United States Patent [19]

Kormann

[11] **3,797,568**

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[54] **RADIATOR**

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[52] **U.S. Cl.** **165/131,** 165/171

[51] **Int. Cl.** **F24h 3/00**

[58] **Field of Search** ..... 165/128–131, 165/170–173, 171 F, 131 F, 150, 151, 130 J

[56] **References Cited**

UNITED STATES PATENTS

1,968,780	7/1934	Kaestner	165/170
1,321,515	11/1919	Fastinger	165/153
1,352,068	9/1920	Kleine	165/148

FOREIGN PATENTS OR APPLICATIONS

1,215,144	4/1960	France	165/130

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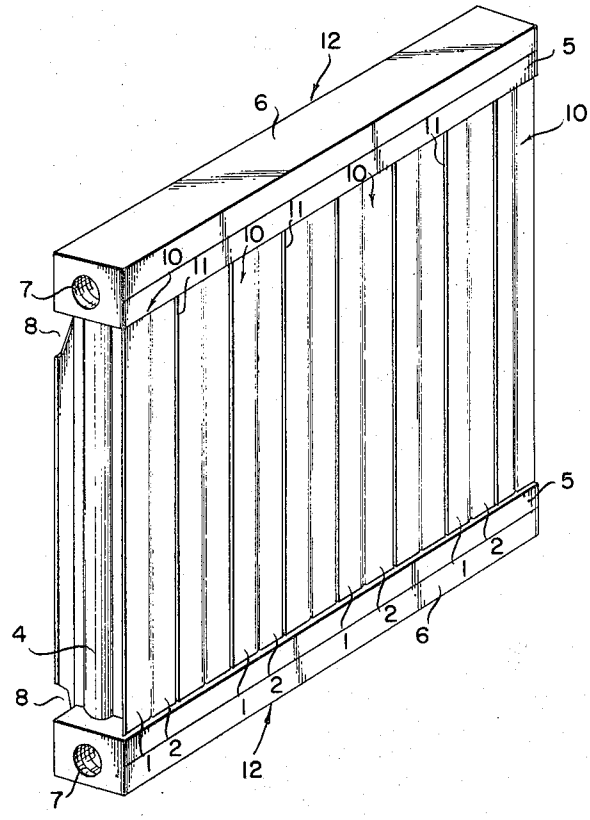
[57] **ABSTRACT**

A radiator has a plurality of vertical pipes with longitudinally co-extensive radiating surface extensions. The extensions are generally T-shaped in cross-section with the base of the T being joined to the pipe. Extensions are joined at opposite sides of an oval pipe. The pipes are joined by headers, and the resulting radiator has a rectangular shape with a plurality of spaced vertical rectangular members.

3 Claims, 6 Drawing Figures



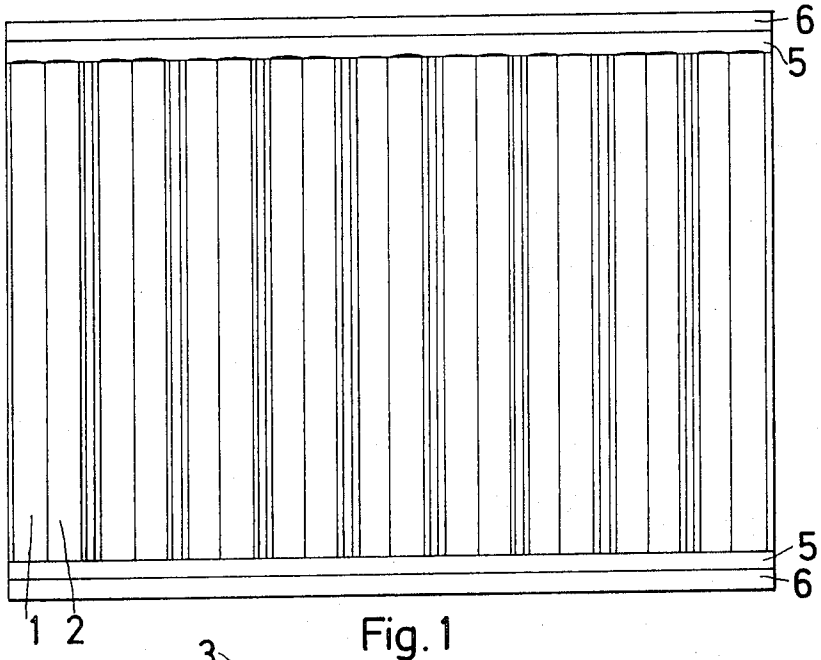


Fig. 1

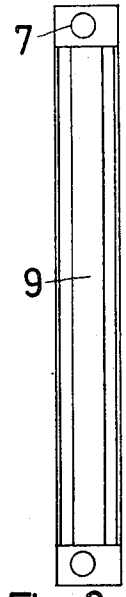


Fig. 3

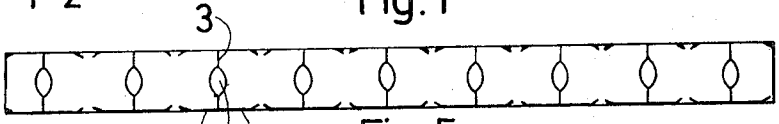


Fig. 5

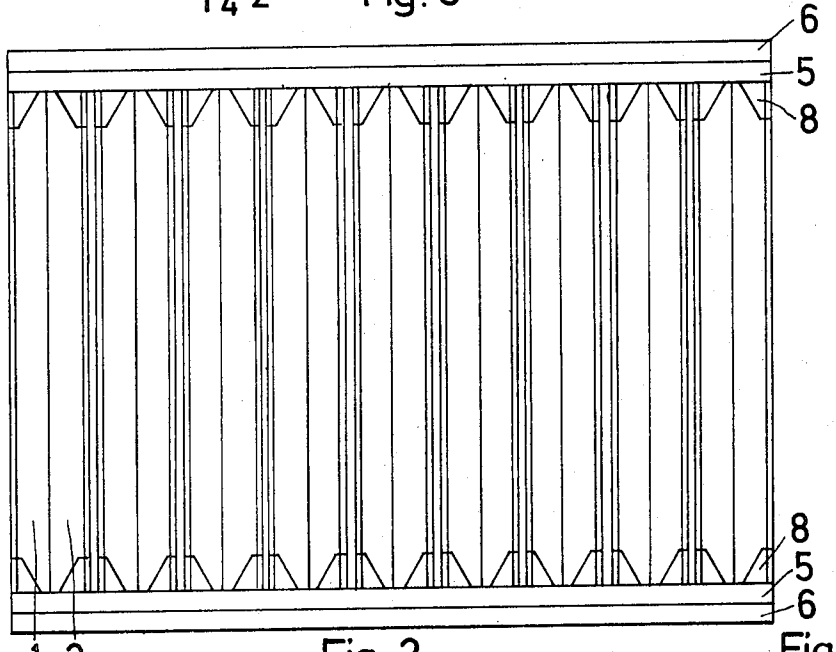


Fig. 2

Fig. 4

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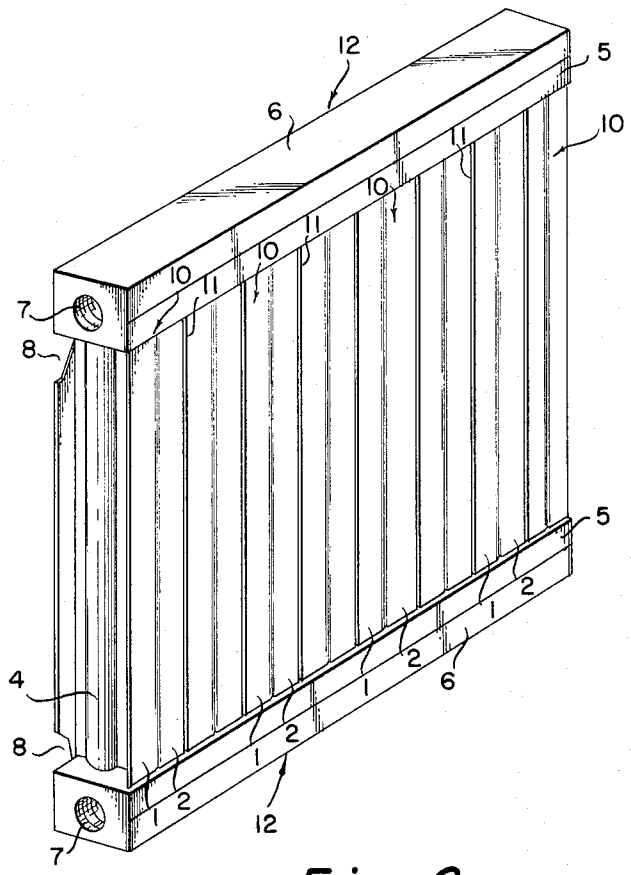

Fig. 6

RADIATOR

This invention relates to radiators, particularly steel radiators, comprising conduit components connected between delivery and return headers or manifolds, and each consisting of two, preferably identical steel-plate shells or plates welded to each other at a comparatively narrow pipe for the heating medium disposed between them, the remaining parts of the shells or plates being spaced.

Such a warm water radiator is disclosed in French Pat. specification No. 1,215,144.

An object of the present invention is to improve such a steel radiator so that it has an almost completely closed rectangular construction, a low manufacturing cost, a minimum use of material, a small water content, and a high heat capacity with a favourable radiant heat rating.

According to the present invention there is provided a radiator, particularly a steel radiator, comprising conduit components connected between delivery and return headers or manifolds, each conduit component comprising two shells or plates connected by a cross-piece incorporating a relatively narrow pipe for the heating medium with the remaining parts of the shells or plates being spaced so that each conduit component has, in cross-section, a double T-shape; each pipe having in cross-section a flat oval shape with, in the longitudinal direction of the cross piece of the double T, a diameter approximately double that in the transverse direction; the conduit components being arranged close together with a narrow slot between adjacent components and with the pipes projecting at both ends thereof and, with a part of the cross-piece being inserted in and welded to a U-shaped half of the header or manifold provided with corresponding apertures therefore; the width of the U-shaped half of the header, which together with a complementary half is welded together to form a rectangular header, corresponds approximately to the length of the double T section so that the radiator has overall a flat construction and, after welding plates to the ends at right angles to the headers or manifolds, it has flat areas of contact on all sides; and the rear surface of the radiator having air ports formed by cutting off the corners of the double T-sections to provide V-shaped notches limited by the headers for the inlet and outlet of air circulating in the cavities of the radiator and heated in the manner of a chimney.

It is known from DT-Gbm No. 1,794,920 to provide a high pressure pipe radiator with delivery and return pipes, which are connected by heating pipes provided with baffles, two baffles being formed as half shells, which together, substantially over their entire length, lying very close together, span the cross-section of a heating pipe. However, in the present invention separate heating pipes are not provided.

From Swiss Pat. specification No. 136,135 it is known to provide heating pipes constituted by tubes having a flat oval shape with a diameter, in the longitudinal direction, approximately double that in the transverse direction, and to insert and weld these pipes in a U-shaped part of a header or manifold provided with appropriate apertures, and to weld the U-shaped part of the header to a U-shaped hood part of the header or manifold.

Advantageously, the shells or plates of the present invention which are located at the rear side of the radiator are provided, in known manner, with ventilation slots. Such ventilation slots are known from DT-Gbm No. 1,740,547.

Due to the fact that, according to the present invention, the header or manifold has the same rectangular shape as the conduit components, and is directly connected to the latter, an almost completely closed rectangular construction of steel radiator is achieved, which has not only a pleasant appearance, but also a high beat capacity, since the heat emitted from the heating pipes flows along the shells, so that a chimney-like circulation is achieved in the cavities encompassed by the adjacent conduit components, whereof the flat front faces radiate a mild heat.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawing, in which:

FIG. 1 is a front view of a steel radiator according to the present invention;

FIG. 2 is a corresponding rear view;

FIG. 3 is a corresponding side view;

FIG. 4 is a corresponding plan view; and

FIG. 5 is a plan view of the conduit components with the upper header or manifold omitted.

FIG. 6 is a vertical perspective view of a radiator according to the present invention.

The steel radiator according to the invention has double T-shaped conduit components **10**, which are formed from two shells or plates **1,2** by longitudinal welding, a heating medium pipe **4** being provided in the cross-piece **3**, which pipe has a flat oval shape with, in the longitudinal direction, of the cross-piece **3**, a diameter approximately double that at right-angles thereto. These conduit components are, as shown in FIG. **5**, arranged very close to each other but are spaced by a narrow slot **11**. In the region of the heating medium pipe **4** and adjoining narrow sections of the cross piece **3** the conduit components have projections, which engage in corresponding apertures of a rectangular half **5** of a header or manifold **12** and are welded thereto. After welding of the conduit components, the header or manifold is closed by welding on thereto a corresponding reactangular half **6** of the header or manifold and is provided at the front ends with threaded sunken connections **7**. As shown in FIG. **2**, V-shaped notches **8** limited by the headers are provided at the rear in the curved parts of the shells or plates **1** and **2**, which facilitate the entry of air into the cavity between the conduit components closed almost completely by these curved parts and thus a chimney-like rising of the heated air. In order to improve the circulation, ventilation slots can be provided in the curved parts of the shell or plates at the rear.

The radiator according to the invention can be easily produced from steel-plate, in that the conduit components are continuously welded together from two appropriately profiled steel plates, are cut to the required length of the components, and with the projecting sections of the heating medium pipe **4** and cross-piece **3** are inserted into corresponding apertures in the header halves adjacent the components and are welded thereto, after which, due to welding on the outer header halves closed rectangular headers are formed having the same depth as the components, one side of the headers being provided with recessed threaded

connections. Since the end components can also be closed at their side faces by appropriate steel strips 9, the finished steel radiator has an almost completely closed, flat rectangular construction, the necessary circulation being assured inside the cavities enclosed by the components by the V-shaped slots 8 at the rear, and, if necessary, additional ventilation slots at the rear. Due to the recessing of the threaded connections several radiators can be arranged in a narrow space behind each other, without any disturbing gap being formed. According to the heating requirements, conduit components can be connected adjacent to each other, to a correspondingly wider header or manifold.

What I claim is:

1. In a radiator comprising a plurality of parallel conduit components connected between two manifolds, each conduit component comprising two longitudinally joined plates, incorporating therebetween a pipe for containing a heating medium, the plates extending on opposite sides of the pipe outwardly therefrom, the improved combination wherein the plates extend on opposite sides of the pipe outwardly therefrom to surfaces of the radiator and terminate in flat faces perpendicular to the plates, wherein the flat faces present substantially plane, continuous surfaces periodically cut by a narrow slot between adjacent components, and wherein adjacent pairs of components encompass substantially closed cavities for chimney-like circulation of air, each cavity contiguous with two said pipes, one on each of two opposite sides of the cavity.

2. A radiator according to claim 1 wherein corners of the flat faces are removed thereby providing for additional air circulation.

3. In a radiator comprising a plurality of parallel conduit components connected between two manifolds, each conduit component comprising two longitudinally joined plates, incorporating therebetween a pipe for containing a heating medium, the plates extending on opposite sides of the pipe outwardly therefrom, the improved combination wherein the plates extend on opposite sides of the pipe outwardly therefrom to surfaces of the radiator and terminate in flat faces perpendicular to the plates, wherein the flat faces present substantially plane, continuous surfaces periodically cut by a narrow slot between adjacent components, wherein adjacent pairs of components encompass substantially closed cavities for chimney-like circulation of air, each cavity contiguous with two said pipes, one on each of two opposite sides of the cavity, and wherein the two manifolds are rectangular and are each comprised of two complementary U-shaped halves, the width of each half corresponding to distance between the surfaces of the radiator and wherein corners of the flat faces are removed thereby providing for additional air circulation.

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