J. A. KUENZ.

RADIATOR CORE.

APPLICATION FILED APR. 1, 1920.

1,429,440

Patented Sept. 19, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

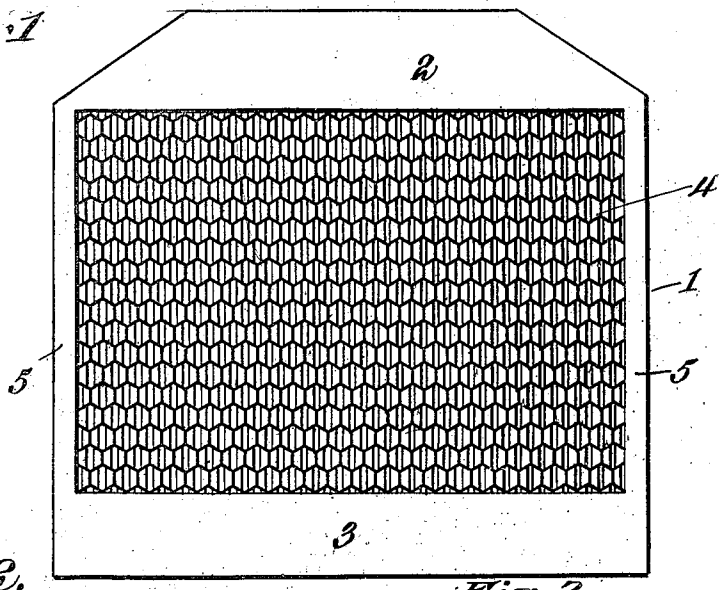


Fig. 2.

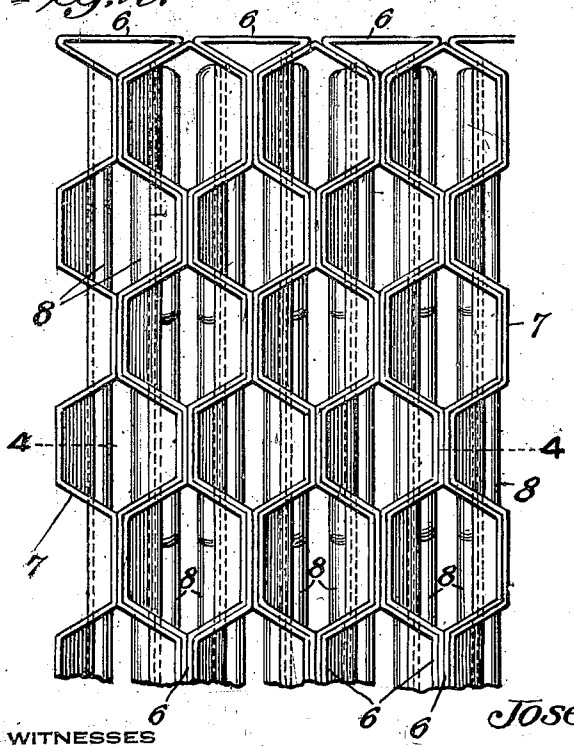
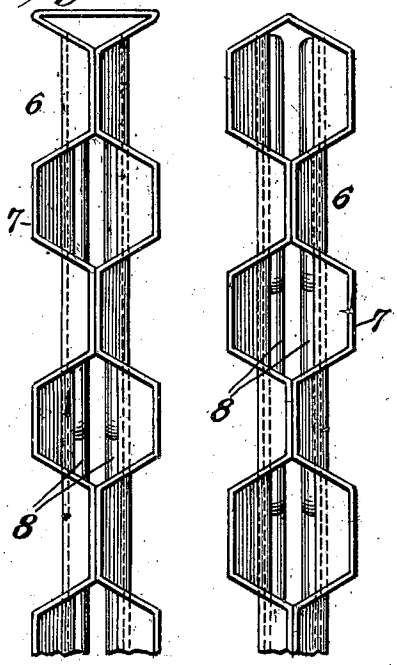


Fig. 3.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 4

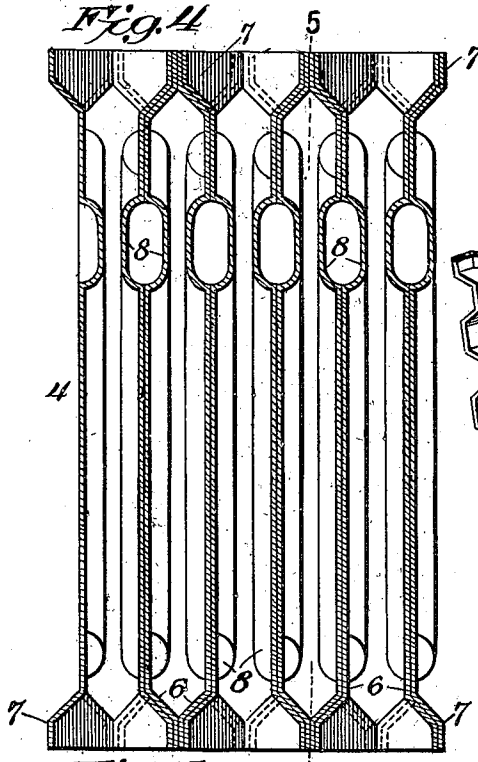


Fig. 5.

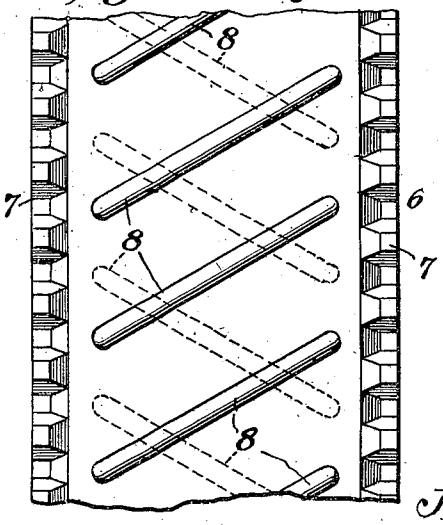
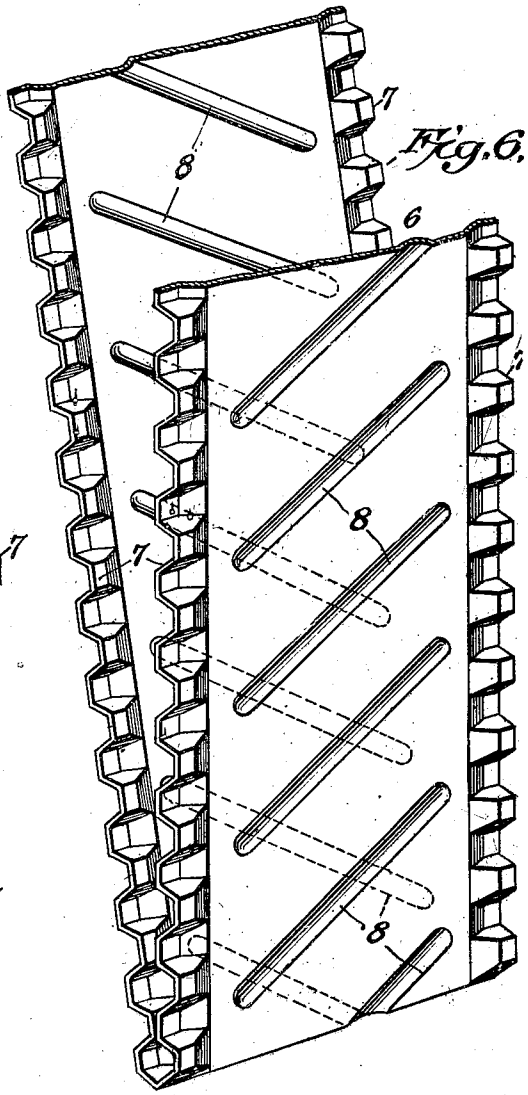


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH A. KUENZ, OF JACKSON, MICHIGAN.

RADIATOR CORE.

Application filed April 1, 1920. Serial No. 370,406.

To all whom it may concern:

Be it known that I, JOSEPH A. KUENZ, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented a new and useful Radiator Core, of which the following is a specification.

This invention has reference to radiator cores designed particularly for use in connection with radiators of motor vehicles such as automobiles, tractors, flying machines, motor boats, etc.

The object of the invention is to provide a cellular structure of more rigid construction than heretofore, without undue increase in weight and having large air circulating spaces in conjunction with water circulating spaces through which latter the cooling water has free course but in a tortuous path, whereby the water, after passing through the engine and becoming heated is subjected to the action of an ample volume of air to rapidly cool the water, such cooling medium being the one usually employed for explosion engines, although, of course, other cooling mediums may be used.

The walls of the circulating channels for the water are made of thin sheet metal, such as brass or copper, but preferably brass which has the advantage of strength over copper and also has other advantages. The sheet metal is stamped or otherwise formed into shapes which contribute to strength, assemblage and the production of large radiating surfaces.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing in the drawings, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings,

Fig. 1 is a front elevation of a radiator embodying the invention.

Fig. 2 is an elevation of a portion of the core of the radiator shown in Fig. 1 but drawn on a larger scale.

Fig. 3 is an elevation on the scale of Fig. 2 of two elements or units of the radiator core with the units separated to better show their construction.

Fig. 4 is a section on the line 4—4 of Fig. 2.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig 6 is a perspective view of a one-piece core unit with the sides spread apart from the end where the said sides are integrally connected.

In the drawings, there is shown a radiator 1 which may be considered as of customary outline and including upper and lower chambers 2, 3 above and below a core 4 of cellular type. In the particular showing of the drawings, the radiator has side members 5 connecting the top and bottom chambers and with the latter constituting a frame in which the core is lodged and secured in any appropriate way.

The radiator core is made up of an assemblage of numerous substantially identical elements or units joined face to face, and a portion of one of which is best shown in a partially displayed position in Fig. 6.

Each core unit, indicated generally at 6, is preferably made of a relatively long and relatively narrow sheet of strip form as wide as the depth of the radiator from front to rear and twice as long as the core from top to bottom, the strip being folded upon itself intermediate of its length. The intermediate folded portion of the strip closes one end of the unit while the ends of the strip remote from the fold are brought together and joined by soldering, or otherwise, to form a closure for the unit.

The edges of the strip are crimped as shown at 7, such crimping, in the particular showing of the drawing, being semi-hexagonal so that when the edges of the strip are brought together and joined by solder or otherwise, there is formed on each side of the strip a longitudinal row of openings or cells of hexagonal outline leading into the space between the adjacent walls formed by the folded strip. Extending diagonally across the strip between the edges 7 in each wall of the unit are hollow ribs 8 each of a depth somewhat less than the projection of the crimps or corrugations of the edges 7, so that when the edges are brought together and fastened, the space between the walls of the unit is divided into numerous tortuous passages permitting the flow of air

between the walls but with the continuity of flow retarded by the diagonal ribs projecting into the air space. The units are so set that the hexagonal openings are at the front and back of the radiator with the ribs slanting from front to rear, those in one wall of the unit slanting upwardly and those in the other wall of the unit slanting downwardly, so that the ribs cross each other near their outer ends but need not actually touch, whereby air flowing through the radiator core is greatly disturbed by the tortuousness of the paths through which it flows and the air is enabled to very readily absorb a great amount of heat in its flow through the radiator. Such flow is materially prolonged so that the absorbing action of the air in passing through the radiator is correspondingly prolonged and is correspondingly more efficient than where the path of flow of the air is straight through the radiator from front to rear.

The ribs 8 are pressed into the walls of the radiator unit from one face of each wall, so that the opposite wall is flat with numerous elongated hollows in it formed by the obverse of the ribs. In this way, each rib is in relief on one face of the sheet from which the radiator unit is formed and in intaglio on the opposite face.

Such a radiator core unit is particularly strong and rigid, this being due to the cellular form of the edges 7 and also to the ribs 8, whereby each core unit may be made of thin gage metal and yet be resisted to comparatively heavy distorting strains.

The core is made up of enough such units to extend from one side of the radiator to the other, with the units united at their crimped edges throughout the length of the latter. This also very materially enhances the rigidity and strength of the unit.

When two core units, such as shown in Fig. 6, are joined along the edges by nesting the crimped edges into each other and soldering or otherwise fastening them together, the hollow or intaglio portions of the ribs 8 are brought against the plane or flat surface of the adjacent folded sheet or strip with the hollow sides of the ribs of one unit crossing those of the next adjacent unit. The intaglio sides of the ribs cross each other a short distance from the outer ends of said ribs, as best indicated in Fig. 5. In this manner, water from the chamber 2 may find its way by gravity in a tortuous path through the core by way of the channels formed by the crossed intaglio sides of the ribs to the chamber 3. Since the meeting faces of the adjacent units are not united and the units are fastened together only at the edges 7, more or less of the water may trickle down between such meeting faces while flowing in greater volume by way of the channels formed by the crossed intaglio sides of the ribs. In this manner, there is a relatively large surface of water presented to a relatively large volume of air through thin metallic walls of large heat-conducting capacity. This means that the radiator is particularly efficient in rapidly reducing the temperature of the heated water in passing through it.

The units are united only at the edges, and being of thin sheet metal, readily yield or expand in case of freezing of the water, thus avoiding damage to the radiator in freezing weather. The ribs and corrugated edges of the units stiffen the units and also contribute to the resistance of the units to the effects of freezing.

While the shape of the crimps or corrugations 7 of the strips or sheets from which the units are made are so formed that hexagons are produced in the finished units, it is to be understood that any other appropriate shape may be employed for the mouths of the air passages through which the cooling air finds access to the interiors of the units. The hexagon shape is advantageous in permitting close fitting and firm union between the edge portions of the units and providing for hermetic sealing of such edge portions of adjacent units so that no leakage occurs in the water-conducting portions of the core.

While the radiator core is adapted for the gravity flow of water therethrough, the radiator is also adapted for use where forced circulation is employed.

What is claimed is:—

1. A radiator core comprising a plurality of units with each unit composed of an elongated strip of sheet-metal with corrugated or crimped edges and folded intermediately of its length upon itself, the edges nesting in each other and secured together against leakage between them, the folded strip having laterally extended meeting faces with diagonal grooves crosswise of the inner faces between the edges and having ribs in relief on the outer faces, whereby the unit has a continuous zig-zag duct from top to bottom, the core being made up of a plurality of such units and the hollow ribs formed by the grooves in relief being located between the units to restrict the spaces formed thereby, and the united crimped nested edges providing mouths for admitting air between the units in close contact with the walls of the ducts formed by the communicating hollow ribs.

2. In a radiator core, a group of units each formed of a strip of metal bent intermediately upon itself and hermetically joined along the edges which are opposite the bent portion, with those edges towards the front and rear of the radiator pressed in honeycomb form and adapted to nest one in the other, the remainder of the strips between

the edges lying flat against each other, the honeycomb formation providing mouths leading to the interior of the radiator core, and the several units being joined together at their honeycomb edges, whereby the walls of the unit are united together against leakage and the units of the radiator core are united against separation, and water passages formed between adjacent units.

3. A radiator composed of sheet-metal strips with those edges toward the front and rear of the radiator pressed into honey-comb form adapted to nest one in the other and there united against leakage, and the remainder of the strips between the edges lying flat against each other, and provided with outwardly projecting hollow ribs extending diagonally from edge to edge of the unit and crossing and communicating to provide a zig-zag channel throughout the height of the radiator, with the relief side of the ribs of less depth than the nested portions of the edges of the units to provide passages between the units of larger capacity than the passage formed by the associated ribs, and each unit being made fast at the honey-comb mouths to the next unit in order.

4. A radiator core unit comprising an elongated strip of sheet-metal substantially flat throughout the greater portion of its length and width, with the strip folded intermediately upon itself and having the long edges crimped or corrugated, whereby the corrugations may be nested and hermetically closed, and the flat mid-portion of the strip having diagonally arranged hollow ribs with the hollow portions facing each other and crossing and communicating to form a tortuous passage lengthwise of the unit for the flow of water therethrough.

5. A radiator core unit comprising an elongated strip of sheet-metal substantially flat throughout the greater portion of its length and width, with the strip folded intermediately upon itself and having the long edges crimped or corrugated, whereby the corrugations may be nested and hermetically closed, and the flat mid-portion of the strip having diagonally arranged hollow ribs with the hollow portions facing each other and crossing and communicating to form a tortuous passage lengthwise of the unit for the flow of water therethrough, the core being formed of numerous units brought together at the crimped or corrugated edges to provide many air passages leading to the interior of the core between the units.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature.

JOSEPH A. KUENZ.