

Jan. 6, 1931.

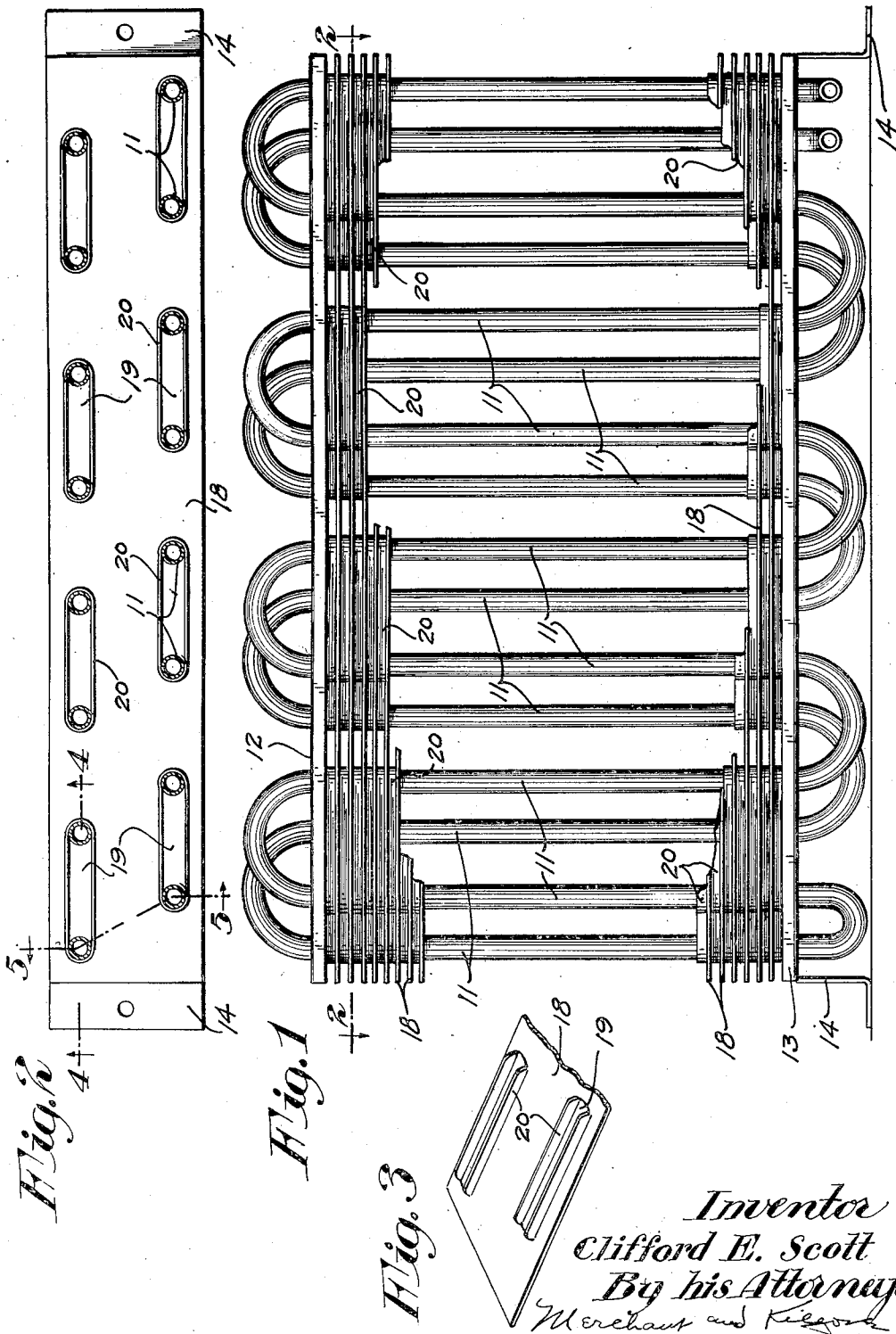
C. E. SCOTT

1,788,068

HEAT EXCHANGE DEVICE

Filed Dec. 24, 1928

3 Sheets-Sheet 1



Inventor
Clifford E. Scott
By his Attorneys
Merchant and Keegan

Jan. 6, 1931.

C. E. SCOTT

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HEAT EXCHANGE DEVICE

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3 Sheets-Sheet 2

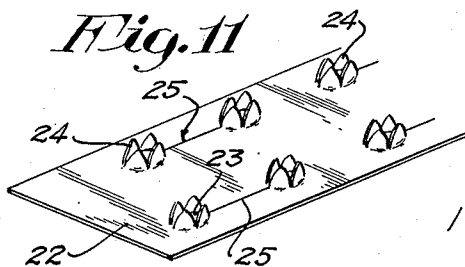


Fig. 5 *Fig. 13*

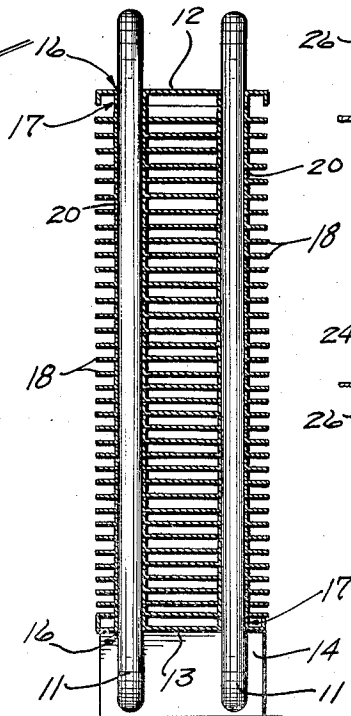
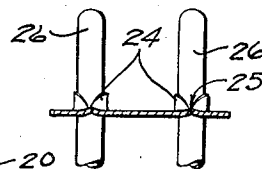


Fig. 4

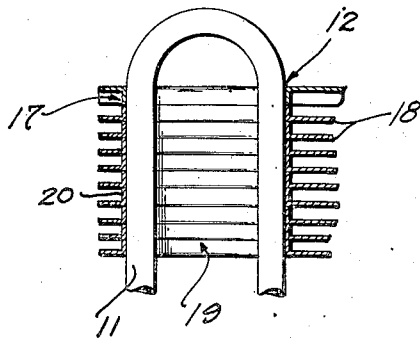
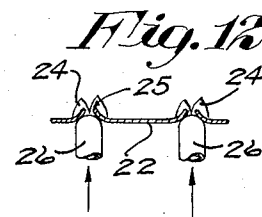


Fig. 9

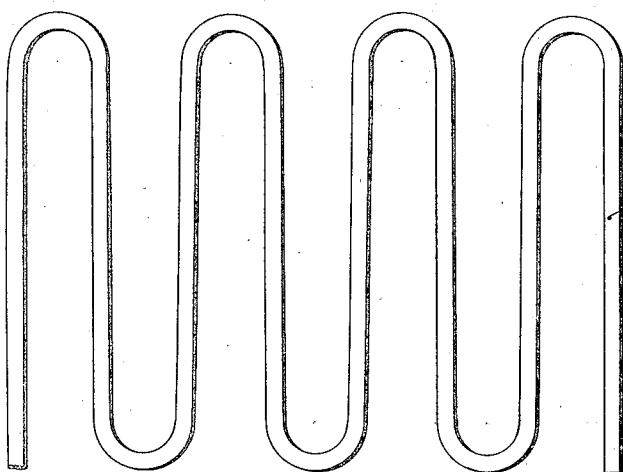
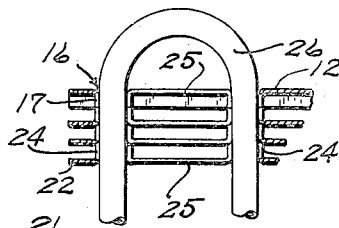


Fig. 10



Inventor
Clifford E. Scott
By his Attorneys
Morehouse and Kline

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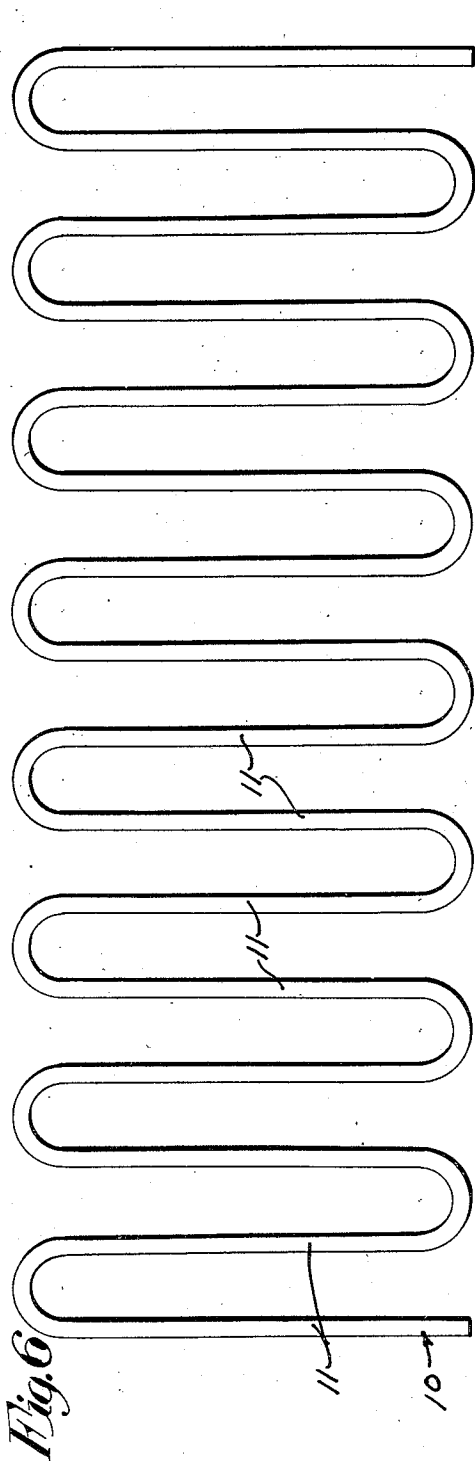
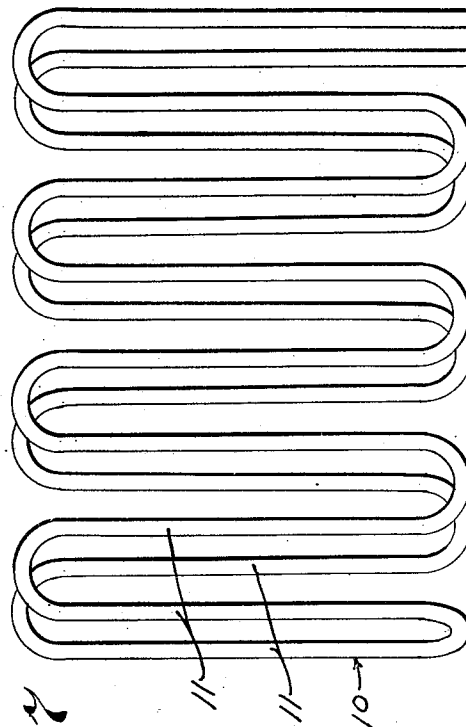
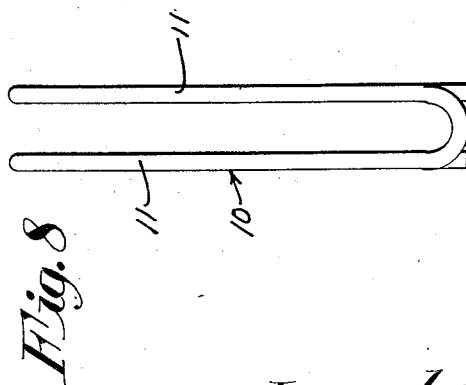
C. E. SCOTT

1,788,068

HEAT EXCHANGE DEVICE

Filed Dec. 24, 1928

3 Sheets-Sheet 3



Inventor
Clifford E. Scott
By his Attorneys
Wheeler and Kieger

UNITED STATES PATENT OFFICE

CLIFFORD E. SCOTT, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO McQUAY RADIATOR CORPORATION, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF DELAWARE

HEAT-EXCHANGE DEVICE

Application filed December 24, 1928. Serial No. 328,192.

My present invention relates to an improved heat exchange device of the type disclosed and broadly claimed in my United States Letters Patent, "heat exchange device," 1,704,409, March 5, 1929.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a side elevation of the improved heat exchange device, with some parts removed and other parts broken away;

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary perspective view of one of the fins;

Fig. 4 is a fragmentary detail view, principally in section, taken on the line 4—4 of Fig. 2;

Fig. 5 is a view in transverse vertical section taken on the line 5—5 of Fig. 2;

Fig. 6 is an elevation of the coil before it is folded upon itself;

Fig. 7 is a view corresponding to Fig. 6 but showing the coil folded;

Fig. 8 is a left-hand end elevation of the coil as shown in Fig. 7;

Fig. 9 is a modification showing a coil formed from two independent laterally spaced sections only one of which is shown;

Fig. 10 is a view corresponding to Fig. 4 but showing a modification of the fins;

Fig. 11 is a fragmentary perspective view of one of the fins shown in Fig. 10;

Fig. 12 is a view partly in elevation and partly in section showing the method of applying the fin shown in Fig. 10 to the bends of a coil; and

Fig. 13 is a view corresponding to Fig. 4 but showing a further step in the process in which the fin is fully positioned on the bends.

Referring first to the invention as shown in Figs. 1 to 8, inclusive.

The numeral 10 indicates a continuous seamless tube for the circulation of a radiating medium, and which tube is bent to

form a flat coil having substantially U-shaped bends 11. This coil is folded upon itself with the sections thereof laterally spaced and the U-shaped bends in said sections staggered. The folded coil is mounted in upper and lower vertically spaced horizontal header plates 12 and 13, respectively, in the form of channels, the flanges of which are turned toward each other. The lower header plate 13, at its end, is provided with supporting legs 14.

Formed in each header plate 12 and 13 are two longitudinally extended rows of edgewise spaced slots 16 formed by piercing said plates and pressing the stock therefrom laterally inward to form reinforcing flanges 17 at the edges of said slots. The slots 16 in the two rows are staggered in the manner shown in Fig. 2 and the staggered bends 11 in the two sections of the coil are inserted through said slots, as best shown in Fig. 5. The flanges 17 not only materially reinforce the header plates 12 and 13, but afford wide supporting surfaces for the bends 11.

Mounted between the header plates 12 and 13 are a multiplicity of laterally spaced flat fins 18, each of which has two longitudinally extended rows of edgewise spaced slots 19. The slots 19 in the two rows of each fin 18 are staggered and the two rows of slots in the fins 18 and the header plates 12 and 13 are aligned, with the bends 11 extending through the slots 19. These slots 19 are formed by piercing the fins 18 and pressing the stock laterally to form flanges 20 at the edges of said slots. The flanges 20 individually space the fins 18 from each other and the flanges 17 space the end fins 18 from the header plates 12 and 13. Said flanges 20, in addition to individually spacing the fins 18, afford wide supporting surfaces which contact with the U-shaped bends 11 and support the fins 18 thereon.

In assembling the heat exchange device, the fins 16 are assembled between the header plates 12 and 13 with the slots 16 and 19 thereof aligned and the U-shaped bends 11 are then inserted through said aligned slots with the header plates 12 and 13 and fins 16 properly spaced by the flanges 17 and 20.

These flanges 17 and 20 afford metallic contact between the header plates 12 and 13 and fins 18 completely through the heat exchange device, longitudinally in respect to the U-shaped bends 11. Said flanges 17 and 20 also afford metallic contact with the runs of the U-shaped bends 11 throughout substantially their full length. With the heat exchange device thus assembled, the contacting metallic parts thereof are rigidly connected by sweating or otherwise to form a rigid unit which affords a simple and highly efficient radiating device. Obviously, the coil, header plates 12 and 13, and fins 18 afford a very large, efficient and compact radiating surface.

Referring to the invention as disclosed in Fig. 9, the coil is formed from two independent laterally spaced sections 21, only one of which is shown, and which section is identical with one of the sections of the coil shown in Fig. 7, except in this instance, the coil sections are not connected by a continuous pipe.

In the invention disclosed in Figs. 10 to 13, inclusive, the fins 22 have two rows of spaced holes 23 surrounded by laterally projecting hub-like spacing and contacting flanges 24. These flanges 24 are formed by the stock pressed from the fins 22 in forming the holes 23. Said fins 22 are longitudinally slit at 25 between alternate pairs of holes 23 of each row. To assemble the fins 22 on the U-shaped bends 26, only one of which is shown, of a coil, said bends are pressed through the holes 23, flanges 24 and slits 25, as shown in Fig. 12. The stock in the fins 22 at the slits 25 is displaced by the curved ends of the bends 26 and springs back between the runs of said bends after their ends have passed through the slits 25. As the displaced stock of the fins 22 does not spring back quite into its original position but, in transverse section through the slits 25, assumes slightly oblique relation to the surface of said fins, it leaves the respective faces of the fins slightly roughened. This method of attaching the fins 22 to a coil affords continuous fin and flange contact with the runs of the U-shaped bends 26. Furthermore, it permits free circulation of air through the fins 22 between the flanges 24 thereof. The roughened faces of the fins 22 produced by the insertion of the bends 26 through the slits 25 increases the turbulence of the air in passing between the fins 22 and thereby increases the efficiency of the device.

What I claim is:

1. A heat exchange device comprising a single pipe bent to form a flat coil having substantially U-shaped bends, said coil being bent upon itself to form two laterally spaced sections, the bends in each section being in substantially the same plane, and a plurality

of fins having two rows of spaced apertures through which said bends extend.

2. A heat exchange device comprising a single pipe bent to form a flat coil having substantially U-shaped bends, said coil being bent upon itself to form two laterally spaced sections, the bends in each section being in substantially the same plane, a pair of header plates having two rows of spaced apertures, and a plurality of fins having two rows of spaced apertures aligned with the apertures in the header plates and through which aligned apertures said bends extend.

3. A heat exchange device comprising a single pipe bent to form a coil having substantially U-shaped bends, and a plurality of fins having holes through which the runs of the bends extend and have close contact therewith, said fins having slits connecting the holes for the pairs of connected runs of the bends.

4. A heat exchange unit comprising a pipe having a U-shaped bend and a fin having a pair of spaced holes for the runs of said bend and a slit connecting said holes to permit the displacement of the stock between said holes by the insertion of the connected ends of the runs therethrough to mount the fin on the pipe with its runs in said holes.

5. The structure defined in claim 4 in which the fin is formed from flexible material, whereby the displaced stock between the holes will return to substantially normal position after the insertion of the bend through the fin.

In testimony whereof I affix my signature,
CLIFFORD E. SCOTT.