

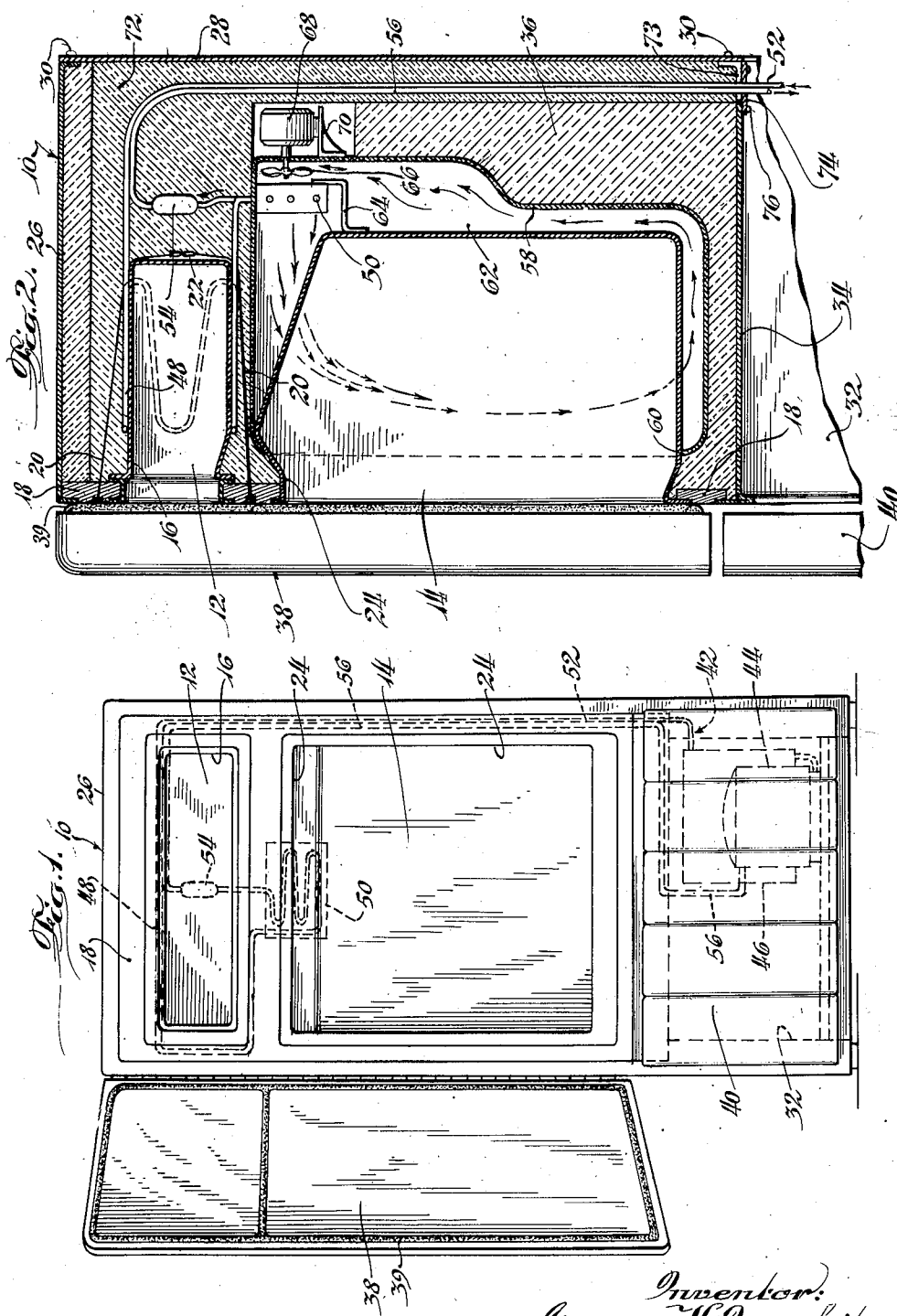
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TWO-TEMPERATURE REFRIGERATOR

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TWO-TEMPERATURE REFRIGERATOR

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4 Claims. (Cl. 62-102)

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This invention relates to refrigerators and particularly to refrigerators of the type having two compartments to be maintained at different temperatures. This application is a division of the copending application of George K. Iwashita, Serial No. 494,629 filed July 14, 1943 and issued on June 20, 1950 into Patent No. 2,511,851.

It is an object of the present invention to provide an improved two temperature, two compartment refrigerator provided with a single refrigerant circulating circuit which is so associated with the two compartments that one of the compartments will be cooled to a lower temperature than the other compartment.

It is another object of the present invention to provide a two temperature, two compartment refrigerator wherein the cooling of the compartments is accomplished by one refrigerant circulating circuit having a pair of evaporators, one of the evaporators being in direct heat exchange relation with one of the compartments and the other of the evaporators being in indirect heat exchange relation with the other compartment so that the latter compartment has a temperature higher than that of the first compartment.

It is a further object of the present invention to provide a two temperature, two compartment refrigerator having a single refrigerant circulating circuit provided with a pair of evaporators, one of the evaporators being in direct heat exchange relation with one of the compartments which is to be cooled to a low temperature and the other evaporator being enclosed within an air chamber which substantially surrounds the other compartment and in which refrigerated air is forcibly circulated to effect an efficient cooling of the second compartment but only to a temperature higher than that of the first compartment.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a front elevational view of a refrigerator constructed according to the present invention; and

Fig. 2 is a medial longitudinal section on a somewhat enlarged scale illustrating the arrangement of the two compartments with respect to each other and the manner in which

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the evaporator coils are associated with the compartments.

In the drawing, the reference character 10 indicates generally a refrigerator constructed in accordance with the present invention having a top low temperature compartment or frost chest 12 and a low higher temperature compartment 14. The frost chest 12 is formed by a metallic liner 16 which is secured to a front frame at 18. The liner 16 may be removably secured to the frame 18, if desired, by a pair of tensioned straps 20 which are secured at their forward ends to the frame 18 and which have their rear ends connected together by a detachable connector 22 which may be disconnected in the event that it is desired to remove the liner 16 from the refrigerator as will be hereinafter explained. The lower compartment 14 is formed by a liner 24 which is permanently affixed to the frame 18. An outer shell 26 is secured along its forward edge to the frame 18 and has secured to its rear edge a panel 28 which is connected to the shell 26 by sheet metal screws 30. A third compartment 32 designated as the machinery compartment is provided in the refrigerator cabinet below the storage compartment 14 and has its upper limit defined by a metallic panel 34 fastened to the frame 18, the outer shell 26 and the rear panel 28.

The space surrounding the liners 16 and 24 and between them and the frame 18, outer shell 26, rear panel 28 and bottom panel 34 is filled with suitable thermal insulating material 36 which may be rock wool, balsa wool or the like.

Access is had to the compartments 12 and 14 through forwardly facing openings which are closed by a single door 38 which is preferably insulated and constructed in a manner well known in the prior art. The door 38 carries a deformable sealing gasket 39 adjacent its peripheral edge to seal against the cabinet. The front opening to the machinery compartment 32 is closed by a panel 40.

The compartments 12 and 14 are cooled by a refrigerant circulating system 42 which includes a compressor 44, a condenser 46 and a pair of evaporators 48 and 50. The evaporator coil 48 is secured in heat exchange relationship to the outer surface of the liner 16 and may have the heat exchange therebetween made more effective by the use of a substance such as metallic Perma-

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gum which is a heat transfer agent having high thermal conductivity formed of a soft non-oxidizing material impregnated with aluminum flakes, graphite and the like. The inlet to the evaporator coil 48 is connected by means of a capillary tube 52 to the outlet from the condenser 46. The outlet from the evaporator coil 48 is series connected to the inlet of the evaporator coil 50, the arrangement of which will be described in detail hereinafter. The outlet from the evaporator coil 50 leads to an accumulator 54 which in turn is connected by a suction tube 56 to the inlet to the compressor 44.

The liner 24 is substantially enclosed by a spaced shell 58 having its forward edge 60 sealed against the outer surface of the liner 24. Space 62 between the outer surface of the liner 24 and the shell 58 forms a path for the circulation of cooling air about the liner 24. The evaporator 50 is mounted within the space 62 and is supported therein by a bracket 64, and, if desired, may be removable from the space 62. The air is circulated in the path indicated by the arrows by a fan 66 driven by an electric motor 68 the cycling of which preferably is governed by the temperature conditions in the compartment 14. The motor 68 is mounted outside the shell 58 on a shelf 70.

If it is desired that the refrigerant circulating system be removable from the refrigerator, the insulation may be divided as shown and that part of the insulation indicated by the reference character 72 may be readily removable. Access is had to the refrigerating system within the cabinet by removing the panel 30 and the insulation 72. This will uncover the liner 16, and the coupling 22 may be disconnected, to permit removal of the liner and the evaporator tubing 48 from the cabinet. If the evaporator 50 is made to be removable from the space 62 it is taken out in an upwardly direction through an opening provided for that purpose and thus the two evaporators which are connected in series are removed from the cabinet. The tubes 56 and 52 pass downwardly through a slot 73 and panel 34 and the opening through which they pass is closed by a cover plate 74 which is secured in place by screws 76. This plate is removed with the tubes 52 and 56. The compressor and condenser are unbolted from the frame and the removal of the system from the cabinet is completed. The system is replaced by reversing these steps.

The two compartments 12 and 14 are maintained at different temperatures since the evaporator coil 48 is in intimate heat absorbing relation with the liner 16 while the evaporator 50 is mounted in the space 62 and the compartment 14 is cooled by the convection currents flowing over the evaporator 50 and then over the liner 24. This does not provide for rapid or intense cooling, and the temperature in the compartment 14 will be a predetermined amount higher than the temperature in the compartment 12. It should be noted that the compartment 12 is substantially smaller than the compartment 14 and if the same area of the evaporator coil is used the compartment 12 is maintained at a colder temperature. Furthermore, the evaporator coil surrounding the liner 16 is first in series from the condenser 46 and the temperature conditions in the compartment 12 would thus be satisfied first. Thus the frost chest 12 will be operated at a temperature below freezing for the storage of frozen foods and the freezing of foods and ice cubes, and the com-

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partment 14 will have a temperature above freezing.

While only one modification of the present invention has been shown, it will be obvious to those skilled in the art that numerous modifications and changes may be made without departing from the spirit of the invention, which is to be limited only by the scope of the appended claims.

What is claimed as new and desired to be secured by United States Letters Patent is:

1. A refrigerator comprising a liner which forms a low temperature compartment, a second liner spaced from the first liner which forms a high temperature compartment, said second liner being partially encompassed by a spaced sheet which forms with the wall of said liner an enclosed space, a refrigerant circulating system having a pair of evaporator coils, one of said coils being in heat absorbing relation with the low temperature compartment liner and the other of said coils being positioned in said enclosed space, and means for circulating air over said second evaporator coil and then over said higher temperature compartment liner.

2. A refrigerator comprising a liner to form a first compartment, a second liner spaced from said first liner to form a second compartment, said second liner being partially encompassed by a spaced sheet which forms with the wall of said liner an enclosed space, a refrigerant circulating system having a pair of series connected evaporator coils, one of said coils being in heat absorbing relation with said first liner and the other of said coils being positioned in said enclosed space, and means for circulating air over said second evaporator coil and then over said second liner.

3. A refrigerator comprising a liner to form a first compartment, a second liner spaced from said first liner to form a second compartment, said second compartment being substantially larger than and separate from said first compartment, said second liner being partially encompassed by a spaced sheet which forms with the wall of said liner an enclosed space, means thermally insulating said compartments from each other and from the ambient air, a refrigerant circulating system including an evaporator coil having a first portion in heat absorbing relation with said first liner and a second portion positioned in said enclosed space, and means for circulating air over said second portion of said evaporator coil and then over said second liner, the temperature of said second compartment being substantially higher than the temperature of said first compartment.

4. A refrigerator comprising a liner to form a first compartment, a second liner spaced from said first liner to form a second compartment, said second compartment being substantially larger than said first compartment, said second liner being partially encompassed by a spaced sheet which forms with the wall of said liner an enclosed space, a refrigerant circulating system having a pair of series connected evaporator coils, one of said coils being in heat absorbing relation with said first liner and the other of said coils being positioned in said enclosed space, and means for circulating air over said second evaporator coil and then over said second liner, the relative sizes of the two compartments and the indirect cooling of said second compartment by said second evaporator portion causing the tem-

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perature of said first compartment to be substantially lower than the temperature of said second compartment.

GEORGE K. IWASHITA.

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