Aug. 19, 1924. 1,505,701

A. B. COX

RADIATOR CONSTRUCTION

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Fig. 1.

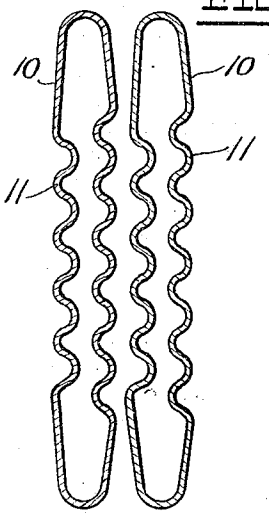


Fig. 2.

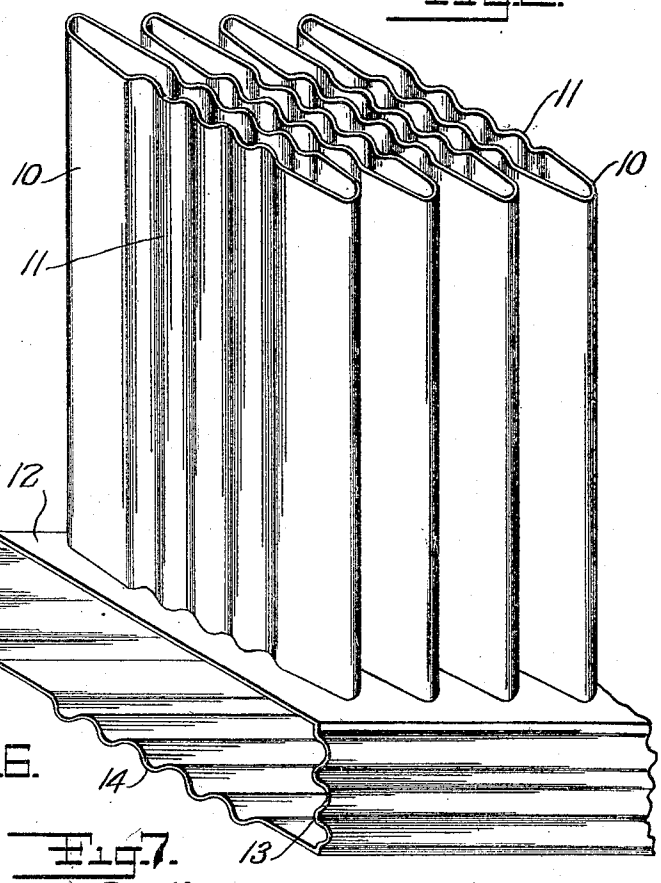


Fig. 5.

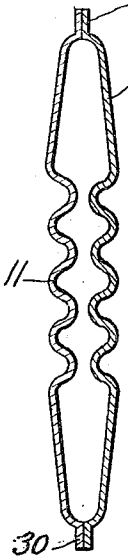


Fig. 6.

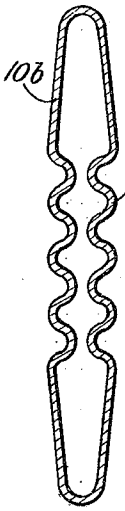


Fig. 7.

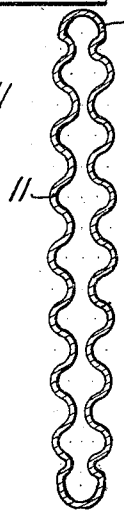


Fig. 8.

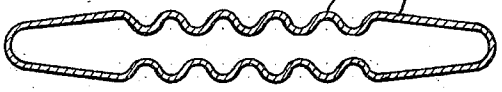
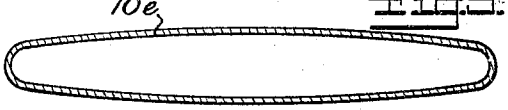


Fig. 9.



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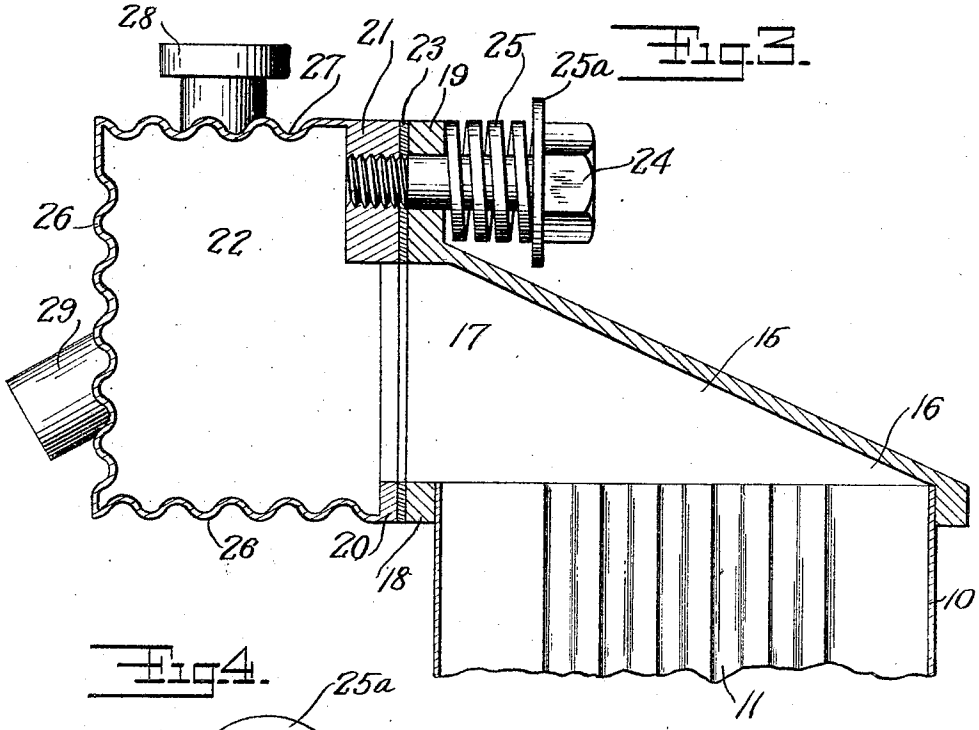


Fig. 3.

Fig. 4.

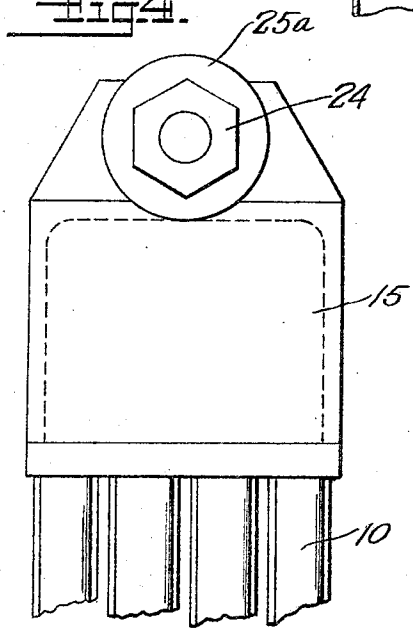


Fig. 10.

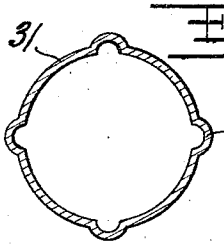
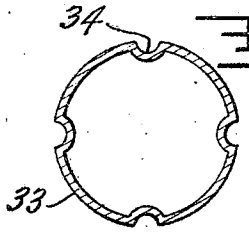


Fig. 11.



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UNITED STATES PATENT OFFICE.

ABRAHAM B. COX, OF CHERRY VALLEY, NEW YORK.

RADIATOR CONSTRUCTION.

Application filed June 26, 1920. Serial No. 391,901.

To all whom it may concern:

Be it known that I, ABRAHAM B. COX, a citizen of the United States, and a resident of Cherry Valley, Otsego County, New York, have invented a new and useful Improvement in Radiator Constructions, of which the following is a full, clear, and exact description.

My invention relates to improvements in the construction of radiators for automobiles or the like, and the object of my invention is to improve the construction of such devices where the tubes or headers, or both, are liable to have the water in them freeze and burst the container. My invention is especially intended to improve the tube construction, and this I do by making the tubes so that they can expand to a considerable extent if the water freezes, without cracking the tube or disrupting its connections. My invention is also intended to improve the header construction with which the tubes connect, so that the headers will not burst when the water in them freezes. My invention is further intended to produce an efficient and economical construction having a large surface, and in which the tubes can be arranged so that the water in them will be very rapidly cooled by the passage of air between them. My invention is also intended to produce a structure in which a section of tubes can be rapidly removed when desired, and generally to produce an efficient, economical, and practically indestructible structure of the kind referred to.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a cross section showing a pair of tubes embodying my invention.

Figure 2 is a broken perspective view showing the arrangement of the tubes and their connection with a header.

Figure 3 is a detail sectional view showing a modified construction of header in which a section of tubes is easily removable.

Figure 4 is a broken front view of the construction shown in Figure 3.

Figures 5 to 9 show various slight modifications in the shape of the tubes, and

Figures 10 and 11 show other modified forms of tubes which are adapted for a slightly different type of radiator.

The drawings are shown by way of example and without the idea of limiting the invention to the precise forms illustrated. They show the invention as applied to a radiator, but it will be understood that for light boilers for automobiles or the like, the construction can be substantially similar.

The tubes 10 are generally flattened and are preferably corrugated lengthwise as shown clearly in Figure 1, so that if the water in them freezes, the corrugations will bulge out but the tubes will not burst, and the metal of the tubes can be sufficiently springy so that when the ice melts the tubes will spring back to shape. Where the tubes are corrugated lengthwise as shown, they can be arranged in the radiator so that the bent or convex part of one corrugation will come opposite the concave part of the corrugation of the next adjacent tube. In other words, the corrugations can be staggered so that the tubes can be placed rather near together, and the air passing between them will pass rapidly and in a thin stratum. This provides for a compact arrangement of the tubes, and gives them a very large cooling surface. The tubes can connect with the headers in any usual way, and the headers 12, as shown in Figure 2, can be alike on top and bottom, and their side and bottom walls 13 and 14 can be corrugated as shown so that if the water in them freezes the walls will expand as already described. Obviously one or more of the walls can be corrugated as necessity requires.

The tubes can be made in very many ways without departing from the idea disclosed above, as shown in Figures 5 to 9, and doubtless other forms can be devised which would not depart from the invention. The tube 10^a, for instance, in Figure 5, has less corrugations than that shown in Figure 1, and it is made in two parts which are fastened together as shown at 30 at the edges of the tube. The tube 10^b shows corrugations of another type, and the tube 10^c shows its whole side surfaces longitudinally corrugated. The tube 10^d shows another arrangement of the corrugations, and the tube 10^e is without corrugations, but is flattened or of elliptical cross section, so that if the water in its freezes it can still expand with-

out straining the metal to the bursting point. This will be readily understood, because it is known that as the tube bulges on the sides and tends to assume a more nearly circular section, its area will increase.

In figure 3 I have shown a modified type of header which can be used at top and bottom, instead of the header 12. As here shown the ends of the tubes 10 enter a removable section 15 of the header, and this section is narrower at its outer end as shown at 16, and widens progressively to its inner end 17, so that if the water in it freezes it will expand toward the wider end of the extension without bursting the same. At its wider end the extension has flanges 18 and 19 which are secured to the corresponding parts 20 and 21 of the header 22, and a washer or gasket 23 can be inserted between the parts. The parts can be fastened together in any convenient way, and I have shown a bolt 24 connecting the members 19 and 21, and with a stiff spring 25 around the bolt 24 and between the member 19 and the collar 25[a] on the bolt. When the bolt is tightened upon the parts, the spring 25 is stiff enough so that a water-tight joint is made, but if undue expansion occurs owing to freezing, the spring yields sufficiently to act as a further safeguard against the bursting of the header. In consonance with the idea already disclosed, one or more of the walls on the header 22 can be corrugated as shown at 26 and 27, and I have shown it provided with the usual filler pipe 28 and inlet pipe 29.

In Figures 10 and 11 I have shown types of tubes embodying the idea of my invention but adapted for other forms of radiators in which fins are applied to the tubes. Here the tube 31 is of generally circular cross section, but has outwardly bulging corrugations 32, while the tube 33 has inwardly bent corrugations 34. In either case sufficient metal is provided to permit the expansion of the tube without bursting it.

From the foregoing description it will be seen that I have produced a frost proof radiator in which a large radiating or heating surface as the case may be, is provided, and in which the whole radiator, including the header and connecting tubes, can expand in any direction without bursting, and will spring back to shape after the frost has thawed. It will further be noticed that the tubes are independent and preferably flattened so that they can be placed with their flattened sides adjacent, and a simple structure is had which has the advantages stated, and the further advantage that any particular tube can be removed if desired.

I claim:—

1. The herein described construction of radiators and the like, comprising headers with corrugated walls spaced apart, and a series of separate independent tubes connecting the headers, the tubes having generally flattened sides and being arranged with their flattened sides adjacent.

2. The improved construction of radiators, and the like comprising headers with corrugated walls and banks of separate tubes connecting the headers, said tubes being also constructed with longitudinal corrugations extending substantially their full length.

3. The improved construction for radiators, and the like, comprising headers having detachable extensions, said extensions having yielding connections with the bodies of the headers and banks of tubes connecting the extensions, said tubes being longitudinally corrugated.

4. The improved radiator construction comprising headers, detachable extensions on the headers, said extensions being progressively wider from their outer to their inner sides, and banks of tubes connecting the extensions.

5. The improved radiator construction comprising headers with corrugated walls, detachable extensions on the headers, said extensions being progressively wider from their outer to their inner edges, and banks of tubes connecting the extensions.

6. The improved construction of radiators, and the like, comprising headers, extensions secured to the headers and being progressively wider from their outer to their inner sides, a yielding connection between the extensions and the bodies of the headers, and banks of tubes connecting the extensions.

ABRAHAM B. COX.

Witnesses:
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M. G. O'DONNELL.