

[54] REFRIGERATION UNIT

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62/326, 62/237, 165/76

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[58] **Field of Search**.....62/77, 326, 298, 237, 448;
165/76, 48

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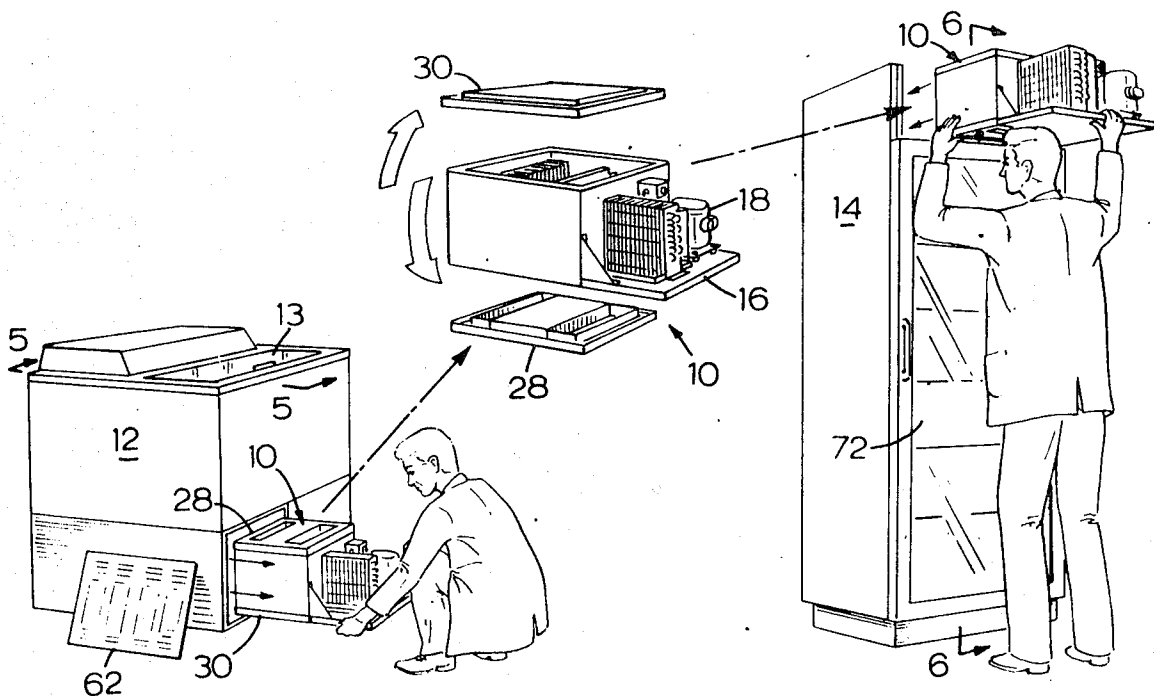
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[57] **ABSTRACT**

This invention relates to a refrigerator and to a refrigerating unit for a refrigerator that can be adapted by minor adjustment for mounting in refrigerating cabinets of different design. Essentially the refrigerating unit is a complete unit that has a chamber for the heat exchanger with two openings of similar perimeter design; covers are provided which can be fitted over either opening. One of the covers is solid and the other has an inlet and outlet opening designed to permit the ingress of air to the heat exchanger and the exit of air from the heat exchanger. Depending upon the type of refrigerated cabinet that the unit is to be installed in, the cover with the inlet and outlet openings is mounted on one or other of the openings in the chamber that houses the heat exchanger.

4 Claims, 6 Drawing Figures



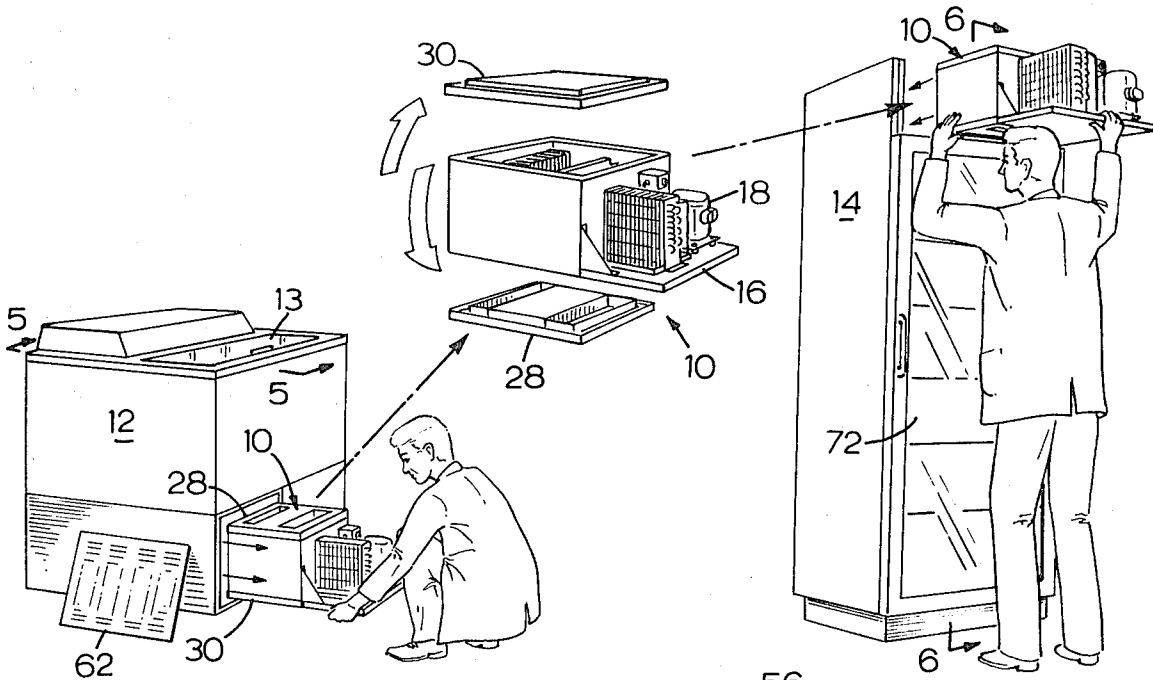


FIG. 1

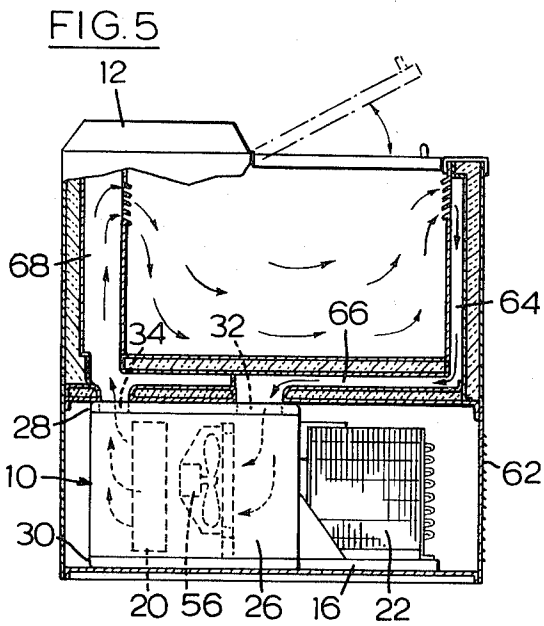


FIG. 5

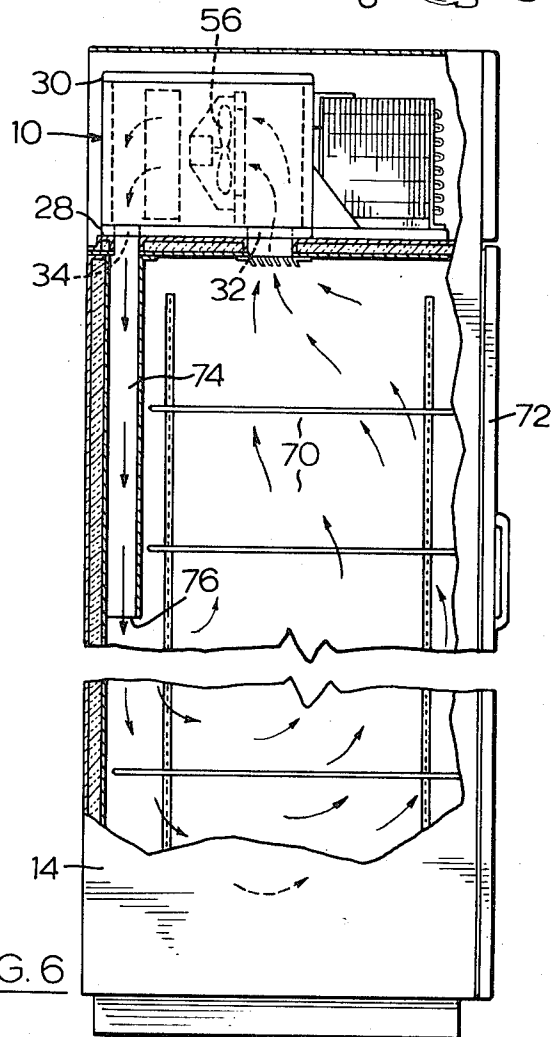
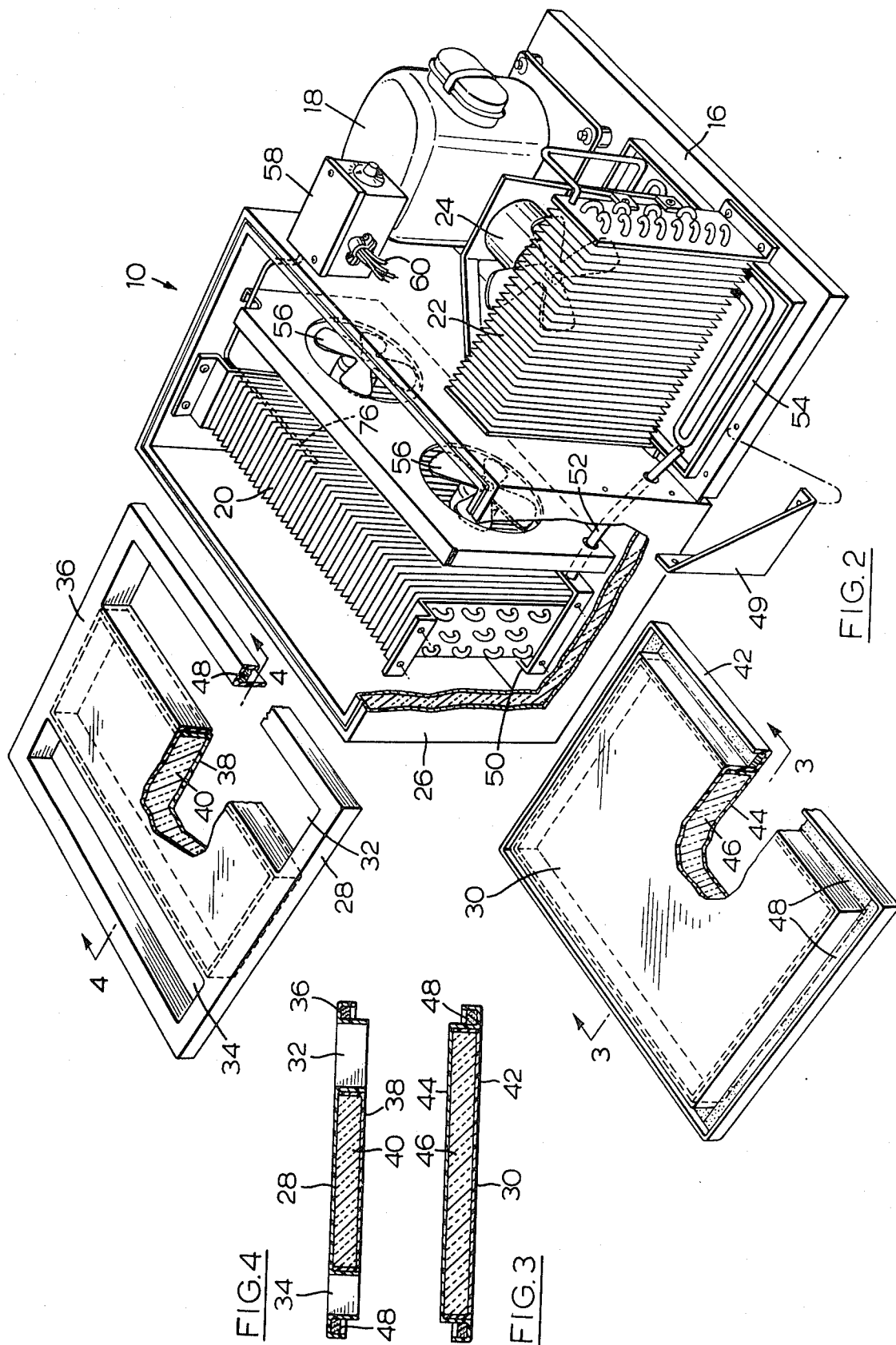


FIG. 6



REFRIGERATION UNIT

This invention relates to a refrigerator and to a refrigerating unit for a refrigerator that is capable of being bodily mounted in refrigerators of different designs with a minimum of modification.

A refrigerator of the evaporation type can be considered to consist essentially of a refrigerating cabinet, which stores the food or other articles to be refrigerated, and a refrigerating unit, which includes the heat exchanger and the means for liquefying the gaseous refrigerant from the heat exchanger and returning it to the heat exchanger in liquified form for evaporation by the heat of the air that is circulated through the cabinet and into heat exchange relation with the heat exchanger. The refrigerating unit includes all of the working parts of a refrigerator, and it is desirable to have the refrigerating unit mountable as a single unit in the refrigerating cabinet. By this construction all of the working parts can be removed from the refrigerating cabinet for service. There are basically two types of refrigerating cabinets. There is a top opening or chest type and a front opening type. In the case of the chest type, the refrigerating unit is usually mounted at the bottom of the refrigerating cabinet and air is circulated from the refrigerated compartment over the heat exchanger and back to the refrigerated compartment by means of a circulating fan. In the case of the door type refrigerating cabinet, the refrigerating unit is usually mounted at the top of the refrigerating cabinet. Air is similarly circulated over the heat exchanger of the refrigerating unit by means of a fan.

As indicated above, it is an object of this invention to provide a refrigerating unit that can be bodily mounted into either a top opening refrigerating cabinet or a front opening type of refrigerating cabinet.

It is a further object of the invention to provide a refrigerator design that is applicable to chest and front opening cabinet designs wherein the refrigerating unit is common to both cabinet designs.

Such a refrigerating unit and refrigerator design has a very substantial advantage in use from a manufacturing point of view and also from a servicing point of view. The manufacturer, for example, can stock the refrigerating cabinets and the refrigerating units separately and combine a cabinet of either type with any refrigerating unit. The production run of the refrigerating unit is increased and stock keeping problems are reduced. These things effect cost savings.

From a service point of view the service man can remove the refrigerating unit from either type of refrigerating cabinet and replace it with a similar refrigerating unit. He does not have to carry with him two kinds of refrigerating unit, one for each of the two types of refrigerating cabinets.

With these and other objects in view, a refrigerating unit for a refrigerating cabinet according to this invention comprises a base, a refrigerating heat exchanger, a chamber on said base for said refrigerating heat exchanger, said chamber having two openings with similar perimeter geometry, a first cover for either of said two openings, a second cover for either of said two openings, said first cover having an air inlet opening and an air outlet opening, circulating fan means in said chamber for moving air from said air inlet opening of said first cover into heat exchange relation with said

refrigerating heat exchanger and out of said second opening of said first cover when said first cover is over either one of said two openings and said second cover is over the other one of said two openings, means mounted on said base exterior of said chamber for liquefying gaseous refrigerant from said heat exchanger and returning it to said heat exchanger in liquefied form for evaporation by heat of air carried in heat exchange relation with said refrigerating heat exchanger by said fans.

The invention will be clearly understood after reference to the following detailed specification read in conjunction with the drawings.

In the drawings,

FIG. 1 is a schematic illustration illustrating the manner in which a refrigerating unit according to this invention can be removed from a chest type refrigerator and inserted into a front door opening type of refrigerator;

FIG. 2 is an exploded perspective illustration illustrating a refrigerating unit according to this invention;

FIG. 3 is a view along the line 3—3 of FIG. 2;

FIG. 4 is a view along the line 4—4 of FIG. 2;

FIG. 5 is a sectional illustration taken along the line 5—5 of FIG. 1 showing the air circulation through a refrigerator of the chest type; and

FIG. 6 is a sectional illustration taken along the line 6—6 of FIG. 1 showing the circulation of air through a front door opening type of refrigerator.

Referring to the drawings, the numeral 10 generally refers to a refrigerating unit according to this invention. This unit can be bodily inserted into the refrigerating cabinet 12 of a chest type refrigerator or the refrigerating cabinet 14 of a front opening type of refrigerator.

The refrigerating unit is mounted on a common base 16 and it includes the working parts of the refrigerator. Thus, the working parts can be bodily assembled into the refrigerator on initial manufacture, and, in the case of service, the working parts can be bodily removed from the refrigerating cabinet. The arrangement has advantages from a manufacturing point of view, from a stock keeping point of view and also from a service point of view.

The refrigerating unit illustrated includes a motor compressor unit 18, which receives gaseous refrigerant from the heat exchanger 20, compresses it to a high pressure and delivers it to the condenser 22. A fan 24 circulates room air over the condenser 22 to remove heat from the compressed refrigerant and reduce it to a liquid condition. The liquefied refrigerant is then conducted to the heat exchanger 20, where, in use, it is evaporated to a gas as air from the interior of the refrigerator is circulated over it.

The refrigerating cycle is not part of this invention and detailed reference is not made to it. The basic mechanical refrigerating cycle includes a heat exchanger, such as the one 20, to which liquid refrigerant is supplied and in which the liquid refrigerant evaporates to gaseous form as the result of the passage of air over the outside of the heat exchange unit but in heat exchange relation with the gas on the inside of the heat exchanger. Various equipment may be used for taking the evaporated gas from the heat exchanger and reducing it to a liquid form for further service in the cooling operation. These things are not

part of the invention and they are not referred to in detail in this application.

This invention is primarily concerned with the assembly of the refrigerating unit and with its cooperation with the refrigerating cabinet. The unit consists essentially of the base 16 to which is rigidly mounted a chamber 26 that houses the heat exchanger 20. The chamber 26 is open at its top and open at its bottom. The two openings have similar perimeter geometry so that either one of the covers 28 or 30 can be mounted on either the top or the bottom opening.

Cover 28 has an air inlet opening 32 and an air outlet opening 34. Cover 30 has no openings.

The sectional construction of the two covers is indicated at FIGS. 4 and 3 respectively. The cover 28 consists of two plastic trays 36 and 38 which interfit one with the other and contain an insulating material 40 in the space between them. The cover 30 is similarly formed from two cooperating plastic trays 42 and 44 with an insulating material 46 between them.

It will be noted that there is a perimeter channel around each of the covers. This perimeter channel fits over the edge opening of the chamber 26. An insulating material 48 is located in the bottom of the perimeter channel to achieve a tight seal. The walls of the chamber 26 are insulated with an insulating material and the chamber is mounted to the base 16 by means of brackets 49, which are bolted to the base and chamber walls, as indicated in FIG. 2.

The heat exchanger 20 has a tray 50 at the bottom thereof to collect liquid that drips from the exterior of the heat exchanger 20 as it is defrosted in use. A tube 52 conducts this liquid to the tray 54, which underlies the condenser. Heat from the condenser evaporates the moisture. This is standard refrigerating practice.

Fans 56 force air from the interior of the refrigerated cabinet over the heat exchanger in use, as will be explained later. Numeral 58 is a control box for all electrically operated motors of the unit, including the fans 56 and 24 and motor compressor 18. Wiring 60 from the control box 58 connects the complete unit to a source of power supply. There are appropriate connections in the refrigerating cabinet of the refrigerator for easy connection of lighting not shown.

To mount the refrigerating unit in a chest type refrigerator 12 with a top opening door 13, one secures the bottom cover 30 over the bottom of the chamber 26 and the top cover 28 over the top opening of the chamber 26. It will be noted that each of the openings has similar perimeter dimensions.

The unit is then inserted into a chamber at the bottom of the unit, as illustrated in FIG. 1, and a cover panel 62 is applied. When so mounted it assumes a position similar to that indicated in the cross-sectional view of the unit (FIG. 5). The wiring 60 is connected into an appropriate power entry for the cabinet 12.

When so connected the refrigerator works in the usual manner. There is a temperature sensing device 76 in the heat exchanger 20 of the refrigerator which is sensitive to temperature changes to turn the compressor on or off to provide cooling as required (see FIG. 2). When the refrigerating unit operates to cool the device, air is circulated down the channel 64 at the front wall of the refrigerator along the channel 66 under the bottom of the refrigerated compartment of

the refrigerator and down through opening 32 in the top 28 of the chamber 26 within which the heat exchanger 20 is mounted. Circulation is, as indicated, achieved by means of operation of the fans 56 and these fans carry the air across the exterior of the heat exchanger 20 and in heat exchange relation with the refrigerant therein. Following this, the air is lead upwardly through the opening 34 of the top cover 28 to the upwardly directed duct 68 and out an opening at the top of duct 68 into the refrigerated area of the refrigerating chest.

In the case of a front opening refrigerator 14, where access to the refrigerating compartment 70 is achieved by means of a front opening door 72, it is usual to mount the refrigerating unit 10 over the refrigerating compartment of the refrigerator. In this case, the cover 30 is applied to the top opening of the chamber 26 and the cover 28 is applied to the bottom opening of the chamber 26. In this case, the circulating fans 56 operate to achieve a circulation of air from the refrigerated chamber 70 through opening 32 of cover 28 over the heat exchanger 20, out the opening 34 of cover 28, down a duct 74 at the back of the unit and out an opening 76 to the refrigerated compartment 70.

By reason of the novel design of the chamber for the heat exchanger, it is possible by simply alternating the location of the covers on the openings to the chamber to adapt the refrigerating unit 10 for use in either a top opening or a front opening refrigerator. The refrigerating cabinets have been adapted to receive the refrigerating unit.

Embodiments of the invention other than the one illustrated will be apparent to those skilled in the art. For example, it may be possible to change the location of the two openings in the chamber or to use a different type of refrigerating cycle.

What we claim as our invention is:

1. A refrigerating unit for a refrigerating cabinet comprising: a base, a refrigerating heat exchanger, a chamber on said base for said refrigerating heat exchanger, said chamber having two openings with similar perimeter geometry, a first cover for either of said two openings, a second cover for either of said two openings, said first cover having an air inlet opening and an air outlet opening, circulating fan means in said chamber for moving air from said inlet opening of said first cover into heat exchange relation with said heat exchanger and out of said outlet opening of said first cover when said first cover is over either one of said two openings and said second cover is over the other one of said openings, means mounted on said base exterior of said heat exchanger for liquefying gaseous refrigerant from said heat exchanger and returning to said heat exchanger in liquefied form for evaporation by heat of air carried in heat exchange relation with said heat exchanger by said circulating fan means.

2. A refrigerating unit for a refrigerating cabinet as claimed in claim 1 in which one of said two openings in said chamber is a top opening and the other of said two openings in said chamber is a bottom opening.

3. A refrigerating unit for a refrigerating cabinet comprising: a base, a refrigerated heat exchanger, a chamber on said base for said heat exchanger, said chamber having two openings with similar perimeter geometry, a first cover for either of said two openings, a

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second cover for either of said two openings, said first cover having an air inlet opening and an air outlet opening, said air inlet and said air outlet openings being adapted to permit the ingress and egress of air in heat exchange relation with said heat exchanger, means mounted on said base exterior of said chamber for liquefying gaseous refrigerant from said heat exchanger and returning it to said heat exchanger in liquefied

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form for evaporation by heat of air carried in heat exchange relation with said heat exchanger.

4. A refrigerating unit for a refrigerating cabinet as claimed in claim 3 in which one of said two openings in said chamber is a top opening and the other of said two openings in said chamber is a bottom opening.

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