Jan. 22, 1929. 1,699,542

T. E. MURRAY

RADIATOR

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Fig. 2.

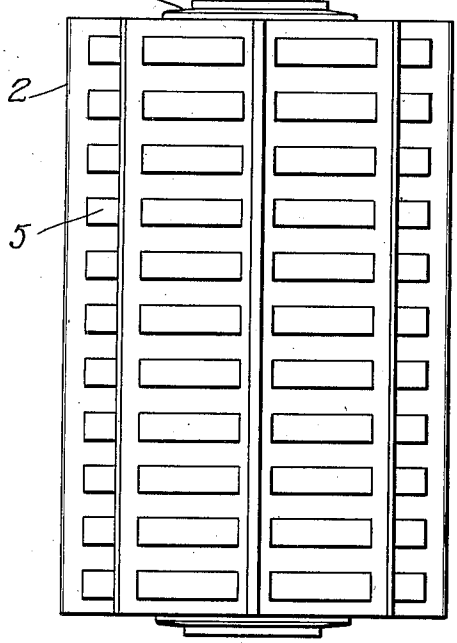


Fig. 1.

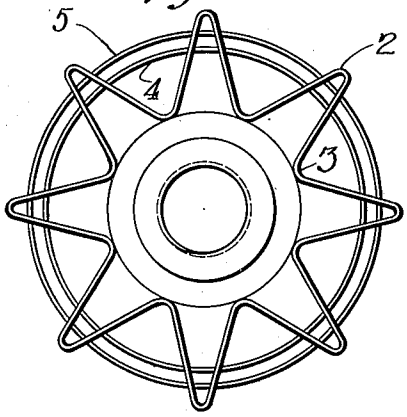


Fig. 3.

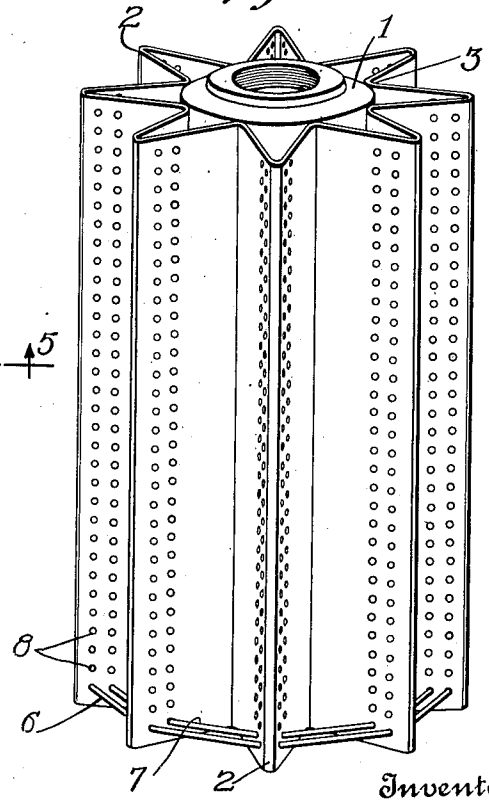


Fig. 4.

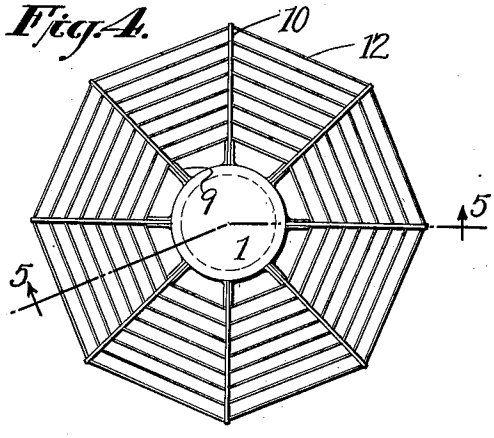
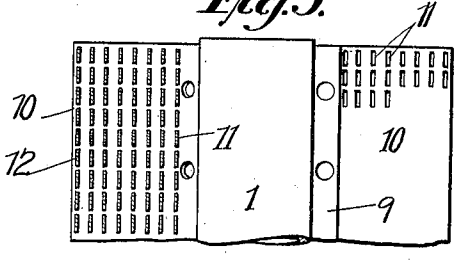


Fig. 5.



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Fig. 6.

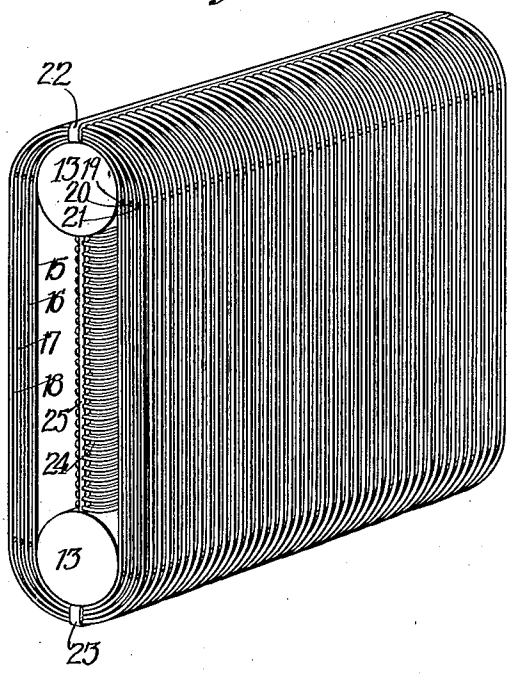


Fig. 7.

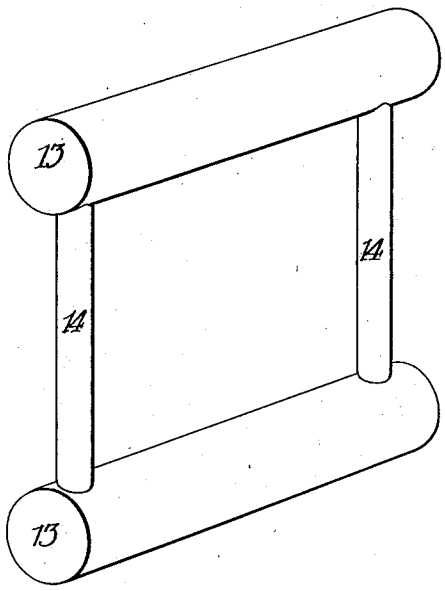


Fig. 8.

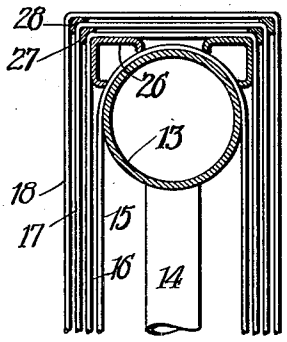
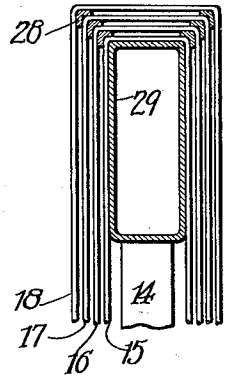


Fig. 9.



INVENTOR

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BY

D. Anthony Usina, ATTORNEY

Patented Jan. 22, 1929. 1,699,542

UNITED STATES PATENT OFFICE.

THOMAS E. MURRAY, OF BROOKLYN, NEW YORK.

RADIATOR.

Application filed May 27, 1924. Serial No. 716,123.

My invention aims to provide certain improvements in radiators by which an extended surface is exposed to the air and the heat is utilized with a high degree of efficiency.

The accompanying drawings illustrate embodiments of the invention.

Fig. 1 is a plan of a radiator embodying my invention;

Fig. 2 is a side elevation;

Fig. 3 is a perspective view illustrating a modified design in process of construction;

Fig. 4 is a plan of a third design;

Fig. 5 is a vertical section of the upper part thereof approximately on the line 5—5 of Fig. 4;

Fig. 6 is a perspective view of another style of radiator;

Fig. 7 is a similar view of the tubular structure of Fig. 6;

Figs. 8 and 9 are transverse vertical sections of modifications.

Referring to the embodiments of the invention illustrated, and particularly Figs. 1 to 3, a central chamber or pipe 1 has welded or otherwise attached to the outside of it a plate of metal bent to such a shape as to provide separate radiating portions 2 between which the sheet is bent in and fastened to the central tube as at 3. This sheet in itself furnishes a very large surface exposed to the air. The air passes up within each of the radial arms 2 so as to take heat from the inner faces thereof, these inducing a certain amount of draft in the manner of chimneys and causing a circulation of air about the radiator. The outer faces of the metal, between the arms 2, are, of course, also exposed to the air and serve to heat the same.

In addition I propose to use these radiating arms as supports for wires which provide additional radiating surface. In Figs. 1 and 2 a thin flat wire (this being the shape which presents the largest surface in proportion to its cross-section) is passed around the radiator and through openings in the radial arms 2. Two layers of such wire are used, indicated at 4 and 5 respectively. The number of layers will depend on the size and desired capacity of the radiator, the size of the central chamber, the use of steam or hot water or other heating medium, and other conditions. Likewise the size of the sheet metal radial arms will depend on a variety of circumstances. For greater compactness I prefer to use copper for the sheet metal radial arms and also for the wire. The central tube or chamber 1 may be of steel as usual. With the extensions of sheet metal and wire made of copper, the size and weight of the apparatus can be considerably reduced because of the superior conductivity of this metal. It can be rolled into sheets and drawn into wire of very small dimensions, and I propose to make the sheet metal parts and the wire parts very thin. The use of thin copper for the sheets is not claimed in the present application, being covered in my copending application, Serial No. 725,559 filed July 12, 1924.

The wire may be arranged in spirals, or each of the annular lengths shown may be separate from the next. By passing the wire through openings in the arms, the wires are fixed firmly in place so as to preserve the desired spacing between them. They should make good contact with the sheet metal arms to transmit the heat therefrom. Such contact may be secured by soldering or welding. The wires are preferably arranged at or near the outer ends of the arms 2 so as to give to the entire structure substantially a drum shape with channels, not only inside the radial arms 2 as above described, but also between such arms and within the layers of wire.

Fig. 3 illustrates the use of common round wire in layers 6 and 7 and shows the arms 2 punched with holes 8 through which the wires are threaded. Such round wires will be spaced more closely together than the flat wires of Figs. 1 and 2. Also it will be easy and convenient to thread the round wires through the holes in continuous spirals commencing at the bottom and finishing at the top.

According to the design of Figs. 4 and 5, the central pipe 1 is provided with flanges 9 which may be welded thereto and between which are fastened wider radial flanges or arms 10. These are provided at suitable intervals with openings 11 (Fig. 5) through which are threaded the rings or spirals of flat wire or ribbon 12.

Figs. 6 to 9 illustrate the application of the idea to a differently shaped chamber or tubular structure for the heating medium. The hollow structure through which the steam or other heating medium is passed, comprises top and bottom tubes 13, communicating at their ends by vertical tubes 14. This hollow structure carrying the steam is made the core of numerous wrappings of

wire. The arrangement shown of headers, like 13, with two or more connecting tubes 14 between them, is structurally well adapted to the purpose of supporting the wire wrapping as well as to the purpose of affording circulation for the steam.

According to Fig. 6, a first layer of wires 15 is wrapped about the top and bottom tubes and spirally along substantially their entire length, with slight air spaces between the successive convolutions of the spiral. Outside of this are similar layers of spaced wires indicated at 16, 17 and 18, respectively. Not only are the convolutions of each spiral separated to permit the passage of air between them, but each of the layers or spirals 15, 16, 17 and 18 is separated from the next. For example, they may be spaced apart by wires 19, 20 and 21 arranged in line with the sides of the tubes 13 and extending lengthwise.

The innermost layer of wires 15 should be in close contact with the tubes 13 for good transmission of heat. As illustrated they lie directly against one-half of the circumference of the tubes 13. Although it is desirable to have the various layers of wire separated from each other for greater surface exposure to air, yet it is advantageous to unite these wires closely at certain points. This means a wider distribution of the heat, that is distribution through a greater extent of wire; and means also a stronger structural arrangement, holding the parts firmly and in properly spaced relation to each other.

At the top and bottom of the structure there are illustrated bars 22 and 23 which may be of solder embracing all the wires crossing around the tubes 13 and also soldering these wires to the tubes. Instead of such a block of solder, making intimate contact with all or practically all the wires, a steel or other metal bar may be used with the wires passing through slots or openings therein, the bar to be soldered or welded or otherwise united to the tube. And similar connections between the wires to hold them rigidly in proper spaced relation may be placed in other points of the structure.

The arrangement described of wires about the tubes 13 is duplicated in a measure about the intermediate tubes 14. For this purpose horizontal wires 24 are wound about the tubes in one or more spiral layers with the convolutions of each layer spaced apart and with the successive layers spaced apart from one another; and the wires are united by bars 25 at the ends analogous to the bars 22 and 23.

A radiator with this arrangement of wires provides two series of spaces for the air, that is the vertical series of spaces provided by the outer wires and the horizontal spaces provided between the inner wires 24. Thus the air is exposed to the heat in a very great number of very small channels. The wire may be round or square or otherwise shaped in cross-section. It may be of any suitable metal as above stated in connection with Fig. 1.

The tubular structure and the supports or fastenings for the wires may be very widely varied. In Fig. 8, the inner layer 15 of wires is similar to that in Fig. 6. The next layer of wires 16 pass around blocks 26 fitting against the rounded portions of the layer 15 which bear on the tube 13, and providing substantially rectangular corner supports for the wires of the layer 16. Similar angular spacers 27 and 28 are provided at the corners between the wire layers 16 and 17, and 17 and 18. These spacers may be notched or perforated as for the bar 22 of Fig. 6, and soldered or welded to the several wires with which they contact.

For economy of space, the top and bottom tubes may be rectangular as shown at 29 in Fig. 9. Otherwise the radiator illustrated in this figure is substantially like that of Fig. 8.

The wires, of course, must make heat conducting contact with the tubular chamber or structure carrying the heating medium, either direct contact as for the inner layers in Fig. 6, or indirect through some other part as in the case of the flanges or windings of the designs of Figs. 1 to 5. In either case there is an intimate union, by soldering or welding, of the wires with the steam chamber.

The radiator may be equally used for cooling air by circulating cold brine or the like through the pipes so that the latter become a heating element only in the negative sense, that is, they extract heat from the radiating structure and induce a flow of the cool air downward through the flues similar to the upward circulation of air induced by the passage of steam through the pipes.

The combination of the central pipe or chamber and the corrugated metal forming hollow radiating arms around it is claimed separately in an application of mine Serial No. 294,364, filed July 21, 1928, which is a division of an earlier application filed April 26, 1924, No. 709,080.

Though I have described with great particularity of detail certain embodiments of my invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiments described. Various modifications may be made by those skilled in the art without departure from the invention as defined in the following claims.

What I claim is:

1. A radiator including in combination a chamber for the heating medium and a plurality of layers of wire extending around the chamber at substantial and different distances from the chamber, each layer comprising a number of courses spaced apart from one another at close intervals along the length

of the structure, all the wires having intimate metallic union with the chamber.

2. A radiator including in combination a chamber for the heating medium, arms united by an intimate metallic union with the chamber and extending outward therefrom and wires extending between said arms in a number of courses spaced apart from one another at close intervals along the length of the arms and having intimate metallic union with said arms so as to provide an extensive radiating surface with intimate metallic union to said chamber.

3. A radiator including in combination a chamber for the heating medium, a sheet metal structure in the form of hollow arms united at their bases to the chamber with an intimate metallic union and forming vertical flues for accelerating air circulation, and wires extending between said arms in a number of courses spaced apart from one another at close intervals along the length of the arms and providing an increased radiating surface.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.