Nov. 10, 1936. D. P. HEATH 2,060,072

SHEET METAL EVAPORATOR

Original Filed May 16, 1931 2 Sheets-Sheet 1

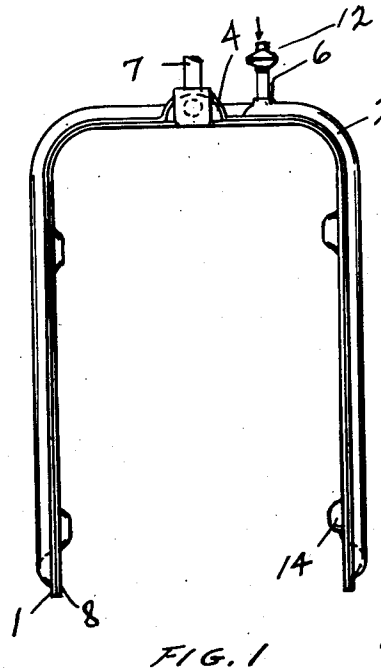


FIG. 1

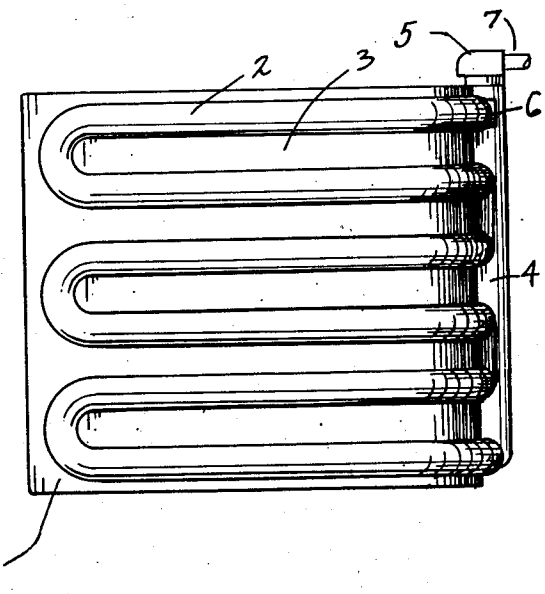


FIG. 2

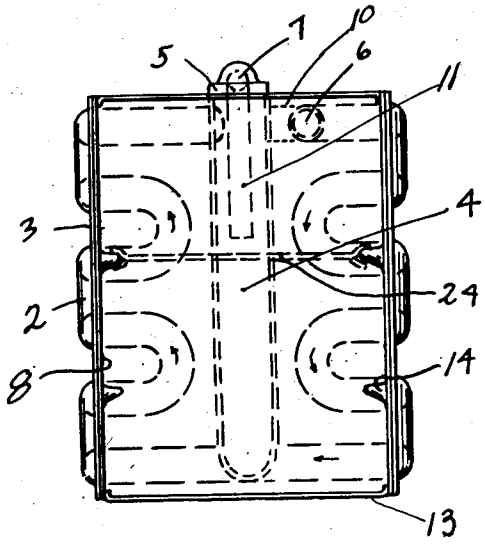


FIG. 3

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SHEET METAL EVAPORATOR

Original Filed May 16, 1931 2 Sheets-Sheet 2

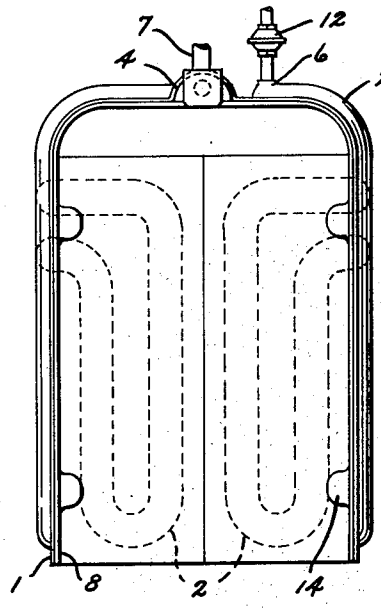


FIG. 7

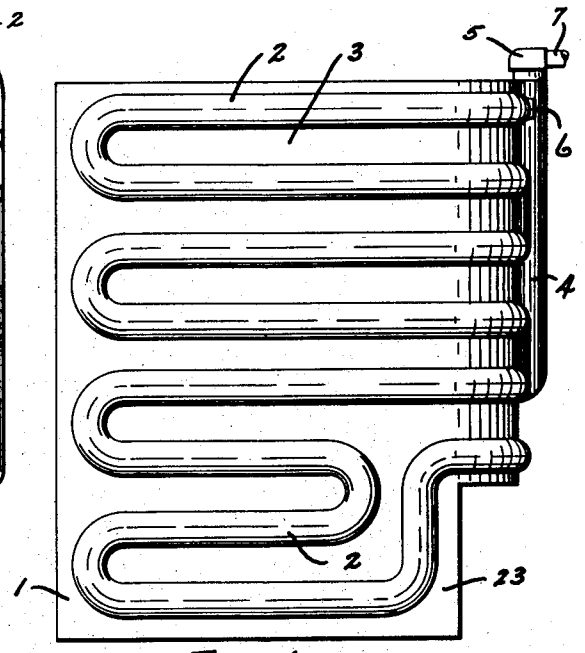


FIG. 4

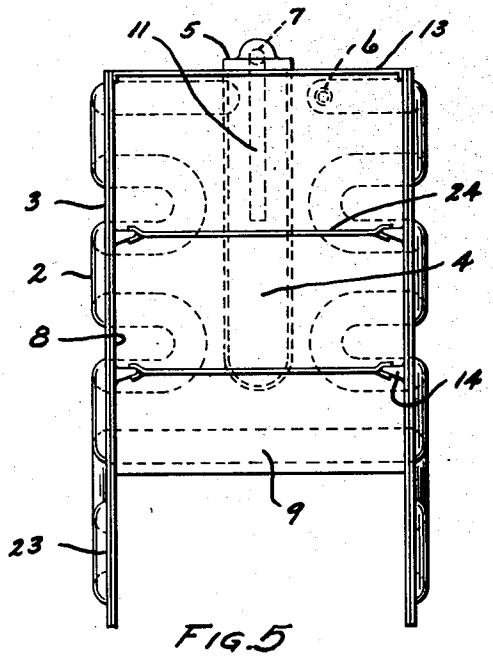


FIG. 5

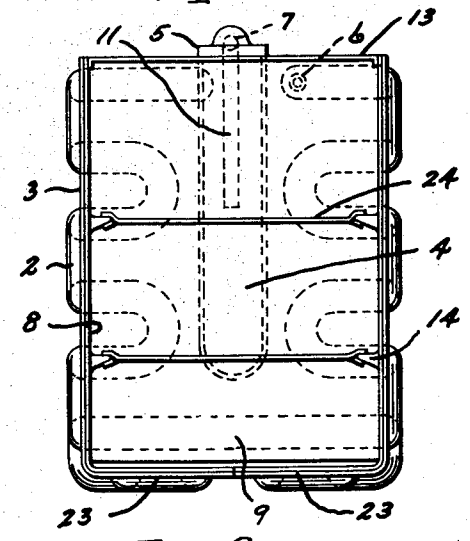


FIG. 6

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2,060,072

SHEET METAL EVAPORATOR

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Application May 16, 1931, Serial No. 537,965
Renewed August 24, 1934

12 Claims. (Cl. 62—126)

The present invention relates to evaporators and more especially to those of small size which are employed in domestic refrigerators.

An object of the present invention is to provide an improved evaporator of the refrigerated double sheet metal wall type and method of forming same.

A further object of the present invention is to provide an improved evaporator structure wherein superimposed and secured together sheet metal portions are formed or arranged to provide at least three upright double refrigerated walls of a freezing compartment adapted to receive ice trays and wherein an extension of the double wall structure is bent inwardly of the freezing compartment to provide a refrigerated wall extending across the compartment.

Another object of the invention is to provide a sheet metal evaporator arranged to provide a plurality of upright walls of a sharp freezing compartment with a refrigerated quick freezing floor formed by bending inwardly a corrugated extension or a plurality of extensions of the sheet metal structure and then joining the ends of the extensions to provide rigidity or increased structural strength.

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:

Fig. 1 is a plan view of an evaporator constructed according to the present invention;

Fig. 2 is a side elevation of the evaporator shown in Fig. 1;

Fig. 3 is a front view of the evaporator shown in Figs. 1 and 2 disclosing a plate for closing the top and bottom of the ice tray compartment;

Fig. 4 is a side view of an evaporator similar to the evaporator shown in Fig. 2 but provided with corrugated extensions adapted to be bent in accordance with the present invention;

Fig. 5 is a front view of the evaporator shown in Fig. 4 in a form prior to the bending of the extensions;

Fig. 6 is a front view of the evaporator disclosed in Fig. 5 after having the extensions bent inwardly; and

Fig. 7 is a top plan view of the evaporator shown in Fig. 6.

Referring to Fig. 1 of the drawings it will be noted that the sheet metal receptacle comprises two flat walls, 1 and 8, each or both of which may be indented or embossed with corrugations to form refrigerant passageways. I may employ any of the various processes to accomplish the forming of these corrugations, such as rolling, stamping or expanding by fluid pressure. When the sheet metal walls 1 and 8 are stamped or rolled I prefer to indent each separately before welding. The sheets are then either formed to shape of the desired freezing compartment and welded together or are first welded and then bent to the final shape. In detail the corrugations 2, Figs. 1, 2 and 3 are shown formed in the outer sheet 1 and are sinuous in arrangement having an inlet opening 6 for the admission of a volatile refrigerant and the accumulator or chamber designated at 4 is in communication with the passageways 2 which may be formed in either one or both of the sheets 1 and 8. This accumulator 4 may be closed by the head 5 or may have portions of the sheets 1 and 8 closing its ends. In Figs. 1 to 7 inclusive the chamber 4 is established centrally in those portions of 1 and 8 connecting the evaporator side walls but it may, if desired, be located in one of the side walls.

Between the channel corrugations 2 I secure the contact portions of sheets 1 and 8 together along portions indicated by the numeral 3 by welding, brazing or other methods. The sheets are also contiguous at their peripheries and are sealed at or near these contacting edges by welding or by other sealing means.

The inner sheet 8 may be indented inwardly to provide the projecting bosses 14 which serve as supports for ice freezing trays or for removable shelves used in the freezing compartment. The intimate thermal relationship thus established between the refrigerant in these bosses and the metallic tray or shelf which is retained by pressure on the bosses provides improved heat transfer conditions. The bosses 14 may extend as channels of considerable length to provide a maximum of contact surface if desired, or they may be short and oval-shape in section substantially as shown.

As regards the direction of the corrugations formed in either of the sheets 1 or 8 for the flow of refrigerant it is usually more adavntageous for carrying out certain welding processes to position these corrugations to allow the lines of welding between the corrugations to extend continuously as far as practicable. It must be understood that the corrugations 2 may also be indented to provide sinuous passageways in the side walls, the major portion of which passageways extend horizontally. In either of the con-

structions disclosed the header or chamber 4 may be established vertically.

In the operation of a refrigerating system the evaporator shown in Figs. 1, 2 and 3 has the expansion valve 12 admitting unexpanded refrigerant at 6 which refrigerant flows downwardly along the back and one side wall of the evaporator and then flows into the gas space of the chamber 4. The expanded refrigerant then passes through outlet 7 to the refrigerant condensing unit. This expansion of the refrigerant removes heat from the evaporator walls. The head 5 of the accumulator chamber 4 may be fitted with the suction pipe 11 which serves to minimize the possibility of displacement from the evaporator to the compressor of any liquid refrigerant which may have passed into the evaporator. A plate 13 may be welded or otherwise secured to the walls of the evaporator shown in Fig. 3 for closing the top and bottom of the freezing compartment formed by the evaporator walls.

In the modified construction disclosed in Figs. 4, 5, 6 and 7 it will be noted that the bent-in extensions 23 provide an evaporator having three upright walls and a horizontal bottom wall of a sharp freezing compartment and that all four walls are refrigerated. In this modified showing of the invention refrigerant is admitted at 6 and flows in a continuous path down across the back and one side wall of the evaporator and across a portion of the bent-in bottom wall thereof and then again flows across the back, through the passage 9 forming a continuation of the corrugated passageway 2, to the opposite bottom and side wall portions of the evaporator to the outlet chamber 4. The provision of corrugated extensions 23 formed on the structure shown in Fig. 4 affords an improved method of making a sheet metal evaporator which method can be carried out at low cost.

It will be noted that chamber 4 in Figs. 1, 2 and 3 extends to the lower portion of the evaporator and that the corrugated passageways 2 communicate with the chamber at the top and the bottom thereof. Referring now to Figs. 4, 5, 6 and 7 it will be noted that the accumulator chamber 4 stops short of the bottom of the back wall of the evaporator and that the passage 9 conducts refrigerant across the back wall of the unit from the corrugations 2 in the bottom and on each side thereof.

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, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. The method of making a sheet metal evaporator which consists in, superimposing sheet-like portions and securing said sheet-like portions together at certain contiguous points to provide a unitary double walled plate-like structure having a refrigerant expansion chamber therebetween, forming the plate-like structure to provide three vertical walls of a sharp freezing compartment, and bending an integral part of at least one vertical wall of the structure to provide a horizontal wall for the sharp freezing compartment.

2. The method of making a sheet metal evaporator which consists in, superimposing sheet-like portions and securing said sheet-like portions together at certain contiguous points to provide a unitary double walled plate-like structure having a refrigerant expansion chamber therebetween, forming the plate-like structure to provide three vertical walls of a sharp freezing compartment, and bending an integral part of a plurality of the vertical walls of the structure to provide a bottom wall for the sharp freezing compartment.

3. In a sheet metal evaporator, two vertically disposed shells having a central header portion and spaced apart walls formed by a continuation of the material of said header walls, a sinuous passageway for refrigerant formed in one of said shells on one side of said header portion, one end of said sinuous passageway communicating with said header portion near the bottom thereof and the other end of the passageway communicating with the header portion near the top thereof, and said shells being secured together at contiguous portions between said passageway and sealed at their peripheries to form a chamber for the expansion of refrigerant.

4. In a sheet metal evaporator, two vertically disposed shells having a central header portion and spaced apart walls formed by a continuation of the material of said header walls, a sinuous passageway for refrigerant formed in one of said shells on one side of said header portion, a second sinuous passageway for refrigerant formed in one of said shells on the opposite side of said header portion, one end of each of said sinuous passageways communicating with said header portion near the bottom thereof and the other end of each of said passageways communicating with the header portion near the top thereof, and said shells being secured together at contiguous portions between said passageways and sealed at their peripheries to form a chamber for the expansion of refrigerant.

5. The method of making a sheet metal evaporator which consists in, superimposing sheet-like portions and securing said sheet-like portions together at certain contiguous points to provide a unitary double walled plate-like structure having a refrigerant passage or passages therebetween, forming the plate-like structure to provide at least three upright walls of a sharp freezing compartment, and bending an integral part of at least one upright wall of the double walled structure to provide a wall extending across said sharp freezing compartment.

6. The method of making a sheet metal evaporator which consists in, superimposing sheet-like portions and securing said sheet-like portions together at certain contiguous points to provide a unitary double walled plate-like structure having a refrigerant passage or passages therebetween, forming the plate-like structure to provide at least three upright walls of a sharp freezing compartment, and bending an integral part of the lower portion of at least one upright wall of the double walled structure to provide a wall extending across the bottom of said sharp freezing compartment.

7. The method of making a sheet-metal evaporator which consists in, superimposing sheet-like portions and securing said sheet-like portions together at certain contiguous points to provide a unitary double walled plate-like structure having a refrigerant passage or passages therebetween, forming the plate-like structure to provide at least three upright walls of a sharp freezing compartment, and bending an integral part of a plurality of the upright walls of the double walled structure to provide a wall extending across said sharp freezing compartment.

8. The method of making a sheet metal evaporator which consists in, superimposing sheet-like portions and securing said sheet-like portions together at certain contiguous points to provide a unitary double walled plate-like structure having a refrigerant passage or passages therebetween, forming the plate-like structure to provide at least three upright walls of a sharp freezing compartment, and bending an integral part of the lower portion of a plurality of the upright walls of the double walled structure to provide a wall extending across the bottom of said sharp freezing compartment.

9. An evaporator for a refrigerating system comprising, superimposed sheet metal portions forming a double walled structure, the sheet metal portions of the double walled strcture having certain parts thereof secured together and certain other parts thereof spaced apart to provide a refrigerant passage or passages therebetween, said double walled structure being bent to form three upright sides and at least one other side of a sharp freezing compartment, said refrigerant passage or passages extending over portions of all of said sides of said freezing compartment, and inlet and outlet means for conveying refrigerant to and for withdrawing refrigerant from said passage or passages.

10. An evaporator for a refrigerating system comprising, superimposed sheet metal portions forming a double walled structure, the sheet metal portions of the double walled structure having certain parts thereof secured together and certain other parts thereof spaced apart to provide a refrigerant passage or passages therebetween, said double walled structure being bent to form three upright sides and the bottom side of a sharp freezing compartment, said refrigerant passage or passages extending over portions of all of said sides of said freezing compartment, and inlet and outlet means for conveying refrigerant to and for withdrawing refrigerant from said passage or passages.

11. An evaporator for a refrigerating system comprising complementary U-shaped sheet metal portions bent to form a plurality of side walls and a bottom wall of a sharp freezing compartment, means for joining said sheet metal portions together, at least one of said sheet metal portions having an indentation therein cooperating with the other sheet metal portion to form a chamber in the upper portion and adjacent the top of one of said side walls, at least one of said sheet metal portions having an indentation therein forming a sinuous refrigerant circulatory passage between said sheet metal portions and communicating with said chamber, said sinuous passage extending along said one side wall to a point below said chamber and upwardly along another of said side walls, and means for discharging liquid refrigerant into a portion of said passage in said another side wall.

12. An evaporator for a refrigerating system comprising complementary U-shaped sheet metal portions bent to form a plurality of side walls and a bottom wall of a sharp freezing compartment, means for joining said sheet metal portions together, at least one of said sheet metal portions having an indentation therein cooperating with the other sheet metal portion to form a chamber in the upper portion and adjacent the top of one of said side walls, at least one of said sheet metal portions having an identation therein forming a sinuous refrigerant circulatory passage between said sheet metal portions and communicating with said chamber, said sinuous passage extending along said one side wall to a point below said chamber, along said bottom wall and upwardly along another of said side walls, and means for discharging liquid refrigerant into a portion of said passage in said another side wall whereby incoming refrigerant to said evaporator is directed by said passage first over said another side wall then over said bottom wall and thence over said one side wall of said freezing compartment to said chamt

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