

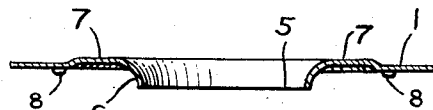
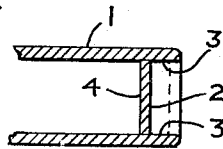
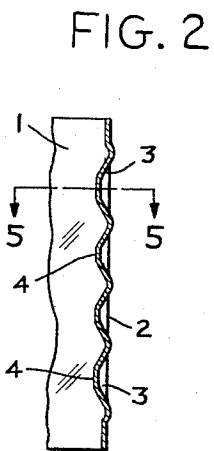
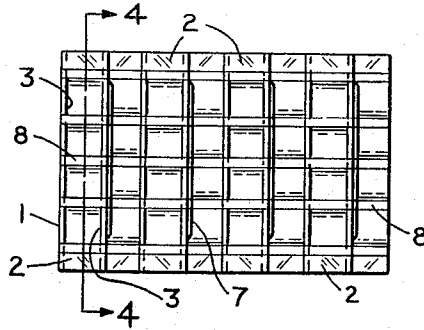
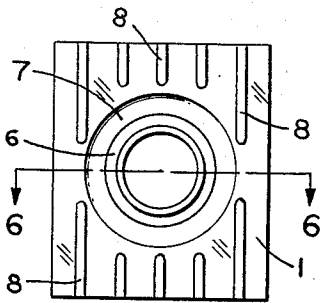
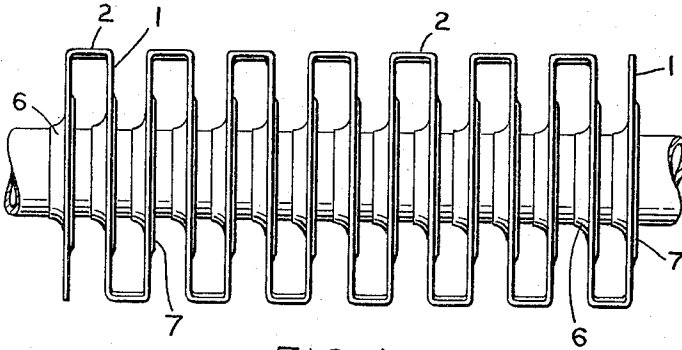
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2,959,402

HEAT TRANSFER UNIT

Filed May 27, 1958



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2,959,402

HEAT TRANSFER UNIT

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3 Claims. (Cl. 257—262.18)

This invention relates to a new and improved heat transfer tube particularly designed and adapted for use in baseboard convection heating units, but also applicable for other heat transfer uses.

Extensive tests indicate that the most efficient fin for use on tubes in baseboard type heat transfer installations is a fin with a fin area two inches deep and two and one quarter inches ($2\frac{1}{4}$ "') to two and one half inches ($2\frac{1}{2}$ "') wide with approximately five fins to the inch of tube length. Such fins may be as low in thickness as .008 inch without an appreciable diminishing of B.t.u. output and for economical reasons it is desirable to employ fins of such thickness. However, it is self evident that fins of such thickness would be of an extremely fragile nature, subject to bending, creasing, and be difficult to handle both in construction of the finned tubes and installation.

The present invention relates to a construction and configuration of fin which permits practical use of the .008 inch thick metal in making the fin and yet provides a fin of sufficient ruggedness in structure to enable the finned tubes to be manufactured and installed with minimum losses due to the thinness of the fin and its consequent tendency to disruption of its desired shape. This ruggedness is obtained by forming the fins of a continuous strip of metal and zigzagging the fins back and forth so that alternate sides have a closed box-like structure.

The zigzagging of a strip of thin metal to four heat transferring fins was known back in 1902 and is shown in U.S. Patent No. 709,875 issued Sept. 30, 1902 to R. Commichau.

It has been found by experiment that when dealing with thin metal strips suitable for present day heat transfer tubes, so as to provide the required heat transfer and yet be sufficiently economical in manufacture as to be competitive on the market, that it is very difficult to fabricate such structures as shown in Patent No. 709,875 and partially impossible to do so without economically prohibitive loss of metal and time and labor required to mount the fins on the tubes.

The present invention relates to a zigzag fin structure in which all the fins are in parallel arrangement one with another and in which cutting or dimpling is employed in the transverse connecting sections of the fin structure to provide rigidity, equally space the fins, form stops for the bending of the strip to form the fins and align all of the tube receiving openings in the fins to facilitate the mounting of the fin structure on a tube.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a heat transfer tube of a preferred form embodying the invention and the features forming the invention will be specifically pointed out in the claims.

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In the drawings:

Figure 1 is a side elevation of the improved heat transfer fin showing it mounted on a tube.

Figure 2 is an end view of a tube having the fins thereon.

Figure 3 is a top plan of the heat transfer fin.

Figure 4 is a detail section (slightly enlarged) taken on the line 4—4 of Figure 3.

Figure 5 is a detail section taken on line 5—5 of Figure 4, and

Figure 6 is a fragmentary detail section taken on line 6—6 of Figure 2.

The improved heat transfer fin is formed of a single strip of thin flat metal fabricated to form the zigzag appearing fin structure clearly shown in Figure 1 of the drawings and comprising a plurality of substantially flat heat transfer fins 1 arranged in uniformly spaced relation and in parallelism one with another.

The spaced parallel fin sections 1 are connected at alternate ends by transversely extending connecting sections 2 which extend at right angles to the faces of the fin sections 1.

The connecting sections 2 are cut, as shown at 3, at spaced points along their lines of juncture with the fin sections 1 and the metal between the cuts is dimpled or bent inwardly as shown at 4, thus forming indented abutments against which the fin sections 1 abut, providing for rigidity and ruggedness in the overall fin structure and providing stops which limit the bending of the metal strip when forming the zigzag structure.

The flat fin forming sections have tube receiving holes 5 punched therein which holes are surrounded by tube engaging flanges 6 provided to provide fin heat conducting contact between the fins and tubes. If it is so desired the openings may be surrounded with reverse indentures 7 which have a tendency to increase the rigidity of the fin and to provide greater depth of the tube engaging flanges 6. Also if it is so desired, ribs 8 may or may not be formed in the fin sections 2 to increase their rigidity.

In forming the improved heat transfer fin, the tube receiving holes 5 are die punched and at the same time the flanges 6 are extruded, the depressions 7 formed, and the slits 3 are cut in proper spaced relation and the depressing for inward bending of the metal, as shown at 3 is provided. When bending pressure is applied, the bending takes place along the lines of the slits 3 and when each bend has reached 90° the depressed metal between the parallel slits 3 engages the fin sections 2 and prevents bending beyond the 90°. The bending operation is continued, acting upon each line of the slits 3 in succession until a complete fin is formed. This operation places the holes 5 in perfect alignment as established by the accuracy of the die and punch set by which they are formed and greatly facilitates the mounting of the fin on a tube.

This structure provides a finned tube structure which is rigid, eliminates practically all spoilage in manufacture, one that can be held and handled by an installing contractor without liability of spoiling the fins or cutting his hands, embodies the economy and efficiency of the .008 thickness of metal and is noiseless in operation.

What is claimed is:

1. A heat transfer fin for finned tubes formed of a strip of thin metal bent to form a plurality of spaced parallel fin forming sections and connecting sections connecting the fin forming sections at alternate ends to provide a substantially zigzag fin structure, said strip of thin metal provided with a line of spaced slits extending transversely across the strip at each line of juncture between a fin forming section and its connecting section,

the metal of the connecting strip between the slits at its opposite edges being depressed to form inwardly extending stops to limit the bending of the metal strip and maintain the fin forming sections and the connecting sections at approximately ninety degree angles to each other.

2. A heat transfer fin as claimed in claim 1 wherein said fin forming sections have tube receiving openings therein, said inwardly extending stops serving by limiting the bending of the strip to maintain the openings in all of the fin sections in alignment.

3. A heat transfer fin as claimed in claim 2, wherein the openings in the fin forming sections are surrounded

by laterally extending tube engaging flanges to increase the heat conducting contact of the fins with a tube and enhance the rigidity of the fin forming sections.

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