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FAN RING FOR COOLING TOWERS

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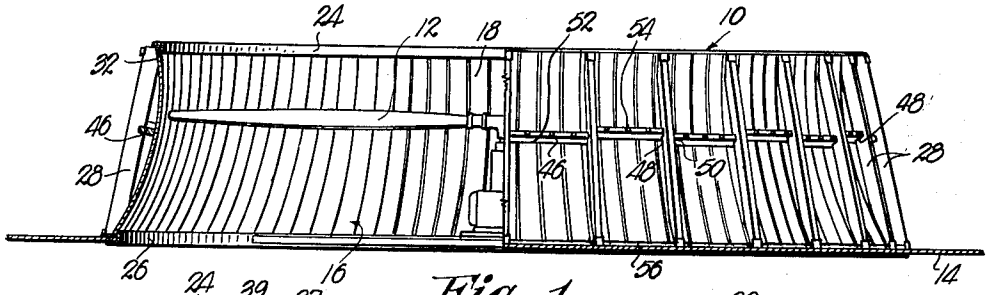


Fig. 1.

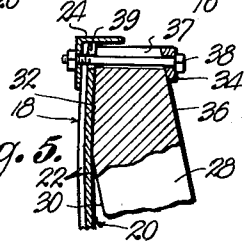


Fig. 5.

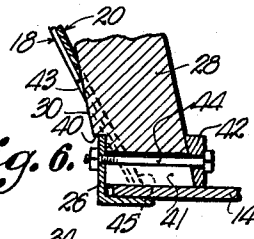


Fig. 6.

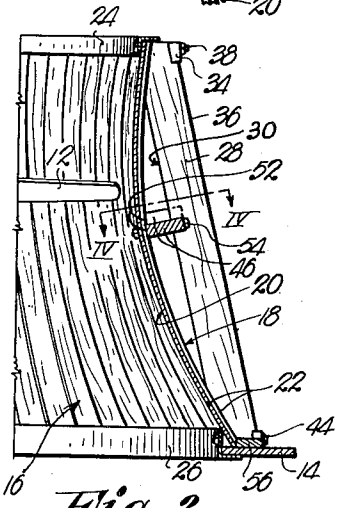


Fig. 2.

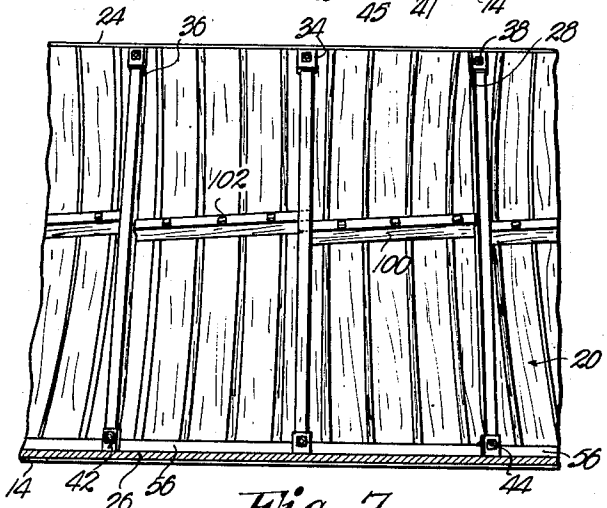


Fig. 7.

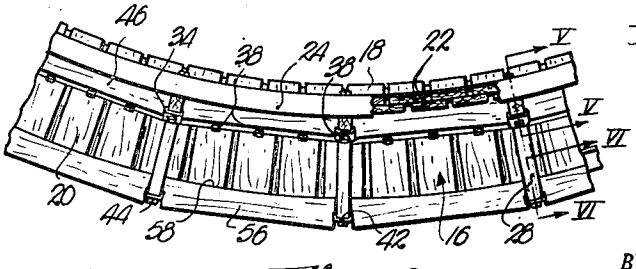


Fig. 3.

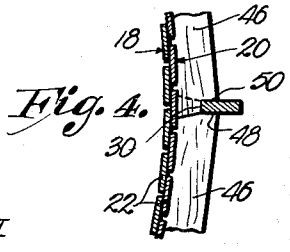


Fig. 4.

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FAN RING FOR COOLING TOWERS

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8 Claims. (Cl. 230—133)

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This invention relates generally to cooling towers and particularly to the usual throat construction that is provided adjacent the uppermost end of the tower for receiving an encircling fan forming a part of the tower, the primary object being to provide novel fan ring construction having the form of a Venturi tube and being adaptable for varying the curvature of the side wall thereof to suit the desires and needs of the user.

It is the most important object of the present invention to provide a fan ring of the aforementioned character including a tubular body wherein the side wall thereof is arched to present a pair of truncated cones having their smaller ends interconnected, there being a pair of spaced-apart members on one face of the side wall and circumscribing structure on the opposite face thereof, offset with respect to the said pair of members for holding the side wall in the desired arcuate condition.

Another important object of the present invention is to provide a fan ring having a side wall provided with a pair of annular members at each end respectively thereof and on one side of the side wall, together with a plurality of cross-members that circumscribe the tubular body on the outermost face thereof, and intermediate the annular members in offset relationship thereto for holding the side wall transversely arcuate.

A further object of the present invention is to provide a tubular body having the shape of a Venturi tube wherein the abovementioned annular members are interconnected by a plurality of spaced-apart vertical ribs, the holding means on the outside of the wall being interposed between the ribs and the proximal face of the side wall.

Other objects of the present invention include the way in which the plurality of rings are disposed to interconnect the annular members on the inner face of the ring; the way in which the outermost cross-members that are disposed between the ribs and the side wall, are joined to the latter for holding the individual strips forming the side wall, in place; the manner of offsetting and notching the outermost holding members for disposition in partial overlapping relationship; and many additional, more minor objects, all of which will be made clear or become apparent as the following specification progresses, reference being had to the accompanying drawing, wherein:

Figure 1 is a side elevational view of a fan ring

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for cooling towers made according to the present invention, parts being broken away and in section to reveal details of construction.

Fig. 2 is a slightly enlarged, fragmentary, detailed vertical, cross-sectional view thereof.

Fig. 3 is a fragmentary, top plan view, parts being broken away for clearness.

Fig. 4 is a fragmentary, detailed, cross-sectional view taken on line IV—IV of Fig. 2.

Fig. 5 is an enlarged, fragmentary, detailed, sectional view similar to Fig. 2 showing the uppermost end construction taken on line V—V of Fig. 3.

Fig. 6 is an enlarged, fragmentary, detailed, sectional view similar to Fig. 5 showing the lowermost end construction taken on line VI—VI of Fig. 3; and

Fig. 7 is a fragmentary, side elevational view showing a slightly modified form of fan ring embodying the present invention.

It is common knowledge that throat construction for air-moving structures, and particularly those adapted to receive and circumscribe a fan or the like, are advantageously formed in the shape of a Venturi tube. In relatively large throat constructions producing such desired shape through use of dies, fixtures and the like, is an expensive and complicated operation and not easily accomplished for final disposition at high points upon upright cooling towers.

As will hereinafter appear, the fan ring of this invention is exceedingly simple, easy to construct, inexpensive, adjustable as desired and yet sturdy and capable of withstanding considerable abuse. The form of my invention shown in Figs. 1 to 6 inclusive, constitutes a tubular body broadly designated by the numeral **10**, and adapted to circumscribe a suitable fan **12**, preferably in coaxial relationship therewith.

The manner of mounting the fan **12** for rotation on a substantially vertical axis, forms no part of this invention and may constitute any suitable brackets joined directly with the cooling tower shown only in part in the drawing and including a top wall **14**. While body **10** is shown to be circular, such contour is of no importance and may be varied as desired. In any event, body **10** includes a side wall broadly designated by the numeral **16** and including a pair of superimposed or relatively telescoped layers **18** and **20**. Each layer **18** and **20** in turn constitutes a plurality of side-by-side, but spaced, elongated strips **22** preferably of substantially identical character so far as length and width is concerned.

It is noted that the outermost layer 20 has the spaces between the strips 22 thereof completely covered by the corresponding overlapping strips 22 of the layer 18 (see Fig. 4). The uppermost and lowermost ends of the wall 16 are supported or held against inward movement by a pair of continuous, annular members 24 and 26 respectively.

It is noted that in the shape of fan ring chosen for illustration, the member 24 is of slightly lesser diameter than that of the member 26, but here again, such relative diameters may vary as desired.

It is preferred that members 24 and 26 be made from metallic material and that the same be formed in an L-shape in cross-section as is clear in Fig. 2 of the drawing. Consequently, the innermost face of wall 16 adjacent the uppermost and lowermost marginal edges thereof, bears against the vertical flanges of the two members 24 and 26. The annular angle member 26 may be joined directly with wall 14 of the cooling tower with which the ring hereof is adapted to be used in any suitable manner not shown. Obviously, wall 14 is provided with an opening with which body 10 registers coaxially.

The members 24 and 26 are rigidly interconnected through the medium of a plurality of substantially vertical, angularly disposed, spaced-apart ribs 28. The innermost edge 30 of each rib 28 is angularly cut-away as at 32, such portion 32 being substantially vertically disposed and bearing directly against the outermost face of the outer layer 20.

A U-shaped clamp 34, partially embraces the outermost edge 36 of each rib 28 respectively for receiving a bolt 38 that passes transversely through each rib 28 respectively, at the uppermost end thereof for connecting ribs 28 to the horizontal flange of annular member 24. Ribs 28 and corresponding strips 22 of layer 20 are notched as at 37 and 39 respectively to receive bolts 38.

The lowermost end of each rib 28 rests directly upon the wall 14 and is provided with a notch 40 on edge 30 thereof to accommodate and receive the vertical flange of member 26. A plurality of clamps 42 and bolts 44, join the ribs 28 directly to the member 26. A transverse groove 41 in rib 28 receives bolt 44, and notches 43 and 45 in proximal strips 22 of layers 18 and 20 respectively receive ribs 28.

A plurality of cross-members or cross-bars 46 span the distance between pairs of ribs 28 as shown in Fig. 1, throughout the circumference of body 10 and intermediate the members 24 and 26. The members 46 each have a pair of opposed notches 48 and 50, one at each end of members 46, for receiving proximal ribs 28, and as shown in Fig. 2, the members 46 are interposed between the edges 30 of the ribs 28 and the proximal outermost face of wall 16. Consequently, one arcuate edge 52 of each cross-member 46, bears directly against the outermost face of the layer 20 and is connected to the layers 18 and 20 by means of a plurality of bolts or fasteners 54, members 46 serving therefore, to hold the strips 22 in place. It is noted that the innermost arcuate edges 52 of the members 46 are offset inwardly with respect to a plane passing through the members 24 and 26.

The transverse, arcuate contour of wall 16 that extends longitudinally of the strips 22, depends therefore, upon the position of the members 46 and the distance between such members and the

angular rings 24 and 26. Cross-members 46, therefore, hold the wall 16 arched inwardly and by virtue of the fact that the layer 18 of wall 16 bears against the vertical flanges of rings 24 and 26, inward movement of the wall 16 is limited thereby. It is noted also that the uppermost end of the wall 16 bears against the horizontal outturned flange of ring 24, limiting upward movement therefore, of the strips 22, and the lowermost and innermost marginal edge of wall 16 is held against the vertical flange of ring 26 through use of a plurality of spacers 56 between the ribs 28 and joined to wall 14 of the cooling tower in any suitable manner not shown. The innermost edge 58 of the spacers 56, is arcuate to conform to the outermost circular contour of body 10.

It is noted in Fig. 1 that the members 46 are relatively vertically offset whereby the ends of one member 46 partially overlap the proximal members 46.

A slightly modified form of my invention is shown in Fig. 7 of the drawing, the difference being only in the dispostion of the holding members on the outermost face of the tubular body. Such members are designated in Fig. 7 by the numeral 100 and in lieu of the offset relationship shown in Fig. 1, such members 100 are disposed on a slight angle with respect to the horizontal so that one end of each member 100 partially overlaps the proximal end of an adjacent member 100. The cross-members 100 are joined with the side wall of the tubular body through the medium of a plurality of bolts 102 in the same manner as above described with respect to the form of my invention illustrated in Figs. 1 to 6 inclusive.

It is seen from the foregoing that the entire side wall 16 may be made from a plurality of originally flat, elongated strips 22 that can be easily shipped in a flat condition and formed "on the job" through use of the framework including ribs 28, cross-members 46 and rings 24 and 26. All of the members 46, ribs 28 and spacers 56 may be pre-cut at the factory and the entire ring assembled and mounted quickly and easily upon wall 14 of the cooling tower. The Venturi tube formation can be varied by simply changing the disposition of the holding members 46 or changing the width thereof. Since the ends of the wall 16 merely bear against the retaining rings 24 and 26, the need of fastening at the uppermost and lowermost ends of the body 10, is entirely eliminated.

The strips 22 may be of identical character with the exception of such strips 22 as are adjacent ribs 28 and having notches 39, 43 and 45 cut therein. While the nature of the material utilized in forming the tube is of no particular consequence, it has been found that wood is easily handled and inexpensive and particularly through use of a redwood, a construction is presented that will withstand variable weather conditions and therefore, be of long-lasting nature. Through use of such material, painting is unnecessary and the entire cost of construction is additionally reduced.

Such further advantages as will emanate through use of the construction hereinabove set forth and as fairly come within the spirit of this invention, are contemplated hereby and it is, therefore, desired to be limited only by the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A fan ring comprising a pair of annular

members disposed in spaced planes; a wall circumscribing said members and including a plurality of elongated, initially flat, flexible strips, each bearing against the members exteriorly thereof; and means deforming the strips, said means engaging the strips and joining the members for holding the strips tensioned inwardly in frictional engagement with the members, said means engaging the strips intermediate the ends thereof in inwardly offset relationship to a plane passing through said members for holding the strips under tension and longitudinally arched inwardly.

2. A fan ring as set forth in claim 1 wherein said means comprises a plurality of ribs joining the members and a number of cross-bars wedged between the ribs and the strips.

3. A fan ring as set forth in claim 2 wherein is provided means bearing against each end respectively of the strips for holding the strips against movement on their longitudinal axes relative to said members and said ribs.

4. A fan ring comprising a pair of annular members disposed in spaced planes; a laminated wall circumscribing said members and having a number of layers each including a plurality of elongated, initially flat, flexible strips, the strips of the outer layer overlapping the strips of the inner layer, the strips of the inner layer each bearing against the members exteriorly thereof; and means deforming all of the strips, said means engaging the strips of the outer layer and joining the members for holding all of the strips tensioned inwardly with the strips of the inner layer in frictional engagement with the members, said means engaging the strips of the outer layer intermediate the ends thereof in inwardly offset relationship to a plane passing through said members for holding all of the strips under tension and longitudinally arched inwardly.

5. A fan ring as set forth in claim 2 wherein said plurality of ribs are disposed to bear against the wall exteriorly thereof at one end of the ribs and to bear against the underlying members of the wall respectively at the opposite end of the ribs, said wall being provided with a notch for each rib respectively adjacent said opposite ends thereof for clearing the ribs.

6. A fan ring comprising a pair of vertically spaced, annular members each provided with a vertical flange and a horizontal flange; a wall between the horizontal flanges and circumscribing the vertical flanges, said wall including a plurality of elongated, initially flat, flexible strips, each bearing against the vertical flanges exteriorly thereof; and means deforming the strips, said means engaging the strips and joining the vertical flanges for holding the strips tensioned inwardly in frictional engagement with the vertical flanges, said means engaging the strips intermediate the ends thereof in inwardly offset relationship to a plane passing through said vertical flanges for holding the strips under tension and longitudinally arched inwardly.

7. A fan ring comprising a pair of vertically spaced, annular members each provided with a vertical flange and a horizontal flange; a laminated wall between the horizontal flanges and circumscribing the vertical flanges, said wall having a number of layers each including a plurality of elongated, initially flat, flexible strips, the strips of the outer layer overlapping the strips of the inner layer, the strips of the inner layer each bearing against the vertical flanges exteriorly thereof; and means deforming all of the strips, said means engaging the strips of the outer layer and joining the vertical flanges for holding all of the strips tensioned inwardly with the strips of the inner layer in frictional engagement with the vertical flanges, said means engaging the strips of the outer layer intermediate the ends thereof in inwardly offset relationship to a plane passing through said vertical flanges for holding all of the strips under tension and longitudinally arched inwardly.

8. A fan ring as set forth in claim 7 wherein said means comprises a plurality of ribs joining the vertical flanges and a number of cross-bars wedged between the ribs and the strips, and wherein is provided bolts connecting the cross-bars and the wall, said bolts interconnecting the layers.

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