

J. M. FEDDERS.  
RADIATOR.

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1,296,058.

Patented Mar. 4, 1919.

Fig. 1.

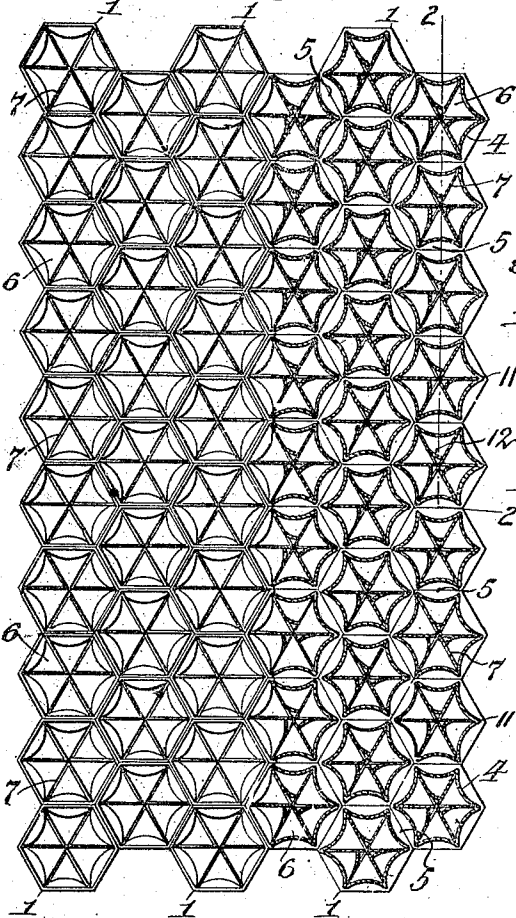


Fig. 2.

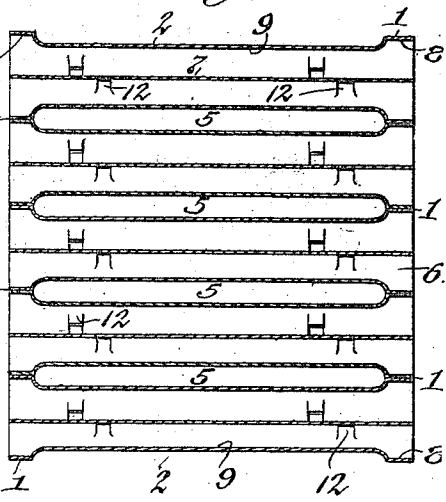


Fig. 3.

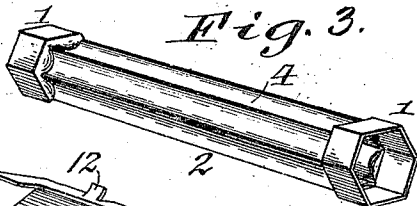


Fig. 5.

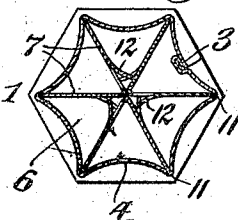


Fig. 6.

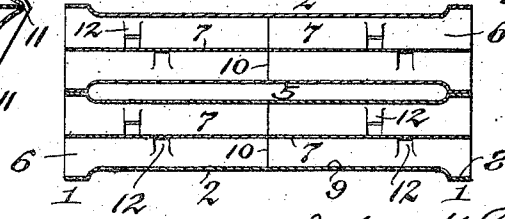


Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## RADIATOR.

1,296,058.

Specification of Letters Patent.

Patented Mar. 4, 1919.

Application filed January 9, 1918. Serial No. 210,995.

*To all whom it may concern:*

Be it known that I, JOHN M. FEDDERS, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Radiators, of which the following is a specification.

This invention relates more particularly to that type of radiators for cooling the water of an automobile gas engine or the like in which the water passages and air conduits are made up by means of a plurality of tubes each of which has an enlargement at its opposite ends while its intermediate part is contracted so that upon assembling a plurality of such tubes side by side, the enlargements at opposite ends of the tubes will engage with each other and practically form heads on opposite sides of the radiator core while the spaces formed between the contracted central parts of these tubes serve as water passages and the conduits formed by the bores of the several tubes serve as air passages for carrying away the heat of the water which is circulated through the water passages.

Heretofore such tubes have been made comparatively small and a large number were usually employed for a given size radiator so that the cost of the same was considerable and practically prohibitive in cases where a low priced radiator was required.

In order to reduce the cost of a radiator of this type this invention proposes to make the tubes of larger diameter so that a smaller number of the same is required for a given size radiator. Such increase in diameter however would permit too free a passage of air through the tubes and not yield the maximum efficiency unless some provision were made for increasing the radiation of heat from the inner side or bore of the tubes.

It is therefore one of the objects of this invention to provide simple, efficient and inexpensive radiating means within the tubes which can be readily and quickly assembled with the tubes and which will effectively dissipate the heat to the atmosphere and still preserve an ornamental appearance of the radiator when viewed from either of its sides.

A further object of this invention is to so construct the tubes as to render them stiff and strong and without appreciably stretching the material but instead so disposing the

same by bending that weakening thereof is avoided.

In the accompanying drawings: Figure 1 is a front elevation, partly in section, of a radiator-core embodying my invention. Fig. 2 is a fragmentary vertical longitudinal section of the same taken on line 2—2, Fig. 1. Fig. 3 is a perspective view of one of the tubes forming part of the body of the radiator core. Fig. 4 is a perspective view of one of the sections of one of the radiating devices within one of the tubes. Fig. 5 is a cross section, on an enlarged scale, of one of the tubes showing a modified construction of the same, and also containing an internal radiating device similar to that shown in Figs. 1 and 2. Fig. 6 is a section similar to Fig. 2, and showing a slight modification in the form of the radiating means within the air tubes or conduits.

Similar characters of reference refer to like parts throughout the several views.

Each of the tubes of which a plurality are employed to make up the body of the radiator core is preferably constructed of sheet metal and is shaped so as to form enlargements 1, 1, at opposite ends of this tube while its intermediate or central part between these large ends is contracted or reduced in diameter, as shown at 2. These tubes may be formed either by drawing sheet metal through dies so that the tubes are seamless, as shown in Fig. 1, or the same may be formed from a sheet metal blank which is bent into the form of a tube and has its longitudinal edges connected by means of a lock seam 3 to complete the tube, as shown in Fig. 5. Such a tubular body, either with or without a seam, is first produced so that the same is of uniform diameter throughout its length and thereafter this tubular body is subjected to the operation of suitable dies or forming mechanism which contracts the intermediate or central part of the body but leaves the end portions thereof uncontracted thereby causing the central part of the tube to be mainly bent to effect such contraction. Inasmuch as the metal from which these tubes are made is exceedingly thin and will not permit of much stretching, the central or intermediate part of the tube is formed into a plurality of longitudinal flutes and the facet 4 of each flute is dished inwardly and preferably curved in a direction circumferentially of the tube. By thus dish-

ing the facets of these flutes inwardly, the surplus metal in the central part of the tube which is obtained by contracting the same is disposed of without appreciably stretching the metal in bringing about this change in the contour of the tube. Although the form of these tubes in cross section may be varied it is preferable to construct the enlargement at the ends thereof of hexagonal form and also to construct the central part thereof of corresponding hexagonal shape, as shown in Figs. 1, 2 and 5. Upon assembling a plurality of such tubes side by side, the facets of the enlargements at opposite ends of the several tubes are fitted against each other, so that these several enlargements together practically form heads on the front and rear sides of the radiator core while the spaces between the adjacent contracted central parts of the several tubes form water passages 5 and the conduits through the bores of the several tubes form air passages 6. In the completed radiator, this core is associated with water inlet and outlet boxes which communicate with the opposite ends of the water passages and the sides of these passages are closed in any suitable manner to prevent leakage.

Within each of the tubes is arranged a radiating device which operates to increase the dissipation of the heat in the water from the bore of the tube to the atmosphere. Although these radiating means may be varied, so far as their details of construction are concerned, the same preferably comprises a plurality of sheet metal sections, preferably three in number, each of which is bent so as to form two longitudinal flanges 7, 7 which are connected with each other at their inner longitudinal edges and arranged in substantially V-shaped form in cross section. Each of the flanges of a radiating section has its outer longitudinal edge provided adjacent to its opposite ends with projecting edge portions 8, 8 and intermediate of said portions with a receding edge portion 9. In assembling these sections with a tube, three of these sections are placed within the tube so that the inner sides of the corners or angles of the several radiating sections engage with each other while the projecting end portions of their flanges engage with the bore of the enlargements of the tube and the receding central edge portions of these flanges engage with the contracted central part of the tube. These sections of the radiating means may be thus introduced into a tube by first pushing two of the sections into place within the tube which can be done freely and then springing the third section into place between the tube and the other sections, and when thus assembled these radiating sections are held against lengthwise displacement in the tube by reason of the projecting end portions of the flanges en-

gaging with the enlargements at opposite ends of the tube.

Instead of springing any of the radiating sections for the purpose of introducing the same into a tube, such introduction of the radiating sections into the tube may be effected by splitting each section transversely about midway of its length, as shown at 10 in Fig. 6, thereby permitting one-half of each radiating section to be introduced into the tube from one end thereof and the other half from the opposite end thereof.

In assembling these radiating sections with the tube, the outer edges of the flanges thereof engage with the inner sides of the corners of the salient parts 11 of the flutes thereof, as shown in Figs. 1 and 5, thereby causing these radiating sections to be retained in a definite position with reference to each tube and insuring a uniform and symmetrical appearance of the radiator when viewed from either of its sides.

Inasmuch as the inner sides of the corners of the radiating sections present a comparatively small contact area with adjacent companion radiating sections, it is desirable to provide means for holding these sections reliably in engagement with each other so that they will not become displaced and therefore preserve the general orderly appearance of the radiator. A simple means for accomplishing this purpose consists in striking out retaining lips or lugs 12 from the radiating flanges adjacent to the corners thereof and bending the same laterally so that the retaining lip of one radiating section engages with a flange of an adjacent radiating section and the several radiating sections thereby mutually support each other so that they remain in a properly centered position within the tube.

After each tube has been thus provided with an internal radiating device, and the several groups have been assembled, the opposite ends of the group of tubes and radiating means are dipped into solder so that the radiating means are secured to the tubes and the tubes are secured to each other, thereby completing the core ready to be assembled with the water headers or boxes, the inclosing casing and other fittings which go to make up a complete radiator.

A radiator thus constructed permits of using tubes of much larger diameter than those heretofore employed in similar types of radiators and also permits of materially reducing the cost without sacrificing efficiency or strength or detracting from the appearance of the radiator.

If at any time a tube of such a radiator should leak, this particular tube can be readily detached from the remaining tubes by unsoldering the same and replacing it after it is repaired or replacing it with a new tube without disturbing any of the

other tubes of the group. If the use of the machine in which the radiator is employed will not permit of interruption long enough to make this repair, the use of the radiator can still be continued by simply plugging the leaky tube at its opposite ends, thereby cutting the same out of use until an opportune time presents itself when such repair can be made to advantage. This ability to continue the use of a radiator even though the same springs a leak, is particularly advantageous in the case of farm tractors which often are used at a considerable distance from a place where repairs can be advantageously effected and a considerable loss would be entailed if the machine and the attendants would be required to suspend operations until such repairs could be made.

I claim as my invention:

1. A radiator core having a tube which is enlarged at its ends and contracted between its ends, and radiating means arranged within said tube and comprising a plurality of V-shaped sections each of which is bent out of a strip of sheet metal to form two flanges which are connected at their inner longitudinal edges to form a corner engag-

ing the corresponding corners of adjacent radiating sections, and which has the outer longitudinal edge of each of its flanges provided with projecting edge portions which engage with the inner sides of the enlarged ends of the tube and an intermediate receding edge portion which engages with the inner side of the contracted part of said tube.

2. A radiator core having a tube which is enlarged at its ends and contracted between its ends, and radiating means arranged within said tube and comprising a plurality of V-shaped sections each of which is bent out of a strip of sheet metal to form two flanges which are connected at their inner longitudinal edges to form a corner engaging the corresponding corners of adjacent radiating sections and which has the outer longitudinal edges of its flanges engaging the bore of said tube, and said radiating sections being provided with retaining lips each of which projects laterally from a flange of one section into engagement with a flange of an adjacent section.

JOHN M. FEDDERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."