

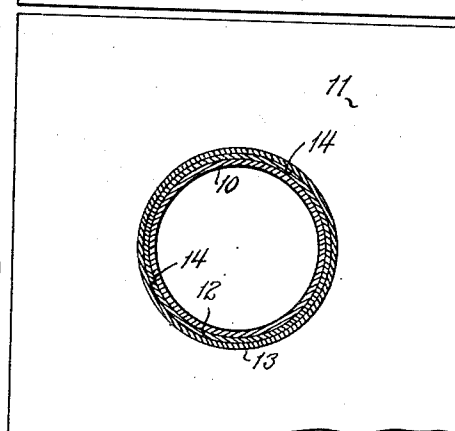
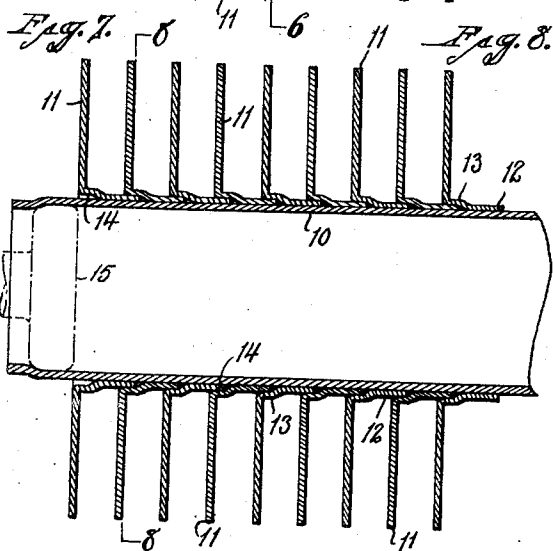
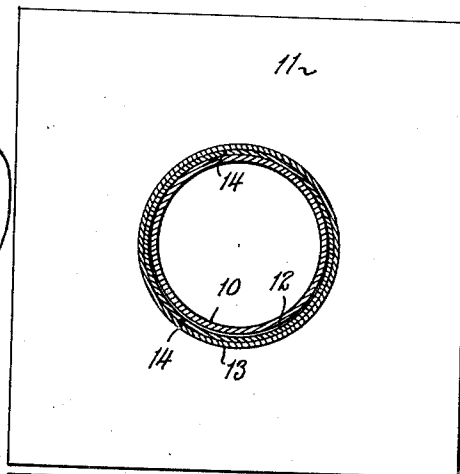
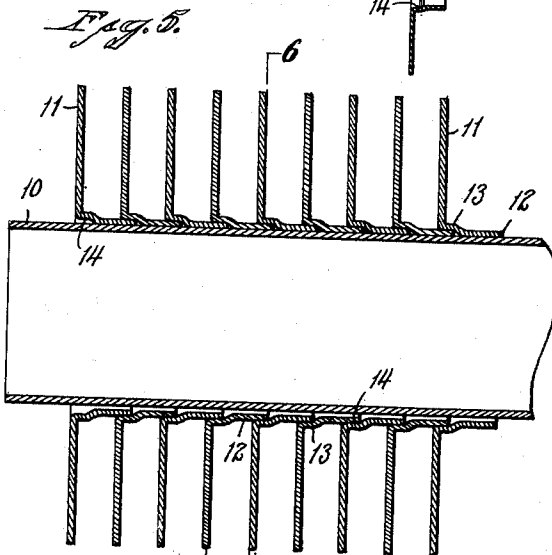
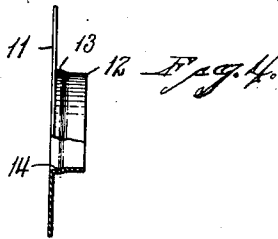
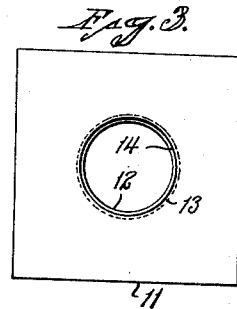
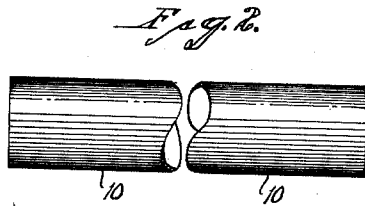
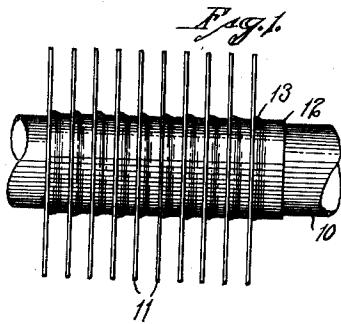
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RADIATOR UNIT AND METHOD OF PRODUCING THE SAME

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RADIATOR-UNIT AND METHOD OF
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2 Claims. (Cl. 29—157.3)

This invention relates to an improvement in heat-transfer units and methods of producing the same, and particularly to that type of heat-transfer unit consisting of a tube and a series of fins or plates mounted thereon and provided with collars or sleeves engaging the same. Such units, while commonly referred to as "radiator" units, are useful in a wide variety of situations where it is desired to effect the transfer of heat, such for instance, as heating systems, cooling and refrigerating apparatus, etc.

The main object of my present invention is to provide, at a relatively low cost for manufacture, a strong and rugged radiator unit constructed with particular reference to insuring an intimate heat-conductive engagement between the sleeves or collars of the fins or plates and the tube upon which the same are mounted, to thereby provide for the efficient and effective transfer of heat from a fluid in the said tube or tubes, and the circumambient medium (usually the surrounding air) or vice versa.

With the above and other objects in view as will appear from the following, my invention consists in a radiator unit characterized by a tubular body-member; and a series of fin- or plate-members through which the said tubular body-member extends, and each provided with an offsetting sleeve or collar formed adjacent its point of junction with the plate-member proper, from which it offsets with a recess in which is installed the outer end of the sleeve or collar of an adjacent plate-member; the inner surfaces of the respective sleeves of the said plate-members being intimately engaged with the outer surface of the said tubular body-member and the outer surfaces of the respective outer ends of the said sleeves being intimately engaged with the inner surface of the said recess in the sleeve of an adjacent plate-member by being expanded thereinto; whereby the respective sleeves of the said plate-members are maintained in engagement with the said tubular body-member and prevented from flaring.

My invention further consists in a radiator-element characterized as above and having certain other details of construction and combinations of parts as will be hereinafter described and particularly recited in the claims.

My invention still further consists in a novel method of manufacturing a radiator-element having a certain sequence of steps or operations as will be hereinafter described and particularly recited in the claims.

In order that the novelty of my invention may be more fully appreciated, I wish to point out at

this time that it is old practice to assemble a series of radiating-plates, each having an offsetting tubular collar upon a tubular body-member, and to secure the said fins in place by expanding the tubular body-member in an effort to secure intimate engagement between the sleeves of the plates and the tubular body-member, but such practice, while in many respects superior to other practices, has been relatively ineffective for the reason that the sleeves or collars of the respective plate-members were apt to flare or bell-mouth into conical form as a result of the expanding operation, and thus fail to lie in intimate contact with the body-member as is required if maximum efficiency is to be had from the element. The difficulty just mentioned is effectively overcome and obviated by means of my invention, as will be apparent from the following.

In the accompanying drawing:

Fig. 1 is a broken view in side elevation of one form which a radiator-element embodying my invention may assume;

Fig. 2 is a broken view in side elevation of the tubular body-member prior to the assembly of the fins or plates thereupon;

Fig. 3 is a face view of one of the plate-members detached, looking toward the recessed end of its sleeve;

Fig. 4 is a view thereof partly in edge elevation and partly in transverse section;

Fig. 5 is a broken view in longitudinal section of the tubular body-member, showing a series of plates such as is shown in Figs. 3 and 4, assembled thereon and prior to the expansion of the body-member to bring the outer surface thereof in intimate engagement with the respective sleeves of the said plates;

Fig. 6 is a view thereof in transverse section, taken on the line 6—6 of Fig. 5;

Fig. 7 is a broken longitudinal sectional view corresponding to Fig. 5, but showing the relative positions of the parts after an expanding tool has been passed through the body-member; and

Fig. 8 is a transverse sectional view thereof, taken on the line 8—8 of Fig. 7.

In the particular radiator-element herein chosen for the illustration of my invention, I employ a tubular body-member 10, preferably formed of a ductile metal such as copper of any desired length and upon which I mount a series of plate-members 11.

Each plate-member 11 above referred to is, as shown, of rectangular form and is provided substantially centrally with an integral offsetting sleeve or collar 12 formed adjacent its point of

junction with the plate proper, with an annular outwardly-offset portion 13 providing an internal annular recess 14 for the reception of the outer end of the sleeve of an adjacent fin, as will hereinafter appear.

The tubular body-member 10 and the series of plates 11 are assembled together in any approved manner such, for instance, as sliding the said plates over the tube, or by first lining up the series of plates and passing the body-member 10 through the aligned sleeves 12, in such manner that the outer ends of the respective sleeves 12 are nested within the annular recess 14 by the next adjacent sleeve, in the manner shown in Figs. 5 and 6.

With the parts assembled as illustrated in the figures just above referred to, the tubular body-member is expanded outward by any approved means such, for instance, as the expanding tool 15 indicated by broken lines in Fig. 7, to bring its outer surface into intimate engagement with the inner surfaces of the respective sleeves 12 of the plates 11 to insure the maximum heat conductivity between the said plates and the body-member 10.

I wish to call particular attention to the fact that the sleeves 12 are prevented from being flared out of intimate contact with the body-member 10, by reason of their having their outer ends anchored within the recess 14 of an adjacent sleeve. Furthermore, when the tubular body-member 10 is stretched outward into engagement with the inner surfaces of the respective sleeves 12, as just described, the outer surface of the projecting end of each of the said sleeves will be also brought into intimate engagement with the inner surface of the particular recess 14 into which it projects, and thus not only stabilize the plate-member into which it projects, but provide for the radiation of heat in either direction through the sleeve of one member and the plate-portion proper of an adjacent member. Thus not only does each individual plate transmit heat through the intermediary of its own integral sleeve, but also through the intermediary of the outer end of the sleeve of an adjacent plate by virtue of the intimate nesting and association referred to.

The outline of the plates 11 may be polygonal, as shown, circular or any other desired form. Also, if desired, the cross-sectional form of the tubular body-member 10 may be varied as desired, provided only that the sleeves 12 of the plates installed thereon are appropriately shaped in cross-section and nested before the expanding operation.

It will be appreciated in this connection that an air gap, even of small extent, provides a relatively-high degree of insulation so that the prevention of any appreciable flaring of the respective sleeves 12, during the expanding operation, is essential to a high degree of thermal efficiency.

It will be understood by those skilled in the art that my invention may assume varied physical forms without departing from my inventive concept and I, therefore, do not limit myself to the specific embodiments herein chosen for illustration, but only as indicated in the appended claims.

I claim:

1. A radiator-unit comprising: a continuous tubular body-member; and a series of plates mounted upon said tubular body-member and each having a heat-radiating fin provided with an inner tubular surface and an offsetting, continuous, tubular sleeve; a substantial intermediate tubular area of the interior of each sleeve being in intimate, metal-to-metal, flow-pressed-together contact with the outer surface of said tubular body-member; the inner tubular surface of each fin where it joins its sleeve, and the adjacent tubular portion of the sleeve, being spaced from the outer surface of said tubular body-member; and the tubular free end portion of the sleeve of each intermediate plate being between, and in intimate, metal-to-metal, flow-pressed-together contact with the outer surface of said tubular body-member and the inner tubular surface of a fin and its adjacent sleeve portion which are spaced from the tubular body-member.

2. The method of making a radiator-unit comprising: providing a tubular body-member; providing a plurality of plates, each having a heat-radiating fin provided with an inner tubular surface and an offsetting, continuous, tubular sleeve; the diameter of the inner tubular surface of each fin and its adjacent sleeve portion being large enough to receive the outer tubular surface of the free end portion of each sleeve, and the inner diameter of the free end portion of each sleeve being of a size to fit upon the tubular body-member; assembling said plates in a series upon said tubular body-member with the free end portion of the sleeve of each intermediate plate between the outer surface of the tubular body-member and the inner tubular surface of a fin and its adjacent sleeve portion of an adjacent plate; and subjecting the interior of the tubular body-member to an expanding force, to flow-press the outer surface of the tubular body-member into intimate, metal-to-metal contact with a substantial, intermediate, tubular area of the interior of each tubular sleeve and to flow-press the outer tubular surface of the tubular body-member into intimate, metal-to-metal contact with the inner surface of the free end portion of the sleeve of each intermediate plate and to flow-press the outer surface of each free end portion of the sleeve of each intermediate plate into intimate, metal-to-metal contact with the inner tubular surface of a fin and its adjacent sleeve portion of an adjacent plate.

ADOLPH C. RECKER.