July 5, 1932. A. C. RECKER ET AL 1,865,444

METHOD OF PRODUCING RADIATOR UNITS

Filed July 17, 1931

Fig. 1.

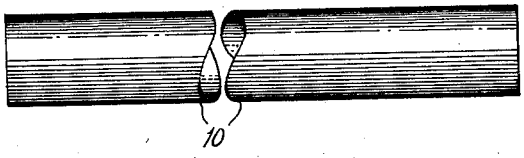


Fig. 2.

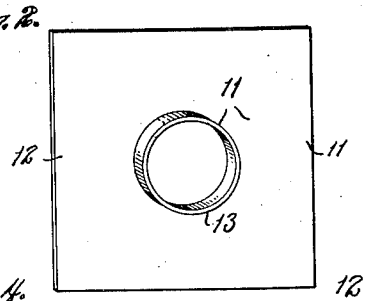


Fig. 3.

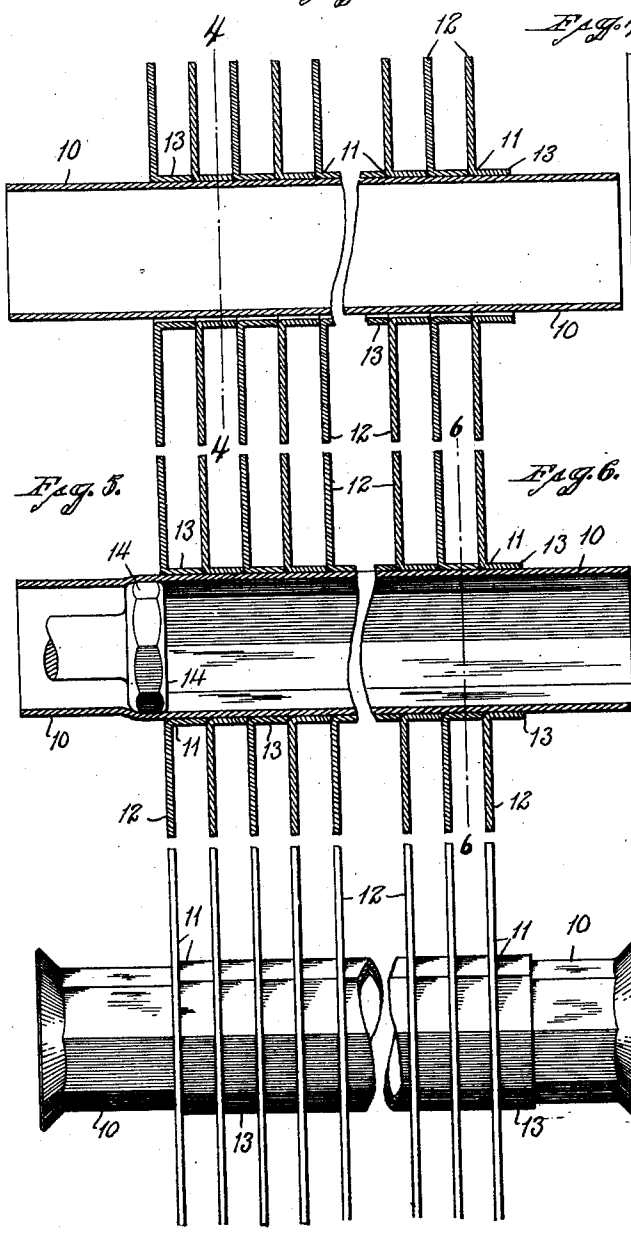


Fig. 4.

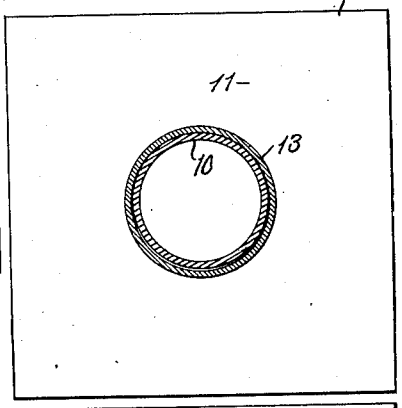


Fig. 6.

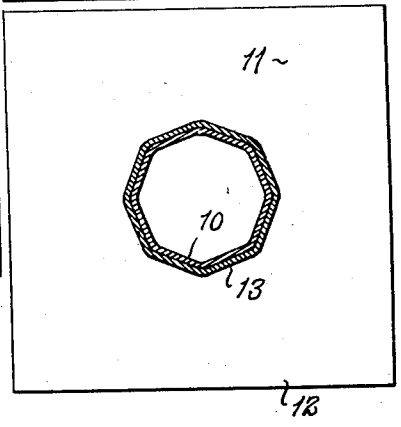


Fig. 7.

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UNITED STATES PATENT OFFICE

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METHOD OF PRODUCING RADIATOR UNITS

Application filed July 17, 1931. Serial No. 551,325.

This invention relates to methods or processes for the manufacture of heat-transfer elements or units, and particularly to a method for the manufacture of types of heat-transfer units which consist of a tubular body member having one or more fins or plates mounted thereon for increasing the superficial area of the unit. 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 in heating systems, cooling and refrigerating apparatus, etc.

The main object of our present invention is to effect both a highly efficient heat-conductive union and a strong and durable mechanical union between a tubular body member and the fin or fins mounted thereupon.

It may be explained in this connection that there are two well-known recognized species of the so-called "finned-tube" radiator units in the manufacture of which our improved process may be advantageously employed. One species consists of a plurality of separately formed fins or plates mounted upon the tubular body member in spaced relation, and the other species consists of a continuous fin or ribbon helically wound edgewise upon such a body member. For the purpose of illustrating our invention, we have shown and described only the former of the two species.

With the above and other objects in view as will appear from the following, our invention consists in a method of producing radiator units characterized by mounting upon a tubular body member, one or more fins or plates, and then altering the cross-sectional form of both the said tubular body member and that portion of the fin or fins engaged therewith to effect both a strong and durable mechanical union and a highly efficient heat-conductive union therebetween.

In the accompanying drawing:.

Fig. 1 is a broken view in side elevation of one form which a tubular body member may assume;

Fig. 2 is a perspective view of one of the fins or plates adapted for mounting upon the tubular body member shown in the preceding figure;

Fig. 3 is a broken view in longitudinal section showing a series of fins or plates mounted upon the body member in spaced relation, preparatory to altering the cross-sectional form of the body member and those portions of the fins or plates engaged therewith;

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a broken longitudinal sectional view corresponding to Fig. 3, but showing the parts after the alteration of the cross-sectional form of the body member and the contiguous portions of the fins or plates, as the result of the movement through the tube of an appropriately shaped tool or mandrel;

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 5; and

Fig. 7 is a broken view in side elevation of the completed radiator unit.

In carrying out our invention as herein shown, we employ a tubular body member 10 (Fig. 1) of any desired cross-sectional area and form and preferably formed of copper, brass, or other relatively-ductile and thermally-efficient material. Upon the tubular body member 10, we mount a series of fins or plates 11 (Fig. 2), each consisting, in the form herein chosen for illustration, of a fin or plate portion proper 12 and an integral offsetting sleeve 13, the outer end of which latter preferably abuts against an adjacent fin, as clearly illustrated in the drawing.

The interior shape of the sleeve 13 of the respective fins 11 preferably corresponds to the cross-sectional form of the body member 10, and is also preferably of slightly larger size (the relative proportions as illustrated in the drawing being somewhat exaggerated in the interest of clearness) so as to permit the convenient assembly of the fins upon the said body member, though, if desired, the fins may be forced over the latter or the same may be forced through the fins.

After the assembly of the fins 11 upon the tubular body member 10 in the desired spaced relationship and location, we forcibly alter the cross-sectional form of the tubular

body member together with that of the portions of the fins contacting therewith, including the respective sleeves 13, by passing through the said body member a tool or mandrel 14 having a different cross-sectional form from the cross-sectional form of the said body member.

The passage of the mandrel 14 through the tubular body member 10 not only alters the cross-sectional form of the latter, but also that of the contacting portions of the fins 11 with the effect of tightly engaging the contiguous surfaces of the said body member and fins, to effect a highly efficient heat-conductive union therebetween, and a tight and rugged mechanical union of such character as will prevent the movement of the fins with relation to the body member.

Our invention, as already mentioned, is applicable to radiator units employing the well-known helically-wound fin rather than a plurality of individual fins, as shown in the accompanying drawing, inasmuch as the alteration of the cross-sectional form of the tubular body member in accordance with our invention, serves to lock in place such a helical fin thereon and produce a strong and effective thermal and mechanical union therebetween.

We have found that by employing a polygonal mandrel, a most efficient thermal and mechanical union is effected between the parts of the unit, since during the action of such a mandrel, the contacting portions of the tube and fins are stretched into faceted cross-sectional form, thus insuring a permanent engagement despite the disrupting tendencies of subsequent expansion and contraction.

Preferably and as herein shown, for the purposes of economy in production, we employ an initially cylindrical body member, since tubes of that character most readily lend themselves to manufacture, and the tool expense for the manufacture of fins or plates for application thereto is also minimized, but it will be understood that we do not limit ourselves to the method of manufacture which alters the cross-sectional form of cylindrical tubes only since the mechanical and economic advantages of our invention will be markedly apparent, regardless of either the initial or final form assumed by the elements employed.

In the appended claims, in referring to a change in cross-sectional "shape", we wish to be understood as meaning a change of form or contour which does not merely effect a change in size but actually alters one shape to another shape by changing from one form, such, for instance, as from a cylindrical or rounded form, etc., to a polygonal or oval form, etc.

It will be understood by those skilled in the art to which our invention relates that the shape, size or other character of the elements of a radiator unit manufactured in accordance with our improved method or process may vary widely without departing from our inventive concept as set forth in the appended claims.

We claim:

1. A method of producing radiator units, which comprises assembling a fin upon a tubular body member, and then altering the cross-sectional shape of both the said tubular body member and also that portion of the fin engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

2. A method of producing radiator units, which comprises assembling a fin upon a tubular body member, and then passing through the said body member a mandrel having a cross-sectional shape differing from that of the body member to alter the cross-sectional shape of both the said body member and that portion of the fin engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

3. A method of producing radiator units, which comprises assembling a plurality of individual fins upon a tubular body member in spaced relation thereon and then altering the cross-sectional shape of both the said tubular body member and that portion of the fin engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

4. A method of producing radiator units, which comprises assembling upon a tubular body member a plurality of individual fins, each having an offsetting sleeve, and then altering the cross-sectional shape of both the said tubular body member and the respective sleeve portions of the said fins engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

5. A method of producing radiator units, which comprises assembling upon a tubular body member a plurality of individual fins, each having an offsetting sleeve, and then passing through the said body member a mandrel having a cross-sectional shape differing from that of the body member, to alter the cross-sectional shape of both the said tubular body member and the sleeve portions of the said fins engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

6. A method of producing radiator units, which comprises assembling a fin upon a cylindrical body member and then altering the cylindrical cross-sectional shape of the said tubular body member and also the

cross-sectional shape of that portion of the fin engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

7. A method of producing radiator units, which comprises assembling a fin upon a cylindrical body member and then passing through the said tubular body member a mandrel of noncylindrical cross-sectional form to alter the cylindrical cross-sectional form of the said body member and also the cross-sectional form of that portion of the fin engaged therewith to effect a highly-efficient heat-conductive union and a strong and durable mechanical union therebetween.

8. A method of producing radiator units, which comprises assembling a fin upon a cylindrical body member and then passing through the said tubular body member a polygonal mandrel to alter the cylindrical cross-sectional form of the said body member and also the cross-sectional form of that portion of the fin engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

9. A method of producing radiator units, which comprises assembling upon a cylindrical tubular body member a plurality of individual fins, each having an offsetting sleeve, then passing a polygonal mandrel through the said tubular body member to alter the cylindrical cross-sectional form thereof and also the cross-sectional form of the respective sleeves of the fins engaged therewith to effect a highly efficient heat-conductive union and a strong and durable mechanical union therebetween.

In testimony whereof, we have signed this specification.

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