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H. R. VAN DEVENTER

1,886,607

REFRIGERATING SYSTEM

Filed March 14, 1927

Fig. 1

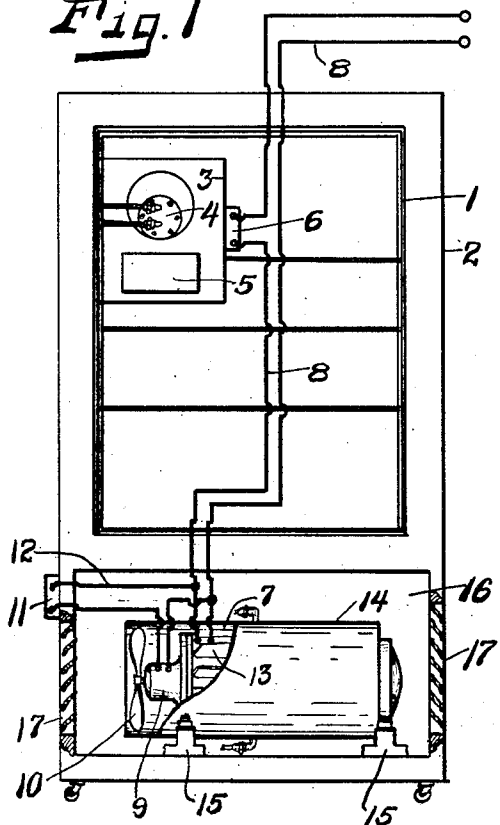


Fig. 2

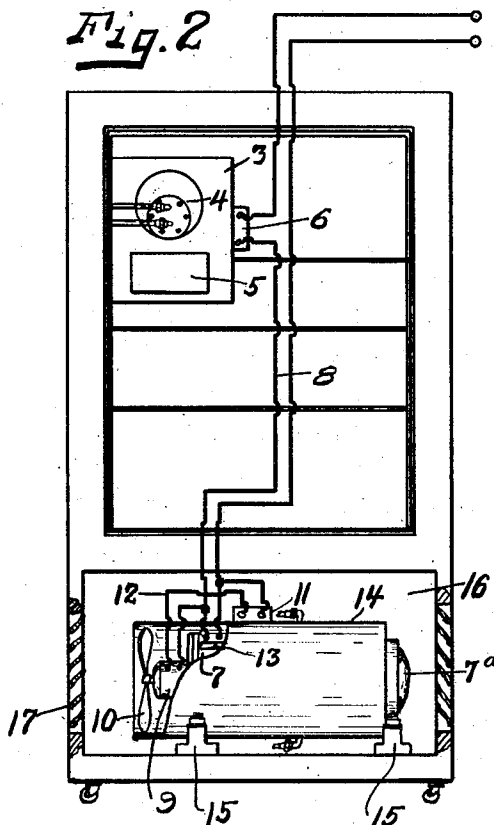


Fig. 3

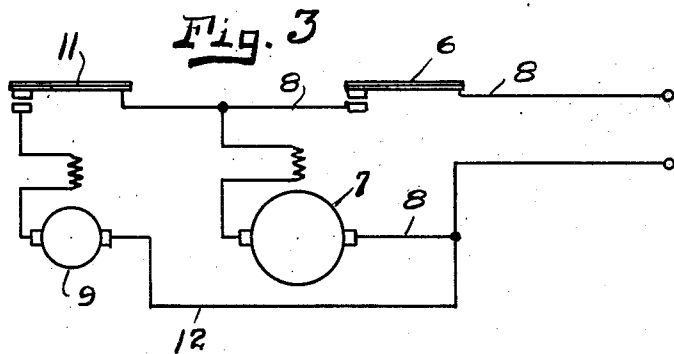
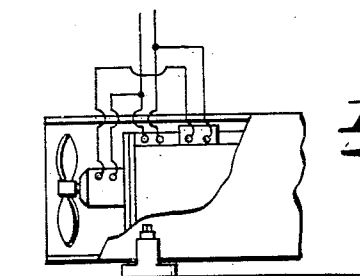


Fig. 4.



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REFRIGERATING SYSTEM

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This invention relates to refrigerating systems and more particularly to a mechanical refrigerator.

Heretofore in the operation of compressors in mechanical refrigerating systems, the heat developed by compression of a fluid plus the heat developed by the mechanism was imparted to the fluid and carried by it as sensible heat into the cooling system, which includes the usual condenser connected between the compressor and an evaporator or cooling unit. This resulted in lowered efficiency of the system by decreasing the temperature differential. In the following specification and claims where "compression unit" is referred to I intend to include a compressor and electric motor for operating the same.

An object of this invention is the maintenance of a refrigerator compressor unit in a cool condition at all times under varying conditions of temperature.

A further object of the invention is the provision of thermostatically controlled cooling means for mechanical refrigerating compressor units.

Yet another object of my invention is the provision of thermostatic control for auxiliary cooling means for compressor units of mechanical refrigerating systems that may be operated by the temperature of the air or of the compressor unit itself.

A still further object of my invention is to provide a compressor unit wherein the cooling thereof may be governed either by the room temperature or by the temperature of the refrigerator chamber being cooled.

A still further object of my invention is the securing of optimum efficiency by maintaining the maximum temperature differential in the refrigerant of mechanical refrigerating systems.

I accomplish these and other desirable results by providing cooling means for the compressor unit which is operably associated

therewith only when its temperature exceeds certain predetermined limits.

To make my invention more easily understood, I have shown in the accompanying drawing a preferred embodiment. In these the same numerals refer to similar parts throughout the several views of which,

Fig. 1 represents an elevation of a refrigerator having a thermostatically controlled compressor unit cooling means;

Fig. 2 represents a modification thereof;

Fig. 3 is a diagrammatic showing of the control circuits, and

Fig. 4 represents a modification of part of Fig. 2.

Referring to the drawing, there is shown a refrigerator having an interior shell 1 forming a food compartment, and a spaced exterior shell 2. Positioned in the upper part of shell or food compartment 1 and to one side thereof is a cooling unit or evaporator 3 comprising a freezing chamber 4 and ice tray 5. Automatic control means for maintaining the cooling action within the food compartment substantially constant may be provided. Thus, operatively associated with cooling unit 3, is a thermostat 6, which is electrically connected to the compressor unit 7, through a suitable circuit 8. I provide a motor and compressor unit enclosed in hermetic seal to each other, such as described in my copending application, Ser. No. 141,213, filed Oct. 12, 1926. Auxiliary cooling means for the compressor unit 7 or for removing the heat of compression, comprises the induction motor 9 and fan 10. Motor 9 is attached to compressor unit 7 in any desired manner, but I prefer to have it integral therewith for purposes to appear more fully hereinafter. Automatic control means independent of the temperature conditions of above described automatic control means may be provided for the motor 9. Thus, motor 9 is controlled by a thermostat

11 outside the food compartment in electrical connection with compressor circuit 8, through line 12.

Compressor unit 7, the compressor end of which is designated by 7a is provided with heat radiating metal fins 13 so adapted and arranged as to provide longitudinal channels for the passage of a cooling fluid, such as air, between it and a surrounding open-ended tubular casing or air tunnel 14, which also encloses motor 9 and fan 10.

While I have shown the passage of a cooling fluid through longitudinal channels, it will be obvious that I can use a spiral or helical arrangement of the radiating metal fins 13, so as to secure a more tortuous or winding path for the cooling fluid with a concomitant increase in efficiency of heat removal.

It has not been deemed necessary to show or describe a condenser and its connections between the compressor unit M and evaporator 3, as such connections are the usual and ordinary ones well understood in this art.

Casing 14 is resiliently mounted on supports 15 through suitable shock absorbers, not shown, and is positioned in chamber 16, which is provided with suitable gratings 17, permitting free flow of air therethrough.

The operation of the device is as follows: The compressor unit 7 is set in motion by the action of thermostat 6 when the temperature in the cooling unit 3 or the refrigerator chamber in which unit 3 is mounted, falls below a predetermined temperature.

During the operation of the compressor unit, heat is generated both by the compression of the fluid and the running of the motor. This heat is imparted to the fluid, and transferred by it ultimately to the expanding or cooling chamber, thereby diminishing the effective heat absorbing capacity of the expanding fluid.

To overcome this disadvantage, I provide an auxiliary cooling means for the compressor unit, which comprises essentially, a motor driven fan designed to draw a current of cooling fluid such as air, over the surface of the unit between heat radiating metal fins and a tubular casing or air tunnel surrounding the entire structure. This casing is so arranged with respect to the heat-radiating fins as to provide a series of longitudinal channels or air passages therethrough.

Thermostat 11 is in series with the fan motor only and may be located on the outside of the box, as shown. In this position it is controlled by the room temperature, the object being that when the room temperature rises to some predetermined point, say 85° F., the thermostat then cuts the fan motor in circuit and the fan operates until the room temperature falls below the aforesaid predetermined point, whereupon the thermostat will open the fan circuit and thereby save

considerable current consumption due to the fan.

This arrangement is particularly suited for use in torrid climates or torrid conditions in temperate climates such as "heat-waves" which are prevalent in summer months.

It is obvious that thermostat 11 can be regulated from any other suitable point. For instance it can be placed on the compressor-fan unit casing as shown in Fig. 2 of the drawing or inside of it on the compressor unit as shown in Fig. 4, so that the cooling is operable when the compressor attains a certain predetermined temperature irrespective of the temperature conditions obtaining in the room.

It will now be appreciated that I have provided an apparatus which maintains the compressor unit of a mechanical refrigerating system in a cool condition, thereby preventing the transmission of heat generated in the compression unit. This insures the optimum efficiency of the refrigerant by maintaining its maximum thermal differential.

While I have herein shown and described a preferred embodiment of my invention, it is to be understood that this is merely for purposes of exemplification, for since the underlying features may be embodied in other specific mechanical structures, I do not intend to be limited to the ones shown, except as such limitations are clearly imposed by the appended claims.

I claim as my invention:—

1. In an automatic refrigerating apparatus, in combination, a motor, a thermostat for controlling said motor, a compressor, auxiliary cooling means for said motor and compressor comprising a motor driven fan, a tubular casing housing said motor, compressor and auxiliary cooling means, and a second thermostat for controlling said auxiliary cooling means.

2. In an automatic refrigerating apparatus, in combination, a motor, a thermostat for controlling said motor, a compressor, auxiliary cooling means for removing heat of compression comprising a motor driven fan, a tubular casing housing said motor, compressor and auxiliary cooling means, and a second thermostat for controlling said auxiliary cooling means, said thermostats being provided with and operating electric switches for controlling the operation of said motor and motor driven fan, one of said switches controlling the operation of both the motor and motor driven fan, and the other switch controlling only one of them.

3. An apparatus of the character described comprising a refrigerator having a compartment to be cooled, a cooling unit therefor, a compressor, a motor for driving said compressor, automatic control means for controlling the operation of said motor to main-

tain the cooling action of said cooling unit constant, a cooling means for removing heat of compression, said cooling means including a fan and motor for said fan independent of said first named motor, and automatic control means for said second named motor responsive to temperature conditions independent of temperature conditions which control said first named automatic control means.

4. An apparatus of the character described comprising a refrigerator having a compartment to be cooled, a cooling unit therefor, a compressor, a motor for driving said compressor, automatic control means for controlling the operation of said motor to maintain the cooling action of said cooling unit constant, a cooling means for removing heat of compression, said cooling means including a fan and motor for said fan independent of said first named motor, and automatic control means for said second named motor responsive to temperature conditions outside of said compartment.

5. An apparatus of the character described comprising a refrigerator having a compartment to be cooled, a cooling unit therefor, a compressor, a motor for driving said compressor, automatic control means for controlling the operation of said motor to maintain the cooling action of said cooling unit constant, a cooling means for removing heat of compression, said cooling means including a fan and motor for said fan independent of said first named motor, and automatic control means for said second named motor responsive to temperature conditions of said compressor.

6. An apparatus of the character described comprising a refrigerator having a compartment to be cooled, a cooling unit therefor, a compressor, a motor for driving said compressor, automatic control means for controlling the operation of said motor to maintain the cooling action of said cooling unit constant, a cooling means for removing heat of compression, said cooling means including a fan and motor for said fan independent of said first named motor, and automatic control means for said second named motor responsive to temperature conditions outside said refrigerator.

7. An apparatus of the character described comprising a refrigerator having a compartment to be cooled, a cooling unit therefor, a compressor, a motor for driving said compressor, automatic control means for controlling the operation of said motor to maintain the cooling action of said cooling unit constant, a cooling means for removing heat of compression, said cooling means including a fan, and automatic control means for said fans responsive to temperature conditions outside of said refrigerator.

8. An apparatus of the character described comprising a refrigerator having a compart-

ment to be cooled, a cooling unit therefor, a compressor, a motor for driving said compressor, automatic control means for controlling the operation of said motor to maintain the cooling action of said cooling unit constant, a cooling means for removing heat of compression, and automatic control means for said fan responsive to temperature conditions independent of temperature conditions which control said first automatic control means.

In testimony whereof I affix my signature.
HARRY R. VAN DEVENTER.

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