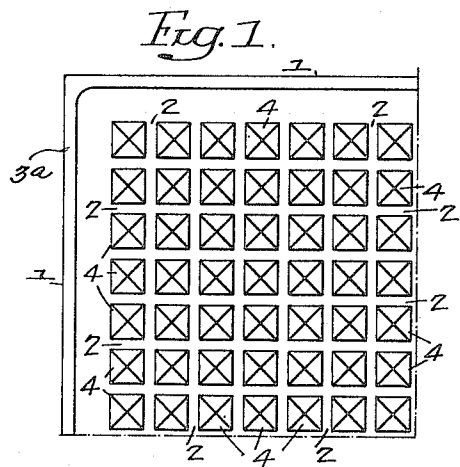
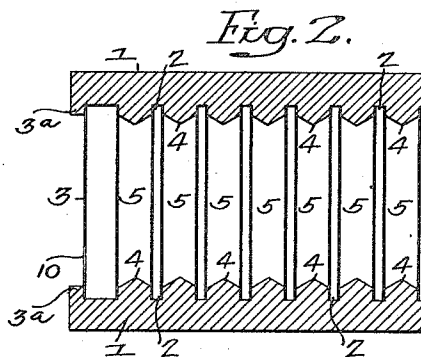
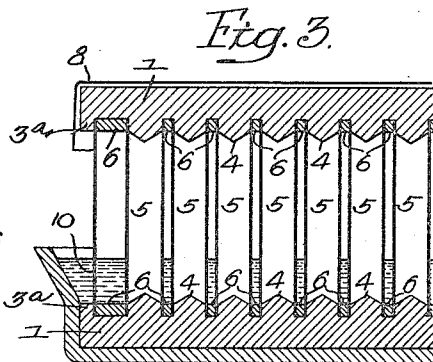
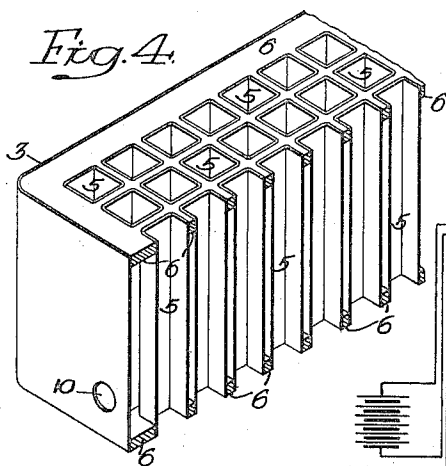
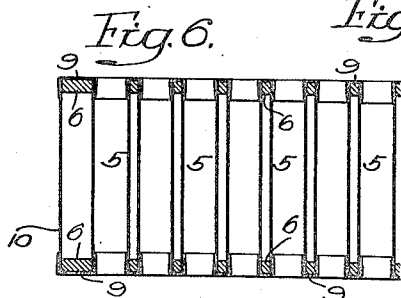
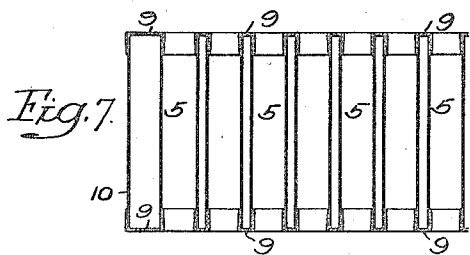


H. E. HERSH.
PROCESS OF MAKING RADIATORS.
APPLICATION FILED SEPT. 19, 1914.

1,182,271.

Patented May 9, 1916.



Witnesses—

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UNITED STATES PATENT OFFICE.

HARVEY E. HERSH, OF ALLENTOWN, PENNSYLVANIA.

PROCESS OF MAKING RADIATORS.

1,182,271.

Specification of Letters Patent.

Patented May 9, 1916.

Application filed September 19, 1914. Serial No. 862,517.

To all whom it may concern:

Be it known that I, HARVEY E. HERSH, a citizen of the United States, residing in Allentown, Lehigh county, Pennsylvania, have invented the Process of Making Radiators, of which the following is a specification.

My invention relates to the manufacture of radiators, such as automobile radiators, consisting of a plurality of tubes of thin sheet metal of any suitable or desirable cross-section, and having their ends suitably secured together whereby an internal space is provided between the several tubes for the reception of a liquid to be cooled.

While the process forming the subject of my invention has been designed for and is particularly applicable to the manufacture of automobile radiators, it will be understood that it may be employed in the manufacture of various other forms of radiators for use in heating and cooling systems without departing from my invention.

These and other features of my invention are more fully described hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, is a plan view of a portion of a tube assembly plate employed in carrying out my process; Fig. 2, is a sectional view of a pair of plates showing a number of tubes assembled between them; Fig. 3, is a view showing the assembled tubes receiving the temporary spacing material; Fig. 4, is a sectional perspective view of a plurality of tubes and the shell or casing of the radiator; showing the temporary support and spacing means at the ends of said tubes; Fig. 5, shows the temporarily confined tubes suspended in an electroplating bath; Fig. 6, is a sectional view showing the electro-deposited metal bridging the ends of the tubes and the shell or casing of the radiator, and Fig. 7, is a similar sectional view illustrating the finished radiator after the temporary spacing material at the ends of the tubes has been removed.

The first step in the process of preparing my improved radiator is to provide temporary supports for the tubes. For this purpose, a pair of metal plates 1, 1, are slotted or grooved from side to side at right angles to each other, as indicated at 2; such plates either having the shape of the finished radiator or being additionally grooved for the reception of a sheet of metal 3 to

form the outer wall, of the shape of the finished radiator casing, or provided with a wall 3^a to serve as a guiding support for such wall. This grooving of the plates at 2 provides a plurality of projections 4 which, in view of the right angled cutting of the plates, will be square, and preferably these projections have pointed ends so as to facilitate the mounting of the tubular sections 5, forming the radiator, upon the same. These tubular sections are preferably of copper; in the present instance square, (although other sections may be employed) and they are preferably arranged to exactly fit the projections of the plates. After the tubes are assembled in place, the outer shell or wall 3 of the structure is positioned, and then the whole structure with the temporarily held tubes positioned between the plates 1, 1, is placed in a bath of hot water. While in such bath a mass of low fusing metal, indicated at 6, is run into the bath of hot water for engagement with the ends of the tubes positioned in one of the plates. The bath is of such a temperature as to hold the metal in a fused condition until the structure is lifted from such bath, whereupon the metal will cool and retain the tubes rigidly in position. By preference, I use a metal that fuses at about 165° F., and the mass of metal used is carefully measured or gaged so that there will be just sufficient to hold the ends of the tubes in place, and fully bridge the gap or space between the same. After one end of the tubes has been retained in this manner, the plates with the assembled tubes are inverted, immersed in the water bath and another mass of molten metal flowed in for the purpose of engaging the opposite ends of the tubes. In this action, it is desirable to place a cold wet cloth 8 over the plate with the previously calked tubes to avoid danger of such transmission of heat as would melt out the first mass of metal. When one end of the tubes has been calked, the plate 1 which has positioned the same may be removed and the wet cloth placed directly on the calked tube ends. After the second mass of temporary holding and spacing metal has cooled, the plates are removed, leaving the tubes 5 and the outer shell or casing 3 of the radiator supported by the temporary fillings 6 of the low fusing metal. This bridging or filling metal together with a small portion of the inner walls of the tubes

is then prepared in the usual manner for electroplating purposes, and then the whole structure is immersed in an electroplating bath for the deposition of a thin copper shell 9 over the bridging portions of the low fusing metal and in contact with the ends of the tubes, as clearly illustrated in the drawings.

The outer shell or casing 3 of the radiator will be provided with the usual apertures, one of which is indicated at 10, for the proper circulation of water through the radiator, and the low fusing metal employed as the temporary holding means for the tubes may be entered and withdrawn through these openings. After the deposition of the connecting metal portions, the tubular structure may be placed in a bath of water having a temperature sufficiently high to melt the low fusing metal, which may be discharged through one of the openings of the outer shell or casing, and when this is done, the structure is complete; only requiring the usual polishing, painting or other finishing treatment before it may be placed on a car.

It will be understood, of course, that other forms of radiators involving the use of tubular members may be connected together in a manner precisely similar to the automobile radiator, without departing from my invention.

While I have referred to the use of a low-fusing metal as the means for temporarily securing and bridging the space between the ends of the tubes prior to the electroplating treatment to permanently secure them together, it will be understood that I wish to include any material that may be employed to perform this function and is removable after the electroplating treatment has been completed.

In the preferred method of carrying out my invention, the bridging metal is electrolytically deposited at both ends of the tubes simultaneously. It will be understood, however, that one end of the tubes may receive the filling material and be subsequently connected by the electro-deposited metal and that after this operation the other end of the tubes may be filled and then connected by the electro-deposited metal.

While I have referred to the employment of tubes in the making of my improved radiator, it will be understood that other walled inclosures permitting circulation of liquid may be employed in lieu of tubes, having their ends connected in a manner precisely similar to that described with reference to the tubes.

I claim:

1. The process of making tubular radiators, which consists in assembling a plurality of tubes of the same length between supporting members with the walls of said tubes out of contact with each other, filling the spaces

between the walls of said tubes with a material having a low melting point, electrolytically depositing a body of metal in engagement with and bridging the spaces between adjoining tubes, and then removing said filling material.

2. The process of making tubular radiators, which consists in assembling a plurality of tubes of the same length between supporting members with the walls of said tubes out of contact with each other, filling the spaces between the walls of said tubes at their respective ends with a fusible metal, electrolytically depositing a body of metal in engagement with and bridging the spaces between adjoining tubes, and then removing the fusible metal.

3. The process of forming tubular radiators, which consists in assembling a plurality of tubes in spaced relation, connecting the ends of said tubes by means of a fusible metal, preparing said tube ends and the filling of fusible metal to receive an electrolytic deposition of metal to bridge the spaces between adjoining tubes, depositing metal on such portions, and then melting out the fusible metal.

4. The process of making tubular radiators, which consists in assembling a plurality of tubes out of contact with each other, filling the spaces between the walls of said tubes with a material having a low melting point, such filling being accomplished at two operations, maintaining the first filling in a sufficiently cool state while the second filling is being made, electrolytically depositing a body of metal in engagement with the tubes and filling and bridging the spaces between adjoining tubes, and then removing said filling material.

5. The process of making tubular radiators, which consists in assembling a plurality of tubes out of contact with each other, filling the spaces between the walls of said tubes with a metal having a low melting point, such filling being accomplished at two operations, maintaining the first metal filling in a sufficiently cool state while the second metal filling is being made, electrolytically depositing a body of metal in engagement with the tubes and the filling metal and bridging the spaces between adjoining tubes, and then removing said fusible metal.

6. In a radiator, the combination of a plurality of tubes spaced apart throughout their length and having their ends connected by a shell of metal electrolytically deposited, said shell embracing the ends of said tubes but not closing the bores of the same.

7. In a radiator, the combination of a plurality of tubes spaced apart, the several tubes being connected together by shells having perforate portions entering the open ends of said tubes to which they are secured.

8. A radiator comprising a plurality of

tubes spaced apart, a casing inclosing said tubes, and metallic shells connecting and spacing the ends of said tubes and connected to the casing, said shells having perforate portions entering the ends of said tubes and to which they are secured, which tubes are open throughout their length.

9. In a radiator, a plurality of open-ended tubes having their said ends connected by a shell of electrolytically deposited metal bridging the spaces between said tubes.

10. A radiator comprising a plurality of

open-ended tubes, a casing inclosing said tubes, and a metallic shell connected to and spacing the ends of said tubes and connected to the casing, said shell having perforate portions entering the ends of said tubes. 15

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

HARVEY E. HERSH.

Witnesses:

MURRAY C. BOYER,
JOS. H. KLEIN.