I. A. RANDEL.

PROCESS OF PRODUCING RADIATOR SECTIONS.

APPLICATION FILED JAN. 24, 1912.

1,065,886.

Patented June 24, 1913.

2 SHEETS—SHEET 1.

Fig. 1

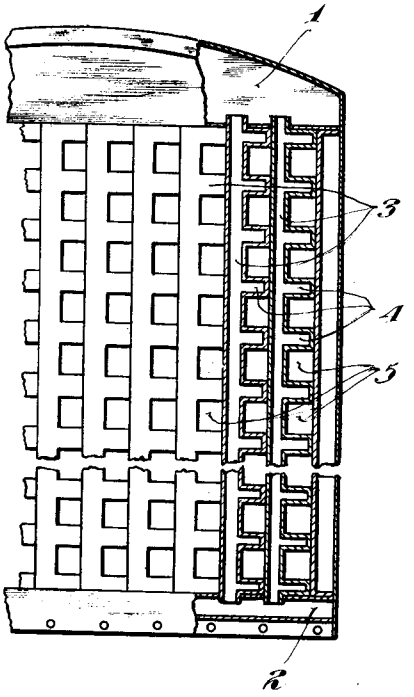


Fig. 2

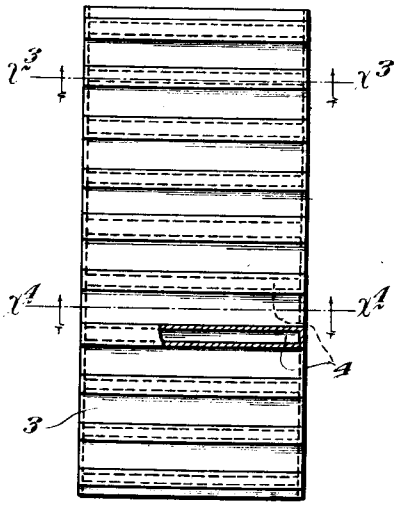


Fig. 3

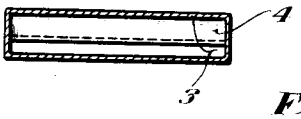


Fig. 4

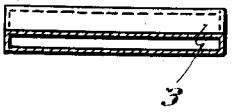
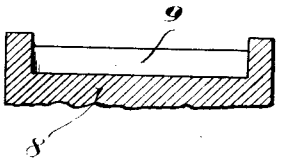


Fig. 7



Witnesses;

Geo. Knutson

E. C. Skinkle

Inventor;

Ivar A. Randel

By his Attorneys;

Williamson Merchant

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2 SHEETS—SHEET 2.

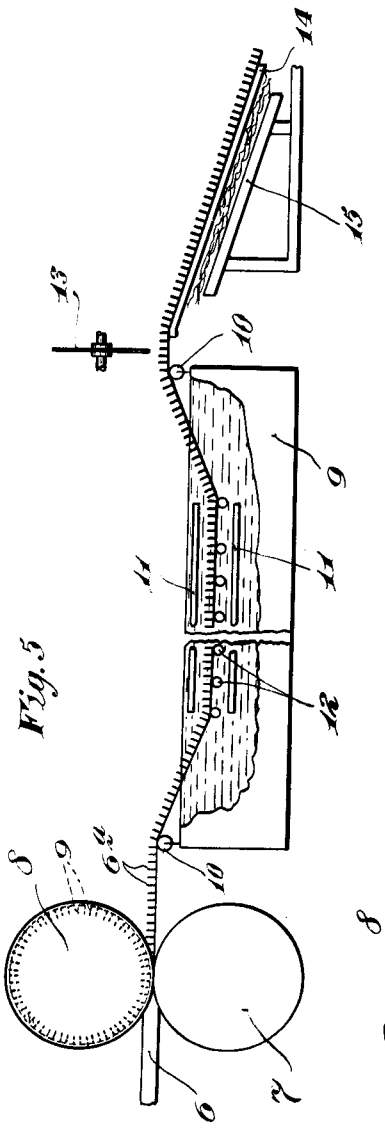


Fig. 5

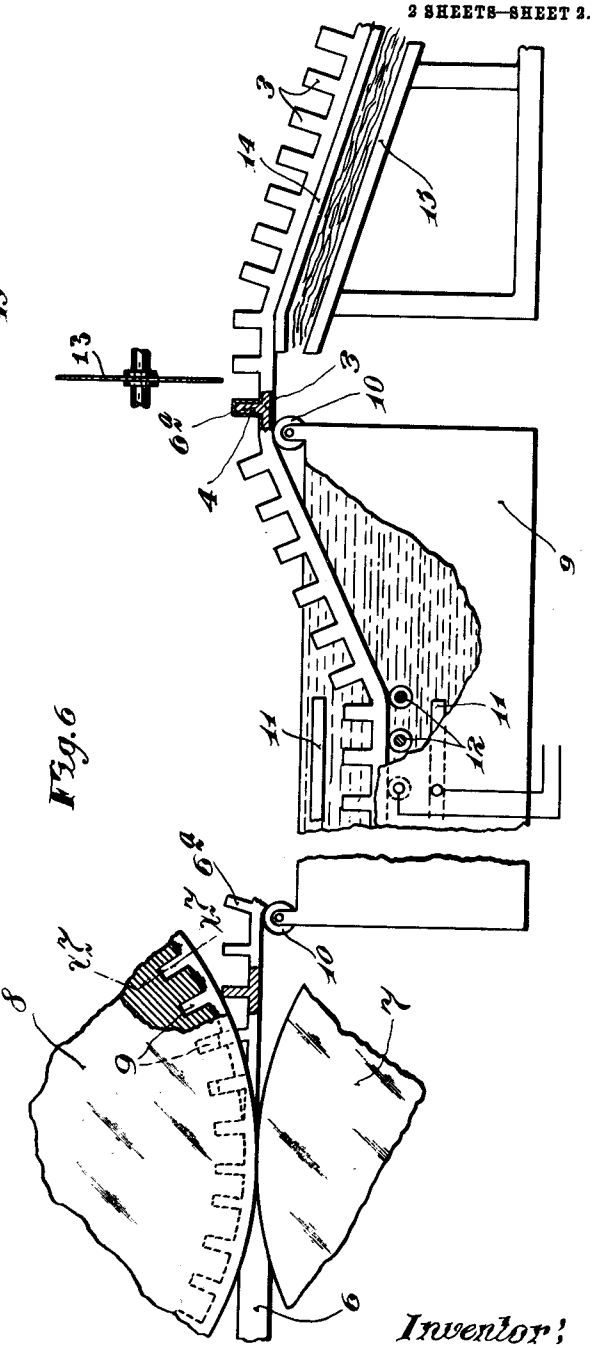


Fig. 6

Witnesses;

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UNITED STATES PATENT OFFICE.

IVAR A. RANDEL, OF CHICAGO, ILLINOIS.

PROCESS OF PRODUCING RADIATOR-SECTIONS.

1,065,886. Specification of Letters Patent. Patented June 24, 1913.

Application filed January 24, 1912. Serial No. 673,056.

To all whom it may concern:

Be it known that I, IVAR A. RANDEL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improved Process of Producing Radiator-Sections; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the construction of seamless metallic tubes or shells, and particularly, is directed to the provision of an improved process of producing a radiator section.

Generally stated, the improved process consists of the novel steps of manipulation or treatment hereinafter described and defined in the claims. The radiator sections may take different forms, but preferably, and as illustrated, the radiator sections are thin metallic shells or tubes open at their upper and lower ends and having transverse corrugations, and the sides of the said radiator sections, and the ends of the said corrugations being closed, and, in fact, the entire radiator sections being a seamless integral structure.

In forming the improved radiator sections in accordance with my improved process, I preferably use as a forming core, a flat bar of solder or other suitable material of low fusibility and give the same the form desired in the radiator section by passing the same between suitable dies. This properly formed core strip is then passed through an electroplating bath, and an integral seamless shell of copper, or other suitable metal is formed thereon. The core and shell covering the same are then cut into sections of the desired length and the core is removed from the shell by melting or fusing the said core and allowing the same to run out of the said shell. The shell thus formed constitutes the radiator section which, preferably, has the form above indicated, but which may, nevertheless, take various other forms.

In the accompanying drawings wherein like characters indicate like parts throughout the several views, I have shown an automobile radiator embodying the preferred form of my invention, and have illustrated an apparatus for conveniently carrying out the improved process of constructing the radiator sections.

Referring to the drawings, Figure 1 is a view partly in front elevation and partly in vertical section with some parts broken away, showing an automobile radiator in which my improved radiator sections are employed; Fig. 2 is a side elevation of one of the radiator sections, some parts being sectioned; Fig. 3 is a section taken on the line x^3 x^3 on Fig. 2; Fig. 4 is a section taken on the line x^4 x^4 on Fig. 2; Fig. 5 is a diagrammatic view with some parts broken away, indicating an apparatus by means of which the improved process is carried out; Fig. 6 is a fragmentary view in side elevation of the apparatus shown in Fig. 5, showing the parts on a larger scale, some parts being sectioned and some parts being broken away; and Fig. 7 is a detail in transverse section taken on the line x^7 x^7 on Fig. 6.

Describing first the radiator in which the sections, made in accordance with my invention, are employed, the numeral 1 indicates the top or head tank, and the numeral 2 the bottom tank of the radiator; and the numeral 3 indicates as an entirety, the tubular shells or radiator sections which are made in accordance with my process, and which open at their upper and lower ends into the said tanks 1 and 2, respectively. So far as my present invention is concerned, these radiator sections or elements 3 may take various different forms, but each element is, in itself, an integral seamless shell structure, and preferably each has a multiplicity of transverse corrugations 4. The water to be cooled flows vertically through the sections 3 and fills the corrugations 4 thereof, and when the radiator sections are secured together, as shown in Fig. 1, a multiplicity of air passages 5 are formed between the corrugations 4. The front and rear sides of the vertical shells and the ends of the corrugations 4 of the said sections 3 are, of course, closed, by the integrally formed front and rear sides of the said sections.

The manner in which the seamless integral radiator sections are formed by my improved process will now be considered, and attention is now directed to Figs. 5, 6 and 7.

A core-forming strip 6 of solder metal or other suitable metal which will fuse under low temperature, is passed through or between suitable dies and thereby given a form which will correspond to the desired form of the radiator section. Preferably,

the forming dies are in the form of a pair of coöperating rollers 7 and 8, which are suitably supported and driven, the former having a smooth periphery and the latter having a channeled periphery formed with circumferentially spaced transversely extended peripheral notches 9 that are adapted to form on the core strips 6 laterally projecting lugs 6ª. The core strip thus formed by the dies corresponds to the form that will be given to the radiator sections, and the lug 6ª thereof, form the corrugations 4 of the said radiator sections. From the rotary dies 7 and 8, the formed core strip is passed into and through the electroplating tank 9 and is plated with copper or other suitable metal which has a relatively high fusibility as compared with the core strip. The said core strip, in passing through the electroplating bath runs over guide rollers 10 on the end portions of the tank 9, and passes between upper and lower anodes 11 and slides over cathodes 12 of the electroplating apparatus. In practice, it has been found that it takes about forty hours to plate the core strip or to form the copper shell deposited thereon of the proper thickness, and hence, of course, the velocity of the die rollers must be controlled to give the proper rate of travel to the said core strip. After passing from the electroplating tank, the core strip and the shell formed thereon are cut into sections of the desired length, preferably by a circular saw 13, which will be operated in any well known manner. The sections are then passed onto a heated table 14 kept hot by a gas burner pipe 15, or other suitable means, and by the action of heat, the solder or other fusible metal of the core is melted and runs out of the copper shell leaving the thin integral seamless radiator sections above described.

As is evident, with the above described process, the electroplating action may be continuous, the formed sections being intermittently cut off and the cores melted therefrom. The seamless integral radiator sections formed by this process have no joints to leak, whereas radiator sections made up of a multiplicity of parts united by solder are very likely to leak because of the very great difficulty of properly uniting the numerous joints with solder.

What I claim is:

1. The process of constructing tubular sections, which consists in forming a core of fusible material, in forming around the said core a tubular shell of relatively high fusibility, in cutting the said shell into sections, and in removing the core from the shell sections by fusing the same.

2. The process of constructing open ended tubular sections, which consists in forming a core of fusible material, in forming around the said core a metallic shell of relatively high fusibility, by the electroplating process, and in removing the core from the shell sections by fusing the same.

3. The process of constructing tubular sections which consists in forming a fusible core, in forming around the said core a metallic shell of relatively high fusibility, by the electroplating process, in cutting the said shell and core into sections, and in removing the cores from the shell sections by fusing the same.

4. The process of constructing tubular metallic sections which consists in giving the desired form to a fusible core, by means of coöperating dies, in subjecting said core to an electroplating bath and thereby forming thereon a metallic shell of relatively high fusibility, in cutting the said shell and core into sections, and in removing the core from the shell sections by fusing the same.

5. The continuous process of constructing metallic shells, which consists in displacing portions of a fusible strip to thereby form a core having the desired interior form of the shell to be formed thereon, in forming on the said core a thin metallic shell of relatively high fusibility, the said two operations being carried out during approximately coincident periods of time, and in thereafter removing said core from said shell by fusing the same.

6. The continuous process of constructing tubular metallic sections, which consists, first, in giving the desired form to a fusible core strip, by passing the same between coöperating forming dies, second, in passing the formed core through an electroplating bath to thereby form thereon a metallic shell of relatively high fusibility, third, in cutting the said shell and core into sections, fourth, in removing the core from the said shell sections by fusing the same.

7. The continuous process of constructing tubular sections, which consists in forming a core of fusible material, in forming around the said core a tubular shell of relatively high fusibility, in cutting the said shell into sections, and in removing the core from the shell by fusing the same, the said steps being performed simultaneously.

8. The continuous process of constructing tubular metallic sections which consists in giving the desired form to a fusible core, by means of coöperating dies, in subjecting said core to an electroplating bath and thereby forming thereon a metallic shell of relatively high fusibility, in cutting the said shell and core into sections, and in removing the core from the shell sections by fusing the same, the said steps being carried on simultaneously.

9. The process of constructing tubular metallic radiator sections having corrugations thereon, which consists in first displacing body portions of a fusible metallic

bar, to thereby form a core with projecting ribs thereon, in thereafter subjecting this core to an electroplating bath, to thereby form thereon a corrugated metallic shell of relatively high fusibility, as compared with said core, and in removing said core from said shell, by fusing the same.

In testimony whereof I affix my signature in presence of two witnesses.

IVAR A. RANDEL.

Witnesses:
R. L. McIntosh,
J. F. Corvin.