D McR. LIVINGSTON.

RADIATOR.

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1,239,495.

Patented Sept. 11, 1917.

Fig. 1.

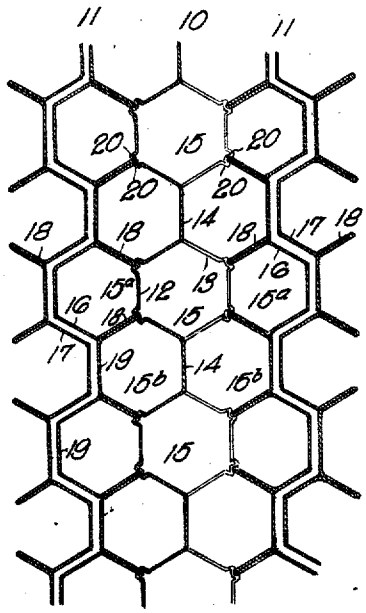
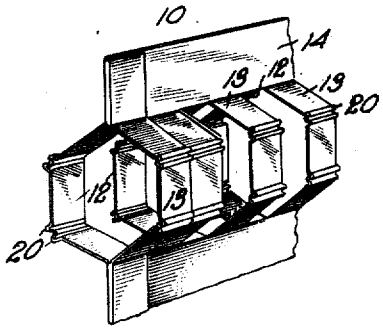


Fig. 2.



WITNESSES

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RADIATOR.

1,239,495. Specification of Letters Patent. Patented Sept. 11, 1917.

Application filed November 17, 1915. Serial No. 61,995.

To all whom it may concern:

Be it known that I, D McRA LIVINGSTON, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Radiator, of which the following is a full, clear, and exact description.

My invention relates to cellular radiators employed on automobiles. More particularly, the invention relates to a type of radiator in which hexagonal air cells are formed jointly by opposite walls of two corrugated water tubes and by an intermediate radiating unit.

The present invention is characterized by an expanded radiating element in which a single plate is expanded at intervals in opposite directions to form parallel hexagonal cells in the radiating element, the respective cells being separated by and alternating with unexpanded members presenting plane zones. When the expanded radiating element is assembled with water tubes, with fins at the salients as hereinafter described, the corrugations and fins of which present alternately three and five sides of a hexagon, said tubes will form jointly with said element, cells at the sides of the expanded cells and in a horizontal row therewith and will form furthermore, with said element, additional cells in horizontal alinement at opposite sides of the plane zones. Among the purposes served by the construction thus briefly characterized, are lightness with strength, an ample radiating surface with a minimum amount of metal, and a facility of assembling the various parts and soldering the same without danger of crushing the walls of the water tubes, as will more clearly appear as the description proceeds.

Reference is to be had to the accompanying drawings forming part of this specification in which similar reference characters indicate corresponding parts in both views.

Figure 1 is a transverse vertical section of a portion of the radiating section of a radiator embodying my invention; and

Fig. 2 is a perspective view of my improved radiating element.

In the illustrated practical embodiment of my invention the numeral 10 indicates my improved radiator element and the numeral 11 designates two water tubes. The improved radiating element is formed from a plate of single thickness and at intervals the same is expanded laterally at opposite sides to produce members 12 and 13, constituting respectively opposite side walls of horizontal cells 15, each member 12 and 13 presenting three sides of a hexagon. The expanded cells 15 thus produced are separated by unexpanded members 14 presenting plane zones running lengthwise with the cells and disposed parallel with each other at the median line of said cells.

The respective walls of the water tubes 11 are indicated generally by the numerals 16, 17, and these have radiating fins 18 formed by folding the material on itself. The said fins 18 are disposed alternately in opposite directions at angles to the horizontal at the salients of the walls 16, 17. Thus, at each depression presented by the corrugated water tube at a side toward the radiating element 10, the depression will present three sides of a hexagon and two adjacent converging fins 18 will form two walls of the said hexagon. The tubes and radiating element are assembled so that the remaining wall of the hexagonal cell will be formed by a side of an expanded cell of the radiating element, the terminals of the fins 18 contacting with a wall of an expanded cell at a side thereof, the fins ranging oblique to the horizontal. There will thus be formed jointly by the water tubes and the radiating element at the sides of the expanded cells 15, cells 15^a. Moreover, there will be formed additional cells 15^b at opposite sides of the unexpanded members 14, and jointly by members of adjacent cells 15, the said unexpanded members 14, and the members of the respective water tubes 11. The cells, 15, 15^a, will aline horizontally with one another and the cells, 15^b, will also aline horizontally with each other. The cells 15^b are separated by the unexpanded members 14 while at the outer sides of said cells 15^b, the opposed walls of the water tubes will present vertical members 19 which are parallel with the said members 14.

A single element 10 between a pair of water tubes, in contacting directly with the fins 18 of the latter, effectively braces the tubes and provides the maximum number of radiating members. A light construction is obtained with the maximum number of cells, there being a horizontal row of three air cells alternating with a horizontal row of two cells. Also, although obtaining a

large number of air cells, an efficient total number of water tubes is employed in a radiator of given size since the lateral projection of the fins 18 is less because of the obliquity of the said fins than would be the lateral projection of horizontally disposed fins.

In practice, I prefer to form on the plate 10, projecting members 20, adjacent to and at each side of the salients presented by the expanded members 12, 13. The said projecting members 20 are produced by pressing the material of the plate outwardly to form, in effect, a V-groove, which receives the terminals of the fins 18 on the respective water tubes 11.

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

1. In a radiator, a radiating element of hexagonal cellular construction formed of a plate of single thickness, expanded at intervals alternately in opposite directions to form opposed walls of parallel cells separated by unexpanded zones of a single thickness, the said plate at the front end being returned on itself, the returned portions following the said unexpanded zones and following the lines at one side of each cell.

2. A radiator, including a pair of water tubes having corrugated walls, and pairs of convergent fins and an intermediate radiating element formed of a single plate expanded at spaced intervals in opposite directions forming opposite walls of a plurality of hexagonal cells alternating with non-cellular members, the said element and the said water tubes and their convergent fins forming hexagonal cells additional to the expanded cells of the radiating element.

3. In a radiator, a pair of water tubes having corrugated walls, and an intermediate radiating element consisting of a plate of single thickness expanded at spaced intervals in opposite directions to form in said element a series of hexagonal cells separated by intervening unexpanded zones, the walls of the said water tubes adjacent to the said radiating element presenting members forming, with the said element, cells at the sides of the expanded cells, and additional cells at the opposite sides of the said zones.

4. In a radiator, a pair of water tubes having corrugated walls, and an intermediate radiating element consisting of a plate of a single thickness expanded at intervals in opposite directions to form in said element a series of hexagonal cells separated by intervening plane unexpanded members, the walls of the water tubes adjacent to the said element presenting members forming, with said element, cells at the side of and in horizontal alinement with the expanded cells, and additional cells at the opposite sides of the said plane members, said additional cells being in horizontal alinement.

5. In a radiator, a pair of water tubes having corrugated walls, and an intermediate radiating element consisting of a plate of single thickness expanded at spaced intervals in opposite directions to form in said plate rows of hexagonal expanded cells separated by members presenting plane unexpanded zones, said tubes forming with the said element hexagonal cells at opposite sides of the expanded cells and in horizontal alinement therewith, and additional cells in horizontal alinement with each other at the opposite sides of the said plane zones, those cells in horizontal alinement presenting vertical outer side wall members and vertical separating members parallel with one another.

6. In a radiator, a pair of water tubes having corrugated walls, and an intermediate radiating element consisting of a plate of single thickness expanded at spaced intervals in opposite directions to form in said plate rows of hexagonal expanded cells separated by members presenting plane unexpanded zones, the angular corrugations of said water tubes presenting at each depression thereof members forming three sides of a hexagon and there being fins on said tubes at each salient of the tubes, said fins at the ends of each depression being convergent, said tubes forming with the said element hexagonal cells at opposite sides of the expanded cells and in horizontal alinement therewith, and additional cells in horizontal alinement with each other at the opposite sides of the said plane zones, those cells in horizontal alinement presenting vertical outer side wall members and vertical separating members parallel with one another.

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

D McRA LIVINGSTON.

Witnesses:
J. L. McAuliffe,
Philip D. Rollhaus.