June 3, 1930. J. KARMAZIN 1,761,397

HEAT EXCHANGER

Filed March 31, 1927

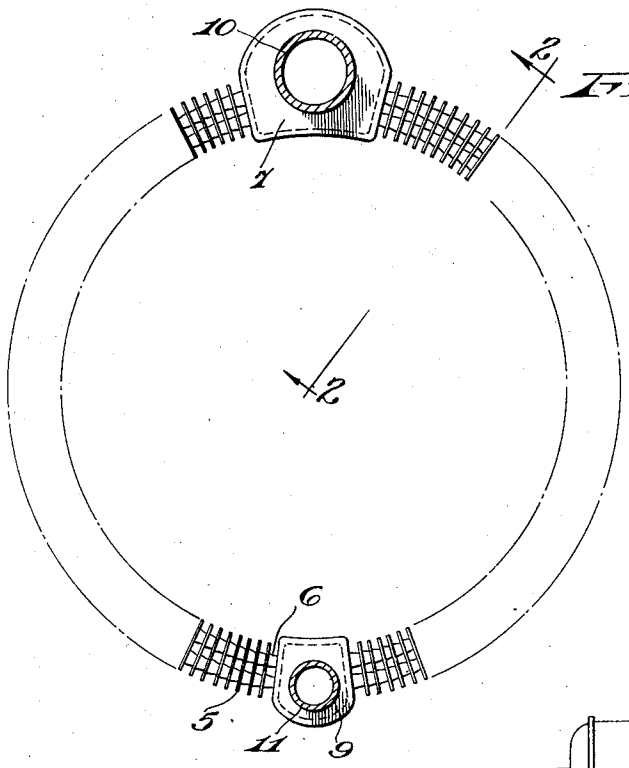


Fig. 1.

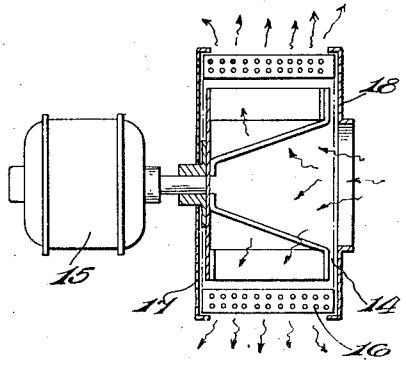


Fig. 3.

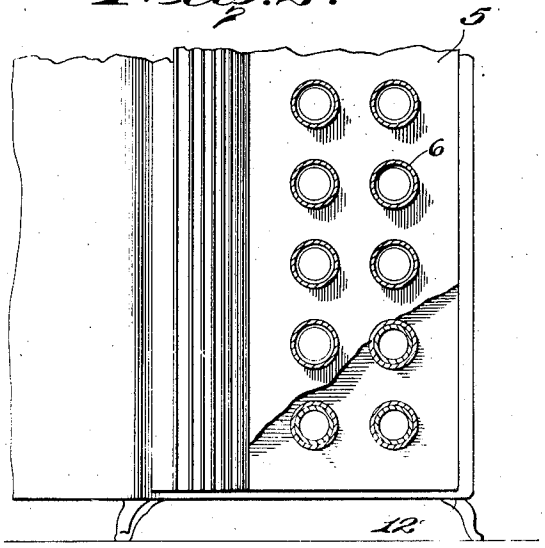


Fig. 2.

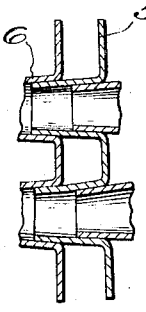


Fig. 4.

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UNITED STATES PATENT OFFICE

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HEAT EXCHANGER

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This invention relates to the construction of heat exchange devices, such for example as radiators adapted for the heating of rooms or buildings.

One object of my invention is to provide a heat exchange unit of the type mentioned in which steam or other heated fluid may pass through a number of tubular conduits whose walls are integral with extending fins or vanes, providing a greatly enlarged radiating surface in intimate contact with the heated fluid.

A further object of my invention is to construct a heat exchange device of this type wholly or chiefly of drawn sheet metal, rather than cast metal.

A further object of my invention is to construct a heat exchange device of this type from a plurality of elements having integral tubular projections, tapered in varying degree, the projections of each element nesting within those of an adjacent element to form continuous tubes, to permit the tubes to be curved throughout their lengths or a portion thereof.

A further object of my invention is to construct a radiator of a minimum weight, and of arcuate or circular form, adapted for use in conjunction with a fan or blower.

A further object of my invention is to so form the radiator elements that when properly nested together the structure naturally assumes an arcuate shape.

With these and other objects in view my invention consists in the novel combinations and arrangements of parts, a representative embodiment of which is shown in the accompanying drawings and will be more fully described hereinafter.

In the drawings:

Fig. 1 is a plan view of one form of radiator embodying my invention.

Fig. 2 is a fragmentary sectional elevation, substantially on the line 2—2 of Fig. 1.

Fig. 3 is a side elevation, partly in section, showing the use of a heat exchange unit embodying my invention in conjunction with a fan or blower.

Fig. 4 is an enlarged transverse detail section.

The heat radiating section of the device is built up of a number of elements, each of which comprises a plate having formed thereon a plurality of transversely extending tapering tubular projections 6. These projections are preferably so formed as to be of substantially the same thickness as the plate itself, rather than drawn to a reduced thickness, and they may be conveniently arranged in two or more rows, lengthwise of the sheet.

Said elements are assembled with the projections of one element telescoping into the projections of the adjacent element to form continuous tubes, and are firmly pressed together to insure tight joints. The joints may be further secured by solder, which may be applied in a variety of ways, such as dipping the ends of the tube elements in solder prior to assembly, applying comminuted solder and a flux to the tube sections before or during assembly, or dipping the assembled structure.

The heat exchange units shown in the drawings are of arcuate cross section, an arcuate or circular configuration being desirable for some purposes. The arcuate shape is secured by assembling in a properly shaped jig or form, and its production may be facilitated by forming the tube sections which make up the shorter arc with a slightly greater taper than those which make up the longer arc. The tube sections of the greater taper will obviously telescope to a greater extent under the same pressure, and a unit of any desired curvature is thus readily secured.

The tubes of the heat exchange sections thus formed communicate with an intake header 7 and an outlet header 9, connecting with a source of fluid supply through pipes 10 and 11. As illustrated in Fig. 1, the complete heat exchange device comprises two substantially semi-circular branches or units, the whole forming a substantially circular annulus. When the device is intended to stand upright a suitable pedestal base 12 may be provided.

A heat exchange unit of this construction is admirably adapted for use in conjunction with a fan or blower. A typical construction of this character is illustrated in Fig. 3. A sirocco wheel 14 is directly connected to a

motor, and the circular heat exchange device 16 surrounds the wheel. Housing plates 17 and 18 serve to direct the air displaced by the wheel 14 outwardly through the heat exchange element. The plates of said element being radial and substantially parallel to the movement of the air, a maximum area of contact with the air and a very high efficiency are secured.

The operation of the device may be summarized as follows: Heated water, steam or other fluid is introduced into the header 7 through the intake pipe 10 and passes through the tubes of the two radiating units toward the outlet header 9. Heat is very rapidly absorbed by the walls of the sheet metal tubes and is in part radiated directly by the tubes, and in part conducted to the plates 5, to be radiated from them. The tube sections being integral with the plates, a very rapid conduction of heat to the plates is effected. Moreover, the structure being of sheet metal rather than cast metal radiation is much more rapid, and a far greater amount of radiation in proportion to the weight is secured.

The embodiments of my invention which have been shown and described are to be considered as illustrative rather than restrictive, the invention being limited only by a broad interpretation of the appended claims.

What I claim as my invention is:

1. A heat exchange device for room or building heating comprising a plurality of plate elements having integral tapering tubular projections extending transversely therefrom and assembled with the tubular projections of adjacent elements in telescoping relation, some of said projections extending further into the adjoining projections than others to give an arcuate form.

2. A heat exchange device for room or building heating comprising a plurality of substantially flat plate elements of sheet metal having a plurality of rows of integral tapering tubular projections extending transversely therefrom, assembled with tubular projections of adjacent elements in telescoping arrangement and arcuate in shape, and a fan within said device for displacing the air parallel to said plate elements.

3. A heat exchange device comprising a plurality of plates each having a plurality of tapering tubular projections extending transversely therefrom and assembled with the projections of each plate in telescoping relation with the projections of adjacent plates, said projections being arranged in rows longitudinally of said plates, the projections in the rows toward one edge of each plate tapering more than the projections toward the opposite edge, whereby the assembled structure is given an arcuate shape.

4. A heat transferring device comprising a fan and an annular heat exchange member disposed about said fan and comprising a plurality of radially disposed plates, each plate having integral therewith a plurality of transversely extending tapering tubular projections, the projections of each plate telescoping with the projections of adjacent plates to form circular continuous tubes.

5. A heat transferring device comprising a fan and an annular heat exchange member disposed about said fan, and comprising a plurality of radially disposed plates, each plate having integral therewith a plurality of transversely extending tapering tubular projections, the projections of each plate telescoping with the projections of adjacent plates, to form continuous tubes, and the projections of each plate being arranged in inner and outer rows, the projections in the inner row being tapered and telescoped slightly more than the projections in the outer row, to give the heat exchange member its annular form.

6. In a heat exchange device for room or building heating, a plate element having tapering tubular projections extending transversely therefrom, some of said projections tapering more than others for the purpose set forth.

7. A heat exchange device for room or building heating comprising a pair of branches placed side by side, and headers for uniting the adjacent ends of said branches, each of said branches comprising plate elements with tapering tubular projections extending transversely therefrom and assembled with the tubular projections of said elements in telescopic relation, some of said projections extending farther into adjoining projections than others.

In testimony whereof I have affixed my signature to this specification.

JOHN KARMAZIN.