

J. M. FEDDERS.

RADIATOR.

APPLICATION FILED OCT. 23, 1917.

1,276,197.

Patented Aug. 20, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

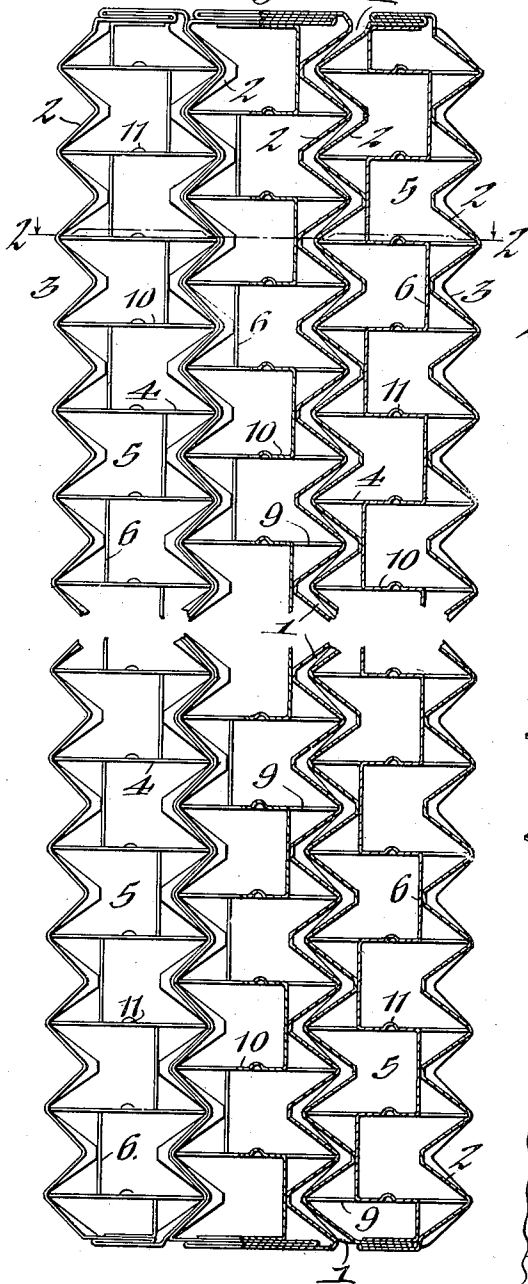


Fig. 2.

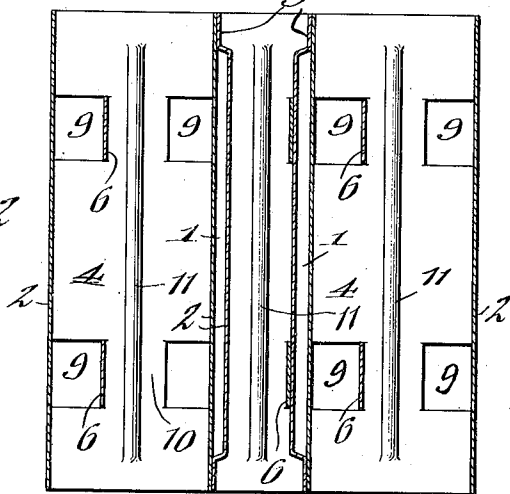


Fig. 3.

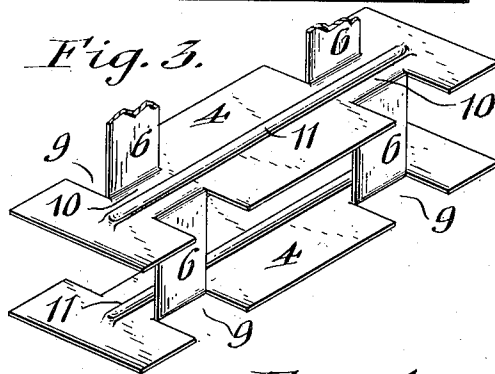
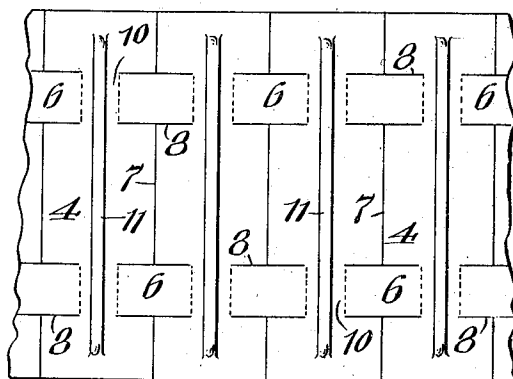


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

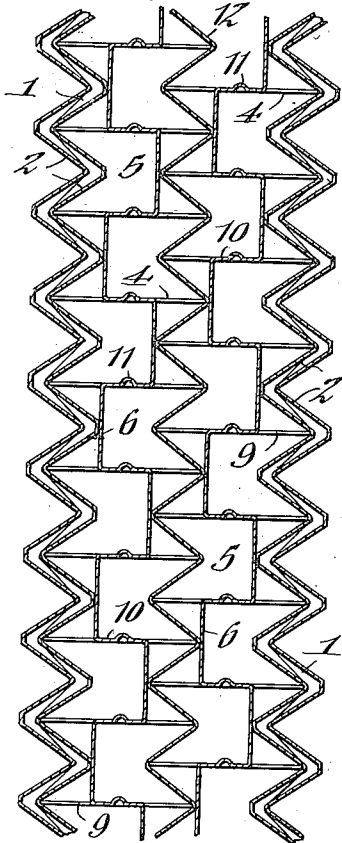
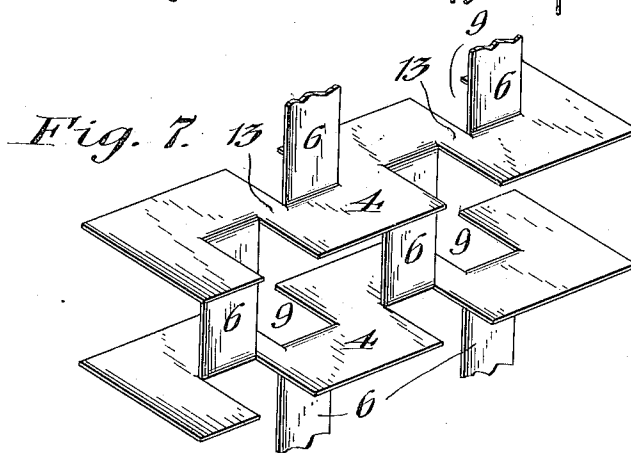
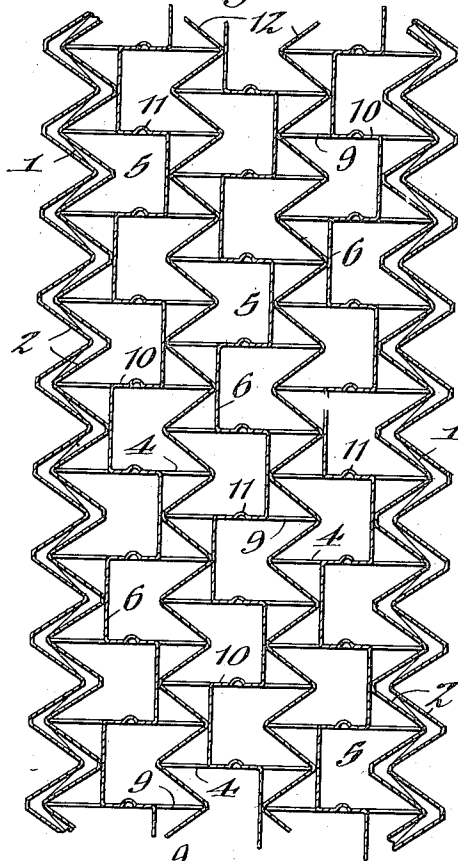


Fig. 6.



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UNITED STATES PATENT OFFICE.

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RADIATOR.

1,276,197.

Specification of Letters Patent.

Patented Aug. 20, 1918.

Application filed October 23, 1917. Serial No. 198,040.

To all whom it may concern:

Be it known that I, JOHN M. FEDDERS, a citizen of the United States, residing at 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 to a radiator of that type in which radiating elements are interposed between adjacent water tubes for the purpose of increasing the transmission or dissipation of the heat in the water to the atmosphere.

It is the object of this invention to produce a radiator of this character in which the radiating members are constructed without any waste metal and no double thickness of metal is employed in its formation, and in which the radiating member is so disposed between two adjacent water tubes that it serves to effectively brace these tubes relatively to each other and materially strengthen the radiator as a whole.

In the accompanying drawings:

Figure 1 is a fragmentary front elevation, partly in section, of a radiator core embodying one form of my improvements. Fig. 2 is a horizontal section taken on the correspondingly numbered line in Fig. 1. Fig. 3 is a fragmentary perspective view of the preferred form of a radiating member containing my invention. Fig. 4 is a plan view of a portion of a blank from which my improved radiating member is constructed. Figs. 5 and 6 are fragmentary vertical sections showing an adaptation of my invention in radiator cores in which one or more radiating fins or spacers are employed between adjacent water tubes. Fig. 7 is a fragmentary perspective view showing a slightly different form of a radiating member from that shown in Figs. 1-3 and constructed in accordance with my invention.

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

Referring to Figs. 1 and 2, 1 represents a plurality of water tubes which are arranged side by side and which are adapted to be connected at their opposite ends with the water circulating system of a gas engine in any suitable manner for the purpose of cooling this water. Each of these water tubes is

preferably constructed of two corrugated strips 2 of sheet metal which are assembled so as to form two parallel side walls, the longitudinal edges of these strips being offset, as shown at 3, and connected by solder. As shown in Fig. 1 the adjacent tubes of the radiator core are so assembled that the valleys on one side of each of these tubes are arranged opposite the valleys of an adjacent tube.

Between every two adjacent water tubes is arranged one of the radiating members which embodies my invention and which in its preferred form is constructed as follows:

4 represents a plurality of transverse radiating plates which are arranged in a longitudinal row in the space between two adjacent water tubes and each of which engages at its opposite side edges with the corresponding valleys or bottoms of two corrugations of a pair of adjacent water tubes, thereby forming together with the walls of the water tubes, a plurality of air passages or conduits 5 through which the air passes from one side of the radiator to the other for reducing the temperature of the water in the tubes. 6 represents a plurality of longitudinal coupling straps which alternate with the transverse plates and each of which is connected at its opposite ends with two adjacent transverse plates. The several transverse plates and coupling straps of the radiating unit are preferably constructed integrally from a single sheet or strip of metal by providing each strip with a plurality of equidistant transverse slits 7, which divide the several plates from each other and a plurality of pairs of longitudinal slits 8 which cross the transverse slits and extend part way into the opposite side edge portions of each plate, as shown in the blank in Fig. 4. In forming the radiating member from a blank of this character the several coupling straps are displaced or bent relatively to the plates so that the straps and plates are at right angles to each other and the plates are arranged parallel in a longitudinal row and the several coupling straps are arranged lengthwise and each one connects two of the radiating plates. In the construction shown in Figs. 1-4 each radiating member is provided with two rows, sets or groups of such

straps which are preferably arranged at a distance from opposite side edges thereof, but if desired the number of sets or rows of such straps may be varied depending upon the width of the radiator for which the radiating member is intended.

When displacing the metal for the side edge portions of the several transverse radiating plates, openings or notches 9 are formed therein which permits of cross circulation of air from one air tube to another, which openings, however, are produced without any special operation inasmuch as they are formed incidentally by the displacement of the metal which forms the straps, thereby avoiding any waste of material for this purpose.

For the purpose of facilitating the manufacture of these radiating members and simplifying the construction of the dies and machinery necessary for this purpose the coupling straps of each group or set are preferably so disposed relatively to each other that each strap which is formed out of one side edge portion of one plate is arranged transversely in line with a strap which is formed out of the opposite side edge portion of the same plate, as shown in Figs. 1-4. In order, however, not to remove all of the metal of a particular plate between a pair of straps projecting in transverse alignment from opposite sides thereof, each of these straps is connected with one of said plates nearer one of the side edges of the latter than the other side edge of the same plate, in other words, the companion straps formed from transversely opposite edge portions of a plate are arranged on opposite sides of the longitudinal center line of this plate so as to leave the solid portion 10 between these straps which forms a neck, whereby the central part and the respective end part of the plate remain integrally connected. By this formation of the coupling straps, a staggered arrangement of the several straps of each group between the several plates is obtained in a direction crosswise of the plates.

It will be noted that each of the straps is formed partly by metal displaced or bent from the side edge of one transverse plate and partly by metal displaced from the side edge of the adjacent transverse plate so that no metal other than that obtained from the flat blank is required for producing the connection between the several transverse radiating plates. Furthermore, no doubling or folding of the metal upon itself occurs in the formation of this radiating member so that no plaits or double thicknesses of metal exist, thereby reducing to a minimum the amount of metal required for producing these radiating members and effecting a corresponding saving in cost of production.

For the purpose of rendering the radiating members less susceptible to distortion while handling the same in assembling them with the corrugated water tubes, it is preferable to stiffen them and this is readily accomplished by providing each of the radiating plates with a stiffening or strengthening rib or bead 11 arranged lengthwise midway of its side edges and having its two opposite ends terminating short of or merging gradually into the body of the respective plate so that these end portions present only a single thickness of metal in appearance.

After the radiating members have been thus assembled with the several tubes, the opposite sides of the core thus formed is dipped part way into a bath of solder for the purpose of connecting the several water tube walls with each other and the end portions of the radiating plates with the water tube walls.

When a plurality of such radiating members are to be interposed in the space between two adjacent water tubes, one or more radiating fins or spacing members 12, preferably of corrugated form, are employed, one between two adjacent radiating members. For instance, in Fig. 5 is shown a construction in which a single corrugated spacing or radiating fin 12 of sheet metal is arranged between two radiating members, each of these radiating members in this particular instance having its transverse plates engaged at side edges with the valleys of the corrugations on one side of the spacing fin while the opposite side edges of the respective transverse plates engage with the opposing valleys of one of the corrugated water tube walls.

In Fig. 6 is shown a construction in which two corrugated spacing or radiating fins 12 are employed in connection with three radiating members and two water tube walls, the central or intermediate radiating member having its transverse plates engaging their opposite side edges with corresponding valleys on the opposing sides of the two spacing fins, while each of the radiating members on one side of the intermediate member has its transverse plates engaging their side edges respectively with the valleys or bottoms of the corrugations of one of the water tubes and the opposing side of one of the spacing fins. In like manner additional radiating fins or spacers may be employed to suit the required width of the finished radiator and the particular service which the same is required to perform.

If desired the alternating straps of each group or row may be arranged in line with each other in a direction crosswise of the radiating plates, but in this case these straps must be staggered or offset from each other in a direction lengthwise of these plates in order to leave an uncut part 13 of the stock

of this plate to form a neck between the central and end parts of this plate which integrally connects the same and preserves the structure, as shown in Fig. 7.

5 It will be apparent from the foregoing that a radiator having a radiating member constructed in accordance with this invention requires a minimum amount of metal in its organization and that all of the metal
10 which is employed is so distributed that it operates with the maximum efficiency.

Furthermore, by arranging the plates 4 transversely between the opposing valleys of adjacent corrugated members a thoroughly
15 bracing effect is obtained between the same which materially strengthens the radiator and permits of considerable pressure to be applied to the radiator in a direction parallel with the radiating plates 4 without in-
20 juring the same. In fact such pressure is desirable in assembling the radiating parts inasmuch as such pressure operates to aid in centering the radiator parts relatively to each other and retain them in place until
25 they are connected by solder on the opposite sides of the radiator core.

Moreover, the employment of but a single thickness of metal in the transverse plates causes the latter to engage at their side edges
30 only by comparatively narrow contact surfaces with the bottoms or valleys of adjacent corrugated members so that when these members are soldered together no unnecessary use of solder occurs from which no
35 benefit is derived, as would take place when soldering together parts which present an unnecessary solder receiving area.

It is therefore possible by means of this improvement to produce a very strong radiator and obtain a maximum radiating service
40 for the amount of metal which is employed and one which can be economically manufactured.

I claim as my invention:

45 1. A sheet metal radiating member having a plurality of transverse plates arranged in a longitudinal row, and a plurality of longitudinal coupling straps alternating with said transverse plates, said straps being
50 connected at their ends with adjacent transverse plates and formed by metal displaced from the latter and said plates projecting in opposite directions from said straps.

55 2. A sheet metal radiating member having a plurality of transverse plates arranged in a longitudinal row, and a plurality of longitudinal coupling straps alternating with said transverse plates, said straps being con-
60 nected at their ends with adjacent transverse plates and formed by metal displaced from the side edges of the latter and said plates projecting in opposite directions from said straps.

65 3. A sheet metal radiating member hav-

ing a plurality of transverse plates arranged in a longitudinal row, and a plurality of longitudinal coupling straps alternating with said transverse plates, each of said
70 straps being formed partly by metal displaced from the side edge of one transverse plate and partly by metal displaced from the side edge of an adjacent transverse plate and said plates projecting in opposite directions
75 from said straps.

4. A sheet metal radiating member having a plurality of transverse plates arranged in a longitudinal row, and a plurality of longitudinal coupling straps alternating with said
80 transverse plates, each of said straps being formed partly by metal displaced from the side edge of one transverse plate and partly by metal displaced from the side edge of an adjacent transverse plate, and the straps be-
85 tween the several transverse plates being staggered relatively to each other in a direction crosswise of the plates.

5. A sheet metal radiating member having a plurality of transverse plates arranged in a longitudinal row, and a plurality of longitudinal coupling straps alternating with said
90 transverse plates, each of said straps being formed partly by metal displaced from the side edge of one transverse plate and partly by metal displaced from the side edge of an adjacent transverse plate and each strap being
95 connected with said plates nearer one of the side edges of the latter than the other side edge of the same.

6. A sheet metal radiating member having a plurality of transverse plates arranged in a longitudinal row, and a plurality of longitudinal coupling straps alternating with said transverse plates, each of said
100 straps being formed partly by metal displaced from the side edge of one transverse plate and partly by metal displaced from the side edge of an adjacent transverse plate and each strap being connected with said plates
105 nearer one of the side edges of the latter than the other side edge of the same and each strap formed out of one side edge portion of one plate being arranged transversely in line with a strap formed out of the oppo-
110 site side edge portion of the same plate.

7. A sheet metal radiating member having a plurality of transverse plates arranged in a longitudinal row, and a plurality of longitudinal coupling straps alternating with said transverse plates, said straps being
120 connected at their ends with adjacent transverse plates and formed by metal displaced from the latter and said plates projecting in opposite directions from said straps and water tubes having corrugated walls, the ex-
125 ternal valleys of which engage with the side edges of said plates.

8. A sheet metal radiating member having a plurality of transverse plates arranged in a longitudinal row, and a plurality of 130

longitudinal coupling straps alternating with said transverse plates, said straps being connected at their ends with adjacent transverse plates and formed by metal displaced 5 from the latter and said plates projecting in opposite directions from said straps, water tubes having corrugated walls the external valleys of some of which engage with some of the side edges of some of said plates, and a corrugated spacing fin engaging the bot- 10 tom of its valleys with other side edges of said plates.

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