

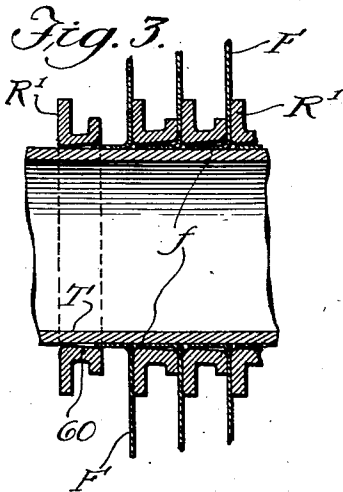
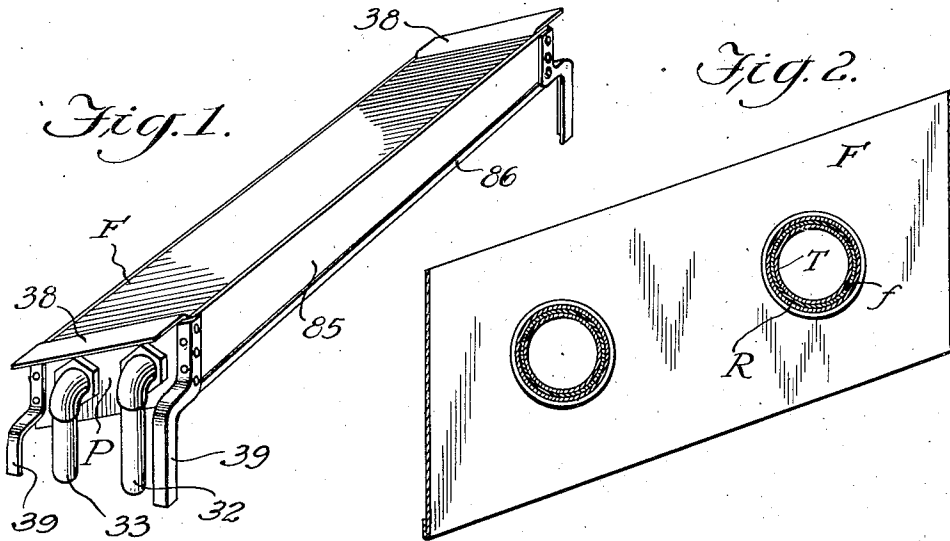
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R. N. TRANE

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RADIATOR

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UNITED STATES PATENT OFFICE

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RADIATOR

Original application filed April 23, 1928, Serial No. 104,196. Divided and this application filed May 31, 1929. Serial No. 282,002.

This invention relates to radiator units and to devices for forming said units, and is a division of my co-pending application, Serial No. 104,196 filed April 23, 1928.

My invention relates to radiators, and more especially to radiators used in steam, vacuum or hot water heating systems and employing a multiplicity of fins of thin sheet metal in heat-conducting relation to the heat tube portion of the radiator, which contains the heating medium. In heating a room, such a radiator, as compared with the usual cast iron radiator, operates more upon the principle of conduction of air than upon the principle of radiation.

One of the chief objects of my invention is to provide an improved heat-conducting contact between the fins and the heat tube whereby very thin sheet metal may be used for the fins and the heat tube may be of relatively small diameter, and still there will be sufficient heat conduction from the tube to the body of the fin to conduct the heat at the required rate.

Another object is to provide a radiator wherein the cost of material is minimized in proportion to the capacity of the radiator, and where the manufacturing operations are greatly simplified.

Another object of my invention is the provision of a radiator which, for the same heating capacity, has a volume, floor area, weight, height and cost considerably less than the usual cast iron radiator construction. As compared with the usual design of cast iron radiators, my radiator unit described in this specification, for example, has but 60% of the manufacturing cost, 8% or 10% of the weight, and less floor space.

A further feature of my invention is that it enables the use of fins made from very thin sheet metal, but which are so designed that they are sufficiently strong and have a maximum area available for heat radiation.

A further object of my invention is to pro-

vide an improved means for securing the fins to the tube.

Other objects will be apparent as the detail description of my invention proceeds.

In the accompanying drawings which represent preferred embodiments of my invention and in which like parts are indicated by similar reference characters (the same reference characters being used as were used in the parent application referred to above),

Figure 1 is a perspective view of a form of my radiator unit;

Figure 2 is a vertical transverse section through the unit which may be considered as taken along the line 2—2 of Figure 1;

Figure 3 is a fragmentary section along a heat tube with spacing rings having cammed or tapered inner peripheries for effecting heat conducting contact between the fin flanges and the tube.

In Figures 1 and 2 I have shown a form of my radiator unit employing a pair of spaced tubes T conveniently formed by bending a single tube into a U-shape. A multiplicity of closely spaced fins F formed from very thin sheet metal are fixed upon the spaced tubes making contact therewith by aid of flanges f struck out from the sheet stock of the fins about the margins of spaced openings through which the respective tubes pass.

In order to keep the radiator as light as possible, I prefer to use very thin metal for the fins. Sheet copper .007 inch thick has been found to give very satisfactory results and a minimum weight. Obviously the flanges f struck from such sheets will not have enough strength to form and maintain a good heat-conducting contact with the outer surface of a tube T; and also the flanges are neither strong enough nor thick enough to serve as spacers between adjacent fins without danger of the flanges overlapping or being crimped. To overcome these difficulties, I provide spacing rings or ferrules R

which are disposed as sleeves about the outer peripheries of the flanges *f* and with the faces of the rings abutting the opposed faces of adjacent fins *F*. These spacing rings not only serve as relatively unyielding sleeves between which and the tubes the flanges *f* may be tightly and permanently compressed to preserve a firm heat conducting contact over a large area between the fins and the tubes, but also supplement the heat conduction by reason of the contact between the faces of the rings and the flanges of the fins thereby serving much as hubs to augment the cross-sectional area of heat conduction where the heat conduction must necessarily be the most concentrated in its path from the tube to the radiating surfaces of the fins.

In order to avoid any complications from varying coefficients of expansion, I make the tubes *T*, the fins *F* and the spacing rings *R* all of copper and, at least in those methods of assembly wherein I expand the tube in order to press the tube and fin tightly against each other and against the spacing ring; I prefer to maintain a proportion between the thicknesses of the three elements somewhat as follows: The fins are formed from sheet stock .007 inch thick, the shell of the tube *T* is about .020 inch thick and the spacing rings are stamped from stock about .030 inch thick.

Various methods of effecting heat-conducting contact between the fins and the tube may be employed as described in the parent application. In this invention instead of soldering the tubes or internally expanding the tube, I effect heat-conducting contact by externally forcing the flanges against the heat tube by forcing a cammed ring against a flange as shown in Figure 3.

In Figure 3 I have shown the rings with belled bores 60 which are adapted to slide onto the flanges *f* of the fins under heavy pressure thereby camming the flanges into firm engagement with the tube.

While I have described in detail preferred embodiment of my radiator structure and the means for securing the fins on the tube, it is understood that this description is by way of example only and that I am not limited to the details except as defined by the following claims:

1. In a device of the class described, a tube, a heat radiating fin provided with an aperture through which said tube is inserted, a flange on said fin adapted to bear against the tube, and a channel shaped reinforcing ring comprising an annular cam portion whereby said ring pinches said flange against said tube.

2. In combination a tube, a plurality of heat radiating fins provided with apertures for receiving said tube, flanges on said fins adapted to fit against the tube, rings adapted to space said fins and to reinforce said flanges, and a continuous annular cam portion on said

rings whereby said ring pinches said flange against the tube.

3. In combination a tube, a heat radiating fin provided with an aperture and an integral flange surrounding said tube, a reinforcing ring surrounding said flange, comprising a continuous annular cam portion for radially compressing said ring against said flange to pinch it against the tube.

In witness whereof, I hereunto subscribe my name this 24 day of May, 1928.

REUBEN N. TRANE.