

Sept. 7, 1943.

H. K. JOHNSON
REFRIGERATING APPARATUS

2,328,810

Filed May 3, 1941

2 Sheets-Sheet 1

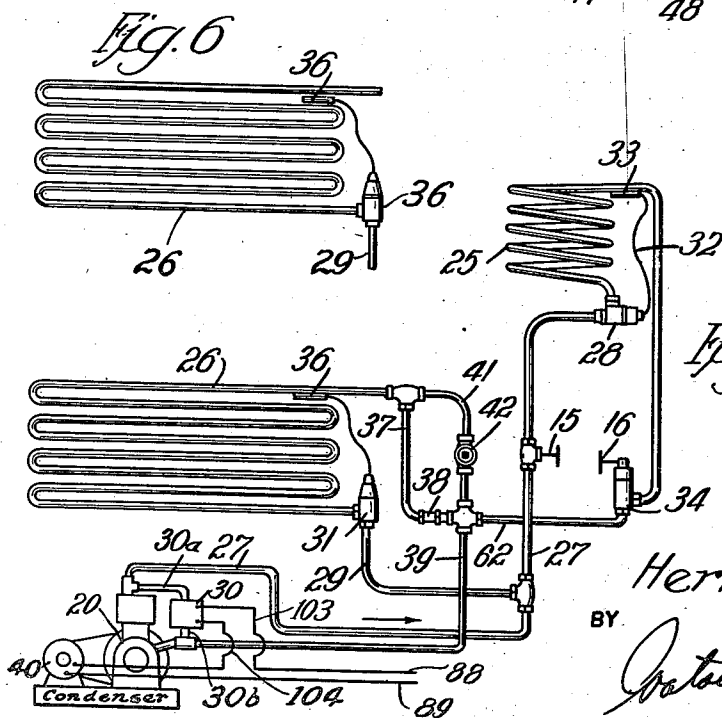
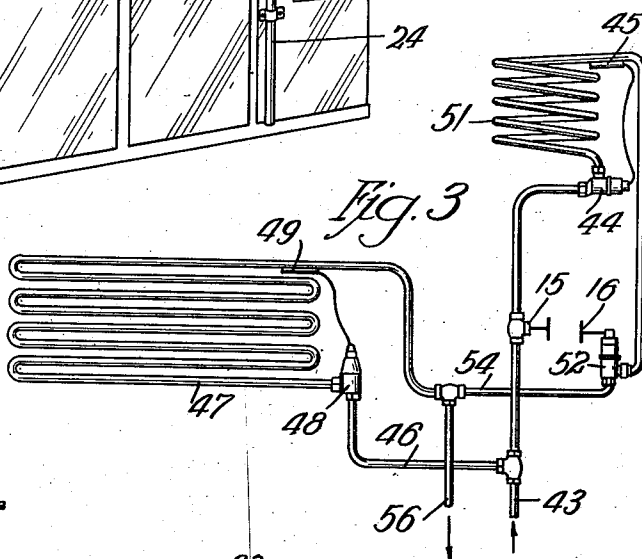
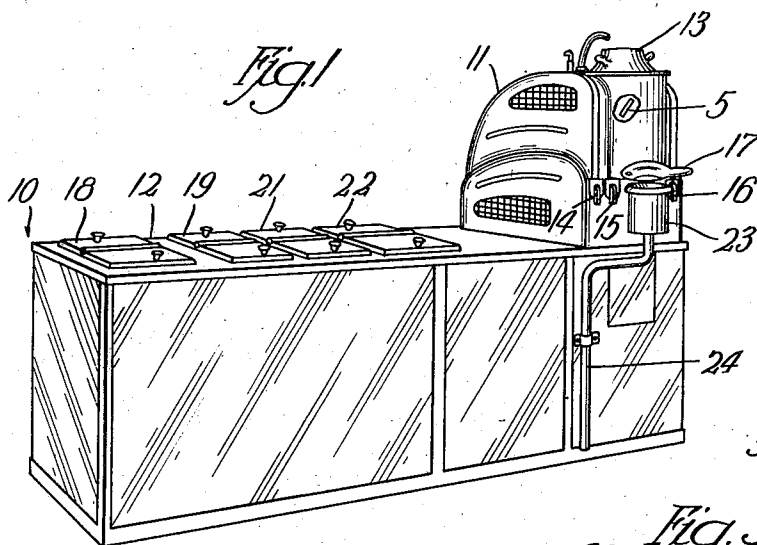


Fig. 2

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2 Sheets-Sheet 2

Fig. 4

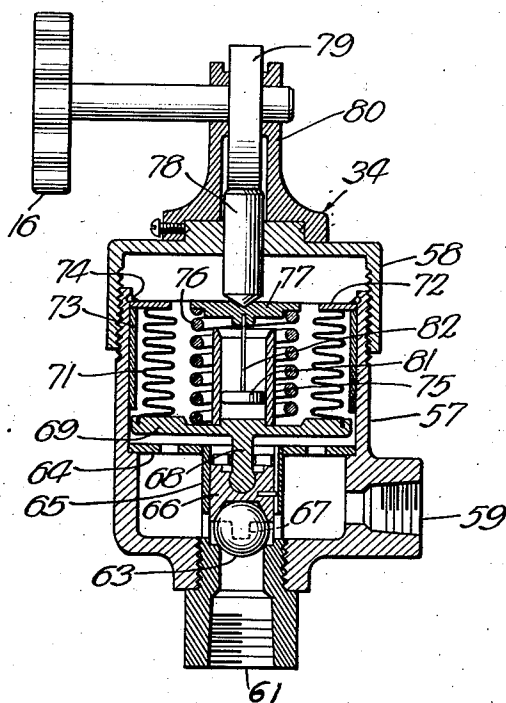
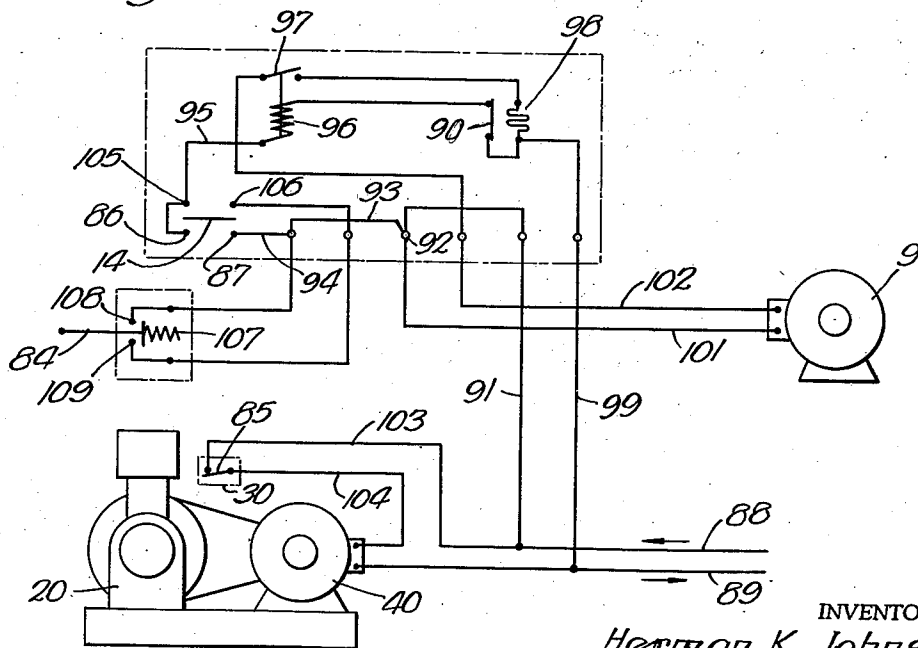


Fig. 5



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2,328,810

REFRIGERATING APPARATUS

Herman K. Johnson, Grand Haven, Mich., assignor to The Bastian-Blessing Co., Chicago, Ill., a corporation of Illinois

Application May 3, 1941, Serial No. 391,656

13 Claims. (Cl. 62—114)

This invention relates to apparatus for refrigerating or cooling confections and other products.

The principal object of the invention is the provision of new and improved refrigerating apparatus having a plurality of different compartments that are maintained at different temperatures by separate refrigerating coils containing the refrigerant at different temperatures and pressures, together with novel means for utilizing the low pressure, low temperature coil as an expansion or surge tank into which gaseous refrigerant from the high pressure expansion coil may flow to prevent short cycling of the machine.

Another object of the invention is the provision of a new and improved refrigerating or cooling apparatus having freezing and hardening compartments cooled by means of a high pressure, high temperature expansion coil and by a low pressure, low temperature expansion coil, respectively, so constructed that the refrigerant vapor coming from the high pressure or freezer compartment coil may, under certain conditions, flow into the low pressure coil of the hardening compartment which may be said to act as a condenser.

A further object of the invention is the provision of a new and improved refrigerating apparatus having multiple compartments at different temperatures, that is simple in construction, efficient in operation, easily installed, and that is not likely to get out of order or cause trouble during its operation.

Other and further objects of the invention will appear from the following description, taken in connection with the accompanying drawings, in which—

Fig. 1 is a perspective view of a cabinet embodying the invention;

Fig. 2 is a diagrammatic view of the expansion coils and associated mechanism for the refrigerating apparatus;

Fig. 3 is a view similar to Fig. 2, but showing a modified form of construction;

Fig. 4 is a vertical section of a pressure reducing valve;

Fig. 5 is a wiring diagram for the apparatus; and

Fig. 6 is a diagrammatic view showing a modification of the arrangement of the thermostat 36 with relation to the expansion coil 26.

In refrigerating apparatus of the dry system having a plurality of cooling or refrigerating compartments that are maintained at different

temperatures with a single refrigerating compressor, it has been proposed to employ a surge tank in communication with the suction line of the compressor in order to prevent short cycling of the machine. Such an arrangement is objectionable not only because of the size of the tank, which occupies considerable space, but also because of the inconvenience and the added expense in its manufacture and installation.

The present invention seeks to eliminate this surge tank and to so construct the refrigerating mechanism that gaseous refrigerant escaping from the high pressure, high temperature or freezing coil of the freezing compartment may pass into the low pressure, low temperature or hardening coil of the hardening compartment.

Referring now to the drawings, the reference character 10 designates a refrigerating apparatus having a plurality of refrigerating or cooling compartments. For the purpose of disclosing the principle of the invention, only two compartments need be shown.

The cabinet itself is more or less conventional and comprises the freezing compartment 11, having the conventional beater 5 therein with a separate motor 9 (Fig. 5) for operating the same, and the hardening compartment 12. The freezing compartment has a closure or cover 13, through which the liquid material is poured into the freezer compartment or receptacle. This freezer portion of the cabinet 10 may have the conventional selector switch 14, master or cut-off valve 15, temperature control 16, and the draw-off gate 17 mounted on the exterior thereof. The gate 17 has a suitable motor control associated therewith, as will presently appear. The fluid-frozen confection is discharged through this gate, as is usual in such constructions. The hardening compartment may consist of a plurality of receptacles 18, 19, 21 and 22, having suitable closures therefor. A waste receptacle 23, having a drain 24 leading therefrom, may be provided beneath the gate 17 to carry away the waste.

The cabinet is conventional, and since the same, per se, constitutes no part of the present invention further description is deemed unnecessary, except to state that the wiring diagram for the different electrical controls, the piping for the pressure controls, and the associated mechanism, are herein disclosed diagrammatically in Figs. 2, 3 and 5. The compressor for the refrigerant is shown diagrammatically at 20, the motor for operating the compressor at 40, and the condenser for condensing the refrigerant is

located in the casing within the base of the compressor, as indicated by the legend in Fig. 2 and which is water-cooled in the conventional manner. The motor 40 is supplied with electric energy by the leads 88 and 89. A detailed description of this mechanism is not believed necessary to an understanding of the invention. This information may be found, however, in a manual published by The Bastian-Blessing Company, 240 East Ontario Street, Chicago, Illinois, entitled "Bastian-Blessing Ice Cream Freezers, Installation and Service Instructions," August 1, 1940, F-907.

Any suitable control mechanisms may be employed. The form of control mechanism shown in my Patent No. 2,209,979, of August 6, 1940, may be employed with certain modifications.

The freezing and hardening compartments are cooled by separate refrigerating or expansion coils 25 and 26, as shown diagrammatically in Fig. 2. The invention relates principally, but not entirely, to the piping of the refrigerating apparatus, and for a clearer understanding of the invention there is shown, in Fig. 2, a diagram of the piping for the refrigerant within the cabinet. In this view the refrigerating coil for the freezer 11 is shown at 25, and the coil for the hardening cabinet at 26. The compressor 40 is adapted to compress the gaseous refrigerant, which is afterward condensed into the liquid refrigerant and delivered into the high pressure conduit 27, as is usual in such constructions. The average compressor head pressure should be between 90 and 100 pounds. The liquid line or conduit for the liquid refrigerant from the discharge side of the condensing unit 20 is shown at 27. The compressing and condensing mechanism is usually located in the basement or at some remote or convenient place.

The conduit 27 is in communication with what, for convenience of description, will be termed the lower end of the refrigerating coil 25 through temperature responsive expansion valve 28. The conduit 27 is provided with a branch conduit 29, which is in communication with what, for convenience of description, will be termed the lower end of the refrigerating coil 26 through a thermostatic expansion valve 31. The conduit 27 is provided with the manual cut-off or master valve 15, between the branch conduit 29 and the automatic expansion valve 28, for controlling the amount of fluid flowing through the conduit 27 relative to that flowing through the branch conduit 29. This valve 15 may be closed entirely if it is desired to operate the hardening mechanism to the exclusion of the freezer. The handle for this valve extends to the exterior of the cabinet, as shown at 15 in Fig. 1.

The automatic expansion valve 28 may be of any suitable or well known construction. The operation of the valve is controlled by a thermosensitive control member 32, within the hardening compartment 12. The parts are so arranged that as the temperature of the bulb 33 rises above a predetermined amount the pressure within the control increases for correspondingly opening the expansion valve 28 against the compression of a spring which closes the valve upon a decrease of this pressure, as is usual in such constructions. For the purpose of illustration the thermostat or feeler bulb 33 of the control member 32 is mounted in heat exchange relation with the suction end of the coil 25, as by being secured in contact therewith, and is filled with a volatile fluid that automatically opens

the valve as the fluid expands in response to the increase in temperature of the refrigerant flowing through the coil. Since any suitable thermostatic expansion valve may be employed, such, for instance, as the valve 11 employed in said patent, it is not thought necessary to illustrate or describe the same more in detail.

The discharge end of the coil 25 is provided with an automatic pressure reducing valve 34 for maintaining a predetermined pressure in the coil 25 that is much higher than that maintained in the coil 26, as will presently appear.

The pressure reducing valve 34 is of the pressure control type, and is provided with a suitable knob or handle 16 extending to the exterior of the cabinet, as shown at 16 in Fig. 1. and by means of which the operation of the valve may be manually adjusted to maintain any desired pressure and corresponding temperature within the coil 25.

The coil 26 is likewise provided with an automatic expansion valve 31, which is also provided with an automatic control device 36 similar to that of the automatic expansion valve 28. These valves are of the usual or any well known construction, and since the details of the valves constitute no part of the present invention it is not thought necessary to show or illustrate those details. Certain types of such valves are disclosed in said patent and manual.

The parts are so constructed that the control device 36 is responsive to the temperature within the hardening cabinet, as shown in Fig. 6. It is shown in Fig. 2 as being responsive to the refrigerant flowing through the discharge end of the expansion coil 26, and is attached to said coil. The control is so adjusted that the expansion valve 31 will open at a lower temperature, and a consequent lower pressure, than the valve 28. The discharge end of the coil 25 is in communication with a pipe 37 having a check valve 38 therein. The pipe 37 is in communication with the suction conduit 39 of the condensing unit 20. A by-pass 41 is provided around the check valve 38. The passage 41 is provided with a manually operated valve 42 for closing the passage 41 when the expansion coil 26 is not functioning as a surge tank, as will presently appear.

The compressor is automatically stopped and started by a low pressure control 30, and its setting will determine the temperature obtained in the hardening compartment or any other compartment that may be used in conjunction with the freezer. The control mechanism 30 is in communication with the high pressure side of the system through the pipe 30^a, and with the suction side through the pipe 30^b, which correspond to the pipes 60 and 61, respectively, of said Patent No. 2,209,979. The parts are so constructed and arranged that the switch 85, which is in series with the motor 40, is opened when the pressure due to the operation of the compressor in the line 27 and pipe 30^a exceeds a predetermined amount, and is closed when the pressure in the suction line 39 builds up above a certain amount due to the expansion of the gas in this line, all as disclosed in said patent.

It may be stated that in practice the expansion coils 25 and 26 are in heat exchange contact with metallic containers in the respective compartments, whereby the use of brine or the like as a heat exchange medium is dispensed with.

In the operation of the device, valves 28 and 34 are adjusted so that the temperature of the coil 25 is relatively high, say from 25° F. to 31° F., and with a correspondingly high pressure, say around 25 lbs., when the refrigerant used is dichloro-difluor methane, (F-12), so that when the freezer is operated the product will be congealed but not to such an extent that it will not flow when the draw-off gate 17 is opened. In other words, the product will be congealed but in a plastic or semi-solid state. The hardening coil 26, on the other hand, is maintained at considerably lower temperature and at a correspondingly lower pressure, so that material taken from the freezing compartment 11 and stored in the hardening compartment 12 will soon become hard and will be maintained in that condition.

The operation of the compressor motor 40 is automatically controlled by a dual pressure control device 30, which opens and closes a circuit through the motor, and which may be of any conventional construction, such, for instance, as that shown in Fig. 1 of my patent referred to above in which the circuit is closed through the compressor motor when the pressure in the return or suction conduit 39 of the compressor rises above a predetermined amount, and is opened when the pressure in the liquid or high pressure conduit 27 of the compressor falls below a predetermined amount.

When the freezer 11 containing the coil 25 is in continuous operation, the hand valve 42 may be closed, but when the freezer is used only intermittently, as in dispensing the frozen product from the freezer 11 to the customers, the valve 42 is opened and during the rest interval of the freezer the refrigerant gas escaping through the pressure reducing valve 34, instead of moving downwardly through the conduit 39 after the pressure in the coil 25 and conduit 39 equalizes, will expand upwardly into the coil 26, through the valve 42, whereby the coil 26 will act as a condenser. In other words, since it is cooler than the gaseous refrigerant escaping from the coil 25, this latter gas will be condensed to a certain extent, and hence its pressure will be automatically reduced.

The expanding of the refrigerant under high pressure into the low pressure coil 26 eliminates the necessity for a surge tank for preventing short cycling of the apparatus. In other words, since the circuit through the compressor motor is automatically closed when the pressure within the return conduit 39 reaches a predetermined maximum, it is evident that by expanding the gas from coil 25 into the coil 26 it will take a longer time after each operation of the motor for the gas in the return conduit 39 to build up to the required pressure for operating the switch 85 than if the gaseous refrigerant were not permitted to expand into the coil 26 through the shunt passage 41.

In Fig. 3 is shown a form of construction in which the freezer mechanism is adapted to be operated either continuously or intermittently without adjustment. This form of construction dispenses with the check valve within the return conduit for the hardening coil, and consequently does not require a shunt passage for by-passing the gaseous refrigerant from the hardening coil. In this form of construction the discharge conduit 43 from the compressor is in communication with the expansion valve 44, which is similar to the valve 28 and which is

controlled by thermostat 45 which corresponds to the thermostat 33 of the previous construction, and is attached in the same manner. A branch passage 46, similar to the passage 29 of Fig. 2, is in communication with the lower or inner end of the expansion or refrigerating coil 47 through an expansion valve 48, similar to the expansion valve 31 in the previous construction. The expansion valve 48 is automatically controlled by a thermostat 49. The thermostats 33 and 36 of Fig. 2, and the thermostats 45 and 49 of Fig. 3, are shown in proximity to or attached to the adjacent coils. In most cases it is desired that these thermostats be actuated by the temperature within the compartment, in which case they are spaced from the coils, as indicated diagrammatically in Fig. 6.

The outer or discharge end of the coil 51 is in communication with a pressure reducing valve 52, which is automatic in its action but is adjusted by means of the manually operated member 16, as described above. A pipe 54 from the reducing valve 52 is in communication with the return conduit 56. The upper or discharge end of the coil 47 is also in communication with the return conduit 56. A shut-off manually controlled valve 15 is placed in the conduit 43 beyond the branch conduit 46, and anterior to the automatic expansion valve 44, so that when desired the freezer having the coil 51 may be shut off by closing the valve 15. In this construction, as in that previously described, the pressure within the coil 51 is maintained at a higher level than that in the coil 47 by means of the pressure reducing valve 52.

In the operation of this form of construction the refrigerant vapor escapes from freezer coil 51 through the pressure reducing valve 52 and is free to expand into the low pressure coil 47 and return conduit 56, thereby eliminating the necessity for the use of a surge tank in preventing short cycling of the machine.

The pressure reducing valve 52 is similar to the pressure reducing valve 34. These valves may be of any suitable or well known construction, and each has manual means 16 extending to the exterior of the cabinet for adjusting the same.

In Fig. 4 is shown one of these valves, which may be considered the valve 34. As shown, said valve comprises a casing 57, which has a threaded cap 58 thereon for closing the upper end thereof. The casing 57 has an intake passage 59, which is in communication with the discharge end of the expansion coil 25. It also has a discharge passage 61, which is in communication with the suction conduit 39 through the pipe 62. A ball valve 63 is seated between the intake 59 and the discharge passage 61.

Suitable means are provided for lifting the valve 63 and permitting the refrigerant to escape from the coil 25 when the pressure therein exceeds a predetermined amount. In the form of construction shown, the casing 57 is provided with a perforated partition 64, having a downwardly extending cylinder member 65 that extends down to the bottom of the casing and partially encloses the ball valve 63. This cylinder has openings in its lower walls through which the refrigerant gas enters. Mounted within the casing is a piston 66, which has fingers 67 thereon for engaging the ball for elevating the same when the piston 66 is elevated. The piston 66 is normally held downwardly against the ball by a projection 68 on a head

69 of a cylindrical bellows 71. The bellows 71 is rigidly attached to an annular ledge 72 extending about the inner side of the upper portion of the circular wall of the casing 57. The ledge 72 is rigidly connected to a sleeve 73, which frictionally engages the inner surface of the wall of the casing 57 and is held in position therein by a scaling member 74.

The head 69 carries a cylinder 75 of a dash pot, and surrounding this cylinder is a spring 76, the lower end of which engages the head 69 and the upper spring plate 77. The spring plate 77 is engaged by a slidable pin 78, which is adapted to be forced downwardly by a cam 79 attached to the handle 16 extending to the front of the cabinet. The cam 79 is pivoted in an upward projection 80, mounted on the cap member 58 of the casing 57. The tension of the spring 76 may be adjusted by turning the knob 16 in one direction or the other. The cylinder 75 constitutes a dash-pot, the piston for which is shown at 81. This dash-pot prevents fluttering of the valve mechanism and insures a smooth, even movement of the valve and bellows. The piston 81 has the stem 82, which is rigidly attached to the spring plate 77.

In the operation of the device, when the pressure of the refrigerant in the coil 25 rises above a predetermined pressure the gas flowing through the perforated plate 64 will force the head 69 upwardly and with it the ball valve 63. The gaseous refrigerant then passes through the casing and into the suction conduit 39 of the condensing unit 20, and if the valve 42 be open portions of this gas will flow into the expansion coil 26 of the hardening compartment, as described above. By adjusting the valve 16 the pressure and consequent temperature in the coil 25 may be adjusted. By turning the handle so as to compress the spring, the pressure within the coil 25 may be increased before the spring plate or diaphragm 69 will be moved upwardly against the compression of the spring 76. By moving the handle in the opposite direction, the refrigerant in the coil 25 may be maintained at a lower pressure, and consequently at a lower temperature.

In Fig. 5 is shown a wiring diagram for the apparatus. In this figure the compressor-condenser 20, the motor 40 for operating the same, the motor 9 for operating the freezer 5, and the dual control 30 for the motor 40, are shown diagrammatically. In this diagram the switch, closed by a spring when the cut-off gate 17 is opened, is indicated by the reference character 84; the switch for the dual control 30 is indicated by the reference character 85; and the selector switch 14 is shown at the left of Fig. 5. The wiring is such that when the selector switch 14 is in neutral position, as shown in Fig. 5, the motor 9 will not operate.

It is believed that the diagram can be better described by tracing the different circuits. Assuming that it is desired to operate the freezer motor 9 continuously regardless of the position of the gate 17 and associated switch 84, the selector switch 14 is moved to close the circuit through the contacts 86 and 87. The current entering the lead 88 will pass upwardly through the conductor 91 to the terminal 92, then through the conductors 93, 94, switch 14 and along the conductor 95, through the solenoid 96, which will close the switch 97. The current from the solenoid 96 will pass through the switch 90 of circuit breaker 98 and back to the line through

the conductor 99. After the switch 97 is closed, the current then will move along the lead 88, the conductors 91, around to the terminal 92 and dividing the main portion will flow along the conductor 101, through the motor 9, back through the conductor 102, switch 97, through the circuit breaker 98, conductor 99 and back to the lead 89. In other words, when the selector switch 14 is moved into contact with the terminals 86 and 87, the freezer motor 9 will run continuously during this time.

If the pressure in the suction conduit 39 for the refrigerant rises above a predetermined amount, the switch 85 will close and the current from the power line 88 will then pass through the conductor 103, switch 85 and conductor 104 to the motor 40 and then back through the power line 89. In other words, the motor 9 will run continuously and the motor 40 will run as required by the temperatures or pressures within the expansion coils. These pressures and temperatures cause the variation of the pressures within the liquid and gaseous lines 27 and 39 of the refrigerating apparatus which in turn open and close the switch 85 in the dual pressure control device 30.

If it is desired to adjust the mechanism so that the freezing motor 9 will operate only when the gate 17 is open, and will operate automatically as when the freezer is operated for delivering the material for serving customers, the selector switch 14 is moved from the position shown in Fig. 5 into contact with the terminals 105 and 106. When the switch 14 is in this position and the switch 84 is closed by opening the gate 17 and permitting the spring 107 to force the switch 84 into contact with the terminals 103 and 109, the circuit is then closed through the motor 9. The current may then be traced from the power line 88, through the conductors 91, 93, 94, the switch 14, the conductor 95, solenoid 96, circuit breaker switch 90, line 99 and back to the power line 89. The solenoid 96, being energized, will close the switch 97 so that the current may be traced from the power line 88, through the conductor 91, where it divides at 92, the main portion passing through the conductor 101, through the motor 9, back through the conductor 102, switch 97, circuit breaker 98 and the conductor 99 to the power line 89. The motor 40 will respond as before to the differential pressure between the lines 27 and 39 without being affected in any way by the operation of the motor 9.

It is thought from the foregoing, taken in connection with the accompanying drawings, that the construction and operation of my device will be apparent to those skilled in the art and that changes in size, shape, proportion and detail may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. In a refrigerating cabinet, a freezing compartment, a hardening compartment, refrigerating means of the dry system type for cooling said compartments, said system comprising a high pressure expansion coil for a refrigerant for said freezing compartment, a low pressure expansion coil for said hardening compartment, means for maintaining a higher pressure within said coil for said freezing compartment than within said coil for said hardening compartment, said coils having a common conduit for conducting the refrigerant discharge therefrom whereby the refrigerant discharged from the high pressure coil

may escape into the coil having a lower pressure for preventing short cycling of the machine.

2. A refrigerating system of the dry type, comprising, a plurality of expansion coils arranged in parallel, a conduit in communication with the intake of both of said coils for conducting a refrigerant from a compressor to said coils, a conduit in communication with the discharge ends of said coils for conducting the refrigerant from said coils back to the compressor for recycling, expansion valves for said coils, a pressure reducing valve for one of said coils for maintaining a higher pressure within one of said coils than within the other, a check valve for preventing reverse flow of refrigerant in said other coil, and a shunt passage around said check valve whereby refrigerant discharged from the high pressure coil may flow through said shunt passage into said other coil for preventing short cycling of said compressor.

3. A refrigerating apparatus of the dry system type, comprising a freezer compartment, an expansion coil therefor, a hardening compartment, an expansion coil therefor in parallel with said first-named coil, an expansion valve for each of said coils, a pressure reducing valve for one of said coils for maintaining higher pressure therein than in the other coil, and a suction conduit common to both of said coils whereby gaseous refrigerant discharged from the coil having the higher pressure may escape into the other coil and thereby prevent short cycling of the apparatus.

4. In a refrigerating apparatus, a cabinet having a freezing compartment and a hardening compartment, a high pressure conduit therefor, an expansion coil in each compartment in communication with said high pressure conduit, a suction conduit for said compressor-condenser in communication with the discharge ends of said coils, a thermostatically controlled expansion valve for the intake end of each of said coils, a suction conduit for said compressor-condenser, a passage between the discharge end of one of said coils and said suction conduit, a passage for conducting gaseous refrigerant from the discharge end of the other coil to said suction conduit, a check valve within said last-named conduit, a by-pass around said check valve, and a manually controlled valve in said by-pass.

5. A refrigerating cabinet of the dry system type, comprising, a freezing compartment, a hardening compartment, a pair of expansion coils for circulation of a refrigerant for cooling said compartments, respectively, means for circulating said refrigerant through said coils about said compartment for reducing the temperature therefor, means including an expansion valve for each expansion coil and a pressure control valve for the expansion coil of the freezing compartment for maintaining one of said compartments at a lower temperature than the other, and means for utilizing the low temperature coil for preventing short cycling of the refrigerant through the hardening compartment.

6. In a refrigerating apparatus, a freezing compartment, a beater therein, a motor for operating said beater, a discharge passage for said compartment, a cut-off gate for closing said passage, means for closing a circuit through said motor when said gate is in open position, a hardening compartment, means for automatically maintaining said freezer compartment at a higher temperature than said hardening compartment, means in parallel for simultaneously low-

ering the temperatures in said compartments, and means for preventing short cycling of said apparatus during its operation.

7. A refrigerating apparatus for a dry system, comprising, a freezing compartment, a hardening compartment, an expansion coil for each compartment, a compressor discharge passage, conduits between said passage and the intake ends of said coils, respectively, a compressor suction conduit in communication with the discharge end of each of said coils, means including an expansion valve at the intake ends of each coil and a pressure control valve for the suction end of the expansion coil for the freezing compartment for maintaining a higher temperature within the freezing compartment than in the hardening compartment, a check valve for preventing back flow of gaseous refrigerant into the hardening coil, and a shunt passage around said check valve for conducting gaseous refrigerant escaping from said freezer coil to the hardening coil.

8. In a refrigerating apparatus, a plurality of compartments, refrigerating means of the dry system type for cooling said compartments, said means comprising an expansion coil for a refrigerant for each compartment, an expansion valve at the entrance end of each coil, a pressure control valve at the suction end of one of said coils, means including said valves for maintaining one of said compartments at a higher temperature than the others, and means for conducting gaseous refrigerant from a higher temperature coil to a lower one during the operation of the apparatus for preventing short cycling of said apparatus.

9. In a refrigerating cabinet for a dry refrigerating system, a freezing compartment, a second refrigerating compartment, an expansion coil for each compartment, means, including a compressor and condenser, for circulating a refrigerant through said coils, said means comprising a discharge conduit in communication with both of said coils in parallel, a suction conduit for returning the refrigerant from both of said conduits to said compressor and condenser, a thermostatic expansion valve for the intake end of each refrigerating coil, a pressure reducing valve for the suction end portion of said freezer coil, means, including said last-named valve, for varying the pressure maintained within the coil of said freezing compartment, pressure controlled means for automatically controlling the operation of said compressor and condenser, and means including certain of said conduits for conducting the refrigerant gas from the coil of said freezer compartment into the suction end of the expansion coil of said second compartment for delaying the action of said pressure controlled means.

10. In a refrigerating apparatus, a freezing compartment, a second compartment, a refrigerating system for maintaining said compartments at different temperatures, said system comprising an expansion coil for a refrigerant for each of said compartments, a compressor and condenser for liquefying said refrigerant, a motor for operating said compressor, a discharge and a suction conduit for said refrigerant for said compressor, said discharge conduit being in communication with the intakes of said coils in parallel, a thermo-sensitive valve for the intake of each coil, said suction conduit being in communication with the discharge ends of said coils, in parallel, a pressure reducing valve for the dis-

charge end of the expansion coil for said freezer compartment for maintaining a higher pressure and higher temperature within said last-named coil than in the other coil whereby the refrigerant gas discharged therefrom may expand within said other coil, and means controlled by the pressure within said suction conduit for controlling the operation of said motor.

11. In a refrigerating apparatus, a freezing compartment, a second compartment, a dry refrigerating system for cooling said compartments, said system comprising an expansion coil for each compartment, an expansion valve at the entrance end of each expansion coil, a pressure control valve for one of said expansion coils, a condenser unit for said system, a motor for operating said compressor, means controlled by the pressure within the intake and discharge conduits of said motor in said system for controlling the operation of said motor, means including said valves and condenser unit for maintaining said compartments at different temperatures, and means for reducing the pressure of at least a portion of the refrigerant gas discharged from the expansion coil containing the higher temperature refrigerant whereby short cycling of the apparatus is prevented.

12. In a refrigerating apparatus, a freezer compartment, a stirrer within said compartment, a motor for operating said stirrer, a discharge passage for said compartment, a closure for said passage, means for closing a circuit through said motor when said closure is opened, means for closing a circuit through said motor for operating said motor continuously and for rendering the circuit controlled by said closure inoperative, a hardening compartment, a cooling system for said compartments, said system comprising a compressor, an expansion coil for each compartment, a suction conduit for said motor, the discharge ends of said coil being in communication with said suction conduit in parallel, a liquid conduit for the discharge of said compressor, an expansion valve between said liquid

conduit and the intake end of each coil, a pressure reducing valve between the discharge end of the expansion coil for said freezer compartment and said suction conduit, a check valve in the passage from the expansion coil for the second compartment, a by-pass around said check valve, a manually operated valve for said by-pass whereby when said by-pass valve is open, gas from said freezer compartment coil may expand into the expansion coil for the second compartment for preventing short cycling of the refrigerant, and means controlled by the pressure of the refrigerant in said suction and high pressure conduits for controlling the operation of the compressor motor.

13. In a refrigerating cabinet having a freezer compartment and a hardening compartment, the combination of a refrigerating system for cooling said compartments, said system comprising a condensing unit, a high pressure expansion coil for the freezer compartment, a low pressure expansion coil for the hardening compartment, a conduit for conducting refrigerant from said condensing unit to said high and low pressure coils in parallel, a suction pipe for conducting the refrigerant from said high pressure expansion coil back to said condenser unit, a thermally controlled expansion valve for the intake end of said high pressure coil in communication with said conduit, a pressure reduction valve between said high pressure coil and said suction pipe, a conduit for conducting refrigerant from said suction pipe to said low pressure expansion coil, a thermally controlled valve between said first-named conduit and said last-named coil, a branch conduit between said suction conduit and the suction end of said low pressure coil, a check valve in said branch conduit, a shunt conduit for conducting refrigerant from the suction conduit of said high pressure coil around said check valve to said low pressure coil, and means for adjustably controlling the flow of refrigerant through said shunt conduit.

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