

Dec. 26, 1933.

J. KARMAZIN

1,940,804

RADIATOR

Filed April 9, 1930

2 Sheets-Sheet 1

Fig. 1.

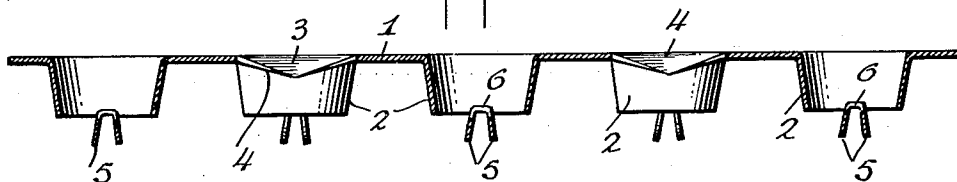


Fig. 2.

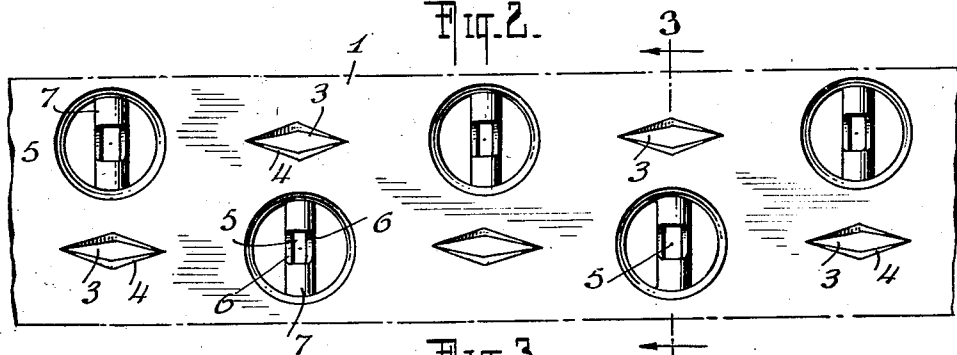


Fig. 3.

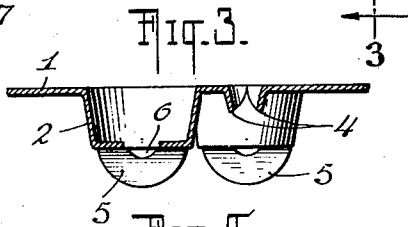
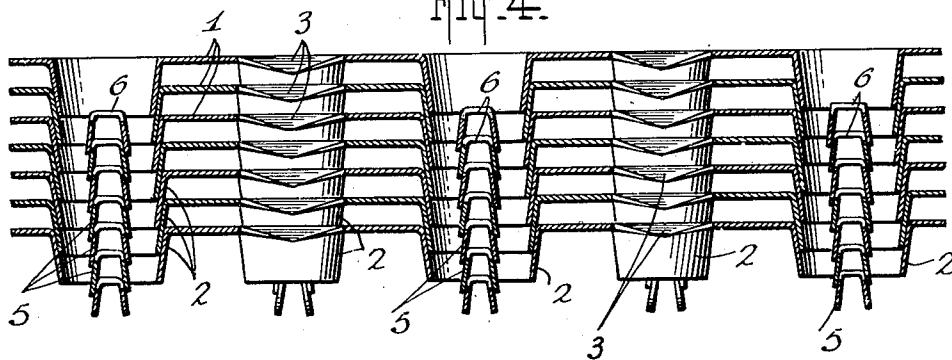


Fig. 4.



INVENTOR
JOHN KARMAZIN
BY *Hammond & Little*
ATTORNEYS

Dec. 26, 1933.

J. KARMAZIN

1,940,804

RADIATOR

Filed April 9, 1930

2 Sheets-Sheet 2

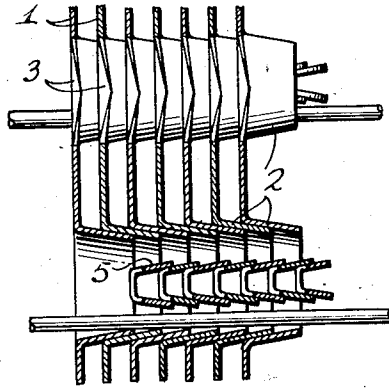


Fig. 5.

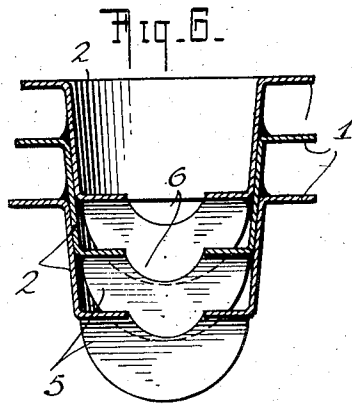


Fig. 6.

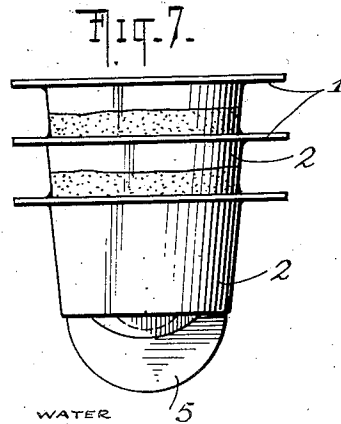


Fig. 7.

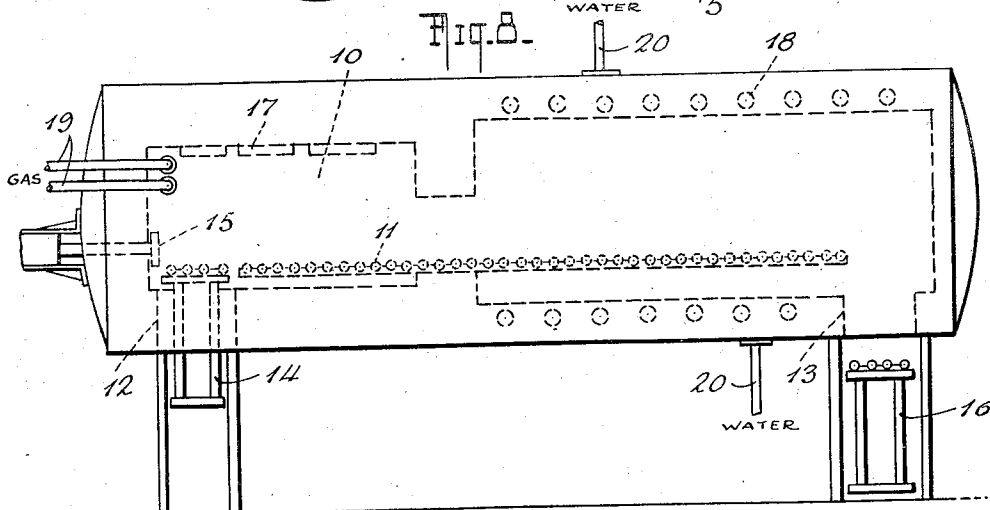


Fig. 8.

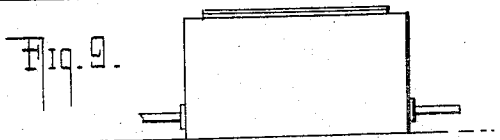


Fig. 9.

INVENTOR
JOHN KARMAZIN
BY *Hammond & Little*
ATTORNEYS

UNITED STATES PATENT OFFICE

1,940,804

RADIATOR

John Karmazin, Detroit, Mich., assignor to
Karmazin Engineering Company, Detroit,
Mich., a corporation of Michigan

Application April 9, 1930. Serial No. 442,728

9 Claims. (Cl. 257—129)

The present invention relates to improvements in heat radiators and has for an object to provide an improved radiator.

The invention has been developed more particularly in connection with the production of a heat radiator of sheet steel designed especially for use on motor vehicles and for convenience of description such an embodiment of the invention will be more particularly described.

Heretofore it has been usual practice to make radiators of this type of brass and copper because of the high conductivity of these materials and the difficulties in manufacture of sheet steel radiators. In the development of the radiator provided by the present invention it has been discovered that if the thickness of the material is of the order of 1/100 of an inch or less the effect of the relatively lower conductivity of sheet steel is substantially negligible. Furthermore, the efficiency of the tubes in conducting heat from the cooling liquid can be increased by heat conducting elements integral with the tubes and suitably arranged therein and the invention provides a particularly effective arrangement of such heat conducting elements.

The nature and objects of the invention will be better understood from a description of an illustrative embodiment thereof, for the purposes of which description reference should be had to the accompanying drawings forming a part hereof and in which—

Figure 1 is a sectional view of a portion of a radiator element embodying the invention taken longitudinally of Fig. 2,

Fig. 2 is a plan view of the same,

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2,

Fig. 4 is a sectional view showing several similar radiator elements in assembled relation,

Fig. 5 is a sectional view indicating the horizontal position of the tubes during the brazing of the joints,

Fig. 6 is a sectional view indicating the manner in which the copper spelter takes effect at the joints of the tubes,

Fig. 7 is a view showing the spelter on the outside of the tube,

Fig. 8 is a diagrammatic view of an apparatus used in brazing the radiators, and

Fig. 9 is a diagrammatic view of a galvanizing bath.

The radiator shown for the purposes of illustration is formed of a plurality of similar strips or plates 1 of sheet steel stamped to provide tubular projections 2 which taper slightly to

facilitate assembly in telescoping relation. The assembled strips are thus interlocked in self-sustaining relation to form continuous tubes which in the finished radiator constitute water tubes. Each strip may be provided with openings 3, the edges of which are bent out of the plane of the strip as indicated at 4 to increase the eddying effect of the air currents passing through the radiator and thereby to increase the heat transmitting efficiency.

The tubular projections may effectively be arranged in a plurality of rows and preferably the projections in one row are staggered relative to those in the adjacent row or rows. As shown, the openings 3 with their bent edges 4 alternate with the tubular projections both laterally and longitudinally of the strip. The free ends of the tubular projections, the lower ends as shown in the drawings, are preferably formed with integral transverse heat conducting elements 5 which in the assembled units extend transversely within the continuous tubes. These transverse members may conveniently be formed by a stamping and bending operation in which the end portions of the tubular members are cut to form two side wings with end portions integral with the tubular projections, the side wings being bent to nearly parallel relation as indicated in Fig. 4. As shown, the wings are formed by severing what may be considered the flat bottom portion of the tubular projections along the lines which unite them with the side walls of said projections around their edges except at two diametrically opposite points by a stamping operation.

These transverse members are similarly positioned in successive strips and each is of a width to project beyond the ends of the tubular projections a distance greater than the distance between successive strips. When the strips are assembled with the tubular members telescoped to form continuous tubes, the side wings of the transverse members are also in overlapped and preferably contacting relation thus forming two substantially continuous partitions extending longitudinally of the tubes.

The transverse members are preferably centrally apertured as indicated at 6, whereby the two partitions form, in effect, a secondary tube or passageway longitudinally within each of the continuous tubes of the finished radiator. There is thus a circulation of water between the two partitions thereby to improve the heat conducting efficiency thereof. The apertures 6 can be formed by the stamping operations above noted.

In the assembled structure, as shown in Fig. 4, 110

the telescoping tubular projections form continuous tubes for circulation of the cooling liquid having integral fin members which are engaged by the cooling air currents. The heat is conducted from the water to the fins both by the tube walls and by the central partitions which transmit heat from the water in the center of the tubes. The cooling air engages both the tube walls directly and the fins integral therewith.

When the fin and tube elements are assembled, the joints between the successive tubular projections are sealed by a brazing operation. It has been found that the joints can be effectively sealed by a copper spelter, if the assembled elements with the spelter are heated to a suitable temperature. In practice the brazing material may be introduced into each tube in the form of a rod, wire, or a sheet bent to conform more or less to the contour of the tube and the assembled unit while so positioned that the continuous tubes are horizontal may be heated to a temperature such that the brazing material will fuse and will by capillary attraction flow along and completely seal the joints. The brazing material may be of any suitable composition, such, for example, as pure copper or if a lower melting temperature is desired a spelter consisting of 90% copper and 10% tin. The heating of the units to braze the joints preferably is performed in a hydrogen atmosphere which prepares the surfaces of the sheet steel for the brazing operation and prevents the formation of copper oxides to interfere with the brazing process. As indicated diagrammatically in Fig. 8, the units are placed in a horizontal oven 10 and carried along therein by a suitable conveyor 11 through a hot zone, where the copper is fused, to a cooler zone, where the temperature is sufficiently reduced but in which the hydrogen atmosphere is maintained to prevent oxidation of the copper. As shown, the apparatus is provided with an entrance door 12 for the introduction of the units and an exit door 13 for the removal of the finished units. Both doors are at the bottom of the cylindrical furnace whereby the opening of one door for the introduction of a fresh unit or the removal of a finished unit can be accomplished without substantial escape of hydrogen gas. The units are moved upwardly through the entrance door by an elevator 14 and pushed forward by a plunger 15 to the conveyor by which they are carried along the interior of the oven, and they are removed by a second elevator 16 at the exit door. Suitable electric heating units are indicated diagrammatically at 17 and cooling coils at 18. Ordinarily, effective brazing can be accomplished without rotating the units to distribute the fused copper along the joints, the capillary attraction being sufficient to cause the necessary flow of the copper to seal the joints. If desired spelter may be so positioned with the tubes that the partition forming wings will be brazed together to add rigidity and perhaps improve the heat conduction of the partitions.

The units as brazed are preferably further treated to avoid corrosion of the steel and to provide a more attractive appearance. In Fig. 9 is indicated diagrammatically a galvanizing bath in which the units are coated with corrosion resisting metal. The composition of metal preferred is 95% lead and 5% tin.

The foregoing particular description is illustrative merely and is not intended as defining the limits of the invention.

I claim:—

1. A radiator comprising strips affording fin elements with tubular projections punched therefrom assembled with the tubular projections of successive strips telescoping to form continuous tubes, each tubular projection having at its end a transverse member having wings of a width lengthwise of the tube such that the members of successive tubular projections overlap and form a substantially continuous wall across the tube.

2. A radiator comprising strips affording fin elements with tubular projections punched therefrom assembled with the tubular projections of successive strips telescoping to form continuous tubes each tubular projection having at its end a heat conducting transverse member presenting generally parallel side wings with an aperture therebetween, the side wings being of a width to form substantially continuous partition walls within the tube whereby a secondary tube is formed within each continuous tube.

3. A radiator comprising integral fin and tube elements united to form continuous tubes and each element having an integral wall section, said sections cooperating to form a substantially continuous heat conducting partition within a tube.

4. A radiator as defined in claim 3 in which the wall sections are secured together.

5. A radiator comprising fin elements with projections punched therefrom, the outer ends of said projections having perforated semi-circular vanes attached to the projections at diametrically opposite points, the plane of the perforation being transverse to the flow of liquid through the projections and the plane of the vanes being parallel to the liquid course, said vanes being thin and not materially impeding the flow.

6. A radiator comprising a fin element having projections stamped therefrom, the outer ends of said projections carrying semi-circular vanes projecting therefrom and said vanes having portions uniting the ends of the vanes to the interior of the projections at diametrically opposite points, the portion of the outer end of said projections intermediate said vanes being perforated to form a central water course.

7. A radiator comprising water tubes having within each tube and integral with the tube wall a heat conducting partition extending longitudinally of the tube, said partition having a plurality of centrally apertured wings to aid heat transfer without material increase of resistance to flow of liquid through said tube.

8. A radiator comprising water tubes having within each tube and integral with the tube wall a transverse member and a pair of spaced heat conducting partitions extending longitudinally of the tube integral with the transverse member, said transverse member being centrally apertured to reduce resistance to flow of water through said tubes.

9. A radiator comprising strips affording fin elements with tubular projections punched therefrom assembled with the tubular projections of successive strips telescoping to form continuous tubes, each tubular projection having at its end a transverse wing member forming a heat conducting element, said members being centrally apertured to reduce the obstruction to flow through the tubes, said heat conducting element extending integrally throughout the mid-portion of the tubular projection and in heat radiating relation to the tubular projection.

JOHN KARMAZIN.