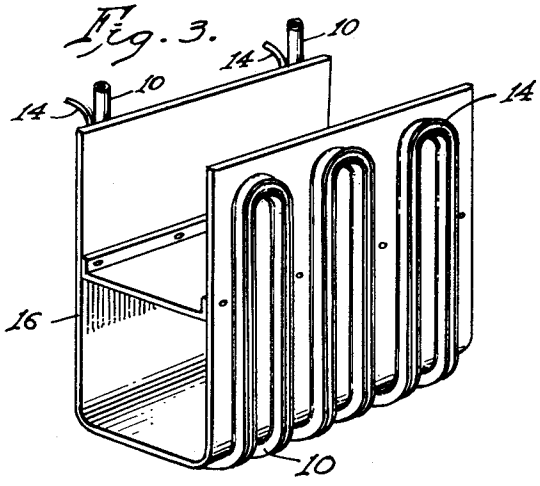
Aug. 31, 1954 S. S. BARTLOWE 2,687,626

HEAT EXCHANGER HAVING OPEN-SIDED BORE SUPERIMPOSED ON CLOSED BORE

Filed Feb. 16, 1952

Fig. 3.



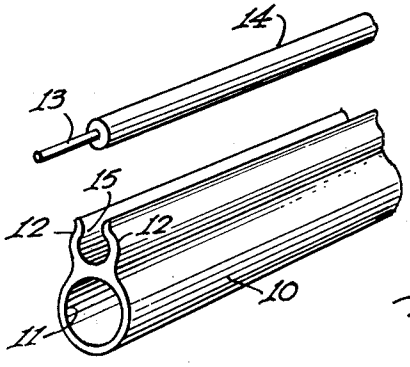


Fig. 1.

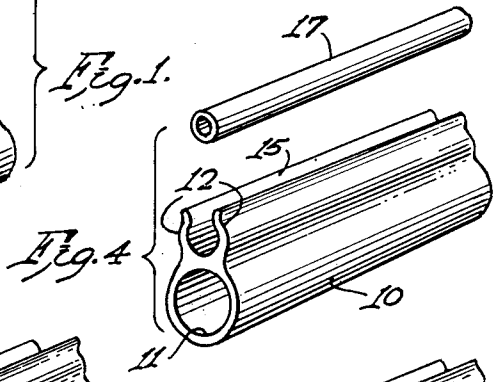


Fig. 4.

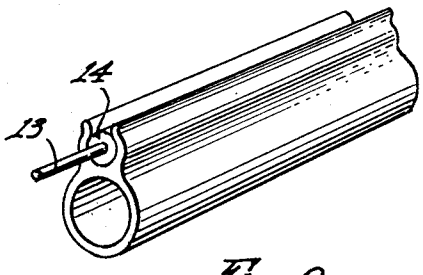


Fig. 2.

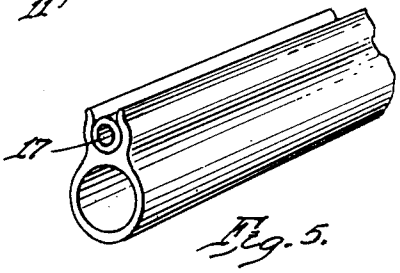


Fig. 5.

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HEAT EXCHANGER HAVING OPEN-SIDED BORE SUPERIMPOSED ON CLOSED BORE

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7 Claims. (Cl. 62—126)

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This invention relates to heat exchangers, and aims to provide a simple and effective device suitable for use wherever a fluid passing through a tube is required to extract heat from an adjacent element.

The invention is applicable in providing heat-defrosting evaporators as well as in suction-liquid-line assemblies. Either of the devices may be used in domestic, commercial or industrial refrigeration or air-conditioning.

In its essentials the invention consists of a unitary strip which is provided with a closed bore through which fluid passes, and also provided with an open-sided bore which forms a groove for the reception of a cylindrical heating member such as an electrical heating element or a capillary tube. A good heat path is provided between the heating member and the walls of the open-sided bore.

These and other objects and advantages of the invention will become apparent as the description proceeds.

In the drawings:

Fig. 1 is an exploded perspective of one form of the invention useful in self-defrosting evaporators.

Fig. 2 is a view similar to Fig. 1, but showing the parts in assembled position.

Fig. 3 is a perspective of an evaporator utilizing the device of Fig. 1.

Fig. 4 is an exploded perspective of a modified form of the invention useful for a suction-liquid-line assembly.

Fig. 5 is a view similar to Fig. 4, but showing the parts in assembled position.

Referring more particularly to Figs. 1 and 2, the heat exchanger includes a main body 10 formed with a longitudinal bore 11 adapted to carry refrigerant. A pair of flanges 12 project from one side of the body 10 and the material at the base of the flanges is rounded so as to form a partly cylindrical, trough-like groove which may be called an open-sided bore. The heating element may be of any preferred form, the one illustrated consisting of resistance wire 13 surrounded by insulation 14, which may be rubber or a resilient plastic.

The flanges 12 are formed so as to provide a throat 15 which is narrower than the normal outside diameter of the heating element. In assembling the heating element into the groove to the position illustrated in Fig. 2 it is necessary to use a slight amount of force, which may be applied by the fingers or a ball-shaped tool. After the heating element passes the throat 15 it expands to its normal shape, completely filling the trough-like groove between the flanges 12, and maintaining resilient-pressure contact with the wall of the groove.

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The body 10 with its bore 11 and its open-sided bore may be extruded as a unitary shape, or it may be formed or drawn, and it may be composed of any suitable material having good heat transfer properties, such as copper, brass or plastics. An aluminum extrusion is especially suitable, since it may be economically manufactured to the desired shape with a minimum of finishing operations, and has good heat-transfer properties.

As shown in Fig. 3 the heat exchange strip may be attached, by brazing or any preferred method, to the outside of an evaporator 16 designed for use in a domestic refrigerator, and which may also be of aluminum. The strip may be bent sinuously or in any desired shape for application to the body 16. Refrigerant is permitted to flow through the bore 11 to cool the evaporator body. When the evaporator becomes frosted and it is desired to defrost, an electric current is sent through the resistance wire 13 for a time suitable to melt or loosen the frost.

It will be clear from the above description that the invention permits the assembly of a simple and inexpensive heat-defrosting evaporator. The heat is distributed evenly over the wall of the evaporator to the same surfaces that received the chilling effect of the refrigerant, and hence the evaporator is defrosted with the minimum of current and in a very short time.

While the heat exchange strip has been disclosed as applied to a domestic refrigerator, it should be understood that it is also applicable in commercial, industrial and air-conditioning applications.

Figs. 4 and 5 illustrate a different form of the invention in which a capillary tube 17 is inserted in the open-sided bore of the body 10. In this form, as the capillary tube is pushed past the throat 15, the flanges 12 may be formed so as to yield resiliently and then spring back to hold the capillary tube, which has an external diameter which fits closely in the open-sided bore. Here, again there is maintained resilient-pressure contact between the capillary tube and the wall of the groover. The capillary tube may be of any suitable material, but is preferably of aluminum.

When used in a refrigeration system the warm, compressed refrigerant flows through the capillary tube, and the cold, expanded refrigerant is drawn through the large bore 11, thus providing

for heat exchange between the hot and cold lines.

In forming the body 10 the open-sided bore is preferably formed to such a size as to snugly fit around the cylindrical object (heating element or capillary tube), and the flanges 12 are sufficiently resilient to permit the cylindrical object to be inserted. At the same time the flanges 12 are preferably of sufficient strength to firmly hold the cylindrical object without the necessity of any crimping together of the flanges, or similar extra finishing operation. This construction insures a resilient-pressure contact between the cylindrical object and the wall of the groove throughout the life of the device.

However, in some cases it may be desirable to insert the cylindrical object through a throat of the same width as the open-sided bore, thereafter crimping the flanges 12 around the cylindrical object. To increase heat transfer, any of the various commercial heat-transfer compounds may be applied between the surface of the open-sided bore and the cylindrical object.

According to the provisions of the patent statute, I have explained the principles of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practised otherwise that as specifically illustrated and described.

I claim:

1. A heat exchanger comprising a unitary strip of resilient material formed with a closed bore adapted to carry fluid and with an open-sided bore, an insulated heating element mounted in the open-sided bore, there being a good thermal path between the walls of the open-sided bore and heating element.

2. A heat exchanger comprising a unitary strip of resilient material formed with a closed bore adapted to carry fluid and with an open-sided bore, a capillary tube mounted in the open-sided bore, there being a good thermal path between the walls of the open-sided bore and the capillary tube the open-sided bore being superimposed on the closed bore to give the strip the general shape of a figure 8.

3. A heat exchanger comprising a unitary strip of extruded aluminum formed with a closed bore adapted to carry fluid and with an open-sided bore, a cylindrical heating member mounted in the open-sided bore, the walls of the open-sided bore being in resilient-pressure contact with the heat-exchange member the open-sided bore being superimposed on the closed bore to give the strip the general shape of a figure 8.

4. A heat exchanger comprising a unitary strip of extruded aluminum formed with a closed bore adapted to carry fluid and with an open-sided bore, an insulated heating element mounted in the open-sided bore, the walls of the open-sided bore being in resilient-pressure contact with the heating element the open-sided bore being superimposed on the closed bore to give the strip the general shape of a figure 8.

5. A heat exchanger comprising a unitary strip of extruded aluminum formed with a closed bore adapted to carry fluid and with an open-sided bore, an aluminum capillary tube mounted in the open-sided bore, the walls of the open-sided bore being in resilient-pressure contact with the capillary tube the open-sided bore being superimposed on the closed bore to give the strip the general shape of a figure 8.

6. An evaporator for a refrigeration system comprising an evaporator wall, a heat-exchanger secured to the evaporator wall, the heat-exchanger comprising a unitary strip formed with a closed bore adapted to carry refrigerant and with an open-sided bore, an insulated heating element mounted in the open-sided bore, there being a good thermal path between the walls of the open-sided bore and the heating element.

7. An evaporator for a refrigeration system comprising an aluminum evaporator wall, a heat exchanger secured to the evaporator wall, the heat exchanger comprising a unitary strip of extruded aluminum formed with a closed bore adapted to carry refrigerant and with an open-sided bore, an insulated electrical heating element mounted in the open-sided bore, there being a good thermal path between the walls of the open-sided bore and the heating element.

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