

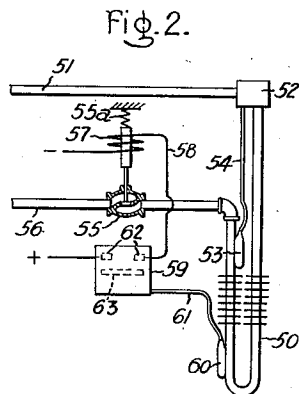
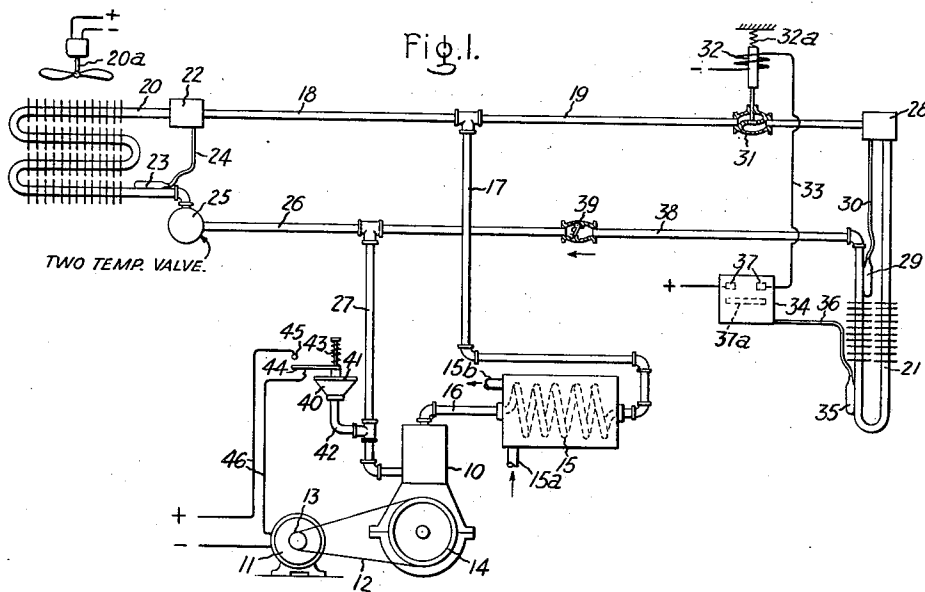
Jan. 25, 1938.

H. F. BRIGGEMAN ET AL

2,106,591

REFRIGERATING SYSTEM

Filed Feb. 19, 1935



Inventors:
Harold F. Briggeman,
Roger A. Fuller,
by *Harry E. Dunham*
Their Attorney

UNITED STATES PATENT OFFICE

2,106,591

REFRIGERATING SYSTEM

Harold F. Briggeman and Roger A. Fuller, Fort Wayne, Ind., assignors to General Electric Company, a corporation of New York

Application February 19, 1935, Serial No. 7,210

13 Claims. (Cl. 62—3)

Our invention relates to refrigerating systems of the type having two or more evaporators supplied with a refrigerant from a single source.

It is frequently desirable to cool a number of rooms, compartments or the like, of varying sizes and further to maintain each of them at a different average temperature, or to maintain rooms of various sizes at the same average temperature. For example, in a meat market, it may be desirable to provide apparatus for cooling a large meat storage room located in the rear of the store and also apparatus to cool a relatively small display case located in the front part of the store. Separate evaporators of proper capacity may be provided for the storage room and for the display case, the temperature of each evaporator being regulated according to the requirements of the compartment which it cools. If all of the evaporators are supplied with a refrigerant from a common compressor and condenser unit or other source of supply, the cost of the apparatus as well as the cost of its operation will be minimized.

It is an object of our invention to provide an improved refrigerating system of the type having two or more evaporators supplied with a refrigerant from a single source, the system being adapted to maintain said evaporators at different average temperatures.

It is a further object of our invention to provide a refrigerating system of the type having two or more evaporators of different capacities supplied with a refrigerant from a single source, the system being adapted to maintain said evaporators at either different or the same average temperatures.

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

For a better understanding of our invention, reference may be had to the accompanying drawing in which Fig. 1 is a schematic representation of a refrigerating system embodying our invention and Fig. 2 is a schematic representation of a modified control arrangement for one of the evaporators included in the system shown in Fig. 1.

Referring to the drawing, we have shown in Fig. 1 a refrigerating system embodying our invention. This refrigerating system is provided with a refrigerant liquefying unit including a compressor 10 of the reciprocating type driven

by an electric motor 11 through a belt 12 which is connected to a pulley 13 on the motor 11 and a fly-wheel 14 on the crank shaft of the compressor 10. The refrigerant liquefying unit also includes a water-cooled condenser 15, to which the compressed gaseous refrigerant passes through a conduit 16 from the compressor 10. Cooling water enters the casing of the condenser 15 through the inlet 15a and leaves through the outlet 15b as indicated by the arrows in the drawing. The gaseous refrigerant is liquefied in the condenser 15 and the liquid refrigerant passes therefrom through a refrigerant supply conduit 17. The refrigerant supply conduit 17 is provided with branches 18 and 19 through which the liquid refrigerant is supplied to the evaporators 20 and 21. In this form of our invention, the evaporator 20 is a forced draft type evaporator of relatively large capacity, being provided with a motor driven fan 20a for circulating air over the surfaces thereof. The evaporator 20 is arranged to be maintained at a relatively high temperature as compared to the evaporator 21. The evaporator 20 may be used to cool a storage chamber, for example, and the smaller evaporator 21 may be used to cool a display case. The evaporator 21 is of the fin type, air being circulated over its surfaces by natural convection.

An automatic thermostatic expansion valve 22 is provided in the inlet of the evaporator 20 and controls the admission of liquid refrigerant thereto by throttling the same. The automatic thermostatic expansion valve 22 is of the conventional type, and includes a bulb 23 connected thereto by conduit 24, the bulb 23 containing a fluid such as sulphur dioxide, which is cooled by the portion of the evaporator 20 adjacent the outlet thereof. A bellows or similar pressure responsive member is included in the thermostatic expansion valve 22, and is subjected to the pressure of the refrigerant in the evaporator 20. When the pressure decreases the bellows or the like opens the valve to admit refrigerant to the evaporator 20, and as the pressure increases the bellows or the like gradually closes valve 22, thus cutting off the supply of liquid refrigerant to the evaporator 20. The thermostatic expansion valve 22 is so arranged that on a rise in temperature at the outlet of the evaporator 20 the expansion of the fluid in the bulb 23 causes the valve 22 to open and conversely on a drop in this temperature the fluid contracts and causes the valve to close. Since for every refrigerant vapor pressure in the evaporator there is a corresponding temperature, it will be seen that the valve

22 is controlled by the difference between the temperature in the evaporator 20 and the temperature of the bulb 23, and in consequence maintains this difference at a constant value.

5 Maintaining this difference in temperature really amounts to controlling the superheat of the gas at the outlet of the evaporator, that is, the warming of the refrigerant vapor above the temperature at which it is vaporized. It is necessary to
10 maintain this superheat constant in order that no liquid refrigerant will pass to the compressor 10, so as to protect the latter and to maintain efficient operation of the system.

A two-temperature valve 25 of the conventional
15 pressure operated snap-acting type is provided at the outlet of the evaporator 20. The valve 25 is arranged to close the outlet of the evaporator 20 when the pressure therein reaches a predetermined low value and to open again when the pressure in the evaporator 20 reaches a predetermined higher value. The two-temperature valve
20 25 thus serves to maintain the evaporator 20 within the limits of the above mentioned predetermined temperatures. Vaporized refrigerant passing through the two-temperature valve 25 enters a suction conduit 26, passes therethrough to the main suction conduit 27 through which it returns to the intake of the compressor 10. It will thus be seen by the use of the two-temperature valve 25, we have provided an arrangement
30 by which the evaporator 20 may be maintained at a relatively high temperature, while at the same time all of the cooling surfaces of the evaporator 20 may be utilized. It is thus unnecessary to "starve" the evaporator in order to maintain
35 it at a relatively high temperature, that is, it is unnecessary under conditions of light load on the evaporator 20 to limit the refrigerant supplied thereto to such an amount that only a part of
40 the surface of this evaporator is utilized for cooling.

In the preferred form of our invention, in which the evaporator 20 is used to cool a storage room or the like, the two-temperature valve 25
45 is set to open at a temperature above 32° F. and to close at a temperature below 32° F. The pressure settings might be 12 lbs. per square inch and 0 lbs. per square inch gauge pressure, for example, if SO₂ is used as the refrigerant. The
50 evaporator 20 is thus operated alternately above and below 32°, that is, on what is known as a defrosting cycle. Such operation is advantageous in that the relative humidity of the air in the room or space cooled by the evaporator 20 is increased and the dehydration of articles preserved
55 therein is decreased.

The low temperature evaporator 21 is provided with an automatic thermostatic expansion valve 28 at the inlet thereof, which is similar to the
60 automatic thermostatic expansion valve 22 described above. The thermostatic expansion valve 28 includes a bulb 29 connected thereto by a conduit 30, the fluid in the bulb and conduits 29 and
65 30 being cooled by a portion of the evaporator 21 adjacent the outlet thereof so as to maintain substantially constant the superheat of the vaporized refrigerant withdrawn from the evaporator. In order to maintain the illustrative conditions high and low temperatures of the evaporators 20 and
70 21 noted above, it is necessary to provide some control arrangement for maintaining the temperature of the evaporator 21 at a relatively lower value than the temperature of the evaporator 20. If a two-temperature valve, similar to the valve
75 25, were placed in the outlet of the evaporator 21,

however, difficulties under certain conditions of operation would arise. For example, if the evaporator 20 were subjected to a sudden heavy load as by the placing of a large quantity of material to be cooled in proximity thereto, the pressure in the evaporator 20 would remain for a long period
5 of time at a value too high to cause closing of the valve 25, and the compressor 10 would continue to operate during all this period. At the same time, if such a two-temperature valve were
10 arranged at the outlet of the evaporator 21 the valve would remain open, as it would be set for a lower value of pressure for closing. During a long period of the time mentioned, the evaporator 21 would be subjected to a low suction pressure and the compartment cooled by the evaporator 21 would thus be subjected to sustained low
15 temperature for too long a period. In order to overcome this difficulty, we have provided a valve 31 located in the supply conduit of the evaporator 21 in series with the thermostatic expansion valve 28. The valve 31 is of the shut-off type, that is, it moves from the fully open to the fully closed position as distinguished from the gradual opening of the valve 28, for example, with its
20 consequent throttling action. The valve 31 is opened by a solenoid 32 which is energized by current supplied through the conductor 33. The electric circuit through the conductor 33 is opened and closed by a thermostatic operating mechanism 34 which includes a fluid containing bulb 35
25 connected thereto by a conduit 36. The bulb 35 is responsive to the temperature of the evaporator 21 and in the illustrative form of our invention is located on the surface thereof adjacent its center. When the evaporator 21 reaches a predetermined high temperature, the fluid in the bulb 35 and the conduit 36 expands, as it is warmed by the evaporator 21, and actuates a bar 37a to close contacts 37 of the thermostatic
30 switching device 34, thus completing the operating circuit of the solenoid 32. When the solenoid 32 is thus energized, it opens the valve 31 and admits the liquid refrigerant to the evaporator 21. This liquid refrigerant vaporizes in the evaporator 21 and when the latter, as a consequence, reaches a predetermined low temperature, the contraction of the fluid in the bulb 35 and conduit 36 causes the contacts 37 to open, thus de-energizing the solenoid 32. Upon a de-energization of the solenoid 32, the valve 31 is closed by a spring 32a and the supply of liquid refrigerant to the evaporator 21 is stopped. After the vaporization of the liquid refrigerant remaining in the evaporator 21, the temperature of the
35 latter will rise until it again reaches the predetermined temperature at which the contacts 37 are closed and the cycle repeated. In the illustrative form of our invention the valve 31 might be set to open and close at 36° F. and 22° F.
40 respectively. When the evaporators 20 and 21 are subjected to stable load conditions, the solenoid operated valve 31 functions primarily as a protective device rather than as a control device.

The refrigerant vaporized in the evaporator 21
45 passes therefrom through a suction conduit 38 to the common suction conduit 27 through which it returns to the intake of the compressor 10. A check valve 39 is provided in the suction conduit 38 in order to prevent vaporized refrigerant from the evaporator 20 entering the evaporator 21
50 when the latter has been exhausted to a low pressure.

A back pressure control device 40 has been provided in the suction conduit 27 for controlling
75 25,

the motor 11. The back pressure control device 40 includes a diaphragm 41 which is subjected to the pressure existing in the suction conduit 27 through a pressure connection 42 and is biased by a compression spring 43. When the pressure in the suction conduit 27 reaches a predetermined high value, the diaphragm 41 is moved upwardly against the bias of the spring 43, thus moving the contact 44 into engagement with the stationary contact 45 and completing the supply circuit of the electric motor 11 through the conductors 46. The electric motor is thus started and it drives the compressor 10 until the pressure in the suction conduit 27 reaches a predetermined low value in consequence of which the diaphragm 41 moves downwardly carrying the movable contact 44 therewith, thus opening the electric circuit of the motor 11 and stopping the compressor 10.

The utilization of a valve 25 at the outlet of the evaporator 20 makes it possible to set the back pressure control device 40 more nearly in accordance with the requirements of the colder evaporator 21, since if the compressor 10 reduces the pressure in the suction line 27 below the point for which valve 25 is set the latter will close while the refrigeration of the evaporator 21 may continue. If the valve 31 is arranged to open and close at 36° F. and 22° F., respectively, the control device 40 may be set to open and close at 10 lb. pressure and 6 in. vacuum respectively.

It will be understood that the various valve settings may be altered in order to provide for desired temperatures of the evaporators as required in various applications. The valves 22, 25, 28 and 31 may be set to maintain the evaporators 20 and 21 within the same temperature range despite their different capacities if such operation is desired.

In Fig. 2 of the drawing, we have shown a modified control arrangement for an evaporator 50, which corresponds to the evaporator 21 in the system shown in Fig. 1. The evaporator 50 is of the fin type and is of relatively small capacity as compared to the evaporator 20. Liquid refrigerant is supplied to the evaporator 50 through a conduit 51, the admission of liquid refrigerant to the evaporator 50 being controlled by a thermostatic expansion valve 52. The valve 52 is similar to the valve 28 described above and is provided with a bulb 53 connected thereto by a conduit 54, the bulb 53 being located at the outlet of the evaporator 50, so as to maintain substantially constant the superheat of vapor withdrawn from this evaporator. A shut off valve 55 is provided in a suction line 56 in order to control the flow of refrigerant through the evaporator 50, and thus maintain the same within a predetermined range of relatively low temperatures. The valve 55 is opened by a solenoid 57, which is energized by current supplied through a conductor 58. The electric circuit through the conductor 58 is opened and closed by a thermostatic operating mechanism 59, which includes a fluid containing bulb 60 connected thereto by a conduit 61. The bulb 60 is responsive to the temperature of the evaporator 50 and in the form of our invention illustrated is located on the surface thereof adjacent its center. When the evaporator 50 reaches a predetermined high temperature, the fluid in the bulb 60 and the conduit 61 expands as it is warmed by the evaporator 50 and closes contacts 62 of the thermostatic switching device 59 by a bar 63, thus completing the operating circuit of

the solenoid 57. When the solenoid 57 is thus energized, it opens the valve 55 against the action of a spring 55a, thus permitting the flow of refrigerant through the evaporator 50 to the suction line 56. The remainder of the refrigerating system for use with the modified control arrangement shown in Fig. 2 is the same as that shown in Fig. 1.

While we have shown a particular embodiment of our invention in connection with a compression refrigerating machine, we do not desire our invention to be limited to the particular construction shown and described, and we intend in the appended claims to cover all modifications within the spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a valve at the outlet of said one of said evaporators for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means including a solenoid operated shut off valve located in the conduit connecting the outlet of another of said evaporators to said refrigerant liquefying unit for shutting off the flow of refrigerant therethrough, and means for controlling said solenoid to control said shut off valve in accordance with the temperature produced by said last mentioned evaporator and for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second named control means being independent of said first named control means.

2. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant inlet and outlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, supply and exhaust conduits connecting the inlets and outlets of said evaporators to said liquefying unit in parallel relationship, means including a thermostatic expansion valve responsive to the temperature at the outlet of one of said evaporators and located at the inlet thereof for throttling the flow of refrigerant therethrough, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a two-temperature stop valve at the outlet of said one evaporator for maintaining the temperature of said one evaporator within a predetermined range of relatively high temperatures, means including a second thermostatic expansion valve responsive to the temperature at the outlet of another of said evaporators and located at the inlet thereof for throttling the flow of refrigerant therethrough, means including a solenoid operated stop valve located in the exhaust conduit of the last mentioned evaporator for shutting off the flow of refrigerant therethrough, and means for controlling said solenoid to control said shut off valve in accordance with the temperature produced by said last mentioned evaporator and for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second named control

means being independent of said first named control means.

3. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators
 5 having a refrigerant inlet and outlet, means including a compressor and supply conduits for supplying liquid refrigerant to said evaporators, a common suction conduit connecting the out-
 10 lets of said evaporators to said compressor in parallel relationship, means responsive to the pressure in said common suction conduit for starting said compressor at a predetermined maximum pressure and stopping said compres-
 15 sor at a predetermined minimum pressure, means including a thermostatic expansion valve responsive to the temperature at the outlet of one of said evaporators and located at the inlet there-
 20 of for throttling the flow of refrigerant therethrough, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a two-tempera-
 25 ture stop valve at the outlet of said one evaporator for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means including a second thermo-
 30 static expansion valve responsive to the temperature at the outlet of another of said evaporators and located at the inlet thereof for throttling the flow of refrigerant therethrough, means including a solenoid operated shut off valve located in a supply conduit of the last mentioned evaporator for shutting off the flow of refrigerant through said last mentioned evaporator, and means for controlling said solenoid to control
 35 said shut off valve in accordance with the temperature produced by said last mentioned evaporator and for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second named
 40 control means being independent of said first named control means.

4. In a refrigerating system having a plurality of refrigerant evaporators, one of said evaporators having a relatively large capacity and another of said evaporators having a relatively
 45 small capacity, each of said evaporators having a refrigerant inlet and outlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, means including an automatic expansion valve located at the inlet of said evaporator of relatively large capacity for throttling the flow of refrigerant
 55 therethrough, control means responsive to the refrigerant pressure prevailing at the outlet of said evaporator of relatively large capacity and including a two-temperature stop valve located at the outlet of said evaporator of relatively large capacity for maintaining the temperature thereof within a predetermined range of temperatures, means including a second automatic expansion valve located at the inlet of said evaporator of relatively small capacity for throttling the flow of refrigerant therethrough, means including a solenoid operated shut off valve for shutting off the flow of refrigerant through said evaporator of relatively small capacity, and
 60 means for controlling said solenoid to control said shut off valve in accordance with the temperature produced by the last mentioned evaporator and for maintaining the temperature thereof within said predetermined range of tem-
 65 peratures, said second named control means be-

ing independent of said first named control means.

5. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying
 5 liquid refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a valve at the outlet of said one of said evaporators for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means includ-
 10 ing an expansion valve located at the inlet of another of said evaporators for throttling the flow of refrigerant therethrough, and a second control means shutting off the flow of refrigerant through said last mentioned evaporator and dependent upon the temperature produced by said last mentioned evaporator for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second control means being independent of said
 15 first named control means.

6. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying
 20 refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a valve at the outlet of said one of said evaporators for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means including an expansion valve located at the inlet of another
 25 of said evaporators for throttling the flow of refrigerant therethrough, means including a solenoid operated shut off valve for shutting off the flow of refrigerant through said last mentioned evaporator, and means for controlling said solenoid to control said shut off valve in accordance with the temperature produced by said last mentioned evaporator and for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second named
 30 control means being independent of said first named control means.

7. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet and a refrigerant inlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, exhaust and supply conduits connecting the outlets and inlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a valve at the outlet of said one of said evaporators for maintaining the temperature thereof within
 35 a predetermined range of relatively high temperatures, means including an expansion valve located at the inlet of another of said evaporators for throttling the flow of refrigerant therethrough, means including a solenoid operated shut off valve located in the supply conduit of said last mentioned evaporator for shutting off the flow of liquid refrigerant therethrough, and means for controlling said solenoid to control said shut off valve in accordance with the tem-
 40 peratures, said second named control means be-

perature produced by said last mentioned evaporator and for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second named control means being independent of said first named control means.

8. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying liquid to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a two-temperature stop valve located at the outlet of said one of said evaporators for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means including an expansion valve located at the inlet of another of said evaporators for throttling the flow of refrigerant therethrough, and a second control means shutting off the flow of refrigerant through said last mentioned evaporator and dependent upon the temperature of said last mentioned evaporator for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second control means being independent of said first named control means.

9. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet, means including a compressor for supplying liquid refrigerant to said evaporators, a common suction conduit connecting the outlets of said evaporators to said compressor in parallel relationship, means responsive to the pressure in said common suction conduit for starting said compressor at a predetermined maximum pressure and for stopping said compressor at a predetermined minimum pressure, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a valve at the outlet of said one of said evaporators for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means including an expansion valve located at the inlet of another of said evaporators for throttling the flow of refrigerant therethrough, and a second control means shutting off the flow of refrigerant through said last mentioned evaporator and dependent upon the temperature of said last mentioned evaporator for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second control means being independent of said first named control means.

10. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a valve at the outlet of said one of said evaporators for maintaining the temperature thereof alternately above and below 32° F., means including an expansion valve located at the inlet of another of said evaporators for throttling the flow of refrigerant therethrough, and a second control means shutting off the flow of refrigerant through said last mentioned evaporator and de-

pendent upon the temperature of said last mentioned evaporator for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second control means being independent of said first named control means.

11. A refrigerating system having a plurality of refrigerant evaporators, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of one of said evaporators and including a two-temperature stop valve at the outlet of said one of said evaporators for maintaining the temperature thereof alternately above and below 32° F., means including an expansion valve located at the inlet of another of said evaporators for throttling the flow of refrigerant therethrough, and a second control means shutting off the flow of refrigerant through said last mentioned evaporator and dependent upon the temperature of said last mentioned evaporator for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second control means being independent of said first named control means.

12. A refrigerating system having a plurality of refrigerant evaporators, one of said evaporators having a relatively large capacity and another of said evaporators having a relatively small capacity, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of said evaporator of relatively large capacity and including a valve at the outlet of said evaporator of relatively large capacity for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means including an expansion valve located at the inlet of said evaporator of relatively small capacity for throttling the flow of refrigerant therethrough, and a second control means shutting off the flow of refrigerant through said evaporator of relatively small capacity and dependent upon the temperature produced by said last mentioned evaporator for maintaining the temperature thereof within a predetermined range of relatively low temperatures, said second control means being independent of said first named control means.

13. A refrigerating system having a plurality of refrigerant evaporators, one of said evaporators having a relatively large capacity and another of said evaporators having a relatively small capacity, each of said evaporators having a refrigerant outlet, means including a refrigerant liquefying unit for supplying liquid refrigerant to said evaporators, conduits connecting the outlets of said evaporators to said liquefying unit in parallel relationship, control means responsive to the refrigerant pressure prevailing at the outlet of said evaporator of relatively large capacity and including a two-temperature stop valve located at the outlet of said evaporator of relatively large capacity for maintaining the temperature thereof within a predetermined range of relatively high temperatures, means including an expansion valve located at the inlet of said evap-

orator of relatively small capacity for throttling the flow of refrigerant therethrough, and a second control means shutting off the flow of refrigerant through said evaporator of relatively small capacity and dependent upon the temperature of said last mentioned evaporator for main-

taining the temperature thereof within a predetermined range of relatively low temperatures, said second control means being independent of said first named control means.

HAROLD F. BRIGGEMAN.
ROGER A. FULLER.