Oct. 27, 1931. J. G. KING 1,828,776

REFRIGERATING APPARATUS

Filed Oct. 31, 1927 3 Sheets-Sheet 1

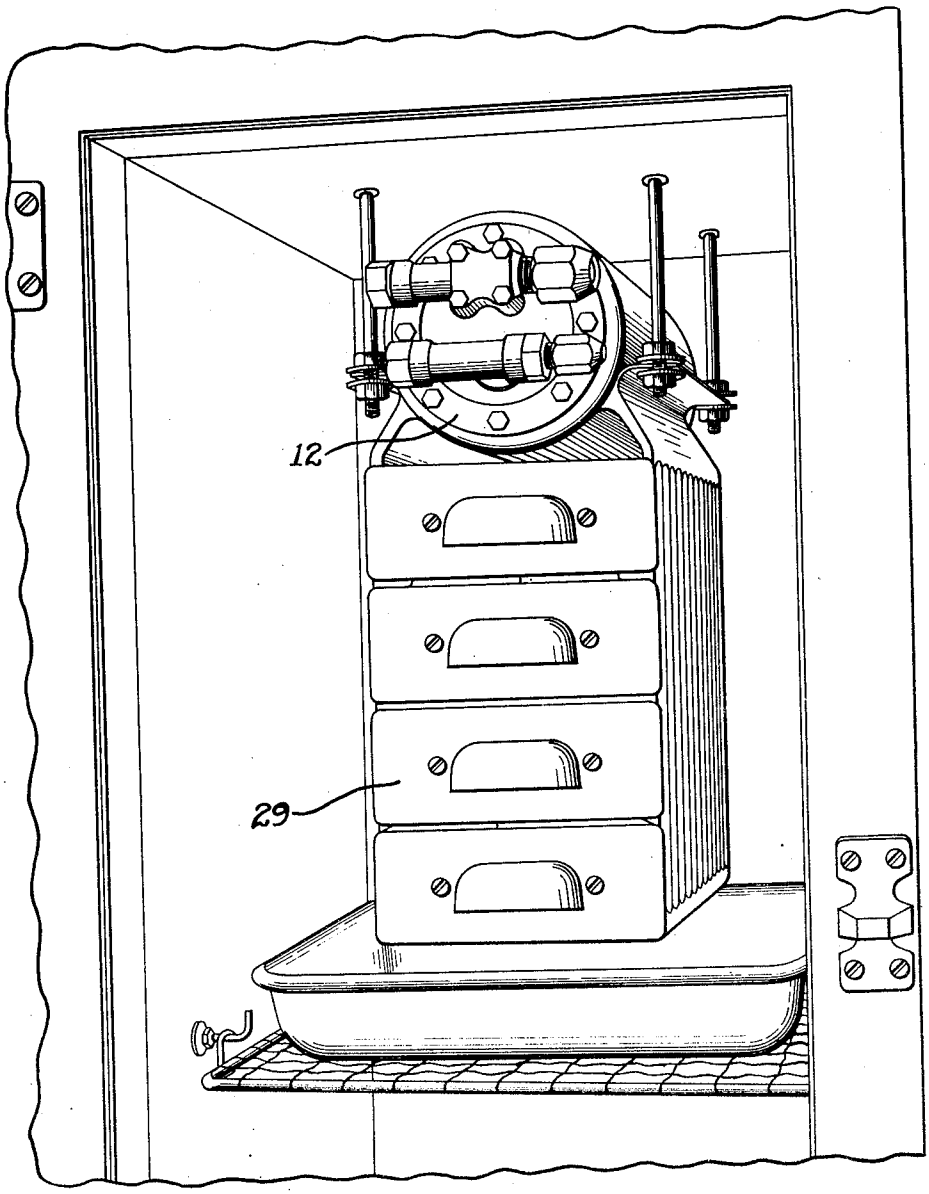


Fig. 1

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REFRIGERATING APPARATUS

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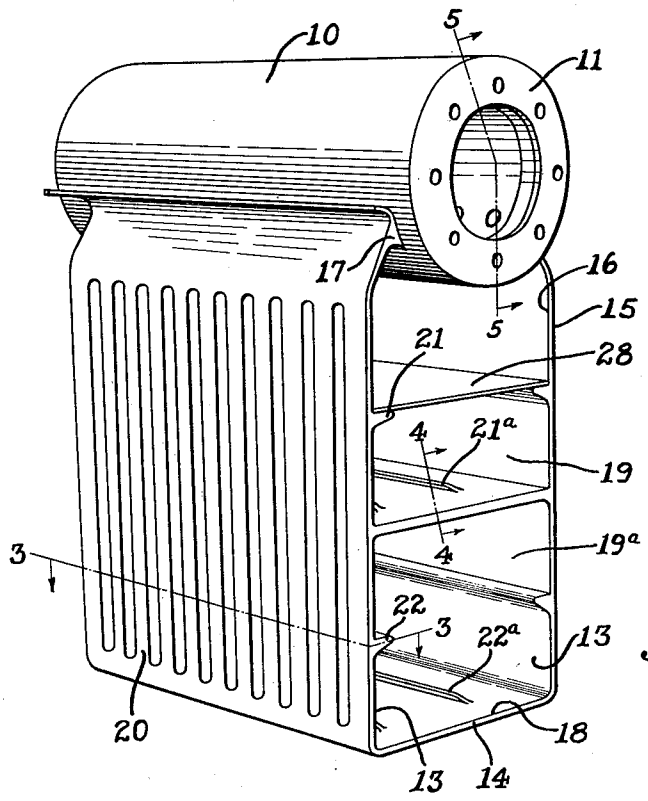


Fig. 2

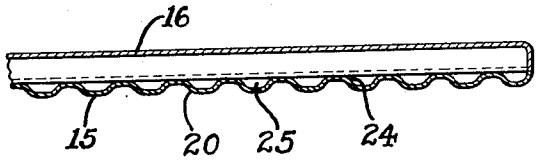


Fig. 3

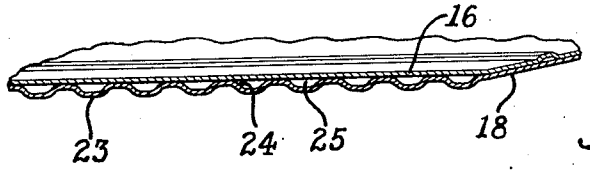


Fig. 4

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REFRIGERATING APPARATUS

Filed Oct. 31, 1927 3 Sheets-Sheet 3

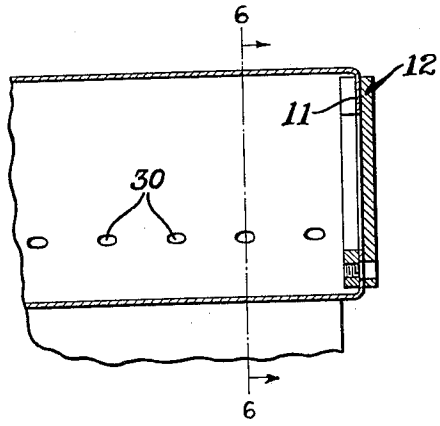


Fig. 5

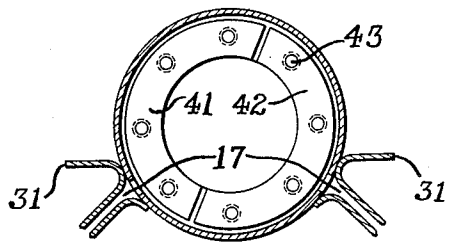


Fig. 6

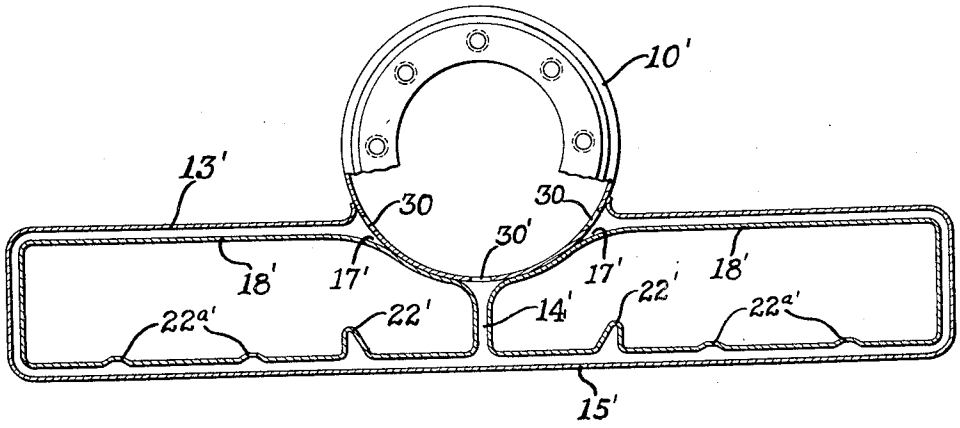


Fig. 7

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Patented Oct. 27, 1931 1,828,776

UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

Application filed October 31, 1927. Serial No. 229,910.

This invention relates to a novel construction of evaporators for refrigerating apparatus.

One of the objects of the invention is to provide an improved evaporator which is easily and cheaply constructed.

Another object of the invention is to provide an evaporator which is smooth and readily cleaned, and of pleasing appearance.

Another object is to provide an improved evaporator having an enclosure for ice-freezing receptacles which freezes ice quickly.

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 perspective view of one form of my improved evaporator in a refrigerating cabinet;

Fig. 2 is a perspective view of a portion of the evaporator removed from the cabinet;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is a section on the line 5—5 of Fig. 2;

Fig. 6 is a section on the line 6—6 of Fig. 5; and

Fig. 7 is a vertical section of a modified form of evaporator construction.

Evaporators of the type including a header forming a reservoir for liquid refrigerant and depending loops of pipe connected to the header for enclosing an ice-making receptacle and for circulating refrigerant have been known heretofore and are exemplified by the patent to Osborn, No. 1,556,708, October 13, 1925. Objections to such evaporators are first, that they are very expensive to manufacture, second that they are difficult to clean, and third, that they are rather unsightly when placed in a refrigerator cabinet, and for the latter reason it has been customary to conceal the evaporators in refrigerator cabinets by a special lining or partition. My invention is concerned among other things, with eliminating the above-mentioned disadvantages.

Referring to Figs. 1 and 2, I may construct an evaporator entirely of sheet metal which permits the evaporator to be formed by punching and stamping operations which are very economical to carry out. I may employ a cylindrical header or container 10 formed of sheet metal, one end of which may be closed in any suitable manner. The other end of the header is provided with an inturned flange 11 for receiving a front closure plate 12, (see Figs. 1 and 5). This flange is also formed of thin sheet metal. Depending from the header are a pair of hollow sheet metal walls 13 enclosing a freezing space 19, which are preferably joined at their ends by a connecting hollow wall 14. Preferably these walls are formed as follows. A pair of generally U-shaped plates 15 and 16 are secured together in spaced relation and joined at their edges to form a hollow U-shaped wall as shown in the drawings. The U formed by plate 15 is a great deal longer than the other U so as to extend a considerable distance below it when the two are assembled as described. This wall is left open at its two ends 17 as shown in Fig. 6, and the ends of both sheets are welded along the length of the header. A third sheet metal member 18 is formed into a generally rectangular shell and inserted in the space provided by the difference in length of the two U-shaped members. This rectangular shell is then welded along its edges to each of the U-shaped members so as to be spaced therefrom and thus provides a hollow wall surrounding a portion 19*a* of the freezing space 19. Preferably the sheet 15 is provided with corrugations 20 extending in the direction of its length, while the sheet 16 has a few corrugations 21 and 21*a* which are transverse to its length, but is otherwise generally flat. Likewise the shell 18 has corrugations 22 and 22*a* extending along the freezing space 19, and on the side adjacent the U-shaped member 16, it is provided with corrugations 23 extending from one wall 13 to the other wall 13. All of the sheets are spot-welded together along the lines where the corrugations 20 and 23 touch the adjacent sheets. The spot welds are indicated at 24 and form tie means for holding two sheets together against pressure within

the walls. The spaces between the corrugations 20 and the sheets 16 and 18, and between corrugations 23 and sheet 16 form channels or ducts 25 for circulating refrigerant. The corrugations 21 and 22 on the sheets 16 and 18 are adapted to support shelves 28 on which ice-making receptacles 29 may rest. These corrugations being hollow and communicating with the interior of the hollow walls thus enable refrigerant to be circulated within them and accelerate the freezing of ice within the receptacles placed on the shelves. The corrugations 21*a* and 22*a* form slide ways or supports for trays placed on the shelves formed by sheets 16 and 18.

Along the line where the walls are joined to the header, and between the sheets 15 and 16 the header is provided with a series of holes 30 to establish communication between the header and the walls. Also at the points where the walls join the header, the sheet 15 is bent outward to form flanges 31 by which the evaporator may be supported within the refrigerating cabinet.

If desired, the back of the freezing space may be closed by a cover plate not shown.

For the sake of appearance it is preferred to coat the entire evaporator structure with vitreous enamel and for this purpose it is necssary to bake the entire structure at high temperature. It is essential to the successful coating and baking of a thin sheet metal structure that the different parts of the structure not be of greatly different thicknesses, in order to insure uniform heating and cooling of the structure thruout. Consequently, the flange 11 for supporting the front closure plate must be of thin sheet metal substantially the same as the rest of the structure. However, such closure plates are usually bolted to the header and are ordinarily heavy, due to the weight of valves mounted on them. It is impractical to bolt a heavy closure plate to a thin sheet metal flange. Therefore, I prefer to use a re-enforcing means within the header which is sufficiently heavy to enable the closure plate to be securely bolted to it. It is essential that this re-enforcing means be removed during the baking operation, for the reasons mentioned above. To facilitate its removal the re-enforcing means is formed as a pair of semi-circular members 41 and 42, each of which can be passed into the opening in the flange 11 and which when placed together behind the flange from a re-enforcing ring for supporting the front closure plate. The re-enforcing ring is provided with bolt holes 43 and the flange 11 is clamped between the re-enforcing ring and the front plate 12.

Fig. 7 shows a modified form of evaporator construction which may be used where a low, flat evaporator is desired. In this figure, the header or container 10′ and the walls 13′ may be formed and joined together in the same manner as described in connection with the other modification. The walls, however, are shaped so as to provide a wide, flat freezing space adapted to hold two ice-making containers side by side. Preferably the ice freezing space is divided into two portions, each adapted to contain one tray. In this instance the walls are formed of a sheet 15′ and two substantially rectangular shells 18′ both of which are secured to the corrugations of sheet 15′ to form the passages for circulating refrigerant. The two shells 18′ are spaced from each other at the center to provide a vertical bridge 14′ which permits the circulation of refrigerant between the ice-making containers. The portion of one of the shells 18′ which lies adjacent the other shell 18′ to form the bridge is corrugated and spot welded to the other shell in order to withstand pressure within the bridge. Transverse corrugations 22′ form guides for holding the ice-making containers in proper position within the freezing spaces, and transverse corrugations 22*a*′ form slide ways for supporting the containers. Where the bridge joins the header, the latter is provided with a series of holes 30′ similar to the holes 30 to establish communication between the bridge and header.

It will be noticed that the shells 18′ are continuous about the freezing spaces and therefore need be welded to the header only at the ends of the header, that is along the edges of the shells, in order to hold the refrigerant. The shells may or may not be welded along the length of the header (for example, at points along the line 17′) as may be found necessary or desirable. Even if it should be necessary for structural reasons to weld the shells to the header between the ends it will not be necessary to make these welds continuous, or fluid tight, for the reason that refrigerant between the outer surface of the header and the shells 18′ can do no harm and may even be desirable.

By referring to Fig. 1 it will be seen that I have provided a form of evaporator which has a smooth surface and which presents a neat appearance when placed in a refrigerator cabinet. The smooth surface facilitates cleaning of the evaporator and thus promotes sanitation, while the neat appearance of the device allows the usual linings or partitions to be dispensed with entirely.

While the forms of embodiment of the present invention as herein disclosed constitutes preferred forms, 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. A fabricated sheet metal evaporator for refrigerating apparatus comprising a container forming a reservoir for liquid refrigerant and one or more hollow walls connected to the container for circulating the refriger-

ant, a hollow shelf interconnecting said walls for supporting an ice making receptacle within the enclosure formed by said walls and shelf, said shelf being in communication at its opposite ends with the hollow walls for circulating refrigerant in thermal contact with the receptacle, said container having an opening and being adapted to cooperate with a removable closure for closing said opening, and said evaporator being constructed of sheet metal of substantially uniform thickness to permit uniform heating of the entire evaporator to an enameling temperature.

2. A fabricated sheet metal evaporator for refrigerating apparatus comprising a container forming a reservoir for liquid refrigerant and a plurality of hollow walls connected to the container for circulating refrigerant, a hollow shelf inter-connecting said walls and with said walls and reservoir container forming a plurality of enclosures for ice making receptacles and for forming a support for an ice making receptacle within one of said enclosures, said shelf being in communication at its opposite ends with the walls for circulating refrigerant in thermal contact with the receptacle, said container having an opening and being adapted to cooperate with a removable closure for closing said opening, and said evaporator being coated with vitreous enamel and being constructed of sheet metal of substantially uniform thickness to permit uniform heating and cooling of the entire evaporator during the enameling operation.

3. An evaporator for refrigerating apparatus comprising oppositely disposed hollow walls, a container for liquid refrigerant connected with the interior of said hollow walls, said walls including opposed outside sheet metal portions and a plurality of sheet metal shells forming a plurality of compartments for ice making receptacles, said shells being disposed between said opposed portions one above the other and joined with said portions to form said hollow walls and forming a hollow shelf in communication with said hollow walls for supporting the ice receptacle within the upper compartment.

4. An evaporator for refrigerating apparatus comprising oppositely disposed hollow walls, a container for liquid refrigerant connected with the interior of said hollow walls, said walls including a continuous metal sheet forming opposed outside metal portions and a plurality of sheet metal shells forming a plurality of compartments for ice making receptacles, said shells being disposed between said continuous portion one above the other and joined with said portions to form said hollow walls and forming a hollow shelf in communication with said hollow walls for supporting the ice receptacle within the upper compartment.

5. An evaporator for refrigerating apparatus comprising oppositely disposed hollow walls, a container for liquid refrigerant connected with the interior of said hollow walls, said walls including opposed outside sheet metal portions and a plurality of sheet metal shells forming a plurality of compartments for ice making receptacles, said shells being disposed between said opposed portions one above the other and joined at their edges with said portions to form said hollow walls and forming a hollow shelf in communication with said hollow walls for supporting the ice receptacle within the upper compartment.

6. An evaporator for refrigerating apparatus comprising oppositely disposed hollow walls, a container for liquid refrigerant connected with the interior of said hollow walls, said walls including opposed outside sheet metal portions and a plurality of sheet metal sleeves forming a plurality of compartments for ice making receptacles, said sleeves being disposed between said opposed portions one above the other and joined with said portions to form said hollow walls and forming a hollow shelf in communication with said hollow walls for supporting the ice receptacle within the upper compartment.

In testimony whereof I hereto affix my signature.

JESSE G. KING.