

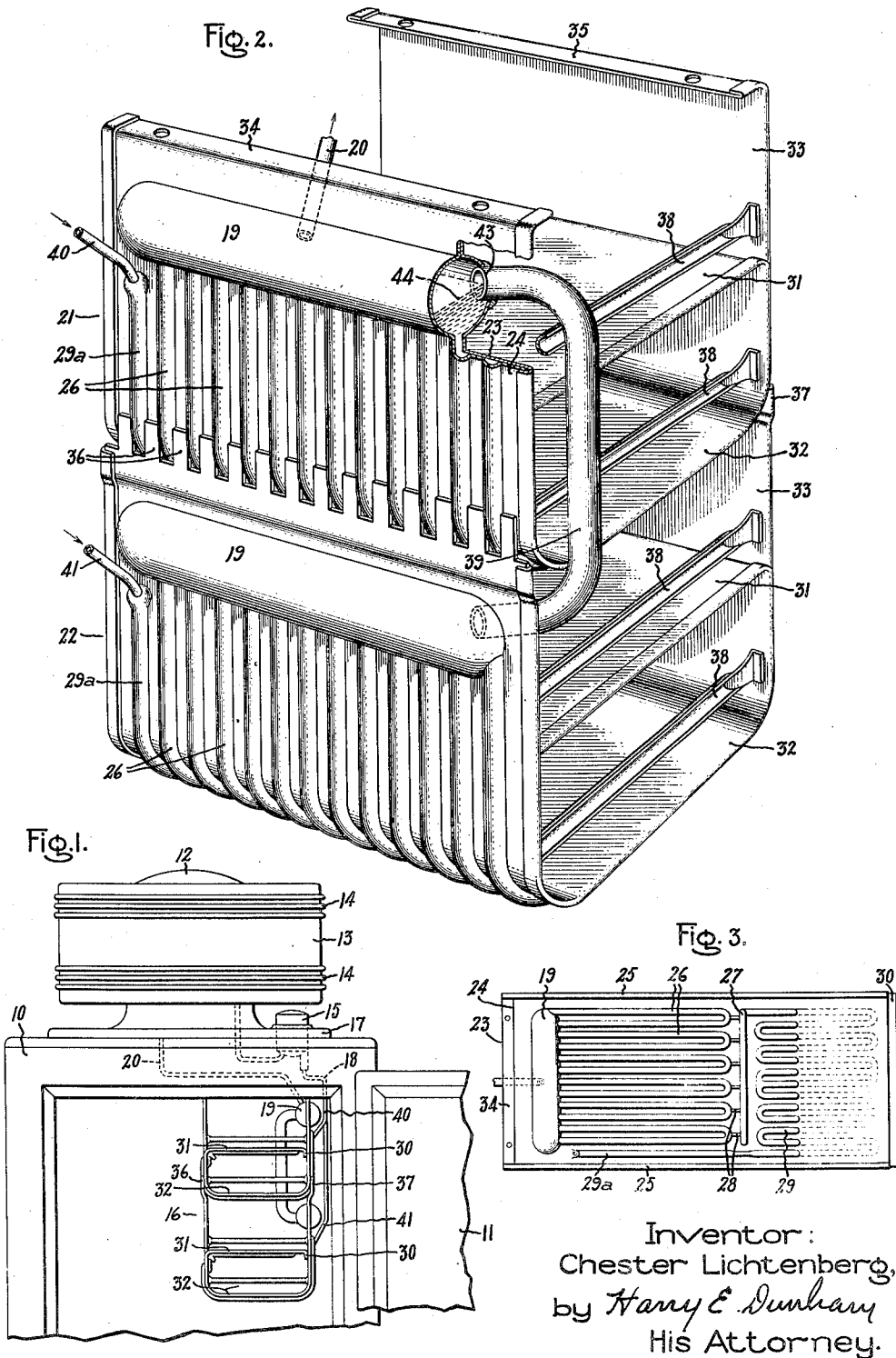
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COOLING UNIT

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2,110,002

COOLING UNIT

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6 Claims. (Cl. 62—126)

My invention relates to cooling units for refrigerating machines.

It is an object of my invention to provide an improved and simplified cooling unit for refrigerating machines having a plurality of shelves for supporting freezing trays and the like, and having a simple and efficient arrangement for circulating liquid refrigerant through passages in the shelves.

Further objects and advantages of my invention will become apparent as the following description proceeds and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of my invention reference may be had to the accompanying drawing in which Fig. 1 shows a household refrigerator having a cooling unit embodying my invention; Fig. 2 is a detail perspective view of the back of the cooling unit shown in Fig. 1; and Fig. 3 is a developed view showing the refrigerant circulating passages in one of the evaporators of the cooling unit.

Referring now to the drawing in Fig. 1, I have shown a household refrigerator comprising a cabinet 10 having a door 11, and provided with a refrigerating machine including a motor and compressor casing 12, a condenser 13 having refrigerant conduits 14 and secured to the casing 12, a float valve or receiver 15, and a cooling unit 16 embodying my invention. The cooling unit is arranged within the cabinet 10 and is suspended from a removable top 17 of the cabinet, which also constitutes the base on which is mounted the motor and compressor casing 12. During the operation of the refrigerating machine gaseous refrigerant is compressed by the compressor within the casing 12 and is discharged into the conduit 14 of the condenser where it is cooled by the circulation of air around the condenser, and is thereby liquefied. The liquid refrigerant flows from the condenser to the receiver or float valve chamber 15 and when a predetermined amount of liquid has cooled, a float within the chamber 15 rises and refrigerant flows through a conduit 18 to the cooling unit 16. The liquid refrigerant is circulated through the cooling unit and absorbs heat from the cabinet 10 and from freezing trays or other articles placed within the cooling unit. This absorption of heat vaporizes the liquid refrigerant which collects in an upper header 19 of the cooling unit and is withdrawn from the header through a conduit 20 and returned to the compressor.

The cooling unit 16 is constructed of sheet metal and comprises an upper evaporator and a lower evaporator of substantially the same construction, each evaporator being formed of sheet metal and having a header and a plurality of depending refrigerant circulating passages formed between the metal sheets and providing circulation of refrigerant through the freezing tray supports or shelves. This construction is clearly shown in Fig. 2 where I have shown an upper evaporator 21 and a lower evaporator 22 each formed from two sheets of metal secured together face to face and provided with indentations forming a header and a plurality of refrigerant circulating passages. The upper evaporator 21 and the lower evaporator 22 are of substantially the same construction and the same numerals have been applied to corresponding parts of the two evaporators. Fig. 3, which is a developed view of the upper evaporator 21, shows the arrangement of the header 19 and the circulating conduits or passages. The outer sheet 24 is shown placed over the inner sheet 23 with the edges 25 of the inner sheet folded over the edges of the sheet 24. The header 19 is formed by complementary indentations in the sheets 23 and 24 near one end of the sheets. A plurality of U shaped passages or conduits 26 communicating with a manifold 27 through a plurality of ducts 28 and a liquid inlet passage 29a are formed by indentations in the outer sheet 24; and a sinuous passage or conduit 29 is formed by indentations partly in the sheet 24 and partly in the sheet 23, the portions of the passage in the sheet 23 being shown by dotted lines. The passage 29 communicates at one end with the liquid passage 29a, and at the other end with the manifold 27. The sheets 23 and 24 are hermetically sealed together around their edges and between the indentations by welding or in any other suitable manner, and the sheets are then bent into the form shown in Fig. 2, a flange 30 on the sheet 23 being bent at right angles to the sheet and being secured by welding to the side wall of the evaporator. The portion of the evaporator containing the refrigerant circulating passages is thus of B shaped cross section. A freezing chamber is formed between upper and lower shelves 31 and 32, and a wall 33 is welded or otherwise secured to the side of the evaporator opposite the header 19 to enclose an upper freezing chamber above the shelf 31. Flanges 34 and 35 formed on the evaporator 21 above the header 19 and on the wall 33 respectively are provided in order to secure the cooling unit to the top wall

of a refrigerator cabinet. The lower evaporator 22 is of substantially the same construction as the evaporator 21, except that in place of a flange corresponding to the flange 34, the evaporator 22 is provided with a plurality of lugs 36 extending vertically from the wall of header 19 thereof. The lugs are welded or otherwise secured to the evaporator 21 between the passages 26, and the wall 33 of the evaporator 22 is provided with an offset vertical extension 37 whereby it is secured by welding or in any other suitable manner to the evaporator 21.

The construction of the evaporators 21 and 22 and the arrangement of the circulating passages is not my invention, but is the invention of Leonard W. Atchison, and is shown and described in his co-pending application Serial No. 7,683, filed February 23, 1935, and assigned to the General Electric Company assignee of my present invention. I do not, therefore, herein claim anything claimed in the said Atchison application which is to be regarded as prior art with respect to the present application, my invention relating to an improved method for constructing a cooling unit comprising a plurality of evaporators.

Each of the evaporators 21 and 22 is provided with guards 38 which prevent freezing trays or other articles placed on the shelves from being pushed too far to the rear of the cooling unit. After the evaporators 21 and 22 have been secured together in the manner described, the headers 19 are connected by an equalizer tube or conduit 39 of relatively large diameter. This equalizer tube provides a passage whereby liquid and gaseous refrigerant may flow from the lower header to the upper header; it is maintained filled with liquid refrigerant during normal operation of the cooling unit.

During the operation of the refrigerating machine shown in Fig. 1, liquid refrigerant is admitted to the cooling unit from the float valve chamber 15, conduit 18, and connections 40 and 41, the latter being connected to evaporators 21 and 22 respectively. The admission of liquid refrigerant to the cooling unit in this manner produces a circulation of refrigerant through freezing shelves 31 and 32 of evaporators 21 and 22. The refrigerant is vaporized upon the absorption of heat from the air surrounding the cooling unit and articles placed within the unit and the refrigerant vapor collects in the headers 19. Some gaseous refrigerant may be trapped in the lower header 19 above the lower opening of the tube 39 and as more vapor is formed it will rise to the top of the lower header 19 and depress the liquid level until the vapor bubbles up through the liquid refrigerant in the tube 39 to the upper header 19. The gaseous refrigerant is withdrawn from the cooling unit through a suction connection 20. The normal liquid level within the header 19 of the evaporator 21 is maintained so that the upper end 43 of the connection tube 39 will be partially below the normal liquid level which is indicated at 44. The tube 39 is thereby maintained filled with liquid refrigerant during normal operation of the cooling unit.

It will be apparent from the foregoing that I have provided a cooling unit having a large number of freezing shelves providing efficient circulation of refrigerant and which is simple to construct and economical to manufacture.

While I have shown my invention in connec-

tion with a cooling unit for a household refrigerator variations in the structure thereof will readily be apparent to those skilled in the art. I do not, therefore, desire my invention to be limited to the particular construction shown and described, and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A cooling unit for refrigerating machines comprising an upper header and a lower header, a plurality of liquid refrigerant circulating conduits communicating with said upper header and depending therefrom, a plurality of liquid refrigerant circulating conduits independent of said first-mentioned conduits and communicating with said lower header and depending therefrom, means supplying liquid refrigerant to said cooling unit for producing a circulation of refrigerant therein, means providing communication between said headers for removing liquid and gaseous refrigerant from said lower header, and means for removing gaseous refrigerant from said upper header.

2. A cooling unit for refrigerating machines comprising an upper header and a lower header, a plurality of liquid refrigerant circulating conduits communicating with said upper header and depending therefrom, a plurality of liquid refrigerant circulating conduits independent of said first-mentioned conduits and communicating with said lower header and depending therefrom, means supplying liquid refrigerant to said conduits for producing a circulation of refrigerant therein, means providing communication between said headers for removing liquid and gaseous refrigerant from said lower header, and means for withdrawing gaseous refrigerant from said upper header.

3. A cooling unit for refrigerating machines comprising an upper header and a lower header, a plurality of liquid refrigerant circulating conduits communicating with said upper header and depending therefrom, a plurality of liquid refrigerant circulating conduits communicating with said lower header and depending therefrom, means supplying refrigerant to said conduits depending from said upper header for producing a circulation of refrigerant therein, means supplying refrigerant to said conduits depending from said lower header for producing a circulation of refrigerant therein, means providing communication between said headers for removing liquid and gaseous refrigerant from said lower header, and means for withdrawing gaseous refrigerant from said upper header.

4. A cooling unit for refrigerating machines comprising an upper header and a lower header, means including a plurality of conduits communicating with said upper header for providing a plurality of surfaces for supporting freezing trays and the like, means including a plurality of conduits independent of said first-mentioned conduits and communicating with said lower header for providing a plurality of surfaces for supporting freezing trays and the like, means supplying liquid refrigerant to said conduits for producing a circulation of refrigerant therein, means providing communication between said upper header and said lower header for withdrawing liquid and gaseous refrigerant from said lower header, and means for withdrawing gaseous refrigerant from said upper header.

5. A cooling unit for refrigerating machines

comprising an upper evaporator and a lower evaporator, each of said evaporators comprising sheets of metal secured together face to face and having a header and a plurality of depending liquid refrigerant circulating conduits formed therein and communicating with the header, each of said evaporators providing a plurality of surfaces for supporting freezing trays and the like, means supplying liquid refrigerant to said conduits for producing a circulation of refrigerant therein, means providing communication between the header of said upper evaporator and the header of said lower evaporator for withdrawing liquid and gaseous refrigerant from said lower evaporator, and means for withdrawing gas-

eous refrigerant from the header of said upper evaporator.

6. A cooling unit for refrigerating machines comprising an upper sheet metal evaporator and a lower sheet metal evaporator, each of said evaporators having formed therein a header and a plurality of depending refrigerant circulating conduits, and means for supporting said lower evaporator from said upper evaporator, said means including a plurality of lugs formed in the sheet metal at the upper end of said lower evaporator and engaging the wall of said upper evaporator in a plurality of the spaces between the refrigerant conduits thereof.

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