Dec. 20, 1932. F. D. PELTIER 1,891,357

REFRIGERATION

Filed Sept. 27, 1930

Fig. 1.

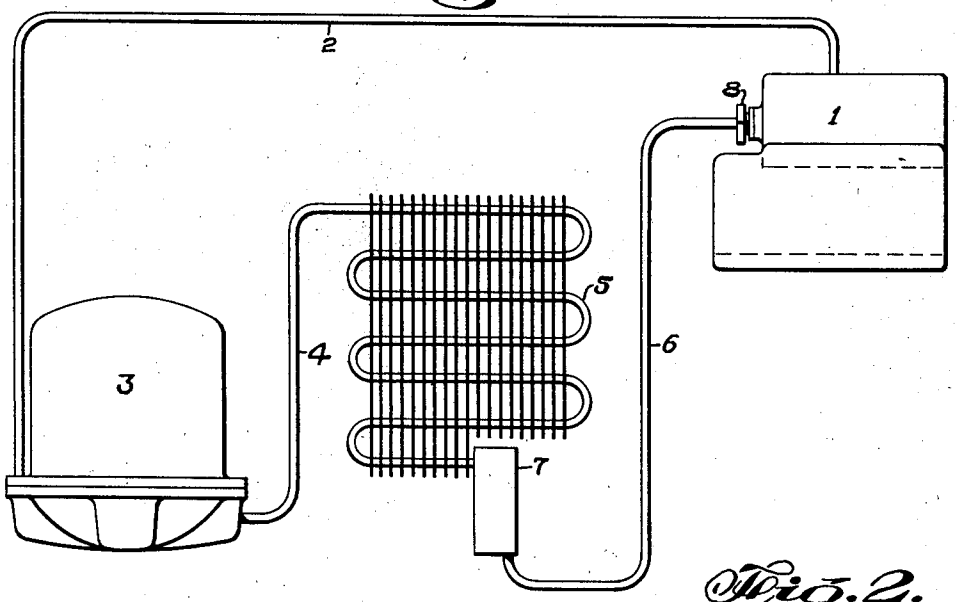


Fig. 2.

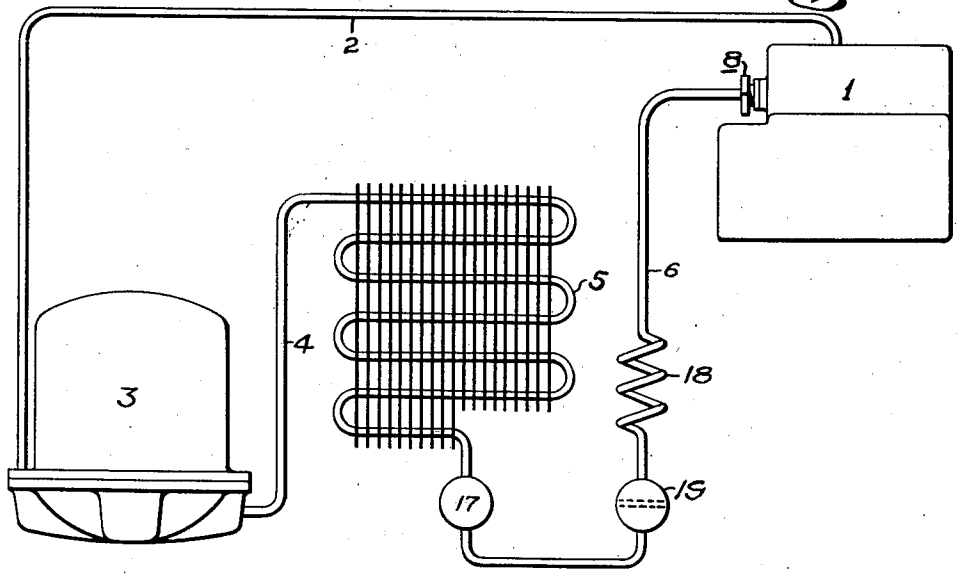
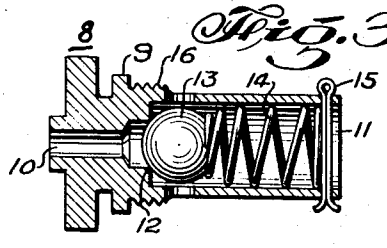


Fig. 3.



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UNITED STATES PATENT OFFICE

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REFRIGERATION

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This invention relates to refrigerating systems and more particularly to systems of the flooded evaporator type wherein the evaporator is located at an appreciable distance from the compressor unit. Such an installation is employed for example in refrigerators in which the evaporator is placed in a refrigerating compartment near the top of the refrigerator and the remaining mechanism is located as a unit in a chamber near the bottom of the refrigerator.

Also, in installations in which a unit in some remote location supplies one or more conveniently located refrigerating elements as, for instance, in apartment houses and stores, the refrigerating elements may be positioned at a considerable distance from the source of liquid refrigerant supply.

In such installations the conduit leading from the source of liquid refrigerant supply to a refrigerating element will contain liquid refrigerant at a pressure substantially the same as that in the evaporator, and therefore evaporation will take place in this conduit, causing a frosting of the exterior thereof and a reduction in the general efficiency of the system.

One object of this invention is to provide means for preventing the accumulation of frost on the exterior of the conduit leading to the evaporator. Another object is to limit the refrigerating effect of the system to the area in which the evaporator is located. More specifically the object of this invention includes means whereby the pressure of the liquid refrigerant in the supply line to the evaporator is maintained at a pressure sufficiently high to prevent evaporation of the refrigerant therein.

The invention will be more fully understood by reference to the following description taken in connection with the accompanying drawing, in which

Fig. 1 is a diagrammatic view illustrating one embodiment of the invention, liquid refrigerant supplied to the evaporator being controlled by a float valve responsive to the volume of refrigerant discharged from the condenser;

Fig. 2, a similar view with the supply of liquid refrigerant from the condenser to the evaporator controlled by a capillary tube; and

Fig. 3, a vertical section of one form of valve contemplated by the invention.

Referring particularly to the refrigerating system shown in Fig. 1, the refrigerant vapor drawn from the evaporator 1 through conduit 2 is compressed by a motor driven compressor unit 3 of any well known type and discharged through conduit 4 into the condenser 5 where the compressed gas is liquefied and then conducted through pipe 6 back to the evaporator. A control means 7 is provided to permit only liquid refrigerant to pass from the condenser into line 6. This control means is preferably the well known "high side" float valve through which liquid refrigerant is allowed to pass dependent upon the volume of liquid refrigerant supplied by the condenser.

If the evaporator 1 is at a considerable distance from the control valve 7 and the line 6 therefor of appreciable length, the liquid refrigerant passing through line 6, being at approximately the same pressure as the liquid within the evaporator, will vaporize and cause a frosting on the outside of the pipe which causes a decrease in the efficiency of the system. To overcome this a valve 8 is placed in the line 6 preferably where this line enters the evaporator, which valve is adapted to open only when the fluid pressure in line 6 increases beyond a predetermined amount. This valve maintains the liquid in line 6 at such a pressure that evaporation will not take place. The valve 8 may be of any type which is normally closed and adapted to open under a predetermined pressure on the inlet side. A convenient form of such a valve is illustrated in Fig. 3 and consists of a casing 9 having therein a passage 10 which extends partly through the casing lengthwise thereof and then forms an enlarged passageway 11 which communicates with the interior of the evaporator. Where the passage 10 joins passage 11 there is a valve seat 12. A valve member 13 shown as a sphere is urged toward its seat by a spring 14 which is held in place by some means as for example pin 15. The valve casing 9 is threaded at 16 so that it may

be conveniently threaded into the inlet opening of the evaporator. The refrigerant supply line 6 may be brazed or otherwise connected to the casing 9 so as to communicate with passage 10.

Normally spring 14 holds the valve member 13 against seat 12 so that no fluid may enter the evaporator from supply line 6. When the compressor is operated the pressure of the fluid in line 6 will increase until it is sufficient to overcome the force of spring 14, whereupon refrigerant will flow into the evaporator until the pressure in line 6 has again dropped to such a value that the spring 14 will seat the valve member 13.

In Fig. 2, there is shown a modification of the system just described in which in place of the "high side" float valve there is substituted a receiver 17 and a capillary tube 18. A strainer is shown at 19 for preventing any solid material from entering the capillary tube. In this modification also, the valve 8 just described is provided to maintain a sufficient pressure in line 6 to prevent refrigeration taking place therein.

It will be obvious to those skilled in the art that various other changes may be made in the construction and arrangement without departing from the spirit of my invention and therefore the invention is not limited to what is shown in the drawing and described in the specification but only as indicated in the appended claims.

I claim:

1. In a refrigerating system including a compressor unit, condenser, an evaporator, a conduit between said condenser and said evaporator, a capillary tube in said conduit for controlling the volume of liquid refrigerant supplied to said conduit from the condenser, a loaded valve in said conduit operable responsive to the fluid pressure of the liquid refrigerant admitted by the capillary tube into said conduit.

2. In a refrigerating system of the compressor-condenser-evaporator type, the combination of a refrigerating element, a conduit for supplying liquid refrigerant to said element, means for supplying liquid refrigerant to said conduit, a capillary tube between said means and said conduit, a loaded valve between said conduit and said refrigerating element adapted to open when the pressure of the liquid refrigerant in said conduit exceeds a predetermined value.

3. In a refrigerating system of the compressor-condenser-evaporator type, the combination of a refrigerating element, a conduit for supplying liquid refrigerant to said element, means for supplying liquid refrigerant to said conduit, refrigerant flow control means between said means and said conduit, a loaded valve between said conduit and said refrigerating element adapted to open when the pressure of the liquid refrigerant in said conduit exceeds a predetermined value.

4. In a refrigerating system of the compressor-condenser-evaporator type, the combination of a refrigerating element, a conduit for supplying liquid refrigerant to said element, means for supplying liquid refrigerant to said conduit, means for permitting liquid only to flow between said means and said conduit, a loaded valve between said conduit and said refrigerating element adapted to open when the pressure of the liquid refrigerant in said conduit exceeds a predetermined value.

In testimony whereof I affix my signature.

FRANK D. PELTIER.