Jan. 31, 1950 H. W. KLEIST 2,496,220

DOMESTIC REFRIGERATING UNIT

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Fig. 1.

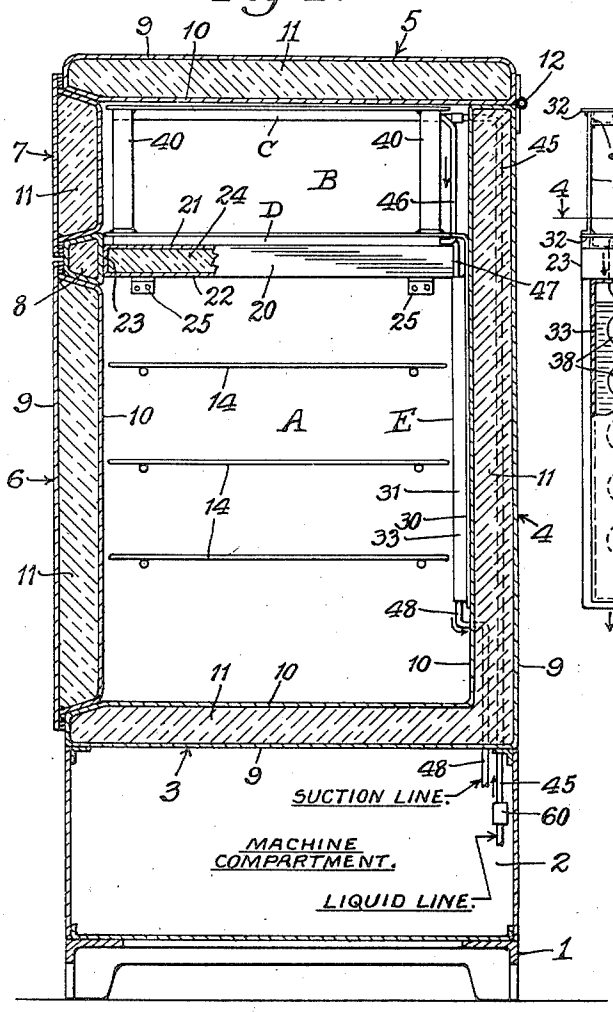
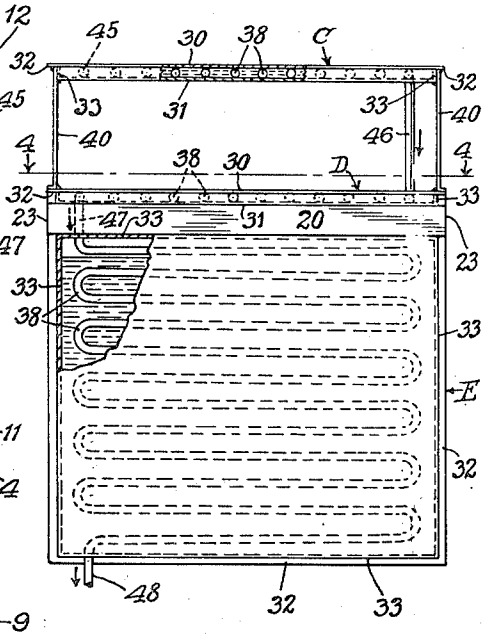


Fig. 2.



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Fig. 3.

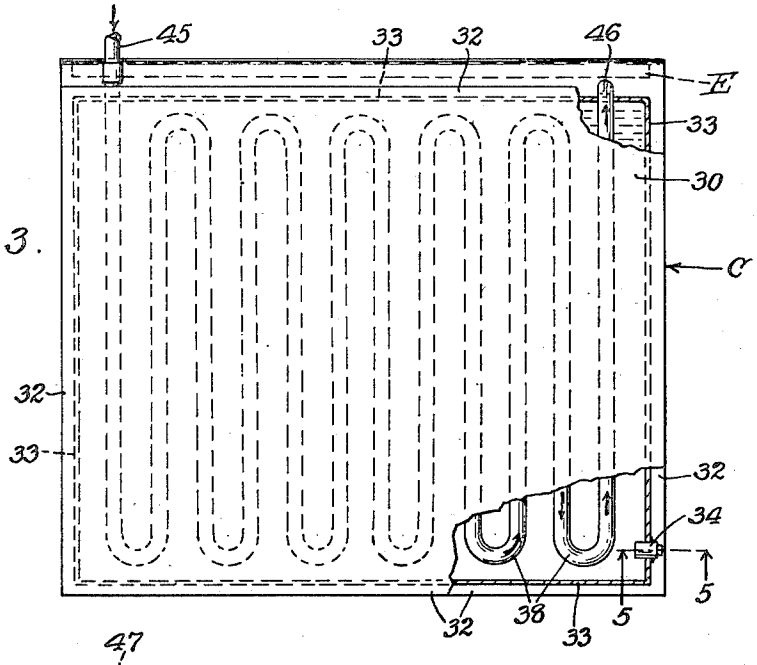


Fig. 4.

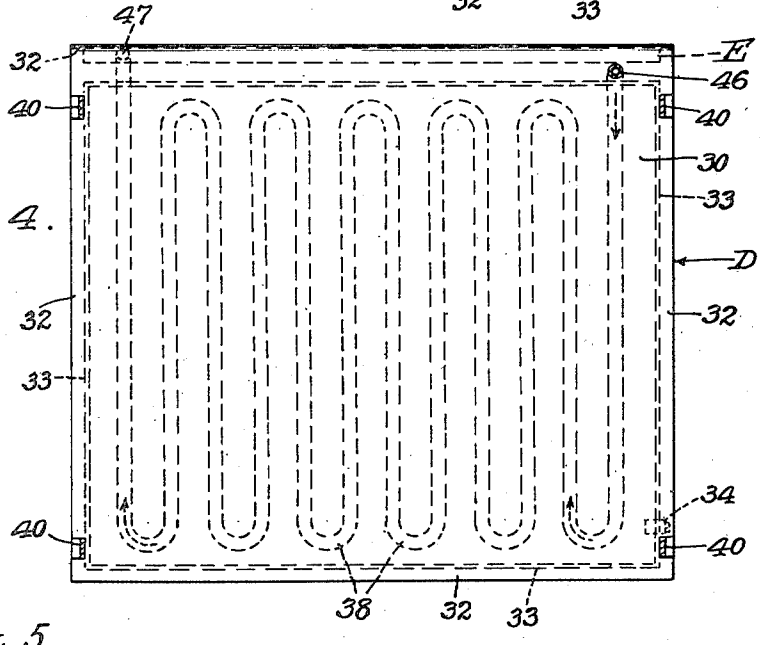
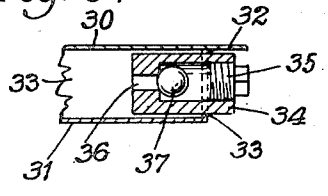


Fig. 5.



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UNITED STATES PATENT OFFICE

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DOMESTIC REFRIGERATING UNIT

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Application June 5, 1944, Serial No. 538,810

3 Claims. (Cl. 62—116)

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My invention relates to an improvement in cooling devices and has for one purpose to provide a cooling element adapted for use in domestic refrigerators.

Another purpose is to provide a combined partition and cooling element adapted to be inserted in a refrigerator housing and adapted to separate and provide the cooling element for two separate spaces which are maintained at different temperatures.

Another purpose is to provide a unit for assembly in refrigerators, which unit includes a partition adapted to divide a refrigerator into a freezing chamber and an ordinary cold chamber.

Other purposes will appear from time to time throughout the specification and claims.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a vertical section through a refrigerator illustrating my unit in position;

Figure 2 is a front elevation of the unit;

Figure 3 is a top plan view of the unit;

Figure 4 is a section along the line 4—4 of Figure 2 on an enlarged scale; and

Figure 5 is a section along the line 5—5 on an enlarged scale, of Figure 3.

Like parts are indicated by like characters throughout the specification and drawings.

Referring to the drawings, I illustrate a refrigerator cabinet, the details of which do not of themselves form part of the present invention. I illustrate for example the base portion 1, the machine compartment 2, the insulated bottom wall 3, the insulated rear wall 4, the insulated top wall 5, which may for convenience be hinged to the rear wall 4, the forward insulated doors 6 and 7 and the front insulated cross-piece 8 between the doors. It will be understood that any suitable insulated elements may complete the cabinet. The cabinet may be of any suitable structure but I illustrate the insulated walls and doors as including inner and outer sheets 9, 10, connected together about their edges and filled with any suitable insulation 11. For convenience in inserting my below described unit, I may hinge the top wall 5 to the rear wall 4 as at 12. It will be understood, however, that in the completed refrigerator, it is normally fixed in relation to the other cabinet walls. 14 are any suitable storage shelves located in the lower storage space generally identified as A. This lower space is defined by the bottom, side and rear walls of the cabinet and a removable transverse partition 20, which serves as the base for the unit, which constitutes the subject-matter of my invention. This base element 20 is an insulated partition having top wall 21 and a bottom wall 22, circumferential edge wall 23 and an interior 24 of insulating material. The base may be mounted for

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example upon any suitable brackets 25 extending from the side walls of the cabinet. It is shown as aligned with and abutting against the insulated front cross-piece 8.

The upper space B constitutes a sharp freezing cabinet space defined by the top wall 5, the rear wall 4, the side walls of the cabinet, the partition 20 and the front door 7.

It will be understood that I may position any suitable compressor-condenser unit in the machine compartment 2. The cooling is done by two evaporator groups or systems, one of which is located above the base 20 and the other below, the evaporator systems being unitarily removable, with the base, and applicable as a unit to the refrigerator.

The evaporator structure includes a plurality of cold plates, each of which includes a pair of parallel walls 30, 31, one of which is shown somewhat projecting beyond the other as at 32, the walls being connected around their edges by any suitable circumferential wall 33, the interior of each such plate being partially exhausted and filled with any suitable eutectic fluid. 34 generally indicates the filling and control valve structure, with the screw threaded removable plug 35, the outlet valve passage 36 and the ball valve 37.

The evaporator structure proper includes a coil 38 located in the space between the walls 30 and 31 and adapted to form part of a circulatory system for the coolant delivered by the compressor in the machine compartment. The coil 38 is held in intimate contact with the walls 30, 31 of the plate, by the vacuum or partial vacuum in the plate.

In Figures 1 and 2, I illustrate the employment of two such cold plates C and D, one above and one below the space B to be cooled. They may be separated by any suitable corner brackets 40. It will be understood, however, that I can, within the scope of my invention, employ additional plates to close the sides and rear of the space B providing a cold space entirely surrounded by cold plates except for the side closed by the insulated door 7. Both plates are supported on the base 20 and the lower plate D may abut directly thereagainst.

In Figures 1 and 2, I illustrate a third plate E which is mounted on and depends from the base 20 and extends downwardly along the rear wall of the storage space A. It will be understood that it is effective to cool the area A but to a temperature substantially higher than the temperature to which the space B is cooled.

I have not illustrated the specific coolant circuit but it will be understood that the duct 45 may be employed to deliver coolant to the plate C. It flows through the coil 38 of the plate C and thence along the duct 46 to the plate D to the plate E by the duct 47 which may be mounted on

or within the base 20. The outlet duct for the plate E is indicated at 48 and extends through the interior of the rear wall 4 to the compressor.

It will be realized that whereas I have illustrated and described an operative device, still many changes may be made in the size, shape, number, arrangement and disposition of parts without departing materially from the spirit of my invention. I wish, therefore, that my showing be taken as in a broad sense diagrammatic, rather than as limiting me to the precise showing.

The use and operation of my invention are as follows:

It is desirable in refrigerator practice, to provide a freezing cabinet area such as is shown at B in which articles of food may be frozen or may be stored in frozen condition. It is also necessary to provide a preferably larger storage area as at A, the temperature of which is sufficiently high so that the stored foods are not frozen. It is necessary for example for the storage of eggs, milk, green vegetables, etc.

In providing a refrigerator having cabinet spaces held at different temperatures, I find it advantageous to employ a unit which may be inserted in a cabinet at the time of the assembly of the finished cabinet and which includes the base 20 which serves as a partition between the freezing space B and the warmer space A and which also carries on it the cooling elements or evaporators for both storage spaces. In the assembly of the cabinet, the top wall 5 may be swung to open position, and the above described unit is then inserted in the interior of the cabinet and connected to the ducts 45 and 48 which are shown as partially embedded in the insulation of the rear wall 4. The cover 5 is then returned to the closed position and preferably permanently or semi-permanently secured in place.

If it is desirable to insert the unit through the front of the cabinet, a single door may be employed or the front cross member 8 may be removably connected to the cabinet. The unit may then be inserted and positioned on the brackets 25 and the necessary ducts connected to the refrigerating circuit. It will be observed that the cooling elements are positioned in relation to each other and in relation to the cabinet as a whole by the fact that they are mounted on the base 20. The base 20, with the cold plates or cooling units on it, can be inserted unitarily in the cabinet at the time of manufacture. The composite unit thus formed can also be removed from the cabinet if drastic repair or servicing is necessary, a substitute unit being temporarily or permanently installed to take its place.

Whereas I have illustrated only two cold plates in the upper space B, it will be understood that it may be advantageous to employ five cold plates adding cold plates at the side and rear of the space B. It is thought unnecessary to illustrate this structure as the individual cold plates may all be identical in construction.

It is advantageous to connect the cold plates in series, with the coolant going first to the cold plates of the freezing cabinet B and reaching the cold plate E, and the cabinet A only after it has flowed through all of the plates of the cold space.

It will be understood that a suitable eutectic fluid is used in all the cold places, and provides

a hold over. As examples of adequate temperatures, I may employ a zero eutectic in the plates in compartment B and a eutectic of a temperature of the order of freezing or slightly below, in compartment A.

One advantage of my system is that I can use a single expansion valve for all of the evaporator units above described. This expansion valve is not illustrated in detail, but is diagrammatically shown at 60 in Figure 1. Its bulb may be located at any suitable point, preferably in the compartment A.

I claim:

1. In a refrigeration structure, a refrigerator cabinet having an upwardly removable top wall, a bottom wall, side walls and a door, said walls and door being insulated, and a partition and evaporator unit removably located within the cabinet, the opening closed by the top wall being of sufficient size to permit the removal of the partition and evaporator unit without disassembling, the unit being readily downwardly insertable through the top of the cabinet when the top wall is withdrawn to open position, means for supporting the unit in horizontal position in the interior of the cabinet, the unit including a plurality of vertically spaced evaporators above said partition, and an evaporator below said partition.

2. For use in refrigerators having spaces cooled to different temperatures, a unit including a generally horizontal base of insulating material adapted to be inserted in a refrigerator cabinet as a partition between differentially cooled spaces, a cold plate supported on said base and depending therefrom, adapted to cool a space below said base and means for cooling a space above said base, including a pair of horizontal, parallel, vertically spaced cold plates, each said plate including a smooth walled outer housing and a refrigerant coil in the space within said housing, the coils of all of said plates being connected in series, and means for delivering the coolant first to the plates above said base.

3. For use in refrigerators having spaces cooled to different temperatures, a unit including a generally horizontal base of insulating material adapted to be inserted in a refrigerator cabinet as a partition between differentially cooled spaces, a cold plate supported on said base and depending therefrom, adapted to cool a space below said base, and a cold plate positioned above said base and adapted to cool a space above said base, each said plate including a smooth walled outer housing and a refrigerant coil in the space within said housing, said coils being connected in series, and a single expansion valve connected to the upper coil.

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