April 9, 1935. E. HEITMAN 1,996,808

REFRIGERATING APPARATUS

Filed Oct. 19, 1932

Fig. 1.

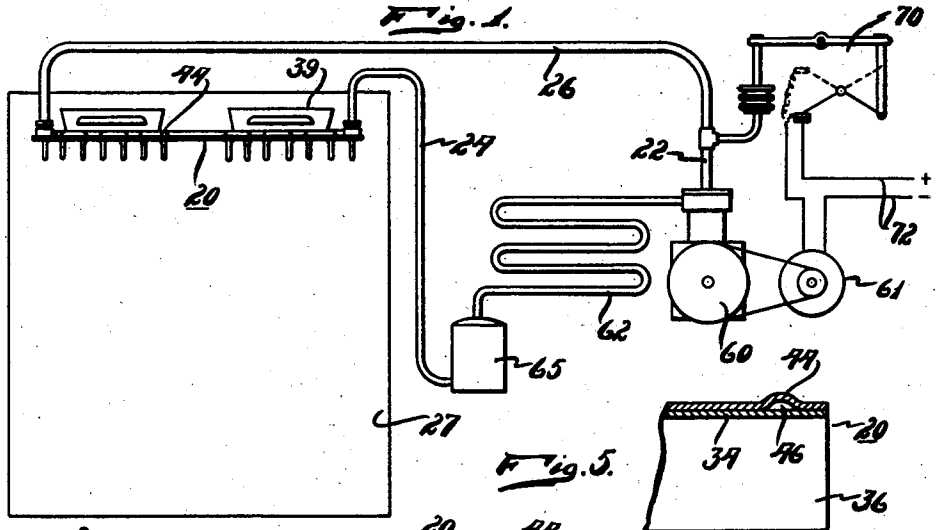


Fig. 5.

Fig. 2.

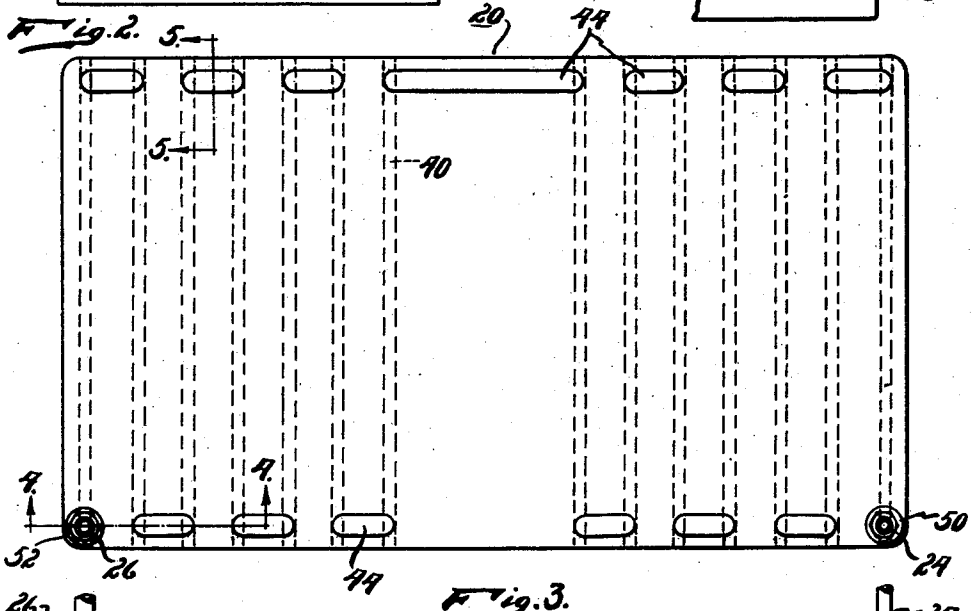


Fig. 3.

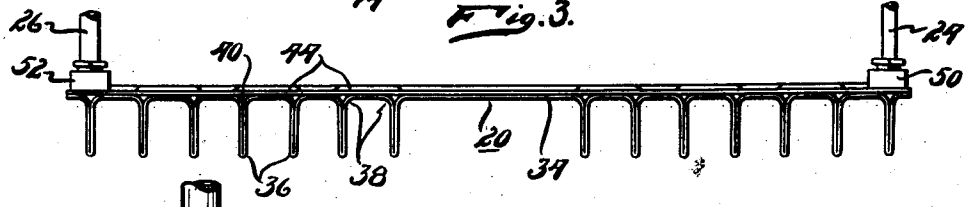
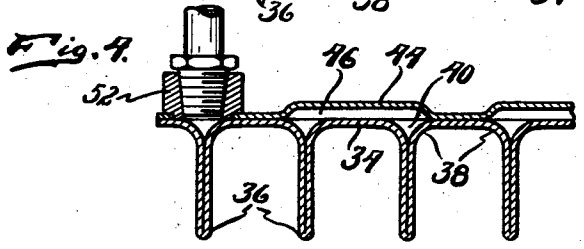


Fig. 4.



INVENTOR.
EDWARD HEITMAN
BY
Ralph E. Baker
ATTORNEY.

Patented Apr. 9, 1935 1,996,808

UNITED STATES PATENT OFFICE

1,996,808

REFRIGERATING APPARATUS

Edward Heitman, Detroit, Mich., assignor to Kelvinator Corporation, Detroit, Mich., a corporation of Michigan

Application October 19, 1932, Serial No. 638,495

2 Claims. (Cl. 62—95)

This invention relates to refrigerating apparatus, and more particularly to refrigerant evaporators for use in such apparatus.

One of the objects of this invention is to provide an improved refrigerant evaporator which is simple in construction and which may be economically manufactured of sheet metal material by stamping and forming operations.

Another object of the invention is to provide a refrigerant evaporator with heat absorbing fins having capillary passages in communication with the refrigerant space of the evaporator to increase the effectiveness of the heat transfer characteristics of the evaporator.

Another object of the invention is to construct a refrigerant evaporator of a pair of sheet metal members with one of the members providing a substantially flat surface for supporting an ice making receptacle, and the other member being bent to provide integral heat absorbing fins and a passage for refrigerant between said members.

Other objects and advantages will be apparent from the following description and accompanying drawing, wherein a preferred form of the present invention is clearly shown.

In the drawing:

Fig. 1 is a diagrammatical illustration of a refrigerating apparatus embodying features of my invention;

Fig. 2 is a top plan view of the refrigerant evaporator embodying features of my invention;

Fig. 3 is a front view in elevation of the evaporator shown in Fig. 2;

Fig. 4 is an enlarged fragmentary view in cross section, taken in the direction of the arrows 4—4 in Fig. 2; and

Fig. 5 is an enlarged fragmentary view in cross section, taken in the direction of the arrows 5—5 of Fig. 2.

Referring to the drawing, the numeral 20 designates my improved refrigerant evaporator. The evaporator 20 is operatively connected to a refrigerant condensing element 22 by a liquid supply conduit 24 and a vapor return conduit 26. The evaporator 20 is adapted to be placed within a compartment 27 for cooling the circulating air therein. The compartment 27 may be, for example, a food storage compartment of a so-called household refrigerator.

Preferably, the evaporator is constructed of sheet metal material and includes an upper sheet metal member 30 and a lower sheet metal member 32. The lower sheet metal member includes a plurality of substantially flat portions 34 and a plurality of parallel return bent portions 36 which are joined to the flat portion 34 by arcuate portions 38, all of which are formed by the single sheet of metal 32. The return bent portions 36 extend downwardly and serve to provide heat absorbing fins to increase the heat absorbing surface of the evaporator. These return bent portions are formed by bending the metal back upon itself in such a manner that the metal is in contacting or abutting relationship between the inner walls of the fins for a purpose about to be described. The arcuate portions 38 are formed in the sheet 32 so as to provide spaces or grooves 40 for refrigerant between the substantially flat lower surface of the sheet metal member 30 and the member 32. These spaces or grooves 40 are arranged in parallel relationship and extend from the front to the rear of the evaporator. The upper sheet metal member 30 is substantially flat, with the exception of raised portions 44 adjacent the front and rear edges thereof. These raised portions are formed in the member 30 to provide relatively short spaces or grooves 46 for refrigerant between the members 30 and 32. The upper sheet metal member, by having a substantially flat surface, provides a support for flat bottom ice making receptacles 39.

As will be noted in Figs. 2 to 5, the sheet metal members are secured together with the grooves 40 cooperating with relatively flat surfaces of the member 30 to provide passages or spaces for refrigerant and each groove 46 overlapping the ends of two grooves 40. By this arrangement, there is provided a continuous serpentine-like passage for refrigerant between the members 30 and 32.

Preferably, the sheet metal members are spot welded together at various places throughout the contacting surfaces thereof and also welded together around the edges thereof and at the ends of the return bent portions 36. In addition, the spaces at the ends of the grooves 40 are also closed by welding.

In order to increase the effectiveness of the heat absorbing characteristics of the evaporator, I have provided capillary passages between the inner walls of the heat absorbing fins and in open communication with the refrigerant passages 40. This is accomplished by bending the fin forming material back upon itself as previously described and by spot welding the material together at various places throughout the length of the fins. By this arrangement, there is provided many capillary passages between the walls of the fins, which are in open communication with the refrigerant passages 40.

The evaporator is provided with an inlet connection 50 and an outlet connection 52, to which are connected the refrigerant supply conduit 24 and the vapor return conduit 26. The opposite ends of conduits 24 and 26 are connected to the condensing element 22, which comprises, in general, a compressor 60, motor 61 for driving the compressor, and a condenser 62. Eveporated refrigerant is withdrawn from the evaporator through conduit 26 by the compressor. The compressor compresses the gaseous refrigerant and delivers it to the condenser wherein it is liquefied and from which it is delivered to the evaporator through conduit 24 under the control of a high side float mechanism 65. Preferably, the apparatus is intermittently operated. In order to control the operation of the motor, I have provided an automatic switch 70 which connects and disconnects the motor to and from the power mains 72 in response to predetermined changes in pressures in the conduit 26.

From the foregoing, it will be noted that I have provided an improved refrigerant evaporator which may be economically manufactured of sheet metal by punching and forming operations. In addition, it will be noted that the entire evaporator is constructed of two sheets of metal which cooperate to form a serpentine passage for refrigerant, and one of the members is formed to provide heat absorbing fins to increase the heat absorbing surfaces of the evaporator. Furthermore, I have provided capillary passages between the walls of the fins in communication with the serpentine passage to increase the effectiveness of the heat absorbing characteristics of the evaporator.

Although only a preferred form of the invention has been illustrated, and that form described in detail, it will be apparent to those skilled in the art that various modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. A sheet metal evaporator for refrigerating apparatus comprising, in combination, a sheet metal member, a second sheet metal member, said members having abutting surfaces and being arranged to provide a continuous passage for refrigerant, the first sheet metal member having outwardly bent portions to provide heat absorbing fins having capillary passages and a space between said members for conducting refrigerant in one direction, and the second member having outwardly bent portions to provide a space between said members for conducting refrigerant in another direction, the bent portions in one of said members being out of alignment with the bent portions in the other member.

2. A sheet metal evaporator for refrigerating apparatus adapted to be arranged horizontally within a compartment to be cooled comprising an upper substantially flat single piece sheet metal member, and a lower single piece sheet metal member having downwardly bent portions to provide heat absorbing fins and spaces between said members for conducting refrigerant therebetween and said upper sheet metal piece being provided with transverse bent portions to provide spaces for refrigerant interconnecting said other spaces.

EDWARD HEITMAN.