J. M. FEDDERS.

RADIATOR.

APPLICATION FILED MAR. 14, 1918.

1,298,192.

Patented Mar. 25, 1919.

Fig. 1.

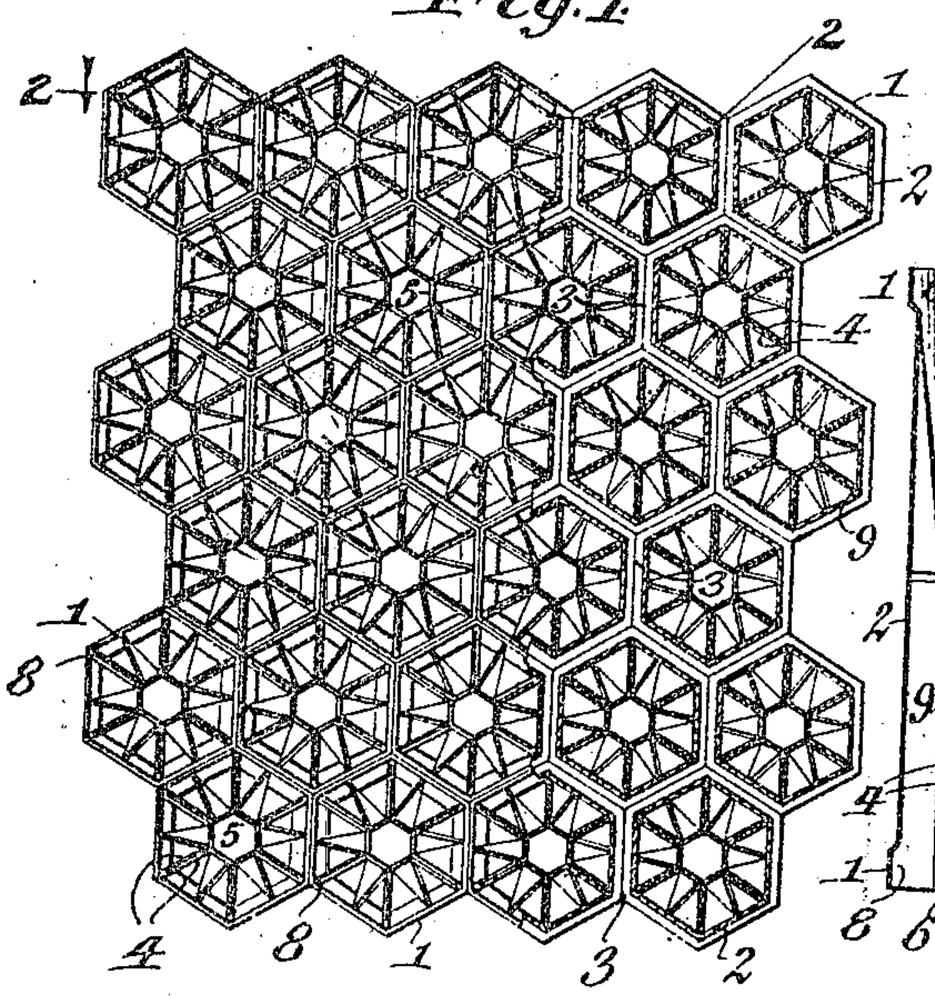


Fig. 2.

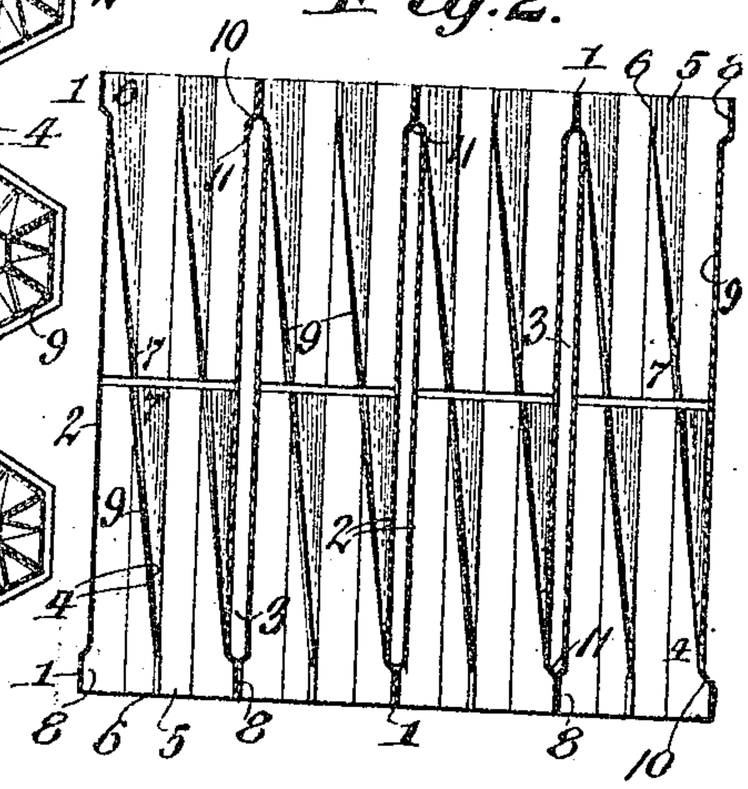
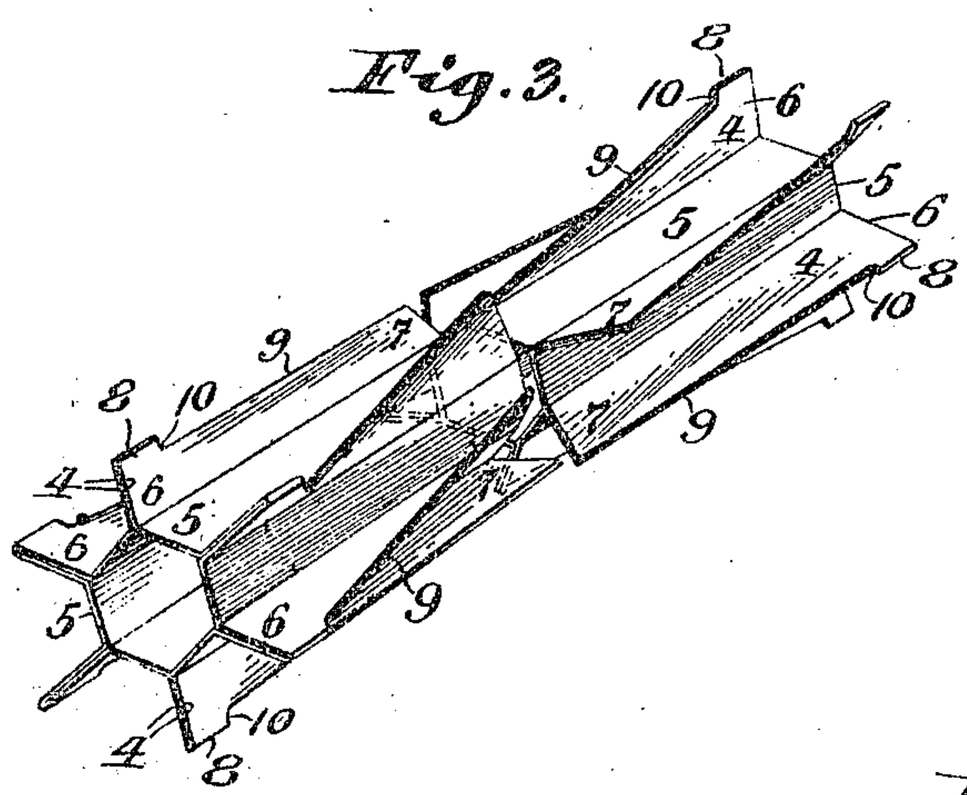


Fig. 3.



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UNITED STATES PATENT OFFICE.

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RADIATOR.

1,298,192. Specification of Letters Patent. Patented Mar. 25, 1919.

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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 to that type of radiators which are used for cooling the water of explosion engines which operate automobiles, although the same may also be used for other purposes, and more particularly to that type of radiators in which a plurality of tubes are arranged side by side forming water passages or conduits between the outer sides of adjacent tubes and air passages through the interiors of these tubes, so that the heat of the water is carried away.

It is the object of this invention to increase the radiating capacity of these tubes by providing the interior of the same with radiating members which can be produced at low cost, are capable of being manufactured and assembled easily and will materially strengthen the radiator and increase its efficiency.

In the accompanying drawings:

Figure 1 is a fragmentary front elevation, partly in section, of the core of the radiator containing one form of my improvements. Fig. 2 is a longitudinal section of the same taken on line 2—2, Fig. 1. Fig. 3 is a perspective view of one of the radiating members which is adapted to be placed in one of the air tubes.

Similar characters of reference indicate corresponding parts throughout the several views.

The core of the radiator in its general organization comprises a plurality of metal tubes each of which is preferably hexagonal in cross section and has its opposite ends 1, 1, enlarged in diameter while the central part 2 thereof intermediate of its ends is reduced in diameter. These tubes when assembled, engage each other on their corresponding enlarged ends so as to form tortuous water conduits or passages 3 between the opposing outer sides of the central parts of these tubes. The water of the gas engine which is to be cooled may be supplied to one end of these conduits and withdrawn from the opposite end thereof in any suitable manner so that the heat in this water is carried away by the air which passes through the inner side of the air tubes.

For the purpose of increasing the radiation of the heat from these tubes to the atmosphere, the interior of each of these tubes is provided with a radiating member which is constructed in accordance with my invention. As shown in the drawings, each of these radiating members is preferably constructed of two sections which are adapted to be inserted into one of the air tubes from opposite ends thereof. Each of these sections is bent or folded from a sheet or strip of metal so as to form an annular row of radiating fins which are arranged circumferentially about the axis of the tube in which the same are mounted. Each of these fins is preferably constructed in the form of a plait, the two plies 4, 4 of which are connected at their outer longitudinal edges while the inner longitudinal edge of each of these plies is connected with the inner longitudinal edge of the ply of an adjacent plait-shaped fin by means of a web 5. These webs are arranged in an annular row around the axis of the air tube and at a distance from this axis so as to form, in effect an auxiliary air tube within the main air tube 1, 2, which receives the radiating member and forms a part of the body of the core. As the air passes through the main air tube, the same is divided by the auxiliary tube and the fins of the radiating member into a plurality of streams each of which engages with the adjacent metal surfaces and operates to carry away the heat of the water from the inner side of the respective air tube.

In order to increase the amount of heat which the air carries away in its passage through the air tube, each of the fins is preferably constructed of substantially spiral form in a direction lengthwise of the air tube. In the preferred form of the radiating member, the outer ends of the fins are retained in a radial position relatively to the axis of the respective air tube so as to present a neat and attractive appearance of the radiator core when viewed from either side but the inner ends of the fins of both radiating sections are bent circumferentially relatively to their outer ends in order to produce a spiral formation of the same. In the preferred construction, the outer ends 6 of the fins of both sections engage with the

corresponding inner corners of the hexagonal enlargements at opposite ends of the respective air tube and the inner end of the fin of each of these sections is bent circumferentially in one direction while the inner 7 of the corresponding fin of the other section is bent circumferentially in the opposite direction, as best shown in Fig. 3. By this means the current of air passing through the spaces between the several fins of the radiating member is split up and given a spiral twist which operates to partly obstruct the passage of the air and retard its passage through the air tube and thus insure the maximum absorption of heat by the air from the hot water before escaping from the air tube.

The outer end of each fin of each radiating section is preferably provided with a laterally-projecting portion 8 which is adapted to engage with the enlargement of one end of the air tube while the inner portion 9 of each fin ha its outer longitudinal edge retracted so as to permit the same to engage with the contracted intermediate part of the respective air tube and also form an inwardly projecting shoulder 10 between the projecting outer end portion 8 and the retracted inner portion 9 of this edge, which is adapted to engage with the outwardly-facing shoulder 11 formed in the bore of the air tube between the enlarged end and the contracted central part thereof, as clearly shown in Figs. 2 and 3. The radiating member is constructed of two practically non-contractible sections which are introduced into the respective air tube from opposite sides thereof and this inward movement is limited by the engagement of the shoulders of these sections with the shoulder of the tube so that the outer ends of these tubes are flush with the opposite ends of the respective air tube.

After the several tubes and radiating sections have been thus assembled, the opposite sides of the core are successively dipped in a bath of solder so as to connect the enlarged ends of the several tubes with each other and form a water-tight joint therebetween which will prevent the leakage of water from the tortuous conduits and at the same time the sections of the radiating members are connected with the air tubes so as to prevent these members from becoming displaced.

Owing to the simplicity of the construction of this radiating member and the ease with which the same can be assembled with the air tube, it is possible to produce the same economically and expeditiously by the use of comparatively unskilled help and owing to the large radiating surface which is provided the efficiency of the radiator is greatly increased. Owing to the radiating members being practically rigid and non-contractible, the strength of the radiator is increased so as to enable the same to withstand greater shocks when in use.

I claim as my invention:

1. A radiator comprising a plurality of tubes which are arranged side by side and each of which has enlarged ends and a contracted central part, and a non-contractible radiating member arranged in each of said tubes and comprising two sections which are introduced into said tube from opposite ends thereof and each of which is provided at its outer end with an enlargement which engages with the respective enlarged end of the tube.

2. A radiator comprising a plurality of tubes which are arranged side by side and each of which has enlarged ends and a contracted central part, and a non-contractible radiating member arranged in each of said tubes and comprising two sections which are introduced into said tube from opposite ends thereof and each of which is provided at its outer end with an enlargement which engages with the respective enlarged end of the tube, and comprises a plurality of spiral fins arranged in an annular row about the axis of said tube.

3. A radiator comprising a plurality of tubes which are arranged side by side and each of which has enlarged ends and a contracted central part, and a non-contractible radiating member arranged in each of said tubes and comprising two sections which are introduced into said tube from opposite ends thereof and each of which is provided at its outer end with an enlargement which engages with the respective enlarged end of the tube, and comprises a plurality of spiral fins arranged in an annular row about the axis of said tube and each fin being constructed in the form of a plait which has its plies connected at their outer longitudinal edges while their inner longitudinal edges are connected with the corresponding edges of plies of adjacent fins.

JOHN M. FEDDERS.