

Jan. 1, 1935.

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1,986,338

MANUFACTURE OF CELLULAR CORES

Filed March 10, 1932

Fig. 2.

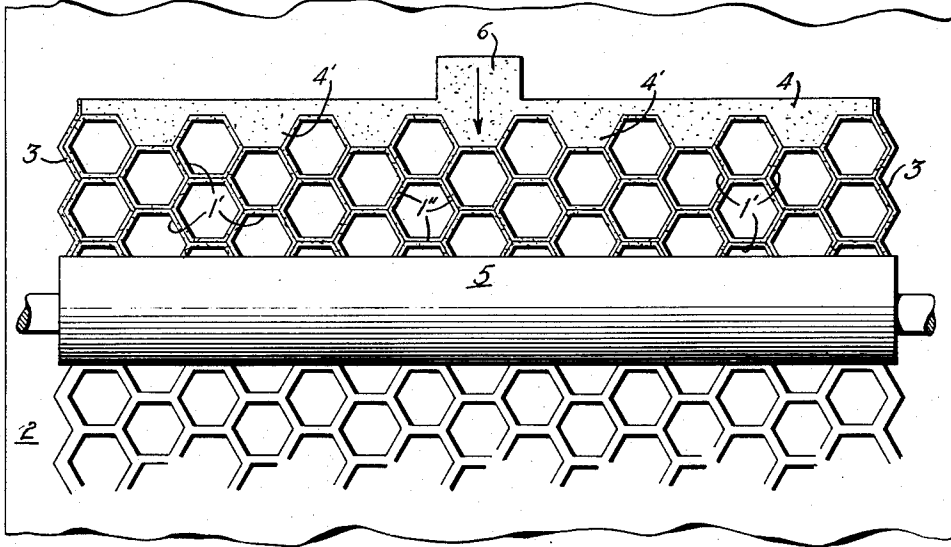


Fig. 3.

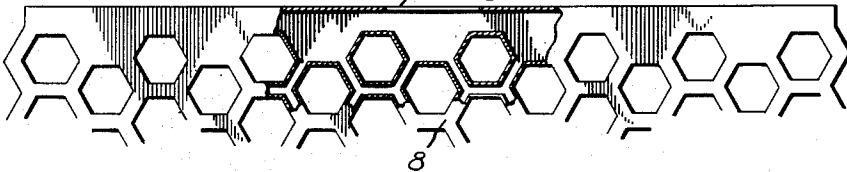


Fig. 1.

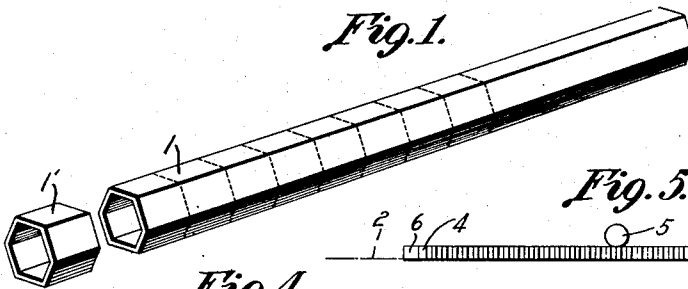
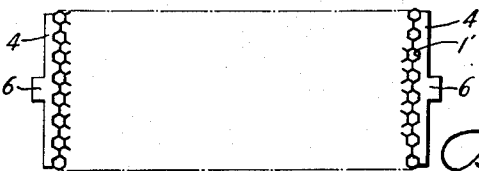


Fig. 5.



Fig. 4.



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1,986,338

MANUFACTURE OF CELLULAR CORES

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Application March 10, 1932, Serial No. 598,040

5 Claims. (Cl. 204—8)

This invention relates to the manufacture of electrodeposited heat exchangers of the cellular type and particularly to the construction and method of forming the core to receive the electrodeposition. The core is formed of easily fusible metal and in providing the core to receive the coating or shell by electrodeposition, the core should have a smooth surface, free from all fin lines, such as may result from the use of a cope and drag when die casting from two piece molds, and further it should be free from all sharp edged hollows or breaks in the continuity of the surface such as are formed when two pieces of metal are pressed together.

Heretofore it has been found unduly expensive in time and money that these cores be cast in molds due to the fact that on chilling the heat must be removed from the body of the die as well as from the casting and therefore the die body must necessarily be of heavy construction to withstand the strains of alternate heating and chilling and in knocking out the casting.

The object of the present invention is to eliminate the heretofore objectionable features of the core forming operations and to provide a seamless, finless core in an economical and practical manner. Further, the invention has for its object to provide a simple constructed core with a multiplicity of cells in which the cells may be shaped to a desired design by a method involving few steps and without involved operations.

In the drawing:

Fig. 1 is a perspective view of a tube of a desired cross section from which sections are severed to form elemental rings or units for the core.

Fig. 2 is a fragmentary view of a core formed by assembling a plurality of such units and framing the same, the view depicting the core in the act of passing beneath a heater utilized for removing hollows and breaks in the surface and for generally smoothing out the core surface for electro-plating.

Fig. 3 is a fragmentary view of the electrodeposited heat exchanger body or shell produced from the core, the core having been removed from the shell.

Fig. 4 is a diagrammatic plan view of the core.

Fig. 5 is a similar view showing the core being sealed and finished.

In proceeding in accordance with the present invention a length of tube 1 is provided which tube is formed of an easily fusible core metal and is given a cross sectional shape corresponding substantially to the shape desired for the cell of the core, preferably a regular sided polygon, such

as a triangle, rectangle, pentagon, hexagon, etc. This shape is suitably produced, as by pressing, drawing, or by extrusion. The wall of the tube will be approximately half the thickness of the passage about the cells of the final electrodeposited product. The core tube is then severed in a plurality of elemental rings or units 1', each having a length approximately equal to the desired thickness of the core from front to back.

The core forming rings which have been severed from the core tube are then assembled, as by placing them upon a bench or table 2 bringing the sides of the several units into flat contact, such as is generally indicated in the upper half of Fig. 2, thereby forming a multi-cellular core having seams 1'' on the front and back faces of the assemblage of core forming units, and on the side margins. The seams along the margins, extending from front to back, are covered by a framing strip 3 conforming to the marginal contour of the core body. In the present showing this framing strip is of zigzag design and may have a thickness equal to the wall thickness of the elemental rings.

The opposite ends of the core body are framed with heavier framing strips or butt pieces 4, which may be solid castings, having their inner faces shaped to interfit and conform with the marginal contour across the end faces of the core body, with the protuberances 4' interfitting with the projecting core forming units, as is clearly shown in Fig. 2. The framing strips 3 may be welded or secured to the butt pieces 4 so as to provide a frame completely encircling the assembly of core forming units, the joints between the framing strips and the butt pieces being finished smoothly. This provides a framed core in which the front and back faces of the core body have the rough end surfaces of the individual units and the seams or joints between the several elemental rings, and between the latter and their framing members.

To smooth these faces and to obliterate the seams, the core body may be immersed in a molten bath of the core metal, or the body may be subjected to heat sufficient to close all crevices and break down all sharp projections. The heat may be applied as by passing the core beneath heat applying means, such as a heated roller 5, or a flame (not shown). For carrying out this finishing operation the assemblage of parts may be firmly compacted, as by clamping the same in a jig or the like.

A hanging sprue 6 is preferably provided on each butt strip by which the core may be con-

veniently suspended in the bath for electrodeposition, and after the process of electrodeposition has been completed the sprue may be removed and the core fused out, as by immersing the same in a bath of molten core metal, thereby leaving the shell seamless throughout and provided with openings 7 where the sprues were located.

After the core has been fused out, the thin walled shell 8 is left having individual cellular design similar to the core tube whatever its cross sectional shape may have been. In the particular showing the resultant heat exchanger shell is provided with a hexagonal cellular design following the cross section of the hexagonal core tube from which the elemental rings were severed.

The heat exchanger shell may be provided with suitable means of attachment (not shown) having fluid communication through the openings 7, all in a manner which it is believed will be obvious.

What is claimed is:

1. In the manufacture of cellular heat exchangers by electrodeposition, the method of forming multi-cell fusible cores to receive the electrodeposition, comprising the steps of shaping a seamless fusible tube to have a cross section of a desired regular sided polygon, severing the tube into even lengths to form polygonal rings, assembling the rings side by side to form a core body with the sides of the rings in flat contact with each other and the seams between adjacent rings being exposed in the front and back faces of the core body, framing the edge faces of the core body by fusible framing core strips to cover the edge face seams between ad-

jacent rings along the margin of said body, and then sealing the seams on the front and back surfaces of the body.

2. The steps in the manufacture of multi-cell fusible cores for the construction of electrodeposited heat exchangers consisting in assembling a plurality of fusible cell forming elements side by side, said elements when assembled side by side forming a multi-cell core body, framing the edge faces of the latter to seal the exposed lines of contact between the elemental rings, and sealing and smoothing the front and back faces of the body which are to be exposed to electrodeposition.

3. A multi-cell fusible core for the manufacture of cellular heat exchangers by electrodeposition, comprising a plurality of fusible elemental rings associated side by side and brought together into an integral core body, and a marginal frame about the core body closing the external angles between the marginal rings.

4. The method of forming cellular heat exchanger cores consisting in forming polygonal shaped fusible rings of substantially equal lengths, assembling the rings in a fusible frame, and then fusing the outer edges of the rings and frame to form a fusible unitary core body.

5. The method of forming cellular heat exchanger cores, consisting in forming thin-walled polygonal-shaped fusible tubes, severing sections of substantially equal lengths from the tubes to form polygonal-shaped rings, assembling the rings in a fusible frame, and then sealing the outer contacting edges of the rings and the frame to form a fusible unitary core body.

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