July 14, 1959 C. H. WURTZ 2,894,731

REFRIGERATING APPARATUS

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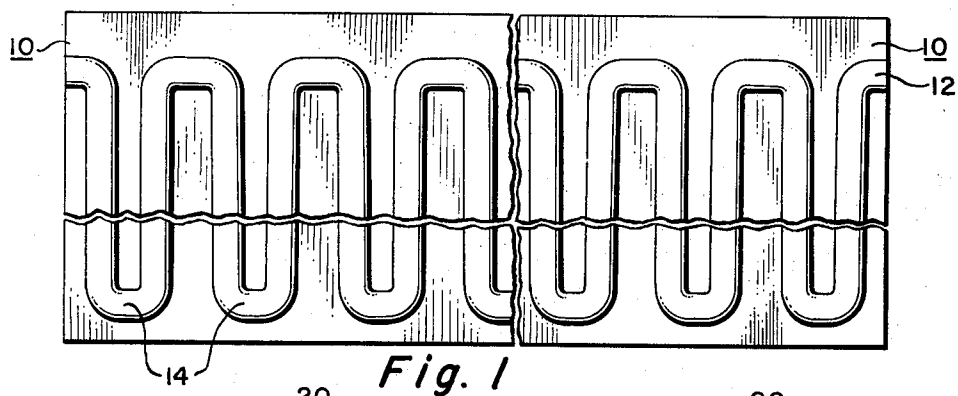


Fig. 1

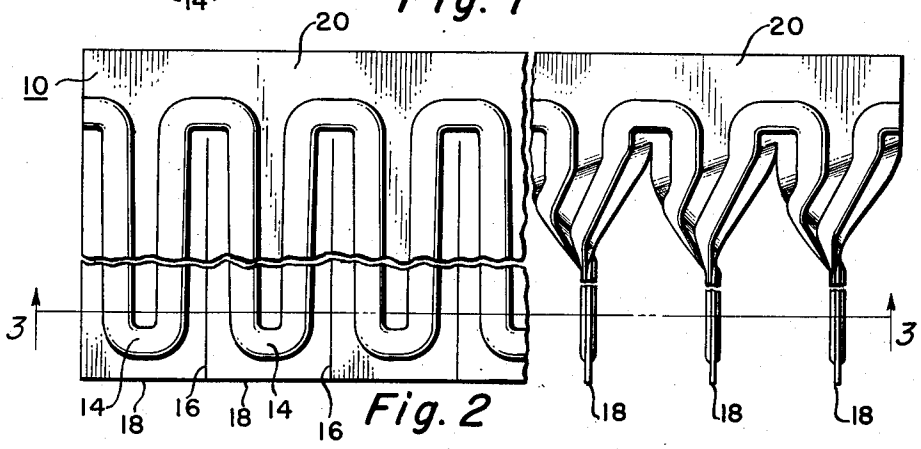


Fig. 2

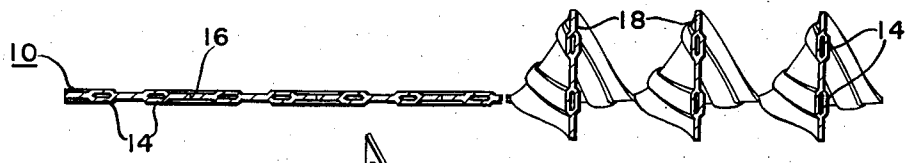


Fig. 3

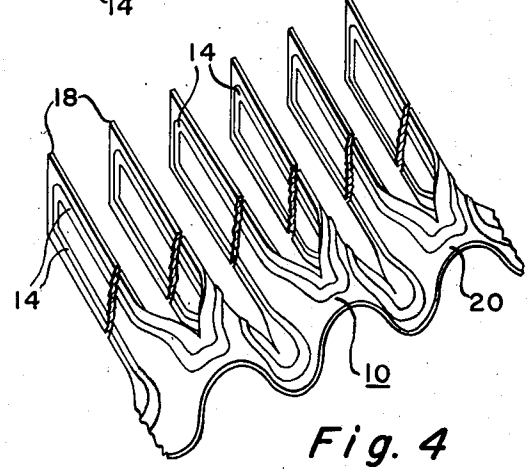


Fig. 4

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REFRIGERATING APPARATUS

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1 Claim. (Cl. 257—256)

This invention relates to refrigerating apparatus and more particularly to an improved type of refrigerant evaporator.

The desirability of manufacturing evaporators and other types of heat exhangers by the roll bonding process has long been recognized but prior to this invention it was considered that only plate type evaporators could be manufactured by the roll bonding process since the roll bonding process is only capable of producing flat plates which have no projecting fins. Roll bonded plate type evaporators have now gone into extensive use but no one has heretofore constructed an evaporator of the so called fin and tube type by the roll bonding process. It is an object of this invention to so arrange the refrigerant passages in a plate and to otherwise process the plate so as to enable one to construct fin and tube type evaporator by the roll bonding process.

Another object of this invention is to provide a roll bonded evaporator wherein condensate forming on the evaporator readily drains from the surfaces of the evaporator.

More particularly, it is an object of this invention to manufacture roll bonded evaporators wherein the refrigerant passages are arranged in a series of parallel loops disposed in a series of flat cantilever fin-like projections which have been bent into a plane perpendicular to the plane of the original roll bonded plate.

Still another object of this invention is to provide a new method of manufacturing fin and tube type evaporators.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a plan view of a roll bonded plate showing the arrangement of the refrigerant passages therein;

Figure 2 is a view similar to Figure 1 showing the plate in a later stage of manufacture;

Figure 3 is a sectional view taken substantially on line 3—3 of Figure 2; and

Figure 4 is a perspective view of a modified form of evaporator.

Referring now to the drawing wherein a preferred embodiment of the invention has been shown, the reference numeral **10** designates a roll bonded evaporator having a refrigerant passage **12** formed therein as shown. The roll bonding process used in manufacturing the evaporator **10** is that disclosed in Long Patent No. 2,662,273, to which reference may be made for a more complete disclosure of the bonding process. Evaporators made by this process are in the form of flat plates having internal passages formed while the plates are held between a pair of flat dies.

In the evaporator shown in Figures 1, 2, and 3, the refrigerant passage **12** comprises a plurality of parallel U-shaped loops **14** which are arranged so as to make it possible to cut slits **16** between adjacent loop portions so as to form a plurality of finger-like projections **18**. After the slits **16** have been made, the resulting finger-like projections **18** are bent into a plane at right angles to the one supporting edge portion **20** of the plate as best shown in Figures 2 and 3. The resulting product is a roll forged evaporator which in effect is a fin and tube type of evaporator with the projecting fingers **18** serving as a series of parallel cantilever fins having refrigerant passages **14** disposed within the fins.

In those constructions where it is desirable to provide fins which are closer to one another than those shown in Figures 2 and 3, the supporting edge of the roll bonded evaporator may be corrugated somewhat as shown in Figure 4 so as to reduce the distance between the adjacent fins. Another advantage of corrugating the one edge is that it reduces the amount of twist necessary in each of the projecting fins.

In actual practice, it is preferable wherever possible that the evaporator be arranged with the bottom edges of the fins inclined slightly so that the condensate will all drain to the lowermost corners of the fins. Liquid refrigerant would be supplied to the one end of the passage **14** by means of a conventional refrigerant liquefying means (not shown) in accordance with usual practice. The one edge of the plate which supports the cantilever fins constitutes a header for directing refrigerant from the one fin to the next. For purposes of illustration only, one bank of fins has been shown whereas several banks could be connected in parallel and if desired, the fins could be vertically disposed.

By virtue of the above described construction and arrangement, it is possible to manufacture a fin and tube type evaporator from a one piece roll bonded element and to arrange the main fin-like cooling surfaces of the evaporator in vertical planes so that the condensate or defrost water which may form on the surfaces of the evaporator will drain by gravity to the lower edge of each of the fin-like fingers or projections **18** and thereby not interfere with the efficient operation of the evaporator.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claim which follows.

What is claimed is as follows:

In a tube and fin type heat exchange device, a one piece sheet metal element having a plurality of integrally formed aligned finger-like projections extending away from one edge portion of said element and forming a plurality of parallel fins between which air may flow, said projections being arranged in side by side relationship and having refrigerant passage means formed directly in said projections, said one edge portion being foreshortened by having a plurality of corrugations formed therein with the sides of said corrugations arranged substantially in alignment with said projections.

References Cited in the file of this patent

UNITED STATES PATENTS

1,798,652	Booth	Mar. 31, 1931
2,162,586	Newman	June 13, 1939
2,363,435	Osborn	Nov. 21, 1944
2,546,737	Gaul	Mar. 27, 1951
2,690,002	Grenell	Sept. 28, 1954
2,712,736	Wurtz	July 12, 1955
2,773,301	Karmazin	Dec. 11, 1956
2,795,035	Kafer	June 11, 1957