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METHOD OF MAKING RADIATOR CORES

Original Filed March 23, 1934

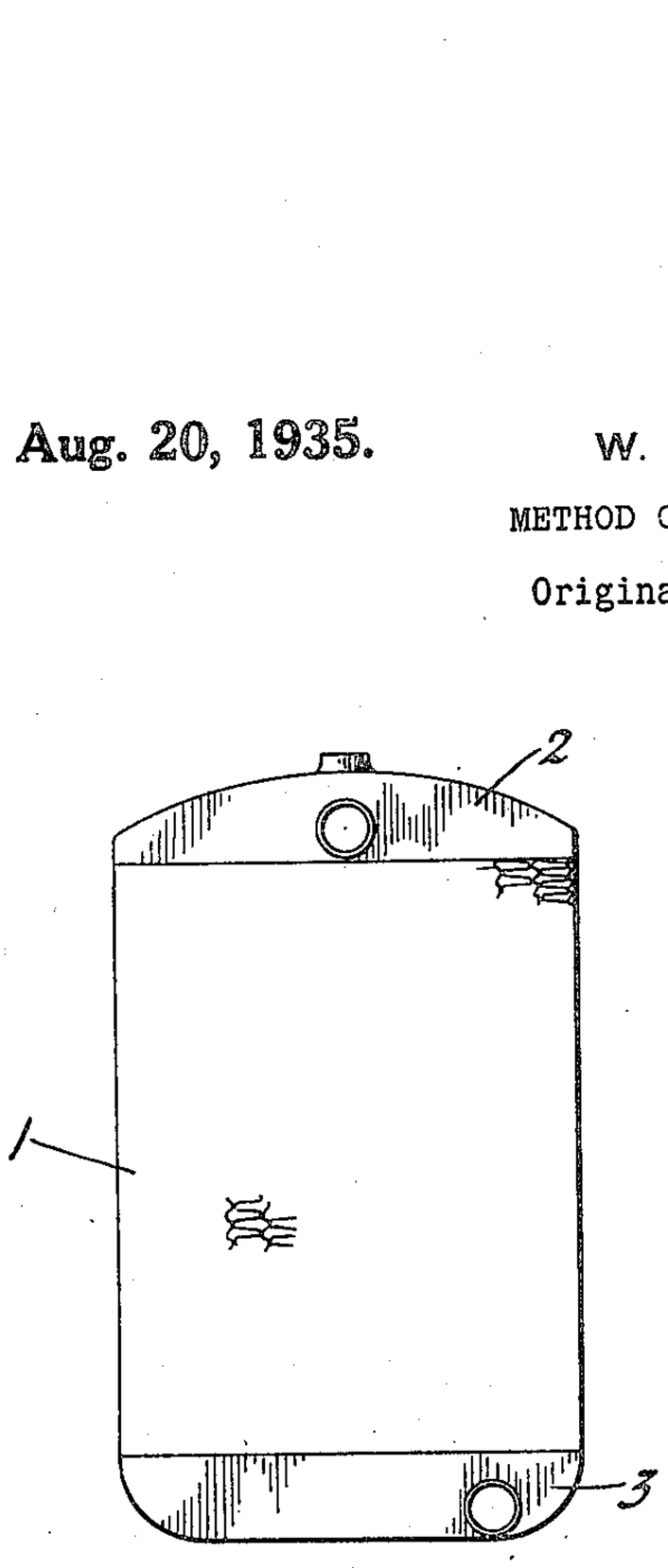

Fig. 1

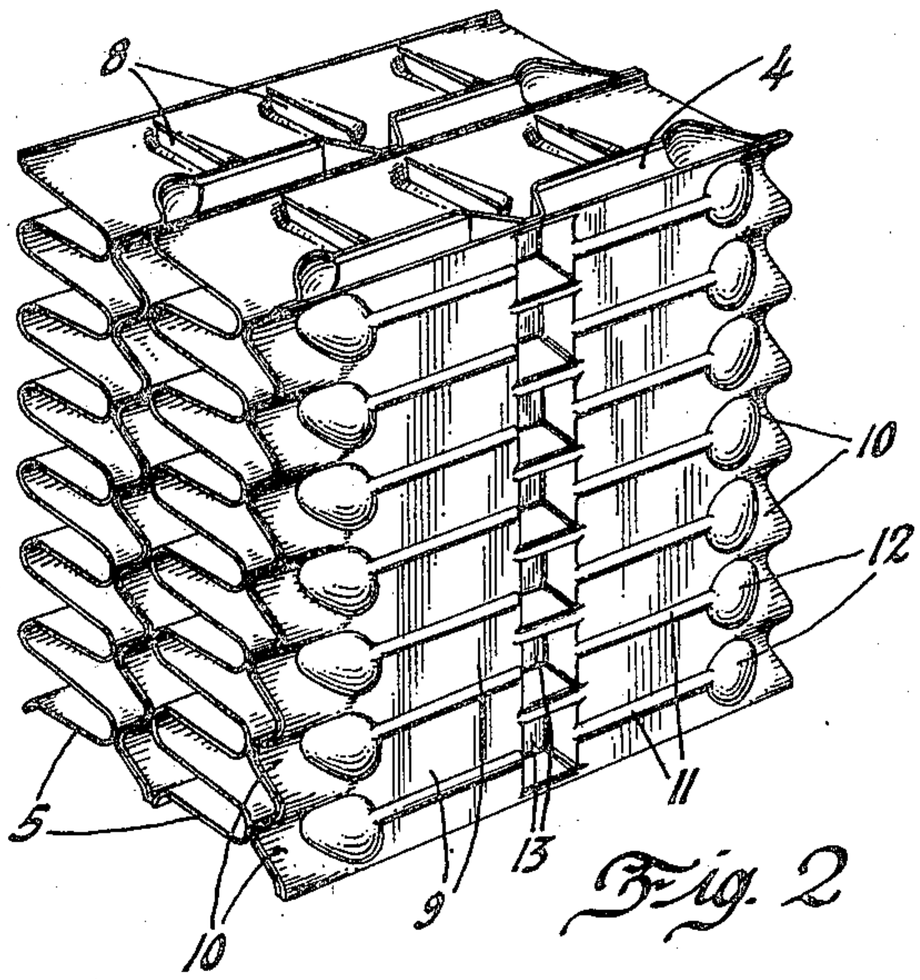

Fig. 2

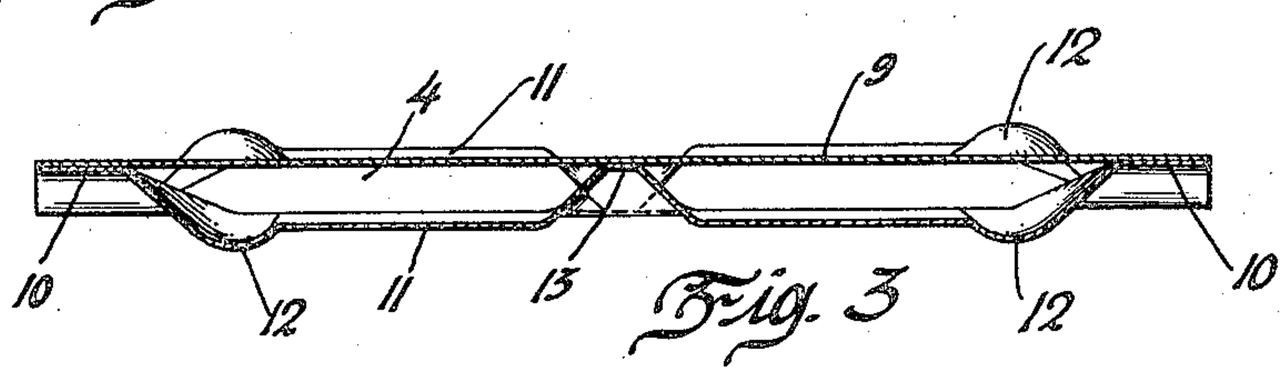

Fig. 3

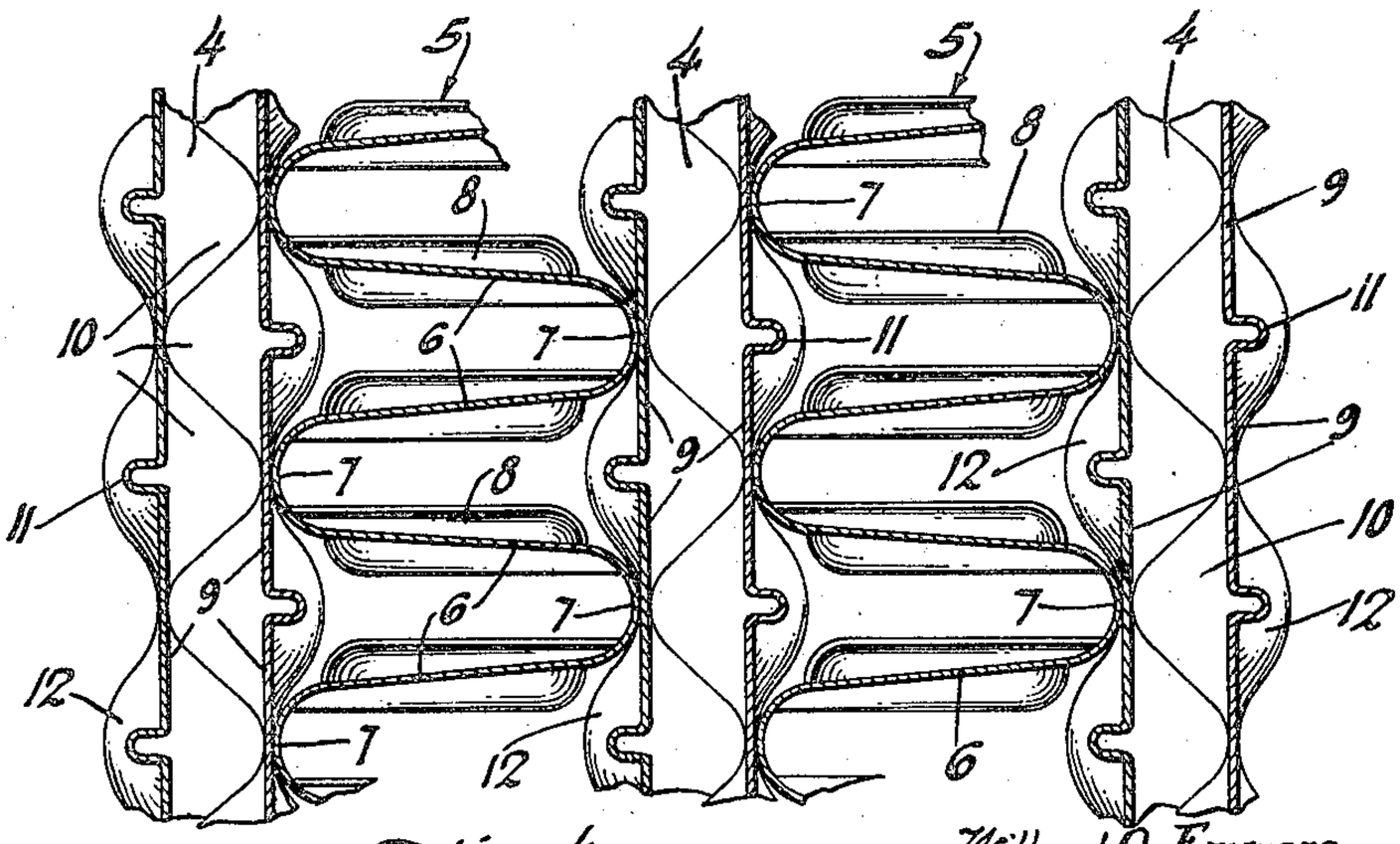

Fig. 4

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METHOD OF MAKING RADIATOR CORES

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Original application March 23, 1934, Serial No. 716,930, now Patent No. 1,998,663, dated April 23, 1935. Divided and this application January 14, 1935, Serial No. 1,642

1 Claim. (Cl. 113—118)

This is a division of our pending application for patent Serial No. 716,930, filed March 23, 1934 issued as Patent No. 1,998,663 on April 23, 1935.

This invention relates to heat exchange devices and concerns structural details of a cellular type radiator core. One of its primary objects is to provide a core which compares favorably with commercial cores now on the market in both efficiency and ease of manufacture, but which is less complicated in design, cheaper to produce, and just as rugged in construction.

The invention has to do particularly with the formation of wall strips which are grouped in pairs with their intermediate wall portions spaced apart, and their opposite edges internested and joined together to provide a passageway for fluid flow. In the preferred embodiment each wall strip contains a longitudinal succession of flat main wall portions extending in a single plane with interiorly projecting bead or ridge projections therebetween pressed outwardly on transverse lines so as not to disturb the straight line flow of fluid, and a longitudinal succession of spacer knees along each edge of the strip pressed out of the plane of the strip in the direction opposite to but in transverse alinement with the bead portions. By this arrangement, the strain incident to the stretching of the metal is distributed across the strip on a transverse line, the stretching of the central part balancing the stretch placed in the edges and stiffening the tube against flimsiness while leaving the inner face practically flat.

Because a pair of cooperating flat faced strips will provide a free straight line flow, the tube space, when the core is used in an engine cooling system, for example, may be relatively narrow for the flow of cooling water in a thin stream without running into conditions sometimes arising with plates which are corrugated to produce turbulence but which restrict the flow to the outlet tank so that the water may be drawn out of the radiator faster than it flows into the core, causing boiling, and the delivery of the aerated water to the cylinder block. With the free flow of water, although in thin streams, steam pockets are eliminated and a more uniform temperature exists between the top and bottom of the cylinder block.

In the accompanying drawing, Figure 1 is a front elevation of a radiator assembly for use on a motor vehicle; Figure 2 shows in perspective a fragment of the core; Figure 3 is a transverse section of one of the water tubes, and Figure 4 is a vertical section through a portion of the core.

Referring to the drawing, the radiator assembly, as will be readily understood, includes a heat dissipating unit or core 1, having at opposite ends a top tank or inlet header 2, and a bottom tank or outlet header 3, adapted for connection, respectively, with the discharge and intake fittings of a cylinder block cooling jacket. For the flow of cooling medium from one tank to the other the core is made up of a number of passages 4, spaced apart by fin strips 5. The fin strip shown in the drawing is of corrugated outline providing a series of fins 6 extending between adjacent walls of the adjoining tubes to divide the space into a number of relatively small air cells and being joined in spaced apart relation at their sides with next succeeding fins through comparatively wide bends 7, constituting the peaks or apices of the corrugations. Each fin has several louvered openings 8 to direct the air stream progressively from cell to cell in its passage through the core and insure wiping contact of heat radiating surface by a maximum number of air particles with negligible baffling or obstruction of flow.

The two side walls of each water tube or passage 4 are identical and are nested together with corresponding parts in staggered relation. Each involves a preformed strip whose width determines the depth of the core. As shown in the drawing, it is made up principally of a longitudinal succession of flat wall portions 9, all lying in a common plane and providing an unobstructed interior surface. A succession of spacer knees 10 are pressed inwardly along both edges of the strip in corrugated outline and these inward projections may be termed substantially V-shape with rounded peaks and valleys. Rounded bends, from the manufacturing standpoint, are preferable to sharp corners, since they are easier to form, result in less die wear and the metal is not so likely to tear when stretched in the forming operation.

The forming dies, which are usually of the roll type, may be so constructed that as the knees are pressed out of the plane of the strip to one side, there also will be pressed in transverse alinement therewith, a stiffening rib or bead 11 across the strip, but in the opposite direction or outwardly from the wall and between the flat portions 9. If only the edge portions were to be stretched the unstretched intermediate portion would be too weak for practical purposes and the forming of the beads, therefore, not only balance for the stretching of the edges, but lend rigidity

to the wall without interfering or baffling the flow through the tube.

To further compensate for the stretching of the edge portions, reversely pressed semi-spheroidal projections 12 are formed in the wall immediately adjacent the knees, and these serve to locate between one another the curved peaks 7 of the fin strip. They also assist in the assembly of the core by providing inclined centering and guiding surfaces on which the fins ride to final seating position. As an optional detail a central series of spacer knees 13 may be provided to guard against inward collapse of the tube, particularly if the core is of great depth.

We claim:

In the manufacture of a radiator core, the method of forming a wall plate from flat strip stock, which includes simultaneously stretching the material of the strip on a transverse line in one direction from the plane of the strip along opposite edges to provide spacer knees and in the other direction between said edges to distribute strain across the strip and provide reinforcing ridges therein, and leaving the unstretched flat portions of the plate lying in a single plane.

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