United States Patent [19]

Knudson

[11] **3,796,416**

[45] **Mar. 12, 1974**

[54] **HUMIDIFIER DRUM CONSTRUCTION**

[75] Inventor: **Robert F. Knudson,** Concord, Mich.

[73] Assignee: **McGraw-Edison Company,** Elgin, Ill.

[22] Filed: **Sept. 7, 1972**

[21] Appl. No.: **287,056**

[52] **U.S. Cl.** **261/92,** 55/400, 55/498, 55/500, 55/DIG. 31

[51] **Int. Cl.** **B01f 3/04**

[58] **Field of Search** 261/92; 55/400, 404, 497–499, 55/500, 510, DIG. 31

[56] **References Cited**

UNITED STATES PATENTS

2,782,015	2/1957	Perrine	261/92 X
2,941,620	6/1960	Thornburgh	55/498
3,596,886	8/1971	Trautman	261/92
3,598,370	8/1971	Hoag	261/92 X
3,599,942	8/1971	Herr	261/92

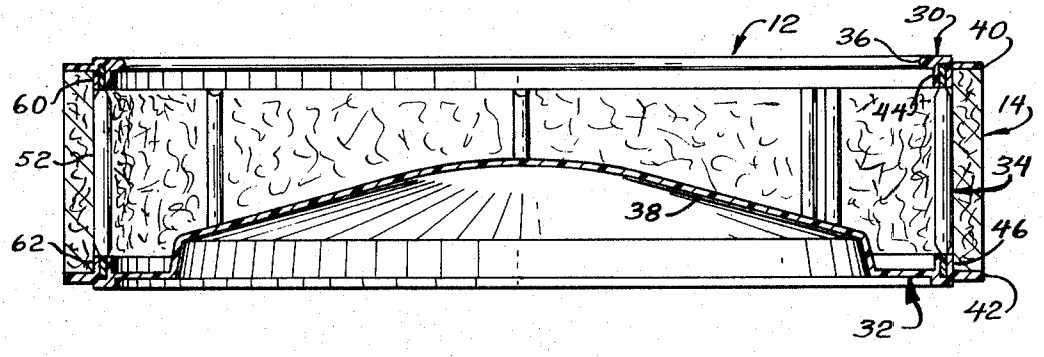
Primary Examiner—Tim R. Miles

Assistant Examiner—Richard L. Chiesa

[57] **ABSTRACT**

A humidifier drum construction having two spaced rigid circular end pieces and at least one unitary circumferentially disposed connecting piece therebetween, each connecting piece having an elongated flexible rail element and a plurality of rigid spaced rung elements thereon, whereby during drum fabrication the rail element can be flexed from the flat to a curvature smaller than the circular end pieces and the rung elements can be fitted transversely to and secured between the end pieces.

8 Claims, 6 Drawing Figures



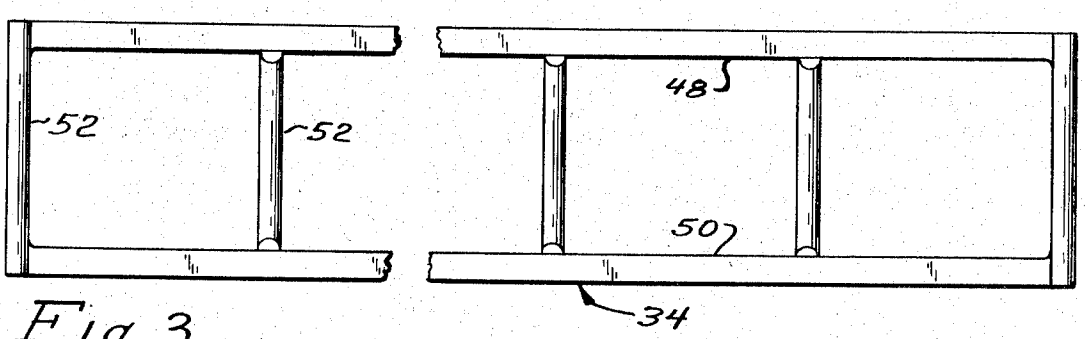


Fig. 3

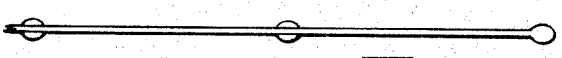


Fig. 4

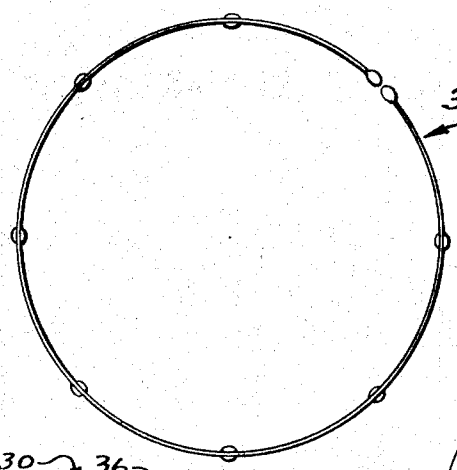


Fig. 5

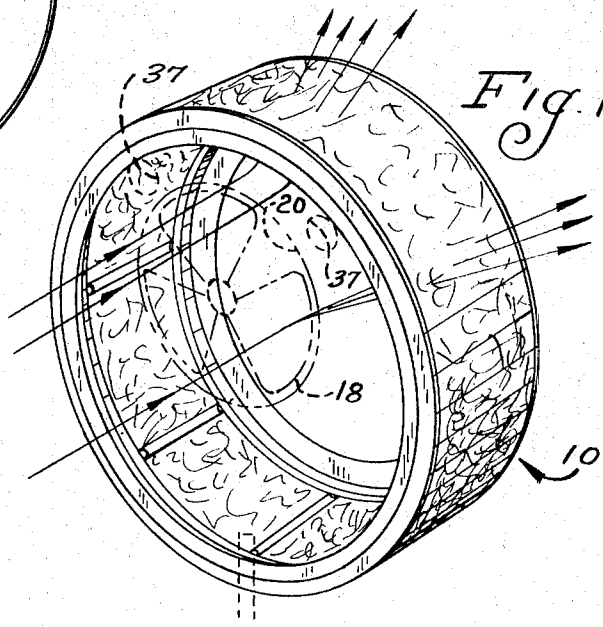


Fig. 1

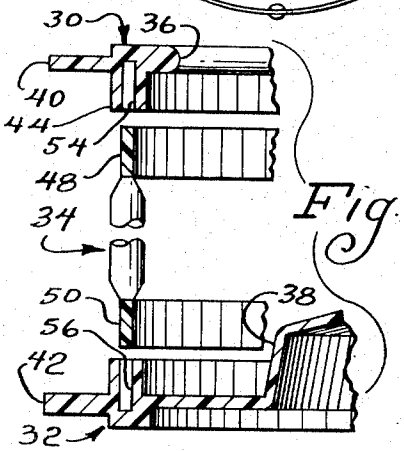


Fig. 6

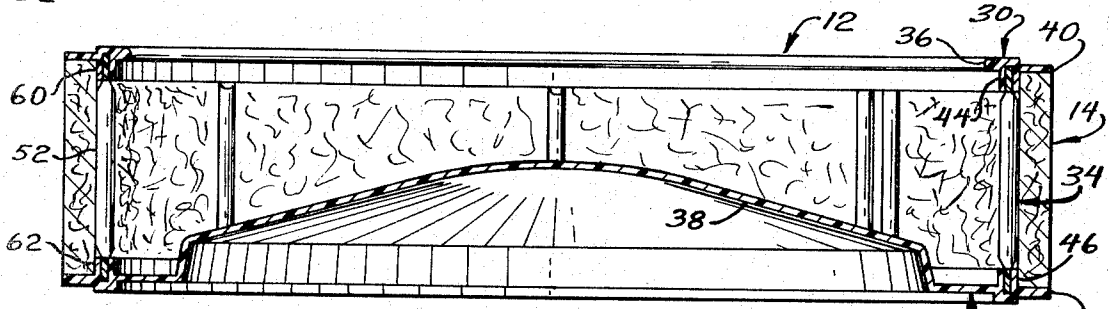


Fig. 2

HUMIDIFIER DRUM CONSTRUCTION

In certain humidifying devices, it is common to support a porus matting on a cylinder drum, to rotate the drum through water to wet the matting, and to provide forced air flow through the wetted matting for adding moisture to the air. The drum is formed of plastic to be lightweight and corrosive resistant, and must be shaped true to allow proper support in and rotation through the water.

An object of this invention is to provide a drum construction having separate prefabricated components that can be easily and accurately assembled to form the finished drum. This allows the components to be fabricated, if required by a plastic specialist and shipped to the humidifier manufacturer, who then can assemble and secure the components together as required, using perhaps at most only simple fixtures or assembly aids.

Specifically, the invention discloses a humidifier drum having rigid end pieces either or each being provided with the appropriate required close tolerance drum support edges, and further having at least one unitary piece connected between the end pieces. Each unitary connecting piece is in the form of a ladder having at least one flexible elongated rail element and a plurality of spaced rigid rung elements thereon. The end and connecting pieces can be shipped flat or nested with like pieces, can be assembled such as in a fixture by flexing the rail element to the curvature of the end pieces and fitting the rung elements between the end pieces, and can be secured together as by mechanical or chemical bonding.

The invention will be more fully understood and appreciated after referring to the following specification, the accompanying drawing forming a part thereof, wherein:

FIG. **1** is a perspective view of a drum formed according to the invention disclosed herein, and showing in phantom its typical relationship in a humidifier;

FIG. **2** is a longitudinal cross section of the assembled humidifier drum shown in FIG. **1**;

FIG. **3** is a top plan view of a preferred embodiment of a connecting piece used in the fabrication of the drum shown in FIGS. **1** and **2**;

FIG. **4** is an elevational view of the connecting piece shown in FIG. **3**;

FIG. **5** is an elevational view of the connecting piece shown shaped to the circular configuration prior to assembly; and

FIG. **6** is a sectional view similar to FIG. **2**, except showing the end and connecting pieces preassembled.

The humidifier drum assembly **10** shown is typically rotated about a horizontal axis where the lower part of the drum lies beneath and passes through water confined in an open top tank within a humidifier case. The drum assembly consists of a structural drum form **12** which has an open periphery and a porous matting **14** supported on the periphery which becomes wetted as the drum is rotated through the water. A fan **18** (phantom only) draws ambient air through an opening **20** (phantom only) in the case for forced air flow thereafter through the wetted matting and discharge outside the humidifier.

The disclosed humidifier drum **12** has a pair of spaced end pieces **30** and **32** and at least one unitary

piece **34** connected between the end pieces. The end piece **30** is actually a hoop configuration and has a circular inner edge **36** which can ride on spaced powered rolls **37** (FIG. **1** phantom only) journaled from the humidifier case showing one typical drive support of the drum. The end piece **32** is shown as a closed disc having conical wall **38** effective to diffuse the air coming toward it from the fan **18** to the circumferential drum periphery and matting **14** thereon. The wall **38** is well drafted even to its outer edge to allow compact nesting of line end pieces **32** within one another. The end pieces **30** and **32** have circular radially extended rims **40** and **42** respectively, typically of equal size where the drum is to be a right angle cylinder, and mutually facing cylindrical bosses **44** and **46** likewise of the same size.

The connecting piece **34** is fabricated as by molding from plastic as a unitary component having a pair of elongated side rails **48** and **50** and a plurality of spaced cross or rung elements **52** connected between the rails. The rails are of rectangular cross section narrow in the direction transverse to the rungs to allow the flexure from the flat (FIG. **4**) to the circular (FIG. **5**) and wide in a direction parallel to the rungs to give lateral stability to the piece. Each rung is circular or eliptical in cross section to provide smooth exterior surfaces and give lateral rigidity.

In the configuration shown, open recesses **54** and **56** are provided in the end piece bosses to receive rail elements **48** and **50** respectively, of the connecting element **34.** To assemble the components, side rail **50** is fitted into its receiving recess **56** and the opposite end piece **30** is fitted with its recess **54** over the opposite side rail **48.** The components are then fused in place by adhesive or by chemical bonding, or by ultrasonic welding or by staking. To provide for a foolproof assembly, the eliptical cross section of the end rungs is extended across the rail and the end piece recesses are enlarged in only the corresponding specific areas to receive these rungs. When assembled, the outer circumferential land areas **60** and **62** of the end piece bosses and the central part of each rung generally line up with one another so that the matting **14** can be uniformly supported thereon between the rims **40** and **42.**

While end piece **30** is shown with an interior edge that rides on the drive rollers, it would be entirely possible for the humidifier case to have support rolls (not shown) upon which the end piece exterior edges **40** and/or **42** would ride for powered support of the drum. Likewise, the diffuser end piece **32** is shown completely closed in the center, but this could be modified by having an opening covered by matting if greater matting surface area were desired. Likewise the connecting element **34** has been illustrated as having two side rails, although a third rail might be added for rigidity, or the elongated rail might actually be located spaced from the rung ends which thus would be directly secured to the end pieces. Only a single connecting element **34** has been illustrated which curves almost throughout the 360° of the circle with the end rungs **52** spaced apart only some 5 to 15° consistent with manufacturing tolerances without causing binding of same. It would be possible for extremely large drums where the length of a single connecting element might be too cumbersome to handle to use more than one such connecting element. In such a case, each of perhaps two similar elements would extend less than 180° again allowing an appro-

priate amount of clearance between the adjacent ends.

What is claimed is:

1. A humidifier drum, comprising in combination a pair of end pieces and innerconnecting means between and fixedly locating said end pieces, each end piece being rigid and having similarly sized circular exterior edges, one of the end pieces being in the form of a hoop and thereby also having an interior edge, the innerconnecting means consisting of at least one unitary piece having at least one elongated rail element and a plurality of spaced cross rung elements thereon, the rail element being flexible in the direction transverse to the rung elements to allow the shaping of same from the flat to a curve smaller than the exterior edges of the end pieces and the rung elements each being rigid and terminating at their ends along spaced parallel planes, and means between the end pieces and each unitary piece for rigidly joining the pieces together with each rail element extending parallel of and the rung elements extending transversely of the end piece exterior edges.

2. A humidifier drum according to claim **1,** wherein each unitary piece has a pair of elongated rail elements and the spaced cross rung elements are extended transversely of and between the rail elements.

3. A humidifier drum according to claim **1,** wherein each end piece has an annular boss disposed to project toward the other in assembled position and being of similar size and shape, and wherein each unitary piece cooperates with the end piece bosses effective for joining the pieces together.

4. A humidifier drum according to claim **3,** wherein each boss is provided with a recess suitable for receiving and cooperating with the unitary piece effective for rigidly joining the pieces together.

5. A humidifier drum according to claim **3,** wherein each unitary piece has two elongated rail elements and the cross rung elements are extended transversely of and between and terminate at the rail elements and wherein the end piece bosses have annular recesses provided in adjacent faces thereof suited to receive the rail elements effective for joining the pieces together.

6. A humidifier drum according to claim **5,** wherein each rung element has a generally circular or eliptical cross section to provide a smooth exterior surface devoid of corners.

7. A humidifier drum according to claim **5,** wherein each end piece has a circumferential land area and a radial rim outwardly adjacent the land area, and wherein the exterior edge of each rung element lines up with the adjacent end piece land areas.

8. A humidifier drum, comprising in combination a pair of end pieces and innerconnecting means between and fixedly locating said end pieces, each end piece being rigid and having exterior edges sized to define the exterior of the drum, the innerconnecting means consisting of at least one unitary piece having a pair of elongated rail elements and a plurality of spaced cross rung elements extended therebetween, the rail elements being flexible in the direction transverse to the rung elements to allow the shaping of same from the flat to a curve smaller than the exterior edges of the end pieces and the rung elements each being rigid, and means between the end pieces and rail elements of each unitary piece for rigidly joining the pieces together with each rail element extending parallel to and the rung elements extending transversely of the end piece exterior edges.

* * * * *