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REFRIGERATING APPARATUS
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2,992,545

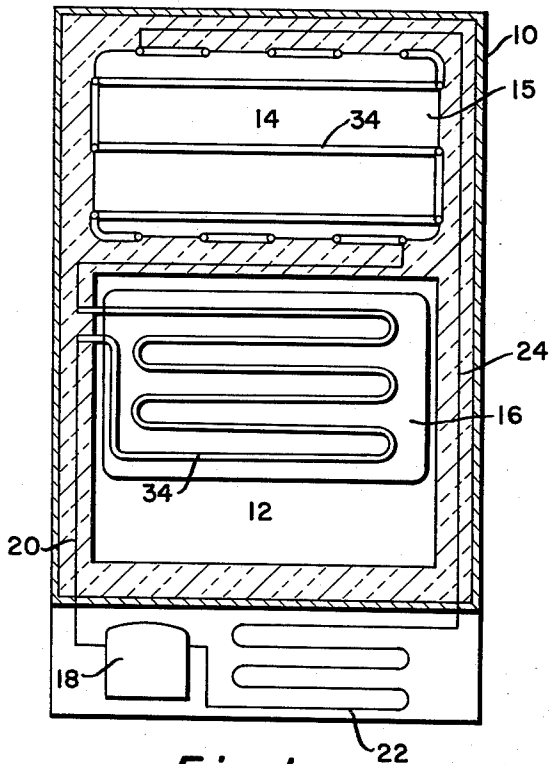


Fig. 1

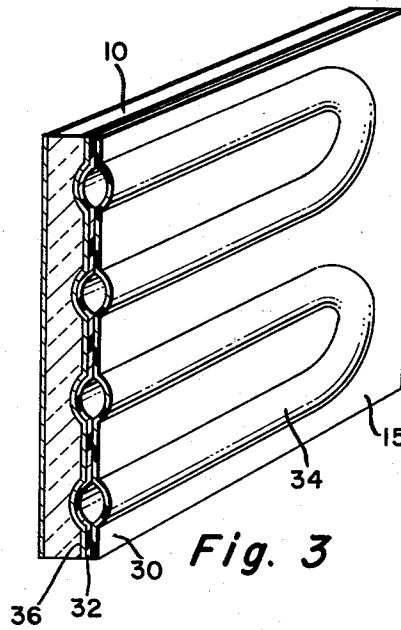


Fig. 3

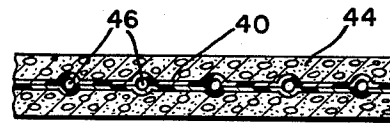


Fig. 4

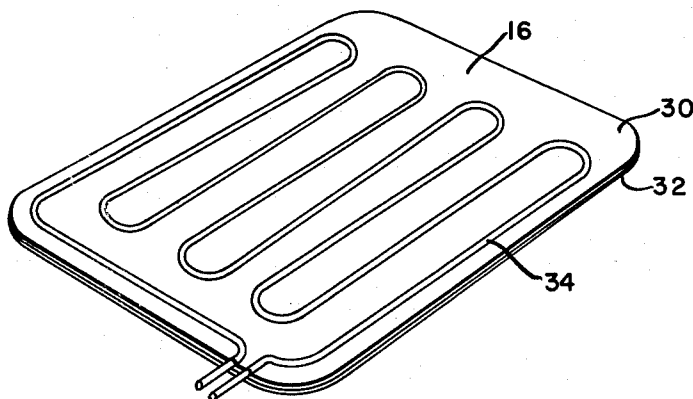


Fig. 2

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REFRIGERATING APPARATUS

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3 Claims. (Cl. 62—515)

This invention relates to refrigerating apparatus and more particularly to an improved heat exchanger arrangement of the type which may be used in refrigerators and the like.

It is an object of this invention to provide a heat exchanger comprising a pair of plastic sheets which have been superimposed upon one another and subjected to heat and pressure in such a manner that the opposed sheets adhere to one another except at the points where fluid passages are to be provided between the sheets.

Another object of this invention is to provide a plastic heat exchanger which is flexible and which may be used alone or in combination with suitable heat insulating and reflecting material.

Still another object of this invention is to provide a plastic heat exchanger which may be incorporated as a part of an insulated refrigerator cabinet or as a part of other devices such as automobiles seats, floor mats and the like.

Still another object of this invention is to provide a heat exchanger which may be embedded in material such as concrete and used to provide either heating or cooling.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein preferred forms of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a vertical sectional view showing the invention applied to a household refrigerator;

FIGURE 2 is a perspective view of a heat exchanger per se constructed in accordance with the invention;

FIGURE 3 is a fragmentary perspective view showing on an enlarged scale the relationship between a plastic heat exchanger and a heat reflecting and insulating wall mounted adjacent to the heat exchanger; and

FIGURE 4 is a fragmentary sectional view showing a heat exchanger embedded in a slab of concrete or the like.

Referring now to the drawing wherein preferred illustrative applications of the invention have been shown, reference numeral 10 designates a household refrigerator cabinet having food storage compartments 12 and 14, at least one of which is provided with a refrigerated inner liner in the form of a plastic evaporator 15 which serves to refrigerate the food storage compartment 14 and the other of which has a flat plastic evaporator 16 arranged therein as shown. For purposes of illustration there has been shown a refrigerant liquefying system including a conventional sealed motor-compressor unit 18 which withdraws vaporized refrigerant from the evaporator 16 through the suction line 20 and which discharges compressed refrigerant into a conventional condenser 22 from whence liquefied refrigerant is fed into the evaporators 15 and 16 by means of a capillary tube restrictor 24. The refrigerant circuit shown is intended to represent a conventional refrigerant circuit.

The evaporators are both formed by placing a pair of plastic sheets in superimposed relationship and then applying heat and pressure to the sheets throughout their entire area except where it is desired to form refrigerant passages such as the passages 34 as best shown in the evaporator 16 in FIGURE 2. The sheets of material used in forming the heat exchanger may be of any shape

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and area suited to their particular application. The material thickness and composition are also dependent on the type of application and may be of any gauge suitable for the application. The material used in forming the heat exchanger would likewise be selected so as to be capable of properly retaining the fluid encountered by the plastic. In the case of a refrigerator using a Freon refrigerant it would be necessary to provide a plastic capable of retaining the Freon and also capable of excluding moisture and air from the refrigerant circuit. In some instances it may be desirable to use a pair of laminated plastic sheets in making the heat exchanger. Thus a laminated sheet including a layer of polyethylene and a layer of Mylar (polyester of ethylene glycol and terephthalic acid) could be used. Materials such as nylon, Teflon, Mylar, Videne, polyethylene, polypropylene, polyester sheets or films can be used alone or in combination with other sheets.

Whereas FIGURE 1 of the drawing shows an application in which the heat exchanger is connected to a refrigerant liquefying unit, the heat exchangers could be connected to any type of fluid pumping system. Thus if the heat exchanger were to be used as a combination seat cover and heater unit it would be connected to the hot water system for the main car engine and the flow there-through would be controlled by a valve or valve system to provide the proper amount of heat in the different areas. Heat exchangers of this type could be used in indoor or outdoor skating rinks in which case the heat exchanger would be laid down and connected to a refrigerant pumping unit. The ice for the rink would then be made in the usual manner.

The one side of one of the sheets of the laminate, such as the bottom sheet, is preferably metalized in applications where it is desirable to reflect radiant heat towards the top sheet or in one direction only as might be the case in automobile seats, floor mats and housing slabs. The metalized coating could be in the form of a vapor deposition or in the form of a thin metallic sheet bonded to the adjacent plastic sheet. FIGURE 3 of the drawing shows a fragmentary portion of a refrigerator wall wherein a metalized layer 36 has been applied to the one side of the evaporator 15.

In FIGURE 4 of the drawing there is shown an application wherein a plastic heat exchanger 40 constructed in accordance with this invention is embedded in a concrete slab 44 which could for example serve as a slab foundation for a house in which heat could be provided by circulating hot water or other heated fluid through the passages 46 formed in the plastic insert. The same construction could be used for heating driveways and sidewalks.

Still another application of a flexible plastic heat exchanger would be in portable light-weight refrigerators for use by the military or expeditionary parties. An inflatable dome of double wall thickness with a 2-inch air space between the outside and inside walls could for example be utilized in such an application. The outside surface of the outer skin would be metalized with a highly reflective material while the inner wall would be of laminate material with passages for refrigerant so arranged to give maximum cooling to the interior.

The above are merely illustrative of the large number of different types of application where a plastic heat exchanger could be used to great advantage.

While the forms of embodiment of the invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In a heat exchanger, a laminated plastic element

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having a continuous open channel formed between the laminations of said element, said laminations being heat sealed to one another throughout the non-passage areas, and a metalized coating on one of said laminated layers.

2. In a heat exchanger, a flexible laminated plastic element having a continuous open channel formed between the laminations of said element, said laminations being heat sealed to one another to form said passages, a metalized coating on one of said laminated layers, and rigid means abutting one side of said flexible plastic element.

3. In a refrigerator, cabinet having an inner wall and an outer wall, said inner wall comprising a laminated

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plastic element having a continuous open channel formed between the laminations of the plastic for the free passage of a refrigerant, the outer surface of said laminated plastic element being provided with a metalized coating and refrigerant translating means for supplying refrigerant to said passages.

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