

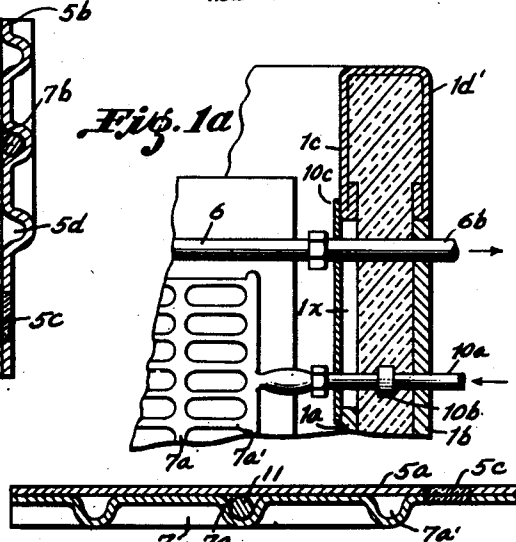
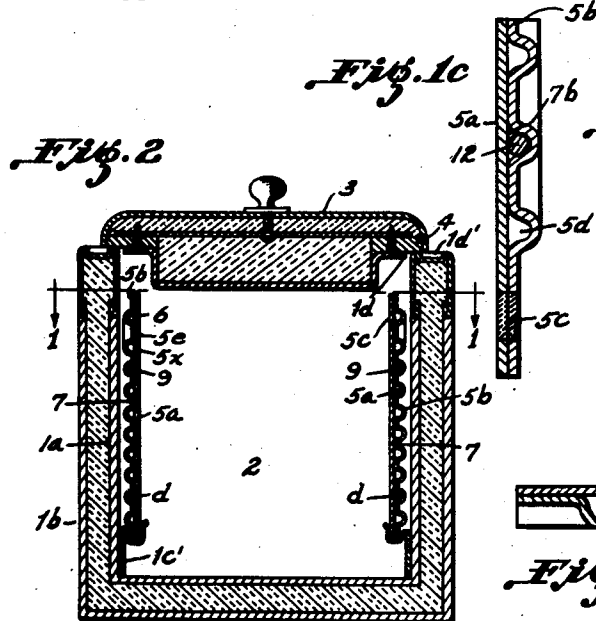
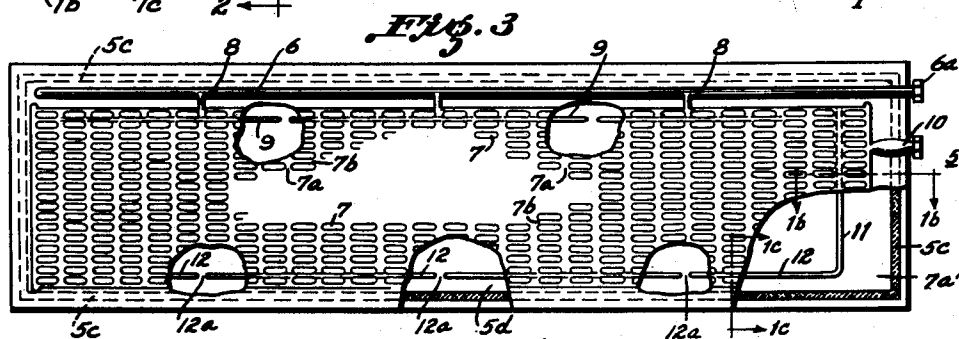
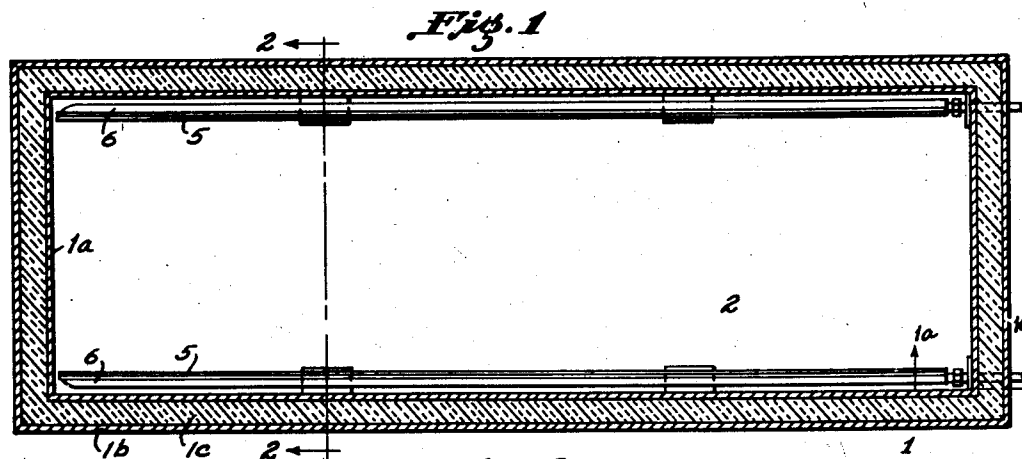
Sept. 13, 1949.

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2,481,556

EVAPORATOR STRUCTURE

Filed Oct. 17, 1945



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UNITED STATES PATENT OFFICE

2,481,556

EVAPORATOR STRUCTURE

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Application October 17, 1945, Serial No. 622,821

3 Claims. (Cl. 62—126)

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This invention relates to refrigeration apparatus of the cabinet type in which is mounted one or more evaporators to which is supplied a volatile liquid refrigerant to provide a relatively low temperature, whereby edibles and beverages may be stored in the cabinet to prevent or retard deterioration thereof.

My improvement relates more particularly to an evaporator of the plate type, wherein the refrigerant supply connection leads into the lower end of the evaporator and the vapor discharge connection leads from the upper end thereof. As it is desirable to arrange the evaporator in close relation to the walls of the storing compartment difficulty arises in installing the supply pipe for the refrigerant and discharge pipe for the vapor so that the cabinet wall has to be provided with an opening to permit access to these connections and in many instances the cabinet has to be so positioned, when installed, that access to these connections require bodily movement of the cabinet.

One object of the invention therefore is to provide an improved evaporator wherein these objections are eliminated.

Another object of the invention is to provide in apparatus of this character an improved evaporator having both the outlet and inlet connection at its upper end and provision is made for circulating the refrigerant over the entire interior area of the evaporator.

Another object of the invention is to provide in apparatus of this character an improved evaporator having supply and discharge connections arranged to simplify and reduce the cost of the construction and to facilitate servicing of the evaporator when installed in a cabinet from time to time.

Other objects of the invention will be apparent to those skilled in the art to which my invention relates from the following description taken in connection with the accompanying drawing, wherein

Fig. 1 is a section on the line 1—1 of Fig. 2 showing an apparatus embodying my invention.

Fig. 1a is a fragmentary section on the line 1a—1a of Fig. 1.

Figs. 1b and 1c are fragmentary sections on the lines 1b—1b and 1c—1c, respectively, of Fig. 3.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is an elevational view of one of the evaporators, parts being broken away.

In the drawings, 1 indicates as an entirety a cabinet of any desired size and construction, the walls of the cabinet forming a compartment 2 and

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insulated in a well known manner. Preferably the inner walls of the cabinet are lined with sheet metal 1a and its exterior walls are provided with a suitable facing material 1b; the lining and facing materials may be utilized to protect the insulation material 1c against deterioration and damage. The top wall of the cabinet is formed with openings 1d, the top wall and openings being preferably surfaced with thin non-corrosive material 1d'. 3 indicates the lids for the openings 1d, each lid being provided on the lower side of its marginal portion with a non-metallic material 4 to eliminate metal-to-metal contact with the cabinet walls, when the lids 3 are in closed position, as shown in Fig. 2.

5, 5, indicate two evaporators each positioned adjacent and parallel to one inner wall of the compartment 2 and removably supported on suitable standards 1c'. The evaporators are preferably related to opposed inner walls and co-extensive in length to those opposed walls of the compartment which are longer than any of the remaining walls thereof. Each evaporator 5 consists of two relatively thin metallic sheets 5a, 5b, the marginal portions of which are welded together face-to-face as shown at 5c. One of the metal sheets (preferably that sheet—sheet 5b—opposed to the inner wall of the compartment when the evaporator is installed therein) is embossed along its upper end within the welded portion 5c and adjacent thereto outwardly to form a conduit 6, which extends from end to end of the evaporator, the embossment terminating at one end adjacent the welded portion 5c, but provided at its opposite end with a nipple 6a connected in a well known manner to a discharge pipe 6b, leading to a suitable compressor (not shown). Below the conduit 6 and throughout the area of the sheet 5b (within the welded portions 5c) the latter is provided with inwardly extending spaced embossments 7, which are elongated in a direction at right angles to the flow of the refrigerant and arranged in horizontal and vertical rows, thereby forming connected vertical and horizontal channels 7a, 7b, respectively, between them, the lower row of horizontal embossments 7 forming a flow channel 5d between them and the adjacent welded portion 5c in connected relation to certain of the vertical channels 7a between these embossments, as later set forth. The inner faces of all of the embossments 7 are suitably welded to the sheet 5a. The displacement of the metal forming the embossments 7 determines the cross sectional areas of the channels 7a, 7b and 5d. Between the upper horizontal row of embossments

channels 7b and the conduit 6, the sheets 5a, 5b, are welded together face-to-face as shown at 5e, except that at spaced intermediate positions the sheet 5b is embossed outwardly, as shown at 8, to provide ducts leading from the channel 5x between the upper row of embossments 7 and the welded portion 5e to the conduit 6 for the discharge of vapor into the latter. 9 indicates a series of spaced endwise related baffles mounted in and filling the channels 7b between two of the upper horizontal rows of embossments 7, thereby closing certain of the vertical channels 7a. The baffles 9 are positioned to dispose their spaced ends approximately intermediate the ducts 8 so that the vapor and refrigerant in those channels 7a related to the spaces between the baffles 9 are prevented from flowing directly into these ducts, but is forced to flow through the channels 7a, 7b, above the baffles, whereby any liquid refrigerant escaping past the baffles 9 may be completely vaporized, to avoid discharge of liquid refrigerant into the conduit 6 and return thereof to the compressor.

10 indicates a supply inlet connection for the liquid refrigerant connected by a suitable nipple to a pipe 10a leading from a source of supply. As shown, the inlet connection 10 is arranged adjacent to but below the nipple 6a, whereby ready access to both the nipple connections results. The discharge pipe 6b and supply pipe 10a extend through the adjacent wall 1b, the insulation 1c and an opening 1x formed in the lining or wall 1a for connection with the nipple 6a and inlet connection 10, respectively, the pipe 10a being provided with a suitable expansion valve 10b. The opening 1x is closed by a cover 10c, which is removably held in place by screws, to hold the insulation material surrounding the pipes 6b and 10a in place. The cover permits access to the valve 10b.

For the purpose of supplying the liquid entering the inlet connection 10 to the adjacent end of the channel 5d, I close the channel 7a between the outermost vertical row of embossments 7 and the adjacent vertical row thereof, so that the closed channel 7a between the outermost row of embossments 7 and the adjacent welded portion 5e forms a conduit 7a' to direct the liquid refrigerant to the flow channel 5d. The closure for this channel 7a may consist of a rod 11 having a diameter equal to the space between the sheet 5a and crown of the channel. The rod 11 extends from the upper welded portion 5e downwardly to the channel 7b formed between the lowermost horizontal row of embossments 7 and the adjacent horizontal row thereof.

12 indicates elements related to the channel 5d for distributing the liquid supplied to channel 5d to different portions of the evaporator, whereby it may circulate through the channels 7a, 7b, over the entire evaporator area to insure high heat absorption efficiency.

The distributing elements 12 are preferably disposed in the channel 7b formed between the lowermost horizontal row of embossments 7 and the adjacent row thereof and may consist of rods the diameter of which is equal to the space between the sheet 5a and crown of the adjacent channel. The distributing elements are relatively spaced to form between their related ends, outlets 12a for the liquid refrigerant, the outer end of the element 12 adjacent to the closure 11 being secured thereto and the element 12 at the opposite end of the evaporator 5 terminating at

a point remote therefrom, so that that portion of the liquid remaining in the channel 5d may freely flow into the channels 7a, 7b.

From the foregoing description it will be observed that the construction of the cabinet walls is simplified and ready access to the inlet and discharge connections is provided for to facilitate servicing and that the refrigerant is delivered to the lower end of each evaporator and distributed therealong for circulation upwardly, whereby the resulting vapor may be readily drawn from the evaporator.

To those skilled in the art to which my invention relates, many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. My disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

What I claim is:

1. An evaporator for a volatile refrigerant consisting of relatively thin metallic sheets secured together along their marginal edges, one of said sheets being embossed outwardly parallel and adjacent to the upper marginal edges of said sheets to form a conduit for vapor, an outlet at one end of said conduit adapted to be connected to a compressor, one of said sheets being embossed laterally parallel and adjacent to the lower connected-together marginal edges of said sheets to form a flow channel therebetween, a device between said sheets parallelly spaced from that end of the evaporator adjacent said outlet and extending from the upper connected-together marginal edges to the adjacent end of said flow channel to form a supply channel for the latter, an inlet for liquid refrigerant connected to said supply channel, one of said sheets throughout the area between said conduit and said flow channel, said device and the connected-together marginal end portion remote from said device having laterally disposed embossments arranged in parallel horizontal and vertical rows and forming between them horizontal and vertical circulation channels for the liquid refrigerant, and spaced portions of said sheets elongated parallel to said conduit and between said conduit and the upper horizontal row of embossments being secured together to form outlet ducts leading from said vertical circulation channels to said conduit.

2. An evaporator as claimed in claim 1 wherein are provided spaced distributing devices disposed parallel to said flow channel and between said flow channel and the lower ends of said vertical circulation channels.

3. An evaporator as claimed in claim 1, wherein spaced baffles are disposed parallel to and spaced from said secured together portions, the spaces between said baffles being out of alinement with said outlet ducts.

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