July 18, 1939. L. A. PHILIPP 2,166,506

REFRIGERATING APPARATUS

Original Filed March 16, 1933 3 Sheets-Sheet 1

Fig. 1.

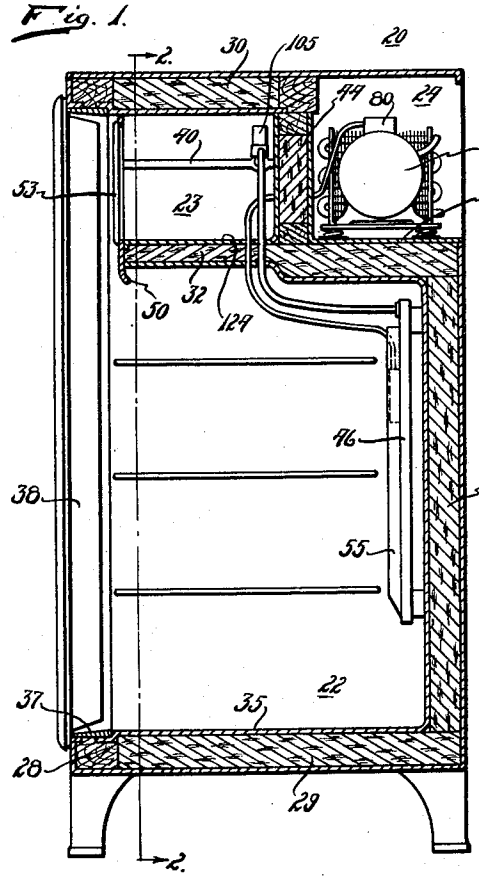


Fig. 2.

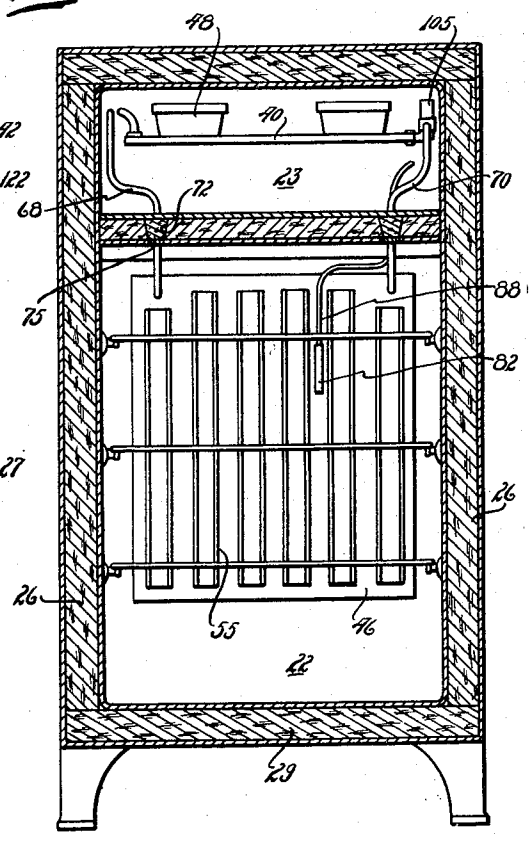


Fig. 3.

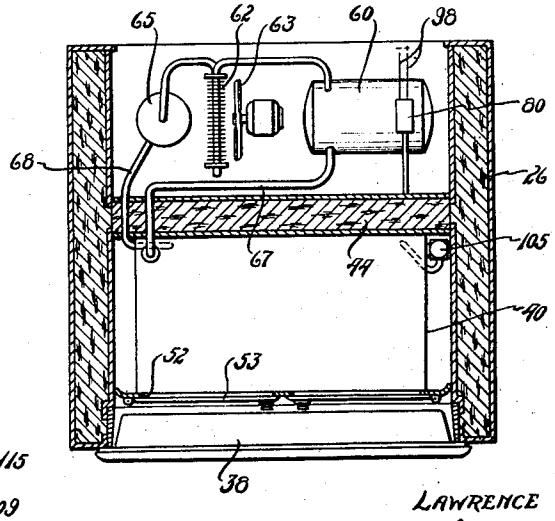
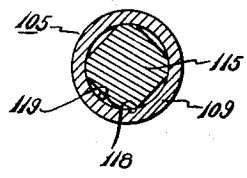


Fig. 11.



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July 18, 1939. L. A. PHILIPP 2,166,506

REFRIGERATING APPARATUS

Original Filed March 16, 1933 3 Sheets-Sheet 2

Fig. 4.

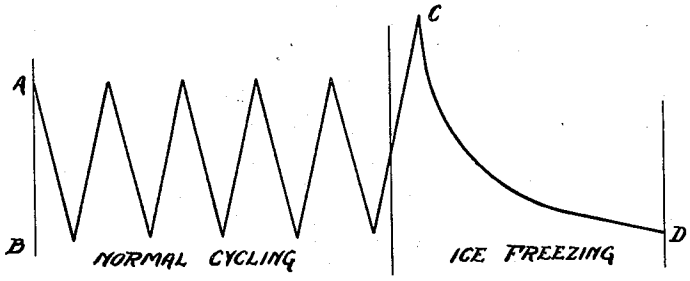


Fig. 5.

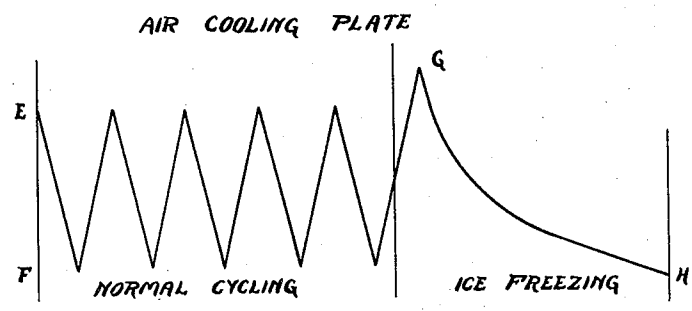


Fig. 6.

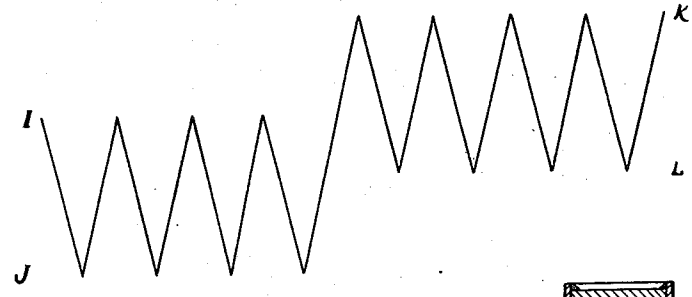


Fig. 8.

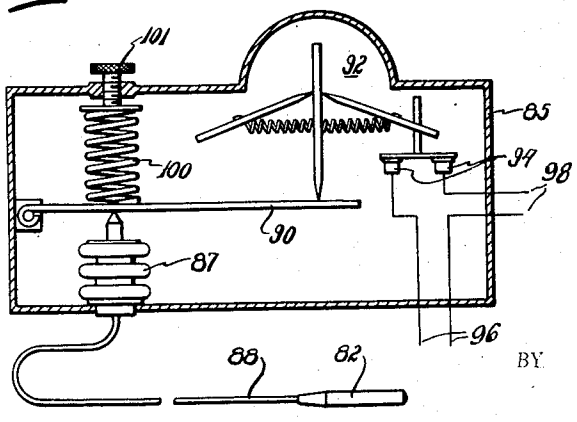
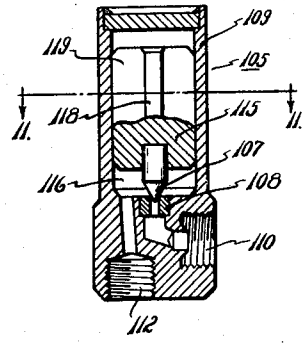


Fig. 7.



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July 18, 1939. L. A. PHILIPP 2,166,506

REFRIGERATING APPARATUS

Original Filed March 16, 1933 3 Sheets-Sheet 3

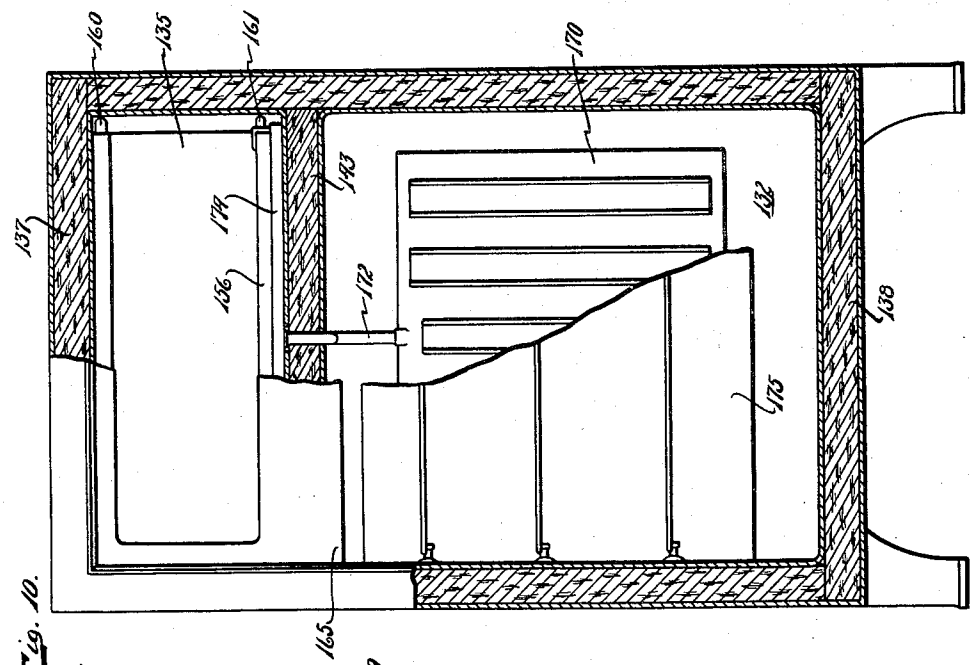


Fig. 10.

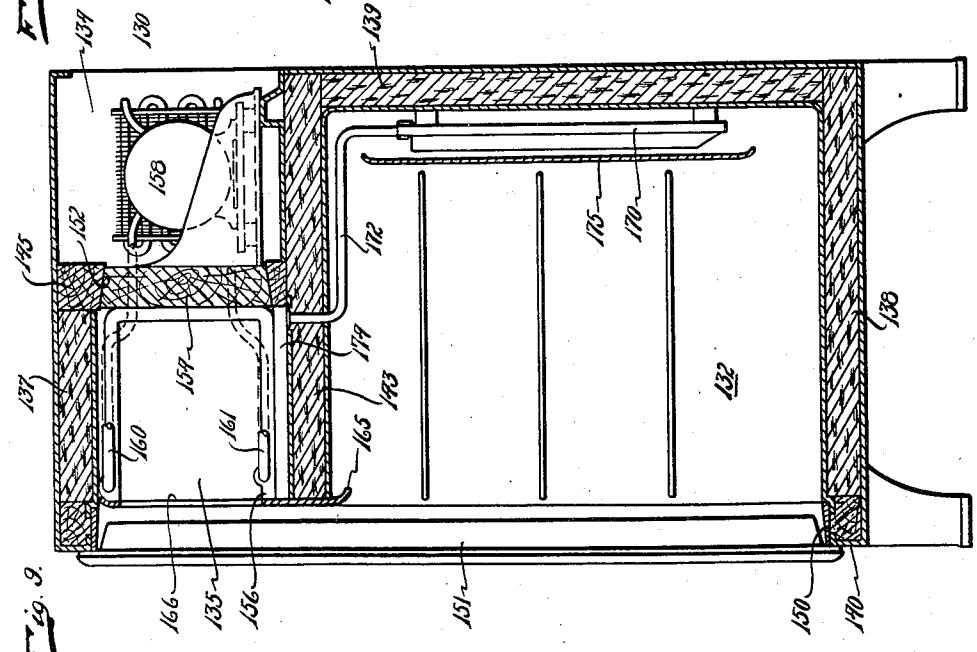


Fig. 9.

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Patented July 18, 1939 2,166,506

UNITED STATES PATENT OFFICE

2,166,506

REFRIGERATING APPARATUS

Lawrence A. Philipp, Detroit, Mich., assignor to Nash-Kelvinator Corporation, Detroit, Mich., a corporation of Maryland

Original application March 16, 1933, Serial No. 661,033. Divided and this application July 10, 1937, Serial No. 153,012

7 Claims. (Cl. 62—116)

This invention relates to refrigerating apparatus, and more particularly to refrigerating apparatus of the multiple temperature type.

The present application is a division of my copending application for Refrigerating apparatus, Serial No. 661,033 filed March 16, 1933, and which has now matured into Patent No. 2,095,010, dated Oct. 5, 1937.

One of the objects of my invention is to provide a new and improved arrangement for freezing substances and for cooling circulating air in a refrigerator cabinet.

Another object of my invention is to provide an improved and simplified arrangement for obtaining a temperature differential between a number of different refrigerator evaporators.

Another object of my invention is to provide for maintaining a substantially constant temperature differential between a number of different refrigerant evaporators without the necessity of making adjustments although various average mean temperatures are sought to be attained in the different evaporators.

Another object of my invention is to provide an improved unitary refrigerating system in a refrigerator cabinet, which system includes a refrigerant condensing element, a low temperature refrigerant evaporator for freezing large quantities of ice cubes and the like, and a relatively high temperature refrigerant evaporator for cooling circulating air in the food compartment of the cabinet, and to provide for controlling the operation of the condensing element in response to changes in temperature in the relatively high temperature evaporator, and also to provide an improved arrangement for maintaining a substantially constant temperature differential between said evaporators which permits a large quantity of substances to be frozen to be applied to the low temperature evaporator without effecting the average temperatures maintained in the air cooling evaporator, while at the same time the operation of the condensing element continues until the heat of the substances to be frozen is substantially or entirely absorbed by the low temperature evaporator.

Another object of my invention is to provide within a refrigerator cabinet an improved arrangement of and control for refrigerant evaporating means which is arranged and operated without the collection of frost thereon or a slight film of frost is allowed to collect thereon during the on-phase of the refrigerating cycle and is melted off during the off-phase of the refrigerating cycle, while at the same time provisions are made for freezing substances, such as ice cubes and the like and for cooling circulating air in the food storage compartment whereby continuous refrigeration at substantially constant, predetermined temperatures is assured and the necessity of periodic inoperative conditions of the system for defrosting is avoided.

Another object of my invention is to provide an improved arrangement for the ready removability of the aforesaid refrigerant evaporators and the condensing element as a unitary structure without uncoupling the devices from one another.

Other objects and advantages will be apparent from the following description, reference being had to the accompanying drawings.

In the drawings:

Fig. 1 is a side vertical view in cross section of a refrigerating apparatus embodying features of my invention;

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

Fig. 3 is a horizontal view in cross section of the apparatus embodying features of my invention;

Figs. 4 to 6 are graphs indicating the cyclic operations of the system under various conditions;

Fig. 7 is a vertical view in cross section of a control valve embodying features of my invention;

Fig. 8 is a diagrammatic representation of the switch mechanism used for controlling the operation of the system;

Fig. 9 is a side vertical view in cross section of a modified form of refrigerating apparatus embodying features of my invention;

Fig. 10 is a front view partly in elevation and partly in cross section of the apparatus shown in Fig. 9; and

Fig. 11 is a view taken along the line 11—11 of Fig. 7.

Referring to the drawings, the numeral 20 designates, in general, a cabinet having a compartment 22 for the storage of foods to be refrigerated, a freezing compartment 23 and a machine compartment 24. The cabinet is constructed of insulated walls, including side walls 26, rear wall 27, front wall 28, bottom wall 29 and top wall 30. The cabinet also includes a fixed, substantially, horizontally disposed, insulated wall 32. The wall 32 extends across the width of the cabinet and from the rear wall to a point adjacent the front wall, separating the food compartment from the freezing compartment and machine compartment. An inner metallic lining member 35 forms the inner walls of the food compartment and is, preferably, provided with a coating of vitreous enamel, such as porcelain, to provide a neat appearing compartment and one which may be easily cleaned. The front wall 28 is provided with an opening 37 through which access may be had to the food compartment and freezing compartment. The opening 37 is closed by door 38.

A unitary structure is arranged to be inserted in and removable from the cabinet through the door opening 37. This structure comprises, in general, a refrigerant evaporating element 40, a

refrigerant condensing element 42, an upright partition or closure member 44 between said elements, and a refrigerant evaporating element 46. When the removable structure is in operative position in the cabinet, the upright partition 44 separates the machine compartment 24 from the freezing compartment 23. Thus, the condensing element is located in the rear of the cabinet and the cooling element 40 is in substantially horizontal alignment therewith at the front of the cabinet.

As shown in the drawings, the refrigerant evaporating element 40 is of the flat plate type and is horizontally disposed substantially midway between the top wall 30 and the wall 32 in the compartment 23. The evaporator 40 may be secured to the upright partition 44 by any suitable means. Preferably, the element 40 is constructed of sheet metal plates which are secured together about the peripheries thereof by seam welding and welded at various points intermediate their edges, but spaced apart between the welded points to provide a space for refrigerant. By locating the evaporating element 40 substantially midway between the walls 30 and 32, and by operating said element at temperatures sufficiently low enough to freeze substances, said substances may be frozen rapidly by placing same on the upper part of the evaporating element and if desired, when frozen, may be removed to be stored and retained in a frozen condition by placing same on the upper part of the wall 32 in compartment 23 immediately below the evaporating element 40. In the drawings, I have shown conventional ice trays 48 mounted on top of the element 40 to freeze substances therein. When the substances are frozen, the trays may be transferred to the space immediately below the evaporating element and additional trays may be mounted on the plate evaporating element to freeze additional substances therein. Thus, it will be noted that I have provided for rapidly freezing large quantities of ice cubes or other substances, and in addition I have provided a large space for storing said substances in a frozen condition.

In order to prevent the circulating air in the food storage compartment 22 from entering the freezing compartment 23, I have provided a closure plate 50 for the front of compartment 23. Plate 50 is provided with openings 52 closed by doors 53. Doors 53 and openings 52 provide ready access to the interior of compartment 23.

Evaporating element 46 may be of similar construction as evaporating element 40 and is vertically disposed in the food storage compartment adjacent the rear wall 27 but slightly spaced therefrom to permit circulating air in the compartment 22 to pass on all sides of the element 46. A plurality of U-shaped heat absorbing fins 55 are secured to the one side of evaporating element 46 to increase the heat transfer characteristics thereof.

The refrigerant condensing element 42 comprises, in general, a motor compressor unit 60, condenser 62, motor driven fan 63 and highside float mechanism 65. The motor compressor unit is of the type which includes a compressor and motor directly connected which are enclosed within a hermetically sealed casing. Units of this type are well known in the art and further illustration thereof in the drawings is deemed unnecessary. The compressor withdraws evaporated refrigerant from the evaporating elements through a vapor conduit 67, compresses the gaseous refrigerant and delivers it to the condenser 62 wherein it is liquefied and from which it is delivered to the high side float mechanism 65. Liquid refrigerant is delivered to the evaporating elements through conduit 68 under the control of the high side float mechanism 65. The electrically operated fan 63 is employed for circulating a blast of air over the condenser 62 to aid in condensing the refrigerant and for circulating air about the compartment 24.

Liquid refrigerant is first delivered to the evaporating element 46 through the conduit 68, and from the evaporating element 46 liquid and gaseous refrigerant is delivered to the evaporating element 40 through a conduit 70. Evaporated refrigerant is withdrawn from the evaporating element 40 through the vapor conduit 67.

As will be noted in Fig. 2 of the drawings, the wall 32 is provided with slots 72 for receiving conduits 70 and 68. The slots 72 extend from a point in the wall 32 adjacent the partition 44 to the front of wall 32 to permit the ready removal of the evaporating elements 40 and 46 and condensing element 42 without uncoupling said devices from one another, as is hereinafter more fully described.. The slots 72 are normally closed by slabs of insulating material 75.

Preferably, the condensing element is intermittently operated. In order to control the operation of the condensing element, I have provided a thermostatically controlled switch 80 to which is connected a thermostat fluid containing bulb 82 which is disposed in thermal contact with the evaporating element 46 so that the switch operates in response to changes in temperature within the evaporating element 46. The switch 80 is adapted to open and close the circuit to the motor of unit 60 in response to predetermined changes in temperature within the evaporating element 46. In view of the fact that the evaporating elements 40 and 46 are of the so-called flooded type, the temperature therein will bear a direct relation to the pressures existing therein.

Referring in detail to Fig. 8, the thermostatic switch 80 comprises, in general, a casing 85 which houses the operating parts of the switch. The switch mechanism includes an expansible bellows 87, which is connected to the thermostatic bulb 82 by means of a conduit 88. The bellows 88 is disposed in engagement with a pivotally mounted lever 90 which moves upwardly and downwardly, depending upon the movement of the bellows 87. The lever 90 is adapted to actuate suitable leverage mechanism 92 for controlling the opening and closing of contacts 94. Contacts 94 control an electric circuit 96 which leads to the motor to thereby control the flow of current from power mains 98 to the motor. A spring 100 is provided for controlling the movement of bellows 87 to thereby control the operation of switch 80 so that the motor may be cut in or cut out of circuit between predetermined operating limits. A screw 101 is provided for varying the effectiveness of spring 100 to thereby vary the cut in and cut out periods of the motor of unit 60. Thus, the thermostatic switch 80 controls the operating periods of the condensing element to thereby control the temperatures within the evaporating elements 40 and 46. It will also be noted that the switch is controlled in response to changes in temperatures within the evaporating element 46.

In order to maintain a predetermined temperature differential between the evaporating element 40 and the evaporating element 46, I have provided a pressure responsive valve 105 which is interposed in the conduit 70 for controlling the flow of liquid and gaseous refrigerant from the evap-

orating element 46 to the evaporating element 40. The pressure responsive valve 105 is adapted to maintain a predetermined pressure differential between the evaporating element 40 and the evaporating element 46 to thus maintain a temperature differential between said evaporating elements. As shown in Fig. 7, the pressure responsive valve includes a valve proper 107 and a valve seat 108 located within a casing 109. The casing 109 is provided with an inlet 110 to which the outlet end of conduit 70 is connected, and an outlet 112. The evaporating element 40 is connected to outlet 112. The valve proper 107 is secured to a weight 115 which is adapted to move upwardly and downwardly within a chamber 116, depending upon the pressure of the refrigerant exerted on the valve proper 107. Preferably, the chamber 116 is cylindrical in shape and also, preferably, the weight 115 is provided with a plurality of arcuate portions 118 which conform to the contour of the walls of the chamber. The weight is also provided with cutaway flat portions 119 between the arcuate portions 118 to provide spaces between the walls of the chamber and the weight so as to prevent binding of the weight in the chamber, and also to prevent a dash pot action therein. When the pressure of the refrigerant in the evaporating element 46 reaches a predetermined point (for example, equal to the pressure within the evaporating element 40 and is of sufficient force to lift weight 115 and the valve proper), the liquid and gaseous refrigerant will move the valve proper 107 and weight 115 upwardly to allow liquid and gaseous refrigerant to enter the chamber 116, whence it passes through outlet 112 into evaporating element 40. When the pressure recedes to a predetermined point for example, to a point less than that required to open valve 107, the weight and valve proper move downwardly to cause the valve 107 to engage itself with seat 108 to prevent further passage of refrigerant into the evaporating element 40. The weighted valve is arranged to be intermittently operated so as to maintain a predetermined pressure differential between the evaporating elements 40 and 46. As previously stated herein, the pressure differential is controlled by the weight of the weighted valve proper 107. In other words, before refrigerant may pass from the evaporator 46 to the evaporating element 40, the pressure within the evaporating element 46 must be equal to the pressure in the evaporating element 40, plus an amount equal to move the weight 115 upwardly to remove the valve 107 from its seat 108. This predetermined pressure differential is maintained irrespective of the temperatures maintained in the evaporating elements 40 and 46.

Preferably, the thermostat is set so that the evaporating element 40 will be operated at temperatures which cause rapid freezing, and the evaporating element 46 at temperatures which are slightly above that which would be likely to cause the collection of frost or ice thereon due to the deposit of moisture from the circulating air in the food compartment. If desired, the thermostat may be set to operate evaporating element 46 at a temperature which would allow a slight film of ice to collect thereon during the on-phase of the refrigerating cycle and melted off during the off-phase of the refrigerating cycle. In view of the fact that the refrigerant condensing element 42 is operated in response to changes in temperature within the evaporating element 46, the adjustable spring 100 of thermostat 80 may be set so as to provide for operating the evaporating element 46 at either of the desired temperatures.

In the refrigerating system herein described, I prefer to use sulphur dioxide as the refrigerant. When sulphur dioxide is used as the refrigerant and when a predetermined setting of switch 85 is made, I have found that the cyclic operation of the system is as indicated by the graphs shown in Figs. 4 and 5. In Fig. 5, as illustrated, the normal cycling is between an upper pressure range limit E, and a lower pressure range limit F. E represents the pressure existing in evaporating element 46 when the motor 60 is cut in to operate the compressor of said unit, and F represents the pressure in said element when the motor is cut out of circuit to render the compressor inoperative to perform its compressing function. When sulphur dioxide is used as the refrigerant, the upper pressure range limit E may be 14 pounds pressure and the lower pressure range limit may be four pounds pressure of the refrigerant in element 46. In Fig. 4, it will be noted that the normal cycling takes place between an upper limit A and a lower limit B in element 40. The upper limit A and the lower limit B may be four pounds pressure and six inches of vacuum, respectively. Thus, it will be noted that a predetermined pressure differential of seven pounds is maintained between elements 40 and 46 while the unit is operating during normal cycling operation and this is accomplished by the weighted valve 105, and the operation of the unit 60 is controlled by thermostatic switch 85 in response to changes in temperature in evaporating element 46.

Assuming now a large quantity of substances to be frozen is applied to the ice freezing plate or evaporating element 40, the pressure of the refrigerant in element 40 is increased by the heat of the substances and the element 40 operates on a curve different from the normal cycling curve between the A and B limits. As shown in Fig. 4, the upper limit is at C, which is, for example, nine pounds pressure of the refrigerant, and the lower limit is at D, which is six inches of vacuum. When this occurs, the pressure of the refrigerant also increases in evaporating element 46 after the unit 60 begins operation owing to the fact that liquid is then supplied to element 46 at a pressure higher than that already in said element, and as a result of the pressure in element 40 being increased above normal cycling limits, the pressures in element 46 are increased until the pressure differential maintained by the valve 105 is attained. As will be noted, the pressure differential maintained by the valve 105 during operation of the condensing element is seven pounds since the lower pressure limit B of element 40 is 6 inches of vacuum, and the lower pressure limit E of element 46 is four pounds pressure of the refrigerant when the unit 60 ceases operation. As indicated, the pressure range in element 46 is varied with the upper limit being at G, which is, for example, 16 pounds pressure, and the lower limit A, which is four pounds pressure of the refrigerant. Thus, it will be noted, that as the temperature in element 46 rises to a temperature corresponding to 14 pounds pressure, the thermostatic switch 85 cuts in the motor-compressor unit 60 to reduce the pressures in the elements 40 and 46, which gradually takes place as the heat of the substances to be frozen is gradually dissipated by being absorbed in the refrigerant and withdrawn from elements

40 and 46 by the motor-compressor unit. As will be noted in Figs. 4 and 5, the placing of a large quantity of substances to be frozen in the element 40 causes the elements 40 and 46 to operate on curves C—D and G—H, respectively, which are at pressure range limits different from normal cycling, and it is also to be noted that the average mean temperatures existing in the evaporating elements are substantially the same as the temperatures existing therein during normal cycling. Thus, it will be noted that the placing of a large quantity of substances to be frozen on element 40 will, after operation of the motor-compressor unit has started, cause it to continue to operate until the substances are either entirely or substantially frozen even though the operation of the motor-compressor unit is controlled in response to changes in temperatures in the evaporating element 46. This is due to the pressure differential maintained by valve 105 which prevents the pressure in element 46 to be lowered to four pounds until the pressure in element 40 is lowered to six inches of vacuum, at which time the substances are frozen. In the event an abnormal large quantity of warm foods should be placed in the food compartment, the pressures in each evaporating element is similarly increased until lowered by the action of the condensing element 42.

Although I have disclosed my pressure differential valve 105 in connection with an intermittently operated refrigerating system, it will be readily apparent from the foregoing that in a continuously operated system, the valve 105 would maintain a predetermined pressure differential between the elements 40 and 46 at all times.

In Fig. 6 there is shown a graph indicating normal cycling operation between predetermined upper and lower pressure range limits in which I is the upper limit and J the lower limit. The pressure limits I and J may correspond to upper and lower limits E—F with respect to evaporating element 46 during normal cycling at a predetermined setting of switch 85. However, when it is desired to operate the system at a higher pressure range, the upper and lower pressure limits may be varied by adjustment of screw 101 to vary the effectiveness of spring 100. As shown, the upper and lower limits have been increased with the upper limit being at K and the lower limit at L. By varying the upper and lower pressure range limits in the evaporating element 46, the upper and lower pressure range limits are correspondingly varied in the evaporating element 40 owing to the pressure responsive valve 105, which maintains a predetermined pressure differential between the two evaporating elements 40 and 46.

From the foregoing, it will be noted that I have provided an improved and simple arrangement for maintaining a pressure differential between a number of different evaporating elements for maintaining a temperature differential therebetween. It will also be noted that the pressure differential is obtained automatically throughout variations in pressure range limits existing in the different evaporating elements. In addition, it is to be noted that the pressure range limits may be set at any desired operating limits by simply adjusting a single manually operable screw without in any way effecting the temperature differential maintained between the different evaporating elements by the provision of the pressure responsive valve 105. Furthermore, it will be noted that in maintaining a predetermined pressure differential, rapid ice freezing is promoted, since the condensing element when once started continues to operate until the ice is frozen.

As previously stated herein, the entire refrigerating system may be removed from the cabinet as a unitary structure. The structure includes the condensing element 42, upright separating wall 44, metallic member 122, which includes an upright portion which is secured to wall 44 and a horizontal portion which rests on wall 32, evaporating element 46, a sheet metal member 124, which includes an upright portion which is secured to the wall 44 and a horizontal portion which rests on wall 32, front closure plate 50 and doors 53. Preferably, the evaporating element is secured to rear wall 27 by screws (not shown) so that it may be readily removed from the wall 27. The entire structure as a unit may be moved forward with portions above wall 32 sliding thereon and the conduits 68 and 70 moving in slots or notches 72. The entire structure, after clearing wall 32, may be removed from the cabinet through opening 37.

Referring now to Figs. 9 and 10, there is shown a cabinet 130, which is similar to cabinet 20, and includes a food storage compartment 132, machine compartment 134 and a freezing compartment 135. The cabinet is formed of insulated walls, including top wall 137, bottom wall 138, rear wall 139, front wall 140, a substantially horizontal, fixed wall 143 located between the top wall 137 and bottom wall 138 to separate the food compartment 132 from compartments 134 and 135, and upright wall 145 between compartments 134 and 135. The front wall 140 is provided with an opening 150 through which access may be had to compartments 132 and 135. The opening 150 is closed by door 151. The upright wall 145 is provided with an opening 152 which is closed by a movable closure wall 154. The closure wall is adapted to support a primary refrigerant evaporator 156 within compartment 135 and an intermittently operated refrigerant condensing element 158, which may be similar to element 42, within compartment 134. The condensing element is operatively connected to the evaporating element 156 by conduits 160 and 161. The front of compartment 135 is arranged to be closed by a closure plate 165, which is provided with an opening 166 through which access to the interior of compartment 135 may be had. If desired, the opening 166 may be closed by doors (not shown) similar to doors 53 shown in Figs. 1 and 2. Preferably, the apparatus including condensing element 158, evaporating element 156, wall 154 and front closure plate 165 are removed from the cabinet as a unitary structure by simply moving same forward through opening 150. The operating of element 158 may be controlled by any suitable control means (not shown).

In order to cool the food compartment 132, I have provided a secondary refrigerant evaporating element 170. The element may be similar to element 46 and is located in the cabinet in a like manner as is element 46. However, liquid refrigerant and evaporated refrigerant enter and leave the element 170 through a single conduit 172. The conduit 172 is connected to a condenser 174 disposed immediately below the evaporating element 156 and in thermal contact therewith to effect condensation in the condenser 174. Evaporated refrigerant passes from evaporating

element 170 through conduit 172 to condenser 174 wherein it is condensed by the refrigerating action of element 156, and the liquefied refrigerant is returned to the evaporating element 170 through conduit 172. If desired, a baffle 175 is placed in front of the element 170 to direct the air flow about the element 170.

In the apparatus shown in Figs. 9 and 10, the primary system, including the condensing element and evaporating element 156, may be removed for repairs and the like while the secondary system is, preferably, permanently installed in the cabinet, for the reason that the secondary system has no operating mechanism to necessitate repairs.

Preferably, the contact between the condenser 174 and the evaporating element 156 is such that during periods when the condensing element 158 is inoperative or, in other words, during the off-phase of the refrigerating cycle, the condensing surface is inadequate to condense all of the evaporated refrigerant in the secondary system which permits the element 170 to warm up to thereby melt the frost formed on its exterior surface. Thus, the evaporating element 156 may be operated at temperatures sufficiently low enough for freezing purposes and the evaporating element 170 is arranged to automatically defrost itself between off and on-phases of the refrigerating cycle. Inasmuch as the evaporating element is closed to the circulating air in the compartment 132, it will be unnecessary to frequently, if at all, defrost this element.

Although only a preferred form of the invention has been illustrated, and that form described in detail, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. Refrigerating apparatus comprising, in combination, a cabinet provided with an opening and having its interior divided into a food compartment and a second compartment by a horizontal insulated notched wall, said cabinet also including a removable, vertical insulated wall above said horizontal wall, a refrigerant condensing element disposed on one side of said vertical wall, a refrigerant evaporator disposed in said second compartment on the opposite side of said vertical wall, a vertically disposed plate type evaporator located in said food compartment adjacent the rear wall thereof, and a conduit extending through said notch and interconnecting said evaporators, said evaporators, removable wall and condensing element being removable bodily as a unit from said cabinet through said opening.

2. Refrigerating apparatus comprising, in combination, a cabinet having its interior divided into a food compartment and a second compartment by a horizontal, fixed insulating wall, said cabinet also including a vertical insulated wall above said fixed wall, a refrigerant condensing element disposed on one side of said vertical wall, a refrigerant evaporator disposed in said second compartment on the opposite side of said vertical wall, and a vertically disposed plate type evaporator disposed in said food compartment adjacent the rear wall thereof.

3. Refrigerating apparatus comprising, in combination, a cabinet having its interior divided into two compartments, a primary refrigerating system including a refrigerant condensing element and a refrigerant evaporator located in one of said compartments, and a secondary refrigerating system including a refrigerant evaporator located in the other compartment, and a condenser located in the compartment with the primary evaporator and in thermal contact therewith, said secondary system being permanently fixed in said cabinet, and said primary system being bodily removable as a unit from the cabinet without disturbing the secondary system.

4. Refrigerating apparatus comprising, in combination, a cabinet having substantially horizontal top and bottom insulated walls, said cabinet also including a wall located intermediate the top and bottom walls to divide the interior of said cabinet into a food compartment and a second compartment, and a flat plate refrigerant evaporator disposed substantially midway between said top and intermediate insulated walls to provide a rapid freezing support for a receptacle on its upper surface and a storage space for a like receptacle therebelow.

5. Refrigerating apparatus comprising, in combination, an insulated cabinet, means dividing said cabinet into two compartments, said cabinet having an opening through a wall thereof opening into one of said compartments, an insulated member removably mounted in said opening, a primary refrigerant evaporator secured to said member and extending into said one compartment, a secondary refrigerant evaporator associated with said other compartment, a condenser for said secondary refrigerant evaporator, said condenser being fixed in the said one compartment and in heat exchange relation with said primary refrigerant evaporator, and condensing means exteriorly of the said one compartment for said primary refrigerant evaporator.

6. Refrigerating apparatus comprising a cabinet having insulated walls, a substantially imperforate partition element dividing the cabinet into two compartments, a primary refrigerating system including an evaporator removably located in one of said compartments, a second evaporator in heat exchange with the other of said compartments, a condenser connected to said second named evaporator, said condenser being associated with said primary system in such manner as to permit the removal of the primary system and to condense refrigerant evaporated in the secondary evaporator, said primary system also including a liquefying element operatively connected to the evaporator thereof, and said cabinet having an opening in a wall thereof to facilitate the removal of said primary system from the cabinet and movable insulating means associated with said opening.

7. Refrigerating apparatus comprising, in combination, an insulated cabinet having means dividing the interior of the same into two compartments, one of said compartments having an opening through a wall thereof, insulating means removably mounted in said opening, a removable primary refrigerating system including an evaporator removably mounted in said one compartment and condensing means exteriorly of said compartment and operatively connected with said evaporator through said insulating means, and a secondary refrigerating system including an evaporator associated with said other compartment and condensing means connected with said last named evaporator and associated in heat exchange relationship with said primary refrigerating system.

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