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REFRIGERATING APPARATUS

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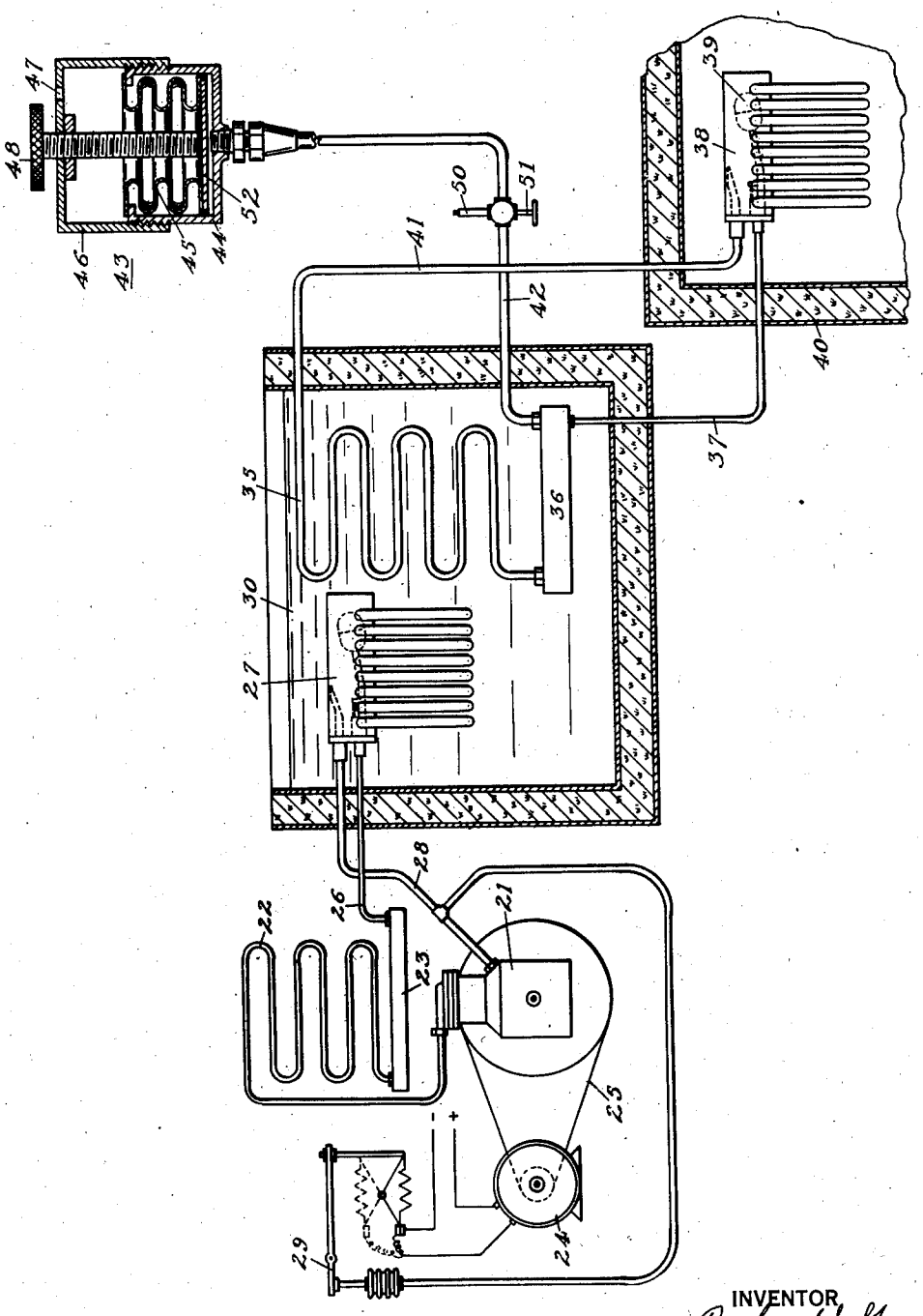

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REFRIGERATING APPARATUS

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This invention relates to refrigerating apparatus and more particularly to a means for controlling the temperature of an evaporator.

In refrigerator cabinets for storing foods, particularly meats and vegetables, it is desirable that the evaporator or cooling unit to be used in cooling such a refrigerator cabinet should be maintained at a predetermined temperature. The desired temperature however, varies to some extent with different foods.

One of the objects of the present invention is to provide means for varying the volume of a closed refrigerating system in order to maintain at will a predetermined temperature condition of the evaporator of the system or to change at will the temperature of the evaporator.

My present invention is particularly directed to refrigerating apparatus of the type having a primary refrigerating system and a secondary refrigerating system, the secondary system including a condenser cooled by the primary refrigerating system and an evaporator. And, a further object of the present invention is to provide for varying the pressure, at will, at which the refrigerant vaporizes in the evaporator of the secondary system while maintaining the condensing temperature of the refrigerant of such system substantially constant.

A still further object of the invention is to provide an improved refrigerating apparatus having a primary refrigerating circuit and a secondary refrigerating circuit, the secondary refrigerating circuit having a chamber connected thereto and means for changing the volume of the chamber.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawing:

The figure is a diagrammatic illustration of my invention.

Referring to the drawing there is shown diagrammatically for illustrative purposes a primary refrigerating system of the compressor-condenser-expander type including a compressor 21 for compressing the refrigerant, preferably sulphur dioxide, and for forwarding it to the condenser 22 where it is liquefied and collected in the receiver 23. A supply conduit 26 conducts the liquid refrigerant from the receiver 23 to the evaporator or refrigerating element 27 which is positioned within a brine tank 30 for cooling the brine. The liquid refrigerant within the refrigerating element or evaporator 27 vaporizes because of the absorption of heat from the brine in the brine tank 30 and is returned to the compressor through the return conduit 28. The actuating mechanism for the compressor preferably comprises a motor 24 connected to the compressor by pulley and belt means 25. A pressure responsive control mechanism 29 is preferably connected to the return conduit 28 for controlling the motor 24 to provide alternate operating and idle periods of the compressor to control the pressure and consequently the temperature of the evaporator 27.

The secondary refrigerating system, which contains a refrigerant such as sulphur dioxide and an inert gas such as air, includes a condenser 35 which condenses the refrigerant and discharges the condensed refrigerant into a receiver 36 both of which are surrounded by brine within the brine tank 30. The liquid refrigerant which collects in the receiver 36, is conducted by a supply conduit 37 to an evaporator 38 preferably of the flooded type in which a certain level is maintained by a float 39 which controls the supply of liquid refrigerant. This evaporator 38 is positioned within a refrigerator cabinet 40. The liquid refrigerant within the evaporator 38 vaporizes because of the absorption of heat and is conducted back to the condenser 35 in vapor form by a return conduit 41. According to the present invention, the top of the receiver 36 is connected by a conduit 42 to the bottom of a flexible closed chamber 43 for changing the volume of the secondary system. The closed chamber 43 includes a cup shaped member 44 having a bellows 45 therein, the upper portion of which seals the top of the cup-shaped member 44. The bellows 45 is

sealed at the bottom by a closure plate 52. A cap member 46 having a vent 47 screws onto the cup-shaped member and encloses the bellows 45. A thumb screw 48 is threaded through the cap member 46 and has its inner end fitting against the closure plate 52 at movable end of the bellows 45 to change the volume within the chamber formed by the bellows 45 and the cup-shaped member 44 and thus to force into or withdraw inert gas from the receiver and thereby change the pressure of the inert gas and also the total pressure in the secondary system. A connecting fitting 50 controlled by a valve 51 is connected into the conduit 42 for introducing the inert gas into the system. If desired, a plurality of secondary systems may have their condensers positioned within the brine tank or in contact with the cooling portion of a single primary system.

By introducing inert gas in addition to the refrigerant in the closed circuit of the secondary system, which circuit includes the condenser 35, the receiver 36, the conduit 37, the evaporator 38 and the conduit 41, the boiling point of the liquid refrigerant within the evaporator 38 may be controlled by varying the pressure of the inert gas within the system, since the evaporated refrigerant and the inert gas are not homogeneously mixed. The evaporator is purged of the inert gas by the evaporated refrigerant which vaporizes within the evaporator and carries the inert gas along with it into the condenser where the evaporated refrigerant is liquefied and is thus separated from the inert gas. The inert gas thus becomes confined to the condenser and receiver. The presence of this inert gas in the condenser raises the condensing pressure thereby increasing the total pressure within the system and because of this the boiling point of the refrigerant within the evaporator is increased. By varying the pressure of the inert gas within the closed circuit the boiling point of the refrigerant within the evaporator may be varied.

The system includes two means for the varying of the pressure. An inert gas is preferably introduced into the closed circuit through the connecting fitting 50 to secure a rough or comparatively large adjustment of the pressure of the inert gas and consequently the boiling point of the refrigerant in the evaporator 38, while the final adjustment and normal smaller adjustments may be made from time to time by means of the thumb screw which expands and contracts the bellows 45 to vary the volume and consequently the pressure of the secondary system. By varying the boiling point of the refrigerant within the evaporator the temperature of the evaporator can be controlled. With my invention it is possible to cool a plurality of compartments at different temperatures with a single primary system and a plurality of secondary systems.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A refrigerating system including a closed circuit including a portion in contact with a cold medium and an evaporator, said system containing a refrigerant and an inert gas, and means for varying the volume of the system at will.

2. A refrigerating system including a closed circuit including a portion in contact with a cold medium and an evaporator, said system containing a predetermined amount of refrigerant and a predetermined amount of an inert gas and means for varying the pressure within the system.

3. Refrigerating apparatus including a closed circuit including a portion in contact with a cold medium and an evaporator, said circuit containing a refrigerant, a chamber connecting with the closed circuit and means for changing the volume of said chamber.

4. Refrigerating apparatus including a closed circuit including a portion in contact with a cold medium and an evaporator, said circuit containing a refrigerant and an inert gas, and selective means for providing definite and constant refrigerating temperatures within the evaporator.

5. Refrigerating apparatus including a closed circuit including a portion in contact with a cold medium and an evaporator, said circuit containing a refrigerant and an inert gas, and a flexible bellows connected to the circuit for varying the pressure within the circuit.

6. Refrigerating apparatus including a refrigerator cabinet, a closed circuit including a portion in contact with a cold medium and an evaporator positioned within the refrigerator cabinet, said circuit containing a refrigerant and an inert gas, said evaporator containing a float for controlling the supply of liquid refrigerant to the evaporator, and means for maintaining a selected temperature within the evaporator.

7. Refrigerating apparatus including a refrigerator cabinet, a closed circuit containing a refrigerant and an inert gas said circuit including a portion in contact with a cold medium for liquefying the refrigerant, a receiver for receiving the liquefied refrigerant, and an evaporator positioned within the cabinet for evaporating the liquefied refrigerant to cool the cabinet, and means connected to the receiver for varying the evaporating temperature within the evaporator.

8. Refrigerating apparatus including a refrigerator cabinet, a closed circuit containing a refrigerant and an inert gas, said

circuit including a portion in contact with a cold medium for liquefying the refrigerant, a receiver for receiving the liquefied refrigerant and an evaporator positioned within the cabinet for evaporating the liquefied refrigerant to cool the cabinet and a flexible closed chamber connected to the receiver for varying the pressure within the circuit.

In testimony whereof I hereto affix my signature.

RICHARD S. GAUGLER.