Another object of this invention is to provide a substantially increased surface area around the heat exchanger tubes and, in turn, to dissipate a greater amount of heat.

The invention has for another object the provision of a louvered support for the heat exchanger tubes, thereby causing the circulating air to pass through the plane of the heat exchanger at an angle which is generally that of the louvered portions.

Moreover, the invention provides a heat exchanger of the type wherein the transfer of heat is effected by a flow of gas contacting the heat exchanger, comprising two supporting sheets of foraminous or meshed material including means for causing turbulent flow of said gas, and passageway means disposed in a plane parallel to the general plane of said sheets and in a heat exchange relation thereto.

Another object of the invention is to provide a heat exchanger in which the tubes containing the heat transfer fluid are supported between two supporting sheets, whereby the heat exchanger is given additional support, and a greater surface area aids in the dissipation of a greater amount of heat.

In the present invention, which attains these objects, the increase in the efficiency of heat transfer over conventional heat exchangers has been found to be as high as twenty per cent.

The above and other objects will become readily apparent from the following description when considered with the drawings in which:

Figure 1 is a face view of the heat exchanger;
Figure 2 is a fragmentary view of the expanded metal sheet;
Figure 3 is a similar fragmentary view of the expanded metal condenser tube in which the louvered portion has been flattened;
Figure 4 is a sectional view taken along lines 4—4 of Figure 1;
Figure 5 is a sectional view taken along lines 5—5 of Figure 1;
Figure 6 is a sectional view taken along lines 6—6 of Figure 1;
Figure 7 is a perspective view of a condenser using the invention.

Figure 8 is an exploded view of another embodiment of the invention.

While it will be obvious that the construction described herein will have numerous applications, for convenience, the description will be limited to the invention as embodied in Fig. 7.

As shown in Figure 1, the condenser 19 consists of the tubing 20 which carries the heat transfer fluid, the tubing being surrounded by two sheets 21, 22 of expanded metal backing. The top and bottom edges of the expanded metal sheets are supported by solid metal sheets 23 and 24.

The expanded metal can be made by any conventional method. One method of manufacture consists of forming, in the metal, parallel lines of slits, the space between the slits of one line being opposite the slits of the adjacent lines. The metal sheet is then stretched or expanded to form louvered openings, as shown in Figure 2 and indicated generally by numeral 25.

The major part of the condenser consists of two louvered expanded metal sheets 21, 22, between which the tubing 26 is disposed. The areas of the expanded metal sheets 21, 22 which immediately surround the tubing 26 are flattened as shown at 25 in Figure 3. The flattening of the expanded metal in such areas facilitates the crimping of the metal around the tubing 26, in addition, provides a more intimate heat conducting contact between the tubing and the expanded metal.

The tubing consists primarily of parallel spaced straight sections 27 which are joined at their ends in a serpentine manner by arcuate sections of tubing 28. The arcuate sections 28 of tubing are welded to the straight sections 27 of tubing as at 29. The two ends of the tubing which are to be connected to the apparatus with which the heat exchanger is to be used are shown at 30 and 31. End 31 is connected to the tubing through a
straight section 32 which rests in a groove 33 formed in the solid metal support piece 24. As shown in Figures 4 and 5, the solid metal support piece 23 is welded to the expanded metal 21 at point 34. In a like manner, support piece 24 is welded to the expanded metal at the edge opposite from support piece 23.

The solid support pieces 23 and 24 are embossed to form grooves 35 to receive the arcuate sections 28 of the tubing. The flattened part 25 of the expanded metal is also embossed to form grooves which receive the straight sections 27 of the tubing.

Figure 6 shows the manner in which the straight portions 27 of the tubing are supported between the expanded metal sheets 21 and 22. Immediately surrounding the tubing, the expanded metal is flattened as shown at 25. Grooves are then embossed in the flattened areas of the expanded metal sheets and raised portions are likewise formed by a stamping operation, so that between each pair of straight sections of tubing the expanded metal is raised as shown at 25. The tubing is then disposed in the grooves and between the sheets, and the sheets 21, 22 of expanded metal are then welded together at land contact portions 36 adjacent to the straight sections 27 of tubing.

A second embodiment of the invention is shown at Figure 8. In this embodiment, the serpentine tubing 40 is formed in one continuous piece. The two sheets of expanded metal 41 and 42 are embossed to form grooves indicated generally at 43 and 44, which grooves conform to the configuration of the tubing. The expanded metal sheets may contain raised portions between adjacent convolutions such as those in Figure 6. The two sheets of expanded metal 41 and 42 are placed around the tubing 40 and are then welded together in much the same manner as was done in the embodiment of Figures 1-7. Thus, the major portion of the condenser will have a configuration which in section is best illustrated by the section shown in Figure 6. The embodiment of Figure 8 has the advantage of being easy to assembly and uses a minimum number of individual parts.

As an illustration of use, the condenser is shown in Figure 7 as being placed on a refrigeration unit 50 upright in back of the refrigerator unit with the straight sections 27 of the tubing extending vertically, thereby providing support for the condenser. The circulating air indicated by the arrows 51 will be drawn through the condenser generally at an angle determined by the angle of the lowered portions of the expanded metal. In this way, the insulating air film which normally surrounds a condenser will be considerably diminished and the circulating air will contact a greater surface area than it would in conventional condensers.

It is to be understood that, while I have described what I believe to be the most practical and efficient embodiments of my invention, there are numerous variations which can be made without departing from the scope of the invention as set forth in the accompanying claim.

I claim:

As an article of manufacture, a heat exchanger comprising, two expanded metal thermally conductive sheets, each said sheet having a plurality of semi-cylindrical grooves, in registry when said sheets are assembled, and adjacent land contact portions, a tube for the passage of fluid disposed between said sheets, in said grooves, and in intimate heat conducting relation with said sheets, said tube having a serpentine configuration comprising parallel legs interconnected by return bends, each of said sheets engaging approximately half the circumference of said tube, and raised portions in said sheets between said grooves, forming enlarged passageways between said sheets, said sheet having webs in said raised portions and inclined to the plane of said sheets to form louvers on the walls of said passageways, whereby surrounding air passes turbulently through said walls and up said passageways to increase heat transfer.

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