F. A. FELDKAMP.

HOLLOW STRUCTURE FOR RADIATORS, CONDENSERS, AND THE LIKE.

APPLICATION FILED MAR. 26, 1914.

1,191,681.

Patented July 18, 1916.

2 SHEETS—SHEET 1.

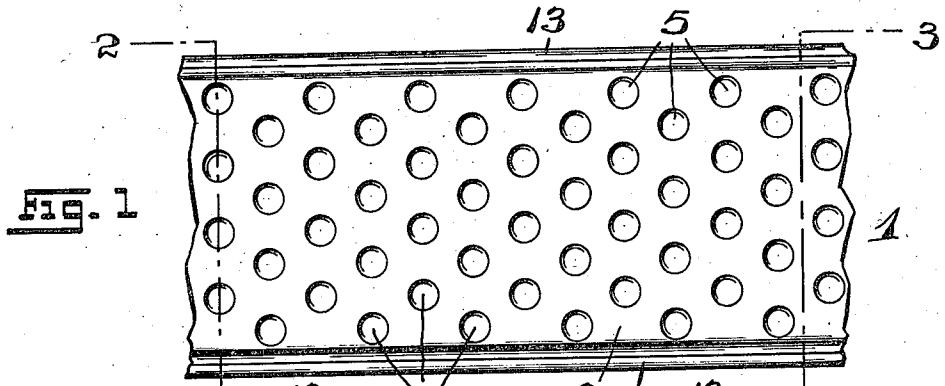


Fig. 1

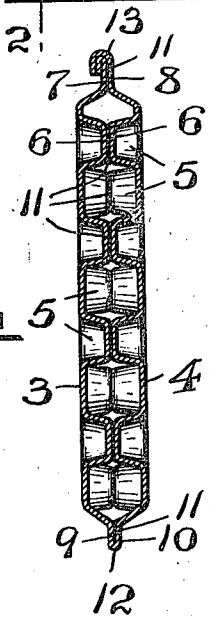


Fig. 2

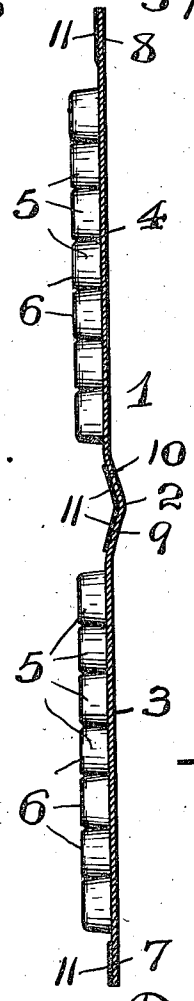


Fig. 4

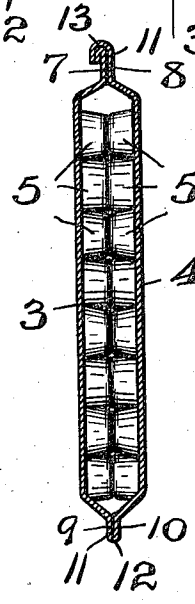


Fig. 3

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2 SHEETS—SHEET 2.

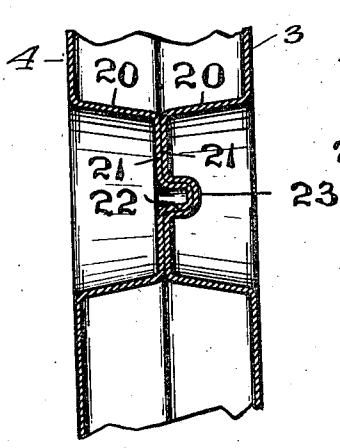


Fig. 5.

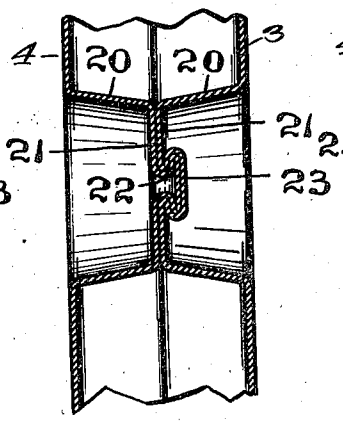


Fig. 6.

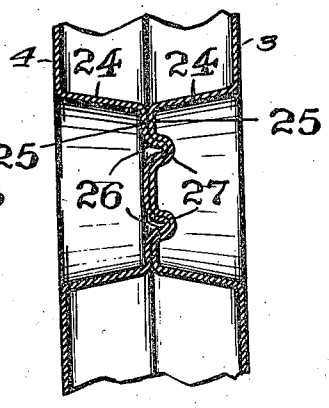


Fig. 7.

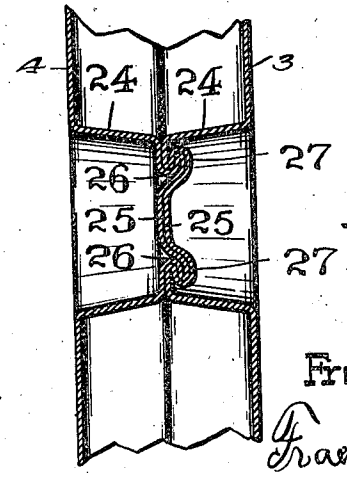


Fig. 8.

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UNITED STATES PATENT OFFICE.

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HOLLOW STRUCTURE FOR RADIATORS, CONDENSERS, AND THE LIKE.

1,191,681. Specification of Letters Patent. Patented July 18, 1916.

Application filed March 26, 1914. Serial No. 827,264.

To all whom it may concern:

Be it known that I, FREDERICK A. FELDKAMP, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Hollow Structures for Radiators, Condensers, and the like; 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, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention has reference, generally, to a novel article of manufacture in the form of a comparatively thin and hollow element, as a band of metal; and, the present invention relates, more particularly, to a thin and hollow structure, in the form of a band of metal, which may be of any suitable length and width, but which, however, is quite thin with respect to the length and width of the same.

The invention, therefore, has for its principal object to provide a thin and hollow metal structure of the general character hereinafter more particularly set forth which is especially adapted for use in the construction of radiators for automobile and house-purposes, but which may also be used in the construction of condensers of the various kinds, in refrigerating and cooling devices, and other devices in the various arts where such thin and hollow metal structures are applicable.

The invention has for its further object to provide a thin and hollow metal structure comprising a single piece of metal which is doubled upon itself and has its longitudinally extending marginal edges united by means of a tight seam, the flat walls of the structure being provided with inwardly and registering reinforcing members or elements, in the form of tubular stud-like projections, having their interiorly located and registering portions closed, and then suitably united, either by means of solder, or a mechanical fastening means of any suitable construction.

Other objects of this invention not at this time more particularly enumerated will be clearly understood from the following detailed description of the present invention.

With the various objects of the present invention in view, the invention consists, primarily, in the novel hollow band of the general character hereinafter more particularly set forth.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a face view of a portion of a thin and hollow structure made according to and showing one embodiment of the principles of the present invention; Fig. 2 is a transverse section of the same, said section being taken on line 2—2 in said Fig. 1; and Fig. 3 is a similar section taken on line 3—3 in said Fig. 1, said Figs. 2 and 3 being considerably enlarged. Fig. 4 is a transverse sectional representation of a blank provided with stud-like projections, the blank being represented in its flat condition before being doubled upon itself to provide the structure represented in said Figs. 1, 2 and 3 of the drawings. Figs. 5 and 6 are transverse sectional representations of portions of a hollow metal structure and registering stud-like projections, respectively representing a method of producing and providing a mechanical clamping means for positively connecting the registering stud-like projections; and Figs. 7 and 8 are similar sectional representations of portions of a modified hollow metal structure and registering stud-like projections, respectively representing another method of producing and providing a mechanical clamping means for positively connecting registering stud-like projections, said Figs. 6, 7 and 8 being drawn on still larger scale.

Similar characters of reference are employed in the said above described views, to indicate corresponding parts.

Referring now to Fig. 4 of the drawings, the reference-character 1 indicates a blank of sheet metal of any desired length and width, the said blank being formed centrally and longitudinally with a slightly and suitably shaped raised portion, as 2, the said raised portion forming a division located between the two portions 3 and 4 of the said blank 1. Simultaneously with producing the blank 1 with said rib-like raised portion 2, the said portions 3 and 4 are also produced with hollow stud-like projections,

as 5, which may be of any suitable shape, but are preferably of conical configuration, as shown, and are closed, as at 6. This structure thus provided, and indicated in said Fig. 4 of the drawings, may be prepared in a suitable die and punch, or may be rolled into the shape desired between suitably constructed rolls, as will be clearly evident. Any suitable arrangement of such stud-like projections may be provided, and the arrangement of said studs may be staggered, as represented in Figs. 1, 2, 3 and 4 of the drawings. Prior to bending the structure represented in said Fig. 4 into the hollow structure illustrated in Figs. 1, 2 and 3, the closed end-portions 6 of all of the stud-like projections, and the longitudinally extending surface-portions 7, 8, 9 and 10 of the metal blank 1, are suitably "tinned", as at 11, see Fig. 4. The blank 1 is then doubled upon itself upon the raised portion or division 2, so that the tinned surface-portion 9 will rest upon the tinned surface-portion 10, that the tinned surface-portion 7 will rest upon the tinned surface-portion 8, and that the tinned closed ends 6 of the respective stud-like projections 5 of the blank-portion 3 will rest upon the tinned ends of the respective and correspondingly placed stud-like projections 5 of the blank-portion 4. The structure is then passed between suitably heated surfaces, as a pair of suitable hot rollers, to bring the tin at the various tinned surfaces to the melting point, at the same time applying sufficient pressure to insure a good contact or union. The structure thus doubled upon itself is then allowed to cool, so as to provide a positive union of the contacting portions, by passing the structure between cold rollers, or otherwise, and at the same time providing the closed longitudinally extending marginal joint 12, and the overlapped or double-seamed marginal and longitudinally extending joint 13, shown more particularly in Figs. 1, 2 and 3 of the drawings, and to provide a finished hollow structure, open at its respective ends, and marginally closed at its longitudinal edges, so as to produce a water or steam-tight structure, as will be clearly evident.

Referring now to Figs. 5 and 6 of the drawings, I have provided the two portions 3 and 4 of the blank with registering stud-like projections, as 20, said projections having contacting closed ends, as 21; but, instead of permanently securing said contacting ends 21 together by means of solder, as in the construction shown in said Figs. 1 to 4 inclusive, the closed end of one of said projections has struck up in said closed end a small tubular stud-like male projection, as 22, while the closed end of the other of said projections 20 has struck up therein a socket-like female member or portion, as 23, extending into the interior of the main stud-like projection 20, substantially as illustrated in Fig. 5 of the drawings. As shown in said Fig. 5, the male projection 22 enters the socket-like female member or portion 23, this being the case with all of the interiorly and registering projections 20 of the complete structure. By means of a punch or other suitable tool, the registering male and female members 22 and 23 are then upset or riveted down, as shown in Fig. 6, whereby the two members 22 and 23 are positively united against separation, and whereby, furthermore, the registering hollow stud-like projections 20 are mechanically united without the use of solder or the method of tinning herein-before described. While in the construction represented in said Figs. 5 and 6, the registering hollow stud-like projections are each provided with a single securing means, a plurality of fastening means may be provided, somewhat in the manner indicated in Figs. 7 and 8 of the drawings. In this modified construction, the two portions 3 and 4 of the blank are provided with the main registering stud-like projections 24, said projections having closed contacting ends, as 25. The closed end of one of said projections has struck up in said end a plurality of small tubular stud-like male projections, as 26, and the closed end of the other of said projections 24 has struck up therein a corresponding number of socket-like female members or portions, as 27, extending into the interior of the main stud-like projection 24, as indicated in Fig. 7 of the drawings. As shown the corresponding male projections or members 26 enter the correspondingly located socket-like female members 27, and then by means of the proper tools the several registering and interconnected male and female members 26 and 27 are flattened down and brought into a positively clamped and locked relation with each other, whereby the several registering main hollow stud-like projections 24 of the main structure are mechanically united against separation, as will be clearly understood from an inspection of said Fig. 8 of the drawings.

The herein-above described hollow metal structure may be put to various uses, in practice, the general uses to which such structures may be put being in the construction of radiators or coolers for automobiles in which the hollow spaces between the wall-portions of the structures, arranged in sections in the frame-work of the radiator, provide a water-receiving space or spaces through which the hot water passes, the heat radiating readily through the thin walls of the main structure, as well as through the walls of the various stud-like projections of the constructions represented in the several figures of the drawings. The

hollow metal structures made according to the principles of the present invention are also applicable in the constructions of condensers, house radiators, and other apparatus.

The hollow structure, as produced, is made of comparatively thin metal, but has great strength, and the thin wall-portions all being of uniform thickness, and quite thin, and the structure itself being thin, radiating surfaces of great efficiency are produced.

While in the foregoing I have described the structure of being made of metal, and preferably of thin sheet-metal, still I am aware that the structure of the present invention may be made of plastic material, such as celluloid, or the like, in which case the structure may be put to uses other than radiating or cooling purposes.

Of course it will be understood, when the structure is made of a plastic material, that the usual cements or collodion solvents may be used for uniting the various contacting parts of the hollow structure.

Of course it will be understood, that some changes may be made in the general arrangements and constructions of the various parts of the hollow structure without departing from the scope of the present invention as set forth in the foregoing specification and as defined in the clauses of the claims which are appended thereto. Hence, I do not limit my invention to the exact details of the construction of the said parts as described in the said specification, nor do I confine myself to the exact details of the construction of the said parts as illustrated in the accompanying drawings.

I claim:—

1. As a new article of manufacture, a hollow structure comprising oppositely placed portions and connecting edge-portions, the oppositely placed portions being provided with interiorly extending and registering non-perforated hollow stud-like projections formed with contacting closed ends.

2. As a new article of manufacture, a hollow structure comprising oppositely placed portions and connecting edge-portions, the oppositely placed portions being provided with interiorly extending and registering non-perforated hollow stud-like projections formed with contacting closed ends, and means for permanently uniting the contacting closed ends of the said registering hollow like projections.

3. As a new article of manufacture, a hollow structure made from a blank doubled upon itself so as to be provided with doubled-over and longitudinally extending contacting portions forming one edge of said structure, and being formed furthermore with longitudinally extending marginal portions lapped over and pressed together to form another edge of said structure, the doubled-over portions of the blank being provided with interiorly projecting and registering hollow stud-like projections formed with contacting closed ends.

4. As a new article of manufacture, a hollow structure made from a blank doubled upon itself so as to be provided with doubled-over and longitudinally extending contacting portions forming one edge of said structure, and being formed furthermore with longitudinally extending marginal portions lapped over and pressed together to form another edge of said structure, the doubled-over portions of the blank being provided with interiorly projecting and registering hollow stud-like projections formed with contacting closed ends, and means for permanently uniting the contacting closed parts of the said registering hollow projections.

5. As a new article of manufacture, a hollow structure made from a blank doubled upon itself so as to be provided with doubled-over and longitudinally extending contacting portions forming one edge of said structure, and being formed furthermore with longitudinally extending marginal portions lapped over and pressed together to form another edge of said structure, the doubled-over portions of the blank being provided with interiorly projecting and registering hollow stud-like projections formed with contacting closed ends, and the said doubled over and lapped marginal portions of the blank and the closed parts of the said registering hollow projections being united with solder.

In testimony that I claim the invention set forth above I have hereunto set my hand this 24th day of March, 1914.

FREDERICK A. FELDKAMP.

Witnesses:
FRED'K C. FRAENTZEL,
FRED'K H. W. FRAENTZEL.