Dec. 24, 1946. B. C. JOHNSON 2,413,233

REFRIGERATOR LINER CONSTRUCTION

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Fig. 1.

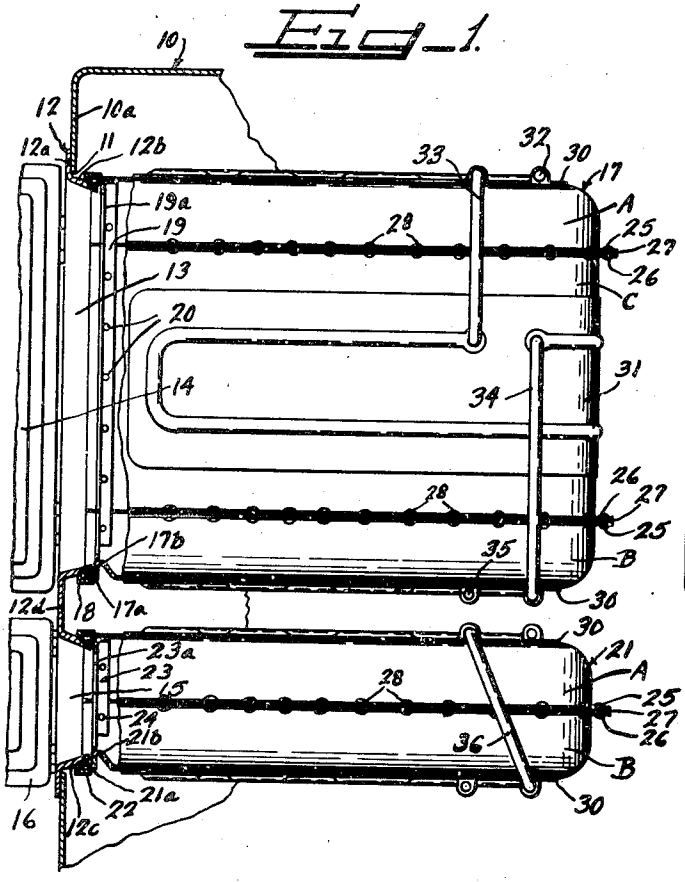


Fig. 2.

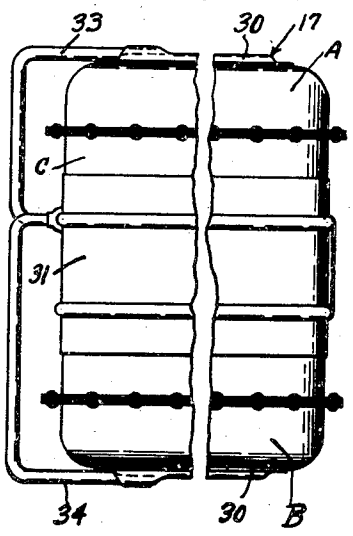


Fig. 4.

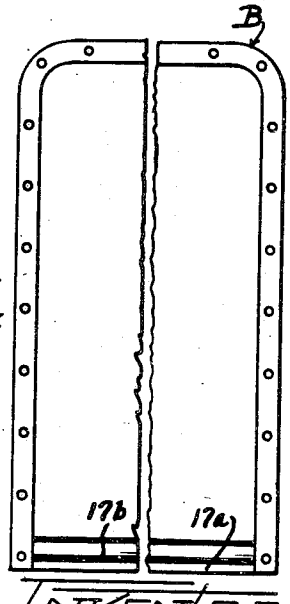
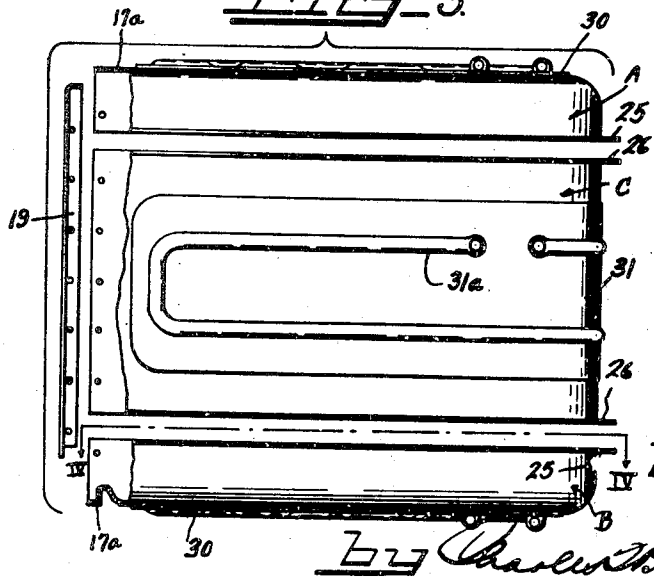


Fig. 3.



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Fig. 5.

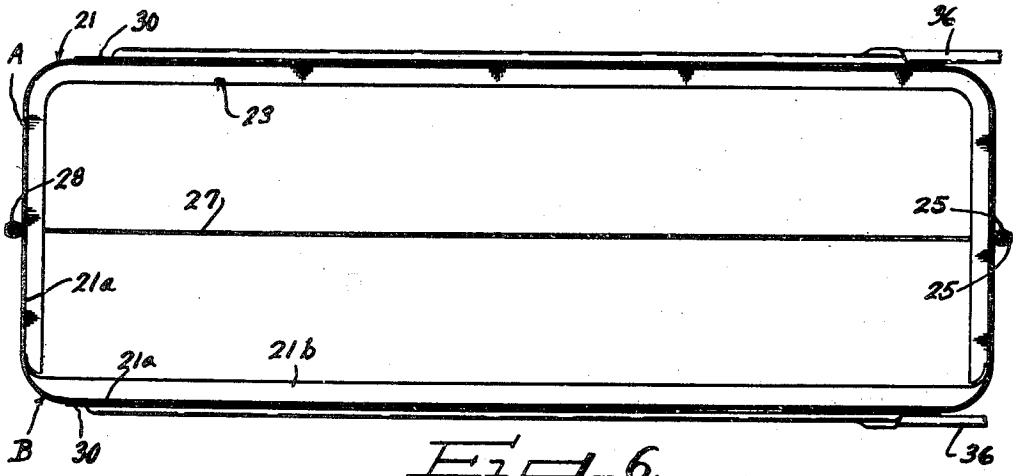
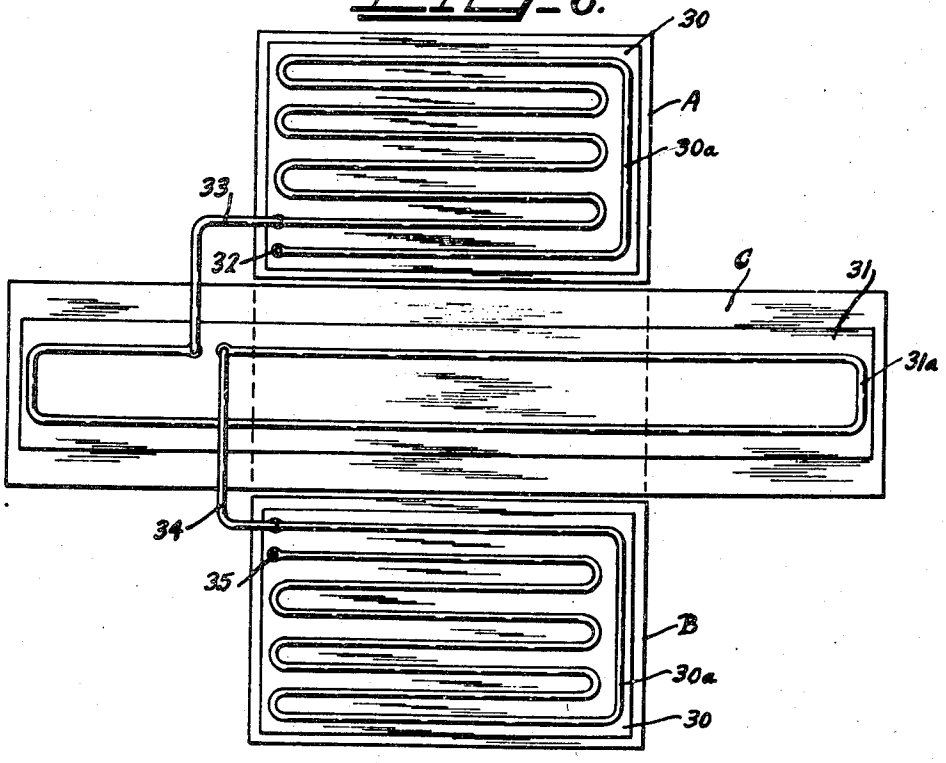


Fig. 6.



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REFRIGERATOR LINER CONSTRUCTION

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Application September 18, 1944, Serial No. 554,610

5 Claims. (Cl. 62—126)

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This invention relates to liner constructions for refrigerators, and specifically deals with sheet metal insert casings for refrigerator cabinets which casings have embossed metal plates bonded thereto to provide refrigerant-distributing ducts.

While the invention will be hereinafter specifically described as embodied in liners for domestic refrigerator cabinets, it should be understood that the principles of this invention are not limited to such usage, being generally applicable to chest constructions, insert casings, and the like.

The usual domestic refrigerator includes an evaporator unit suspended in the interior of the cabinet. The evaporator unit takes up cabinet space and frequently interferes with the arrangement of material in the refrigerator. The evaporator unit defines a sharp-freezing chamber which is always in heat exchange relationship with the rest of the interior of the cabinet. Temperatures materially below freezing, therefore, cannot be maintained in the sharp-freezing chamber without also lowering the temperature of the rest of the cabinet below a desired temperature.

In accordance with this invention, evaporator units suspended in the interior of refrigerator cabinets are eliminated. The invention provides liner casings for insertion in a refrigerator cabinet to define an unobstructed cabinet interior. The casings are stamped and drawn from sheet metal and define top, bottom, side and back walls of refrigerated spaces forming the cold-storage compartments of refrigerator cabinets. The casings are equipped with forwardly projecting edges around the open fronts thereof for receiving sealing strips which cooperate with breaker strips or molded breaker pieces which define entrance mouths to the casing interiors. Embossed metal plates are bonded to outer faces of the casings to cooperate with the casing faces for forming refrigerant-conveying ducts. The refrigerant in these ducts is thus in very intimate heat transfer relation with the spaces enclosed by the casings.

It is, then, an object of this invention to provide simple, inexpensive sheet metal casings adapted to serve as liners for cabinets.

A still further object of the invention is to provide a refrigerator cabinet insert casing which has metal bonded thereto for defining refrigerant-conducting paths in intimate heat transfer relation with the interior of the casing.

A still further object of the invention is to provide an improved sheet metal liner arrangement for domestic refrigerators which has refrigerating ducts formed by brazed-on or welded-on metal plates.

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A further and specific object of the invention is to provide liner casings for refrigerators composed of secured-together dished metal stampings adapted to receive insert stampings therebetween to increase the capacity thereof.

Other and further objects of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which, by way of preferred examples only, illustrate two embodiments of the invention.

On the drawings:

Figure 1 is a fragmentary vertical cross-sectional view of a refrigerator cabinet equipped with two liner casings shown partly in side elevation.

Figure 2 is a broken rear end elevational view of the top liner casing of Figure 1.

Figure 3 is an exploded side elevational view of the parts of the top liner casing of Figure 1, with portions broken away and shown in vertical cross section.

Figure 4 is a plan view of the bottom pan member of the liner casing assembly of Figure 3, taken along the line IV—IV of Figure 3.

Figure 5 is a somewhat enlarged front end elevational view of the bottom liner casing of Figure 1.

Figure 6 is a somewhat diagrammatic plan view of the parts of the top liner casing of Figure 1 arranged to illustrate the refrigerant flow path.

As shown on the drawings:

As shown in Figure 1, the reference numeral 10 designates generally a refrigerator cabinet having a front wall 10*a* with an aperture 11 therein. A molded breaker strip frame 12 has a peripheral outturned flange 12*a* overlying the front wall 10*a*, together with rectangular inwardly sloping flanges 12*b* and 12*c* projecting through the opening 11 and separated by a wall portion 12*d*. The rectangular flange 12*b* defines an opening 13 closed by a door 14 hingedly mounted on the cabinet 10 while the flange 12*c* defines an opening 15 closed by a separate door 16 hingedly mounted on the cabinet 10 beneath the door 14.

A top liner casing 17 is mounted in the cabinet 10. This casing 17 has top, bottom, side and back walls together with an open front receiving the breaker flange 12*b* therein so that the interior of the casing is in full registration with the opening 13.

As illustrated, the casing 17 has a forwardly projecting peripheral edge 17a around the open front thereof receiving a rubber sealing strip 18 thereon. This sealing strip 18 is bottomed by an inwardly projecting leg 19a of an inserted angle strip 19 which is riveted to the casing walls by means of rivet 20. The bottom wall of the casing 17 has a raised bead portion 17b providing an abutment for that portion of the sealing strip 18 that extends along the bottom of the casing.

The flange 12b of the breaker piece 12 is nested in the front edge 17a of the casing in sealing engagement with the sealing strip 18.

A bottom casing 21 is mounted in the cabinet 10 and has top, bottom, side and rear walls defining a refrigerated chamber separate from the chamber defined by the casing 17. The casing 21, like the casing 17, has an open front defined by a forwardly projecting peripheral edge 21a surrounding the flange 12a of the breaker piece 12. A sealing strip 22 is seated on this edge 21a and is bottomed along the top and sides of the casing 21 by an inwardly projecting leg 23a of an angle piece 23 which is riveted to the casing 21 by means of rivets 24. The strip 22, along the bottom of the casing, is bottomed by an upturned bead 21b on the bottom wall of the casing across the front end thereof. The flange 12c of the breaker piece is nested in the open front end of the casing 21 in sealing engagement with the sealing strip 22.

The breaker piece 12 does not have contact with either casing 17 or 21, since it is held in insulated spaced relation therefrom by the sealing strips 18 and 22. The openings 13 and 15 to the interiors of the casings 17 and 21 are provided by the flanges 12b and 12c of the breaker piece, but, since this breaker piece is in insulated relationship with the casings as explained above, the breaker strip can be made of heat-conducting material if desired.

The casing 17 is composed of a stamped top pan A, a stamped bottom pan B and an interposed wall piece C. The pans A and B are substantially identical, the only difference in the two being the provision of the upstanding bead 17b in the bottom pan B. The bead 17b forms a raised dam holding liquid in the bottom of the chest, as when the casing is being defrosted.

The top and bottom pans A and B have outturned flanges 25 around the back and side walls thereof adapted to mate with each other to form a small casing such as the casing 21, or to mate with flanges 26 on the top and bottom of the interposed wall piece C. The mating flanges have gaskets 27 interposed therebetween. Perforations are provided through the flanges to receive rivets 28 connecting the parts together.

The top wall of the pan A and the bottom wall of the pan B are covered with identical embossed metal plates 30, 30. The central portion of the insert piece C is covered with an embossed plate 31. These plates 30 and 31 are brazed, welded, or otherwise integrally secured to the walls which they cover.

As shown in Figure 6, the plates 30 are embossed to define ducts 30a while the plate 31 is embossed to define a duct 31a. The duct 30a of the plate on the top pan A receives refrigerant through an inlet tube 32. This duct 30a discharges through a tube 33 to the duct 31a. The duct 31a extends around the sides and back wall of the part C and discharges through a tube 34 to the duct 30a of the plate 30 on the bottom pan B. This tube 34 discharges to a tube 35. Thus, refrigerant is circulated in serpentine paths over the top of the casing 17, thence around the sides and back wall of the intermediate portion of the casing and thence under the bottom wall of the casing.

The casing 21 receives refrigerant in a serpentine path over its top wall and, as illustrated in Figure 1, refrigerant from this serpentine path over the top wall discharges through a tube 36 directly to the serpentine path under the bottom wall of the pan B.

Casings of any desired height can be made by interposing high or low metal pieces C between the pans A and B, or by directly connecting the pans A and B together.

The casings are inexpensively produced by simple stamping and drawing operations, and have integral refrigerant-circulating ducts around their outer faces formed by embossed metal plates bonded to these outer faces. Since the refrigerant in these ducts is only separated from the casing interiors by the single thickness of casing wall, an excellent heat transfer is obtained. No interposed air space, tube metal, casing finish, such as vitreous enamel, or the like insulation is present, and a more efficient but cheaper casing is obtained. Insulation (not shown) can be provided between the casings and the cabinet in which they are mounted to minimize heat absorption from outside the cabinet.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A liner casing for refrigerator cabinets which comprises spaced opposed top and bottom metal pans having open front ends and side and back walls with outturned flanges thereon, a U-shaped metal piece with sides and a back wall between said top and bottom pans and having outturned flanges mating with the flanges of said pans, means securing said mating flanges together, embossed metal plates bonded to the top and bottom walls of said pans, an embossed metal plate bonded to the sides and back wall of said U-shaped metal piece, said embossed plates defining refrigerant-conveying ducts, a tube connecting one end of the duct on the top pan with one end of the duct on the U-shaped piece, a second tube connecting the other end of said duct on the U-shaped piece with one end of the duct on the bottom wall of the bottom pan, said pans and U-shaped piece cooperating to define a forwardly projecting front edge around the open front of the casing, said bottom wall of the bottom pan having an upturned bead adjacent said forwardly projecting edge, and an angle strip inside of the casing extending along the side walls and top thereof and having an inwardly projecting leg adjacent the forwardly projecting edge cooperating with said bead to form an inside abutment wall around the inlet mouth of the casing.

2. A liner assembly for a refrigerator cabinet comprising stamped top and bottom metal pans each having side and back walls with outturned flanges therearound, means securing said outturned flanges together to define an open front chamber, said pans having embossed metal plates bonded on the top and bottom walls thereof and cooperating therewith to define refrigerant cir

culating ducts, a tube connecting said ducts, said pans having forwardly projecting front edges around the open fronts thereof, the bottom wall of said bottom pan having an upstanding bead embossed therein forming an upstanding flat abutment wall in inwardly spaced relation from said forwardly projecting front edges and facing said edges, and a metal angle strip extending along the sides and top of said liner having an inwardly projecting leg in the liner in spaced relation inwardly from the forwardly projecting front edge cooperating with said abutment wall of said bead to define a continuous abutment wall around the inlet mouth of the liner.

3. A refrigerator comprising a cabinet having a front wall with an opening therein, a breaker piece secured to said front wall having flanges projecting into the cabinet through said opening defining separate doorways in superimposed relation, separate liner casings having top, bottom, side and back walls in said cabinet together with open front ends surrounding said inwardly projecting flanges of the breaker piece, and embossed plates bonded to the outer faces of said casings defining refrigerant-circulating ducts for conveying refrigerant around the casings in intimate heat transfer relation to the unobstructed refrigerating chambers defined by the casings.

4. A casing comprising a top pan having a depending skirt around three sides thereof, a bottom pan having an upstanding skirt around three sides thereof, an insert piece having three sides connecting said skirts together with an open front cooperating with the open ends of the skirts to define an inlet mouth to an enclosed chamber, and means on said insert piece cooperating therewith to define refrigerant-circulating ducts.

5. A liner assembly for a refrigerator cabinet comprising top and bottom pans each having side and back walls, means connecting said pans together to define an open front chamber, said pans having forwardly projecing front edges around the open fronts thereof, the bottom wall of said bottom pan having an upstanding bead portion embossed therein forming an upstanding abutment wall in inwardly spaced relation from said forwardly projecting front edges and facing said edges, and an angle strip in said pan extending along the sides and top of said liner and having an inwardly projecting leg in the liner in spaced relation inwardly from the forwardly projecting front edges and cooperating with said abutment wall of said bead to define a continuous wall around the inlet mouth of the liner.

BERNARD C. JOHNSON.