April 8, 1924. 1,489,529

E. HEY

RADIATOR WITH REMOVABLE SECTIONS

Filed Dec. 30, 1920 2 Sheets-Sheet 1

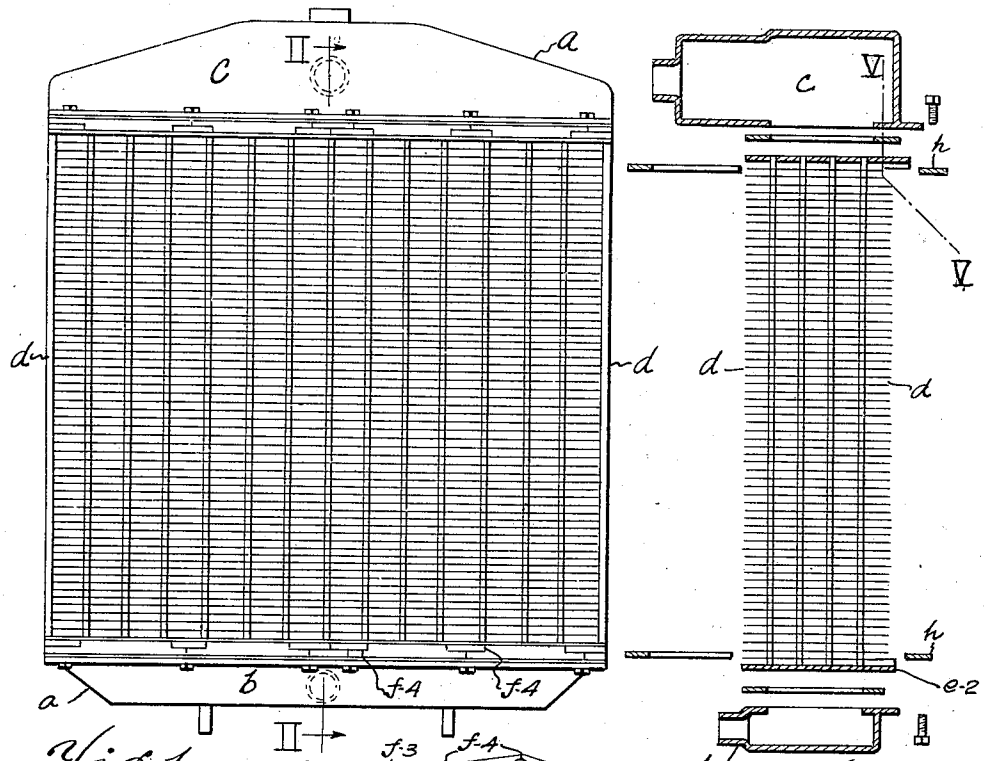


Fig. 1

Fig. 2

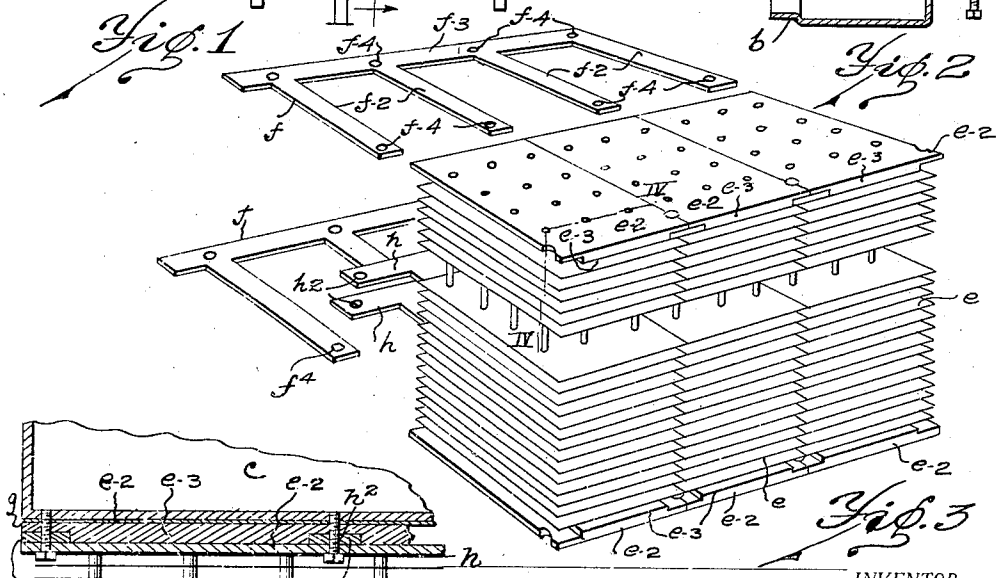


Fig. 3

Fig. 4

INVENTOR.
ERNEST HEY

BY

Ridgemond A. Parker
ATTORNEY.

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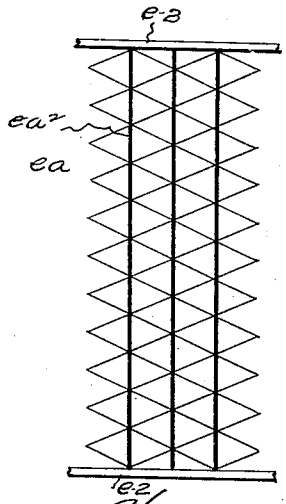


Fig. 9

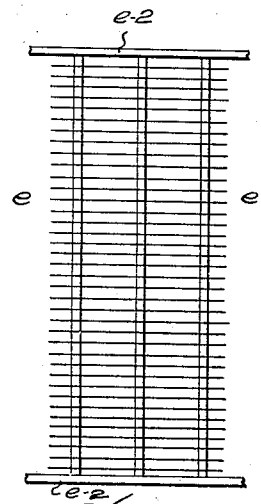


Fig. 6

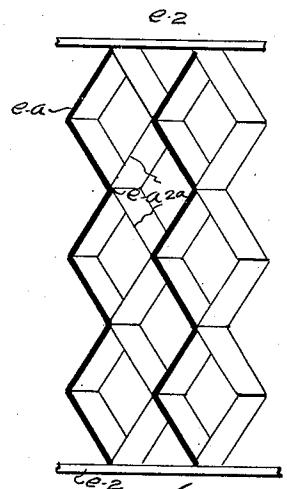


Fig. 12

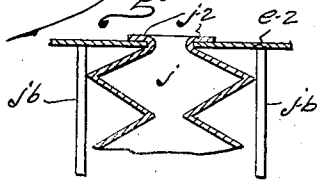


Fig. 10

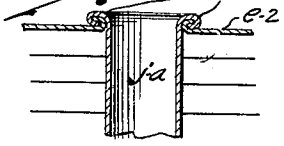


Fig. 7

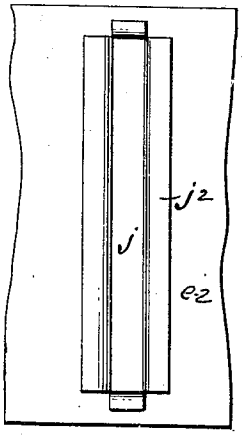


Fig. 11

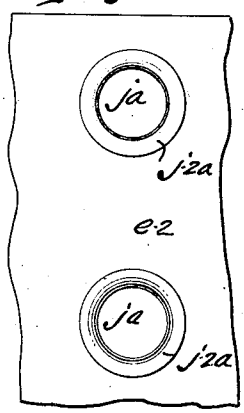


Fig. 8

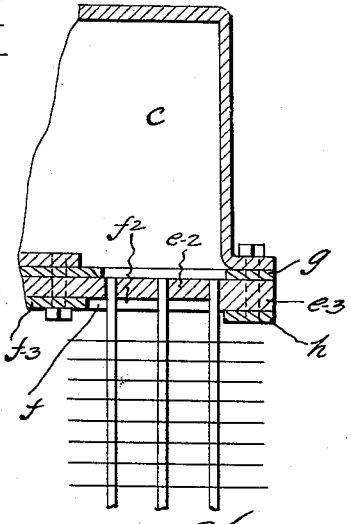


Fig. 5

INVENTOR.

ERNEST HEY

BY

Ralzemond A. Parker

ATTORNEY.

Patented Apr. 8, 1924. 1,489,529

UNITED STATES PATENT OFFICE.

ERNEST HEY, OF DETROIT, MICHIGAN, ASSIGNOR TO EDWARD T. CURRAN, OF DETROIT, MICHIGAN.

RADIATOR WITH REMOVABLE SECTIONS.

Application filed December 30, 1920. Serial No. 434,048.

To all whom it may concern:

Be it known that I, ERNEST HEY, citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Radiators with Removable Sections, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings which form a part of this specification.

My invention relates to radiators and objects of my improvements are to provide an improved radiator for dissipating the heat of cooling water of internal combustion engines and one which may be easily repaired by removing and replacing a part.

I accomplish these objects in the apparatus illustrated in the accompanying drawings, in which:—

Figure 1 is a front elevation of a radiator embodying my invention.

Fig. 2 is a cross-section thereof on the line II—II of Fig. 1, the parts being disassembled to illustrate the construction.

Fig. 3 is a perspective view on a larger scale of some of the constituent parts of the apparatus shown in Fig. 1.

Fig. 4 is a detailed sectional view of part of the assembled radiator, a section being taken in the plane indicated by the line IV—IV—IV, Fig. 3.

Fig. 5 is a detailed section in the plane indicated by the line V—V, Fig. 2.

Fig. 6 is a separate view of one element of the core, or cooling surface.

Fig. 7 is a detailed sectional view showing the method of attaching the water tube to the crown sheet or plane end surface of the cooling elements.

Fig. 8 is a plan view of a part of said sheet showing two cooling tubes.

Fig. 9 shows a modified construction of the cooling element.

Figs. 10 and 11 are respectively sectional elevations of a passage in another form of cooling element and a plan of said element and a part of the adjacent crown sheet.

Fig 12 is a modified form of construction of an element of the cooling surface.

a indicates the radiator as a whole, having the lower reservoir *b* and the upper reservoir *c* with the core *d d* interposed between the two reservoirs and consisting of a plurality of elements *e* e^2. Each of these elements consists of crown sheets e^2 e^2, one at each end, with water passages extending between and through said sheets, with means for dissipating the heat between said crown sheets. The adjacent crown sheets e^2 e^2 of adjacent elements are provided with tongues and grooves forming a dowel construction as illustrated in Fig. 3.

f indicates a holding strip of metal having the parts or strips f^2 extending parallel to each other and transversely of the radiator and the part f^3 extending along the back of the radiator. A holding strip *f* is secured to the lower surface of the upper reservoir *c* and to the upper surface of the lower reservoir *b* by bolts passing through the holes f^4 in the part f^3 of said holding strip. The ends of the parallel parts or strips f^2 which are remote from the part f^3 are provided with bolt holes f^4.

There is a soft metal washer *g* lying against the under surface of the reservoir *c* and the upper surface of the lower reservoir *b* between the holding strips *f* and said surface.

The crown sheet or end plates e^2 of each of the sections of the cooling surface extends beyond the cooling tubes and fins to present projecting portions. These projecting portions of said plates engage over the strips f^2 at the top and under said strips at the bottom.

The ends of the strips f^2 extend beyond the cooling surface proper and engage under the forwardly projecting part of the end plates of the cooling section. e^3 indicates filling strips between the ends of the strips f^2 on the surface of the end plates e^2 at the top and the upper surface at the bottom.

h h are metal securing strips one of which extends across the front of the radiator under the projecting portions of the top plates of the elements and is provided with bolt holes h^2 through which bolts are passed to secure the parts together thus binding the whole to the reservoir *c* and clamping the top plates e^2 and the ends of the strips f^2 between said plate and the reservoir *c*. The construction is the same at the lower end of the reservoir.

In Figs. 1, 2 and 3 I have illustrated the usual tube and fin form of cooling surface

such as shown separately in Fig. 6. These tubes may be turned over the crown sheet or end plates e^2 and beaded at their edges as indicated at j^{2a} and j^a in Figs. 7 and 8.

In Fig. 9 I have illustrated a zig-zag water passage which when a number are assembled to constitute the element, form diamond-shaped passages at the end. ea^2 are plates which form girders, braces, or strengthening pieces in conjunction with the water passages *ea*. These pass preferably by and are secured to the upper and lower corners of the diamond-shaped figure formed by the united passages. In Fig. 12 I have shown substantially the same construction except that instead of the vertical plates ea^2 I have substituted flat plates to form the side of the diamond figure as indicates ea^{2a}.

In Figs. 10 and 11 I have shown another form of tube or water passage having alternate enlargements and contractions and this is supplemented by straight binding plates j^b j^b.

The strengthening plates ea^2, ea^{2a} and j^b not only perform their function as a strengthening means to form a rigid element but they also form surfaces which absorb the radiant heat from the tubes having the water and dissipate the same to the air passing through the radiator.

If one of the sections becomes injured the bolts passing through the strips *h* may be removed and the strips taken off and the section drawn out in front of the radiator and a similar section inserted and the whole bound together as before.

Claims:

1. In an apparatus of the kind described, the combination of a reservoir having a flat inner surface, a core consisting of a plurality of separate constituent sections each of said sections having an end plate projecting laterally therefrom, said end plate being adapted to engage against said surface of said reservoir, and flat strips engaging over the projecting portion of said end plates and binding them to the inner surface of said reservoir.

2. In an apparatus of the kind described, the combination of a reservoir having a flat inner surface, a core consisting of a plurality of separate constituent sections, each of said sections having an end plate adapted to engage against said surface of said reservoir, means for locking adjacent end plates together, and means for securing said end plates to said reservoir to form a tight joint between said end plates and said reservoir, said end plates when in position having their separating lines running transversely of the radiator, a plate *f* having strips f^2 extending therefrom, said plate being adapted to extend with its part longitudinally of the radiator along one edge of said radiator, the strips f^2 extending over the transverse dividing lines between said end plates, and means for securing said reservoir and end plates together to form a tight joint, substantially as and for the purpose described.

3. In an apparatus of the kind described, the combination of a reservoir having a flat inner surface, a core consisting of separate constituent sections, said sections being provided with end plates having laterally extending portions, strips *f* extending transversely of said reservoir and engaging against projecting portions of said end plates to bind them to said surface, and a flat strip *h* extending longitudinally of said reservoir and engaging projecting portions of said end plates to bind them to said surface.

4. In an apparatus of the kind described, the combination of a reservoir having a flat inner surface, a core consisting of separate constituent sections, said sections being provided with end plates having laterally extending portions, strips *f* extending transversely of said reservoir and engaging against projecting portions of said end plates to bind them to said surface, and a flat strip *h* extending longitudinally of said reservoir and engaging projecting portions of said end plates to bind them to said surface, said end plates being grooved transversely and said strips fitting into said transverse grooves.

In testimony whereof, I sign this specification.

ERNEST HEY.