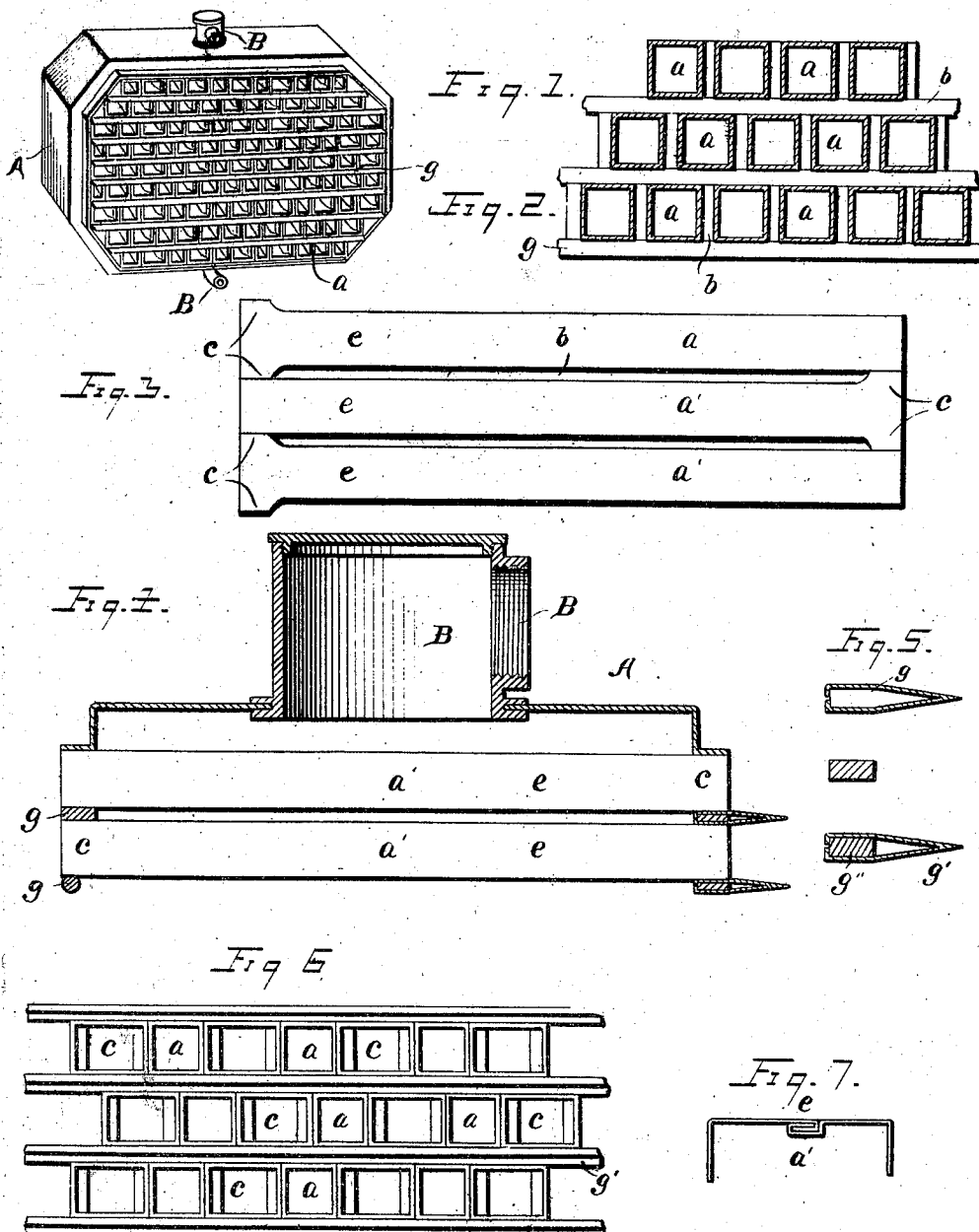


No. 873,385.

PATENTED DEC. 10, 1907.

E. L. OGLE.
RADIATOR.

APPLICATION FILED JAN. 7, 1907.



WITNESSES

W. F. Koble
C. W. Marsh

BY

INVENTOR
E. L. Ogle
Dudley L. Hunt
Attorneys

UNITED STATES PATENT OFFICE.

ELMER L. OGLE, OF NEW YORK, N. Y., ASSIGNOR TO N. LEROY OTIS, OF NEW YORK, N. Y.

RADIATOR.

No. 873,385.

Specification of Letters Patent.

Patented Dec. 10, 1907.

Application filed January 7, 1907. Serial No. 351,095.

To all whom it may concern:

Be it known that I, ELMER L. OGLE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Radiators, of which the following is a specification.

My invention relates to coolers or radiators for dissipation or rapid equalization of temperature in liquids, gases or vapors, and it has for its object the improvement in efficiency, strength and stiffness of such radiators, the cheapening of their manufacture and the prevention of ill effects resulting from corrosive materials which may be brought into contact therewith.

To illustrate one form in which my invention may be embodied the accompanying drawings are furnished which form a part hereof and in which

Figure 1, represents a perspective view of the cooler assembled. Fig. 2, is a section of a part of the cooler showing the grouping of certain square tubes forming the body of the cooler. Fig. 3, is a horizontal section through a part of the cooler. Fig. 4, is a vertical section of a portion showing the deflectors and a portion of the shell. Fig. 5, is a section view showing a construction of the deflector. Fig. 6, is the front view of one form of the cooler. Fig. 7, is a detail of the off-set lock joint in one of the tubes.

Within the casing or shell A is secured a group of comparatively short tubes *a* through which air or other cooling medium may pass and between which the liquid to be cooled may circulate in thin films. To create these spaces *b* between the tubes *a* I enlarge one end of each square tube upon two sides only and then place them side by side alternately as to ends and solder these ends together. These tubes *a* must be thin and consequently fragile if they are to be efficient.

In my cooler the tubes may be held apart in any suitable manner in any event I do very little enlarging of the tubes and this at one end only. I can thus use thinner tubes for my purpose. With thinner tubes, a higher cooling efficiency and a lighter cooler may be constructed which is very rigid and reliable as to construction. With this arrangement it is also possible to use seamed or jointed tubes *a* made up of very thin sheet steel or other metal, the enlargement *c* not necessarily coming at the joint itself.

When the tubes are laid up in courses spacers may be used as shown in Fig. 4, *g* being a plain spacer, *g'* a projecting spacer, the projection of which may be employed as a deflector for the air. A filler *g''* (see Fig. 5.) is provided for the open side of the deflector.

The tubes are solidly soldered at their ends. To produce a cooler which will withstand high pressure I find that this soldering should be very deep and thorough, and to accomplish this I at first found it necessary to tin each end of each "tube" or to use tinned metal tubes. On account of rusting of the surfaces especially where the tubes are made of steel, I find it desirable to coat these tubes after tinning, with copper. This may be done by electric deposition of copper or in any suitable manner. These tubes will solder well owing to the tinning under the thin copper coat and will be much firmer and stronger at the joints than where the tin is not used.

Coolers as at present employed upon automobiles must be so organized as to withstand considerable internal pressure from the cooling liquid as well as a great amount of mechanical shock and jar. A large part of this strain comes upon the soldered joints which, therefore, must be more than ordinarily secure. The facility with which tin alloys itself with other metals, especially steel, is here utilized to secure the evident advantage in employing a cheaper and stiffer metal for tubes while at the same time securing all of the non-corrosive advantages of copper surfaces, especially where traces of acids used in and about or for clearing the core work of the jackets of the combustion engines is likely to be found present in the cooling water circulating in the cooler from such jackets.

It can readily be seen that the tubes may be many sided or even round with squared or rectangular ends, the squared ends being preferred.

The operation of the device is evident from the foregoing description. Its primary use is for the rapid dissipation of heat, this being accomplished by first dividing the heated medium into thin layers between very thin cooled walls and cause circulation in irregular courses so as to bring different portions of the medium to be cooled into contact with such walls. The walls should be thin so as to instantly transmit and dissipate the heat.

The casing or shell A is provided with suitable inlet and discharge openings as BB. (See Figs. 1 and 4.)

For the purpose of illustration I have described one construction of my improved cooler. I do not wish to be limited to any exact detail or arrangement of parts shown as others may be employed and some omitted and the invention extends to such use.

10 Having fully described my invention, I claim:

1. Steel radiator-tubes adapted to be united by solder; tinned at the points where they are to be soldered, in combination with
15 a superimposed coat of copper over-laying the tube including the tinned surfaces.

2. Steel radiator tubes adapted to be united by solder; tinned at the points where they are to be soldered, in combination with

a superimposed, electrolytically-deposited, 20 coat of copper over-laying the tube including the tinned surfaces.

3. A cooler comprising steel tubes adapted to be united by solder; tinned at the points where they are to be soldered, in combination 25 with a superimposed coat of copper over-laying the tube including the tinned surfaces, the said tubes being soldered at their ends through the copper coating, substantially as described. 30

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ELMER L. OGLE.

Witnesses:

FRED P. SCHROEDER,
CHAS. C. KNOLL.