No. 822,736. PATENTED JUNE 5, 1906.

J. GROUVELLE & H. ARQUEMBOURG.

GRATING FOR FACILITATING THE FLOW OF FLUIDS.

APPLICATION FILED AUG. 28, 1903.

2 SHEETS—SHEET 1.

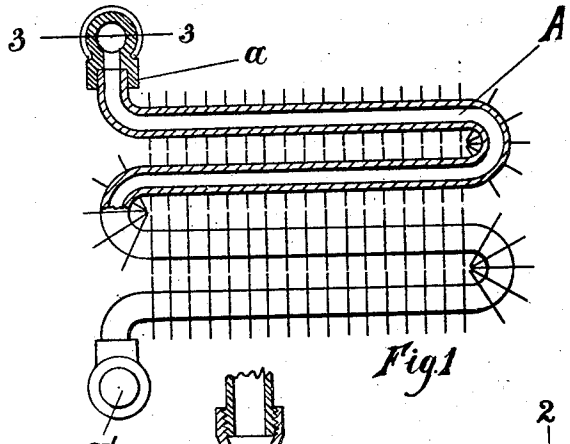


Fig.1

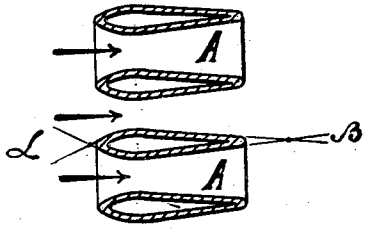


Fig.2.

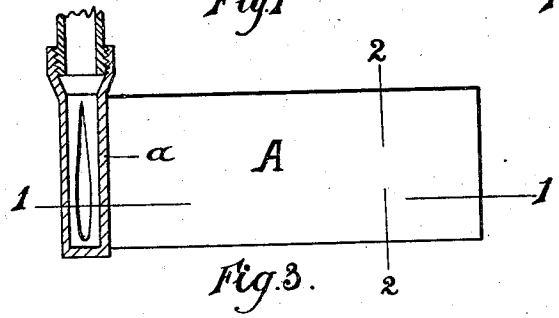


Fig.3.

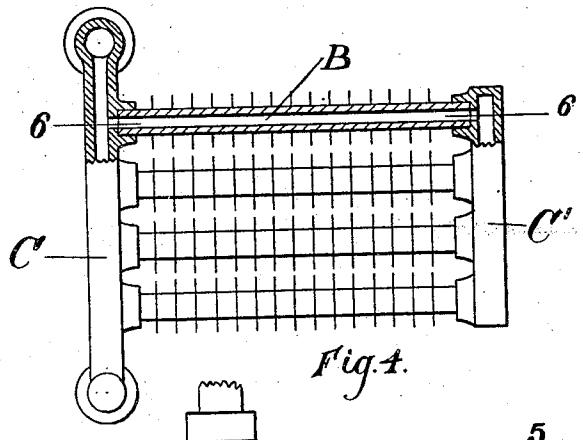


Fig.4.

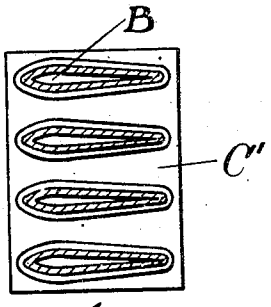


Fig.5.

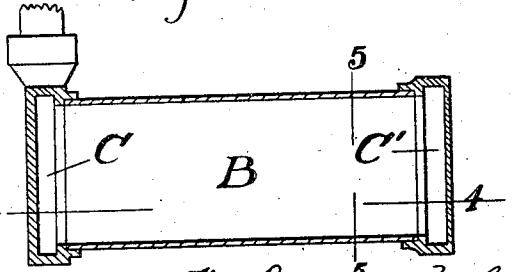


Fig.6.

WITNESSES

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2 SHEETS—SHEET 2.

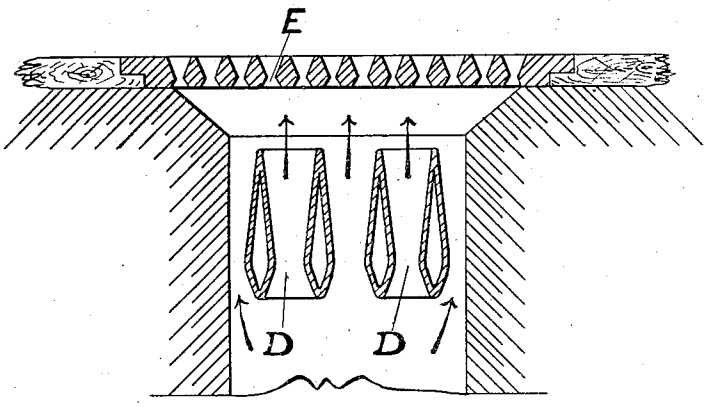


Fig. 7.

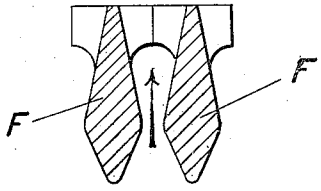


Fig 8

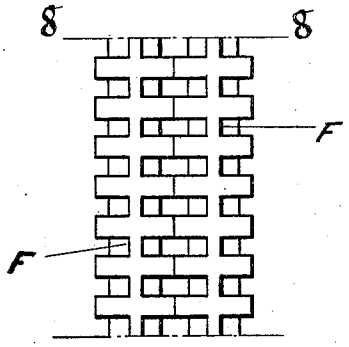


Fig 9

WITNESSES

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GRATING FOR FACILITATING THE FLOW OF FLUIDS.

No. 822,736. Specification of Letters Patent. Patented June 5, 1906.

Application filed August 28, 1903. Serial No. 171,106.

To all whom it may concern:

Be it known that we, JULES GROUVELLE and HENRI ARQUEMBOURG, (trading as LA SOCIETE JULES GROUVELLE ET H. ARQUEMBOURG,) citizens of the French Republic, residing at Paris, France, have invented certain new and useful Improvements in Gratings for Facilitating the Flow of Fluids, of which the following is a specification.

This invention relates, as the title indicates, to gratings adapted to facilitate the flow of a fluid between the bars thereof, which have a specific shape in exterior cross-section, and it relates also to means adapted for exchanging temperature between fluids when the said bars of the grate are made hollow and form a conduit for a fluid.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings, which illustrate embodiments of the invention, Figures 1 to 3 illustrate the application of the invention to a cooler or condenser for an automobile. Fig. 1 is an elevation, partly in section, at line 1 1 in Fig. 3. Fig. 2 is a cross-section at line 2 2 in Fig. 3, and Fig. 3 is a sectional plan, the plane of the section being at line 3 3 in Fig. 1. Figs. 4, 5, and 6 are views similar, respectively, to Figs. 1, 2, and 3, illustrating another slightly different embodiment of the invention, Fig. 4 being a section at line 4 4 in Fig. 6. Fig. 5 is a section at line 5 5 in Fig. 6, and Fig. 6 a section at line 6 6 in Fig. 4. Fig. 7 is a sectional view illustrating the application of the invention to a hot-air flue covered by a grating. Figs. 8 and 9 illustrate the application of the invention to a furnace-grate, Fig. 8 being a vertical cross-section at line 8 8 in Fig. 9, and Fig. 9 a plan.

Referring, primarily, to Figs. 1 to 3, which illustrate the application of the invention to an automobile, either for reducing the temperature of the cooling-water employed with an internal-combustion motor or condensing the steam if the motor be a steam-engine, A designates a soil or serpentine of pipe which has a peculiar cross-section, (seen in Fig. 2,) which we denominate a "lanceolate" section—that is to say, the pipe is flattened and has a cross-section of the form of a lance-head. At the points *a* and *a'*, where the ordinary cylindrical piping is connected to the ends of the flattened pipe A, the latter will have the usual cylindrical form. The flattened pipe A may be gilled, as indicated somewhat diagrammatically in Fig. 1. When the automobile is in motion, the air flows through the spaces of the coil in the direction indicated by the arrows in Fig. 2, and the passages through which the air flows have a rather abrupt angle of contraction at the entrance for a short distance until the point of greatest contraction of the passage is reached, the converging sides of the passage having an angle of about thirty degrees to one another. After passing this point of greatest contraction the passage expands gradually for the remainder of the distance, the sides of the passage diverging from each other at an angle of about seven degrees for the remainder of the distance. The angles of the cross-section of the pipe are designated in Fig. 2 by the Greek letters α and β. If these angles are substantially what is herein set forth, the passage of air through the coil will encounter the minimum of resistance to its flow. It may be briefly explained here that the angles given above of convergence at the receiving ends of the air-passages through the coil and the divergence at the other or delivery ends thereof correspond to those of known "injecto-ejector" elements, wherein the phenomena of injection and ejection are associated as closely as possible, and we have found that the results in practice with the present invention based on these angles have proved very satisfactory.

The construction illustrated in Figs. 4 to 6 is the same in principle as that shown in Figs. 1 to 3, the only difference being that the coil is made up of straight sections of pipe B, having the lanceolate cross-section required for producing the proper form of air-passages between them. The pipes B are connected at their respective ends to upright collectors C and C'. These latter may be of any suitable form and may, if desired, have interior partitions so disposed as to compel the fluid in the pipes to flow through the same in the manner of a coil.

Fig. 7 illustrates the application of the invention to the heating of air introduced to a room through a floor register or grating. In this construction steam or hot water flows through the pipe of the coil D, and air flows through in the direction of the arrows, the pipe of the coil having the same lanceolate section that has been described. This form of the pipes of the coil promotes the circulation of the air, as does also the form of the

passages through the grating E above, this latter form being the same in substance as that of the passages through the coil D.

In the furnace-grate illustrated in Figs. 8 and 9 the grate-bars F have the same lanceolate cross-section as the pipes belore described and the air-passages between them has the same form as the passages between the pipes of the coils described. This construction enhances the draft.

Obviously if gills be used on the pipes forming the coils, Figs. 1 and 4, such gills may be formed in any known or satisfactory manner, and the invention embodied in the present application may be employed for any use or purpose to which it is adapted.

The invention is not restricted to any special dimensions, materials, proportions, or details of construction so long as the novel features thereof are embodied in the construction.

Having thus described our invention, what we jointly claim is—

1. Means for the purpose specified, having a fluid-passage the sides of which, adjacent to that end where the fluid enters, are disposed at an angle of about thirty degrees to one another and converging, and the sides thereof adjacent to the end where the fluid emerges from the passage are disposed at an angle of about seven degrees to one another and diverging.

2. Means for the purpose specified, having a fluid-passage the inlet portion of which gradually contracts in the direction of the flow of the fluid and the outlet portion of which gradually expands in the same direction, the sides of the contracted inlet portion being disposed at about an angle of thirty degrees to one another and those of the expanded outlet portion at about an angle of seven degrees to one another, and the outlet portion being longer than the inlet portion.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JULES GROUVELLE.
HENRI ARQUEMBOURG.

Witnesses:
EDOUARD CARÉNON,
CHARLES MARAIS.