

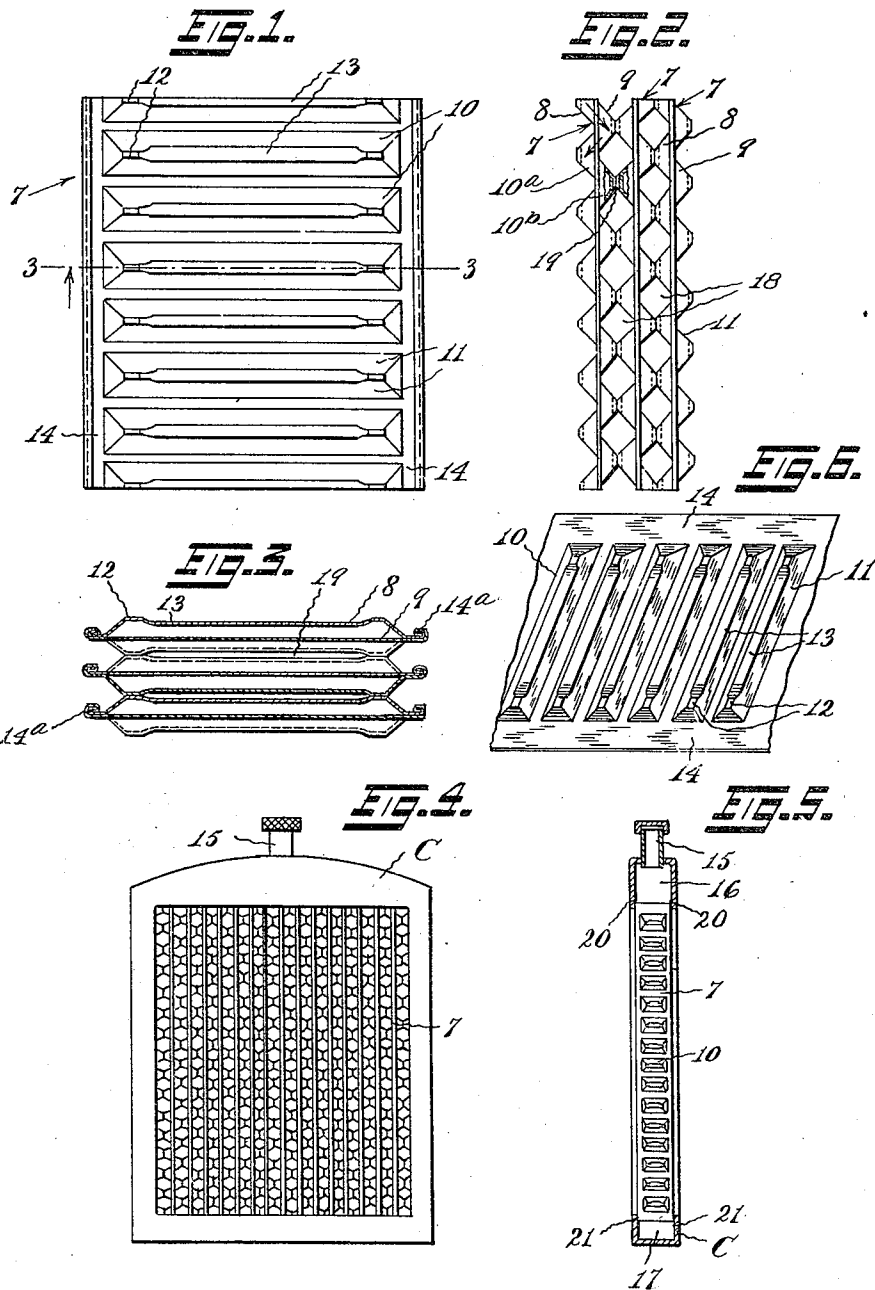
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RADIATOR

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# UNITED STATES PATENT OFFICE.

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RADIATOR.

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*To all whom it may concern:*

Be it known that I, EMIL BEHRINGER, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Radiators, of which the following is a specification.

This invention relates to radiators in general and more especially to automobile radiators having conduits formed out of sheet metal sections.

Among the objects of the present invention, it is aimed to provide an improved radiator construction whereby the radiating surfaces thereof are greatly increased in proportion to the mass of cooling medium employed, thereby reducing the radiator size to a minimum and obtaining maximum radiating efficiency thereby.

The present invention further contemplates a radiator having an improved arrangement for obtaining an extensive heat dissipating surface area.

The invention still further contemplates the provision of a radiator formed out of sheet metal sections having an improved arrangement of the sections, whereby to obtain an extensive heat dissipating surface area and facilitate the effective circulation of the heat absorbing medium without increasing the size of the radiator itself.

With certain types of automobile radiators having merely lateral passages for the heat absorbing medium, pressure of the heat absorbing medium was frequently developed with its consequent detrimental effect on the radiator. The present invention aims to provide an improved arrangement whereby these detrimental pressures may be effectively avoided. To this end, the invention specifically contemplates an improved radiator construction having lateral passages and vertical passages communicating with such lateral passages.

These and other features, capabilities and advantages of the invention will appear from the subjoined detail description of certain specific embodiments thereof illustrated in the accompanying drawings in which,

Figure 1 is a side elevation of a plurality of sections of the radiator.

Figure 2 is an end elevation of Fig. 1 partly broken away.

Figure 3 is a plan view in section on the line 3—3 of Fig. 1.

Fig. 4 is a front elevation illustrating a radiator equipped according to the present invention.

Fig. 5 is an end elevation of a radiator case in section showing the radiator sections secured therein.

Fig. 6 is a fragmental perspective view showing the corrugations or raised portions of a sheet comprised in a section of the radiator.

My present invention comprises radiator sections 7 each composed of complementary sheets 8 and 9 of suitable metal or material provided with corrugations or raised portions 10 pressed or otherwise formed therein. Each of the corrugations 10 is oblong and has sloping sides 11 converging upwardly towards each other, the sides 11 terminating when near the point of convergence in heads or ends 12 connected by a depressed longitudinal portion 13 of the corrugation, the corrugations being of trapezoidal prismatic form, and the purpose of the heads 12 and the depressed portions 13 being hereinafter stated. The corrugations 10 provide on the opposite side of the sheet indented or depressed spaces corresponding in shape substantially to the outward form of the corrugations 10 by which they are formed, which indented or depressed spaces of a sheet 8 in conjunction with the similar spaces of an adjacent sheet 9 form an angular or zig-zag channel hereinafter mentioned. Each of the sheets 10 is provided on the sides of the sheet adjacent to the ends of the corrugations 10 with edges 14 extending laterally beyond the vertical line of the ends of the corrugations, the purpose of edges 14 being hereinafter stated.

A radiator case, such as generally denoted by C, Figs. 4 and 5, is provided for receiving therein a plurality of sections 7 when in adjoining relation, such case having the customary filler 15, and having the upper and lower chambers 16 and 17.

In assembling my device the sheets 8 and 9 are placed back to back to form a section 7, the corrugations 10 of the plate 8 being staggered in relation to the plate 9, as shown by 10<sup>a</sup>, 10<sup>b</sup>, Fig. 2. The edges 14 of the sheets being in contact are folded or crimped together or otherwise suitably secured together as at 14<sup>a</sup>, to fasten the plates together and to provide a water tight connection of the plates at the edges. The sheets 8 and 9 thus form a section 7, open

at top and bottom but closed at the sides, the adjacent inner spaces of the adjacent corrugations 10 forming an angular or zig-zag channel, indicated by the arrows, Fig. 2, extending from the top to the bottom of the section, and open at top and bottom, and each section having two-faced heads or nodules formed by the end-surfaces or end-faces 12 of the complementary sheets placed in back-to-back relation as shown in Fig. 3, with depressed longitudinal portions 13 of the corrugations of each sheet between the heads or nodules on either side of the sheets. The sections 7 are then arranged in adjoining relation to each other so that the faces 12 of one section contact or engage with the faces 12 of an adjacent section, thereby forming transverse air passages 18 Fig. 2 and vertical riser passages 19 Fig. 3 between adjacent sections, the passages 18 and 19 communicating with each other, as shown in Fig. 2, the riser passages 19 being formed by combined depressed longitudinal portions 13 of adjoining sections. The sections 7 when in this adjoining relation are received in the case C, being let into or otherwise suitably secured to the case in a well known manner, as at 20—20 and 21—21, Fig. 5.

I thus provide a radiator having channels formed by the interior spaces of corrugations of metal plates which form sections of the radiator, which channels are open at top and bottom and communicate with the chambers of the radiator, the radiator further having passages which extend transversely through the radiator, and passages which extend vertically through the radiator and communicate with the transverse passages for circulation of air or other cooling medium through the radiator, these transverse and vertical passages being formed by contacting or engaging corrugations of adjoining sections composed of the above mentioned metal plates.

Obviously from the foregoing, it will be noted that owing to my construction a large area of a radiator surface is presented to incoming air, and due to the substantial compression thereof, due to the movement of a vehicle having such radiator thereon that the air will be caused to pass through to transverse air passages 18, in the usual manner, thereby abstracting heat from the conducting surfaces and that air will be compelled to mount upwardly into the vertical riser passages 19 which adjoin the passages 18 and that these surfaces will also radiate heat to be carried off by the air passing therethrough.

It is also obvious that this construction increases the radiating surfaces of my device, and such increase is due to the surface of the depressed longitudinal portions 13, which

form the vertical riser passages 19. It is obvious that this surface may be further developed so as to present a larger proportion of the area of the radiator, and that this in turn will constitute, in a single radiator, a very greatly increased percentage of radiating surface, thereby making far greater efficiency in the cooling of such radiator.

It is obvious that various changes and modifications may be made in the details of construction without departing from the spirit of the invention, or exceeding the scope of the appended claims.

Having thus described my invention, I claim:

1. In a radiator, a plurality of radiator sections, each section comprising two metal sheets, each sheet having formed thereon a series of corrugations of trapezoidal prismatic form having heads formed by depressed portions of the corrugations.

2. In a radiator, a plurality of radiator sections, each section comprising two metal sheets, each sheet having formed thereon a series of corrugations of trapezoidal prismatic form extending transversely of the sheet having heads formed by depressed portions of the corrugations; the sheets being connected back to back to form a section, the corrugations of one sheet being arranged in staggered relation to the corrugations of the other sheet whereby the interiors of the corrugations provide zig-zag interior circulatory space for the section extending in the vertical line of the section.

3. In a radiator, a plurality of radiator sections, each section comprising two metal sheets, each sheet having formed thereon a series of corrugations of trapezoidal prismatic form extending transversely of the sheet having heads formed by depressed portions of the corrugations; the sheets being connected back to back to form a section, the corrugations of one sheet being arranged in staggered relation to the corrugations of the other sheet whereby the interiors of the corrugations provide zig-zag interior circulatory space for the section extending in the vertical line of the section; the contacting exteriors of the corrugations of adjacent sections when the sections are operatively connected to form the radiator providing a plurality of passages for cooling medium extending transversely of the radiator; the depressions between the heads of the corrugations of adjacent sections providing a plurality of riser passages for affording communication in the vertical line of the radiator between the passages for cooling medium.

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