

Jan. 18, 1938.

F. L. FOSTER

2,106,091

RADIATOR

Filed Oct. 26, 1935

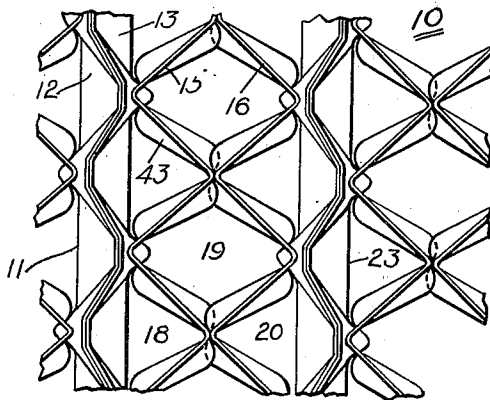


FIG. 1

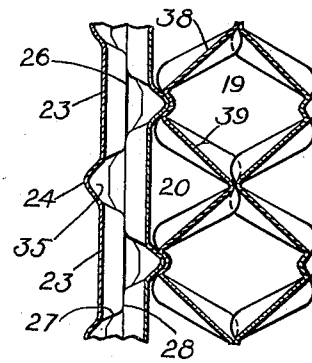


FIG. 2

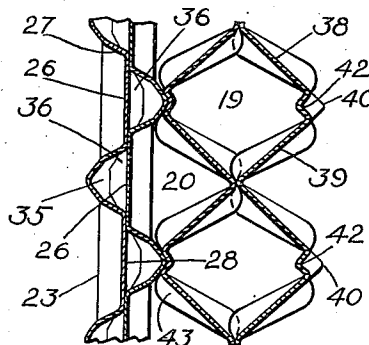


FIG. 3

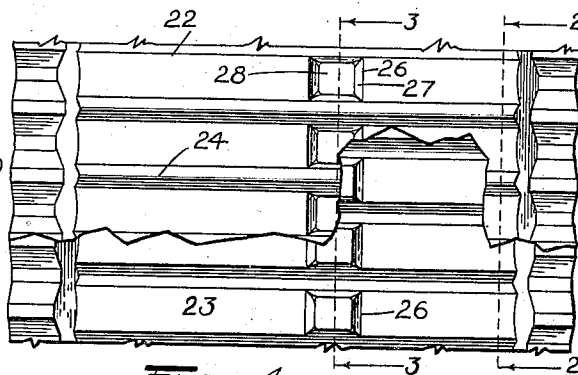


FIG. 4

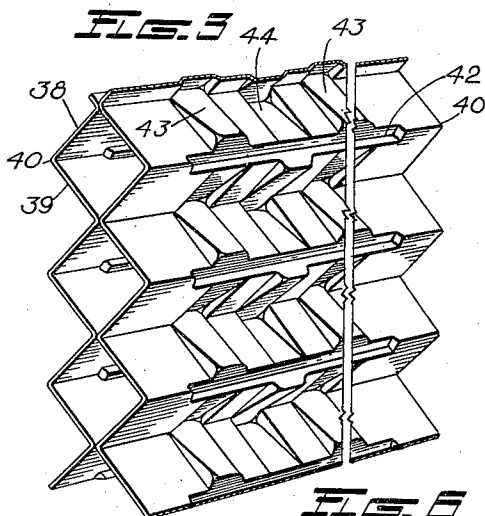


FIG. 5

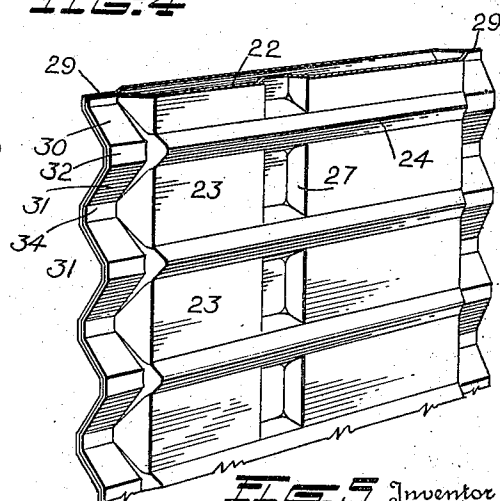


FIG. 6

Inventor
Fred L. Foster

334

Richmond H. Hayes
His Attorney

UNITED STATES PATENT OFFICE

2,106,091

RADIATOR

Fred L. Foster, Jamestown, N. Y., assignor to
Jamestown Metal Equipment Company, Inc.,
Jamestown, N. Y., a corporation of New York

Application October 26, 1935, Serial No. 46,920

3 Claims. (Cl. 257—130)

This invention relates to an improvement in cooling systems for motor vehicles, and particularly to radiators of the cellular type in which vertical water conduits and horizontal air conduits are provided.

The present invention is primarily directed to the purpose of increasing the cooling efficiency of a radiator core and decreasing the cost of manufacture thereof by improvements in water conduit strips, and improvements in the arrangement of seating adjacent separator and water conduit strips.

Prior to this invention, developments have occurred in radiator construction which tended to increase the efficiency of a core and reduce the size thereof, thus decreasing the cost of manufacture. It has been found, however, that mere reduction in size without loss of cooling efficiency is not enough, and that further reduction in cost of manufacture must be accomplished in order to meet the price requirements of automobile manufacturers that are confronted with the continual problem of improving and adding to the equipment of each motor vehicle without increasing the price thereof, and in some instances, reducing the price.

The principal objects and advantages of the present invention are considered to be the provision of straight water conduits; laterally directed horizontal ribs in the walls of each conduit which project into and are engaged with corresponding recesses or indentures of the separator strips; soldered connection between the interengaged surfaces of the strips of the water conduits and air conduits for the purpose of increasing integral contact; increased turbulence in the flow of water through the water conduits by reason of the outwardly directed ribs in the walls thereof; the provision of intermediate support between margins of the walls of each water conduit and the abutment of the elements of this support; and also provision of water connection between the front and rear portions of the conduit. These and other objects and advantages of the invention will be more fully understood from a consideration of the following specification taken in conjunction with the accompanying drawing and in which

Fig. 1 is an enlarged fragmentary end view of a core embodying one modification of this invention;

Fig. 2 is a vertical sectional view of the walls of a water conduit and adjacent separator strips, being taken substantially on the line 2—2 of Fig. 4;

Fig. 3 is a vertical sectional view of water and air conduit strips, being taken substantially on the line 3—3 of Fig. 4;

Fig. 4 is a side elevation of a water conduit, part of one wall being broken away to show the other wall thereof;

Fig. 5 is a perspective view of the water conduit strips; and

Fig. 6 is a perspective view of a pair of inter-fitted separator strips.

Referring to the drawing, the reference numeral 10 is employed to designate a part of a radiator core assembly embodying one form of the invention. The core is comprised of vertical water conduits 11 formed by pairs of reversely disposed interfitting strips 12 and 13. Between adjacent water conduits, separator strips 15 and 16 are located. These strips in conjunction with the adjacent walls of adjacent water conduits form horizontal air conduits, the vertical rows of which are designated as 18, 19, and 20.

The strips 12 and 13, which go to make up a water conduit, are preferably identical, being assembled in opposed relationship. One only of these strips, therefore, will be described in detail. Each strip, as shown in the drawing, necessarily, is formed from ribbon stock and for purposes of explanation is considered to be wall 22. This wall is broken up into lesser walls or segments 23 throughout the length of the strip by a plurality of uniformly spaced horizontal ribs 24. The ribs 24 are directed outwardly of each of the strips 12 and 13, rather than inwardly, in order to avoid direct impendance of the water passage. Near or at the vertical center of each strip a vertical row of ledges 26 is provided. Each ledge projects inwardly of the strip, being formed by side walls 27 which terminate in a flat face 28. In the present modification one projection or ledge 26 is formed in each of the segments 23 and extends from one rib 24 to the next.

The front and rear margins 29 of the strips are identical and are inwardly offset. These margins follow a generally zig zag path throughout the length of the strip and include walls 30 and 31 which, toward the outer face of the strip, meet in a flat seat 32 which is in horizontal alignment with, but inwardly offset from the rib 24. Toward the inner face of the strip, walls 30 and 31 meet in a flat portion 34, similar to the seat 32, excepting that, in this instance, the portion 34 forms a projection to be received by a seat 32 of the corresponding strip.

It has long been evident that, as stock thickness

of radiator cores was reduced, some means must be provided, particularly in deep cores, and preferably in all cores, to prevent collapse of the walls of the water conduit, especially during assembly.

5 In order to assemble strips 12 and 13 margins 29 must be interfitted, thus bringing the projections 34 of one strip into contact with seats 32 of the other strip. The ribs 24 of each strip, as well as the ledges 26, are thus staggered, one strip with respect to the other. The staggered arrangement of the ribs 24 in no wise affects the assembly of the core, but is useful in producing turbulence of water in the conduit, as will hereinafter be more fully described. The staggered arrangement of the ledges 26 causes the flat face 28 of one strip to overlie the recess 35 formed by the outwardly projecting rib 24 of the other strip. Inasmuch as the ledges 26 are greater than half the distance between ribs 24, the ledges of one strip will overlap the ledges of the abutting strip. It will thus be noted that the face 28 of each ledge contacts a portion of two adjacent ledges of the other strip and bridges the recess 35. The water conduit is thus divided into front and rear conduits which it is desirable to have connected throughout their length for the purpose of aiding circulation. Since the ledges 26 are staggered, there is provided a plurality of staggered passageways 36 which connect front and rear conduits.

30 The separator strips 15 and 16 are duplicate and only one will, therefore, be described in detail. Each strip is generally of zig zag conformation and includes walls 38 and 39. The marginal portions of these walls meet in angles 40. It will be understood that the separator strip margins are substantially the same depth as the margins 29 of the water conduit strips 12 and 13. Between margins and in the outer angles only, inverted recesses or seats 42 are made. In each of the walls 38 and 39 air deflecting projections 43 are formed. The projections of each wall 38 and 39, as viewed from one face of the strip, are staggered with duplicate reversed inverted projections. Thus, between a pair of projections 43 viewed from one face of the strip there will be located a depression 44 produced by a projection on the other face of the strip. Conversely, the projections 43 (see Fig. 6) provide depressions or recesses on the other face of the strip. It will be noted that the projections terminate adjacent seats 42 and, as a matter of fact, constitute continuations of the walls of these seats for the purpose of aiding in the assembly of the core.

When the water conduit and separator strips, as above described, are assembled, the ribs 24 of water conduit strips 12 and 13 project into seats 42 of the separator strips 15 and 16. Examination of Fig. 2 of the drawing clearly shows that contact between water and separator strips is not mere abutment but, on the contrary, a considerable area of each rib 24 is in contact with adjacent portions of the separator strips. This contact area, when the core is dipped in solder to make permanent assembly, becomes coated with solder and, so far as transfer of heat is concerned, becomes integral. Thus, heat generated in the walls of the water conduit will be directly conducted to large areas of the separator strips from which it will be dissipated by the air streams in conduits 18, 19, and 20. Since it is not essential to have an integral connection between separator strips, these strips are seated by utilizing the staggered projections 43 for this purpose.

It will be understood that water flowing downwardly through conduits formed by strips 12 and 13 will be free of any projection which would tend to interfere with rapid circulation thereof, but that at the same time, the outwardly offset inwardly opening recesses 35 constitute means for producing turbulence in the stream, and in effect provide swirls in each of the recesses by which the heat of the water is readily transferred to the ribs 24, and thence to the integrally connected portions of the separator strips.

Although applicant has shown and described only one modification of his invention wherein is provided straight walled water conduits, intermediate support between the margins of the water conduit, and other improvements clearly shown and described, it will be apparent to those skilled in the art that further modification of separator and water conduit strips may be made and is contemplated, in so far as such modification lies within the spirit and scope of the invention as set forth in the hereunto annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:

1. In a radiator core structure having water conduits and separator strips interposed between said conduits, a water conduit strip comprising a body portion, the marginal edges of the strip being laterally offset from said portion and of generally zig zag conformation, marginally limited means in said body portion defining vertically aligned wall segments, the segments of two adjacent strips forming a straight water conduit, a ledge formed in each of said segments, said ledge projecting inwardly of said strip into the water conduit formed by a pair of strips, a flat face in said ledge, said ledge, when a pair of strips are assembled, abutting two adjacent ledges of the other strip and serving to bridge the space therebetween to provide a fluid passageway between front and rear portions of the conduit.

2. In a radiator core structure having water conduits and separator strips interposed between said conduits, a water conduit strip comprising a body portion, the marginal edges of said strip being laterally offset from said portion and of generally zig zag conformation, a plurality of spaced apart vertically aligned ledges in said strip, the ledges of one strip being staggered with respect to the ledges of an adjacent strip and having overlapping abutment whereby to support the walls of a water conduit and provide fluid communication between the front and rear portions of a conduit thus divided.

3. In a radiator core structure, a water conduit strip comprising a body portion, the marginal edges of said strip being laterally offset from said portion, a plurality of outwardly directed uniformly spaced ribs in said portion, said ribs being continuous between margins and dividing said portion into wall segments, an inwardly directed ledge in each of said segments, the ledges being in vertical alignment and substantially continuous between ribs, the ledges of adjacent strips being staggered and adapted to have overlapping abutment, a separator strip having zig zag angular bends, and seats in certain of said bends for receiving and interfitted with said ribs during assembly of the conduit and separator strips of the core.

FRED L. FOSTER.