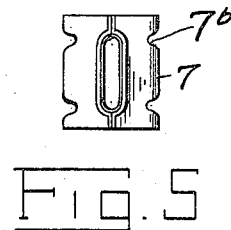
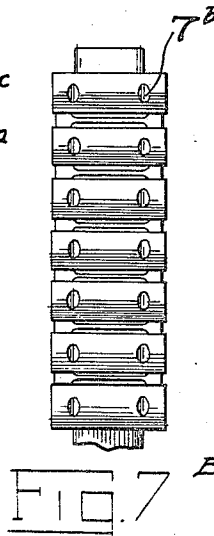
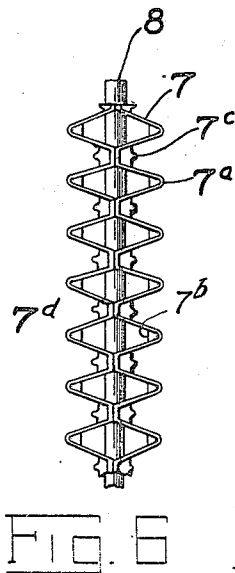
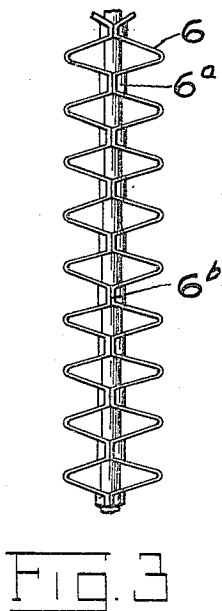
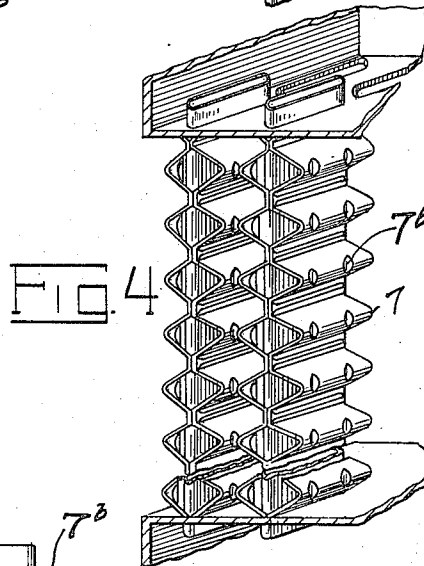
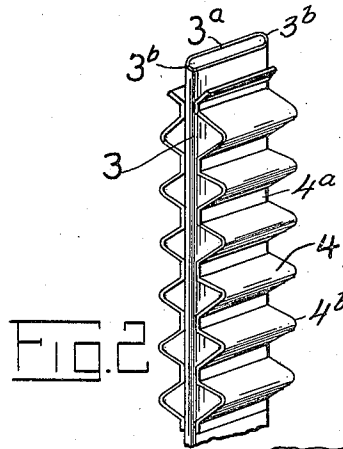
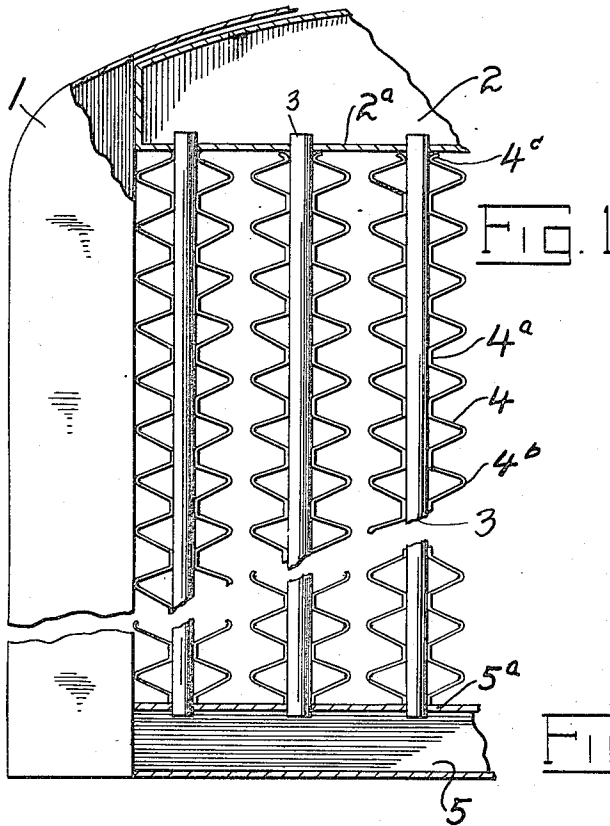


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 AUTOMOBILE RADIATOR.  
 APPLICATION FILED JUNE 25, 1920.

1,401,565.

Patented Dec. 27, 1921.

2 SHEETS—SHEET 1.



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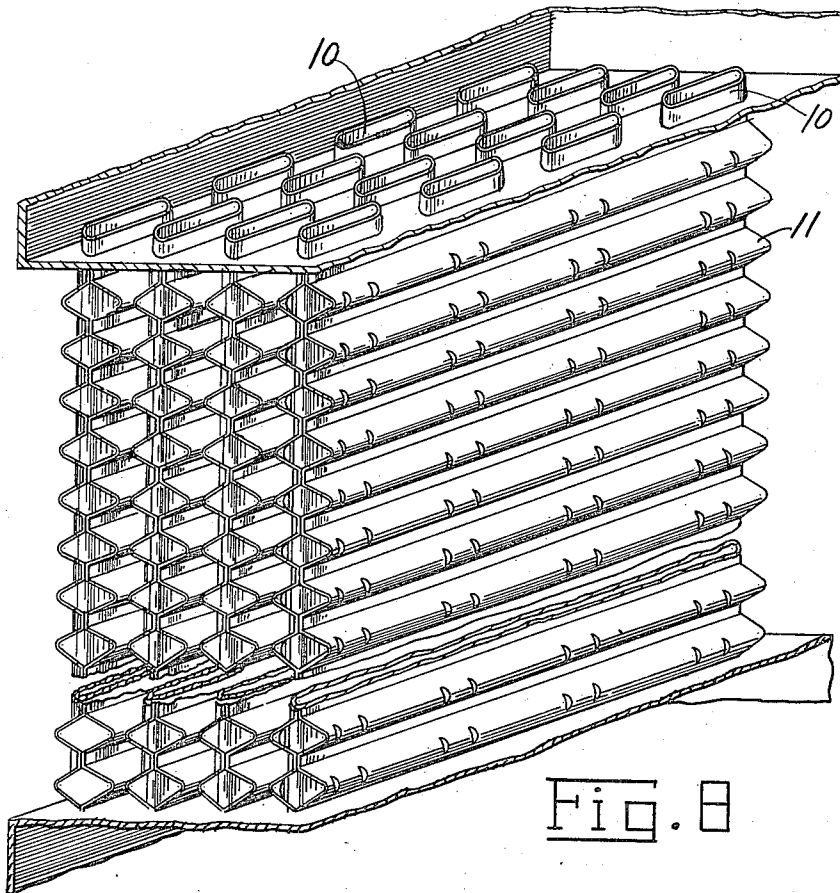


Fig. 8

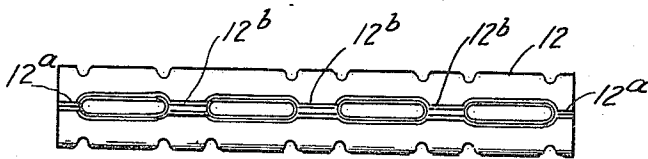


Fig. 9

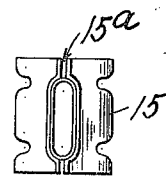


Fig. 10

INVENTOR:  
CHARLES F. SPERY.  
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HIS ATTORNEY.

# UNITED STATES PATENT OFFICE.

CHARLES F. SPERY, OF CHICAGO, ILLINOIS.

## AUTOMOBILE-RADIATOR.

1,401,565.

Specification of Letters Patent.

Patented Dec. 27, 1921.

Application filed June 25, 1920. Serial No. 391,587.

*To all whom it may concern:*

Be it known that I, CHARLES F. SPERY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Automobile-Radiators, of which the following is a specification.

This invention has relation to the type of radiators used in connection with water cooled engines in self propelled vehicles.

The designer of radiators of the aforementioned type is confronted by two major problems. First of all he is required to provide a device of high radiating efficiency. In the second place he must produce a structure cheap enough to compare favorably with devices already on the market. The primary object of my invention is to provide a radiator structure which will successfully meet the said conditions. Furthermore I aim to introduce novel features calculated to enhance the appearance and add to the strength of the radiator. The various objects and the advantageous features of the invention are hereinafter fully described and illustrated in the appended drawings, of which:

Figure 1 is the front elevation of one corner of an automobile radiator, embodying the invention in its simplest form,

Fig. 2 shows a radiator unit removed from the radiator, of Fig. 1,

Fig. 3 is a front view of a somewhat modified form of radiator unit,

Fig. 4 is a fragmentary perspective view of a radiator embodying units of a more elaborate form,

Figs. 5, 6 and 7 illustrate details of the structure last named,

Fig. 8 shows, in perspective, a modified form of radiator,

Fig. 9 is a plan view showing one of the unit sections of Fig. 8 and Fig. 10 is a plan view of one of the tubes, substantially in agreement with the structure of Fig. 7.

Referring in the first instance to Fig. 1, the numeral 1 denotes the radiator casing, at the top of which is placed the radiator tank 2, and at the bottom of the casing is placed the bottom tank 5, all substantially as found in practice. Interconnecting the said tanks are a plurality of tubes 3, set in alined rows, and the said tubes are soldered into the plates 2<sup>a</sup>, 5<sup>a</sup> of the said tanks. As the said alined rows are positioned, in Fig. 1, directly behind each other, only the front

row is visible, but their relative positions are indicated in Figs. 4 and 8. The said tubes are flat and narrow, in cross section, comprising parallel sides 3<sup>a</sup> and rounded corners 3<sup>b</sup>. They are, of course, water tight, and they may be seamless or jointed together, as preferred in practice. To each side of the tube is fastened a continuous strip of thin metal 4, and said strip is corrugated and shaped to provide a flat base 4<sup>a</sup>, from which rise V-shaped sides terminating in a rounded apex 4<sup>b</sup>. For convenience each tube with its pair of corrugated strips will hereinafter be termed a radiator unit. The strips are in the first instance made from a coil of brass of the proper width, by feeding the brass strip through a corrugating machine, whereupon the corrugated metal, as it leaves the machine, is cut into pieces of the proper length, the separations occurring exactly in the middle of the flat base 4<sup>a</sup>. The ends may then conveniently be bent, as indicated at 4<sup>c</sup>, in order to provide a good corner for the solder to lodge in.

In order to assemble the radiator the tubes are, in the first place, inserted into the upper and lower tanks, whereupon the corrugated strips are laid against the tubes, and suitable spacing devices, such as flat bars or the like, are placed between each radiator unit in order to hold the strips temporarily in place. The assembled structure is then dipped into a tank containing molten solder, and again quickly removed, and the structure is found firmly combined and water tight. The temporary bars, which of course are made of material to which the solder will not adhere, are then removed and the radiator is complete and ready for use. The corrugated strips form fins through which, and around which, air is free to circulate.

Unless great care is exercised in handling the above described structure during the assembling and soldering operations there is a danger of the corrugated strips slipping sidewise on the tubes. Or else the aforementioned bars may shift sidewise and drag the strips along. In order to eliminate the danger of such shifting occurring I have made the base 6<sup>a</sup> of the strip 6 conform to the contour of the tube, as shown in Fig. 3. This shape may readily be obtained at the time the strips are made corrugated by simply changing the shape of the corrugating rollers. It is noticed that the edges 6<sup>b</sup> of the strips come together and that the re-

mainder of the bases follow the outline of the tube. When now the units are built up and the spacing bars inserted, there is no danger of the strips shifting out of line.

Another great advantage resides in the fact that the strips now are contacting the full width of the tubes, thereby adding more radiating surface to the structure.

The above features are also brought out in the structure of Figs. 4, 5, 6 and 7, and additional features are furthermore introduced. In the apex 7<sup>a</sup>, of the strip 7, are made a plurality of indentations 7<sup>b</sup>, said indentations extending inward about one-fourth to one-third of the distance of the space from the apex to the tube 8. The said indentations form deflectors, which serve to change the direction of the air rushing through the said spaces and to throw it violently against the sides of the tubes, thereby materially increasing the efficiency of the radiator. It is also noticed that a small fin 7<sup>c</sup> appears in the middle of the base of the corrugated strip 7, and the presence of the said fin will now be explained. When the strips are bent to conform to the contour of the tubes, as shown, it is readily seen, by those versed in the art, that the outer edges 7<sup>a</sup> become stretched far more than the central portion of the strip, in fact the difference is so great that the metal cannot endure the strain and becomes intermittently torn. But I have found it much better practice to equalize the strain by partly stretching the outer edges of the strip and by crowding the central portion of the metal, and the metal thus crowded is caused to take the shape of the aforesaid fin 7<sup>c</sup>. By following this process of corrugation, the metal is not stretched beyond its elastic limit.

Hereinbefore have been shown radiators assembled from single tube units. I shall now describe a composite structure, that is to say a device in which a plurality of tubes are fitted with one common pair of fins, and such structure is shown in Figs. 8 and 9. The tubes 10 remain as described, and they are set in the radiator tanks in rows. Four are shown in each row, but, of course, two or three, or more than four may be used as conditions require. The strips 11 are wide enough to embrace the entire row, and they present all the features hereinbefore described. An additional feature is also introduced, as indicated in Fig. 9. The outer edges 12<sup>a</sup>, of the strip 12, are shown contacting, but the intermediate base portions

12<sup>b</sup> are not drawn entirely together. In the first place this construction is somewhat cheaper to produce because the metal is not required to stretch so much, and therefore less pressure is required in forming the strip, with consequent less wear on the tools and speedier performance. This construction also shows an added airspace, vertically, between the tubes, and thus insures corresponding radiation efficiency.

The structure of Fig. 10 is substantially the equivalent of that shown in Fig. 5, and it is only added in order to show that, even though the outer edges 15<sup>a</sup>, of the strips 15, do not completely meet, for the reasons above stated, the said strips are still firmly held against sideways displacement during the assembling and soldering operations, and the opening between the edges is so slight that it does not suffice to affect the radiating efficiency of my invention, particularly as it is apt to fill up with solder.

I claim:

1. In a radiator, the combination with the upper and lower radiator tanks, of a plurality of flattened tubes interconnecting the said tanks, a pair of corrugated fins attached to each tube, said fins having flat bases encompassing the tubes, shaped with horizontally disposed V's extending from the said bases and having a plurality of indentations in the apex of each V for the purpose of directing the air passing through the said fins toward the tubes.

2. In a radiator, a series of radiator units, each unit comprising a flat tube and a pair of fins encompassing the said tube, each fin consisting of a corrugated strip of thin metal having a series of flat bases for attachment to the tube, said bases bent to follow the outline of the tube and formed with a ridge rising in the middle composed of surplus metal from the bending.

3. In a radiator, the combination with the upper and lower tanks, of a plurality of vertically disposed tubes interconnecting said tanks and arranged in rows from front to rear, and a thin metal strip fastened on each side of each row of tubes, each strip formed to present horizontally disposed V's provided with indentations in each apex for the purpose of directing the passing air toward the tubes, the strips having flat bases bent to follow the outline of the tubes and formed with a ridge rising in the middle of each base composed of surplus metal from the bending.

CHARLES F. SPERY.