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COOLING MEANS FOR MOTOR COMPRESSOR UNITS

Filed Sept. 29, 1950

2 Sheets-Sheet 1

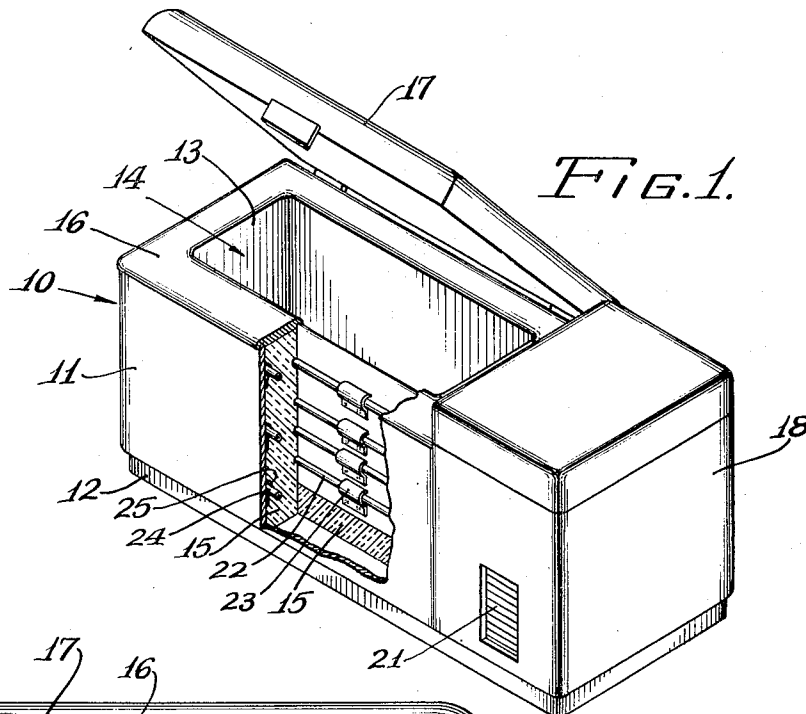


FIG. 1.

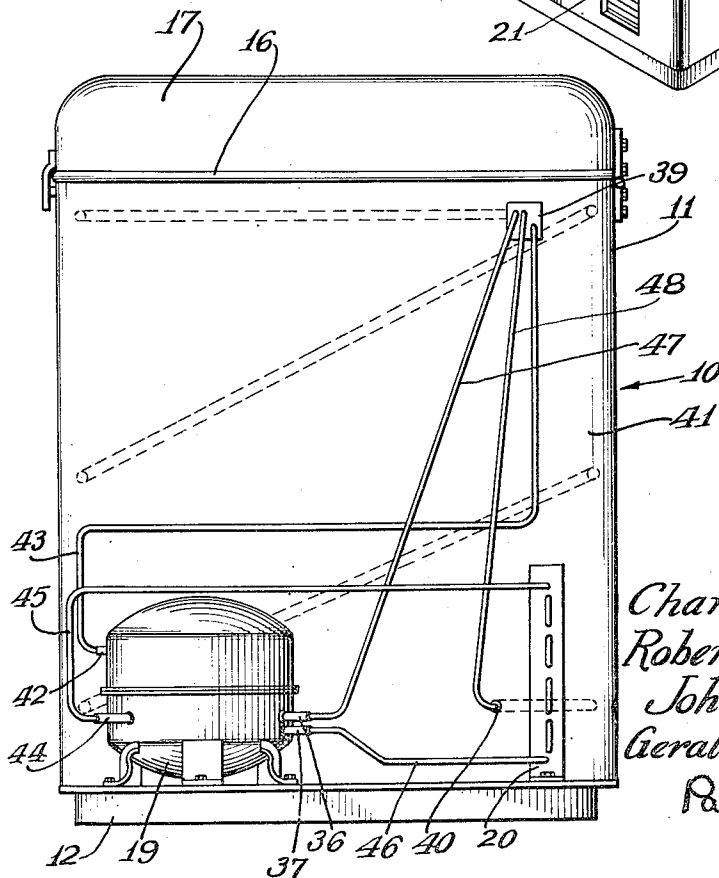


FIG. 2.

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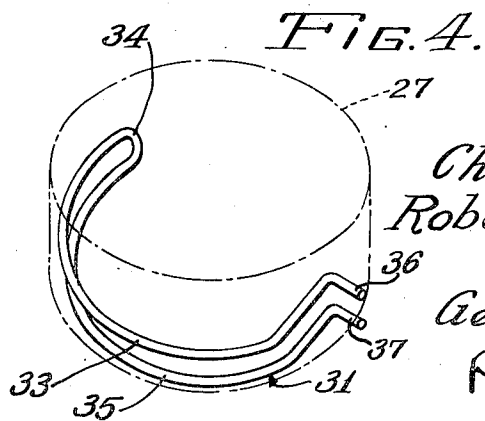
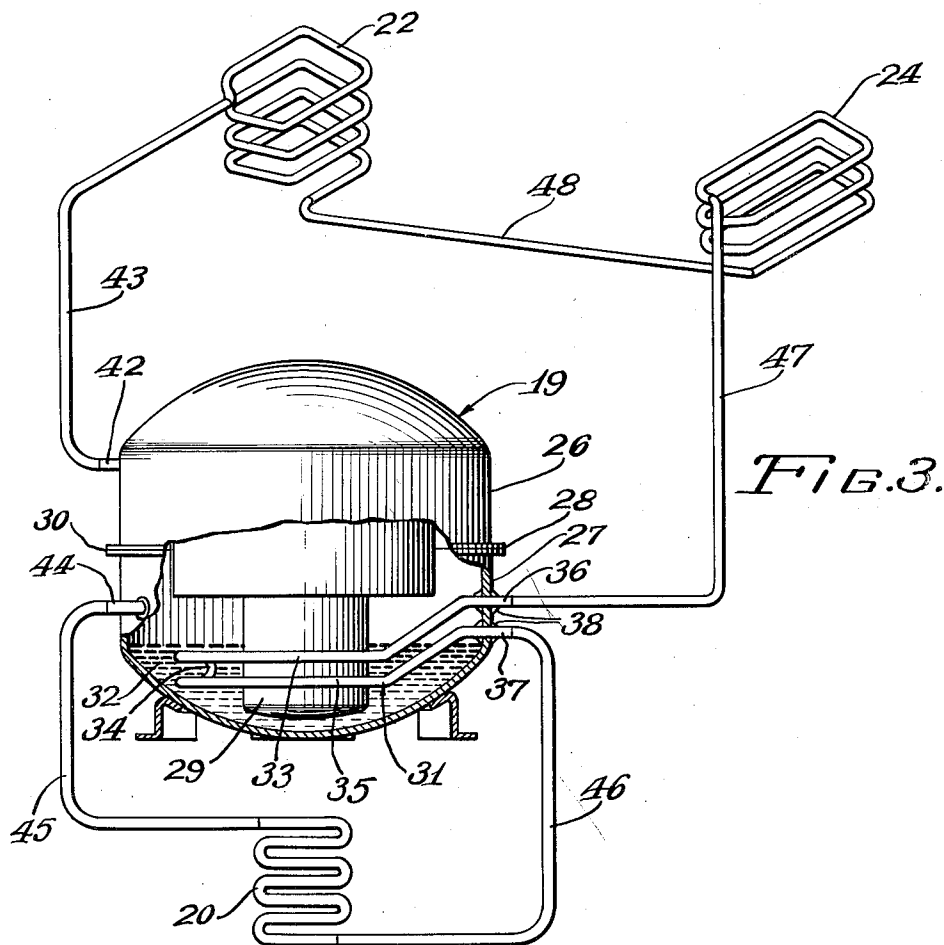
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COOLING MEANS FOR MOTOR COMPRESSOR
UNITS

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6 Claims. (Cl. 62—117.7)

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This invention relates generally to the art of refrigeration and more particularly to an improved refrigerant system and motor-compressor unit.

This invention applies to a refrigerant system in which the refrigerant is drawn from the evaporator by a motor-compressor unit, compressed and then passed through a condenser to be cooled and liquefied. During this operation the motor-compressor unit generates considerable heat and some means must be provided to cool the unit. In many systems an electric fan is provided for circulating room air into contact with the condenser and then over the motor-compressor unit in order to cool both the condenser and motor-compressor unit. If this fan could be eliminated, the initial cost of the system would be decreased and the system would operate more efficiently with a lower noise level.

One object of the present invention is to provide a refrigerant system in which the necessity for a cooling fan is eliminated.

Another object of the invention is to provide a motor-compressor unit with a cooling coil immersed in the lubricating oil through which refrigerant is circulated in order to cool the motor and compressor.

A further object of the invention is to provide a refrigerator cabinet with a condenser coil mounted on a portion of the cabinet's outer wall so that the heat from the refrigerant within the condenser coil will be conducted to said outer wall and dissipated to the air surrounding the cabinet.

A further object of the invention is to provide means for heating the outer walls of a refrigerator cabinet above room temperature in order to prevent the condensation of moisture from the air unto the outer walls.

A still further object is to provide a refrigerant system with a motor-compressor cooling coil connected between a pair of condensers. The compressed refrigerant flows through the first condenser where it is partially cooled and liquefied, then passes through the cooling coil where it is reheated, and then flows through the second condenser where it is completely cooled and liquefied.

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

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

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Fig. 1 is a perspective view of a refrigerator cabinet, with a portion cut away, embodying the present invention.

Fig. 2 is a right end view of the cabinet of Fig. 1 with the condensing unit housing removed.

Fig. 3 is a diagrammatic view of the refrigerant system with a portion of the motor-compressor casing cut away.

Fig. 4 is a perspective view of the cooling coil with the casing represented by dotted lines.

Referring to the drawings, numeral 10 designates generally a freezer chest or cabinet having a decorative outer shell 11 secured to base 12. Spaced within outer shell 11 is an inner liner 13 having walls which form a food storage compartment 14. Insulating material 15 is placed between the outer shell 11 and inner liner 13 in order to reduce heat loss to a minimum. A breaker strip member 16 bridges across the top edges of outer shell 11 and inner liner 13 in order to provide a finished appearance to the cabinet. A door 17 is hinged to outer shell 11 which closes and seals around the food storage compartment 14. A condensing unit housing 18 is removably secured to base 12, and a motor-compressor unit 19 and a static condenser 20 are secured to base 12 under housing 18. A grille 21 is provided in the front wall of housing 18 through which convectional air currents circulate into contact with the motor-compressor unit 19 and static condenser 20.

An evaporator coil 22 is bent into several loops or runs which fit around the walls of inner liner 13 and are secured thereto by clamps 23 which are spot-welded unto the inner liner. A condenser coil 24 is bent into several loops or runs which fit against the inner surfaces of the walls of outer shell 11 and are secured in place by clamps 25.

The motor-compressor unit 19 is provided with an upper casing 26 and a lower casing 27 which are secured together in sealed relationship at 28. A compressor 29 is disposed in lower casing 27 and an electric motor 30 for driving the compressor is positioned in upper casing 26. Details of the motor 30 and compressor 29 are not shown since they are not important to the invention.

In sealed motor-compressor units of this type, considerable heat is generated during the operation of the refrigeration system. In order to remove heat from the motor-compressor unit 19 so that it will operate more efficiently, the present invention provides a cooling coil 31 which is located in the lower portion of bottom casing 27 below the surface of the lubricating oil 32. Coil

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31 is bent into an upper run 33, turn 34 and lower run 35. The runs 33 and 35 are parallel and are circular shaped. The end portions 36 and 37 of runs 33 and 35 respectively extend through bottom casing 27 and are secured thereto by silver solder 38. The runs 33 and 35 are positioned between compressor 29 and bottom casing 27 and extend approximately three quarters of the way around the compressor.

Slots 39 and 40 are provided in end wall 41 of the outer shell 11 through which conduits pass to complete the refrigeration system. The compressor inlet 42 is connected to evaporator coil 22 by conduit 43 and the compressor outlet 44 is connected to the static condenser 20 by conduit 45. Conduit 46 connects the end portion 37 of lower run 35 of the compressor cooling coil 31 to static condenser 20 and conduit 47 connects the end portion 36 of upper run 33 to the condenser coil 24. The condenser coil 24 and evaporator coil 22 are connected by a restrictor tube 48.

During the operation of the refrigeration system, the compressor draws refrigerant vapors from the evaporator coil 22 through conduit 43, compresses the vapors and then forwards the compressed refrigerant through conduit 45 to the static condenser 20. As the compressed refrigerant flows through the static condenser 20, it will lose some heat to the air surrounding the condenser and be partially condensed. From condenser 20 the refrigerant flows through conduit 46 to the cooling coil 31 where it absorbs heat from the hot lubricating oil 32 and again returns to the vapor state. Since the lubricating oil 32 is circulated into contact with the compressor 29 and electric motor 30, it will pick up considerable heat while the refrigeration system is operating. As this heated oil comes into contact with cooling coil 31, it will be cooled and the operating temperature of the motor-compressor unit 19 will be lowered substantially.

The refrigerant is carried from cooling coil 31 by conduit 47 to condenser coil 24 where heat is conducted from the refrigerant to the outer shell 11 and then dissipated into the air surrounding the cabinet. The refrigerant will be cooled and condensed and the outer shell 11 will be heated a few degrees above room temperature. In refrigerator cabinets of the type described, some heat leakage will occur between the inner liner 13 and outer shell 11 which causes the temperature of the outer shell to be lowered below room temperature. As the room air strikes this cool surface, moisture will condense from the air onto the outer shell. This is very undesirable since the condensate is harmful to the finish of the outer shell and will eventually drip onto the room floor. In the present invention, no condensate will collect on outer shell 11 since it is heated to a temperature slightly higher than the room temperature by condenser coil 24.

From the condenser coil 24 the refrigerant is metered by restrictor tube 48 into the evaporator coil 22 where it absorbs heat from the inner liner 13 and is vaporized. The temperature of the inner liner 13 is reduced sufficiently to cool the food compartment 14 to the desired temperature. From the evaporator coil 22 the refrigerant returns to the motor-compressor unit 19 through conduit 43.

While there has been shown and described a particular embodiment of this invention, it will be understood that various modifications and changes will occur to those skilled in the art. The disclosure is illustrative and the invention is to

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be limited only in accordance with the claims appended hereto.

What is claimed is:

1. In combination, a refrigeration system comprising series refrigerant circuit means operable to cause a refrigerant to absorb heat in one portion thereof and to emit heat in another portion thereof, a casing, a motor-compressor unit for operating said series refrigerant circuit means disposed within said casing, an oil for lubricating and cooling said motor-compressor unit, an oil reservoir in the bottom portion of said casing and containing said oil, and a coil disposed in said oil reservoir in heat exchange relation with said oil, said coil having runs which extend around said compressor and end portions which extend through said casing and are secured thereto, said end portions being connected in series in said one portion of said series refrigerant circuit means wherein said refrigerant absorbs heat so that said refrigerant flows through the coil and absorbs heat from said oil.

2. In a refrigeration system, a casing which encloses a motor-compressor unit, an oil for lubricating and cooling said motor-compressor unit, an oil reservoir in the bottom portion of said casing containing said oil, said compressor extending into said oil reservoir, a cooling coil positioned in said oil reservoir having circular shaped turns which extend around said compressor and end portions which extend through said casing and are secured thereto, said turns spaced between said compressor and said casing, a heat exchange unit connected in said refrigeration system and to said coil, and a refrigerant in said system which is cooled by said heat exchange unit and then passed through said coil where it absorbs heat from said oil from the motor-compressor unit.

3. In a refrigeration system, an evaporator, a motor-compressor unit, a pair of condensers, a casing which encloses said motor-compressor unit, a reservoir provided in the bottom portion of said casing for collecting lubricating oil, and a coil disposed in said oil reservoir having circular shaped turns which extend around said compressor and end portions which extend through said casing and are secured thereto, said end portions being connected between said condensers, means connecting said motor-compressor unit and said evaporator to said condensers so that said motor-compressor unit is operable to deliver refrigerant to one of said condensers, through said coil, through the other of said condensers, through said evaporator, and to draw refrigerant from said evaporator when said system is charged with a refrigerant, said one condenser formed to operate to pre-cool said refrigerant delivered thereto, said pre-cooled refrigerant delivered through said coil operating to draw heat from said oil, and said other condenser formed to operate to cool said refrigerant delivered therethrough.

4. In a refrigerator cabinet, an evaporator, a motor-compressor unit for drawing refrigerant vapors from said evaporator and compressing the same, a first condenser for partially cooling the refrigerant, a second condenser for completely cooling and liquefying the refrigerant, said second condenser disposed in heat exchange relation with the outer walls of said cabinet, a casing for enclosing said motor-compressor unit which has a reservoir for lubricating oil, and means for cooling the motor-compressor unit, said means including a cooling coil disposed in said reservoir in heat exchange relation with the lubricating oil,

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said cooling coil being connected between said condensers so that the refrigerant will flow there-through.

5. In a refrigerator cabinet, an evaporator, a motor-compressor unit for drawing refrigerant vapors from said evaporator and compressing the same, a first condenser for partially cooling the refrigerant, a second condenser for completely cooling and liquefying the refrigerant, said second condenser disposed in heat exchange relation with the outer walls of said cabinet, a casing for enclosing said motor-compressor unit which has a reservoir for lubricating oil, said compressor extending into said reservoir, and a coil disposed in said oil reservoir having runs which extend around said compressor below the surface of the oil and two end portions which extend through said casing, said first condenser being connected to one end portion and said second condenser being connected to the other end portion so that refrigerant will flow through said coil and absorb heat from said oil.

6. In a refrigeration system, a casing which en-

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closes a motor-compressor unit, an oil for lubricating said motor-compressor unit, an oil reservoir provided in said casing, a first condenser for partially cooling refrigerant within said system, a second condenser for completely cooling the refrigerant, and a cooling coil disposed in said oil reservoir in contact with said oil, said coil being connected between said condensers so that the partially cooled refrigerant flowing therethrough from said first condenser will absorb heat from said oil.

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