

June 21, 1927.

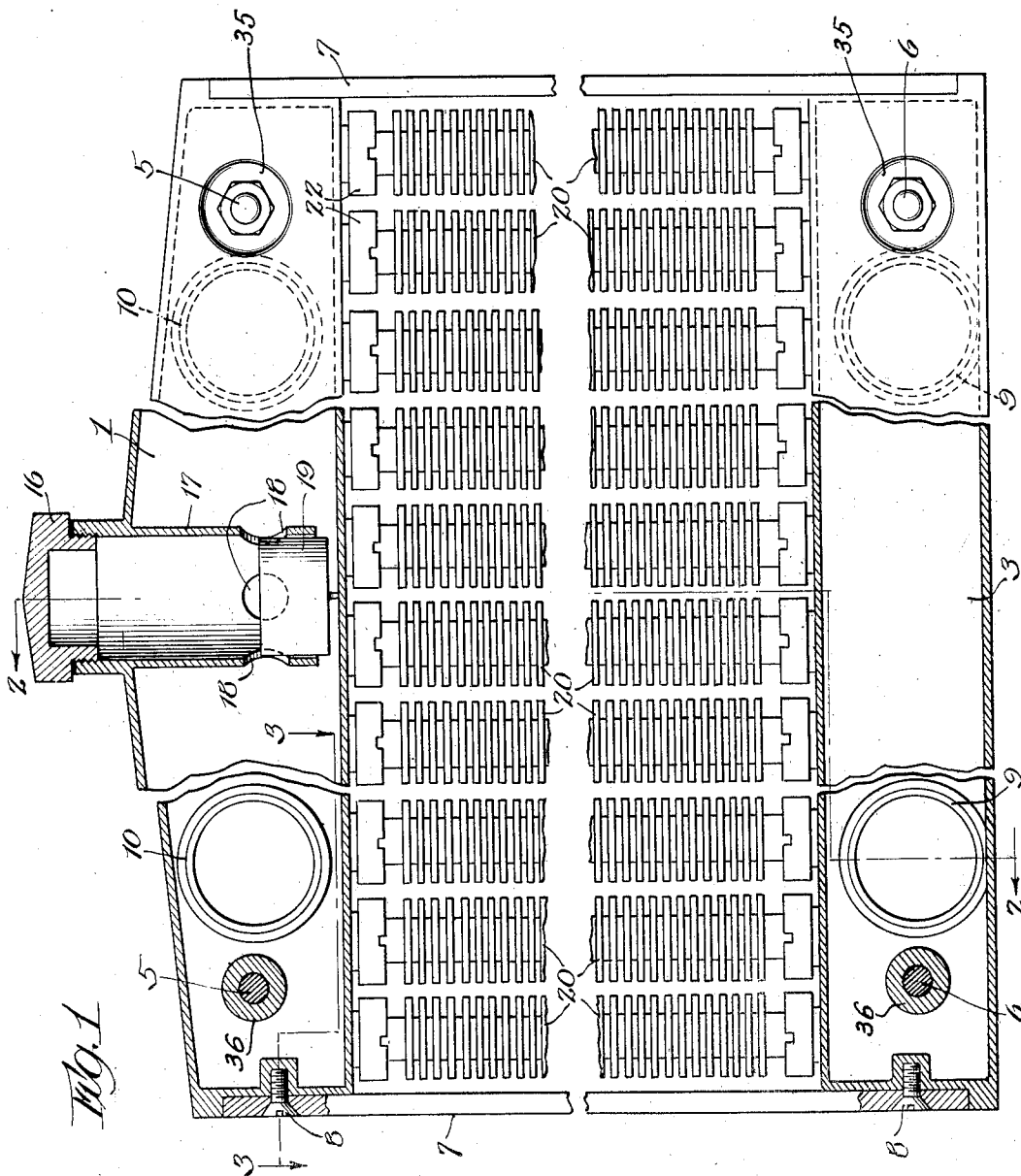
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1,632,803

INTERNAL COMBUSTION ENGINE RADIATOR

Filed Feb. 4, 1922

3 Sheets-Sheet 1



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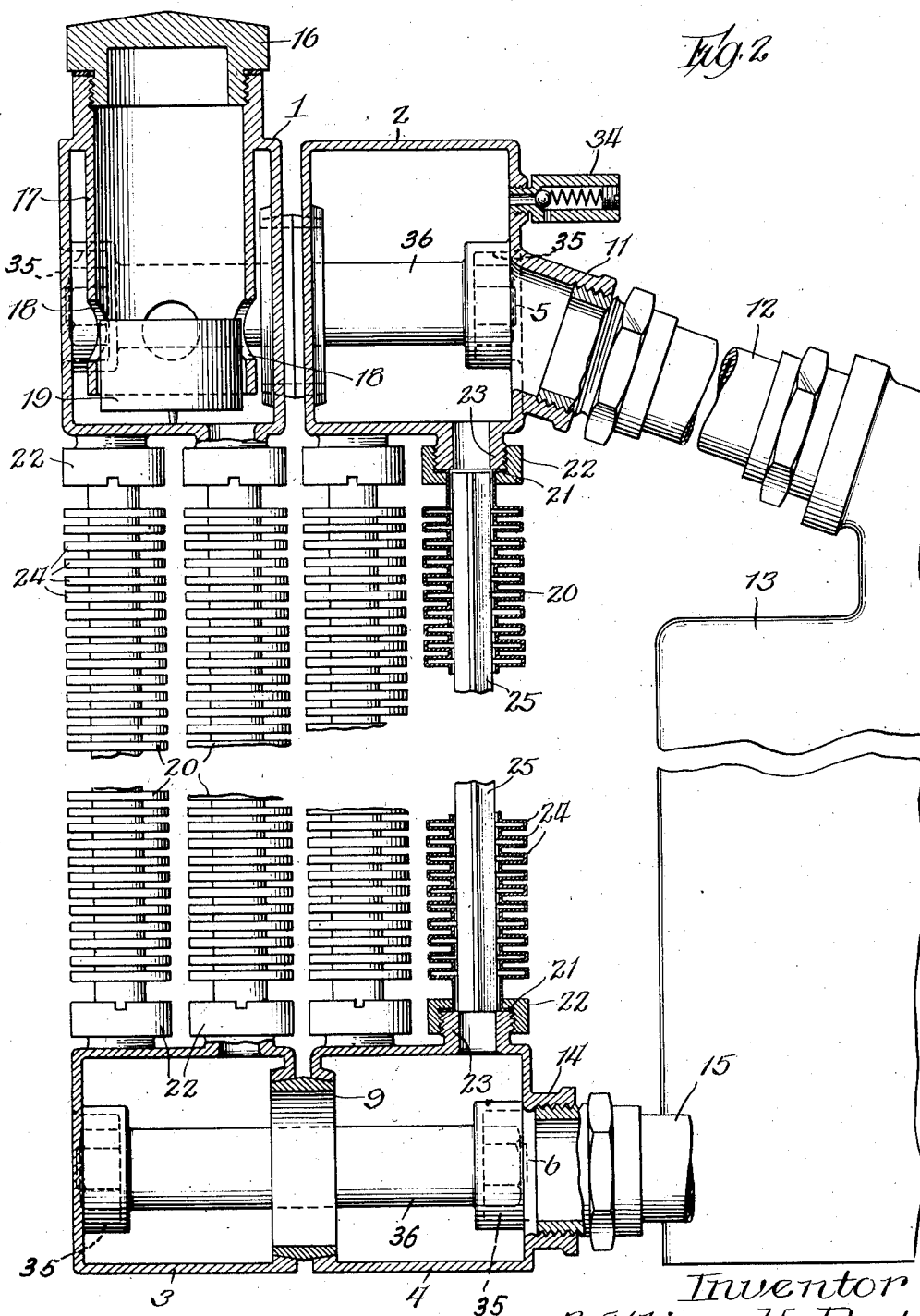
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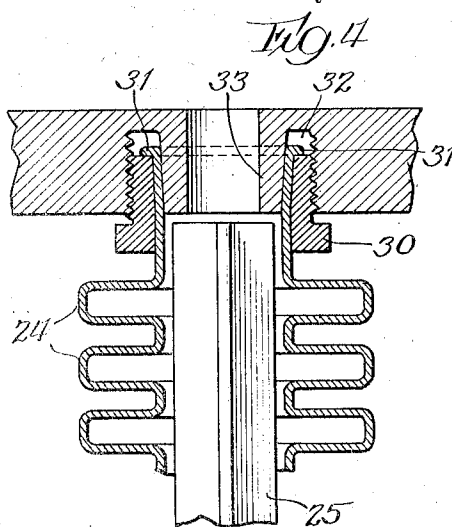
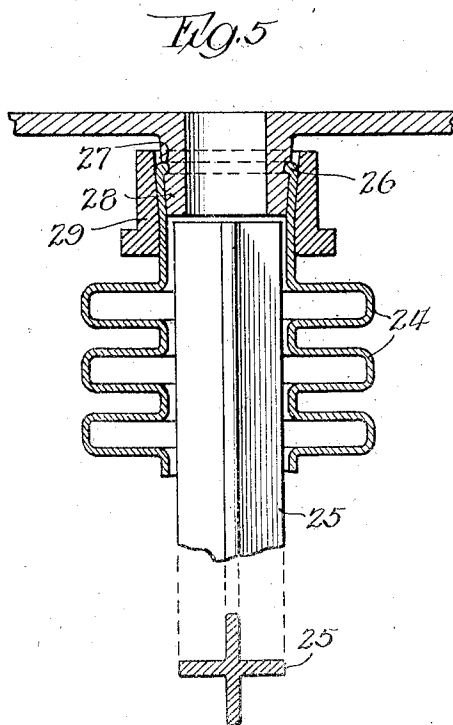
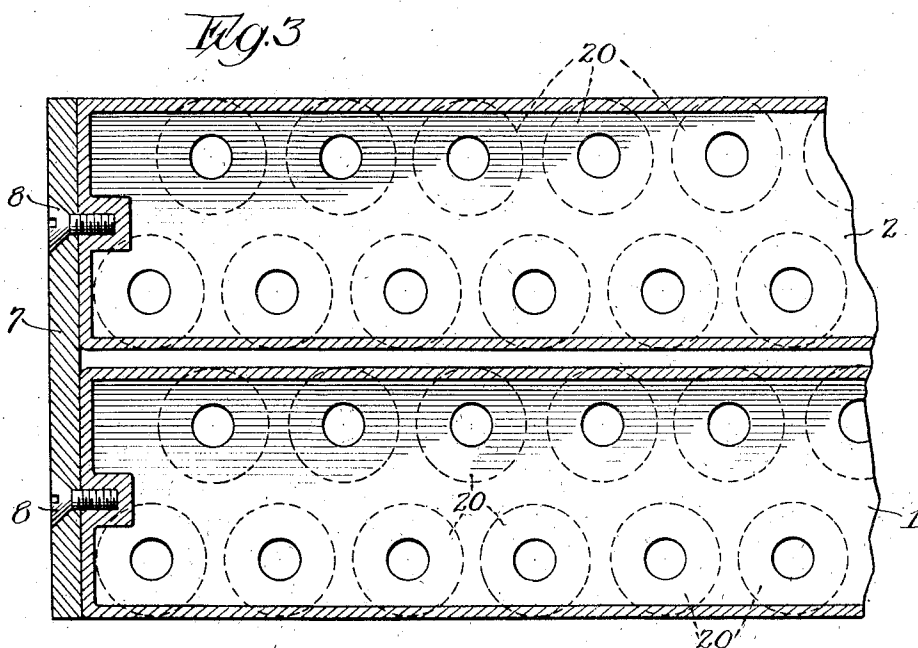
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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION-ENGINE RADIATOR.

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This invention relates to internal combustion engine radiators, and particularly to those employed on automobiles or other vehicles.

5 Generally stated, the object of the invention is to provide a novel and improved construction whereby repairs can be made in an easy and more satisfactory manner than heretofore, by the removal of any tube alone
10 and without the necessity of detaching other tubes, whereby the possibility of damage by freezing will be reduced, and whereby more satisfactory results will be ensured than heretofore in the operation and use of radi-
15 ators for this purpose.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and the desirability of a radiator
20 construction of this particular character.

To the foregoing and other useful ends the invention consists in matters hereinafter set forth and shown in the accompanying drawings in which—

25 Figure 1 is a transverse section of a radiator embodying the principles of the invention, showing the tubes thereof, which constitute a part of the invention, in front elevation.

30 Figure 2 is an enlarged vertical longitudinal section on line 2—2 in Figure 1.

Figure 3 is a fragmentary detail section, on a larger scale, on line 3—3 in Figure 1.

35 Figure 4 is an enlarged detail sectional view showing another form of the invention.

Figure 5 is a similar view showing another form of the invention.

As thus illustrated the invention comprises a pair of upper headers 1 and 2 and
40 a pair of lower headers 3 and 4 arranged transversely of the automobile or other vehicle and clamped together by bolts 5 which extend through the upper headers and by bolts 6 which extend through the lower
45 headers. In addition side plates 7 are fastened to the upper and lower headers by screws 8, so that the structure as a whole is strong and rigid. Rings 9 are interposed between the headers 3 and 4, to provide connection between the two headers, and similar rings 10 are interposed between the two
50 upper headers, for the same purpose, whereby the radiator as a whole is composed of front and rear sections bolted together and provided with means of communication between them. The header 2 has an inlet boss

11 for the inlet pipe 12 leading from the engine 13, and the lower header 4 has an outlet boss 14 for the outlet pipe 15 which leads back to said engine, so that the water
60 enters the radiator at the top and leaves at the bottom thereof, in the usual manner. The header 1 has a filling cap 16, which can be removed to fill the radiator in the usual manner. A tubular portion 17 extends
65 down from said cap and is provided with lateral inlet openings 18 near the lower end thereof. A float valve 19 is movable up and down in said tubular portion 17, to control said openings 18, whereby as soon as the
70 water rises and begins to fill the upper headers the float valve 19 will rise and close the openings 18, thus preventing further filling of the radiator. In other words, the radiator can only be filled to a certain height,
75 as after the float valve 19 closes the openings 18 no further water can enter the radiator from the tubular portion 17 which constitutes a portion of the filling means. In this way, therefore, space is left in the
80 headers 1 and 2 for expansion of the water when it is heated, or when it boils, inasmuch as the water can always expand into the upper headers. The headers can be similarly formed, so that additional headers
85 can be incorporated in the radiator structure, if additional radiating surface is needed. As shown, there are two headers at the top and two headers at the bottom, but it is obvious that three or four or any
90 desired number of headers can be arranged one in front of the other at the top, and also at the bottom, if a larger radiator is required. As the circulating system thus provided is entirely closed, so that no leakage
95 can occur, there will be no loss of water or of anti-freezing compounds, such as those commonly used in winter. Tubes 20 are of sheet metal and have their upper and lower ends provided with flanges 21 held in place
100 by caps 22 screwed upon the bosses 23 on the headers, so that tight joints are provided. These tubes, it will be seen, are provided with hollow circumferential flanges 24, as shown more clearly in Figures 4 and 5, so
105 that the radiating surface is increased, and the tubes can be made of quite thin metal, inasmuch as a solid filler 25 is provided in each tube, to prevent the latter from buckling or becoming distorted in any way. The
110 filler 25, it will be seen, as shown in Figure 5, is cross shaped in transverse section, so

that it provides four grooves or passages for the downward flow of the water through the flanged or corrugated sheet metal tubes which are thus held in position without any solder or packing, whereby said tubes can each be readily removed laterally, without disturbing or disconnecting other tubes when it is desired to make repairs. As shown in Figure 5 the ends of these tubes are bent inward at 26 to engage a groove 27 on the tapered boss 28 of the radiator. A collar 29 which is internally tapered is employed to force the internal edges of the tube into said groove. The collar 29 can be forced in position in any suitable or desired manner, thus forming a tight joint between the tube and the header. In Figure 4 the screw threaded ring 30 is employed to force the out-turned edges 31 of the sheet metal into the recess 32 in the header, so that the tube is forced on to the tapered boss 33 of the header, thus forming a tight joint between the tube and the header. Obviously, however, various constructions can be employed for providing tight joints between the tubes and the headers in such a manner as will permit ready removal of the tubes, by lateral removal of any tube alone, as shown, when such is necessary or desirable. Referring to Figure 3 it will be seen that the tubes 20 are staggered on each header, there being two rows of tubes extending along each header, and the members of one row alternating with the members of the other row, so that they have the desired staggered arrangement. This, it will be seen, serves to facilitate the making of repairs, inasmuch as inner rows of tubes are thereby rendered more accessible. Furthermore, the staggered arrangement causes the air to circulate in a manner to more effectively cool the water. As stated, the heated water from the engine enters at the top of the radiator and flows downward through the flanged or corrugated tubes and into the lower headers, and with space left in the upper headers, the water can always expand, but as a precaution a safety valve 34 is provided on the rear upper header 2, said valve being of any suitable or desired character, whereby the pressure may escape to afford relief in case the pressure does become too great within the radiator.

It will be seen that the bolts 5 and 6 have their opposite heads countersunk in the cavities 35 formed in the header sections, so that the opposite ends of each bolt are practically flush with the vertical surfaces of the headers. Furthermore, it will be seen that these bolts extend through cylindrical portions 36 which are integral with the headers, whereby the bolts can be removed without producing any openings through which leakage could take place. In fact, each bolt is entirely enclosed inside the header sections

by means thus formed integral with the header sections, and leakage around the bolt is absolutely prevented at all points. When the bolts are tightened, the oppositely tapered rings 9 form tight joints between the header sections, and no leakage can occur here when the parts are properly machined and made and fitted together in the right way, thereby to produce the construction shown and described. It will also be seen that by removing the side portions 7, after taking out the screws 8, the upper header can be disconnected from the lower header, thereby to facilitate removal of any of the vertically disposed radiating tubes. Of course, with the construction shown in Figure 2, any tube can be removed without disconnecting the upper header from the lower header, inasmuch as the unscrewing of the caps 22 from the threaded bosses 23 will permit lateral removal of the tube. However, as shown in Figures 4 and 5 some endwise contraction of each tube will be necessary, for its removal, if the upper header were not disconnected from the lower header, and while this can be done, of course, it is possible to take off the side plates 7 and thereby permit loosening of the different tubes in a way that will facilitate their removal when necessary or desirable. The said tubes are made of sheet metal and are of such form that they are laterally flexible, and might warp or bend out of shape, except for the provision of the elements 25 previously described, these elements being stiff and rigid and holding the tubes against lateral warping and displacement between their upper and lower ends, when the tubes are subjected to different temperatures and different pressures.

Thus the sheet metal tubes, although flexible, are held stiffly upright in position, and are held against lateral flexing or bending, as shown, preferably by the stiffening members 25 enclosed therein. In each case, it will be seen, these stiffening members 25 are not long enough to extend into the headers, but are only long enough to just barely extend from one boss 23 below to the boss 23 above, or from one boss 28 below to another boss 28 above, or from one boss 33 below to another similar boss above, whereby these stiffening members 25 are individually laterally movable with their tubes without disturbing the balance of the structure, as shown and described. In Fig. 2 the rings 22 when unscrewed will permit lateral removal of the tube and its stiffening member without in any way disturbing the balance of the structure; and in Fig. 5 the axial displacement of the rings 29 above and below, and some endwise contraction of the sheet metal tube, will permit lateral removal of the tube and its stiffening member 25 without disturbing any of the other tubes, and

this is also true in Fig. 4, for here the unscrewing of the rings 30 above and below, and some endwise contraction of the sheet metal tube, will immediately permit lateral removal of the tube and its interior stiffening member without the necessity of disconnecting or detaching any of the other tubes.

What I claim as my invention is—

1. In a radiator, a plurality of intercommunicating headers forming a sectional upper header, a plurality of intercommunicating headers forming a sectional lower header, means rigidly connecting the upper header to the lower header and detachable therefrom whereby the upper header is detachable from the lower header, radiating tubes held stiffly upright for connecting the upper header to the lower header, the intercommunication between the sections of each header being formed by passage means providing an unobstructed path of flow directly from one section into another, so that free communication is formed between sections, and fastening means on each header and entirely separate from said passage means to detachably connect the sections of each header together, and each tube being removable laterally without disconnecting other tubes, and without disconnecting the upper header from the lower header.

2. In a radiator, a plurality of intercommunicating upper headers, a plurality of intercommunicating lower headers, and endwise compressible radiating tubes for connecting the upper headers to the lower headers, each tube being held against lateral bending or flexing and being of a length to be removable without detaching any of the other tubes and without disconnecting the upper headers from the lower headers, in combination with means independent of said tubes to detachably connect the upper headers to the lower headers.

3. In a radiator, a plurality of intercommunicating upper headers, a plurality of intercommunicating lower headers, and endwise compressible radiating tubes for connecting the upper headers to the lower headers, in combination with horizontally disposed bolts which connect the upper headers together, similar bolts for the lower headers, which bolts are all removable to disconnect the upper headers from each other, and to disconnect the lower headers from each other, and which engage rigid and integral portions of the headers, and means independent of the tubes to detachably connect the upper headers to the lower headers.

4. In a radiator, a plurality of intercommunicating upper headers, a plurality of intercommunicating lower headers, radiating tubes for connecting the upper headers to the lower headers, means to detachably connect the tubes to said headers, so that any

tube can be removed alone, bolts extending through the headers to bind them together, means separate from said bolts and held in place thereby to afford free communication between the upper headers, and between the lower headers, and means integral with the headers to fully enclose said bolts except at their outer ends.

5. In a radiator, the combination of an upper header, a lower header, detachable endwise compressible radiating tubes connecting said headers together, each tube being held against lateral flexing and being of a length to be readily removed without detaching other tubes, and rigid connecting means independent of said tubes to detachably connect the headers in fixed relation, each header being composed of sections, and internally sealed means to connect and disconnect the sections to and from each other.

6. In a radiator, a plurality of intercommunicating upper headers, a plurality of intercommunicating lower headers, and endwise compressible radiating tubes for connecting the upper headers to the lower headers, in combination with horizontally disposed bolts which connect the upper headers together, and similar bolts for the lower headers, which bolts are all removable to detach said connected headers from each other, some of said bolts extending through the upper headers to bind them together, and the other of said bolts extending through the lower headers to bind them together, each said bolt being entirely enclosed except at its ends, and engaging rigid and integral portions of the headers, and means independent of the tubes to detachably connect the upper headers to the lower headers.

7. In a radiator, a plurality of upper headers with intercommunicating means therebetween, a plurality of lower headers with intercommunicating means therebetween, and endwise compressible radiating tubes for connecting the upper headers to the lower headers, in combination with horizontally disposed bolts which connect the upper headers together, and similar bolts for the lower headers, which bolts are all removable to detach said upper headers from each other, and to detach said lower headers from each other, and which engage rigid and integral portions of the headers, some of said bolts extending horizontally through the upper headers, and the other of said bolts extending horizontally through the lower headers, thereby to tighten said intercommunicating means in place, each bolt being entirely enclosed except at its ends, and means independent of the tubes to detachably connect the upper headers to the lower headers.

8. In radiator construction for internal combustion engines, the combination of hol-

low sections forming an upper header, hollow sections forming a lower header, said sections having inwardly tapered openings in their opposing sides, oppositely tapered
5 rings fitted in said openings, disposed in position between the sections of the upper header, and between the sections of the lower header, horizontally disposed bolts extending through the sections of the upper
10 header, bolts extending through the sections of the lower header, means integral with said header sections to fully enclose said bolts within the headers, thereby to preclude leakage around the bolts, whereby said bolts are operative to force said tapered
15 rings in said tapered openings, when the bolts are tightened to lock either of the header sections together, and vertically disposed radiating tubes between the upper and lower headers.

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