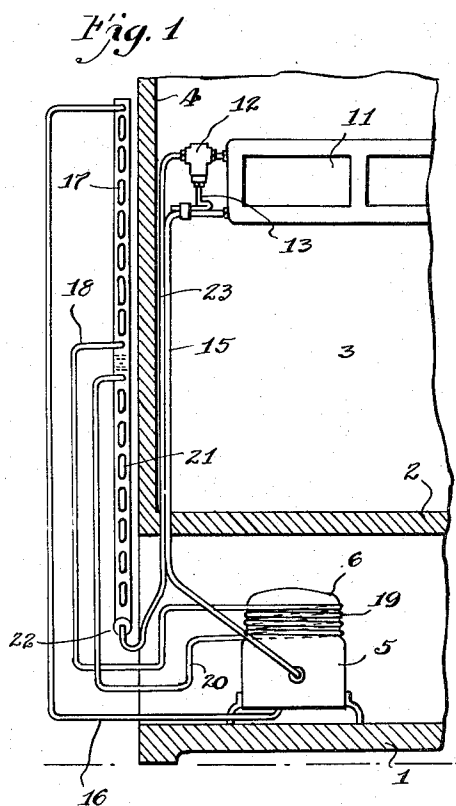
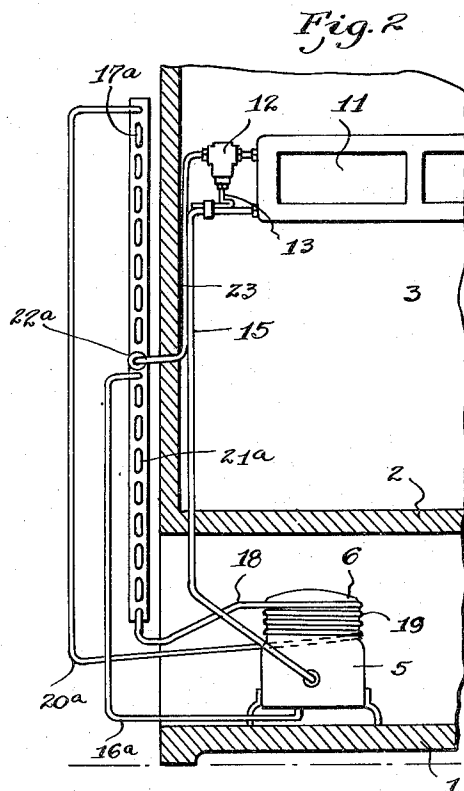
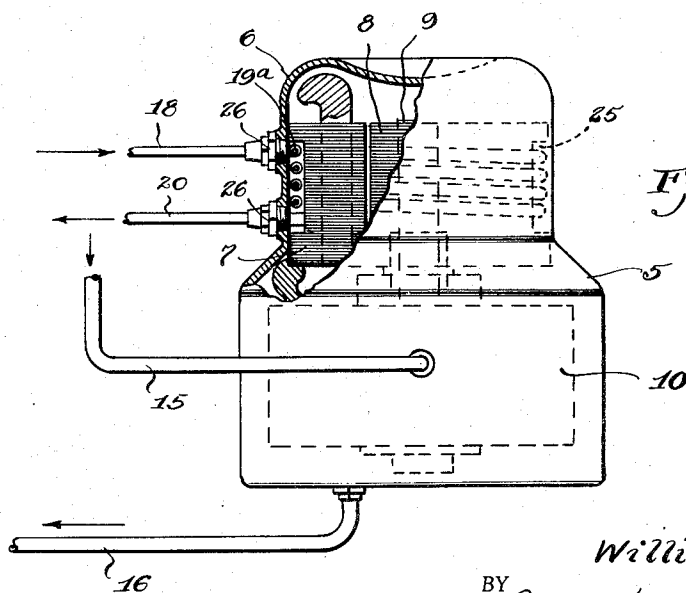


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REFRIGERATING SYSTEM
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REFRIGERATING SYSTEM

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2 Claims. (Cl. 62—115)

This invention relates to refrigerating mechanism, and it has to do particularly with a system wherein the refrigerant is used as a cooling agent for the source of power in the form of an electric motor.

The invention is directed particularly to a system which makes use of a so-called sealed compressor unit wherein the compressor mechanism and motor are housed in a sealed unit. A problem is presented in such a unit of cooling the stator of the motor, since, as it is completely housed, difficulties present themselves in dissipating the generated heat and in keeping the heat away from the compressor mechanism.

It has been proposed to put heat dissipating fins on the external part of the housing surrounding the stator, but where the housing is made of sheet metal the fins have to be applied in some manner, as for example, by welding, and this may distort the housing. Such a distortion, of course, is highly undesirable, particularly in a unit of this kind where the motor and compressor mechanism must be accurately lined up and which alignment is either wholly or partially dependent upon the housing. Moreover, the available surface is too small so that fins on the housing adjacent the stator do not have sufficient surface for adequate cooling unless some outside means such as means for blowing air over the fins is used, but this is undesirable.

By the present invention a more efficient cooling action is obtained than by the use of fins. The heat is transferred from the stator to the refrigerant and then dissipated by a part of the refrigerating mechanism, as for example, by a portion of a condenser. The cooling action, therefore, is obtained largely when the refrigerant is in motion, and this is at the time the electric motor is functioning and generating heat. In this way, the temperature curve of the stator of the motor is considerably leveled out. The refrigerant may be brought into heat exchange relation with the stator in different ways, and the condenser arrangement for the refrigerant may be varied, all within the scope of the invention, and some of these variations are illustrated in the accompanying drawing.

Fig. 1 is a somewhat diagrammatic view showing a portion of a refrigerator and illustrating a sealed compressor unit, condenser, and evaporator.

Fig. 2 is a similar view illustrating a modified form of condenser.

Fig. 3 is an enlarged view partly in section, illustrating a modified arrangement for asso-

ciating the refrigerant in heat exchange relation with the stator of the motor.

The diagrammatic illustration of the refrigerator includes a base 1, an insulated wall 2 which forms the bottom of a refrigerated compartment 3. The compressor unit may be located in this shape between the base 1 and wall 2. One vertical wall 4 of the refrigerator cabinet is illustrated.

The sealed motor-compressor unit is generally illustrated at 5. As illustrated in Fig. 3 the housing or shell has an upper portion 6 within which the electric motor is housed, the stator of which is illustrated at 7. The armature is illustrated at 8 and the motor shaft at 9. In this instance the motor shaft is vertical. Suitable compressor mechanism (not shown) is confined in the lower portion 10 of the housing. It is not necessary to go into detail as to the compressor mechanism, as quite a large number of compressors are known to those skilled in the art, it being sufficient to say that the compressor is operated by the shaft 9.

A suitable evaporator or low-side unit is illustrated at 11 inside the refrigerated compartment. In the form shown the refrigerant is admitted in this evaporator through the means of an expansion valve 12 which may be thermostatically operated by a feeler leg 13 associated with the outlet tube for the expanded refrigerant. It will be understood, however, that so far as the present invention is concerned, other types of evaporators and refrigerant flow controls thereto may be used.

In the form shown in Fig. 1 a tube for expanded refrigerant extends from the evaporator to the compressor unit for carrying the expanded gases to the compressor unit. This tube is shown at 15. The compressed refrigerant in the form of what may be termed "hot gas" leaves the compressor unit through the tube line 16, and this extends to the upper section 17 of a condenser. This condenser, as shown, is mounted in any suitable manner along side of and outside the wall 4. The refrigerant condenses in the section 17 and leaves the same at the bottom thereof through a tube line 18. This may be in the form of warm liquid, relatively speaking. The tube line 18 extends to the compressor unit and is wrapped around the upper portion of the housing in the form of a coil 19. The coil is preferably wrapped around a shell immediately covering or adjacent to the stator. Heat generated by the stator is transferred to the liquid refrigerant in the coil. This, of course, raises the tem-

perature of the refrigerant and it passes then through tube line 20 back to the portion 21 of the condenser. In this portion 21 the refrigerant is again and further cooled suitable for entrance into the evaporator through the expansion valve. At the bottom of the condenser unit 21 there may be a receiver tank 22 for receiving the condensed refrigerant and extending from this tank is a tube line 23 which leads to the expansion valve. The inlet line 23 and the suction line 15 may advantageously be disposed in heat exchange relation as illustrated. This causes a transfer of heat from the suction line to the refrigerant passing to the evaporator, thus minimizing frosting of the suction line, further cooling the liquid refrigerant, and improving the performance of the unit.

The condenser is generally, in effect, a radiator and may be formed in various ways. The one illustrated herein is formed by tubing fashioned into suitable runs of coils.

A modified form is illustrated in Fig. 2, but in this form the same reference characters are applied to the compressor unit, evaporator, and some of the tube lines. In this form the refrigerant first passes through the lower section of the condenser, is then passed in heat exchange relation to the stator and then passes through the upper section of the condenser.

Specifically, the compressed gas tube line 16a leads to the upper portion of the lower condenser section 21a. The condensed refrigerant then passes through the coil 19 and tube line 20a connects into the upper portion of the condenser section 17a. The receiver tank is shown at 22a, and the tube line 23 connects the receiver tank to the expansion valve.

The refrigerant may be passed inside the housing for the motor-compressor unit, and this is illustrated as a modified form in Fig. 3. The tube lines 15, 16, 18 and 20 bear the same reference characters. In this form, however, a coil 19a immediately surrounds the stator 7 inside the shell 6. The stator may be shaped to accommodate the coil, this shape, as illustrated, being in the form of a circumferential recess 25. Suitable sealed connections 26 connect the tube lines 16 and 20 to the coil 19a, these connections being in the form of couplings which have a sealed relation with the housing so that the housing re-

mains sealed. In this latter form the heat generated by the stator is transferred more directly to the refrigerant and it does not have to pass through the housing. This minimizes the flow of heat to the lower portion of the housing wherein the compressor mechanism is located. Furthermore, this form gives a better external appearance and locates the coils 19a in a more efficient position.

Thus the stator of the sealed motor is cooled by the refrigerant, and the cooling action is obtained during the running speeds, or in other words at the time the heat is being generated. In some installations it may be that the condenser will have to be enlarged somewhat to give it the requisite capacity for cooling both the hot compressed gases and the refrigerant which has cooled the stator. In this way the cooling element for the stator is really the condenser and it can be made with such capacity as is needed in any particular installation.

I claim:

1. In a refrigeration system, the combination of a housing having a sealed motor-compressor unit therein, an evaporator, a condenser having two sections, a conduit connecting the evaporator and motor-compressor unit, a conduit connecting the motor-compressor unit with one section of the condenser, a conduit connecting the other section of the condenser to the evaporator, and a coil connected in between the two sections of the condenser and disposed adjacent the housing in direct contact therewith and in close proximity to the stator of the motor for the passage of liquefied refrigerant therethrough to cool the stator.

2. In a refrigeration system, the combination of a motor-compressor unit, a housing in which the unit is sealed, a condenser, an evaporator, conduits connecting the motor-compressor unit, condenser and evaporator and forming a circuitous path for refrigerant, said conduit including parts extending through a wall of the housing and sealed thereto, and including a coil inside the housing disposed in heat exchange relation to the stator of the motor, said coil being in the circuitous path at such a point as to receive liquid refrigerant whereby liquid refrigerant is passed through the coil to cool said motor.

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