two functions, namely, (*a*) to control the temperature of the storage compartment, and (*b*) to control both refrigeration and frost-attracting cycles. Because of the cycling described herein migration of frost and moisture to the frost-attracting coil is faster since the air circulation and cooling of the frost-attracting coil occurs when the tank evaporator is not refrigerating.

Thus there has been disclosed refrigeration apparatus comprising a first evaporator and a first circuit means including a compressor having high and low pressure sides, a condenser and first restriction means operatively connected to circulate refrigerant through the first evaporator. Second or auxiliary circuit means are also disclosed including a second restriction means operatively connecting a second evaporator between said high and low pressure sides of said compressor. The second evaporator is disposed in heat exchange relationship with the first circuit means before the first restriction means. There is disclosed means for selectively terminating refrigerant flow in the first restriction means and the first evaporator in the form of solenoid valve means **13** and the attendant electrical circuits.

The second restriction means is shown in heat exchange relationship with the first circuit between the selective terminating means and the first restriction. This heat exchange relationship between the second restriction means and the first circuit is designed to prevent any substantial flow through the second restriction means because of the heating action of the first circuit means (i.e., hot compressed refrigerant), such that the refrigerant in the second restriction means will become vaporized and form bubbles within the second restriction means and prevent any substantial liquid flow. Other means for preventing any substantial flow in the auxiliary circuit during the normal refrigeration cycle while refrigerant is flowing to the first restrictor and evaporator is or may be arrived at by modifications of the circuit well known to those skilled in the art (i.e., making the inside diameter of the second restriction smaller than that of the first restriction). Thus, the heat exchange relationship between the second restriction means and the first circuit between the selective terminating means and the first restriction means is meant merely to be representative of those means for preventing substantial flow in the second refrigeration or auxiliary refrigeration circuit.

The solenoid valve **13** acts as refrigerant flow directing means in that it is adapted to allow flow in the auxiliary circuit only when flow in the first circuit means is substantially terminated. After the solenoid valve **13** is closed, hot compressed refrigerant will cease to flow at

the heat exchange point between the second restriction means and the conduit means 19. Therefore after a slight cooling off period the refrigerant flow through the second restriction means will be restricted only by the inside diameter of the capillary line.

Included in the first circuit means is a defrost loop. The second evaporator or frost attracting evaporator coil is disposed in heat exchange relationship with the defrost loop. Reviewing the disclosure set forth above, it will be noted that the solenoid valve 13 acting as a refrigerant flow directing means is adapted to allow flow in the second or auxiliary circuit means only when flow in the first circuit or normal refrigeration circuit means is substantially terminated. Therefore the flow of refrigeration in the first or normal refrigeration circuit means through the defrost loop will be operative to defrost the second evaporator or frost attracting coil. It is to be noted that solenoid valve means 13 might also be disposed in the auxiliary circuit to accomplish its flow directing operation if the inside diameter of the first restriction is made considerably smaller than that of the second restriction. However, the preferred embodiment is that shown.

Considering the invention as applied to use in a refrigeration cabinet, there is disclosed a cabinet having storage means and heat trap means. The first or tank evaporator is thermally disposed to cool the storage means. The second evaporator means is disposed to cool the air or cool the heat trap means. Broadly speaking there is control means adapted to circulate refrigerant alternatively through both of said evaporators. The cabinet and refrigeration circuit also includes means adapted to circulate air from the storage means to the heat trap means only when refrigerant is being circulated through the second or frost-attracting evaporator. Again, generally speaking, defrost means are disclosed which are adapted to defrost the second or frost-attracting evaporator only when air is not being circulated through the heat trap means. This, of course, prevents circulation of warm air from the heat trap means into the storage means. It is to be noted that the air circulation means may be made responsive to air temperature in the heat trap means or may include time delay means which will initiate operation or actuate the air circulation means a predetermined time after initiation of the circulation of refrigerant through the second or frost attracting evaporator. It is also to be noted that the control means referred to above is responsive to the temperature of the storage compartment or storage means. The defrost means referred to above is responsive to the control means and is adapted to defrost the second evaporator only when refrigerant is being circulated through the first evaporator.

Thus, broadly speaking, there is disclosed refrigeration apparatus comprising a cabinet means having storage means and heat trap means, a first evaporator thermally disposed to cool the storge means, first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through the first evaporator means. Second circuit means including a second restriction means and a second evaporator means, are provided thermally disposed to cool air in said heat trap means and operatively connected to selectively receive refrigerant circulation therethrough from said compressor. The second evaporator means is disposed in heat exchange relationship with the defrost loop of the first circuit means. In the above general description control means are again utilized for selectively terminating refrigerant flow in the first evaporator means. Again, the second restriction means may be placed in heat exchange relationship with the first circuit means after the selective terminating means. Of course, the control means adapted to selectively terminate refrigerant flow in the first evaporator means may be also utilized to initiate refrigerant flow in the second circuit means. As described hereinbefore air circulating means adapted to circulate air from the storage means to the heat trap means only when the refrigerant is being circulated through said second evaporator means is provided. The air circulating means, as above, is adapted to be responsive to ambient air temperature in the heat trap means or may include time delay means which is adapted to cause the air circulation means to be actuated a predetermined time after the refrigerant flow in the second or frost-attracting evaporator has been initiated.

In conclusion, it is pointed out that while the illustrated example constitutes a practical embodiment of my invention, I do not limit myself to the exact details shown, since modification of the same may be made without departing from the spirit of this invention.

I claim as my invention:

1. Refrigeration apparatus comprising, a first evaporator disposed in heat exchange relationship with a chamber; first circuit means including a compressor having high and low pressure sides, condenser, and first restriction means operatively connected to circulate refrigerant through said first evaporator to refrigerate said chamber; auxiliary circuit means including second restriction means operatively connecting a second evaporator between said high and low pressure sides of said compressor; said second evaporator being disposed in heat exchange relationship with said first circuit means before said first restriction means.

2. Refrigeration apparatus comprising, a first evaporator disposed in heat exchange relationship with a chamber; first circuit means including a compressor having high and low pressure sides, condenser, and first restriction means operatively connected to circulate refrigerant through said first evaporator to refrigerate said chamber; auxiliary circuit means including second restriction means operatively connecting a second evaporator between said high and low pressure sides of said compressor; said second evaporator being disposed in heat exchange relationship with said first circuit means before said first restriction means; and means for selectively terminating refrigerant flow in said first restriction means and said first evaporator.

3. Refrigeration apparatus comprising, a first evaporator disposed in heat exchange realtionship with a chamber; first circuit means including a compressor having high and low pressure sides, condenser, and first restriction means operatively connected to circulate refrigerant through said first evaporator to refrigerate said chamber; auxiliary circuit means including second restriction means operatively connecting a second evaporator between said high and low pressure sides of said compressor; said second evaporator being disposed in heat exchange relationship with said first circuit means before said first restriction means; and means for selectively terminating refrigerant flow in said first restriction means and said first evaporator; said second restriction means being in heat exchange relationship with said first circuit means between said selective terminating means and said first restriction means.

4. Refrigeration apparatus comprising; first circuit means including a compressor, a condenser, a defrost loop, first restriction means and first evaporator means disposed in heat exchange relationship with a chamber; said first circuit means being operatively connected to circulate refrigerant therethrough to refrigerate said chamber; second circuit means including second restriction means and second evaporator means operatively connected to selectively receive refrigerant circulation therethrough by said compressor; said second evaporator means being in heat exchange with said defrost loop; and means for selectively terminating refrigerant flow in said first evaporator means.

5. Refrigeration apparatus comprising; first circuit means including a compressor, a condenser, a defrost loop, first restriction means and first evaporator means disposed in heat exchange relationship with a chamber; said first circuit means being operatively connected to

circulate refrigerant therethrough to refrigerate said chamber; second circuit means including second restriction means and second evaporator means operatively connected to selectively receive refrigerant circulation therethrough by said compressor; said second evaporator means being in heat exchange with said defrost loop; and means for selectively terminating refrigerant flow in said first evaporator means; said second restriction means being in heat exchange with said first circuit means between said selective terminating means and said first restriction means.

6. Refrigeration apparatus comprising; first circuit means including a compressor, a condenser, a defrost loop, first restriction means and first evaporator means disposed in heat exchange relationship with a chamber; said first circuit means being operatively connected to circulate refrigerant therethrough to refrigerate said chamber; second circuit means including second restriction means and second evaporator means operatively connected to selectively receive refrigerant circulation therethrough by said compressor; said second evaporator means being in heat exchange with said defrost loop; refrigerant flow directing means adapted to allow flow in said second circuit means only when flow in said first circuit means is substantially terminated.

7. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means adapted to circulate refrigerant alternatively through either of said evaporators; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator.

8. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means adapted to circulate refrigerant atlernatively through either of said evaporators; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator; defrost means adapted to defrost said second evaporator only when air is not being circulated through said heat trap means.

9. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means adapted to circulate refrigerant alternatively through either of said evaporators; means responsive to air temperature in said heat trap means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator.

10. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means adapted to circulate refrigerant alternatively through either of said evaporators; means including time delay means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator, and after said second evaporator has cooled the ambient air in said heat trap.

11. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means adapted to circulate refrigerant alternatively through either of said evaporators; means responsive to air temperature in said heat trap means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator; defrost means adapted to defrost said second evaporator only when air is not being circulated through said heat trap means.

12. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means adapted to circulate refrigerant alternatively through either of said evaporators; means including time delay means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator and after said second evaporator has cooled the ambient air in said heat trap; defrost means adapted to defrost said second evaporator only when air is not being circulated through said heat trap means.

13. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means responsive to the temperature of said storage means adapted to circulate refrigerant alternatively through either of said evaporators; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator.

14. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; control means responsive to the temperature of said storage means adapted to circulate refrigerant alternatively through either of said evaporators; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator; defrost means adapted to defrost said second evaporator only when air is not being circulated through said heat trap means.

15. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; second evaporator means disposed in said heat trap means; concontrol means responsive to the temperature of said storage means adapted to circulate refrigerant alternatively through either of said evaporators; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator; defrost means responsive to said control means adapted to defrost said second evaporator only when refrigerant is being circulated through said first evaporator.

16. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop.

17. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop;

and control means for selectively terminating refrigerant flow in said first evaporator means.

18. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop; and control means for selectively terminating refrigerant flow in said first evaporator means; said second restriction means being in heat exchange relationship with said first circuit means after said selective terminating means.

19. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop; and control means for selectively terminating refrigerant flow in said first evaporator means and initiating refrigerant flow in said second circuit means.

20. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator.

21. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop; and control means for selectively terminating refrigerant flow in said first evaporator means; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator.

22. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop; and control means for selectively terminating refrigerant flow in said first evaporator means and initiating refrigerant flow in said second circuit means; means adapted to circulate air from said storage means to said heat trap means only when refrigerant is being circulated through said second evaporator.

23. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop; means responsive to ambient air temperature in said heat trap means adapted to circulate air from said storage means to said heat trap means.

24. Refrigeration apparatus comprising; a cabinet having storage means and heat trap means; a first evaporator thermally disposed to cool said storage means; first circuit means including a compressor, a condenser, a defrost loop, and first restriction means operatively connected to circulate refrigerant through said first evaporator means; second circuit means including second restriction means and a second evaporator means, thermally disposed to cool air in said heat trap means, operatively connected to selectively receive refrigerant circulation therethrough from said compressor; said second evaporator means being in heat exchange relationship with said defrost loop; and control means for selectively terminating refrigerant flow in said first evaporator means and initiating refrigerant flow in said second circuit means; means including time delay means adapted to circulate air from said storage means to said heat trap means a predetermined time after refrigerant flow in said second circuit has been initiated.

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