Feb. 22, 1949. H. F. LUECKE 2,462,115

FREEZING CABINET WITH REFRIGERATING REMOVABLE UNIT

Filed June 10, 1946 2 Sheets-Sheet 1

Fig. 4.

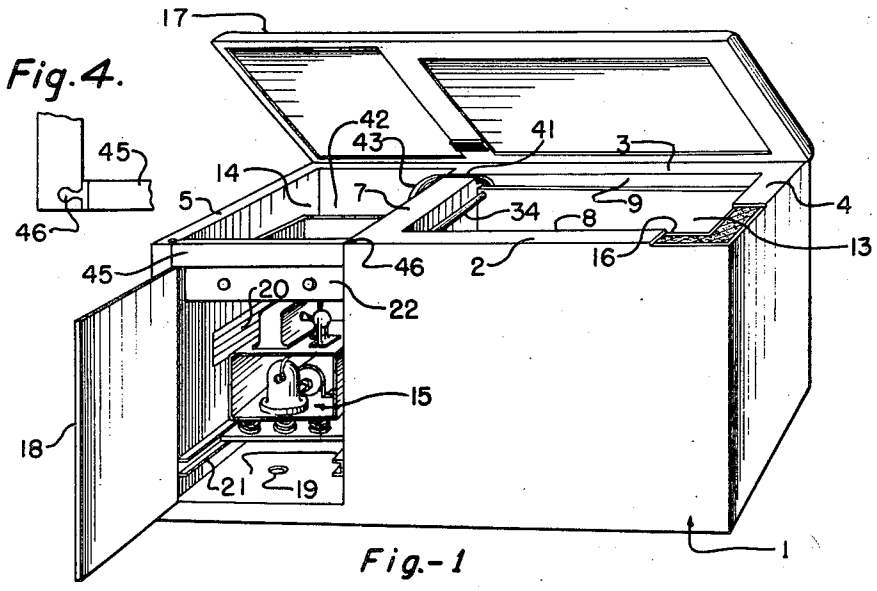


Fig.-1

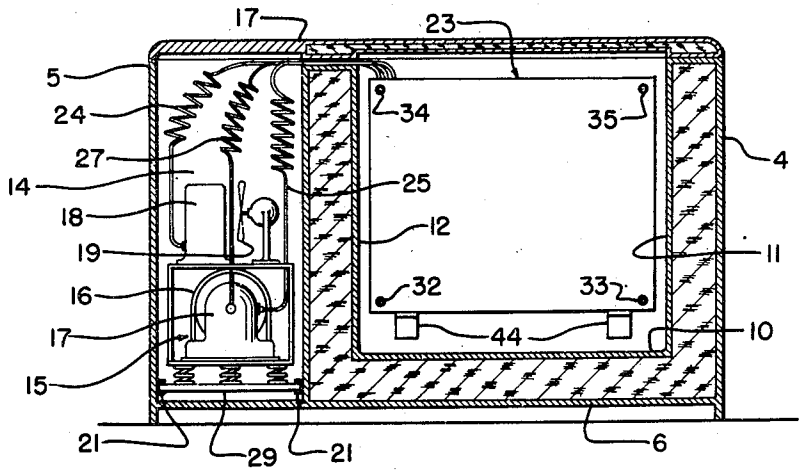


Fig.-2

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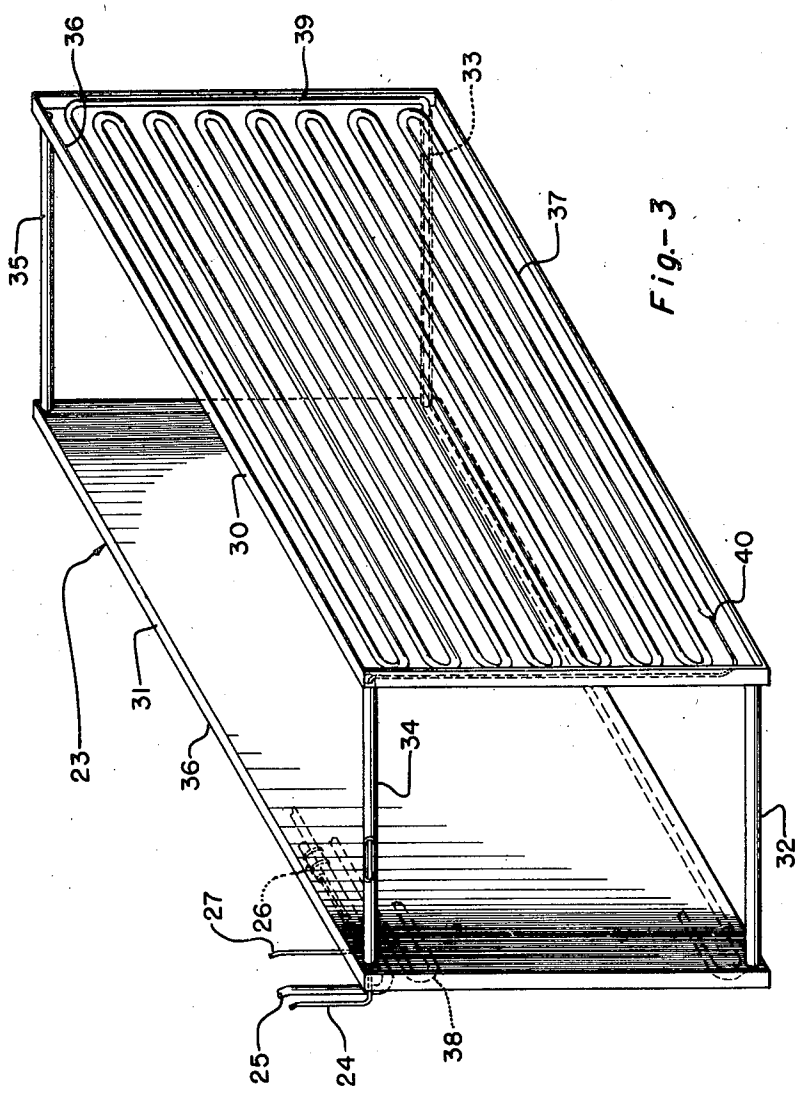


Fig. - 3

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FREEZING CABINET WITH REFRIGERATING REMOVABLE UNIT

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5 Claims. (Cl. 62—116)

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This invention relates to freezing cabinets for the storage of frozen foods, particularly designed for individual home use. The great hazard in connection with such apparatus is interruption of the refrigeration cycle through break-down which cannot be repaired quickly in situ, resulting in rise of the temperature in the refrigerating chamber, with ensuing spoilage of its contents.

One of the objects of the invention is to provide a freezing cabinet in which all of the refrigerating apparatus can be removed as a unit, without uncoupling the refrigerant conduits, and replaced by a fresh unit already fully charged with refrigerant, and ready to operate.

Another object of the invention is to provide a freezing cabinet having a removable evaporator therein, and a removable compressor unit positioned outside the freezing chamber, with high and low pressure conduits permanently connected to the evaporator, and being of surplus length, with the length accommodated by bending or coiling the conduits, so that they may be extended to permit the relative displacement of the evaporator and the compressor unit, without breaking the continuity of these conduits, in removing the evaporator and the compressor unit one at a time, or replacing them in the same manner.

Still another object of the invention is to provide an evaporator in the form of a hollow vertical walled bottomless frame adapted to be positioned peripherally within the freezing cabinet adjacent the walls thereof, surrounding the articles being refrigerated, so that in servicing, the evaporator can be removed and replaced with another, without disturbing the articles contained within the cabinet.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawings throughout the several figures of which the same reference characters have been used to denote identical parts:

Figure 1 is a perspective view of a freezing cabinet embodying the principles of the invention;

Figure 2 is a vertical longitudinal section through the same;

Figure 3 is a perspective view of the evaporator element;

Figure 4 is a plan view in detail, showing one of the connections at the end of the removable lintel with the adjacent cabinet structure.

Referring now in detail to the several figures,

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the numeral 1 represents a cabinet, the overall dimensions of which are embodied in the outer side walls 2 and 3, outer end walls 4 and 5, and outer bottom wall 6. There is a cross partition wall 7. A portion of the cabinet is double walled, having inner side walls 8 and 9, an inner bottom wall 10, and an inner end wall 11, said walls being spaced from the corresponding outer walls, and an opposite inner end wall 12, spaced from the partition wall 7. The inner walls define a freezing compartment 13, the space between the walls which surround it being filled with insulating material. The outer wall extension on the other side of the partition wall 7, together with the outer end wall 5, form an uninsulated compartment 14, which houses the compressor unit 15.

The freezing compartment has a metal lining 16.

The upper ends of both the inner and outer walls, and including the partition wall, terminate in a common horizontal plane and are normally overlain by the common cover 17, hinged to the outer side wall 3, and which forms a closure for both compartments. The outer front wall 2 has a vertically hinged door 18, giving access to the compartment 14 from the front. The bottom of the compartment 14 has an air inlet 19 and the end wall 5 has the outlet louvers 20. Within, the compartment 14 has rails 21 at the same level, upon which the base of the compressor unit is slidable, and near the top of said compartment there may be a drawer 22. This drawer is useful for holding an article taken from the freezing chamber, for thawing it out, advantage being taken of the heat of the compressor unit which rises toward the top of the compartment 14.

The freezing apparatus comprises, on the one hand, the compressor unit 15, which includes the motor 16, compressor 17, condenser 18 and condenser fan 19, and on the other hand, the evaporator 23. The compressor unit is connected to the evaporator by the high and low pressure conduits 24 and 25, and there is also the usual thermostatic device 26 associated with the evaporator, the tube 27 of which connects it to a control switch on the compressor unit.

The compressor unit is per se conventional. It is mounted on a base 29, which slides on the rails 21 so that it can be readily removed from the compartment 14 upon opening the door 18.

The evaporator 23 in the specific form shown, comprises a pair of parallel vertical metal plates 30 and 31 of substantially the same length as

that of the freezing compartment, spaced apart by the tubular rods 32, 33, 34 and 35, which are rigidly fixed to the plates at their upper and lower corners, the rods 33 and 34 opening through said plates. The length of the rods is such as to position the plates 30 and 31 closely adjacent the side walls when the evaporator is in the freezing compartment. Thus, a bottomless rigid parallelepipedal frame is provided which fits the length and breadth of the freezing compartment and can be lifted out by one taking hold of the top rods 34 and 35.

The peripheral margins of the plates 30 and 31 are outbent at right angles to the planes of said plates, forming flanges 36, which stiffen the plates and convert them into shallow housings for the serpentine coils 37 and 38, which are suitably secured as by soldering or brazing to the outside faces of the plates in good surface contact therewith. The coil 37 terminates in a vertical limb 39, which extends down within a vertical corner angle of the plate 30 and then passes across through the hollow rod 33 and joins the lower end of the coil 38. The coils are thus connected in series.

Liquid refrigerant comes into the anterior end 40 of the coil 37, by way of the high pressure conduit 24, which is a capillary tube and comes into the evaporator at the rear of the plate 31, passing through the rod 34 and down within the adjacent vertical corner angle of the plate 30. The length of the capillary tube is predetermined so as to supply refrigerant according to the capacity of the coils.

The capsule type thermostat 26 is shown secured against the coil 38, near its anterior portion.

The high pressure conduit 24, the suction conduit 25, which leads from the posterior end of the coil 38, and the thermostat tube 27 which goes to the motor control switch, emerge from the evaporator at one corner, close together, so that they can all be lodged in the groove 41, which extends across the partition between the freezing compartment 13 and the compressor unit compartment 14.

The drawer 22 terminates short of the back wall of the compartment 14, leaving a space 42 at the rear of the drawer through which the conduits 24 and 25 and tube 27 pass from the groove 41, respectively to the condenser, suction side of the compressor and to the control switch.

The apparatus of the present invention is designed for one-man servicing. By servicing is meant not the making of any repairs on the spot, but the immediate substitution for the refrigeration apparatus unit of a replacement unit, this being done without breaking the refrigerant connections between the compressor unit and evaporator.

When there is a call for service, the service man drives up with a case containing the replacement unit, consisting of both the compressor unit and the evaporator, operatively connected and fully charged with refrigerant. He then proceeds to remove the faulty unit. It is not practical for him to lift the compressor unit vertically out of the top of the compartment 14, and simultaneously to raise the evaporator vertically from the compartment 13. Together they are too heavy and unwieldy. However, the compressor unit can be easily slid forward along the rails 21, through the open door 18, and set on the floor, and the evaporator unit can then be lifted vertically until it clears the top of the compartment 13, and transferred to

the floor. To permit this relative displacement of the compressor unit and evaporator while being removed, the conduits 24 and 25 and the thermostatic tube 27 are made of considerably greater length than the minimum required to reach from the compressor unit to the evaporator when the apparatus is in position in the cabinet. This extra length is normally disposed in the form of a coil 43, which becomes stretched or extended as the compressor unit and evaporator are sequentially removed in the manner set forth. The extent to which the evaporator must be lifted in order to clear the top of the freezing cabinet is minimized through the fact that the evaporator is of less depth than the freezing compartment and rests upon cleats 44 within said compartment.

In making the transfer of the refrigerating apparatus in the manner described, to the floor in front of the cabinet, it is necessary to take out the drawer 22 and remove the lintel 45, which is above the door 18, in order for the conduits 24 and 25 and tube 27 to clear the cabinet. The lintel is made as a tie bar, having tapered lugs 46 at its ends, which fit into correspondingly tapered sockets in the wall structure which abuts its ends so that it can be readily lifted out, and when in place, ties in the upper corner of the outer wall 5.

After the refrigerating apparatus has been taken out, it is for convenience moved aside, and the case containing the replacement apparatus is brought into convenient juxtaposition to the cabinet. The fresh compressor unit is put upon the rails and slid back into the compartment 14, and the fresh evaporator which is connected to the compressor unit is lifted to the top of the cabinet and lowered into the freezing compartment. The refrigerant conduits and thermostat tube are pushed down into the groove 41, and the coil of tubing 43 which became extended in the process of installing the apparatus is pressed back into compact shape for the sake of neatness, the lintel replaced, the drawer reinserted, and the job is done. The lifting in and out of the evaporator is accomplished without the necessity of removing any of the food packages or other articles from the freezing cabinet.

The entire transfer can be made within five minutes or less, before there is time for any substantial warming up of the freezing compartment to have taken place. The faulty apparatus is then placed in the case from which the replacement was removed, without disconnecting the evaporator from the compressor unit, and is reconditioned at the service station where proper tools are available for making a lasting repair.

While I have in the above description disclosed what I believe to be a preferred and practical embodiment of the invention, it will be understood by those skilled in the art that the details of construction and the arrangement of parts as described, are by way of example and not to be construed as limiting the scope of the invention.

What I claim as my invention is:

1. Freezing cabinet comprising a box having an open-topped freezing compartment and a compressor unit compartment having an opening through the front and also open at the top, a partition separating said compartments, the walls of said freezing compartment, including said partition, being heat insulated, a groove across said partition communicating with said

compartments, freezing apparatus comprising a compressor unit removably contained in said compressor unit compartment, an evaporator removably contained in said freezing compartment, and flexible refrigerant connections between said compressor unit and said evaporator of such length as to permit sequential removal of said compressor unit and said evaporator from said cabinet without the necessity of breaking said connections, said connections passing through said groove, and a lid for said cabinet overlying said compartments and groove.

2. Freezing cabinet comprising a box having a freezing compartment open at the top and a compressor unit compartment having an opening through the front of said box below the top edge thereof and being also open at the top, freezing apparatus comprising a compressor unit removably contained in said compressor unit cabinet, an evaporator unit contained in said freezing compartment and flexible refrigerant connections between said compressor unit and said evaporator of such length as to permit sequential removal of said compressor unit from the front of said cabinet and said evaporator from the top of said cabinet without the necessity of breaking said connections, said cabinet including a removable front portion between said top edge and said front and top openings to enable said connections to clear the front of said cabinet in the unitary removal of said freezing apparatus therefrom.

3. In a refrigerating cabinet having a rectangular freezing compartment, freezing apparatus for said cabinet including an evaporator in said compartment, said evaporator including a bottomless parallelepipedal frame removably fitting peripherally within said compartment, said frame comprising opposite plates having out turned shallow peripheral flanges thereabout constituting said plates as coil housings, and transverse rods perpendicular to said plates rigidly connecting them adjacent the corners, certain of said rods being hollow and opening through said plates, flat coils on the outside of said plates in fixed contact therewith and within the bounds of said flanges, serially connected, and having refrigerant connections passing through said hollow rods.

4. In a freezing cabinet, a freezing compartment, a substantially vertically sided bottomless removable frame of external shape corresponding generally to that of said compartment, extending peripherally about the inside of said compartment and about the food space therein, a metal plate constituting at least part of the side wall structure of said frame, having outward peripheral flanges constituting said plate as a coil housing, and a coil on the outside of said plate in fixed contact therewith and within the bounds of said flanges.

5. Freezing cabinet in combination with refrigerating apparatus comprising a compressor unit, and an evaporator, with refrigerant conduit connections therebetween, said apparatus being removable and replaceable with respect to said cabinet without breaking the contact connections, said cabinet comprising a box, a partition in said box dividing it into a freezing compartment and a laterally juxtaposed compressor unit compartment, said freezing compartment being open at the top giving access for the introduction of the evaporator, and said compressor unit compartment having an opening in one of its outside lateral walls for the introduction of the compressor unit, said compressor unit compartment being open also at the top, said partition having a groove therethrough opening in its top face, placing said freezing compartment and compressor unit compartment in communication, said box having a removable wall section normally separating the lateral and top openings of said compressor unit compartment, and which when removed provides unrestricted space for the passing of said conduit connections from a position outside of said cabinet to a position within said groove, or vice versa, when said refrigeration apparatus is being replaced or removed, and closures for said top and lateral openings.

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