T. J. KEHOE.

PROCESS OF MAKING RADIATOR CORES.

APPLICATION FILED JULY 14, 1917.

1,404,030. Patented Jan. 17, 1922.

2 SHEETS—SHEET 1.

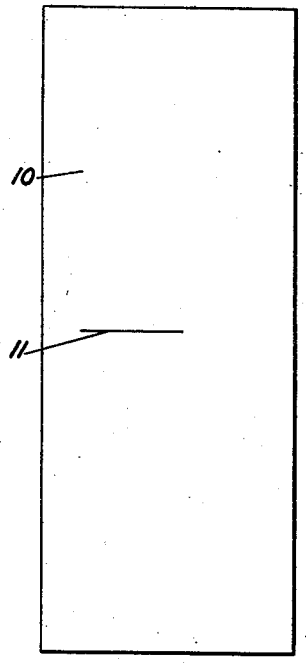


Fig. I.

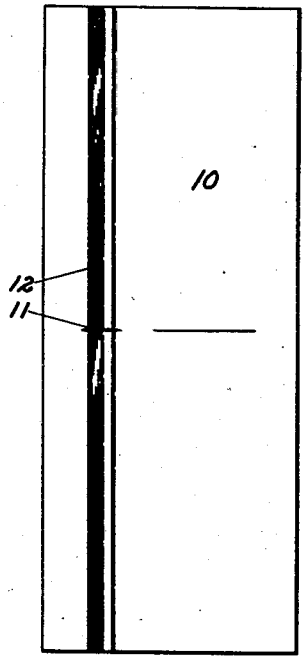


Fig. II.

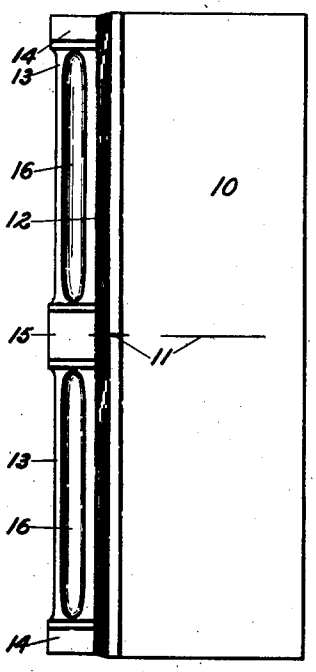


Fig. III.

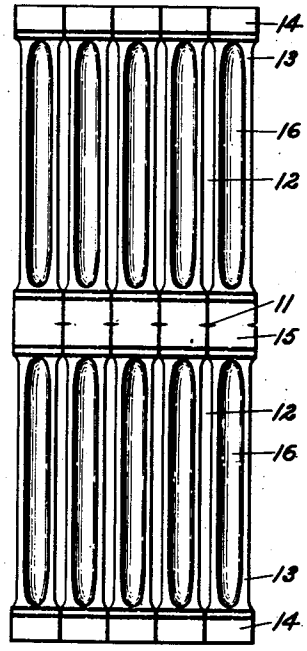


Fig. IV.

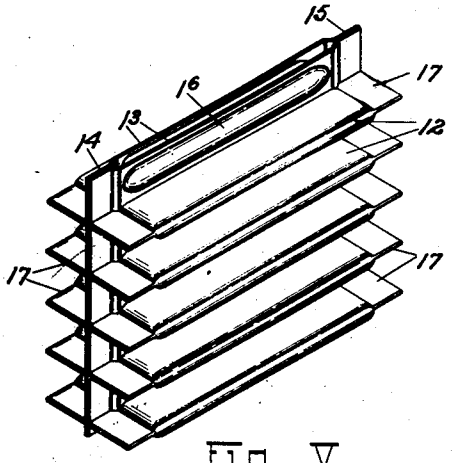


Fig. V.

Inventor
Thomas J. Kehoe
By Chester H. Braselton
Attorney

T. J. KEHOE.

PROCESS OF MAKING RADIATOR CORES.

APPLICATION FILED JULY 14, 1917.

1,404,030.

Patented Jan. 17, 1922.

2 SHEETS—SHEET 2.

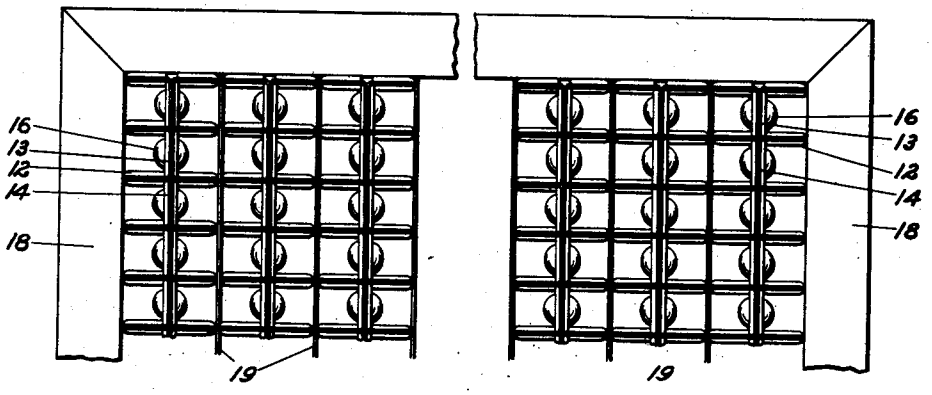


Fig. VI.

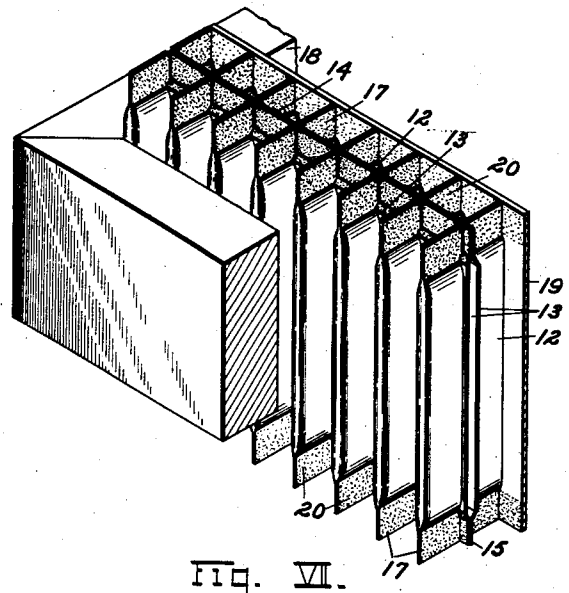


Fig. VII.

Inventor
Thomas J. Kehoe

By Chester H. Braselton
Attorney

UNITED STATES PATENT OFFICE.

THOMAS J. KEHOE, OF TOLEDO, OHIO, ASSIGNOR TO THE WILLYS-OVERLAND COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

PROCESS OF MAKING RADIATOR CORES.

1,404,030. Specification of Letters Patent. Patented Jan. 17, 1922.

Application filed July 14, 1917. Serial No. 180,641.

To all whom it may concern:

Be it known that I, THOMAS J. KEHOE, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Processes of Making Radiator Cores, of which I declare the following to be a full, clear, and exact description.

This invention relates to an improved process for making radiator cores. The principal object of my invention is to provide an improved process for making radiator cores, which will reduce materially the cost of labor and material needed in making such cores, and will enable their rapid production at a low cost.

Further objects, and objects relating to economies of manufacture and details of construction, will definitely appear from the detailed description to follow. I accomplish the objects of my invention by the devices and means described in the following specification. My invention is clearly defined and pointed out in the appended claims.

A structure constituting a preferred embodiment of my invention is illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure I is a plan view of the blank from which the radiator tubes are made, after the slitting operation has been performed.

Figure II is a plan view of the blank shown in Figure I after the first creasing operation has been performed.

Figure III is a plan view of the blank after the depressions forming the side walls of the tube have been formed in the blank.

Figure IV is a plan view of a blank which has been fully formed and is ready to fold along its center line in order to form a complete radiator tube.

Figure V is a perspective view of a portion of a radiator tube formed by folding the blank shown in Figure IV along its center line.

Figure VI is a fragmentary top plan view showing a plurality of radiator tubes and spacing strips assembled in proper relation in a frame preparatory to soldering the edges thereof to form a complete core, and,

Figure VII is a fragmentary, perspective view showing a portion of the radiator core, with the edges of the tube soldered to close the joints.

In the drawings, similar reference characters refer to similar parts throughout the several views.

Considering the numbered parts of the drawing, I have shown a blank or strip of sheet metal 10 from which the radiator tubes are formed. The first operation consists in slitting these blanks along the longitudinal center line thereof forming therein a plurality of spaced slits 11, as shown in Figures I, II and III. A transverse crease or fold 12 is then formed in the blank, as shown in Figure II, which transverse crease extends through the slit 11. A plurality of these creases are formed in the blank and the body of the blank between the transverse creases or folds 12 is then operated upon by means of dies or other suitable tools to form the depressions 13 on opposite sides of the center line of the blank, the portions 14 at the edges of the blank and the portion 15 at the center of the blank being left in the plane of the original sheet of metal, as is clearly shown in Figure III. The grooves 16 are at the same time formed in the depressions 13, as is clearly shown in Figure III of the drawings. Figure IV represents a plan view of the blank after the slitting, creasing and stamping operations thereon are completed, and it will be seen that this strip comprises a double row consisting of the alternating creases or folds 12, and the depressions 13, provided with the grooves 16 therein, the portions 14 at the edges and 15 in the center of the blank being in the same plane, and the slits 11 lying in the center line of the portion 15. At the same time that the dies operate to form the depressions 13 and the grooves 16, they operate to clinch or pinch together the ends of the folds or creases 12, so as to form the portions 17 at the ends thereof to partially seal these portions of the folds 12, as clearly appears from Figure V of the drawing.

After the blank has been formed of a sufficient length to make a radiator tube, it is then folded along its center line, that is along the line of the slits 11, to the form shown in Figure V of the drawing, so as to bring the portions 14 into engagement with each other, to make a complete tube, so that one edge of the tube is formed by the abutting portions 14, while the other edge of the tube is formed by the portions 15, which are folded along the center line. A complete tube is thus formed having the side walls 13 with the grooves therein and the folds 12 forming fins laterally extending from the side of the tube.

The tubes forming the radiator core are made up in this manner, and a plurality of tubes are assembled within a temporary wooden frame 18, with spacing strips 19, which may be made of steel or any suitable material, interposed between the laterally extending fins 12 of the adjacent tubes, as is shown in Figure VI. The tubes in their final form are rectangular in outline as shown in Figure VI, and the fins and depressions on opposite sides of the center line are located symmetrically with respect to the center line, the fins all extending substantially the same distance on each side of the center line. The tubes and spacing strips alternate across the frame when assembled, as shown in Figure VI, in such a manner that each spacing strip parallels the general direction of its adjoining tube and separates such tube from the tube nearest thereto, thus forming a built-up core comprising alternate tubes and spacing strips, which when attached together at their edges mutually support each other in position. A sufficient number of tubes and spacing strips are assembled together within the frame 18 and clamped in this position, leaving the edges of the tubes and spacing strips projecting on both sides of the frame, as shown in Figure VII. These projecting edges are then attached together in any desired manner as by being welded or dipped in solder at 20, so that the portions 14, 17 and 15 of the tubes are completely dipped in the solder, which seals all joints at these places, and seals the tubes to the spacing strips to prevent lateral movement of one relative to the other, and at the same time makes a complete water tight tube. The frame 18 can then be removed and the radiator core is complete and ready for assembling into the radiator frame.

The operations illustrated in Figures I to IV inclusive, are, in practice, performed by a single machine, which does the slitting, creasing and stamping so as to turn out a blank, which is formed as shown in Figure IV.

It will be apparent that a radiator core can be formed in accordance with this process very rapidly, since the forming of the blank from which the tube is made can be rapidly and effectively accomplished and the blank can be easily folded along its center line to form the tube as shown in Figure V. The operation of assembling in the frame 18 can be quickly accomplished and the soldering of the edges to make the complete tube is also very simple since it merely consists in dipping the edges of the tubes into the solder. By means of the use of the spacing strips 19, between the tubes, I can economize on material, as it is not necessary to use spacing strips of brass, as in the case of the tubes, as these strips do not come in contact with the cooling liquid. It will also be apparent that by forming the radiator tube and core in this way, the cost of solder can be lessened, since only the edges of the tubes are soldered and it is a fact that a radiator constructed in accordance with this process takes up much less solder than is used in connection with radiator cores made by other well known processes.

I am aware that this particular process, which I have here shown and described, is susceptible of considerable variation without departing from the spirit of my invention, but I have found that this particular embodiment of my invention is desirable from many standpoints, and, therefore, I desire to claim the same specifically as well as broadly, as indicated by the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is—

1. The method of making radiator cores comprising slitting a blank along its longitudinal center line at spaced intervals; creasing the blank transversely at intervals through said slits; striking down a portion of the body of the blank between said creases; crimping the ends and centers of said creases; folding the blank longitudinally along the line of said slits to make a complete tube; assembling a plurality of tubes thus formed in a temporary frame with spacing strips interposed between adjacent tubes; and dipping the edges of said tubes and strips in solder to seal the same.

2. The method of making radiator cores comprising slitting a blank along its longitudinal center line at spaced intervals; creasing the blank transversely at intervals through said slits; striking down a portion of the body of the blank between said creases; crimping the ends and centers of said creases; folding the blank longitudinally along the line of said slits, to make a complete tube; assembling a plurality of tubes thus formed in a temporary frame; and sealing the edges of said tube.

3. The method of making radiator cores comprising slitting a blank along its longitudinal center line at spaced intervals; creasing the blank transversely at intervals through said slits; striking down a portion of the body of the blank between said creases; crimping the ends and centers of said creases; folding the blank longitudinally along the line of said slits to make a complete tube; and assembling a plurality of tubes thus formed with spacing strips interposed between adjacent tubes.

4. The method of making radiator cores comprising assembling together a plurality of tubes, each tube being formed by first slitting a blank along its longitudinal center line at spaced intervals, creasing the blank transversely at intervals through said slit; striking down a portion of the body of the blank between said creases; crimping the ends and centers of said creases and folding the blank longitudinally along the line of said slits to make a complete tube.

5. The method of making radiator cores comprising slitting a blank along its longitudinal center line at spaced intervals; creasing the blank transversely through said slits; striking down a portion of the body of the blank between said creases; folding the blank longitudinally along the line of said slits to make a complete tube; assembling a plurality of tubes thus formed in a temporary frame; and sealing the edges of said tubes by dipping the same in solder.

6. The method of making radiator cores comprising slitting a blank along its longitudinal center line at spaced intervals; creasing the blank transversely at intervals through said slits; forming depressions in the body of said blank between said creases; folding the blank longitudinally along the line of said slit to make a complete tube; assembling a plurality of tubes thus formed in a temporary frame; and sealing the edges of said tubes when thus assembled.

7. The method of making radiator cores comprising slitting a blank along its longitudinal center line at spaced intervals; forming the blank on each side of said center line to provide spaced grooves and depressions between said grooves; folding said blank longitudinally, along the line of said slits, to make a complete tube; and sealing the edges of said tubes.

8. The method of making radiator cores comprising slitting the blank along its longitudinal center line, at spaced intervals; forming the blank on both sides of said center lines, to provide spaced grooves and depressions between said grooves; folding the blank longitudinally along said slits; assembling a plurality of tubes thus formed in a temporary frame with spacing strips interposed between adjacent tubes; and dipping the edges of said tubes and strips in solder to seal the same.

9. The method of making radiator cores comprising slitting a blank along its longitudinal center line, forming spaced grooves therein and depressions between said grooves; folding the blank on the longitudinal center line to bring the opposite longitudinal edges of said blank in engagement with each other; assembling a plurality of tubes thus formed in a temporary frame; and sealing the edges of said tubes.

10. The method of making radiator cores, comprising the forming of a blank by slitting the blank at intervals along its longitudinal center line forming spaced grooves on either side of said center line; the folding of said blank along its longitudinal center line to bring the opposite longitudinal edges into registering engagement to make a complete tube so that both of said edges will be completely exposed; assembling a plurality of tubes thus formed in a temporary frame, with spacing strips interposed between adjacent tubes; and sealing the edges of said tubes and strips while held in said temporary form to seal said tubes and to join said tubes and strips together to make a complete radiator core.

11. The method of making radiator tubes comprising slitting a blank at spaced intervals along its longitudinal center line, creasing the blank transversely through said slits, striking down portions of the blank, folding the blank along the line of said slits to form tubes having edge portions, and sealing the edges of said tubes.

12. The method of making radiator tubes comprising the forming of a weakened portion along the longitudinal center line of a blank sheet of metal, striking down portions of the body of the blank at each side of the weakened center line, folding the blank along the weakened longitudinal center line to form tubes having edge portions, and sealing the edges of said tubes.

13. The method of making radiator tubes comprising the slitting of a sheet metal blank at intervals along its longitudinal center line, creasing the blank transversely through said slits, folding the blank longitudinally along the line of said slits to bring the opposite longitudinal edges into registering engagement to make a complete tube, and sealing the edges of said tube.

14. The method of making radiator tubes comprising the slitting of a sheet metal blank at intervals along its longitudinal center line, creasing the blank transversely through said slits, folding the blank longitudinally along the line of said slits, crimping the ends of said creases, and sealing the edges of said tubes.

15. The method of making radiator tubes

comprising the slitting of a sheet metal blank at intervals along its longitudinal center line, striking down portions of the blank, folding the blank along the line of said slits to form tubes having edge portions, and sealing the edges of said tubes.

16. The method of making radiator tubes comprising the forming of a weakened portion along the longitudinal center line of a sheet metal blank, striking down portions of the blank, folding the blank along the weakened longitudinal center line, and sealing the edges of said tubes.

In testimony whereof I affix my signature.

THOMAS J. KEHOE.