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Files

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[54] **LAUNDRY SYSTEM WITH DRYING TUMBLER**

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

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[52] **U.S. Cl.** **34/126;** 34/129; 34/132; 34/137; 34/242

[51] **Int. Cl.²** **F26B 11/02**

[58] **Field of Search** 34/130, 131, 132, 133, 34/137, 139, 126, 129, 242

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Primary Examiner—Carroll B. Dority, Jr.
Assistant Examiner—Larry I. Schwartz
Attorney, Agent, or Firm—George H. Fritzinger

[57] **ABSTRACT**

A laundry system comprises a washer-extractor and a separate drying tumbler mounted in line with each other. The washer-extractor has a load-unload opening at one end and the tumbler has load and unload openings at its opposite ends. The separate units can be tilted and the tumbler can also be shifted so that the two units can be engaged in axial alignment with each other in a downwardly-inclined arrangement to permit easy unloading of the washer-extractor into the tumbler. A novel construction of the tumbler provides for a flow of dry air lengthwise of the tumbler counter to the tilt angle thereof so that the items being washed are kept distributed lengthwise of the tumbler during a drying operation. Further, in order that the drying air will be wholly distributed throughout the tumbler, some of the air is directed through the end openings axially of the tumbler and the remaining air through perforated ribs in the tumbler which have baffle plates midway the length of the tumbler to divert the air from the ribs through the central portion of the tumbler.

5 Claims, 6 Drawing Figures

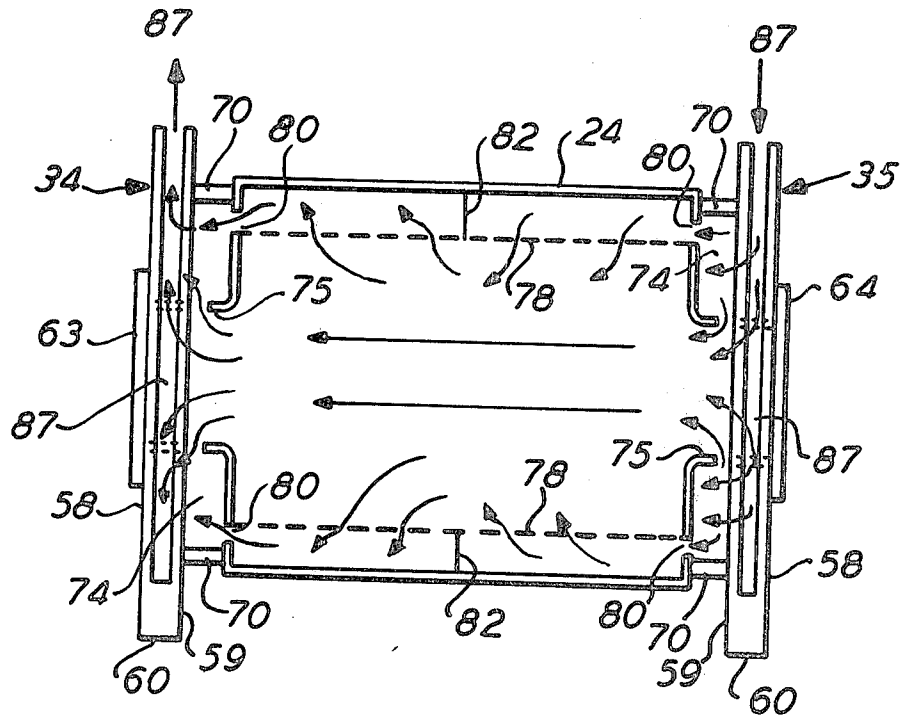


FIG. 1

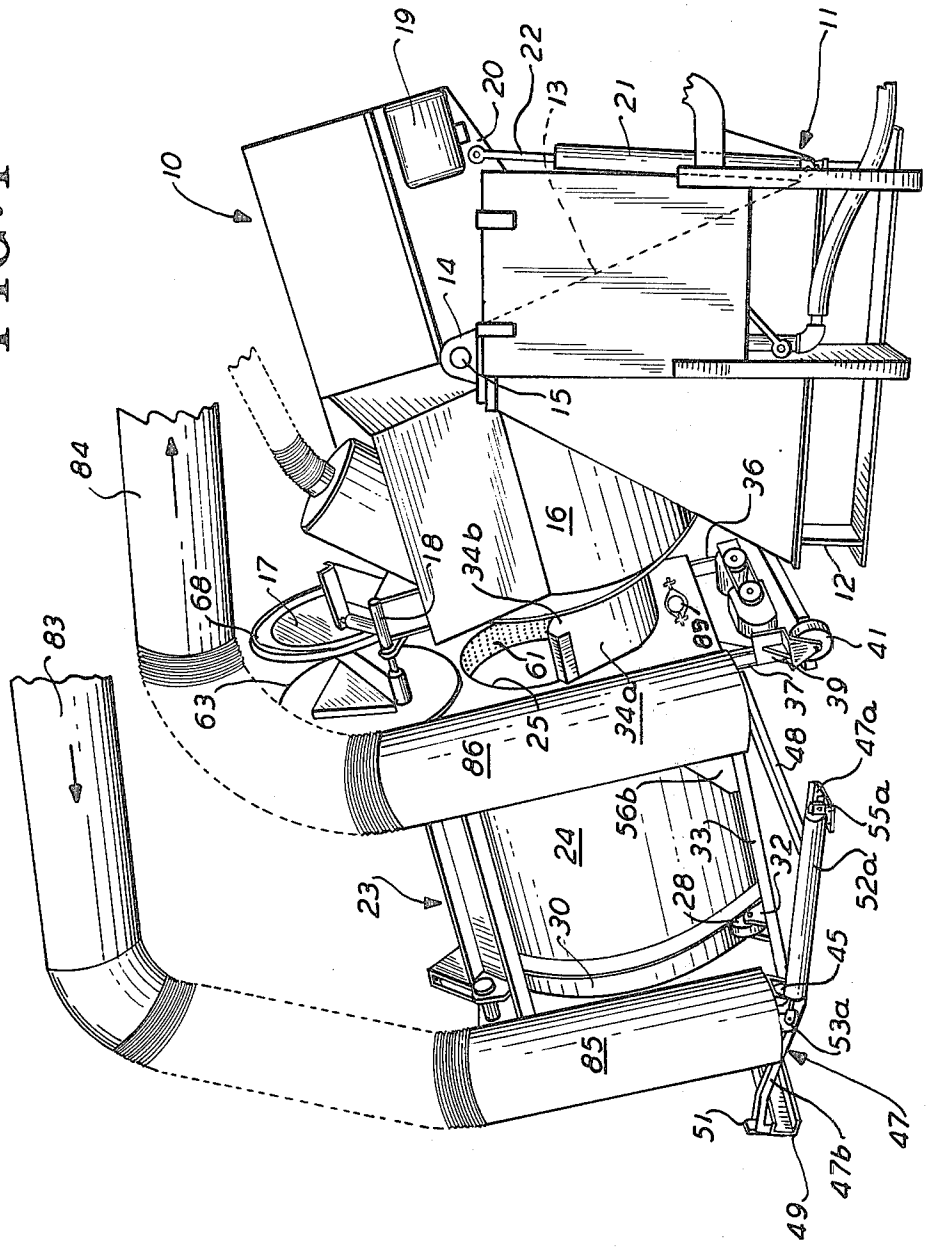

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FIG. 2

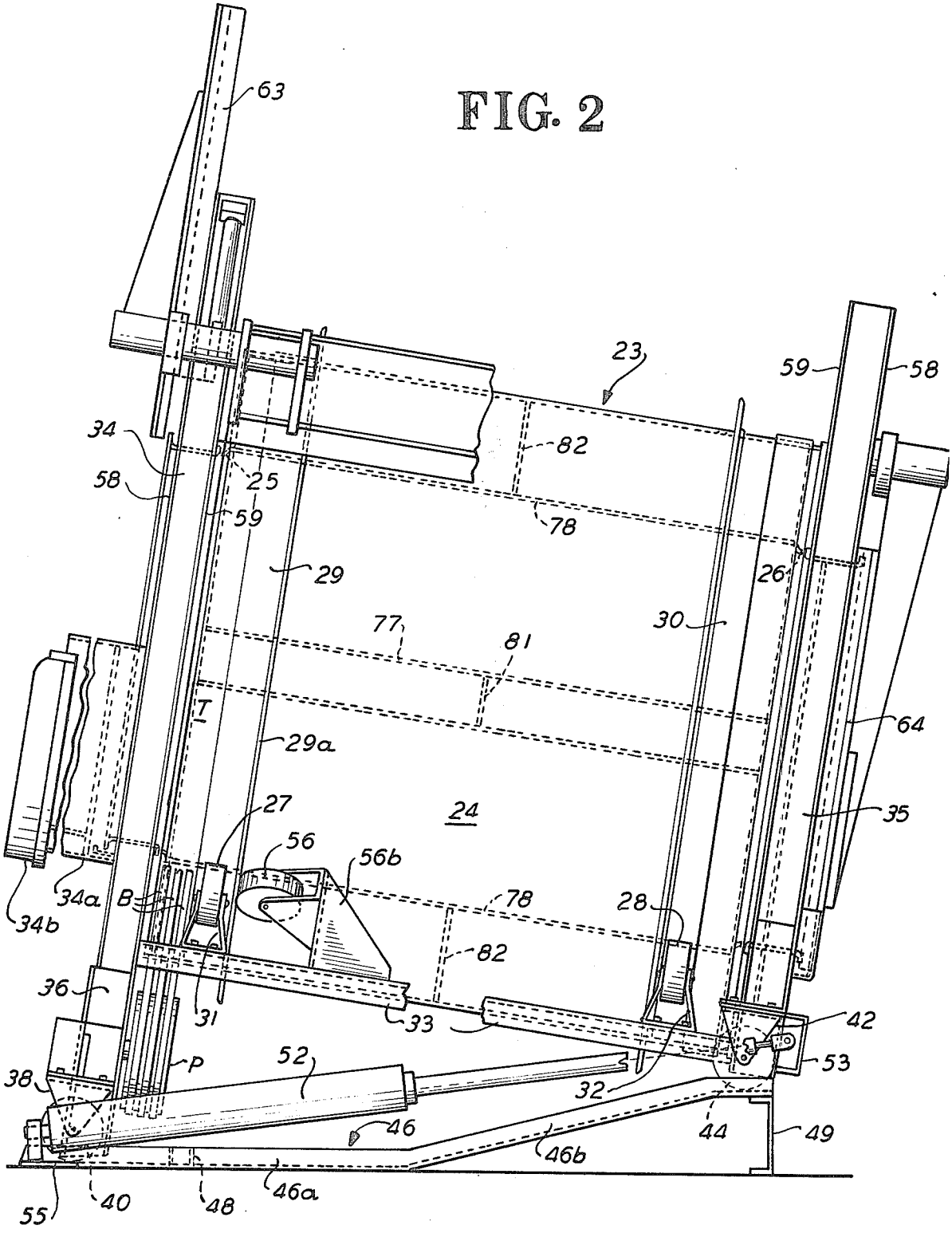
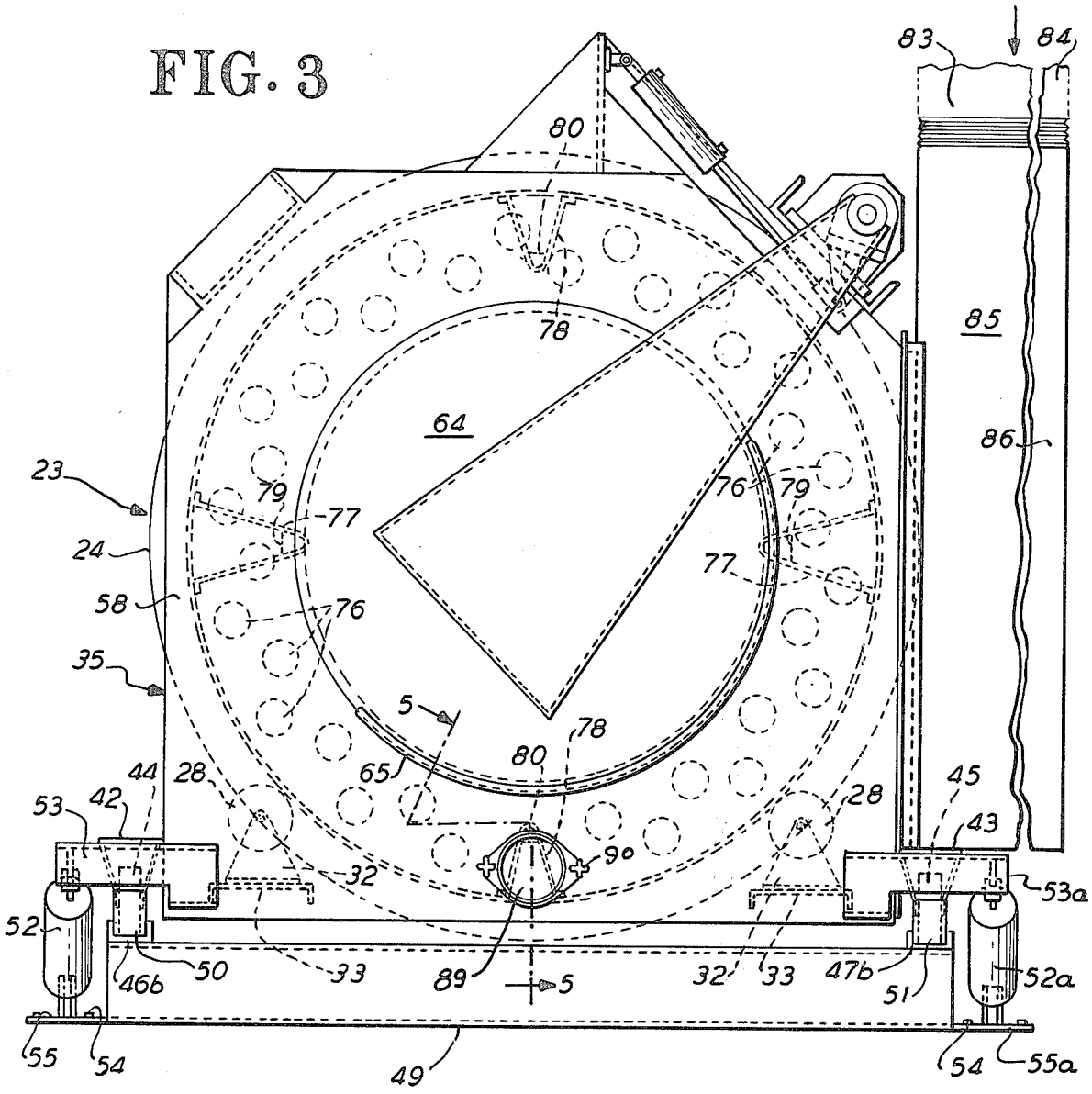

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FIG. 3


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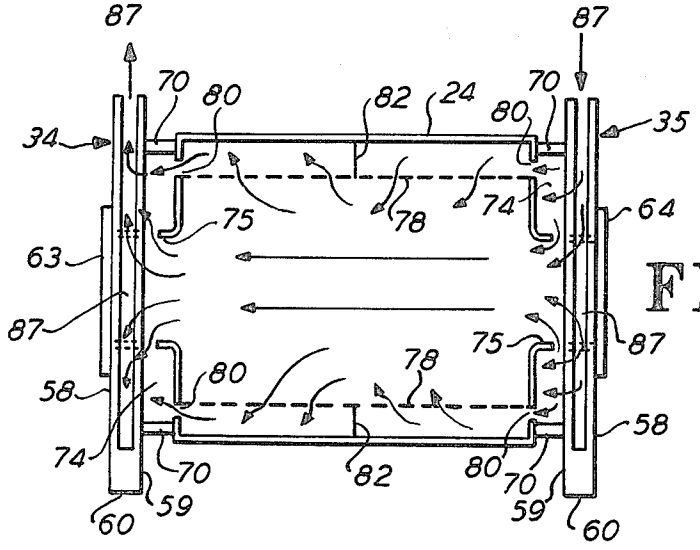

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FIG. 6

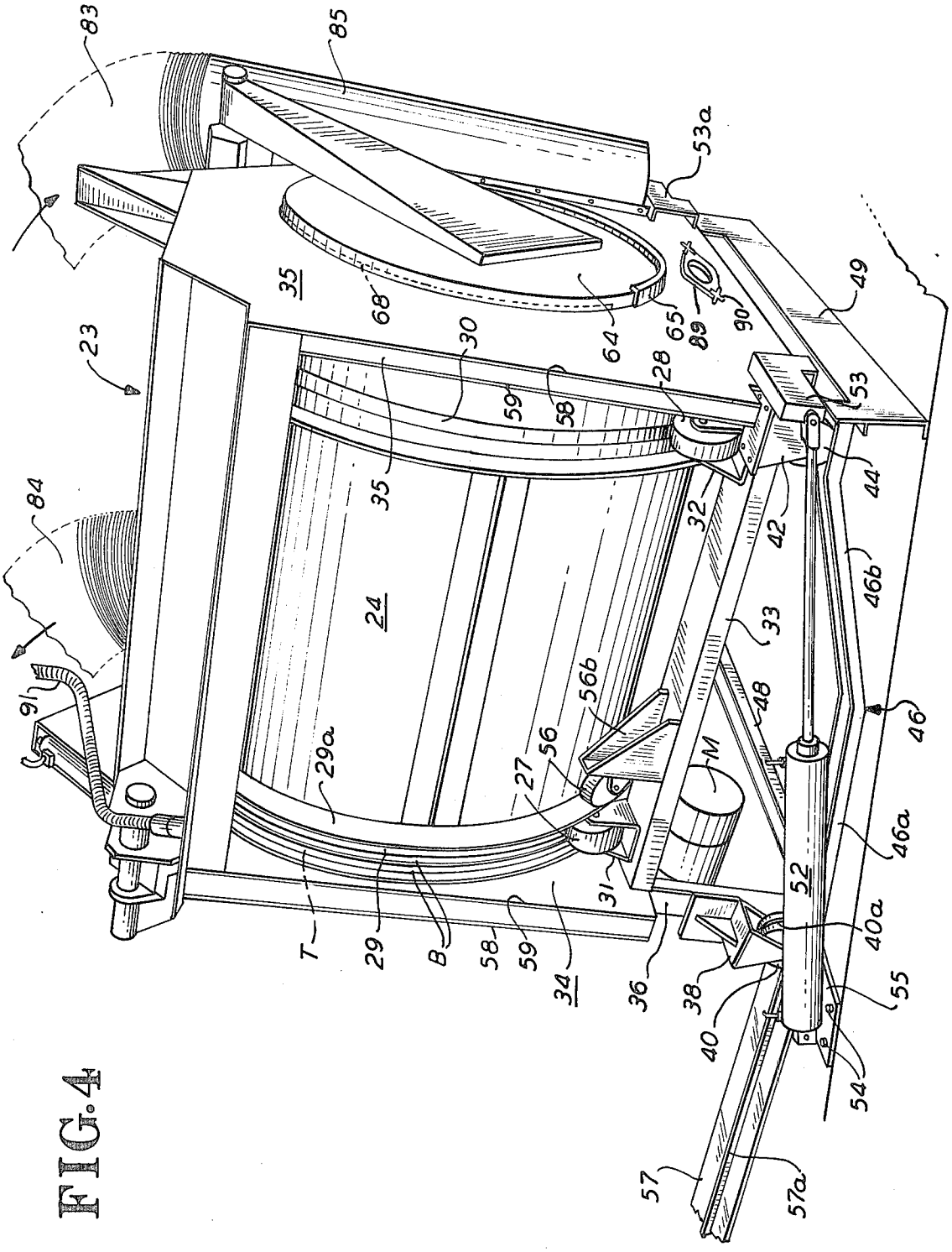
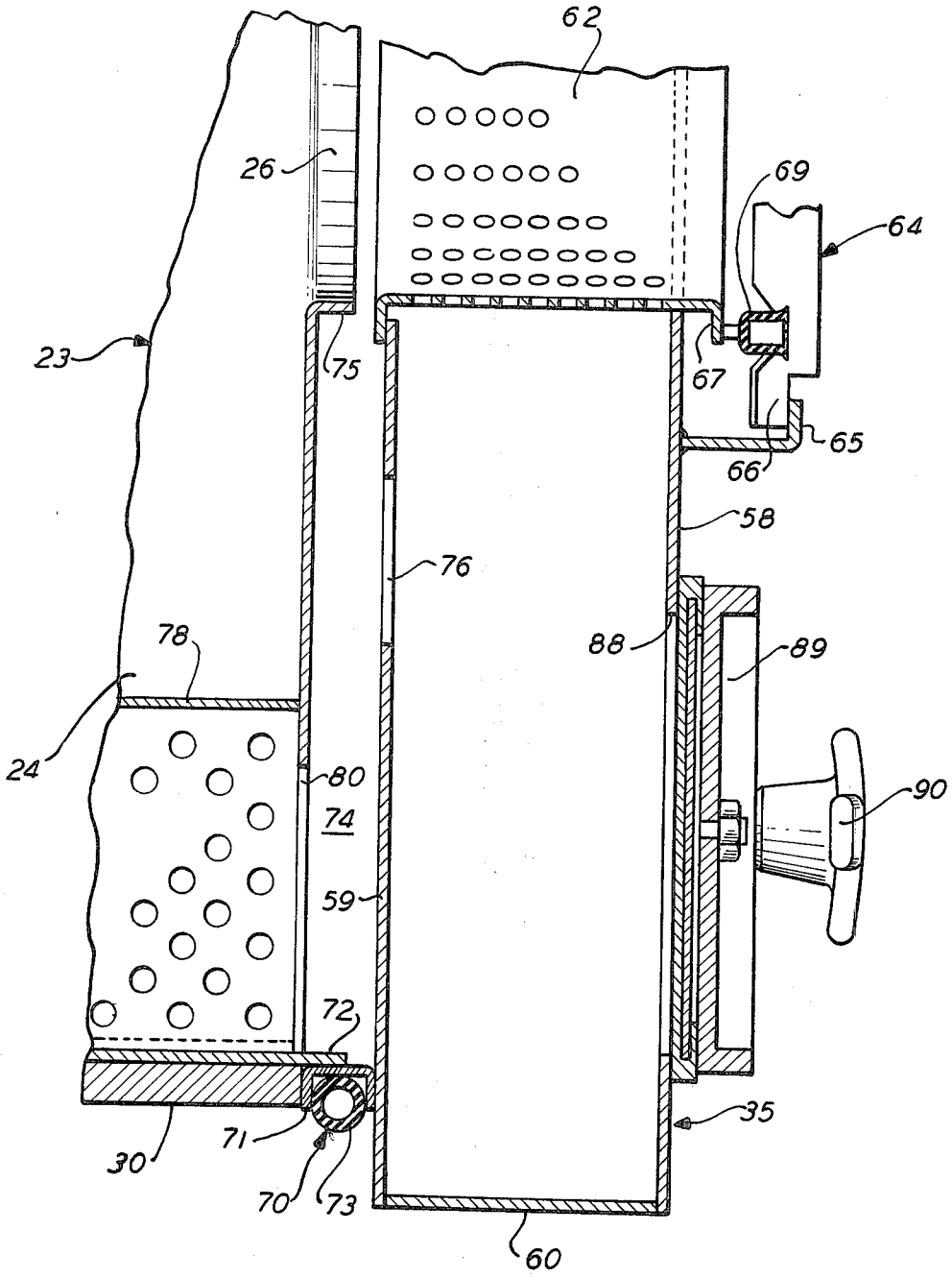

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FIG. 4

FIG. 5


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LAUNDRY SYSTEM WITH DRYING TUMBLER

An object of the invention is to provide a novel laundry system of washer-extractor and drying tumbler which enables easy unloading of the washer-extractor into the tumbler and which permits one wash load to be dried by the tumbler simultaneously as a next wash load is being washed and extracted.

Another object is to provide such laundry system in which the washer-extractor and tumbler are normally separate from each other and in which the washer-extractor is tilted downwardly and the tumbler is simultaneously shifted towards the washer-extractor and tilted into axial alignment therewith when the washer-extractor is to be unloaded into the tumbler.

Another object is to mount the tumbler on wheels which ride down a ramp to change the tilt angle of the tumbler as it is shifted towards the washer-extractor.

Another object is to provide a tumbler with closable load and unload openings respectively at its opposite ends, which is supported in a tilted position during operation and in which drying air is passed counter to the tilt of the tumbler to keep the load distributed while the drying air is circulating.

Another object is to provide such drying tumbler having air heads in slidable sealing engagement with the opposite ends of the rotatable drum of the tumbler for passing drying air axially of the drum via the load and unload openings thereof and also through end wall openings of the drum into and from perforated ribs of the drum wherein the ribs have central baffle plates to divert the air into the drum along the central portion thereof.

These and other objects and features of the invention will be apparent from the following description and the appended claims:

In the description of my invention reference is had to the accompanying drawings, of which:

FIG. 1 is a right-side perspective view of a washer-extractor and of a drying tumbler in engaged relation therewith for transfer of a wash load from the washer-extractor to the tumbler;

FIG. 2 is a left-side elevational view of only the drying tumbler showing the tumbler in operating position with its loading door open and unloading door closed;

FIG. 3 is an elevational view of the unloading end of the tumbler as it appears in FIG. 2;

FIG. 4 is a perspective view of the left side and unloading end of the tumbler showing the tumbler in operating position with the load and unload doors thereof closed;

FIG. 5 is a fractional section to larger scale approximately on the line 5—5 of FIG. 3 through the air head assembly at the unloading end of the tumbler; and

FIG. 6 is a diagrammatic view showing the relation of the load and unload head assemblies to the tumbler.

The present invention is shown by way of illustrative example in connection with a washer-extractor 10 of the type described in the Miller et al. U.S. Pat. No. 3,498,089 dated Mar. 3, 1970. Suffice for the present to describe the washer-extractor as having a supporting structure 11 comprising a base 12 with side pillars 13 of pyramidal shape carrying bearings 14 for trunnions 15 mounted at the back end of a cylindrical casing 16 of the washer-extractor. The casing 16 has a circular load-unload opening at its front end (not shown) which is centered at the axis of the casing and closable by a door 17 hinged to a bracket 18 at the top of the washer-extractor to swing up and down between open and closed positions in the manner described in the above patent. Mounted within the casing 16 is a perforated drum (not shown) having a shaft secured to its back end journalled in a bearing mounted on the back wall of the casing to support the drum from the back end only. The drum is rotated by a motor 19 mounted on a bracket structure 20 extending from the back of the casing. Coupled between the bracket structure and the base 12 is an air cylinder 21 which when the piston rod 22 thereof is extended, as shown in FIG. 1, tilts the washer-extractor downwardly typically to about 15° for unloading the wash load. When the piston rod is drawn inwardly to an intermediate position, the washer-extractor is supported in normal position at about a 5° upward tilt relative to the horizontal wherein the front door is closed and the wash load is washed and extracted. Further, when the piston rod is drawn further inwardly to where the washer-extractor is tilted upwardly by about 20° to the horizontal, the washer-extractor is positioned for a sling loading.

In a laundry operation the load is washed at a normal speed of the drum and then the casing is drained and the speed of the drum is increased to extract the bulk of the washing liquid by centrifugal force. Thereupon, the drum may again be rotated at a low tumbling speed and hot dry air circulated therethrough to remove the last bit of washing liquid and to leave the wash load in a fluffy, dry condition. However, a drying operation is as time-consuming as a washer-extractor operation. Accordingly, when a single unit is used not only as a washer-extractor but also as a dryer, the unit is reduced to a 50% capacity as far as the washer and extractor operations are concerned. To avoid this reduced efficiency it is better to provide a drying tumbler in connection with the washer-extractor so that a drying operation of a wash load can be carried out simultaneously as the next wash load is being washed and extracted. To this end, the present laundry system is provided with a shiftable drying tumbler 23 mounted in line with a washer-extractor but normally at a distance from the latter to enable easy access for loading the washer-extractor.

The tumbler 23 comprises an imperforate cylindrical drum 24 having axially located loading and unloading openings 25 and 26 (FIG. 2) at its opposite ends. This drum is rotatably mounted on respective pairs of rollers 27 and 28 at its load and unload ends. These rollers ride on respective peripheral bands 29 and 30 at the load and unload ends of the drum, the rollers of each set having about a 90° separation relative to the axis of the drum (FIG. 3). The rollers 27 and 28 are journalled in respective brackets 31 and 32 which are mounted on frame channel members 33 at opposite sides of the drum lengthwise thereof. These frame channel members are secured at their ends to head structures 34 and 35 that confront the load and unload end walls of the drum at a spacing therefrom as is shown by FIGS. 5 and 6. Rotation of the drum is effected by a motor M (FIG. 4) driving a pulley P (FIG. 2) coupled by a series of V-belts B to a wide annular track T on the drum. Electric operating power is obtained via a cable 91.

The frame of side channel members 33 and head structures 34 and 35 has legs 36 and 37 depending from the loading head structure 34 at distances inset from the sides of the head structure. Mounted on the lower ends of these legs at the outer sides thereof are brackets

38 and 39 directly below the corners of the head structure. Journalled in these brackets are casters 40 and 41 that ride on the floor supporting the washer-extractor to support the load end of the tumbler at a spacing above the floor. At the corners of the unload head structure 35 there are brackets 42 and 43 which are mounted directly at the sides of the side channel members 33 and which depend only slightly therebelow. These brackets have casters 44 and 45 journalled therein. As a result, when the tumbler is supported by the casters with both ends at the level of the floor, the tumbler is at about a 15° angle to the horizontal with the unload opening at the lower end. This is the positioning of the tumbler when it is in axial alignment with the washer-extractor to receive a wash load therefrom as is indicated in FIG. 1. A chute 34*a* with a rubber bumper 34*b* along its outer edge extends outwardly from the head structure 34 along the lower half portion of the load opening (FIGS. 1 and 2) to bridge the space between the washer-extractor and tumbler when they are fully engaged. Side rollers 56 journalled in brackets 56*b* ride against flange 29*a* of band 29 to take the thrust due to the inclination of the drum.

The tumbler 23 is mounted on a base structure which guides it to and from the washer-extractor and tilts the tumbler between a tilt position of 15° to the horizontal when the tumbler is engaged with the washer-extractor and to a tilt position of about 10° to the horizontal when the tumbler is separated at a normal distance therefrom. This base structure comprises a pair of guide tracks 46 and 47 directed towards the washer-extractor, which have lower flat portions 46*a* and 47*a* resting flat on the floor nearer the washer-extractor and ramp portions 46*b* and 47*b* which are inclined upwardly proceeding away from the washer-extractor. The flat portions 46*a* and 47*a* are interconnected near the ends thereof by a brace 48 and the ramp portions are interconnected at their outer ends by a transverse channel member 49 which also supports the ramp portions above the floor. Plates 50 and 51 connected to the end portions of the channel member 49 serve as stops for the casters 44 and 45 at the end of the ramp. Shifting movement of the tumbler towards and from the washer-extractor is produced by air cylinders 52 and 52*a* at the sides of the tumbler connected between side brackets 53 and 53*a* mounted on the unload head assembly 35 and side plates 55 and 55a connected to the inner end portions of the guide tracks 46 and 47. This shifting movement is between the outermost position of the tumbler shown in FIG. 4 and its innermost position in engagement with the washer-extractor approximately shown in FIG. 1. In the innermost position the casters 42 and 43 have ridden off the ramps 46*b* and 47*b* and onto the flat portions 46*a* and 47*a*. The plates 55 and 55*a* may be secured by suitable bolts 54 to the floor indicated in FIG. 4 to secure the base in fixed relation to the washer-extractor. As a guide for the inner end of the tumbler facing the washer-extractor the left caster 40 at the inner end of the tumbler is provided with a peripheral groove 40*a*, and a plate 57 with a ridge 57*a* engaging the peripheral groove of the caster is mounted on the floor parallel with the guide tracks 46 and 47 (FIG. 4).

The load and unload head assemblies 34 and 35 are flat rectangular structures of hollow construction each comprising outer and inner plates 58 and 59 (FIGS. 5 and 6) closed along their outer edges by an end wall 60 secured in place as by welding. These head structures have central openings therethrough constituting the load and unload openings 25 and 26 for the tumbler. The portions of these openings traversing the head structures are lined by perforated cylindrical rings 61 and 62 (FIGS. 1 and 5) which have outwardly-turned flanged edges beyond the plates 58 and 59. The door rings are secured to the corresponding edges of the plates 58 and 59 as by welding.

These load and unload openings are closable by respective doors 63 and 64 preferably of the character described in the aforementioned Miller et al. U.S. Pat. No. 3,498,089. In order to obtain a fluid-tight closure of the doors, angle irons 65 are extended around the lower half portion of each opening so as to be engaged by an outer edge 66 of the corresponding portion of the door (FIGS. 3, 4 and 5), and an outer flanged portion 67 (FIG. 5) of each door ring extending beyond the outer wall 58 is engaged by an inner flange 68 (FIGS. 1 and 4) on the upper half portion of the door, all so that each door becomes locked along its entire periphery against outward displacement from the head structure when the door is closed. Further, each door may have an inflatable sealing ring 69 which rides onto the flange 67 as the door is closed to seal the closure (FIG. 5).

Between each end wall of the drum 24 and the confronting inner plate 59 of the respective head assemblies 34 and 35 is a sealing ring 70 as shown in FIG. 5. This seal is a slidable one comprising a channel ring 71 of flexible material, preferably of Teflon-impregnated felt. This ring is mounted on an extending circular edge 72 of the drum of the tumbler and is engaged by a tube 73 which is inflatable to expand the side walls of the ring 71 and to exert pressure between the corresponding wall portions of the drum and the plate 59. This sealing ring encloses a cylindrical space 74 between each head assembly and the end wall of the drum. An inwardly-turned flange 75 from the central opening of each end wall of the drum partially closes this space around the opening. The annular portion of each inner wall 59 is provided with a series of openings 76 as shown in FIGS. 3 and 5 to provide communication from the inner space of each head assembly to the annular air space 74 between the head assembly and drum. Further, the drum has on its inner peripheral wall lengthwise thereof two diametrically opposite ribs 77 of higher radial dimension and two intervening ribs 78 of smaller radial dimension. These ribs are made of perforated metal and have openings 79 for the ribs 77 and openings 80 for the ribs 78 through the end walls of the drum (FIGS. 3 and 5). Baffle plates 81 and 82 close the ribs 77 and 78 respectively at points intermediate the length of the drum.

As shown in the figures, large ducts 83 and 84 are connected to cylindrical chambers 85 and 86 standing upright along the right side edges of the head assemblies 35 and 34. These cylindrical chambers have slot openings 87 (FIG. 6) into the head assemblies for feeding air into the unload head assembly 35 and for receiving the air from the load assembly 34. This is a hot, drying air from a source not shown which passes from the unload head assembly 35 through the apertures in the door ring and via the center openings of the drum axially along the length thereof in the direction counter to the tilt angle of the drum. Further, an additional portion of this drying air passes through the openings 76

into the cylindrical air space 74 and then into the perforated ribs 77 and 78, but since these ribs are closed intermediately thereof by the baffle plates 81 and 82 this air is diverted radially inwardly from the ribs into the drum along the central portion thereof and back outwardly through the remaining portion of the ribs to the outlet duct. The effect of this drying air during a tumbling operation is to cause the washed items to be maintained in a distributed relationship throughout the drum because the air flow is counter to the tilt angle of the drum, and to cause the air to flow both axially and radially into and out of the drum for complete distribution of the drying air through the articles being tumbled. The result is that a very efficient drying operation is obtained.

At the bottoms of the head structures 34 and 35 centrally of the widths thereof are clean-out openings 88 for lint, etc. These openings are normally closed by cover plates 89 held in place by securing knobs 90 (FIG. 5).

It is, of course, understood that the load and unload doors are closed during a drying, tumbling operation. When it is desired to unload the tumbler, the unload door 64 is opened and the drum is kept rotating so that with a continuing tumbling rotation of the drum the items being tumbled will gradually flow out of the unload opening to prepare the tumbler to receive another wash load from the washer-extractor. With laundry work the air flow is preferably cut off during unloading so as not to slow down the unloading operation, but with dry-cleaned work the air flow is preferably kept on during unloading so that any solvent fumes in the drum may be withdrawn and not escape into the room.

The embodiment of my intention herein particularly shown and described is intended to be illustrative and not necessarily limitative of my invention since the same is subject to changes and modifications without departure from the scope of my invention which I endeavor to express according to the following claims.

I claim:

1. A drying tumbler for clothing or the like comprising a frame, an imperforate cylindrical drum supported on said frame for rotation about its longitudinal axis and having axial loading and unloading openings at its opposite ends, stationary hollow head structures mounted on said frame in spaced relation to the opposite end walls of said drum each comprising a pair of spaced walls closed along their outer edges and having a central opening therethrough conforming to the respective openings in the end walls of said drum, circular sealing means slidably interposed between said drum and each head structure to enclose a cylindrical air space between the head structure and each end wall of the drum, the inner wall of each head structure confronting said drum being apertured to provide communication of the head structure with said cylindrical air space adjacent the head structure, and an air-circulating means connected between said head structures for circulating air through said drum lengthwise thereof via said head structures, cylindrical air spaces and axial openings in the end walls of said drum.

2. The drying tumbler set forth in claim 1 wherein said supporting means is adapted to carry said drum in an inclined relation to the horizontal with said unloading opening at the lower end, and wherein said air-circulating means is directed to cause the circulating air to enter said drum at the unloading end thereof whereby the air flow through said drum is counter to the gravitational influence on the articles being tumbled to cause the articles to remain distributed in said drum while the drum is being rotated.

3. The drying tumbler set forth in claim 1 wherein the end walls of said drum have also openings near the periphery thereof for additional flow of air via said head structures, cylindrical air spaces and drum whereby to maintain an even distribution of air flow through the drum.

4. A drying tumbler for clothing or the like comprising a frame, an imperforate cylindrical drum structure supported on said frame for rotation about its longitudinal axis and having axial loading and unloading openings at its opposite ends, stationary hollow head structures mounted on said frame in spaced relation to the opposite end walls of said drum each comprising a pair of spaced walls sealed at their outer edges and having a central opening therethrough conforming to the respective openings in the end walls of said drum, circular sealing means slidably interposed between said drum and each head structure to enclose a cylindrical air space between the head structure and drum, the inner wall of each head structure confronting said drum being apertured to provide communication of the head structure with the cylindrical air space adjacent the head structure, hollow ribs mounted on the inside peripheral wall of said drum throughout the length of the drum, each rib having an apertured wall and being open at the ends thereof through the end walls of the drum to said cylindrical air spaces, air-circulating means having an output duct connected to one head structure and an input duct connected to the other head structure, and baffle plates in said respective ribs intermediately thereof for causing the air entering the ends of said ribs from said one head structure to be diverted from the inlet portions of the ribs into the working space of said drum and back from the working space of the drum out through the remaining outlet portions of the ribs.

5. The drying tumbler set forth in claim 4 including cylindrical wall members extending through said head structures in engagement with said central openings thereof, said wall members being perforated to provide also communication of said cylindrical spaces with said axial openings in the end walls of said drum whereby a portion of the circulating air passes axially through said drum from one end to the other.

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