

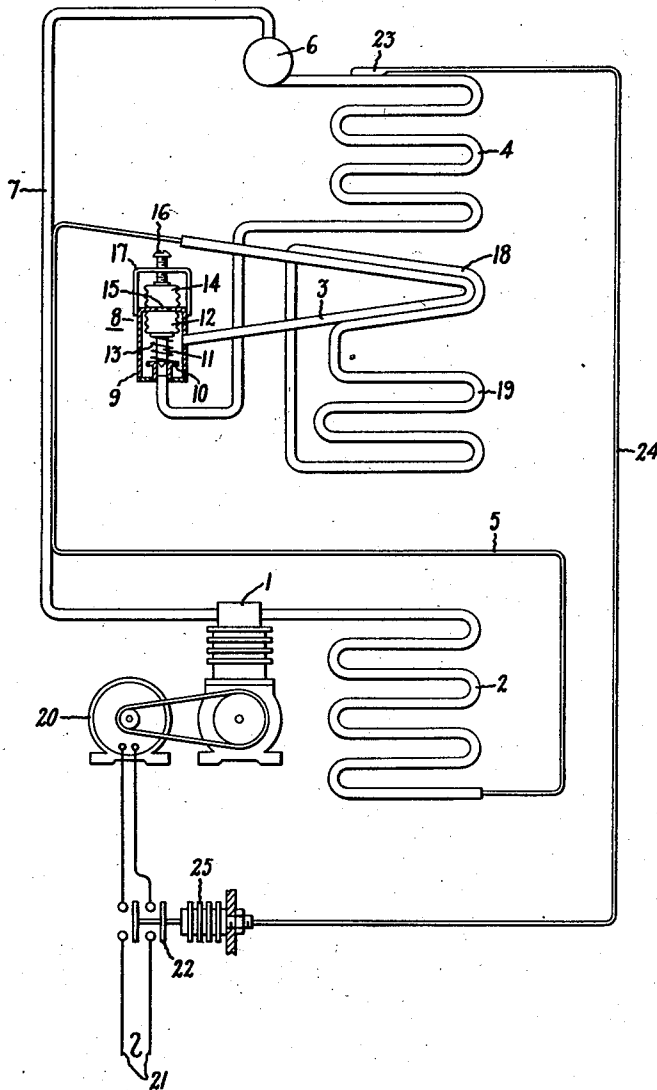
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TWO-TEMPERATURE REFRIGERATING SYSTEM

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TWO-TEMPERATURE REFRIGERATING SYSTEM

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3 Claims. (Cl. 62—115)

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My invention relates to refrigerating systems and particularly to systems including a plurality of evaporators for operation at different temperatures.

It is an object of my invention to provide an improved refrigerating apparatus including primary and secondary refrigerating systems wherein the primary system includes two evaporators having a flow-controlling device therebetween.

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

For a better understanding of my invention reference may be had to the accompanying drawing the single figure of which shows schematically a refrigerating system including an embodiment of my invention.

Referring to the drawing, the refrigerating apparatus includes a primary refrigerating system and a secondary refrigerating system. The primary refrigerating system includes a suitable compressor 1, a condenser 2, and two evaporators 3 and 4. Condensed refrigerant is supplied to the evaporator 3 through a restricted tube 5, sometimes referred to as a "capillary" tube. Vaporized refrigerant collects in a header 6 and is withdrawn by the compressor through a suction line 7. The capillary tube and the suction line are arranged in heat exchange relationship along a portion of their lengths in order to vaporize liquid refrigerant in the suction line and prevent its being drawn into the compressor and also in order to supply additional cooling for the liquid refrigerant passing through the capillary tube.

The evaporators 3 and 4 are arranged in series relationship in the primary refrigerating system. In order to maintain a constant pressure in the evaporator 3, a constant back pressure valve 8 is placed in the primary refrigerating system between the evaporator 3 and the evaporator 4. The valve 8 includes a housing 9 with which the evaporators 3 and 4 communicate. Within the housing 9 there is provided a valve seat 10 with which a valve member 11 is arranged to cooperate to control the flow of refrigerant from evaporator 3 to evaporator 4. A bellows 12 is mounted within the housing and is secured to the valve member 11 in order to control the movement of this valve member. A spring 13 surrounds the valve 11 and is arranged between the valve seat 10 and the bellows 12 to bias the valve upwardly

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toward its open position. The bellows 12 is placed in communication with a second bellows 14, which is fixed to the outside of the housing 9, through an opening 15 in the housing. In order to provide for adjustment of the pressure to be maintained by the valve an adjusting screw 16 is threaded into a bracket 17 secured to the outside of the housing 9 and bears against the bellows 14. Since the bellows 12 and the bellows 14 are in communication through the opening 15, adjustment of the screw 16 affects the pressure exerted by the bellows 12, and accordingly varies the pressure at which the valve opens. The two bellows are charged with any suitable fluid, such as nitrogen.

The secondary refrigerating system includes a secondary condenser 18 and a secondary evaporator 19, which are connected in a closed refrigerating system. In order to extract heat from the refrigerant in the secondary system, the secondary condenser is arranged in heat exchange relationship with the primary evaporator 3. The secondary evaporator may be used, for example, to cool the food storage compartment of a two-temperature refrigerator. It is often desirable to operate the evaporator used for this purpose on a defrosting cycle, that is, the temperature is arranged to rise sufficiently above 32° F. during the off-period of the apparatus to cause a melting of any frost which may have accumulated during the on-period of the apparatus. In order to facilitate the operation of the secondary system on a defrosting cycle, the primary evaporator 3 is made of a small thermal mass. Hence any refrigerating capacity stored in the primary evaporator 3 during the operating period of the refrigerating apparatus will be dissipated rapidly during the off-period, and refrigeration by the secondary refrigerating system will terminate a very short time after the compressor 1 is shut down. This permits the temperature of the secondary evaporator 19 to rise above 32° F. soon after the compressor 1 is shut down and insures that any frost which has accumulated on the secondary evaporator 19 will be removed before the next operating period of the refrigerating apparatus.

In order to further facilitate the operation of the secondary refrigerating system on a defrosting cycle, the primary evaporator 3 is arranged with a substantial slope so that liquid refrigerant contained therein when the compressor stops will drain rapidly from the primary evaporator 3 and will not be available for further refrigeration of the secondary system.

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The compressor 1 is driven by an electric motor 20 or any other suitable source of motive power, and power is supplied to the motor 20 through lines 21. In order to control the supply of power to the motor and hence the operation of the compressor a switch 22 is arranged in the line 21, and the operation of the switch is governed by a thermostatic bulb 23 which is located so as to be responsive to the temperature of the primary evaporator 4. The bulb 23 is connected by a suitable tube 24 to a bellows 25 for moving the switch to its open and closed positions.

Because of the interposition of the constant back pressure valve in the primary refrigerating system which maintains a constant predetermined pressure in the primary evaporator 3, the evaporator 3 may be operated at any desired temperature regardless of the temperature maintained in the evaporator 4. Evaporator 4 will operate at a lower temperature than the evaporator 3, and the evaporator 4 may therefore conveniently be used for refrigerating the low temperature or freezing zone of a two-temperature refrigerator. Because of the construction of the evaporator 3 and its arrangement in the system, evaporator 3 may be operated on a defrosting cycle.

While I have described a specific embodiment of my invention, I do not desire my invention to be limited to the specific construction shown and I intend by the appended claims to cover all modifications within the spirit and scope of my invention.

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

1. Refrigerating apparatus comprising a primary refrigerating system including two evaporators, means for supplying refrigerant to said evaporators in series, a valve connected in said

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system between said evaporators for maintaining a constant pressure in one of said evaporators, and a secondary refrigerating system including a secondary condenser and a secondary evaporator, said secondary condenser being arranged in heat exchange relationship with said one of said first-mentioned evaporators.

2. Refrigerating apparatus comprising a primary refrigerating system including two evaporators, means for supplying refrigerant to said evaporators in series, a valve connected in said system between said evaporators for maintaining a constant pressure in one of said evaporators, said one of said evaporators being sloped to provide rapid drainage of refrigerant from said one evaporator, and a secondary refrigerating system including a secondary condenser and a secondary evaporator, said secondary condenser being arranged in heat exchange relationship with said one of said first-mentioned evaporators.

3. Refrigerating apparatus comprising a primary refrigerating system including two evaporators, means for supplying refrigerant to said evaporators in series, a valve connected in said system between said evaporators for maintaining a constant pressure in one of said evaporators, and a secondary refrigerating system including a secondary condenser and a secondary evaporator, said secondary condenser being arranged in heat exchange relationship with said one of said first-mentioned evaporators, said one of said first-mentioned evaporators being of small thermal mass whereby refrigeration by said secondary system is terminated shortly after the supply of refrigerant to said first-mentioned evaporators is terminated.

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No references cited.