CONDENSER AND METHOD OF MAKING SAME

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Filed Aug. 29, 1952

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

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This invention relates to a heat exchange unit and the method of producing the same, although not necessarily so limited.

In the manufacture of heat exchange units, pressed sheet metal has been used, wherein the tubes for the heat exchange medium are extruded from sheet metal, the margins of the sheet metal being used as fins, as clearly illustrated in the Theodore Karmazin application for United States Letters Patent Serial No. 229,381, filed June 1, 1951, for Heat Exchange Unit and Method of Manufacture, now abandoned.

An object of this invention includes the method of forming a plurality of rows of tubular projections struck from a strip of sheet metal, stacking or superimposing a plurality of strips of sheet metal having such rows or projections struck therefrom and joining two or more tiers of strips by holding the tiers of strips in spaced and aligned relation by a spacer during the brazing operation.

Another object of this invention is to provide a heat exchange unit utilizing tubular projections struck from a strip of sheet metal to form passages for the heat exchange medium, banks of such units being held in aligned relation and properly spaced by metallic spacer members mounted between the banks during the fusing operation to hold the banks properly aligned without buckling and without being deformed.

Another object of this invention is to produce heat exchange units that are economically produced, without undue waste of material and at the same time properly aligned, efficient and dependable.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

In the drawings, Figure 1 is a fragmentary, perspective view of a portion of a heat exchange unit.

Figure 2 is an end view of a heat exchange unit that may be made from two 2" cores to make a four row heat exchange unit.

Figure 3 is a fragmentary side elevational view of a portion of a heat exchange unit with parts broken away and shown in section.

Figure 4 is a perspective view of a spacing member.

Figure 5 is a top plan view of a sheet of metal having a tubular projection struck therefrom.

Figure 6 is a cross sectional view, taken substantially on the line 6--6 of Figure 5.

Referring to the drawings, the reference character 10 indicates sheets of metal having tubular projections 12 struck outwardly from the metal. In the modification disclosed herein, two rows of tubular projections have been provided. In order to provide for the proper flow or movement of metal, slits 14 extend between adjacent pairs of tubular projections. This is to provide sufficient flow of metal, so that when the tubular projections 12 are formed, the tubular projections will be uniform throughout the periphery. The shape of the tubular projections, which has been shown as round, and the size, have merely been shown for the purpose of illustration, in that any suitable shape or size may be had.

The number of sheets 10 having tubular projections 12 struck therefrom are stacked with the projections of one strip nested into the cavities formed by the projections in an adjacent strip, so as to form a heat exchange unit, such as a condenser. A capping member 16 for each pair of adjacent tubular projections may be assembled in association with the sheets. Although two rows of tubular projections have been shown on each sheet, the number is a matter of choice. For example, there may be one, two or three rows, the number depending upon the size and requirements of the heat exchange unit and upon the available equipment.

After the strips have been superimposed upon each other and the top and bottom members placed in position, or the end members placed in position, depending upon the arrangement of the finished assembly, the parts are permanently interconnected by a brazing operation utilizing suitable brazing metal for welding or fusing the parts together. This is a comparatively simple matter when it is only a few strips and only one tier. In the past, it has been common practice when assembling multiple tiers, as disclosed in Figures 1 and 2, to first complete one unit or tier, then a second unit, or tier, this followed by an operation of joining the units or tiers together. By assembling several tiers and brazing all of the tiers simultaneously, the production would be expedited and the cost reduced. However, in the past this has not been feasible, for the reason that in order to assemble a plurality of tiers, the tiers buckle and move out of place. This has been overcome by arranging a spacer member, or several spacer members, located between the several tiers, so as to hold the tiers aligned during the brazing operation.

In the disclosure a tubular member 20 projects between adjacent tiers. This tubular member may be a sheet metal tubular member having a melting point at least slightly higher than the melting point of the brazing material. Instead of a tubular member, a wire may be used, or a rod, or a strip of metal of any suitable configuration. This tubular or spacer member 20 is preferably mounted in one tier of notches 22 in adjacent tiers of strips of metal, so as to economize on space. The spacer member 20 remains as a part of the assembly after the brazing operation is completed. The spacer member 20 gives the finished assembly additional rigidity.

By this arrangement, stacks or tiers of strip material several feet in height may be assembled and several stacks or tiers fused together, so as to form a condenser or heat exchange unit. All of the connecting members 16 and the plates 24, which may be referred to as end plates or top and bottom plates, are assembled together with the necessary conduits 26 before the fusing operation takes place, so that when the assembly is removed from the brazing furnace, the unit is complete.

No attempt has been made to show how the several tubes or passages are interconnected, as this is determined by the requirements of the finished product.

As is well known to those skilled in the art, the brazing operation takes place in the presence of an inert gas or in the presence of a reducing gas, so as to prevent oxidation.

The spacer members are of a length approaching the depth of the tiers, so that the spacer members extend throughout the depth of the superimposed strips, or practically throughout the entire depth. For some purposes the spacer members may be slightly shorter, but not much shorter than the depth of the tiers.
Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. The method of manufacturing multiple tier heat exchange units which comprises the steps of forming a plurality of slots in a plurality of substantially flat sheets of metal with the slots in each sheet arranged in a column intermediate the side edges of each sheet, simultaneously forming a plurality of tapered, tubular projections on each sheet and a plurality of notches in the side edges of each sheet, the projections and the notches being arranged in rows aligned with the slots and the projections being disposed on opposite sides of the slots, superimposing a plurality of sheets to form a tier with the sheets disposed in spaced substantially parallel planes and the projections on the sheets telescoping together to form elongate tubes, mounting at least two tiers in side by side relationship, positioning a straight tubular member in the notches between adjacent tiers with the adjacent side edges of each sheet in each tier frictionally engaging the tubular member so as to hold the sheets of the tiers in aligned relationship, and simultaneously brazing the telescoping projections together and the edges of the sheets to the tubular member to form a unitary structure.

2. A heat exchange unit comprising, in combination, a plurality of tiers, each tier including a plurality of substantially flat sheets each having a plurality of tapered tubular projections integral therewith, said sheets being superimposed with the sheets of each tier disposed in spaced substantially parallel planes and the projections telescoping together and forming tubes, the side edges of each of said sheets having notches therein aligned with the projections, and a straight tubular member; positioned in the notches between the adjacent tiers with the adjacent side edges of each sheet in each tier engaging the tubular member, said telescoping projections being brazed together and the edges of the sheets being brazed to the tubular member to form a unitary structure.

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