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FABRIC DRYING MACHINE

Filed Feb. 21, 1955

2 Sheets-Sheet 1

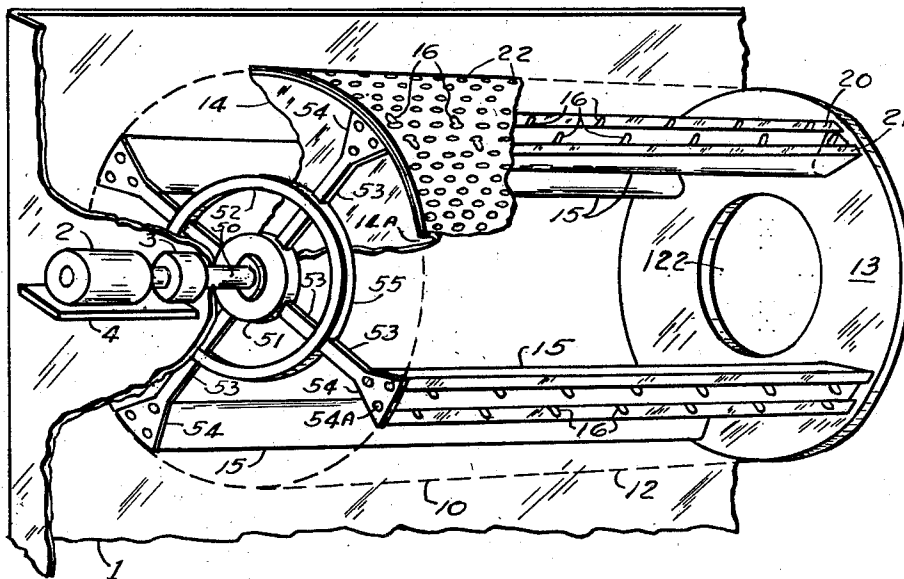


Fig. 1

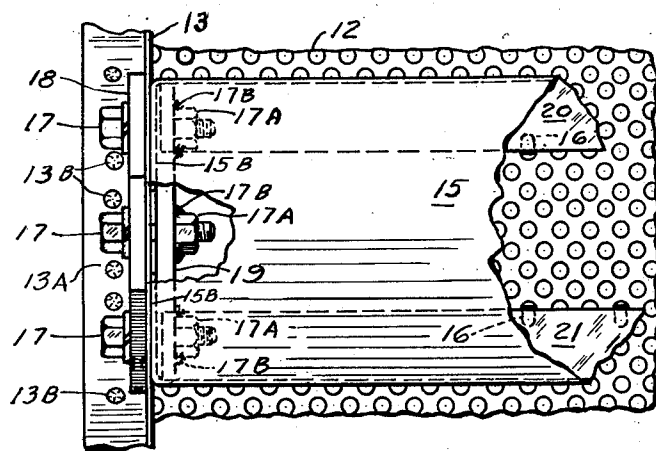


Fig. 4

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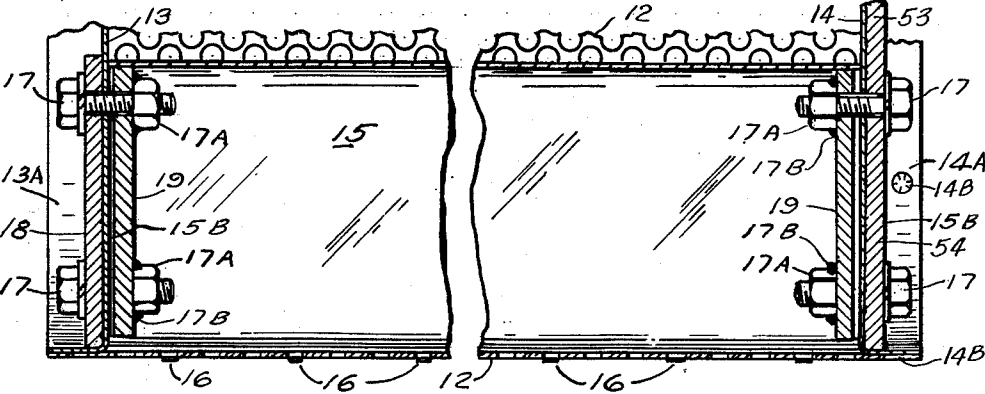


Fig. 3

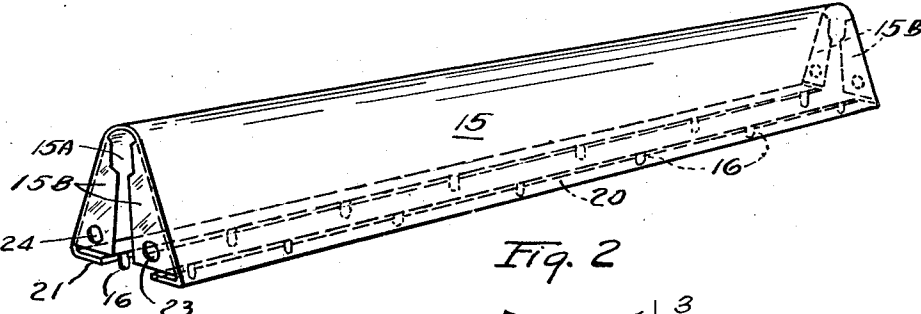


Fig. 2

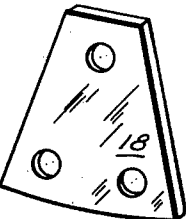


Fig. 6

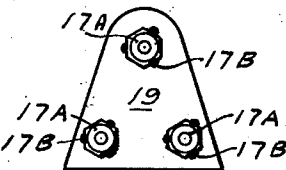


Fig. 7

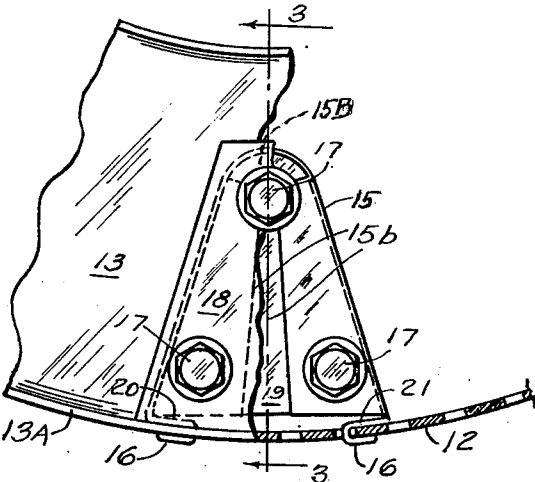


Fig. 5

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1

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FABRIC DRYING MACHINE

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8 Claims. (Cl. 259—89)

This invention relates to fabric drying machines of the type employed by commercial laundries and drycleaning establishments for drying articles of clothing and the like, which comprises a cylinder (cylindrical basket) or drum rotatively mounted within a suitable casing and adapted to receive fabrics, articles of clothing or the like to be dried therein by circulated air heated by gas, steam or electricity.

In these machines the cylinder or drum is provided with an axial opening in one of its end walls through which the articles to be dried are introduced and removed, and the casing is provided with a door in register with the opening in the drum.

A plurality of agitating ribs extend between the end walls of the drum and project radially inwardly, for a comparatively short distance, from the peripheral inside surface of the drum. In operation these ribs serve to lift and tumble the articles to be dried so that thorough and efficient drying is accomplished.

Drying machines of this type are customarily referred to as open end drying tumblers, the rotating drum being provided with a supporting shaft extending axially and longitudinally outwardly from the end wall opposite to that having the axial opening. This shaft is journaled in bearings carried by the casing, and, through a suitable electric motor and driving mechanism connected to the shaft, rotates the drum.

The combined weight of the drum and the articles of clothing constitute an overhung load carried by the shaft, and the added forces of the tumbling articles of clothing within the drum, often cause a drum of conventional structure to distort or sag and lose its alignment so that its useful life is materially decreased. Further, the construction of contemporary drums is such that the pulsative load of the tumbling fabrics is transmitted as an intermittent impact directly to the supporting bearings causing uneven and/or excessive wear, misalignment and lubrication difficulties in the bearings.

The primary object of this invention is to provide a rib and supporting shaft construction that will greatly strengthen the rotating drum and thus allow it to handle loads of fabrics in the neighborhood of one-hundred pounds dry weight. A further object of this invention is the provision of an improved drum construction which will materially reduce bearing wear. Other and distinct objects will become apparent from the description and claims which follow.

As an example addressed to those skilled in the art, the present invention enables open end and dry tumblers intended to handle loads of 35 to 40 pounds dry weight to have a drum 36 inches in diameter and 30 inches in length. Similarly, tumblers to handle loads of 100 pounds dry weight may have a drum 42 inches in diameter and 42 inches in length. The radial height of the ribs are usually 4½ to 6 inches.

The drum ordinarily has end wall members of solid

2

sheet material, and a cylindrical wall of perforated sheet material.

The ribs are substantially uniform in shape throughout their longitudinal length, and each rib has a triangular cross sectional shape with a rounded apex and the base in contact with the inside cylindrical surface of the drum.

Heretofore, a heavy longitudinal stud was placed within the space between the inside surfaces of each rib for clamping the rib between the end walls of the drum. If this stud was tightened too much, the rib buckled throughout its length, resulting in a weak construction that readily distorted in use. Likewise, since the drum is constructed of sheet metal, any distortion or buckling of a rib would allow its stud to become loose, and thus cause the drum to wobble and strike portions of the casing. On the other hand, if the studs were not tightened sufficiently, the entire assembly would work loose after a short period of operation.

In the present invention, the ribs are constructed so that they constitute structural struts connecting the end wall members of the drum; they are so arranged that neither the combined weight of the drum and the fabrics, or the added forces from the tumbling of fabrics, will loosen the ribs and allow the drum to sag. They also are constructed so that they cannot be buckled by excessive tightening during assembly, and so that the weight of the load of fabrics substantially keeps the ribs longitudinally in tension.

We attain the foregoing, as will hereinafter appear, by employing the novel constructions and the combinations and arrangements of elements described below and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of a drying basket embodying our invention, with portions broken away to illustrate the general relationship of the improved construction.

Figure 2 is a perspective view of the rib structure alone showing the end members 15-B and the inwardly extending flanges 20—21 having the attaching ears 16 longitudinally along the length thereof;

Figure 3 is an enlarged fragmentary view, partly in section taken on line 3—3 of Fig. 5, and illustrating the details of the structure joining the ribs to the front wall member and supporting spider arms 53 adjacent the rear wall member;

Figure 4 is an enlarged fragmentary view illustrating the details of the structure joining one of the ribs to the front wall member 13;

Figure 5 is a fragmentary front end view of the cylinder showing one of the clamping plates 18 in relationship to the three clamping bolts 17 and the end members 15-B of a rib 15, also the clinched ears 16 in the perforations of the cylindrical wall 12; and

Figures 6 and 7 are respectively perspective and plan views of the interior clamping plates 18 and 19.

Referring to Figure 1 of the drawings, the drying machine includes a casing 1 provided with an integral bearing boss for rotatively journaling the drive shaft 50 of a drier cylindrical basket or drum 10. Casing 1 also carries a bracket element 4 supporting a drive motor 2 connected for rotating the drive shaft 50. The remainder of the casing structure, including baffling elements have been deleted for the sake of clarity.

The novel drier drum comprises a perforated cylindrical wall 12, preferably formed of galvanized sheet metal, which is broken away in the figure to expose the construction and position of four fabric agitating ribs 15. The ribs 15 are disposed 90° apart about the internal periphery of wall 12 intermediate a front wall 13 and a rear wall 14. Each rib includes a plurality of locking ears 16 which project through perforations 22 in wall

12 and are clinched against the outer surface of the wall to anchor the ribs in their set position. The walls 13 and 14 are forcibly inserted into the open ends of the cylindrical rim 12 and when so positioned form an enclosed clothes receiving chamber or drum. Front wall member 13 includes a central opening 122 providing access for loading and unloading the clothes in cooperation with a conventional door means in the cabinet (not illustrated). Peripheral flanges of the respective end wall members are welded to the wall 12, and, in accordance with the present invention, cooperate with the ribs 15 to form a unique drum or cylinder supporting truss in a manner more fully described hereinafter. The unique rib construction and the function of the truss arrangement will be better understood by reference to Figures 2, 3, and 4.

As shown in Figure 2, each rib comprises an elongated triangular envelope 15 of a relatively light material such as galvanized sheet metal. In forming the rib, the sheet material is bent into a V and the terminal side edges turned inwardly to form opposed longitudinal stiffening flanges 20, 21. The locking ears 16 extend at spaced intervals from the side edges of the flanges and are bent downwardly so as to be readily positioned for passage through the perforations when the ribs are placed in the peripheral wall 12 during assembly. A pair of vertical flanges 15B and 15B are formed at the respective ends of the rib and are provided with holes 23 and 24 for a purpose hereinafter apparent. The flanges extend inwardly towards each other but terminate a short distance apart to present a bolt receiving area 15-A. As will be readily understood by those skilled in the art, the thin material forming member 15, although made substantially more rugged by its triangular configuration, is not a rigid support member; and indeed is incapable of withstanding any substantial compressive force along its longitudinal axis without deforming. However, the thin sheet material is capable of withstanding relatively high tensional forces; and, in accordance with the present invention, this characteristics is utilized to provide a support truss arrangement of equal facility and less expense than those of the contemporary art. This will be better understood by reference to the particular method employed to connect the ribs in the drum as shown in Figures 3 and 4.

As will be noted by reference to Figure 1, the entire drum unit is suspended from a single end bearing 3 by means of the drive shaft 50 and the integral spider 55. The spider 55 comprises a central boss 51 supporting radial arms 53 which terminate in shaped base elements 54. These base elements form a connector junction for joining the drum components to the spider in a tight vibration-resistant union. The respective arms are reinforced by a circular flange 52; providing an exceptionally strong base of relatively light weight. The details of the connection between the spider base elements 54, the wall member 14 and ribs 15 will be better understood by reference to Figure 3 which illustrates the details of one such connection.

As shown, the rear wall member 14 has an axial flange 14-A which extends outwardly to the terminal edge of wall 12. Perforations 14-B are provided in flange 14-A for receiving deposits of filler metal (shaded in the figure) for permanently securing the rear wall member to the peripheral wall 12, as by a tack welding operation. Bolt holes are formed in the face of the wall member 14 in four equidistantly spaced groups of three each for mating with the holes 54A in the spider arms. One of the ribs 15 is shown positioned lengthwise inside drum 12 with its end flanges 15B abutting the inner face of wall 14 and its reinforcing webs 20, 21 lying flush against the surface of peripheral wall 12 and fixedly secured therein by the clinched ears 16 extending through the wall perforations 22. The front edge of the rib is broken away to show the position of a triangular locking or securing plate 19 inside the rib in flush alignment with flanges 15B. As

best seen in Fig. 7 Plate 19 also is provided with three spaced bolt holes 17A and suitable locking nuts 17B welded to the inner face of the plate. Two of the holes 17A are so placed as to align with the holes 23, 24 in the respective rib flanges 15 (see Figure 2), which, in turn, are in alignment with the lower holes in the wall 14 and spider base 54. With this arrangement, bolts 17 can be placed through the respective holes into mating engagement with the lock nuts 17A to draw the entire assembly into a strong, vibration free mounting with the adjacent face of the spider base 54.

The connection of the other end of the ribs 15 to the front wall 13 is made in a similar manner, as will be more readily understood by reference to Figs. 4 and 5. As therein illustrated, the rib 15 is joined with the face of wall 13 via an external V-shaped clamping plate 18, rib flanges 15B, and an internal clamping plate 19. With the exception of plate 18, the structure of the component parts is similar to that set forth with respect to Figure 3. Since the front end of the drum is freely suspended, it is unnecessary and undesirable to employ a supporting spider, or the like, for anchoring the forward ends of rib 15. Instead, it has been found very convenient to utilize the V shaped clamping plates 18 in conjunction with the relatively thin wall 13 and its axial flange 13A to produce a substantial arrangement in which wall 13 ties the four ribs into a rigid cantilever truss unit anchored at spider 55 but capable of free movement at the forward end.

As constructed, the ribs 15 retain the basket frame in coaxial alignment with its horizontal center line. However, the centrifugal force acting on the component parts, plus the intermittent impact of the tumbling fabrics, when the basket is rotating during a drying operation, would normally tend to distort its alignment, causing sag and loosening of the various connections. Heretofore, these deleterious effects have been minimized by constructing the drum member as a substantially rigid drum reinforced by heavy securing bolts spanning the space between the front and rear headers. The present invention, on the other hand, substantially wholly avoids these undesirable effects by providing a lighter, more durable construction having a useful operating life of more than double that of contemporary drums. This unique result is attained with the present construction by reason of the fact that the parallel truss arrangement of ribs 15 functions as a cantilever support providing a much desired flexibility in allowing a predetermined degree of vertical movement of the free end of the drum to cushion the effect of the centrifugal force and the impact of the tumbling clothes.

A unique feature of the present invention is the fact that the relatively light, thin ribs 15, as connected to the faces of the respective end walls, are placed in longitudinal tension by any vertical movement of the outer wall 13. This will be understood by realizing that the outer ends of the ribs tend to move as radial arms anchored at wall 14, and therefore along an arc, but being constrained by wall 13 to move in a vertical plane. As a result, the deflection forces tend to stretch the ribs, i. e., place the rib surfaces in longitudinal tension, a strain which the thin ribs may readily and repeatedly withstand without fatigue and/or failure. This characteristic allows the drum to gently flex from the horizontal during the drying operations without transmitting shocks, vibration, and the like, to the main bearings supporting shaft 50. The effect of this action is to isolate the main bearings, and, as a consequence, the bearing life is materially increased and lubrication problems do not arise. An unexpected advantage of the invention is the discovery that a drum constructed, as herein described, with a diameter of forty-two inches can readily handle loads of one hundred pounds dry weight without permanent distortion.

Yet a further advantage resides in the elimination of assembly problems through the use of the independent clamping connections at the respective ends of the agitating ribs. Simple inspection of the drawings will show

that the securing bolts 17 can be rapidly and firmly threaded into the clamping plates 19 without danger of damaging the ribs or disturbing their alignment. Because of this, reject losses are eliminated and overall construction costs reduced.

Although the present invention has been described with respect to a single embodiment, it will be understood that other and different structures may come within the scope of and incorporate the features of the invention, as will be apparent to those skilled in the art.

Having described the invention, what we claim is:

1. A rotatable drum for a fabric drying machine comprising in combination a foraminous peripheral wall, a flanged front wall and a flanged back wall; said latter walls being inserted in said drum and said flanges being welded to said peripheral wall; said front wall having a central opening providing access into said drum; a plurality of radially arranged agitating ribs secured longitudinally to the inner face of the peripheral wall by means of clinched prongs; each said rib being formed as an elongated triangular envelope provided with a set of inwardly disposed terminal flanges enclosing each end and positioned substantially parallel to the walls; bearing means for rotatably supporting said drum including a shaft integrally carrying a connecting spider; and removable securing means independently cooperating with each set of said terminal flanges and each of said walls and said spider so as to fixedly secure said walls and ribs to said spider whereby loads carried by said drum tend to flex said ribs as a cantilever truss placing said ribs under tension.

2. A rotatable cylindrical basket for fabric drying machines comprising in combination a foraminous cylindrical wall, a flanged back wall and a centrally open flanged front wall enclosing the respective ends of said foraminous wall to thereby form a drum, a plurality of longitudinally extending fabric agitating ribs positioned inside said drum in contact with the foraminous wall and extending radially inwardly, each said rib comprising a triangularly shaped thin metallic envelope having integral securing flanges substantially enclosing each end of the envelope, a rotatable shaft including radial spider arms equal in number to said plurality of ribs positioned in registry with said ribs on the external face of said back wall, and clamping means for independently securing said rib flanges to said back wall and spider arms and to said front wall whereby said foraminous wall is suspendingly supported by a cantilever truss arrangement of said ribs.

3. A rotatable cylindrical basket for fabric drying machines comprising in combination a foraminous cylindrical wall, a flanged back wall and a centrally open flanged front wall enclosing the respective ends of said foraminous wall to thereby form a drum, a plurality of longitudinally extending fabric agitating ribs positioned inside said drum in contact with the foraminous wall and extending radially inwardly, each said rib comprising a triangularly shaped thin metallic envelope having integral securing flanges substantially enclosing each end thereof, a rotatable shaft including radial spider arms equal in number to said plurality of ribs positioned in registry with said ribs on the external face of said back

wall, a pair of internal clamping plates positioned inside each said rib and respectively abutting said end flanges, each said internal clamping plate including a plurality of threaded nuts, external clamping plates positioned on the outer face of said front wall in alignment with said ribs, said spider arms, clamping plates and walls being perforated for receiving bolts to rigidly secure the ribs to said front wall and the back wall to said spider arms whereby said ribs are independently connected to the end walls of the basket for suspendingly supporting the basket from said spider arms.

4. A rotatable cylindrical basket for fabric drying machines comprising in combination a foraminous cylindrical wall, a circular back wall and a circular open front member engaging the respective ends of said cylindrical wall to thereby form an open end drum, a plurality of longitudinally extending fabric agitating ribs positioned inside said drum in contact with and secured to the interior perimeter of the foraminous wall and extending radially inwardly, each said rib comprising a triangularly shaped thin metallic envelope having integral securing flanges substantially enclosing each end of the envelope, each of said ribs also having reinforcing webs extending longitudinally of the axis of said rib and forming a seating base therefor upon said foraminous wall, a rotatable shaft including radial spider arms on the external face of said back wall, and clamping means for independently securing said rib flanges at a first end to said back wall and spider arms and at a second end to said front member whereby said foraminous wall is suspendingly supported by a cantilever truss arrangement of said ribs.

5. In a clothes drier having a rotatable, cantilever-mounted basket including a front wall, a rear wall, and a foraminous peripheral wall joining said front and rear walls and normally subject to distorting stresses during basket rotation, and a basket reinforcing means rotatably supporting said basket externally of said rear wall, the improvement comprising a plurality of peripherally spaced clothes tumbling ribs axially mounted inside said basket in contact with said foraminous wall, and means for rigidly connecting said ribs at a first end to said front wall and at a second end to both said rear wall and said reinforcing means whereby upon rotation of said basket each rib is placed under tension stress as its adjacent foraminous wall tends to flex outwardly.

6. Apparatus as defined in claim 5 wherein said reinforcing means comprises a rigid spider arm.

7. Apparatus as defined in claim 5, wherein said means for connecting said ribs to said front wall includes a locking plate disposed externally of said wall and a locking plate disposed internally of said wall.

8. Apparatus as defined in claim 5 wherein said means for connecting said ribs to said rear wall includes a locking plate disposed internally of said wall.

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