No. 790,884. PATENTED MAY 30, 1905.

H. E. COFFIN.

COOLER.

APPLICATION FILED DEC. 7, 1903.

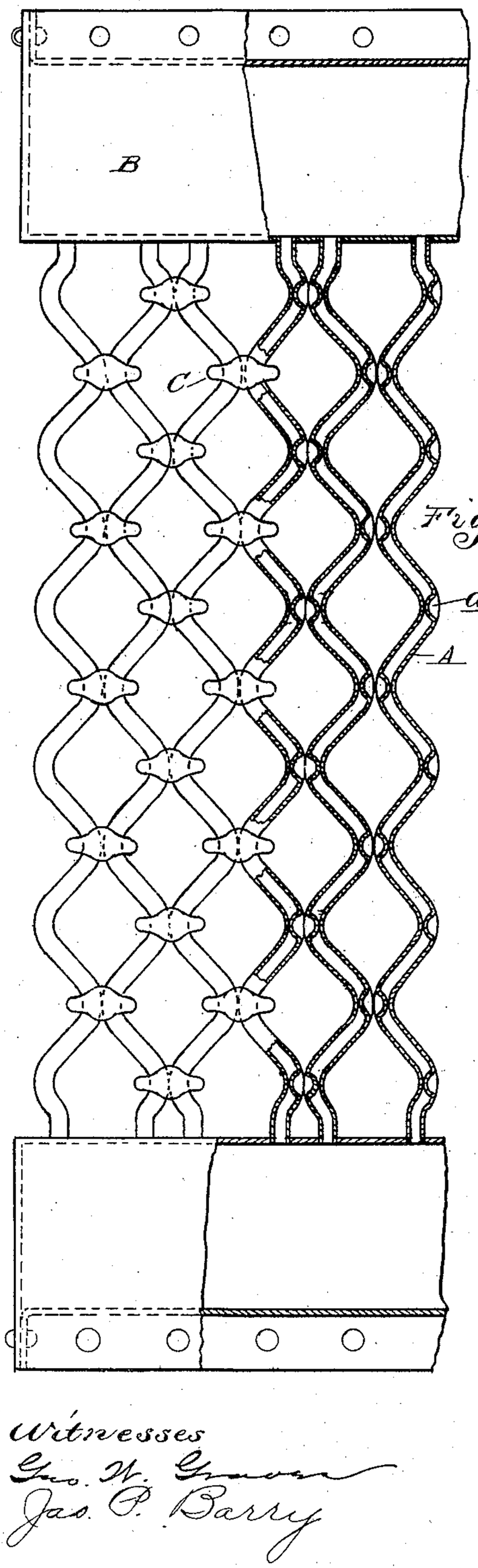


Fig. 1.

Fig. 2.

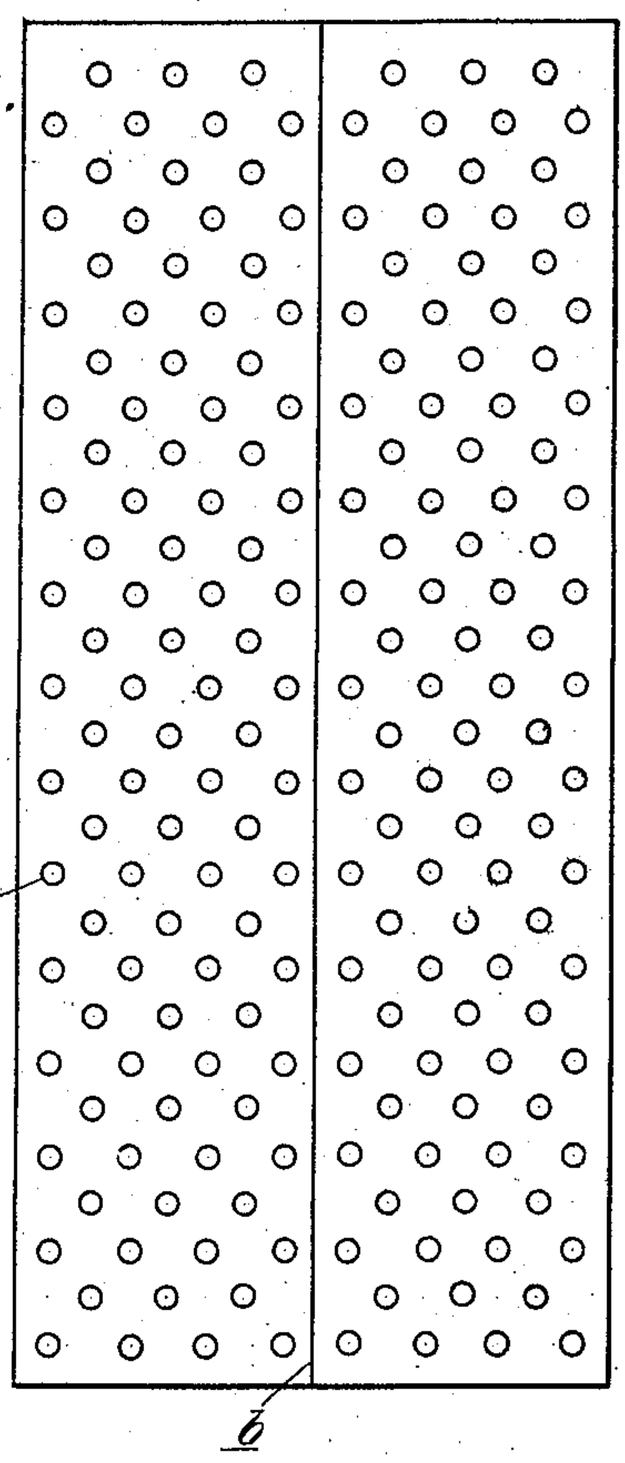


Fig. 4.

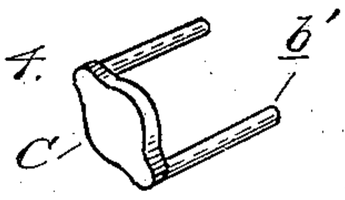
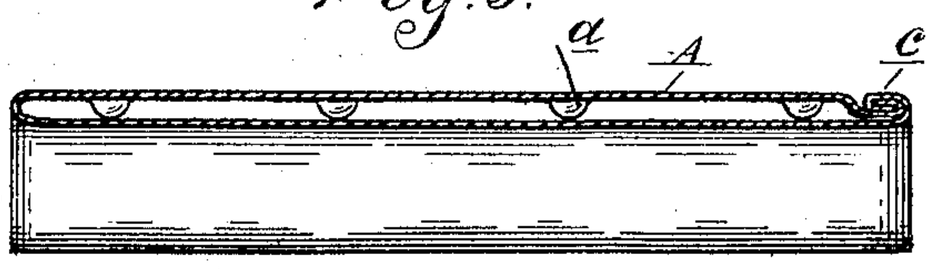


Fig. 3.



Witnesses
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No. 790,884. Patented May 30, 1905.

UNITED STATES PATENT OFFICE.

HOWARD E. COFFIN, OF DETROIT, MICHIGAN, ASSIGNOR TO OLDS MOTOR WORKS, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

COOLER.

SPECIFICATION forming part of Letters Patent No. 790,884, dated May 30, 1905.

Application filed December 7, 1903. Serial No. 184,193.

To all whom it may concern:

Be it known that I, HOWARD E. COFFIN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Coolers, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to coolers, and is more particularly designed for use in connection with explosion-engines in which the surplus heat is first absorbed by a fluid medium.

It is the object of the invention to provide means for circulating the fluid medium in contact with a relatively large area of radiating-surface in relation to the quantity of fluid circulated.

It is a further object to provide means of air circulation in contact with said radiating-surface, and, further, to obtain a construction which is simple and inexpensive to manufacture.

With these objects in view the invention consists in the construction as hereinafter set forth.

In the drawings, Figure 1 is a longitudinal section through the cooler. Fig. 2 is a plan view of the blank from which one of the radiating-tubes is formed. Fig. 3 is a cross-section through one of the tubes. Fig. 4 is a perspective view of a clip employed for connecting adjacent tubes.

My construction of cooler comprises, essentially, a series of flattened tubes for the fluid-circulating medium which are bent longitudinally into a zigzag or serpentine form and are then arranged adjacent to each other to form intermediate transversely-extending circulating-passages. Each of these tubes A is preferably formed from a sheet-metal blank which has struck up therefrom a series of projections *a*, distributed over the surface. The blank is then bent on the central longitudinal line *b*, and its edges are seamed together at *c*, so as to form a flattened tube. The tube is then bent into the zigzag or serpentine form, and the projections *a* serve to hold the opposite walls of the tube spaced from each other, these projections being so arranged as to be at the bends in the tube. A series of the tubes A are then arranged as shown in Fig. 1 and are connected at their opposite ends to headers, such as B. When thus arranged, they form a multiple of cross-connecting tubes between the headers B, through which the fluid-circulating medium passes, while intermediate said tubes are formed a series of transversely-extending air-passages. The tubes A may be secured to each other intermediate their ends by any suitable means, such as the clips C, which are provided with two prongs *b*, adapted to embrace the connecting portions of adjacent tubes A.

A cooler thus constructed is exceedingly simple and inexpensive to manufacture and in use will form an efficient cooling means on account of the large amount of surface that is directly exposed to both the fluid medium and the cooling air-currents.

What I claim as my invention is—

1. A cooler comprising a plurality of flattened tubes for the fluid-circulating medium bent into a zigzag or serpentine form the bended portions of adjacent tubes being oppositely disposed and arranged adjacent to each other to form a series of intermediate transversely-extending air-passages, headers to which the opposite ends of said tubes are connected and intermediate connection between adjacent tubes.

2. In a cooler a fluid-circulating tube formed from a sheet-metal blank having a series of projections struck up therefrom and distributed over the surface thereof, said blank being folded to form a flattened tube and being bent longitudinally at said projected portions in a zigzag form, said projections spacing the walls of the bent tube from each other.

3. In a cooler, a fluid-circulating tube comprising a sheet-metal blank having a series of projections struck up therefrom, and distributed over the surface thereof, said blank being folded to form a flattened tube with the walls thereof separated by said projections

and said tube being bent longitudinally into a zigzag or serpentine form with said projections arranged at the bends.

4. A cooler comprising a series of flattened serpentine tubes the bended portions being oppositely disposed and arranged adjacent to each other to form intermediate transversely-extending air-passages and clips for connecting said tubes to each other at the adjacent points.

In testimony whereof I affix my signature in presence of two witnesses.

HOWARD E. COFFIN.

Witnesses:

GEO. W. GRAVES,

JAS. P. BARRY.