

Aug. 27, 1929.

A. B. MODINE

1,726,360

RADIATOR CONSTRUCTION

Filed Sept. 25, 1925

Fig. 1.

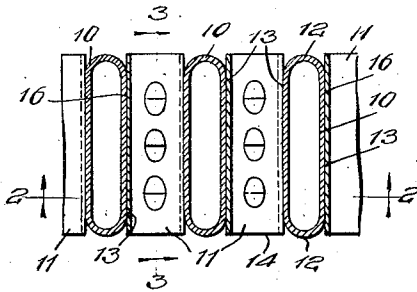


Fig. 2.

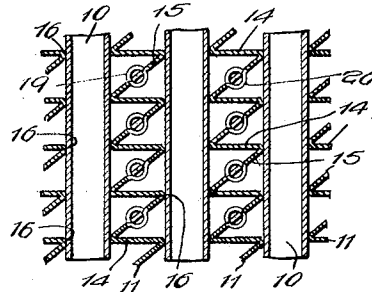


Fig. 3.

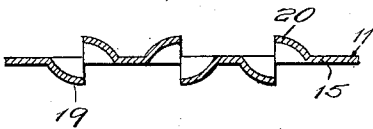


Fig. 4.

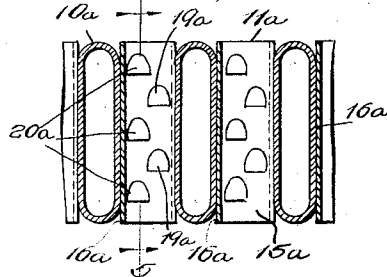


Fig. 5.

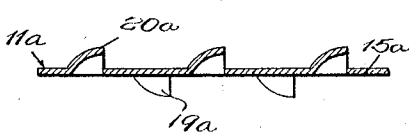


Fig. 6.

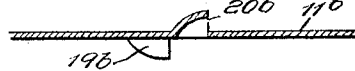


Fig. 7.

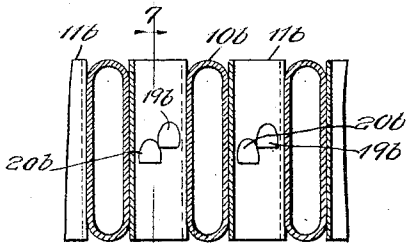


Fig. 8.

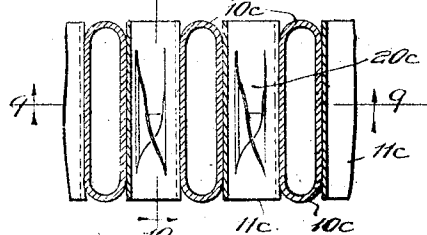


Fig. 9.

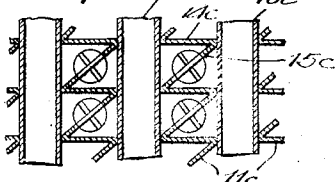


Fig. 10.



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UNITED STATES PATENT OFFICE.

ARTHUR B. MODINE, OF RACINE, WISCONSIN.

RADIATOR CONSTRUCTION.

Application filed September 25, 1925. Serial No. 58,540.

My invention relates to radiators and particularly to radiators of the type which may be advantageously employed in automobiles, aeroplanes and the like.

The invention has among its other objects the production of devices of the kind described which are durable, efficient and satisfactory for use wherever found applicable. A particular object of the invention is to provide improved radiator construction which will insure that substantially all of the air passing through the radiator will come in contact with the water tubes.

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 claims.

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

Fig. 1 is a fragmentary section through a radiator embodying my invention;

Fig. 2 is a section taken on line 2—2 of Fig. 1;

Fig. 3 is a section taken on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary section which corresponds to the section shown in Fig. 1, and illustrates another form of the invention;

Fig. 5 is a section taken on line 5—5 of Fig. 4;

Fig. 6 is a fragmentary section taken through a radiator embodying another form of the invention;

Fig. 7 is a section taken on line 7—7 of Fig. 6;

Fig. 8 is a fragmentary section taken through a radiator embodying another form of the invention;

Fig. 9 is a section taken on line 9—9 of Fig. 8;

Fig. 10 is a section taken on line 10—10 of Fig. 8.

Referring for the present to Figs. 1 to 3, inclusive, the reference characters 10 and 11 designate tubes and plates, respectively, which, when assembled, form a radiator embodying the invention. The tubes 10 are preferably of elongated cross-section and are provided with rounded rear and front edges

12, the sides of the tubes being flattened as at 13. The plates 11 are bent or folded to provide a plurality of braces or struts 14 extending substantially at right angles to the tubes 10 to provide a plurality of diagonal braces or struts 15, the braces or struts 14 and 15 forming apices 16 to which the tubes 10 are soldered or otherwise secured. The diagonal braces or struts 15 are stamped to provide a plurality of lips 19 and 20. The lips 19 are formed on the undersides of the struts 15 and point toward either the rear or the front of the radiator. The lips 20 are formed on the upper surfaces of the struts 15 and point either toward the front or the rear of the radiator. Obviously, the lips 19 and 20 will not impede the air passing through the radiator to any great extent but will cause substantially all of the air to come in contact with the tubes 10 or plates 11. It is, of course, understood that the tubes 10 form water passages of the radiator. Each lip 19 and 20 is so formed that it will cause air passing through the radiator to pass from one side of the strut 15 to the other side thereof. This construction insures that the air will flow back and forth between the water tubes so that substantially all of the air may withdraw heat from the tubes.

The tubes 10 are preferably soldered to the plates 11 by practising my improved method more fully described in my copending application Serial No. 58,542, filed September 25, 1925, the plates 11 being first coated with any suitable substance to which solder will not adhere. This coating is removed from the apices 16 by means of a wire brush or the like and the tubes and plates are then held in their assembled positions by any suitable temporary means (not shown) and are dipped a short distance into a bath of fused solder so that the solder will flow along the apices 16 to solder them to the adjacent surfaces of the tubes 10. The solder flows along the apices because of capillary attraction but does not adhere to the coated surfaces of the plates, nor does it tend to spread itself over those portions of the tubes disposed intermediate the apices 16.

In Figs. 4 and 5, I have illustrated another form of the invention embodied in a radiator comprising water tubes 10^a, which are substantially identical with the aforementioned water tubes 10. The water tubes 10^a are soldered to apices 16^a formed upon plates 11^a,

which resemble the aforementioned plates 11, the plates 11^a being folded or bent to provide a plurality of strut members 15^a extending between the tubes. The strut members 15^a are stamped to provide a plurality of lips 19^a and 20^a, which face toward the front of the radiator. The lips 20^a project from the upper sides of the strut members 15^a and the lips 19^a project from the lower sides thereof. The lips 19^a and 20^a function in a manner which is similar to that in which the aforementioned lips 19 and 20 function. It will be noted that the lips 19^a are laterally spaced with respect to the lips 20^a.

Figs. 6 and 7 illustrate another form of the invention comprising tubes 10^a and plates 11^b formed in the same manner as the tubes 10 and plates 11, respectively, with the exception that the plates 11^b are provided with only two lips 19^b and 20^b which are spaced laterally with respect to each other.

In Figs. 8, 9 and 10, I have shown still another form of the invention embodied in a radiator comprising tubes 10^c which are substantially identical with the aforementioned tubes 10, the tubes 10^c are held in spaced relation and secured to each other by plates 11^c, which are folded or bent to provide a plurality of braces or struts 14^c and 15^c intermediate the tubes 10. Struck up from each strut 15^c are a plurality of blades 20^c which are twisted in such manner that they form a complete turn between the front of the radiator and the rear thereof. The blades 20^c will, of course, set up a turbulence in the air passing through the radiator and cause substantially all of the air to come in contact with the tubes 10^c. The tubes 10^c may be soldered to the plates 11^c by practising the improved method described in the aforementioned co-pending application.

In those forms of the invention illustrated in Figs. 1 to 6, inclusive, it will be noted that the lips 19, 20, 19^a, 20^a, 19^b and 20^b are longitudinally arranged with respect to the radiators. The lips do not interfere to any appreciable extent with the passage of air through the radiator. However, the air is sufficiently deflected as it passes through the radiators so that there will be a relatively large exchange of heat between the elements of radiators and the air.

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:

1. In a radiator, a plurality of substantially straight tubes, bent plates having hori-

zontal portions and inclined portions joining opposite ends of said horizontal portions interposed between the tubes for securing them to each other in spaced relation, said plates being separated from the interior of the tubes solely by the thickness of the material from which the tubes are constructed, and means formed in the inclined portions of the plates for causing a turbulence in air passing through the radiator to bring the air into efficient contacts with the tubes and said plates.

2. In a radiator, a plurality of substantially straight tubes, plates having portions extending transversely between said tubes interposed between the tubes for securing them to each other in spaced relation, each of said plates having strut-like portions disposed diagonally with respect to the tubes and said transverse portions, and passages formed through said diagonally disposed portions to direct air flowing through the radiator against said tubes and said transverse portions.

3. In a radiator, a plurality of substantially straight tubes, plates interposed between the tubes for securing them to each other in spaced relation, said plates being separated from the tubes solely by the thickness of the material from which the tubes are constructed, each of said plates comprising horizontal portions and strut-like portions disposed diagonally with respect to the tubes and joining opposite ends of said horizontal portions, and passages formed through said diagonally disposed portions to direct air flowing through the radiator against said tubes and said plates.

4. In a radiator, a plurality of substantially straight tubes, plates interposed between the tubes for securing them to each other in spaced relation, each of said plates comprising transverse portions connected to said tubes strut-like portions extending between the tubes, and joining said transverse portions, a spiral-shaped member formed in the strut-like portions for causing a turbulence in air passing through the radiator to bring the air into efficient contact with the tubes.

5. In a radiator, a plurality of substantially straight tubes, plates interposed between the tubes for securing them to each other in spaced relation, each of said plates having horizontal portions transversely disposed between said tubes and secured to same, and diagonally disposed strut-like portions extending between said tubes and opposite edges of adjacent horizontal portions, a spiral-shaped portion formed in each strut-like portion for causing a turbulence in air passing through the radiator to bring the air into efficient contact with the tubes and said plates.

In testimony whereof, I have hereunto signed my name.

ARTHUR B. MODINE.