F. TODD.

RADIATOR.

APPLICATION FILED DEC. 11, 1909.

966,721.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

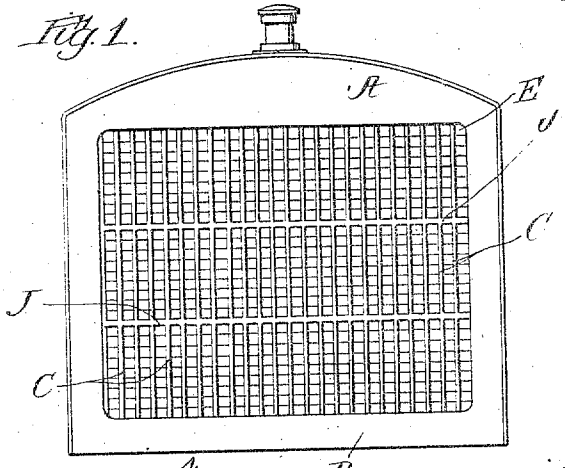


Fig. 3.

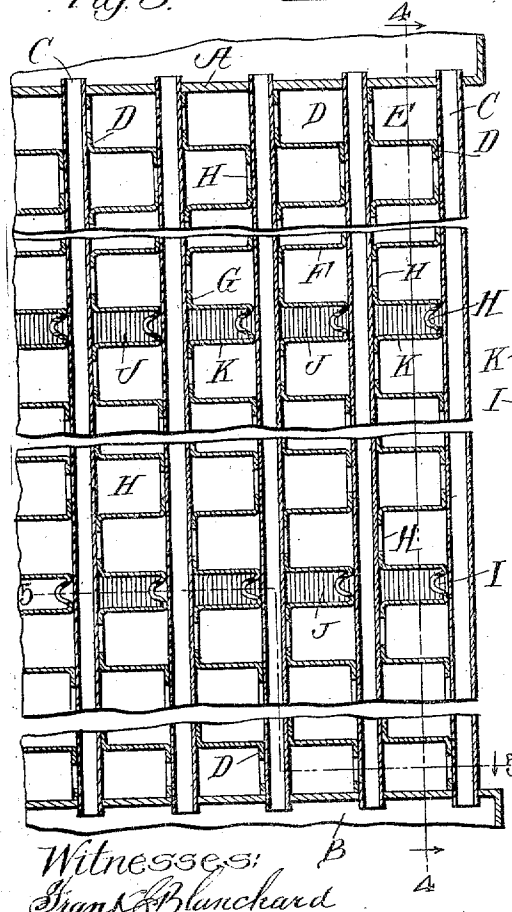
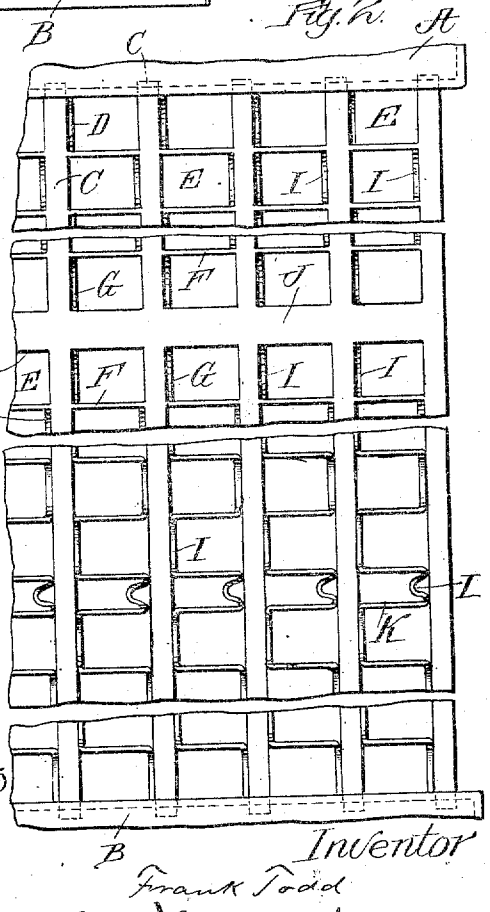


Fig. 2.



Witnesses:
Frank L. Blanchard
Bradley Sayre Carr

Inventor
Frank Todd
By [illegible]
Attorney

F. TODD.

RADIATOR.

APPLICATION FILED DEC. 11, 1909.

966,721. Patented Aug. 9, 1910.

2 SHEETS—SHEET 2.

Fig. 4.

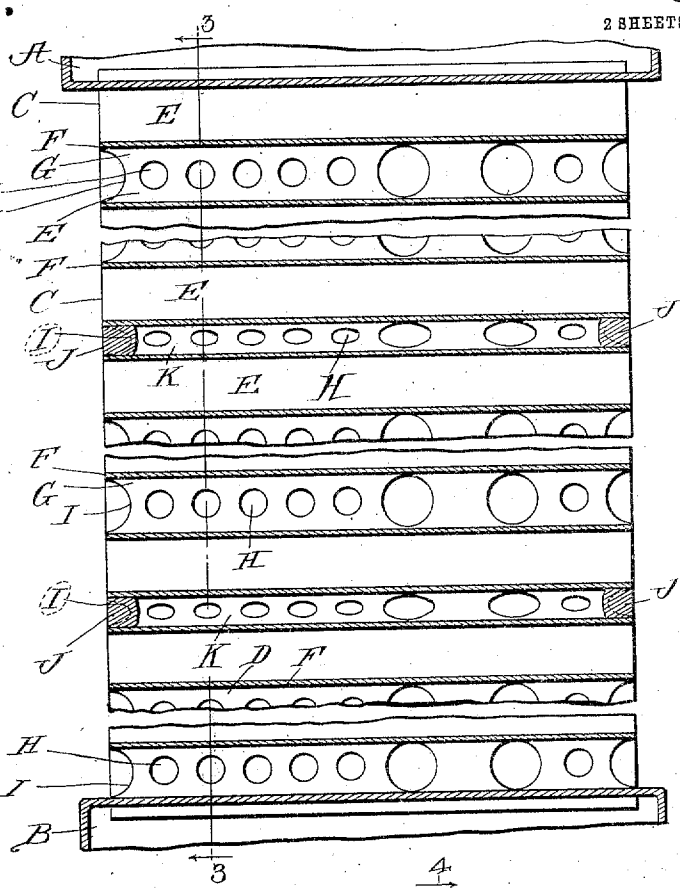
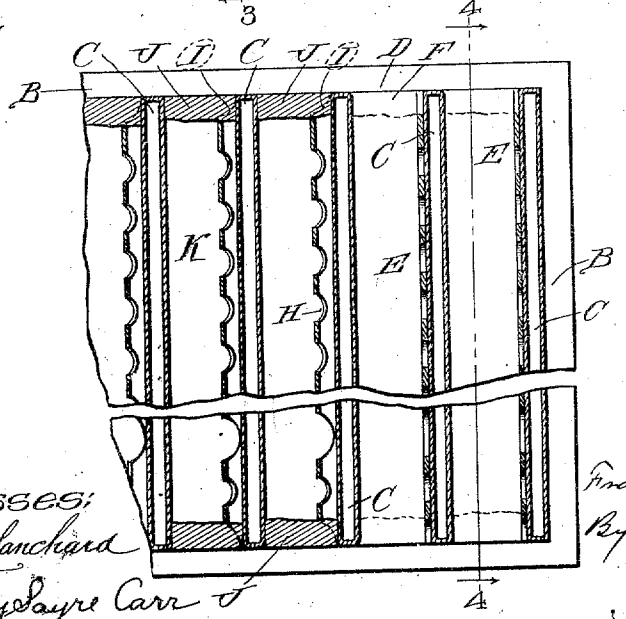


Fig. 5.



Witnesses:
Frank L. Blanchard
Bradley Sayre Carr

Inventor
Frank Todd
By Wilkinson
Attorney

UNITED STATES PATENT OFFICE.

FRANK TODD, OF CHICAGO, ILLINOIS, ASSIGNOR TO JOSEPH B. LONG, OF CHICAGO, ILLINOIS.

RADIATOR.

966,721. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed December 11, 1909. Serial No. 532,553.

To all whom it may concern:

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

The present invention relates to that class of so called radiators that are adapted more especially for use on automobiles but it is manifest that the invention is applicable to any and all apparatuses in which the circulating medium passing through it is to be cooled, or to give up its heat to the surrounding atmosphere, such an apparatus being properly termed a radiator, or in which the circulating medium is to absorb heat from the surrounding atmosphere, such an apparatus being properly termed a cooler or refrigerator.

The primary object of the invention being to provide an efficient radiator for automobiles, the following description will, for the sake of brevity, be confined to such a radiator, with the understanding, however, that I reserve to myself the exclusive right to use the several novel features of the invention in any apparatus for any specific purpose for which they may be adapted.

Desiderata in all radiators for automobiles include low cost of manufacture, lightness combined with adequate strength and durability, efficiency in radiating capacity combined with compactness, and ornateness, and the attainment of all of these in a single radiator, in as high a degree as practicable, is aimed at by the present invention.

The invention consists in the features of novelty that are hereinafter described with reference to the accompanying drawings, which are made a part of this specification, and in which:

Figure 1 is a front elevation on a small scale of a radiator embodying the invention, conventionalized. Fig. 2 is a front elevation of a section or fragment of a radiator embodying the invention on an enlarged scale. Fig. 3 is a vertical transverse section thereof or, in other words, in a vertical plane extending from side to side of the radiator, on the line 3—3, Figs. 4 and 5. Fig. 4 is a vertical longitudinal section thereof on the line 4—4, Figs. 3 and 5. Fig. 5 is a horizontal section thereof on the offset line 5—5, Figs. 3 and 4.

In all of the several figures of the drawings, except Fig. 1, the sheet metal of which the so called channel strips and the water tubes are made is exaggerated in thickness.

The radiator has headers, A and B, into the former of which the water to be cooled, as it comes from the water jacket of the engine, is received while from the latter the water is returned to the water jacket after having passed through the tubes C, connecting the two headers. As shown in the drawings the headers are located one above the other and the water tubes are vertical, but this particular arrangement of the parts is not essential.

According to the present invention, the water tubes pass uninterruptedly from the upper to the lower header and this has the advantage of avoiding any obstructions or irregularities within the tubes which would be incident to forming the tubes in a plurality of longitudinal sections arranged end to end. Each of the tubes in its lateral dimensions, preferably extends from the front to back of the radiator and has flat sides. The several tubes are arranged parallel with each other and spaced apart at such distances as will leave between them passages extending from front to back of the radiator through which the air may freely pass as the machine progresses. In each of these passages is arranged a so called channel strip, D, which extends continuously from the one header to the other. Each of these so called channel strips consists of an integral strip of sheet metal bent rectangularly in such directions as to form a continuous series of rectangular channels, E, which open in opposite directions, or, in other words, have their open sides presented at opposite sides or faces of the strip.

The front ends of the walls, F, which form the sides of the channels, are flush with the front sides or edges of the tubes and are common to adjacent channels, while the bottom walls, G, of the channels contact with the sides of adjacent tubes. These bottom walls are provided with openings or perforations, H, one object of which is to reduce weight, while another object is to facilitate the passage of heat from the walls of the water tubes directly into the horizontal air passages, and in order that these perforations shall not seriously impair the strength of the radiating strip they are located wholly

between the bends of the strip which result in the channels, leaving said bends or angular portions of the strip intact. The outer ends of the bottoms, G, of the channels are cut away or notched as shown at I so that they are not noticeable—in fact they are hardly visible—from the front of the radiator and these notches or cut away portions are provided principally for the sake of appearance in the completed radiator.

Looking at Fig. 3, it will be seen that at the open sides of the channels there is but one thickness of metal intervening between the water in the tubes and the air passages, namely the side wall of the tube, while at the bottoms of the channels, there is a double thickness, excepting where the perforations occur. If this double thickness were continued quite to the front sides or edges of the tubes, the face of the radiator would present an irregular appearance, while, on the other hand, as a result of the cutting away of the ends of the bottoms of the channels, the face of the radiator presents a symmetrical appearance made up of rectangular openings arranged in both horizontal and vertical alinement and having similarly alined boundaries of uniform thickness. That is to say, the front edges of the tubes, all of which are of equal thickness, form the vertical boundaries of the rectangular openings, while the side walls of the channels, all of which are of equal thickness form the horizontal boundaries of the rectangular openings, the tubes, however, being of greater thickness than the side walls of the channels.

The channel strips perform several functions. They serve to space apart and to brace against each other, to a greater or less extent, the intermediate portions of the tubes, and their side walls provide extended radiating surfaces for transmitting the heat from the walls of the tubes and radiating it into the air passages. When continuous tubes, extending uninterruptedly from one header to the other and therefore of considerable length, are used it is desirable to additionally brace the tubes against each other, laterally, as much as possible without materially reducing the aggregate area and capacity of the air passages and at the same time brace and strengthen the strips themselves, which are equal in length to the length of the tubes, as against forces acting vertically and tending to collapse or distort the channels. To this end a limited number of braces acting both horizontally and vertically are arranged in an equal number of the channels so that each brace completely fills the end of the channel in which it is arranged and the several braces are arranged in horizontally alined channels. In that form of the invention, which is the subject matter of the present application, each of these braces consists of a body of solder, J, which completely fills the end of the channel and, as shown more clearly in Figs. 1 and 2, these braces occupy alined channels extending from side to side of the radiator at any desired intervals from the top to the bottom thereof. These braces being flush with the front edges of the tubes and of greater width than the tubes have the effect of giving the front face of the radiator the appearance of a plurality of horizontal panels and this is an appearance which is very popular with and much sought by the users of automobiles of the present day. This panel effect is still further enhanced by making the horizontal dividing lines narrower than the depth of the air passages and to this end the channels in which the braces are arranged are narrower than the open channels, as shown at K. In the process of manufacture this difference in the width of the channels may be produced in any desired manner but it is preferably produced by the use of forming dies which form a longitudinal crimp or corrugation in the bottom of each channel as shown at L, the advantage of these crimps or corrugations being that they tend to increase the rigidity of the channel strip as a whole, while at the same time they do not mar or detract from the appearance of the radiator because they are concealed, whereas, if the bottoms of the open channels were similarly crimped, the crimps would be visible at the front of the radiator and destroy the right-line effect which is desired.

It will be understood that when all of the parts are assembled the front face of the radiator is immersed in a bath of molten solder whereby all of the joints are completely closed and sealed water tight.

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

1. A radiator having, in combination, two headers, a series of flat, parallel, continuous tubes extending uninterruptedly from one header to the other, said tubes being spaced apart leaving air passages between them, integral spacing, bracing and radiating strips bent so as to form a continuous series of rectangular channels opening alternately in opposite directions arranged in said passages with their channels in horizontal alinement, the bottoms of the channels of each strip being in contact with the sides of adjacent tubes and being cut away at their forward ends, while their sides terminate at their forward ends flush with the front sides of the tubes, and braces arranged in horizontally alined channels at infrequent intervals from top to bottom of the radiator.

2. A radiator having, in combination, two headers, a series of flat, parallel continuous tubes extending uninterruptedly from one header to the other, said tubes being spaced apart, leaving air passages between them,

integral spacing, bracing and radiating strips, bent so as to form a continuous series of rectangular channels opening alternately in opposite directions arranged in said passages with their channels in horizontal alinement, the bottoms of the channels of each strip being in contact with the sides of adjacent tubes and being cut away at their forward ends, while their sides terminate at their forward ends flush with the other sides of the tubes, and braces arranged in horizontally alined channels at infrequent intervals from top to bottom of the radiator, the bottoms of the channels being crimped longitudinally.

FRANK TODD.

Witnesses:
JOSEPH B. LONG,
L. M. HOPKINS.