

G. V. CANDLER.
RADIATOR.
APPLICATION FILED JUNE 30, 1910.

976,147.

Patented Nov. 22, 1910.

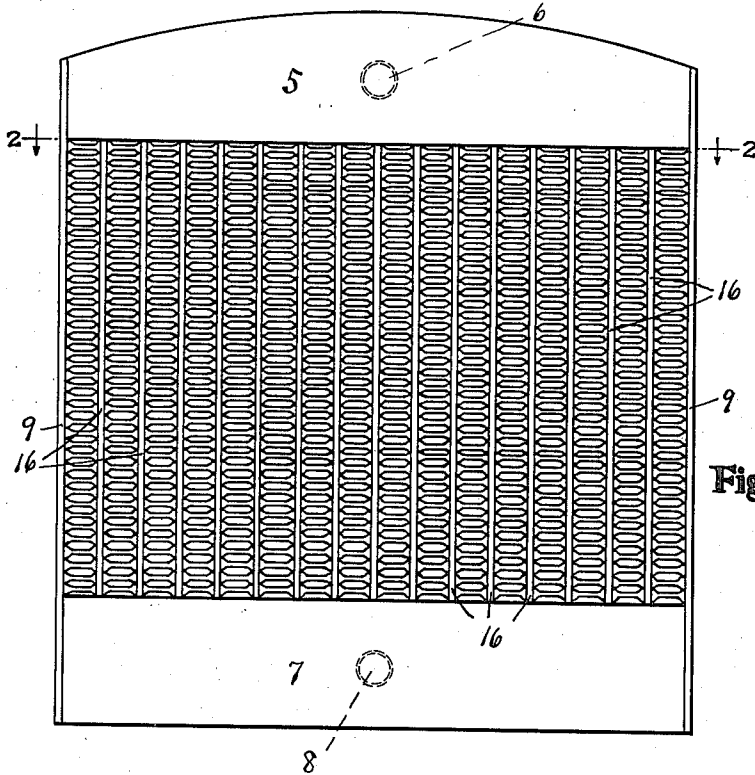


Fig. 1.

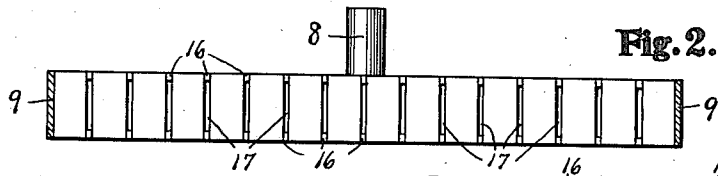


Fig. 2.

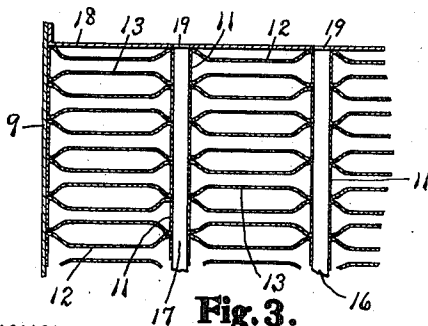


Fig. 3.

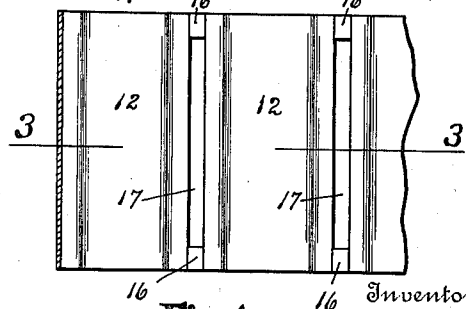


Fig. 4.

Witnesses

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GEORGE V. CANDLER, OF DETROIT, MICHIGAN.

RADIATOR.

976,147.

Specification of Letters Patent.

Patented Nov. 22, 1910.

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To all whom it may concern:

Be it known that I, GEORGE V. CANDLER, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Radiator, of which the following is a specification.

This invention relates to means for cooling the circulating liquids of explosion engines by currents of air passing over thin plates of metal, commonly called fins, which are connected to tubes through which the liquids flow, and the object of my improvement is to provide a radiator having a maximum of cooling surface for its weight, and which can be constructed at moderate cost.

In the accompanying drawings, Figure 1 is a front view of a radiator of this type adapted for automobile engines. Fig. 2 is a cross section on the line 2—2 of Fig. 1. Fig. 3 is a cross section on the line 3—3 of Fig. 4. Fig. 4 is an enlarged section of the construction shown in Fig. 2.

Similar reference characters refer to like parts throughout the several views.

This device follows the general lines of construction adopted by many automobile manufacturers, and comprises an upper tank 5 having an inlet connection 6 for the hot circulating liquid, a lower tank 7 having an outlet connection 8 for the cooled liquid, side frames or plates 9 connecting the tanks, and the proper radiating devices through which the liquid passes from the upper to the lower tank. The present construction further follows the usual practice in providing vertical tubes for the liquid, between the tanks, and radiating fins united to the tubes for dissipating the heat of the liquid in the tubes.

The present radiator is formed by so uniting a series of short tubes, approximately dumb-bell shaped in cross section, into stacks, then combining the stacks to form vertical pipes and radiating fins, and then uniting the radiating elements with the tanks. The tubes are formed with flat sides 11, and concave tops 12 and bottoms 13 as shown in Fig. 3. Short lengths of these tubes are stacked so that the opposite sides 11 of the tubes of each stack form flat surfaces. These sides of the stacks, after proper preparations, are dipped in molten solder which unites the tubes. The tops 12 and bottoms 13 will be preferably substantially equally spaced. A desired number of

stacks are then assembled with narrow spacing bars 16 of metal between the edges of the faces of the stacks, and both sides of the entire structure are alternately dipped in solder to unite the parts. This procedure provides vertical circulating pipes 17 whose walls are formed by the thin sides 11, and by the comparatively stiff bars 16. As the tops 12 and bottoms 13 are integral with the sides 11, they form ideal radiating fins.

The bottom 18 of the upper tank and the top of the lower tank are formed with slots 19 as shown in Fig. 3, and are preferably soldered to the upper ends of the stacks and of the bars 16.

The construction shown offers a maximum of radiating surface for the amount of sheet metal employed, for the radiating fins form the circulating pipes.

The details and dimensions of the various parts can be changed by those skilled in the art without departing from the spirit of my invention.

Having now explained my construction, what I claim as my invention and desire to secure by Letters Patent is:—

1. In a radiator, the combination of an upper and a lower receiver, radiating devices between the same comprising continuous stacks of tubes so formed that their sides contact at their edges to form flat plates between which the separated tops and bottoms of the tubes extend, and upright rods connecting the edges of adjacent stacks to form circulating pipes extending between the receivers.

2. In a radiator, the combination of united stacks of short tubes so formed that the sides of the tubes engage and form substantially vertical plates and the tops and bottoms of the tubes are substantially equally spaced throughout the stack, vertical rods uniting the edges of said plates to form pipes, and tanks for circulating liquids connected to the upper and lower ends of said pipes.

3. In a radiator the combination of stacks of short horizontal tubes having their vertical sides in the same planes and united to form plates and their horizontal sides concave, vertical rods united to the edges of adjacent stacks to form vertical pipes for the circulating liquids, and tanks connected to the upper and lower ends of the pipes.

4. In a radiator, the combination of stacks of short horizontal tubes extending trans-

versely to the face of the radiator and having their vertical sides in the same planes and united to form plates, upright means united to the edges of adjacent stacks to
5 form vertical pipes for the circulating liquids, and tanks connected to the upper and lower ends of the pipes, the sides of adjacent tubes being separated a portion of their length and serving as radiating members to trans-
10 bers to trans-; heat from the water passing

between the tubes to the air passing through the tubes.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GEORGE V. CANDLER.

Witnesses:

EDWARD N. PAGELSEN,
ELIZABETH M. BROWN.