

Sept. 17, 1957

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2,806,360

EVAPORATOR UNIT

Filed April 17, 1956

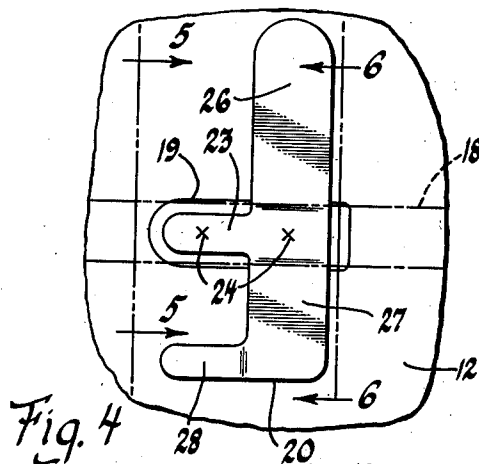


Fig. 4

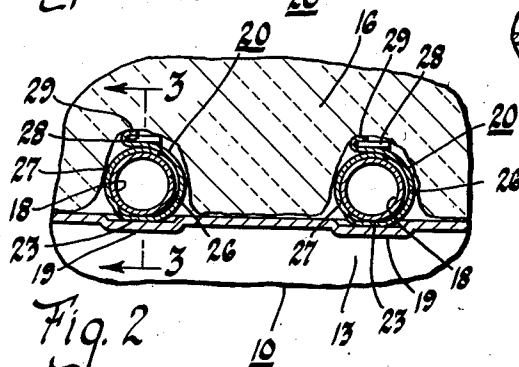


Fig. 2

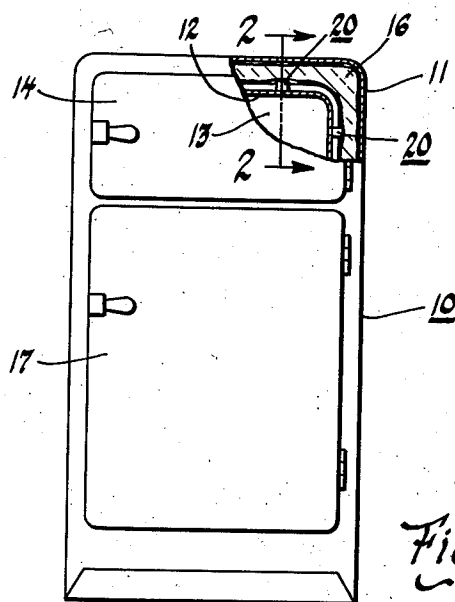


Fig. 1

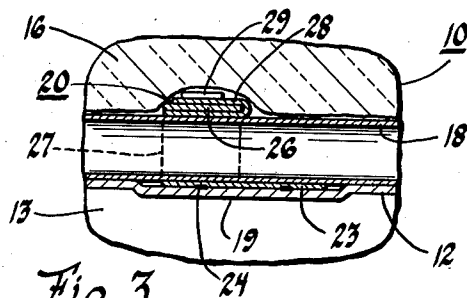


Fig. 3

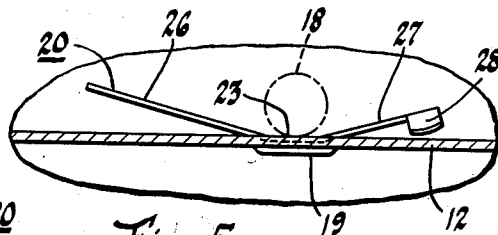


Fig. 5

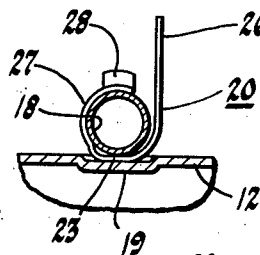


Fig. 6

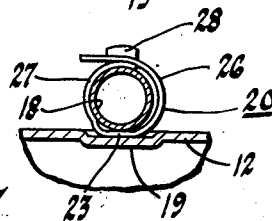


Fig. 7

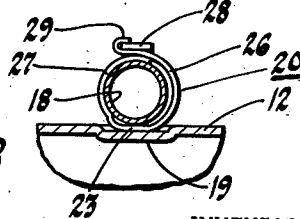


Fig. 8

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2,806,360

EVAPORATOR UNIT

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Application April 17, 1956, Serial No. 578,648

2 Claims. (Cl. 62-126)

This invention relates to refrigeration and more particularly to an evaporator or cooling unit of a mechanical refrigerating system.

Many different types of evaporator or cooling unit elements for refrigerating systems have heretofore been proposed and produced. I am familiar with sheet metal evaporator units that have been formed by brazing an embossed sheet of metal to a flat metal sheet to provide refrigerant passages between the sheets and which bonded together sheets have been bent to provide exposed walls of a freezing compartment within a food storage chamber of a refrigerator cabinet. These evaporator units are expensive to make because of difficulties in sealing the metal sheets together to avoid leaks of refrigerant from passageways provided therebetween and because of the tedious and time consuming operation of flushing the passageways clear of oxides and other foreign matter accumulated therein during bonding of the sheets to one another. In present day household refrigerator cabinets wherein a freezing compartment is surrounded by insulating material and completely isolated from an unfrozen food storage compartment in the cabinet it is for all practical purposes desired to eliminate forming walls of a freezing compartment from bonded together metal sheets in order to reduce the manufacturing costs of a refrigerator. I, therefore, contemplate the provision of an efficient and inexpensive box-like freezing compartment forming evaporator unit for a refrigerating system wherein brazing is reduced to a minimum and wherein a refrigerant expansion conduit wrapped or coiled around walls of the unit can be secured in metal to metal contact therewith by means capable of being deformed by fingers of a person's hand to eliminate expensive brazing and use of special tools in manufacturing such a unit.

An object of my invention is to provide a simplified and improved evaporator unit for a refrigerating system.

Another object of my invention is to provide an evaporator unit in the form of a box-like sheet metal member forming a freezing compartment in a refrigerator cabinet having a refrigerant expansion conduit secured to walls of the member in an improved and inexpensive manner.

A further object of my invention is to provide a plurality of clips on walls of a box-like member of an evaporator unit which form the sole means of securing runs of refrigerant expansion conduit wrapped therearound in metal to metal contact with the walls.

A still further and more specific object of my invention is to provide soft metal clips on walls of a box-like evaporator unit with ear-like portions that can be easily deformed by fingers of a person's hand and rolled in different directions around runs of a refrigerant expansion conduit to secure the conduit to the walls and which clips have portions thereof locked together for preventing rolled overlapped ears of the clips from unfolding from the conduit during handling of the evaporator unit in connecting same to other conduits of a closed refrigerat-

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ing system and in assembling same into a refrigerator cabinet.

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

In the drawings:

Figure 1 is a front view of a refrigerator cabinet partly in section having an evaporator unit embodying my invention forming a freezing compartment therein;

Figure 2 is an enlarged fragmentary sectional view of a portion of the evaporator unit shown in Figure 1 and is taken on the line 2-2 thereof showing a metal clip secured to a wall of the unit with ears on the clips rolled around a refrigerant expansion conduit of the unit;

Figure 3 is another fragmentary sectional view similar to Figure 2 and taken on the line 3-3 thereof;

Figure 4 is a fragmentary plan view showing a substantially F-shaped metal clip secured to a wall of the evaporator unit prior to ears thereof being rolled around a conduit to be associated therewith;

Figure 5 is a view similar to Figure 4 and is taken on the line 4-4 thereof;

Figure 6 is a fragmentary sectional view taken in the direction of arrows 6-6 in Figure 4 showing one ear on the metal clip rolled around a conduit;

Figure 7 is a view similar to Figure 6 showing both ears on the metal clip rolled around a conduit in overlapping fashion; and

Figure 8 is a view similar to Figures 6 and 7 showing the end portion of one ear on the clip bent over a tab on another ear of the clip.

Referring to the drawings, I show in Figure 1 thereof a refrigerator cabinet 10 comprising an outer metal shell or panel 11 and a box-like sheet metal member or liner 12 providing a part of an evaporator unit of this invention and forming walls of a freezing or frozen food storage compartment 13 in the upper portion of a cabinet 10. The front access opening of freezing compartment 13 is closed by a door 14 and this compartment is insulated by any suitable or desirable insulating material 16 preferably of the bagged or wrapped type located between walls of compartment 13 and shell 11. In the lower portion of cabinet 10 there is provided an insulated unfrozen food storage compartment having its front access opening closed by a door 17 as is conventional in this type of refrigerator cabinet. An evaporator (not shown) of a closed refrigerating system associated with cabinet 10 cools the interior of the unfrozen food storage compartment to a temperature above freezing and a second evaporator in the form of a refrigerant expansion conduit 18, wrapped or coiled around walls of the box-like member or liner 12, cools the interior of the frozen food compartment 13 to a temperature below freezing. The evaporators may be connected in parallel or in series relationship as desired with a refrigerant translating device portion of the refrigeration system, which device is usually housed in a machine compartment located in the bottom of the refrigerator cabinet 10.

In order to minimize manufacturing costs of an evaporator unit of the type described and which forms the freezing compartment 13 of cabinet 10 I provide walls of the sheet metal box-like member 12 with a plurality of spaced apart depressions 19 (see Figure 2) along runs of conduit 18 to be wrapped or coiled around the outside thereof in metal to metal contact therewith. A metal clip, generally represented by the reference numeral 20 in Figure 1, is associated with each of the plurality of depressions 19. Each clip 20 is fabricated from sheet aluminum alloy of between .032 and .040 inch thickness which is non-tem-

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pered so as to be readily pliable and easily bent or deformed by fingers of a person's hand. The metal sheet from which clips 20 are fabricated preferably has a specification as follows:

Elements:	Percentage
Manganese -----	1.0 to 1.5
Silicon -----	.6
Iron -----	.7
Copper -----	.2
Zinc -----	.1
Aluminum -----	.15
Other elements -----	.05

The sheet metal liner 12 may be of the same alloy but tempered, such as by annealing same, so as to render its walls stiff and impart rigidity thereto for structural strength. The metal clips 20 are substantially F-shaped in plan view (see Figure 4).

Each of the metal clips 20 has an elongated portion 23 fitting in a depression 19 so as to dispose the outer face of this portion of the clips flush with the outer surface of a wall 12 of compartment 13. Portion 23 of each metal clip 20 is spot welded at two or more spaced points as at 24 (see Figure 4) to secure the clips to liner 12. Each clip has a first integral ear or ear-like projection 26 extending laterally from one side of the elongated portion 23 thereof and a second integral ear or ear-like projection 27 extending laterally from the opposite side of elongated portion 23. In addition each clip 20 has a tab 28 (see Figures 4 and 5) integral with and extending outwardly from the end portion of ear 27 in a direction substantially at right angles to its lateral extension.

In assembling the conduit portion 18 to box-like member or portion 12 of my evaporator unit the conduit 18 is wrapped or coiled around walls of liner 12 with various runs or coils of the conduit paralleling and being positioned over the elongated portion 23 of the spaced apart clips as shown by the dot-dash lines in Figures 4 and 5 of the drawings. After conduit 18 is wrapped or coiled about the liner member 12 the ear 27 on clips 20, together with the tab 28 thereon, is bent or rolled around the conduit as shown in Figure 6 of the drawings and the other ear 26 is bent or rolled therearound to overlap a part of the rolled ear 27 (see Figure 7). The tab 28 on ear 27 is then bent upwardly and downwardly against the overlapping part of rolled over ear 26 (see Figures 3 and 8). Rolled over ears 26 and 27 of metal clips 20 thus fasten runs or coils of conduit 18 in metal to metal contact with the walls 21 of compartment 13 since the depressions or dimples 19 locate the outer surface of the portion 21 of the clips flush with the outer surface of these walls. Tab 28 now overlies the overlapping parts of the rolled or folded over ears 26 and 27 and thereafter end portion 29 on ear 26 is bent upwardly across a side edge and downwardly against the top surface of tab 28 (see Figure 8). By bending the end 29 of ear 26 upwardly and over tab 28 a means is provided to interlock the overlapped parts of ears 26 and 27 of clips 20 to one another and the bent end 29 of ear 26 engaging the tab 28 prevents the ears 26 and 27 from unfolding relative to one another from runs of conduit 18. While clips 20 are of soft non-tempered metal capable of being bent by fingers of a person's hand they are, due to the interlock between ears 26 and 27 formed in the manner described, sufficient under ordinary conditions or circumstances to hold and prevent outward bowing of portions of conduit 18 with respect to walls of the box-like liner member 12. By holding the conduit 18 with portions of clips 20 uniquely folded or bent and

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interlocked together as herein disclosed against walls of member 12 the conduit 18 is prevented from bowing or bulging away from the walls. The evaporator unit can be freely handled by a workman to connect the free or loose ends of conduit 18 to ends of other conduits or pipes of a closed refrigerating system leading to the refrigerant translating device thereof or while assembling same into a refrigerator cabinet without danger of conduit 18 bowing or buckling and causing large voids between the insulating material 16 and outer surfaces of the walls 12. By virtue of the relatively soft non-tempered character of clips 20 portions thereof can be readily bent or deformed by fingers of a person's hand whereby the designing and use of special tools or even pincers or pliers is eliminated in the operation of securing conduit 18 to walls of member 12. Furthermore the bending of portions of clips 20 can be quickly carried out to minimize the time required for this operation to thereby reduce manufacturing costs of producing evaporator units of the type disclosed. While the metal clips are soft and pliable the interlocking together of overlapping ears thereof provides a strong clamping or tying of conduit 18 to walls of the box-like member 12 and the clips are not likely to be pulled open or to be broken under ordinary conditions in the steps of manufacturing closed refrigerating systems and of assembling a system into a refrigerator cabinet.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, 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. A sheet metal heat absorber of a refrigerating system comprising a substantially box-like member having spaced apart metal clips thereon capable of being deformed by fingers of a person's hand each provided with a portion welded to a wall of said member and over which portion a run of a length of a refrigerant expansion conduit is extended and is to be fastened to the wall by said clips, each of said clips including integral ears projecting outwardly from opposite sides of said welded portion thereof to either side of the run of said conduit and a tab integral with and extending laterally from an end of one of said ears in a direction substantially paralleling the conduit run, said one ear of each metal clip together with the tab thereon being rolled in one direction over said conduit run in contact therewith, the other ear of each of said clips being rolled in an opposite direction over said conduit run with a part thereof overlapping a rolled part of said one ear to clamp the conduit run to said wall and to maintain said run spaced from other runs of said conduit, said tab on said one ear of the clips being bent over the overlapping part of said other ear thereof, and the end of said other ear of each metal clip extending beyond said tab and being bent over a side edge thereof to provide an interlock between said ears whereby to prevent unfolding of said overlapped parts of the clips.

2. A heat absorber as defined in claim 1 wherein the welded portion of the clips is disposed in a depression in the wall of the box-like member to position same flush with the outer surface of the wall.

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