Nov. 23, 1948. J. E. TOLAN 2,454,357

FINNED RADIATOR CONSTRUCTION

Filed Dec. 29, 1945

Fig. 1

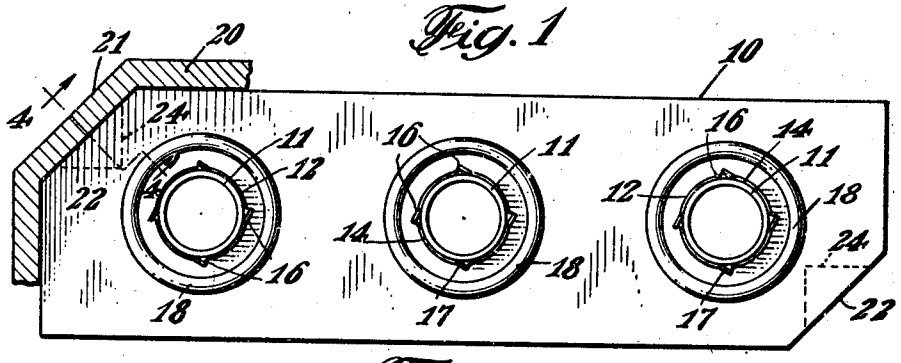


Fig. 2

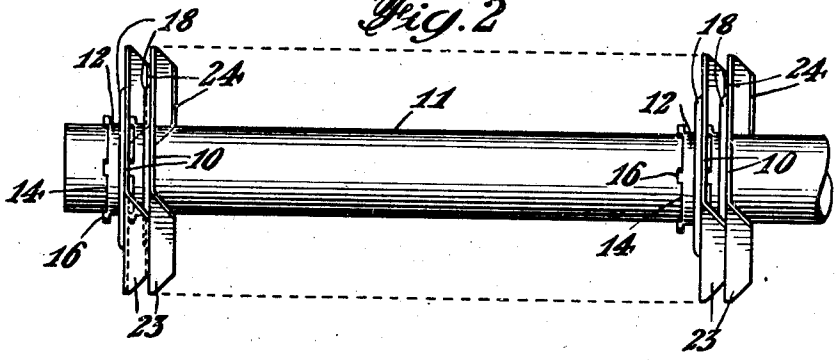


Fig. 3

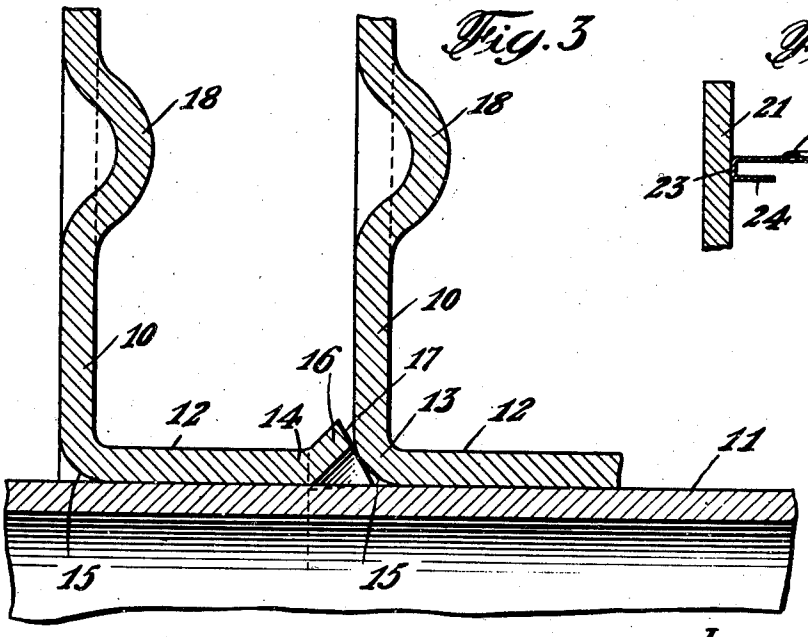


Fig. 4

INVENTOR.
James E. Tolan
BY
Ward, Crosby & Neal
ATTORNEYS

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FINNED RADIATOR CONSTRUCTION

James E. Tolan, Narberth, Pa., assignor to Warren Webster & Company, Camden, N. J., a corporation of New Jersey

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1 Claim. (Cl. 257—262.16)

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This invention relates to heat exchange apparatus and more particularly to such apparatus of a type embodying tubing or conduits upon which are mounted a multiplicity of closely spaced sheet metal heat exchanging fins.

In constructions of the type indicated, the fins may be formed of relatively thin and flexible sheet metal, for example aluminum, each fin being formed with an aperture or apertures for receiving the tubing or conduits carrying a fluid heat exchanging medium. It is common practice to provide on each fin at each aperture, a flange struck out of metal from within the aperture, for surrounding and embracing the tubing, thereby serving to retain the fins in place and in good heat conducting relationship with the tubing, the flanges also acting as spacer means between adjacent fins. Along the annular line of juncture between each flange and its fin, with such constructions the metal usually has a somewhat rounded cross section as a result of the manner in which the flange is struck out from the aperture. Therefore along this annular line a crevice will occur between the external surface of the tubing and the surrounding fin and, unless some form of stop means is provided, there will be a tendency for the annular outer edge of the flange of the next adjacent fin to telescope into such crevice, with the consequence of irregular or improper spacing of the fins.

According to one method of manufacturing such structures, the fins are made with apertures and flanges of a diameter for loosely fitting the tubing so that a series of the fins may initially be readily slid onto the tubing. Thereafter the tubing may be subjected to pressure internally sufficient to expand the same, whereby the fin flanges will closely embrace the exterior walls of the tubing and be permanently retained in position. The above-mentioned tendency of the fin flanges to telescope into the crevices or apertures of adjacent fins is particularly likely to occur during such processes of manufacture prior to the expansion of the tubing, and if the tubing is expanded after more or less of such telescoping has occurred, some of the fins may as a result be bent or warped out of shape as well as being irregularly spaced.

According to the present invention, an improved, simple, inexpensive, dependable and easily formed stop means is provided for overcoming the above-mentioned difficulties. Various further and more specific objects, features and advantages of the invention will clearly appear from the detailed description given below, taken

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in connection with the accompanying drawings which form a part of this specification and illustrate by way of example a preferred form of the invention.

In the drawings:

Figure 1 is a face view of a radiator fin construction in accordance with the invention as applied to three heating fluid conduits;

Figure 2 is a side elevational view of a single heating fluid conduit with a plurality of fins thereon of the type indicated in Figure 1;

Figure 3 is a sectional view showing a portion of a conduit and portions of two flanged fins thereon constructed in accordance with the invention; and

Figure 4 is a detailed sectional view taken substantially along line 4—4 of Figure 1.

Referring to the drawings in further detail, the fin construction as shown may comprise a thin sheet metal plate-like portion as at 10 which in the particular example shown in Figure 1 is formed with three apertures for receiving tubes as at 11, the tubes being embraced by flanges as at 12 struck out of metal from the apertures.

As shown in Figure 3, the metal has a somewhat rounded cross section as indicated at 13 along the annular line of juncture between each flange and the fin from which the flange was struck out. Since the sheet metal of which the fin and flange are formed is ordinarily quite thin in any event, and because of the manner in which the flanges are struck out, the outer edges thereof as at 14 will generally be exceedingly thin or in some cases drawn down to a relatively sharp edge. (This is not made apparent in Figure 3 since this figure is greatly enlarged.) These thin flange edges therefore in the absence of any stop means will tend to creep or telescope into the annular crevice as indicated at 15, beneath the portion of rounded cross section 13, this possibility being particularly likely to happen if the tubing is first inserted before expansion and has considerable clearance within the flanges. In accordance with the present invention, such a stop means is provided in the form of a plurality of small detents as at 16 protruding from the flange edge 14 at spaced points around the tubing. These detents, of which four are shown by way of example on each of the flanges in Figure 1, may preferably be integrally formed with the flange edge, and either all or a substantial portion of each detent is deflected to an acute angle outwardly of the adjacent tube surface so as to engage the next adjacent fin at a point somewhat spaced from the fin aperture. Although the de-

tents may be deflected outwardly flatwise, in the preferred form shown, each of the detents is also somewhat twisted in respect to the adjacent flange surface whereby the outer end edge 17 of the detent will extend for a short distance along a line transverse to the annular line along which the crevice 15 extends, thus insuring that the detent will positively engage the adjacent fin at some point spaced from the tube, and therefore be effective as a reliable stop means even though the parts may be somewhat inaccurately shaped or formed.

In case the series of flanged fins when strung onto the tubing are subjected to any considerable pressure longitudinally of the tubing, these small spaced protruding forms of detents will yield somewhat without tending to distort or warp the fins out of shape, as might be the case if a continuous flared rim were provided as the stop means around the edge of the flange. The outer angularly positioned edges of the detents will at the same time insure that at one point or another, contact will be made with the adjacent fin without danger that the flange edge will slip into the crevice of the adjacent fin. Furthermore, it will be noted that with the somewhat twisted form of detent one side edge thereof may rest against the tube, thereby strengthening the detent against bending out of proper position.

As indicated in the various figures, the metal of the fin surrounding each aperture may if desired be formed with an annular corrugation as indicated at 18 spaced somewhat from the aperture and thereby strengthening the outer portions of the fin against warping or deflection even though the metal around and adjacent the aperture may be expanded somewhat upon expansion of the tubing when securing the flanges in the desired embracing relationship with the tubing.

Preferably the tubing may be expanded within the fin flanges by use of the method and apparatus for freezing a liquid within the tube as disclosed and claimed in copending application Ser. No. 605,698, filed July 18, 1945, and reference to which is hereby made.

When the finned tubing assemblies as of Figure 1 are mounted for use, it may sometimes be desirable to place the same within a casing or supporting structure having beveled or diagonally positioned corners. This is desirable for example where the construction is designed to extend along the baseboard region of a room to be heated, and where it is desired to have the casing simulate a baseboard in appearance. A portion of such a casing is indicated in Figure 1 at 20 having a diagonal corner portion as at 21. When the fin and tube assembly is to be installed in a casing or support of this type, a corner portion of each fin may desirably be bent over at right angles along a diagonal line as at 22 to provide flat portions as at 23 (Figure 2), which will bear against the diagonal portion 21 of the casing. In this manner, as will be apparent from Figure 2, a continuous flat surface will be made available along the series of fins for bearing against the diagonal corner portion of the casing or support and each of the flat surfaces 23 will provide supplemental spacing means for the fins. The outer tip portions of each of the bent-over areas 23 may preferably be bent over again at right angles and inwardly of the fin, as indicated at 24, to extend along the surface of the adjacent fin. This will give the diagonal corner portions of each fin a somewhat channel-shaped cross section of increased strength and will insure that each of the areas 23 acting as spacer means, will not slip out of place with respect to the adjacent fin.

While the invention has been described in detail with respect to a particular preferred example, it will be understood by those skilled in the art after understanding the invention that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended therefore in the appended claim to cover all such changes and modifications.

What is claimed as new and desired to be secured by Letters Patent is:

Heat exchange apparatus comprising tubing carrying a multiplicity of spaced substantially parallel thin sheet metal heat exchanging fins of generally rectangular shape, one or more corners of each fin being bent over at right angles along a diagonal line, the tip of the corner being bent inwardly again substantially at right angles and into a plane extending along the surface of the next adjacent fin, to provide spacer means for the fins and to also provide a diagonal corner supporting surface for the fin assembly.

JAMES E. TOLAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,992,646	Young	Feb. 26, 1935
1,907,036	Belleau	May 2, 1933
1,710,579	Henshall	Apr. 23, 1929

FOREIGN PATENTS

Number	Country	Date
667,479	France	June 17, 1929