

July 7, 1959

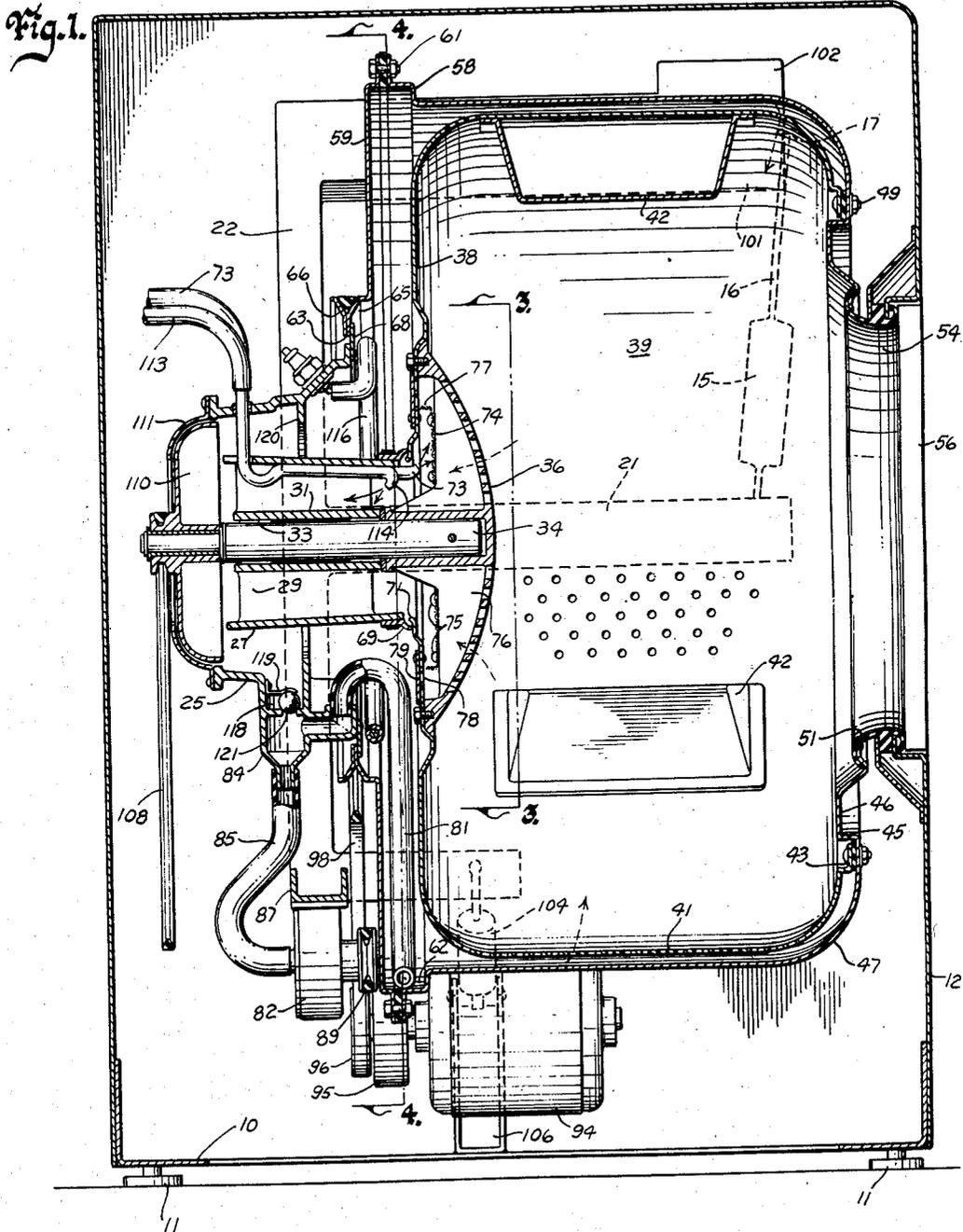
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2,893,135

UNITARY TUB WASHER-DRIER

Filed April 8, 1957

3 Sheets-Sheet 1



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Fig. 3.

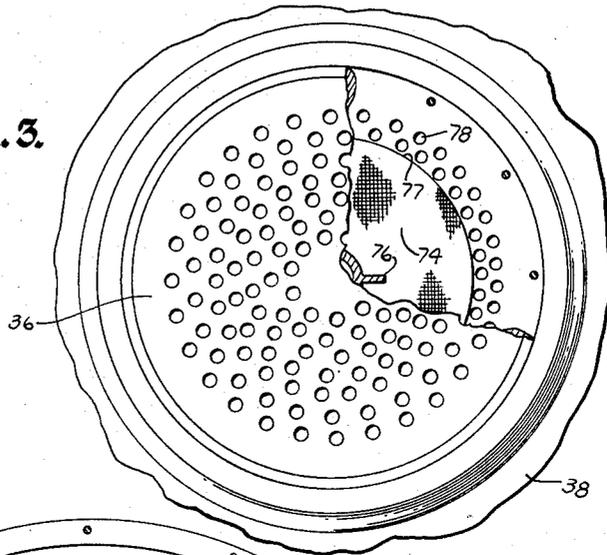
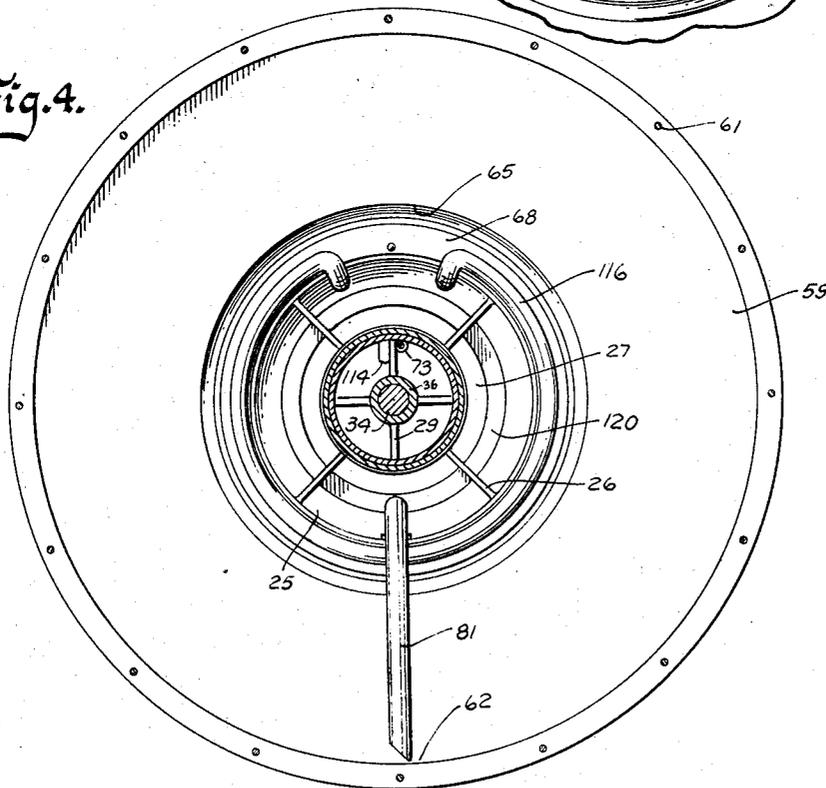


Fig. 4.



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**UNITARY TUB WASHER-DRIER**

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Application April 8, 1957, Serial No. 651,313

14 Claims. (Cl. 34-75)

This invention relates to a combination washer-drier in which clothes may be washed and completely dried within a single container without requiring the use of any effluent ducts to discharge moist air into some remote atmosphere or into the ambient atmosphere surrounding the combination unit itself.

This invention is particularly concerned with a combination washer-drier unit incorporating a unitary tub assembly which eliminates the necessity of using a stationary imperforate casing to enclose a horizontally mounted revoluble clothes drum normally utilized in combination washer-driers for domestic purposes.

This unitary tub assembly construction is formed by connecting a revoluble drive shaft to the rear wall of a horizontal mounted clothes tumbler provided with a perforate cylindrical wall and then fastening to that clothes tumbler an encompassing cylindrical shell which is spaced from the rear and cylindrical tumbler walls to provide an air path into the perforate periphery of the tumbler from the rear part of the tub assembly.

Closed circuit drying in this unitary tub assembly is achieved by circulating air over a stationary heating unit located between the spaced rear walls of the clothes tumbler and the imperforate encompassing shell or cylinder thereby causing heated air to flow through the perforate periphery of the clothes tumbler to evaporate moisture from fabrics carried within the tub assembly. The removal of the resulting hot humid air from the interior of the tub assembly is effected by a suction fan journaled on the drum drive shaft and forming a part of a vapor condensing unit having its inlet in communication with the interior of the clothes tumbler through an opening in the rear wall of the clothes tumbler and having its exhaust communicating with the heating unit which reheats the air prior to its recirculation through the clothes tumbler.

A large resiliently suspended casting provided with a centrally located bearing journalling the drum drive shaft functions as the sole support for this unitary tub assembly. This supporting casting is provided with two concentric air passageways one of which connects the interior of the unitary tub assembly to the intake of the vapor condenser unit while the other connects the discharge of the vapor condenser unit with the space between the rear and side walls of the clothes basket and outer imperforate casing to provide a closed circulatory air path through the tumbler, the vapor condensing unit and the heating unit.

In the accompanying drawings:

Figure 1 is a sectional view in elevation showing a combination washer-drier embodying my invention;

Figure 2 is a rear elevation of the combination washer-drier unit shown in Figure 1;

Figure 3 is an enlarged fragmentary view taken on line 3-3 of Figure 1; and,

Figure 4 is a fragmentary view taken on line 4-4 of Figure 1.

Referring now to the accompanying drawings, it will be seen that base 10, supported on legs 11, serves as the

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support for cabinet 12 which supports the entire washer-drier mechanism enclosed within that cabinet.

This mechanism is suspended for cabinet 12 by means of the four suspension springs 15 which are connected to the link members 16 anchored to cabinet 12 through the brackets 17 fastened to cabinet 12. The lower ends of the springs 15 are connected to the front and rear portions of the generally horizontal members 21 which form part of the two symmetrical somewhat E-shaped support frames 22 mounted on opposite sides of the mechanism within cabinet 12. The rear central portions of these frames 22 are rigidly connected to and form the support for the rather large casting 25 which is positioned intermediate of frames 22.

The outer wall of casting 25 is connected to a plurality of longitudinally directed webs 26 (Figure 4) which converge toward each other to meet and support the tubular portion 27. This tubular portion 27 in turn supports a plurality of longitudinally directed webs 29 which converge radially toward each other to join and support the bearing retainer 31 located in the central portion of casting 25. Bearing retainer 31 is provided with needle bearings 33 which receive the revolubly mounted drum drive shaft 34 projecting from both ends of casting 25.

The forward, or right end of the drum drive shaft 34, as shown in Figure 1, is pinned to a large perforate domed hub member 36 which in turn is rigidly bolted to the rear wall 38 of the clothes drum or tumbler 39. The clothes tumbler 39 also includes a perforate cylindrical side wall 41 provided with clothes tumbling vanes 42 and a short front wall portion terminating in the flange 43. Flange 43 is received by and connected to the shouldered portion 45 of the front wall 46 of the outer imperforate generally cylindrical casing 47 which encompasses and is spaced from clothes drum 39 by reason of its connection to basket 39 through connectors 49.

The front wall 46 is provided with a centrally located access opening 51 which is aligned with the access openings formed in cabinet 12 the latter of which cooperate to receive and retain in a fixed position a door gasket 54 which projects into the access opening 51 to form a watertight seal between front wall 46 and cabinet 12. A door panel 56 engages the front surface of door gasket 54 to maintain a watertight seal for this unit during its normal operation. If desired, other equivalent forms of door seals incorporating convolute configurations may be used to maintain a watertight relationship between wall 46 and cabinet 12 while permitting greater transverse movements of the tub assembly relative to cabinet 12.

The generally cylindrically shaped imperforate member 47 encompassing the tumbler or drum 39 is provided with a shouldered portion 58 which is connected to a circular back wall panel 59 by means of fasteners 61 to form an annular recessed sump area 62 for use in the lower regions of the imperforate encompassing shell formed by the revoluble members 47 and 59.

The central portion of the otherwise imperforate back wall panel 49 is blanked out adjacent the front end of casting 25 to provide a centrally located opening 63 in panel member 49. Rear panel 59 is also provided with a shouldered portion 65 located adjacent opening 63 and rigidly fixed to an annular member 66 in a juxtapositional relationship therewith to form a drive pulley for the unitary tub assembly formed primarily by members 39, 47 and 59. A stationary seal member 68 attached to the front flanged edge of casting 25 engages back wall panel 59 to provide a seal between this revoluble tub assembly and the stationary casting member 25.

A second seal member 69 is attached around the front periphery of the tubular portion 27 to form an airtight seal between the latter member and that portion of rear wall 38 adjacent the periphery of the air exhaust open-

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ing 71 formed in rear wall 38. These sealing members 68 and 69 thus maintain separate paths for air flow through basket 39 and the inner and outer concentric passageways formed in casting 25 during the rotation of the unitary tub assembly described.

The first of these two passageways is formed between bearing retainer 31 and the tubular portion 27 and serves to interconnect the interior of tumbler 39 with a vapor condensing unit located at the rear end of casting 25 as will hereinafter be described more fully. The second passageway, concentric to the first, is formed between tubular portion 27 and the outer wall of casting 25. This second passageway serves as a discharge passageway for the vapor condensing unit and merges into a third passageway communicating with the cylindrical perforate side wall 41 and formed by the cooperation of tumbler 39 with the walls 47 and 59 of its encompassing casing.

Water for the washing operation of this combination washer-drier is supplied through the conduit 73 which enters an upper rear portion of casting 25 and passes inside the tubular portion 27 where it discharges its stream of fluid against the lint screen member 74 which is fastened by means of screws 75 to the radial supporting webs 76 of the domed support member 36. The central portion of lint screen 74 closely encompasses the central portion of the tub support member 36 while the outer periphery of lint screen member 74 is provided with a rearwardly projecting annular flange 77 abutting rear wall 38.

This peripheral flange 77 terminates adjacent the apertures 78 formed in a circular pattern in back wall 38 adjacent the periphery of the domed support hub 46. These apertures 78 are normally covered by the plastic curtain 79 which forms a check valve for these holes and which is fastened at its inner edge to back wall 38. This allows fluid discharged from the wash water conduit 73 to impinge against lint screen 74 and flush accumulated lint particles from the front face of lint screen 74 through apertures 78 and into the sump 62 during the tub filling operations while not materially affecting the air flow patterns through the tub assembly during the drying operations.

Water contained within this unitary tub assembly during the washing operation is removed from the tub assembly subsequent to the washing operation through the stationary discharge or pickup tube 81 which communicates with the self-priming pump 82 by way of the depending fitting 84 and the hose 85 connecting fitting 84 with pump 82. Pump 82 is supported between the supporting frames 22 on a horizontal cross member 87 connected therebetween and is driven by the motor 88 through belt 89. Motor 88 is rigidly connected to the lower horizontal arm 91a forming a part of the right frame 22 as shown in Figure 2.

Rigidly mounted on the lower arm 91b of the opposite frame member 22 is the motor 94 and the two-speed transmission 95 connected together in a unitary housing. The output pulley 96 of the transmission 95 is connected through belt 98 to the pulley formed on the unitary tub assembly by cooperating elements 65 and 66 which together serve as the driving member of the unitary tub assembly. While not shown in detail, transmission 95 is arranged and constructed so that it may drive unitary tub assembly at a tumbling speed of approximately 50 r.p.m. or a spin speed of 200 r.p.m. or more, as desired, to centrifugally extract the fluids retained by fabrics within clothes tumbler or basket 39.

Frames 22 are provided with arms 101 which extend over the back and sides of the unitary tub assembly and carry weights 102 which serve to locate the center of gravity of the unit suspended on springs 15 in a vertical plane passing through the shock absorbers 104 interconnected between the lower arms 91a and 91b and the bracket members 106 attached to base frame 10. This construction allows freedom of movement of the entire

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suspended unit to partially isolate from base 10 those large erratic forces produced by a high speed rotation of the tub assembly containing unbalanced clothes loads while maintaining the tub assembly in a generally horizontal position and additionally providing a means for damping vibrations of large magnitudes of this assembly.

Motor 88 also rotates belt 108 which drives the impeller member 110 journaled on the rear step-down portion of the drum drive shaft 34. Rotation of this impeller 110, which is covered by the impeller cover 111 connected to casting 25, creates an air flow through tumbler 39 in the direction of the arrows shown in Figure 1 so that air is moved forward through the outer concentric passageway formed between the outer wall of casting 25 and the tubular member 27 prior to its being circulated through clothes tumbler 39 through the perforate cylindrical side wall 41 of that clothes receptacle. Impeller 110 also causes the air entering clothes basket 39 to pass through the perforate domed clothes supporting member 36 and enter the inner concentric passageway within tubular portion 27 after passing through the lint screen 74 and the centrally located air exhaust opening 71 in rear wall 38.

During the drying operation, cool condensing water is fed through the conduit 113 which enters the top portion of casting 25 and parallels the wash water conduit 73. The condensing water fed through conduit 113 is discharged through a nozzle 114 contained on the end of that tube so as to discharge a spray rearwardly toward the impeller member 110. Impeller 110, nozzle 114 and that structure at the rear of casting 25 form the primary parts of the vapor condensing unit for condensing vapors passing through opening 71 in rear wall 38.

Also energized during the drying operation by controls not forming the subject matter of this invention is the heating element 116 which is mounted on and insulated from the upper part of the casting 25 which maintains it in its position encircling the tubular portion 27. This serves to heat the air moved past heater 116 by impeller 110 and raises the temperature of that air prior to its reentry into the clothes basket 39 through the perforate cylindrical side wall 41.

The water discharged through nozzle 114 during the drying operation is collected in a sump 118 formed in the lower portion of casting 25 adjacent fitting 84. Sump 118 is provided with a float check valve 119 which permits fluid flow through the port 121 in sump 118 whenever water is present within that sump but which remains closed when no water is present within sump 118.

In operation, the combination washer-drier illustrated in the accompanying drawings functions as follows. After the clothing to be washed and dried has been loaded in basket 39, water pressure is supplied to conduit 73 which fills the unitary tub assembly with the desired quantity of washing fluid as determined by suitable controls not forming the subject matter of this invention. This water level may be, for example, equal to that horizontal plane passing through the upper surfaces of the stationary rear cross member 87 illustrated in Figure 1.

The unitary tub assembly is then rotated at a tumbling speed of approximately 50 r.p.m. by the drive motor 94, transmission 95, and belt 98 to tumble the fabrics during the washing process. As previously stated, wash water fed into the unit through conduit 73 discharges against the lint screen 74 as the tub assembly is rotated and flushes that screen free from any accumulated lint deposits prior to flowing through apertures 78 and into the outer shell formed by members 47 and 59. This automatically places lint screen 74 in a cleansed condition prior to each drying cycle.

After a suitable agitation period, the washing fluid is removed from within the unitary tub assembly by energization of motor 88 which causes the self-priming pump 82 to remove the washing fluid through the discharge tube

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81, fitting 84 and the drain hose 85. While the lower end of the stationary pickup tube 81 dipping into the annular sump 62 may be formed in several ways, it is preferable that its intake opening face the direction of rotation tumbler 39. Removal of practically all wash fluids by pump 82 is made possible by the cooperation between the recessed sump 62 and pickup tube 81.

Following the drainage operation the unitary tub assembly is supplied again with fresh water from conduit 73 for one or more rinse periods after which this rinsing fluid is removed in a manner similar to that employed in the removal of the washing fluids. Transmission 95 is then shifted into its high-speed position for centrifugally extracting most of the residual fluids retained by the fabrics within basket 39. The self-priming pump 82, controlled by motor 88, also operates during this centrifuging process to remove the fluids from within the unitary tub assembly as they are extracted from the fabrics within the clothes receptacle 39.

The energization of motor 88 continues on into the drying period to provide a means for rotating the impeller member 110. Rotation of this impeller member 110 causes air to be forced through the outer concentric passageway formed between the outer wall of casting 25 and the tubular portion 27 of that casting. This air is then forced over the heating element 116 which is also energized during the drying period by conventional controls which are not shown and form no part of this invention. The heated air spreads outwardly in a radial direction as it flows between the rear wall 38 and back wall panel member 59 prior to entering the clothes basket 39 by way of the perforate cylindrical side wall 41.

The entry of the hot air at all portions of the periphery of clothes basket 39 causes an evaporation of the moisture retained by the fabrics within that basket 39 to take place. The hot humid air resulting from this evaporation moves through the perforate domed hub member 36 prior to passing through the lint screen 74 and the air exhaust opening 71 located adjacent the front entrance to the tubular portion 27.

At or shortly after the beginning of the drying period water pressure is made available to the conduit 113 and to nozzle 114 which discharges a spray or fine mist into the hot humid air as it moves toward impeller 110. This contact between the hot moist air from the interior of the basket 39 and the cool spray from nozzle 114 causes the moisture vapors from within basket 39 to condense and coalesce with the cooling mist in this vapor condensing unit formed primarily by the cooperation of casting 25, impeller 110 and nozzle 114. As this air stream is cooled and its vapor condensed by the mist from nozzle 114, the blades of impeller member 110 act as a centrifugal separator for the fluids contacting or forming on or adjacent to that member with the result that the condensate and condensing fluids are centrifugally extracted from the cooled air moved past impeller member 110 by the latter member. Blower 110 therefore aids in removing moisture from the air which it forces through the tub assembly. While this relatively cool air discharged from the vapor condenser unit is again circulated past heating element 116 to be reheated for recirculation through basket 39 to remove additional moisture from the clothes within that basket, the condensate and condensing fluid centrifugally extracted from the air entering casting 25 by impeller 110 are retained within casting 25 by the annular retaining ring 120 within that casting for collection within sump 118 and discharge through hose 85. Should any water flow past retaining ring 120 and enter the unitary tub assembly proper, it will be removed from that assembly by means of the pickup tube 81.

While only one embodiment of my invention has been shown and described, it is to be understood that this invention need not be limited thereto but may comprehend other constructions, arrangements of parts, details and

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features without departing from the spirit of this invention as set forth in the following claims.

I claim:

1. A clothes drier comprising, a support, a revoluble shaft journaled in said support, a tumbler for retaining damp fabrics, said tumbler having a rear wall rigidly fastened to said shaft, said tumbler further including a perforate side wall for admitting air into said tumbler and having a front wall with an access opening therein, an opening in said rear wall for exhausting air from said tumbler, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a passageway located exteriorly of said tumbler and communicating with said perforate side wall, heating means positioned in said passageway to heat air entering said perforate side wall, and means communicating with said exhaust opening for removing moisture vapors from said tumbler.

2. A clothes drier comprising, a support, a bearing in said support, means in said support defining first and second passageways, a revoluble shaft journaled in said bearing, a tumbler for retaining damp fabrics to be dried, said tumbler having a rear wall rigidly fastened to said shaft, said tumbler further including a perforate side wall for admitting air into said tumbler, and having a front wall with an access opening therein, an opening in said rear wall communicating with said first passageway in said support, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway communicating with said second passageway in said support, means for moving air into said tumbler through said second and third passageways and out of said tumbler into said first passageway, and means for heating air entering said tumbler through said second and third passageways.

3. A clothes drier comprising, a support, a bearing in said support, means in said support defining first and second passageways concentric to said bearing and to each other, a revoluble shaft journaled in said bearing, a tumbler for retaining damp fabrics to be dried, said tumbler having a rear wall rigidly fastened to and supported by said shaft, said tumbler further including a perforate side wall for admitting air into said tumbler and having a front wall with an access opening therein, an opening in said rear wall communicating with said first passageway in said support, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway communicating with said second passageway in said support, means for moving air into said tumbler through said second and third passageways and out of said tumbler through said first passageway, and means for heating air passing into said tumbler through said second and third passageways.

4. A clothes drier comprising, a support, a bearing in said support, means in said support defining first and second passageways concentric to said bearing and to each other, a revoluble shaft journaled in said bearing, a tumbler for retaining fabrics to be dried, said tumbler having a rear wall rigidly fastened to and supported by said shaft, said tumbler further including a perforate side wall for admitting air into said tumbler and having a front wall with an access opening therein, a centrally located opening in said rear wall aligned with said first passageway, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway communicating with said second passageway in said support, means for moving air into said tumbler through said second and third passageways and out of said tumbler into said first passageway, and means for heating air passing into said tumbler through said second and third passageways.

5. A clothes drier comprising, a support, a bearing in said support, means in said support defining a first passageway concentric to said bearing and a second passageway encircling and concentric to said first passageway, a revoluble shaft journaled in said bearing, a tumbler for retaining damp fabrics to be dried, said tumbler having a rear wall rigidly fastened to and supported by said shaft, said tumbler further including a perforate side wall for admitting air into said tumbler and having a front wall with an access opening therein, a centrally located opening in said rear wall for exhausting air from said tumbler, said opening being positioned adjacent said support in alignment with said first passageway, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway communicating with said second passageway in said support, a vapor condenser unit interconnecting said first and second passageways, and means for heating air discharged from said vapor condensing unit and entering said tumbler through said second and third passageways.

6. A clothes drier comprising, a support having wall portions, a bearing in said support, a tubular member in said support cooperating with said bearing and said wall portions to define first and second passageways concentric to said bearing and to each other, a revoluble shaft journaled in said bearing, a tumbler having a perforate side wall and a front wall with an access opening therein, said tumbler further including a rear wall connected to said shaft and provided with a centrally located opening aligned with said first passageway, sealing means contacting said tubular member and said rear wall adjacent said opening to provide a seal therebetween during rotation of said tumbler, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway located exteriorly of said tumbler and communicating with said second passageway and said perforate side wall, a vapor condensing unit interconnecting said first and second passageways to provide a closed air path through said tumbler, said first passageway defining an intake into said vapor condenser unit and said second passageway defining a discharge from said vapor condenser unit, said vapor condenser unit including blower means for circulating air through said tumbler, and heating means for heating air entering said drum through said third passageway.

7. A clothes drier comprising, a support having wall portions, a bearing in said support, a tubular member in said support cooperating with said bearing and said wall portions to define first and second passageways concentric to said bearing and to each other, a revoluble shaft journaled in said bearing, a tumbler having a perforate side wall defining an air intake into said tumbler and having a front wall with an access opening therein, said tumbler further including a rear wall connected to said shaft and provided with a centrally located opening aligned with said first passageway, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway located exteriorly of said tumbler and communicating with said second passageway and said perforate side wall, a vapor condensing unit interconnecting said first and second passageways to provide a closed air path through said tumbler, said first passageway defining an air intake into said vapor condensing unit and said second passageway defining a discharge from said vapor condensing unit, conduit means for injecting cooling fluid into said vapor condensing unit, a pump cooperating with said vapor condensing unit for removing fluids from said vapor condensing unit, and heating means for heating air discharged from said vapor condenser unit prior to its reentry into said tumbler through said third passageway.

8. A clothes drier comprising, a support having wall

portions, a bearing in said support, a tubular member in said support cooperating with said bearing and said wall portions to define first and second passageways concentric to said bearing and to each other, a revoluble shaft journaled in said bearing, a tumbler having a perforate side wall defining an air intake into said tumbler and having a front wall with an access opening therein, said tumbler further including a rear wall connected to said shaft and provided with a centrally located opening aligned with said first passageway, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway located exteriorly of said tumbler and communicating with said second passageway and said perforate side wall, a vapor condensing unit interconnecting said first and second passageways to provide a closed air path through said tumbler, said first passageway defining an air path into said vapor condenser from said tumbler, said second passageway defining a discharge from said vapor condensing unit, means for injecting cooling fluid into said vapor condensing unit, a drain in said vapor condensing unit, pump means for emptying fluids from said vapor condensing unit through said drain, sump means in said casing, conduit means interconnecting said sump and said pump means, and heating means positioned adjacent said rear wall for heating air discharged from said vapor condenser unit prior to its reentry into said tumbler through said third passageway.

9. A combination washer-drier comprising, a support having wall portions, a bearing in said support, a tubular member in said support cooperating with said bearing and said wall portions to define first and second passageways concentric to said bearing and to each other, a revoluble shaft journaled in said bearing, a tumbler having a perforate side wall defining an air intake into said tumbler and having a front wall with an access opening therein, said tumbler further including a rear wall connected to said shaft and provided with a centrally located opening aligned with said first passageway, a lint screen covering said opening, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said perforate side wall and said rear wall to define a third passageway located exteriorly of said tumbler and communicating with said second passageway and said perforate side wall, means including a wash water conduit directed at said lint screen for supplying said casing with washing fluid and for cleaning said lint screen, said casing including a shouldered portion defining a sump for receiving fluids, a stationary pickup tube extending into said sump, pump means communicating with said pickup tube for removing fluids from said sump, a vapor condensing unit interconnecting said first and second passageways to provide a closed air path through said tumbler, said first passageway defining an air path into said vapor condensing unit, said second passageway defining a discharge from said vapor condensing unit, means for injecting cooling fluid into said vapor condensing unit, drain means in said condensing unit, and heating means positioned adjacent said rear wall for reheating air discharged from said vapor condensing unit prior to its recirculation through said tumbler through said third passageway.

10. A clothes drier comprising, a support, a revoluble shaft journaled in said support, a cylindrical drum for receiving damp fabrics connected to said shaft for rotation on a horizontal axis, said drum having a perforate cylindrical side wall for admitting air into said drum and having a back wall provided with an opening therein for exhausting air from said drum, said drum further having a front wall with an access opening therein, an imperforate shell encompassing said side wall and unitarily fastened to said drum, said shell being spaced from said side wall to define an air intake passageway located exteriorly of said drum and communicating with said per-

forate side wall, means for moving air through said passageway and said side wall into said drum and out said opening, means for rotating said drum and said shell, and heating means for heating air prior to its passage through said perforate side wall to evaporate moisture from fabrics placed within said drum.

11. A clothes drier comprising, a support, a revoluble shaft journaled in said support, a cylindrical drum for receiving damp fabrics connected to said shaft for rotation on a horizontal axis, said drum having a perforate cylindrical side wall for admitting air into said drum and having a back wall provided with an air exhaust opening therein for exhausting air from said drum, said drum further having a front wall with an access opening therein, an imperforate casing encompassing and unitarily fastened to said drum, said casing being spaced from said side wall and said back wall to define an air intake passageway located exteriorly of said drum and communicating with said perforate side wall, means for circulating air through said drum and out said exhaust opening, means for rotating said drum and said casing to tumble fabrics in the air stream passing through said drum, and means for heating air prior to its passage through said perforate side wall to evaporate moisture from fabrics placed within said drum.

12. A clothes drier comprising, a support, a revoluble shaft journaled in said support, a tumbler for retaining damp fabrics connected to said shaft for rotation on a horizontal axis, said tumbler having a perforate cylindrical side wall for admitting air into said tumbler and having a back wall provided with an opening therein for exhausting air from said tumbler, said tumbler further having a front wall with an access opening therein, an imperforate casing encompassing and unitarily fastened to said tumbler, said casing being spaced from said side wall and said back wall to define a passageway located exteriorly of said tumbler and communicating with said opening and said perforate side wall to provide a closed circuit air path through said tumbler, means for rotating said shaft, heating means for heating air passing through said perforate side wall to evaporate moisture from fabrics placed within said tumbler, and vapor condenser means for condensing moisture vapor passing through said opening in said back wall.

13. A clothes drier comprising, a support, a revoluble

shaft journaled in said support, a cylindrical drum for receiving damp fabrics connected to said shaft for rotation on a horizontal axis, said drum having a perforate cylindrical side wall for admitting air into said drum and having a back wall provided with an opening therein for exhausting air from said drum, said drum further having a front wall with an access opening therein, an imperforate casing encompassing and unitarily fastened to said drum, said casing being spaced from said side wall and said back wall to define a passageway located exteriorly of said drum and communicating with said opening and said perforate side wall to provide a closed circuit air path through said drum, means for circulating air through said drum over said air path, means for rotating said drum and said casing to tumble fabrics in the air stream passing through said drum, means for heating air prior to its passage through said perforate side wall to evaporate moisture from fabrics placed within said drum, and vapor condenser means for condensing moisture vapor discharged through said opening in said back wall.

14. A clothes drier comprising, a support, a revoluble shaft journaled in said support, a cylindrical drum mounted for rotation on a horizontal axis and having a back wall connected to said shaft, said back wall having a centrally located air exhaust opening for air leaving said drum and having a perforate cylindrical side wall provided with an air intake into said drum, said drum further having a front wall with an access opening therein, an encompassing casing fastened to said drum and spaced from said back wall and said side wall to provide a passageway located exteriorly of said drum and communicating with said exhaust opening in said perforate side wall, and means including a fan for withdrawing air from said drum through said exhaust opening and circulating said air through said exterior passageway for entry into said drum through said perforate side wall.

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