April 8, 1941. L. C. SMITH 2,237,508

REFRIGERANT EVAPORATOR

Filed July 24, 1940 2 Sheets-Sheet 1

Fig. 1.

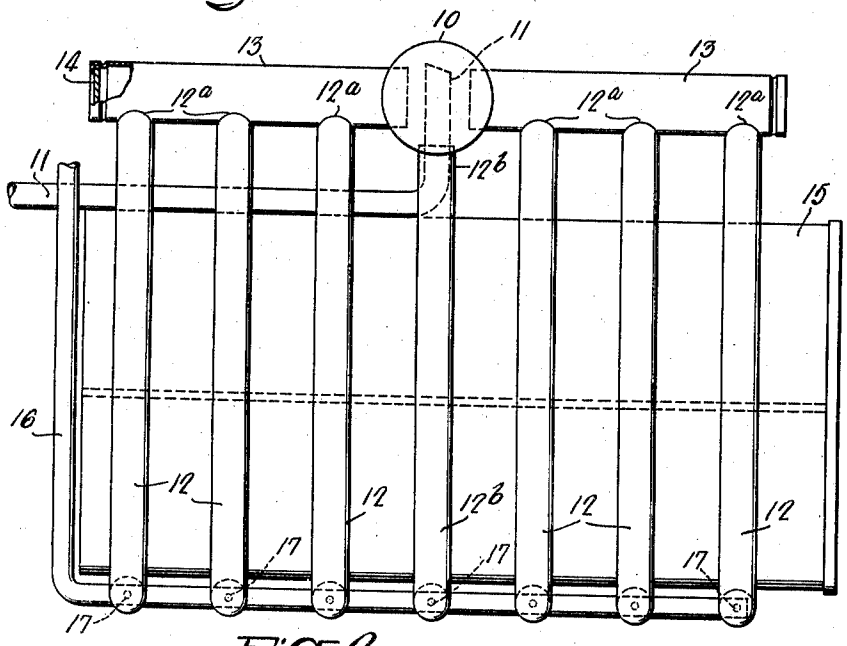
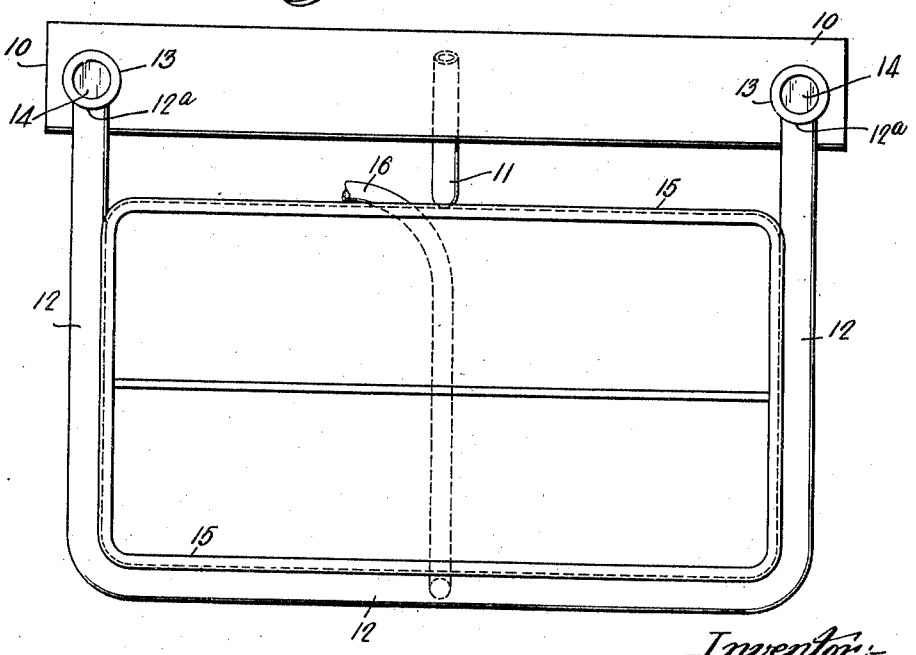


Fig. 2.



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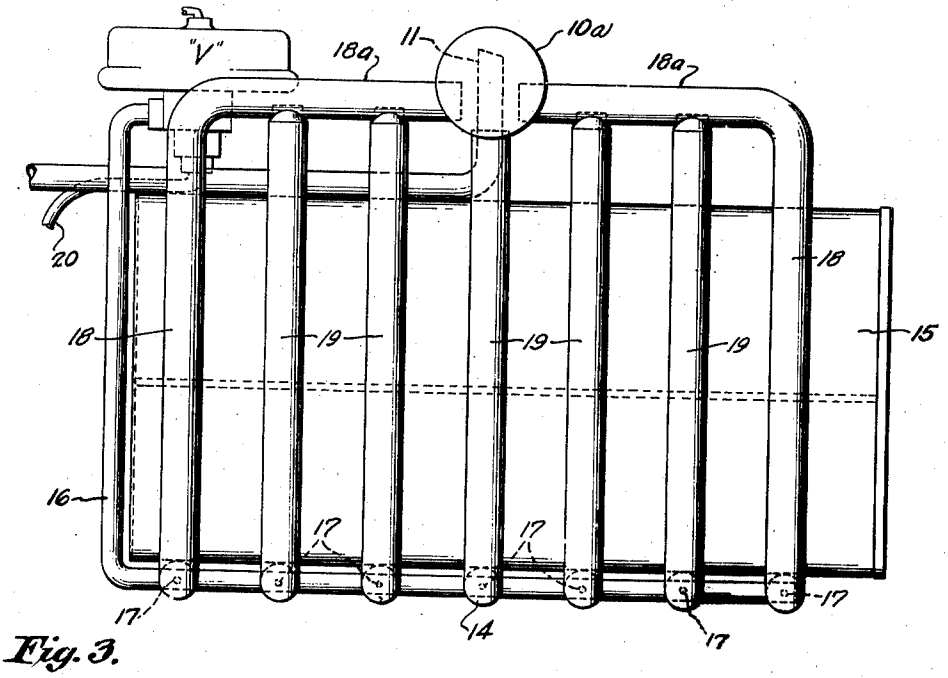


Fig. 3.

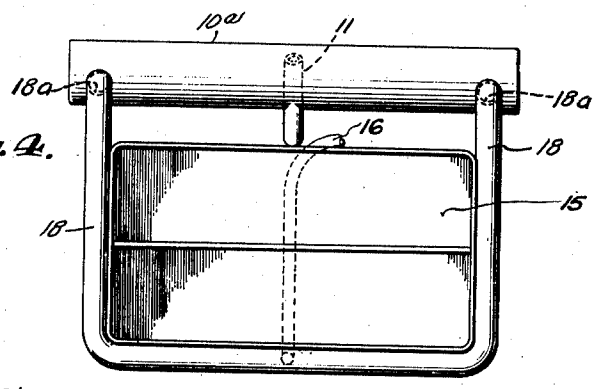
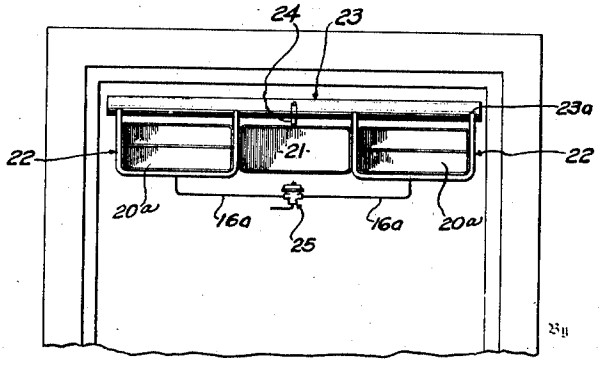


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE

2,237,508

REFRIGERANT EVAPORATOR

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Application July 24, 1940, Serial No. 347,345

6 Claims. (Cl. 62—126)

This invention relates to refrigerant evaporators of the flooded type, and is a continuation in part of my prior application Serial No. 182,450, filed December 30, 1937, for "Refrigerant evaporator."

The invention is directed to an evaporator having a main suction header disposed transversely in the refrigerator casing, and a plurality of communicating sub-headers which are laterally disposed with respect to the suction header. This form of construction offers several distinct advantages, among which may be noted an inherent adaptability to an ice tray compartment of any width, or to a plurality of ice tray compartments, without the necessity of complex connection formations. The invention also offers a distinct improvement in the manifolding system which includes ice tray ducts, sub-headers and main suction header, to the end that uniform and free refrigerant distribution is attained without subjecting any portion of the evaporator to violent refrigerant reactions.

In the drawings:

Fig. 1 is a side elevation, partially in section, of the evaporator;

Fig. 2 is a front elevation thereof;

Fig. 3 is a side elevation of a modified form of the invention;

Fig. 4 is a front view of the form of evaporator shown in Figure 3 on a reduced scale; and

Fig. 5 is a diagrammatic front view of a refrigerator wherein is disposed an evaporator having multiple ice tray compartments.

The evaporator shown in Figs. 1 and 2 consists of a main suction header 10 of a closed cylindrical form having a vertical suction pipe 11 communicating with the central portion thereof. A plurality of parallel U-shaped refrigerant tubes or ducts 12 encompass three sides of an ice tray sleeve 15 which is disposed laterally beneath the header 10. Extending perpendicularly from the opposite ends of the header 10 are pairs of aligned sub-headers 13 the inner ends of which communicate with the suction header and the outer ends of which are blanked off, as indicated at 14. The vertical legs of the tubes 12 communicate at their upper ends with the sub-headers 13, as indicated at 12a and a central refrigerant tube 12b may have its legs in direct communication with the suction header 10. This latter duct may be omitted if so desired, particularly in cases where a more numerous group of ducts 12 is permitted by the proportions of the ice tray sleeve 15.

A refrigerant supply tube 16 extends transversely through all of the ducts at central points thereof, and it is provided with ports 17 which meter correct volumes of refrigerant to each duct. This supply device, which was first disclosed in my copending application Serial No. 103,700, filed October 2, 1936, combines advantageously with the present structure. However, any other supply means known in the art may be utilized with good results also.

Obviously, a construction of this character is capable of considerable modification as, for example, that shown in the construction of Figures 3, 4, and 5, the specific formation of which is claimed in the copending application of Frank D. Peltier and Karl F. Schmidt, Serial No. 194,311, filed March 7, 1938, for "Evaporator unit." In this form of the construction, the endmost of the refrigerant tubes or ducts 18 have the upper ends of the legs thereof angularly bent and extended over the ends of the intermediate tubes 19 arranged at opposite sides of header 10a and said intermediate tubes 19 have their upper ends in communication with the sub-headers 18a thus provided, the construction being otherwise similar to that in Figures 1 and 2. As shown in Figures 3 and 4, the supply tube 16 may communicate with a feed conduit 20 through a suitable thermostatic expansion valve V of any desired construction.

The header 10 or 10a may, obviously, be formed of any desired length, as dictated by the width of the underlying ice tray sleeve. In Fig. 5, for example, the evaporator E is provided with two ice tray compartments 20a and an intermediate freezing compartment 21. The former compartments are enclosed by two groups of duct units 22 of the same general type as previously described. The sub-headers 23a of each unit communicate with a long suction header 23, which in turn is connected with a central suction pipe 24. The duct units may be fed by two supply tubes 16a leading to a single valve 25.

In operation, it has been found, either in the single or multiple ice tray form, that the liquid level in the main header remains at a remarkably uniform level, and as a result, back frosting in the suction line is easily obviated by proper setting of the control instrumentalities of the system. This effect is probably obtained by the general symmetry of the ducts, and the remoteness of the suction pipe from the zone of comparative violence of the discharge terminals of the sub-headers.

It is not intended that the invention be limited in use to the type of fabricated structures

illustrated, as it will be apparent that the underlying principles may be equally well applied to cast or sheet metal structures.

I claim:

1. An evaporator comprising a suction header, an ice tray sleeve disposed transversely beneath said header, oppositely extending transversely positioned sub-headers communicating with the header at opposite ends thereof, said sub-headers being substantially parallel to said sleeve, a plurality of ducts extending about the bottom and side walls of the sleeve, each duct having terminal portions communicating with adjacent sub-headers, and refrigerant supply means organized with said ducts.

2. An evaporator comprising an elongated suction header, a plurality of sub-headers extending horizontally into said header and being disposed laterally thereof, a plurality of ice tray sleeves disposed in a horizontal row beneath said header, the axes of said sleeves being disposed transversely with respect to the axis of the header, a plurality of loops extending transversely about each sleeve and having terminal portions communicating with the sub-headers, and refrigerant supply means organized with said loops.

3. An evaporator comprising a cage-like structure having a header located in the center of the top portion thereof; a plurality of U-shaped tubular members having their bight portions arranged to form the bottom of said structure and their opposite leg portions extending to the top thereof; a supply pipe extending through each of said bight portions and having apertures arranged to permit passage of liquid refrigerant into the same; and tubular means connecting the leg portions of the U-shaped members at the opposite ends of said structure to the header; said tubular means overlying the extremities of the other U-shaped members and communicating therewith.

4. A structure of the type recited in claim 3 and including a sleeve member extending through said cage-like structure and arranged to support ice trays within the evaporator.

5. An evaporator comprising an elongated suction header, a plurality of transversely positioned sub-headers entering said header and being disposed horizontally, a plurality of depending pipe loops, each loop having terminal portions connected to adjacent sub-headers, and refrigerant supply means organized with said loops.

6. The structure of claim 1 wherein the upper ends of the legs of at least one of said U-shaped members communicate directly with said header.

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