Feb. 26, 1929. 1,703,682

A. B. MODINE

RADIATOR CONSTRUCTION

Filed Sept. 25, 1925

Fig. 1.

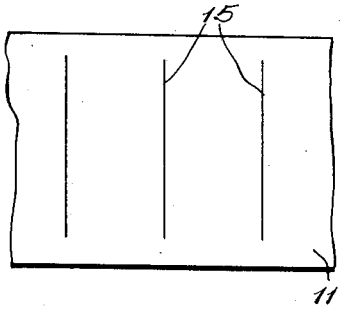


Fig. 2.

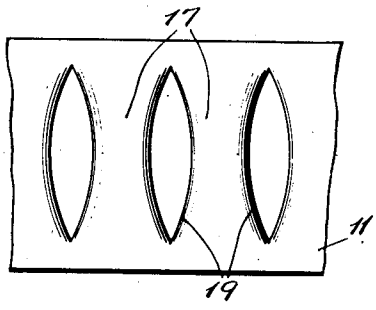


Fig. 3.

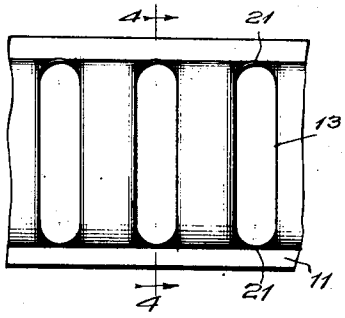


Fig. 5

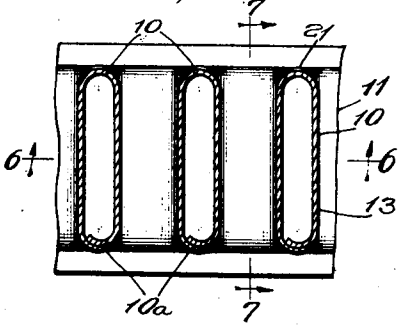


Fig. 6.

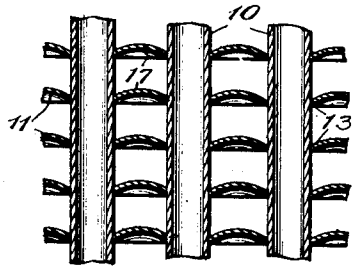


Fig. 7.

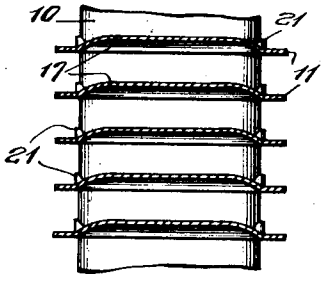
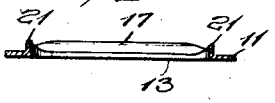


Fig. 4.



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Patented Feb. 26, 1929. 1,703,682

UNITED STATES PATENT OFFICE.

ARTHUR B. MODINE, OF RACINE, WISCONSIN

RADIATOR CONSTRUCTION.

Application filed September 25, 1925. Serial No. 58,539.

My invention relates to radiators and particularly to radiators suitable for use in automobiles, aeroplanes and the like. The invention has among its other objects the production of devices of the kind described which are compact, durable, efficient and satisfactory for use wherever found applicable.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claim.

In the drawings, wherein like reference characters indicate like or corresponding parts;

Figs. 1, 2 and 3 are fragmentary views in elevation of a plate adapted to form parts of a radiator embodying the invention, the plate being shown in various stages of manufacture;

Fig. 4 is a section taken on line 4—4 of Fig. 3;

Fig. 5 is a fragmentary section taken through a radiator embodying the invention;

Fig. 6 is a section taken on line 6—6 of Fig. 5; and

Fig. 7 is a section taken on line 7—7 of Fig. 5.

As illustrated in Figs. 5, 6, and 7, a preferred form of the invention is embodied in a radiator comprising a plurality of tubes 10 and plates 11, the tubes 10 being passed through apertures 13 in the plates. The tubes 10 are preferably formed from flat sheets of metal and are preferably of elongated cross-section, the front and rear edges of the tubes being rounded, the side edges of the sheets being brought together to form lap seams 10^a.

In Figs. 1, 2 and 3, I have illustrated a method whereby I preferably form the apertures 13 in the plates 11. Thus, in Fig. 1 I have shown the plate 11 provided with a plurality of slits 15 extending transversely of the plate, the slits 15 being punched or stamped in the plate by any suitable apparatus (not shown). After the slits have been formed in the plate 11, those portions of the plates disposed intermediate the slits are stamped or formed into elongated arcuate bulges 17 which are most clearly shown in Figs. 6 and 7. This draws the slits 15 into pointed ended slots 19 which are illustrated in Fig. 2. The ends of each slot 19 are then rounded, as illustrated in Fig. 3, to correspond to the rounded ends of the tubes 10, the material at the ends of the slots 19 being upset to provide arcuate flanges 21 adapted to engage the tubes 10.

After the tubes 10 have been inserted in the apertures 13 of the plates 11, they are preferably soldered to the plates by practising the improved method more fully described in my copending application, Serial No. 58,542, filed September 25, 1925. Briefly each plate 11 is preferably coated with any suitable substance to which solder does not readily adhere. This may be done before or after the apertures 13 are formed in the plates, but preferably before, so that the edges of the slots 13 and the inner surfaces of the arcuate flanges 21 will present clean surfaces to the tubes. If the coatings are applied to the plates after the slots 13 are formed therein, the edges of the slots 13 and the inner surfaces of the arcuate flanges 21 may be cleaned by brushing them. After the tubes and plates have been assembled, the radiator is held in substantially horizontal position, and then dipped a short distance into a bath of fused solder, whereupon the solder rises along the tubes at those points where the tubes are in close proximity to the edges of the slots 13 and the inner surfaces of the arcuate flanges 21. The fused solder rises in this manner because of capillary attraction. To insure that the plates will be properly soldered to the tubes, the radiator is preferably inverted after it has been dipped into the solder for the first time and then dipped into the solder for a second time. The solder does not adhere to the coated surfaces of the plates 11 nor does it tend to spread itself over those surfaces of the tubes disposed intermediate the plates 11, except that the lap seams are soldered during one dipping operation.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

A method of forming a radiator compris-

ing a plurality of plates and substantially flat sided tubes passed through apertures in said plates, which method comprises forming a plurality of substantially straight slits in the plates while they are flat in such manner that substantially all of the material is left in the plates, forming each of said slits into an aperture conforming to the shape of the tubes by forming the excess material into flanges at the ends of the aperture and into bulges adjacent the aperture, and inserting said tubes through the apertures in the plates.

In testimony whereof, I have hereunto signed my name.

ARTHUR B. MODINE.