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H. A. GOLDBERG
HEAT EXCHANGER

2,494,548

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Fig. 1

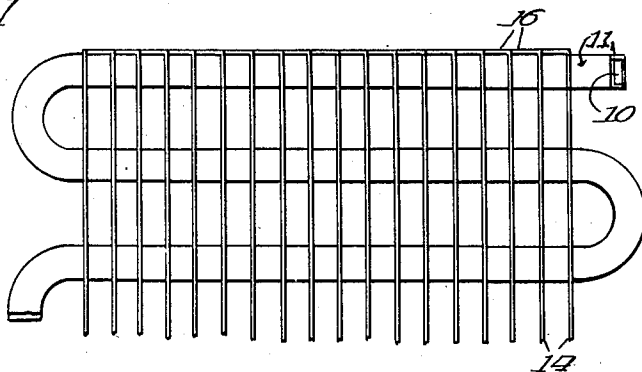


Fig. 2

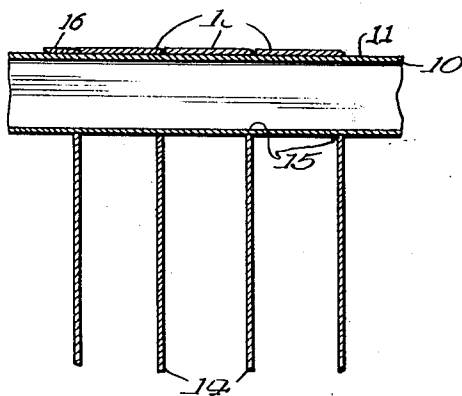


Fig. 3

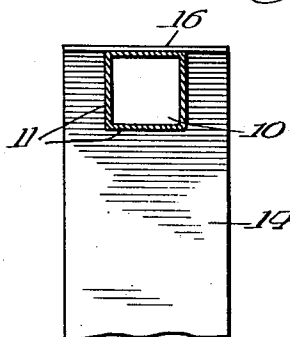


Fig. 4

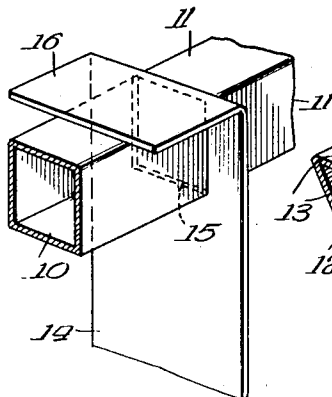
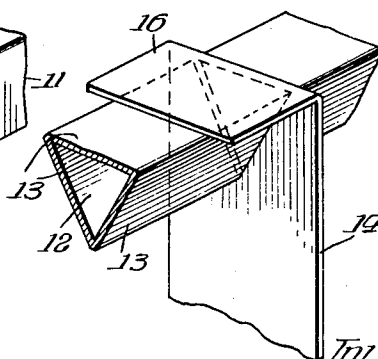


Fig. 5



BY

Inventor:
Harry A. Goldberg
For Jochnum & Gatty

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HEAT EXCHANGER

Harry A. Goldberg, Chicago, Ill., assignor to Auto Radiator Specialty Co., Chicago, Ill., a corporation of Illinois

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This invention relates, in general, to heat exchangers, but is concerned more particularly with the tubes and fins which form a part of the structure, and one of the objects of the invention is to improve and increase the conductivity and convection qualities of the exchanger.

Heretofore, in exchangers of this character, it has been customary to employ round, or substantially round tubes, to which the radiating surfaces or fins are attached. The fins have been fastened to the tubes in various ways, but generally by expanding the tube by means of a mandrel or other suitable tool. While good results have been obtained from such a construction, it has been found that, due to irregularities in the contacting surfaces of the tube and fin, or for other reasons, oftentimes there is not an entire contact between such surfaces, and spaces are formed, which not only reduces the effective radiating area, but also provides a means which eventually results in a looseness between the parts, and a final slipping of the fins with relation to the tube. Furthermore, in many instances, it has been necessary to provide spacers between adjacent fins.

It is another object of the present invention to overcome these difficulties and objections, and to provide an improved assembly of this character, in which the effective radiating surfaces will be increased by increasing the contacting area between the fins and tube, and also by providing a tube in which the outside circumference is greater than that of a round tube of substantially the same area.

A further object is to provide an improved construction of fin, and improved means for spacing and holding the fins in spaced relation, and which spacing means are disposed at the top of the fins, so that when the fins are assembled, the spacing means will co-operate with each other to form a flat supporting surface for objects or articles.

To the attainment of these ends, and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts, hereinafter more fully described and claimed, and shown in the accompanying drawing illustrating this invention, in which

Fig. 1 is a side elevation of a portion of a heat exchanger, constructed in accordance with the principles of this invention;

Fig. 2 is a vertical sectional view of a tube, having several fins attached thereto;

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Fig. 3 is a view, partly in vertical section and partly in elevation, of another form of the invention;

Fig. 4 is a perspective view of a portion of a tube, having a fin applied thereto;

Fig. 5 is a perspective view, similar to Fig. 4, of another form of the invention.

Referring more particularly to the drawing, the heat exchanger embodies a tube 10, which may be formed of any suitable material, and may be of any desired size. It is preferably of rectangular form, although it may be of any desired shape which is angular in cross-section, two of such configurations being shown. The tube 10 is rectangular, and is shaped to provide extended flat peripheral surfaces 11, while the tube 12 is triangular in cross-section, to provide the flat peripheral surfaces 13.

Secured to the tube in any suitable manner and in spaced relation with respect to each other, are fins 14, which may also be constructed of any suitable material having high convection and conductivity qualifications. These fins may be of any desired thickness and of any suitable size and shape. That is, they may be of a size so that one or more tubes may pass therethrough, to which tubes the fins are secured. As illustrated in one of the forms shown, the fin is of a size to accommodate one tube, and is provided with an opening 15 therethrough, which may be located at any desired position with respect to the area of the fin. The opening 15 is of a size and shape to conform to the contour of the tube 10, and fits tightly about the tube which passes therethrough.

When the parts are thus assembled, the tube and fin are fastened together in any desired or suitable manner well known in this art, but preferably by expanding the tube with any suitable tool or instrument, thereby causing a tight fit. The edge of the fin at the top thereof is bent to form a laterally projecting flange 16, for the purpose of not only forming a means for spacing adjacent fins, but also forming a portion which contacts and rests against the adjacent portion or top face of the peripheral surface of the tube. This may be accomplished by bending the fin along one side of the opening 15 of the fin.

It will therefore be seen that a portion of the face of the fin will contact the tube, and as the contacting faces will be of an area considerably greater than the thickness of the fin, an extended convection and conducting area of the assembly will be provided. The width of the flange 16 may be varied, as desired, according to the size

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of the space to be provided between adjacent fins.

With this construction it will be manifest that the radiating and the convection area will not only be more greatly increased when a square tube, or one angular in cross-section, is employed than with a round tube of substantially the same dimension, but a considerable article supporting surface will be provided. For example, the circumference of a round tube is "Pi," or the ratio of the circumference to its diameter. That is, a tube of one inch in diameter has a circumference of Pi (3.1416) times one inch, while a one inch square tube will have a perimeter of four inches.

When the form of the invention shown in Figs. 2 and 4 is employed, it will be manifest that the flanges 16 will not only have an extended contact with the face of the tube, but the flanges will form a supporting surface for any article placed thereon, and the face of the tube being flat and extended, will prevent the flange from knuckling, as would be the case if a round tube were employed. These same advantages are carried out with the form of the invention shown in Fig. 5.

While the preferred forms of the invention have been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:

1. A heat exchanger comprising a plurality of

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spaced apart fins, said fins each having aligned openings therein, a tube passing through said aligned openings, a flange projecting inwardly at the top of each fin and of a length equal to the distance the fins are spaced apart, each flange having contacting engagement with the tube and with an adjacent fin, said flanges all being at the same elevation to provide a continuous flat plate for supporting articles.

2. A heat exchanger comprising a plurality of spaced apart fins, said fins each having a plurality of spaced aligned openings in each fin, tubes passing through each of said aligned openings and a flange projecting from the upper edge of each fin and contacting one of said tubes and adapted to contact an adjacently spaced fin, each flange being flat and in alignment with each other flange to provide a flat plate-like surface to support articles thereon, said flanges being integral with the fins.

HARRY A. GOLDBERG.

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