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2,573,583

PLATE TYPE REFRIGERANT EVAPORATOR

Filed Jan. 3, 1947

2 SHEETS—SHEET 1

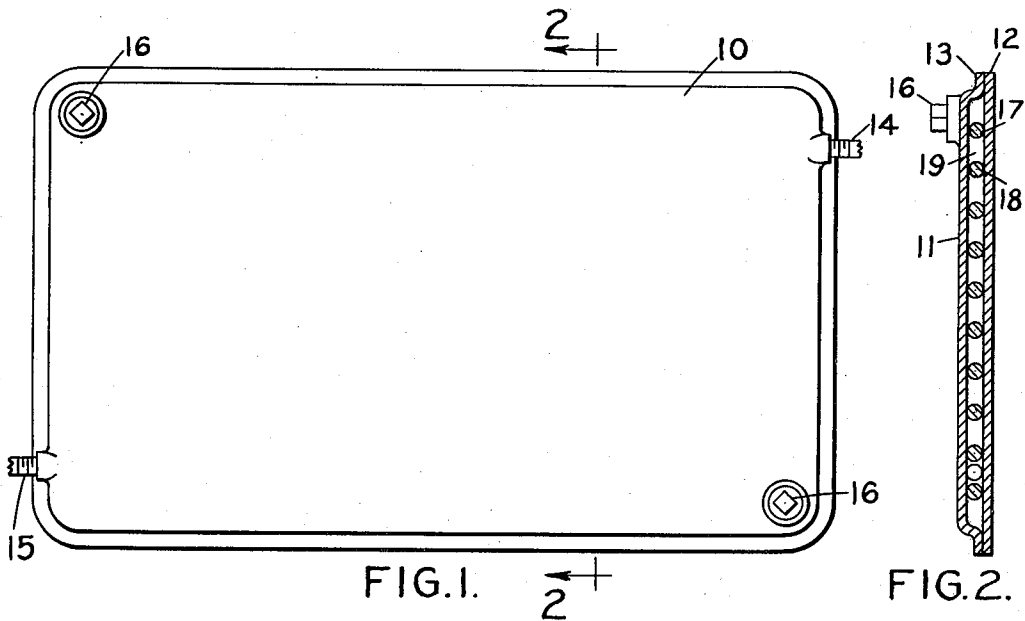
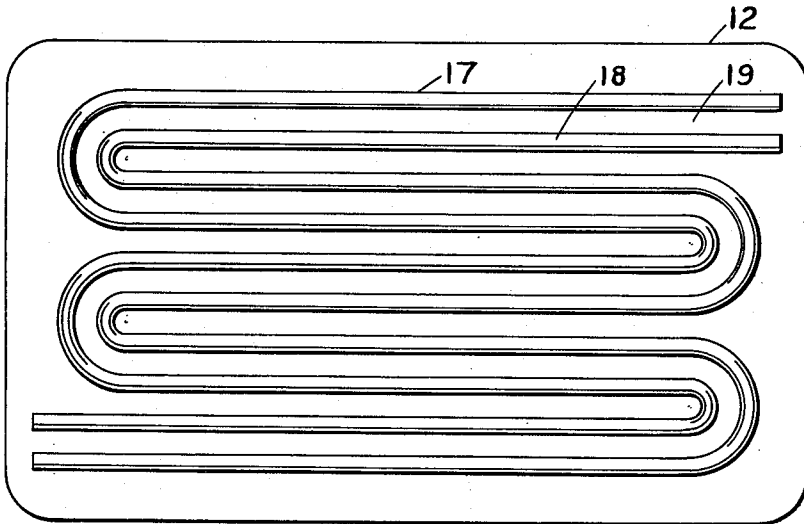


FIG. 3.

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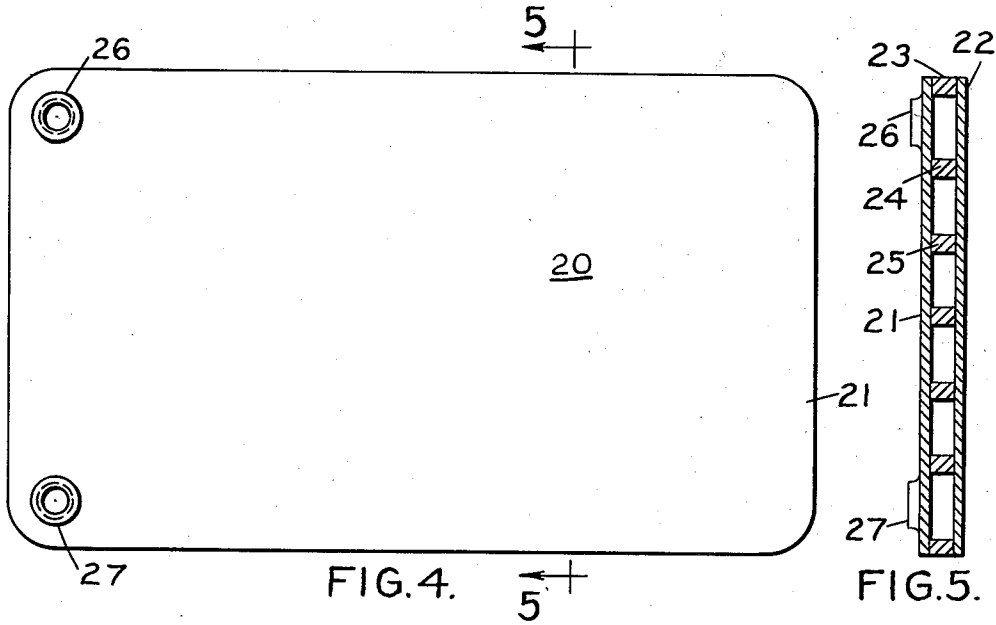
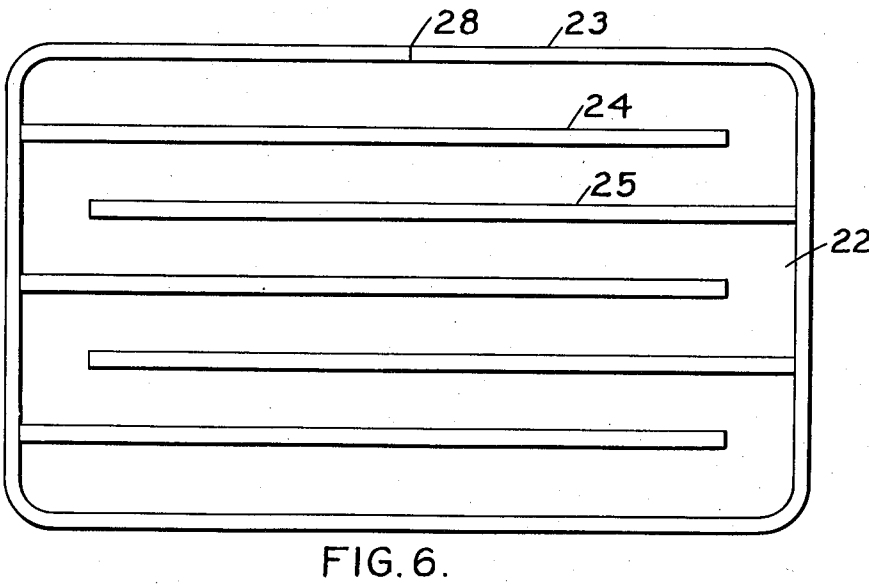
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PLATE TYPE REFRIGERANT EVAPORATOR

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2 SHEETS—SHEET 2



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PLATE TYPE REFRIGERANT EVAPORATOR

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This invention relates to heat exchangers and more particularly to heat exchangers of the so-called "plate type."

The principal object of the invention is to provide a heat exchange plate of particularly simple and economical construction.

Another object is to provide a heat exchange plate in which passageways for fluid are defined in part by rods bent into serpentine form.

These objects will more fully appear in the following specification when read in connection with the accompanying drawings, wherein:

Figure 1 is a plan view of an evaporator plate embodying the invention;

Figure 2 is a cross-sectional view taken on substantially the line 2-2 of Figure 1;

Figure 3 is a plan view of one side wall of the evaporator with a pair of serpentine rods in place thereon;

Figure 4 is a plan view of a modified form of heat exchanger embodying the invention;

Figure 5 is a cross-sectional view taken on substantially the line 5-5 of Figure 4; and

Figure 6 is a plan view of the heat exchanger with one wall thereof removed.

The invention is shown in Figures 1 to 3 as embodied in a refrigerant evaporator of the so-called "hold-over plate" type, but it will be evident that the invention is not limited to evaporators of this type, nor ever to evaporators, but may be utilized either in heating or cooling systems.

The evaporator illustrated in Figures 1 to 3 includes a container 10 formed from two sheet metal side walls 11 and 12. Side wall 11 is pressed into a shallow dish shape. A flange 13 surrounds the perimeter of the side wall 11. The openings are formed in the ends of side wall 11 to receive a pair of couplings 14 and 15 as will more fully appear presently. Filler openings closed by a removable threaded plug 16 are also formed in side wall 11 adjacent opposite corners thereof.

Side wall 12 is flat and of the same size as side wall 11. The two side walls are seam welded about their perimeters in the region of the flange 13.

Passageways for refrigerant are formed in the container 10 by means of a pair of rods 17 and 18. The rods are preferably copper clad steel. They are bent into similar serpentine configuration as shown in Figure 3, so that when arranged as shown they are spaced equidistantly throughout their linear extents.

The two bars are arranged as shown and the couplings 14 and 15 are brazed or otherwise se-

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cured to each pair of adjoining ends. The ends of the couplings 14 and 15 adjacent the rods 17 and 18 are of the same thickness as the diameter of the rods 17 and 18 so as to fit tightly against the side walls 11 and 12. Preferably the couplings are copper clad also.

One surface of the side wall 12 is coated with a suitable flux and the rods 17 and 18 are laid upon the fluxed surface in the position shown in Figure 3 and "tacked" thereto by brazing or soldering. The side wall 11 is then coated with flux on its inner surface and placed over the rods 17 and 18 and side wall 12. The couplings 14 and 15 are inserted in the openings in the wall 11 adapted to receive them.

The two side walls 11 and 12 are clamped firmly in position, pressure being applied in such a manner as to bring the inner surfaces of the side walls into contact with the rods 17 and 18. Heat is then applied to fuse the copper coating of the rods to the inner surfaces of the side walls. The edges of the side walls are seam-welded together as mentioned above. The welding may be done either before or after brazing the rods to the side walls.

From the foregoing it will be seen that a serpentine passageway 19 is formed between the rods 17 and 18 extending from coupling 14 to coupling 15. The space within the container 10 outside of the passageway 19 is filled with a suitable eutectic solution through the filler holes, and the latter are then closed by plugs 16.

Couplings 14 and 15 may be connected to a refrigeration system of the compressor-condenser type and refrigerant passed through the passageway 19 to solidify the eutectic solution. The connections may be permanent, as in a fixed installation, or may be disconnected when the plate is employed in a movable refrigerating unit such as a truck or railway car.

Instead of using copper clad rods and couplings corrosion resistant steel without coating may be employed. In that case, then sheets of brazing metal are placed between the rods and the side walls prior to brazing.

Figures 4 to 6 illustrate a modified form of the invention. It comprises a container 20 comprising a pair of walls 21 and 22 spaced apart by bars 23, 24 and 25 positioned between the walls 21 and 22.

The walls 21 and 22 are flat sheets of metal of generally rectangular shape, the corners of which preferably are rounded as shown. Wall 21 is provided with two drawnecks 26 and 27 for a purpose which will presently appear.

Preferably, although not necessarily, the bars 23, 24 and 25 are of rectangular cross-section, and are all of equal thickness. The bar 23 is bent to conform to the shape of the perimeters of the walls 21 and 22. The two ends of the bar 23 are arranged in abutting relation and are brazed or welded together at 28.

The bars 24 and 25 are all of equal length and are somewhat shorter than the lengths of the walls 21 and 22. The bars 24 and 25 are arranged upon the wall 22, as shown in Figure 6, with the bars 24 abutting the bar 23 at the left hand end of the heat exchanger (as viewed in Figure 6), and the bars 25 abutting the bar 23 at the other end of the heat exchanger. The wall 21 is then laid upon the bars 23, 24 and 25 and the assembly clamped together after which they are joined together by brazing or welding.

If the bars are to be brazed to the walls 21 and 22, either the bars must be copper clad, or brazing metal must be placed between the bars and the walls, as in the case of the modification previously described. On the other hand, the bars may be welded to the walls after assembly of the parts in the manner described.

It will be apparent from the foregoing that the walls 21 and 22 and the bar 23 form a container having inlet and outlet ports at the draw-necks 26 and 27. Within the container is a serpentine passageway for fluid, formed by the walls and the bars 24 and 25.

From the foregoing it will be seen that the present invention provides a novel heat exchanger of very simple and economical construction.

The scope of the invention is indicated in the appended claims.

I claim:

1. A hold-over evaporator comprising a container formed from a pair of spaced apart side walls joined together in fluid tight engagement throughout their perimeters, a pair of elongated rods of serpentine shape between said side walls, said rods being of similar shape and spaced apart throughout their linear extents, each of said rods

having the convolutions thereon spaced from each other, said rods being united with said side walls throughout the linear extents of said rods and cooperating with said side walls to divide said container into a serpentine refrigerant passageway and a space for a eutectic solution, and means on said evaporator for coupling the ends of said passageway to a refrigerating unit.

2. A hold-over evaporator of the character defined in claim 1 wherein said rods are brazed to said side walls throughout the linear extents of said rods.

3. A heat exchanger comprising a container including a pair of relatively closely spaced parallel side walls, means joining said side walls together in fluid tight engagement throughout their perimeters, a pair of elongated rods of generally similar serpentine shape arranged in spaced relation between said side walls and united to said side walls throughout the linear extents of said rods, said rods cooperating with said side walls to provide a serpentine passageway for fluid and spaces outside of said passageway for a eutectic solution, and means on said container for coupling the ends of said passageway to a fluid circulating system.

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