

April 15, 1958

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2,830,384

DRYER FOR FABRICS OR THE LIKE

Filed Oct. 24, 1956

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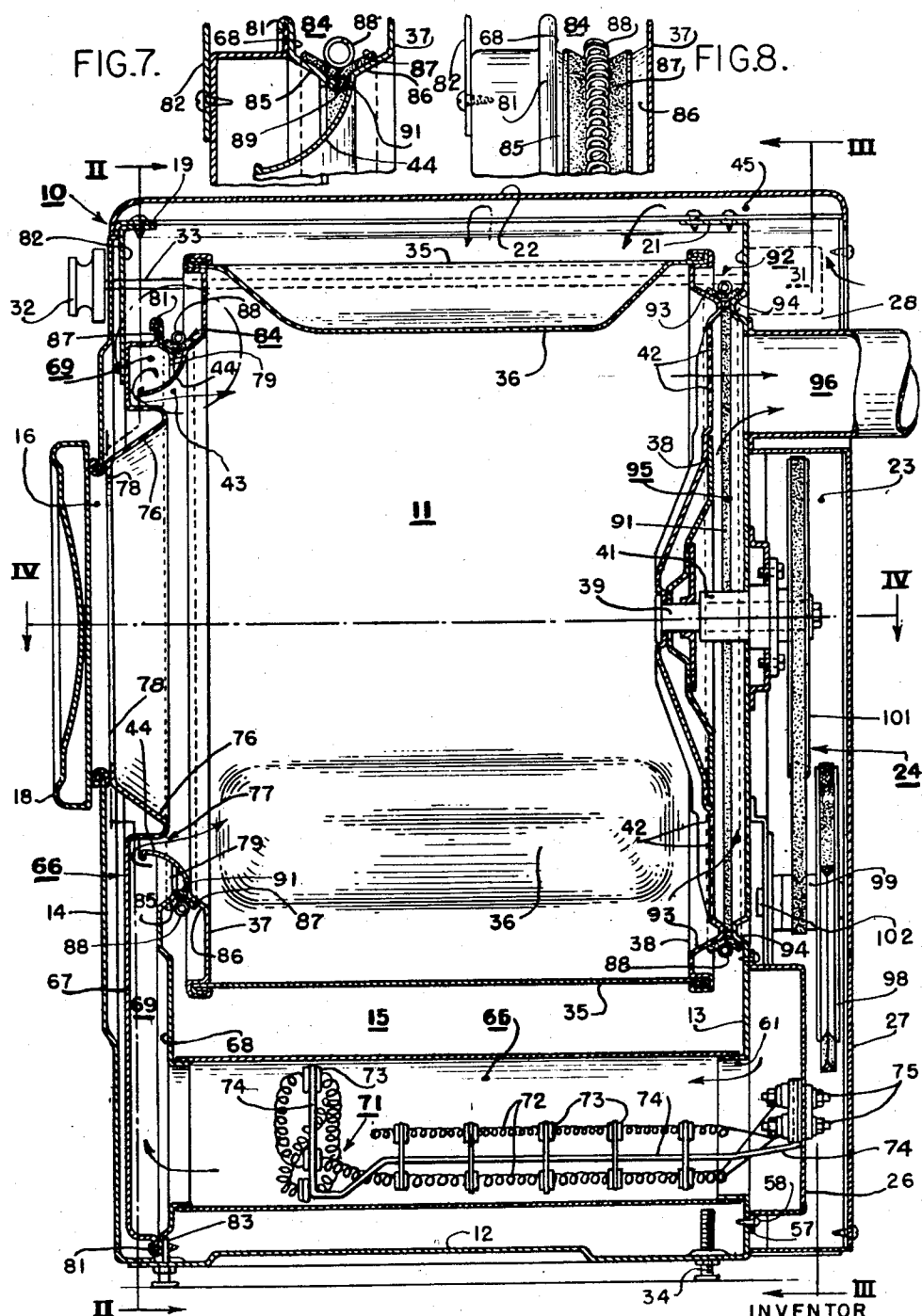


FIG. 1.

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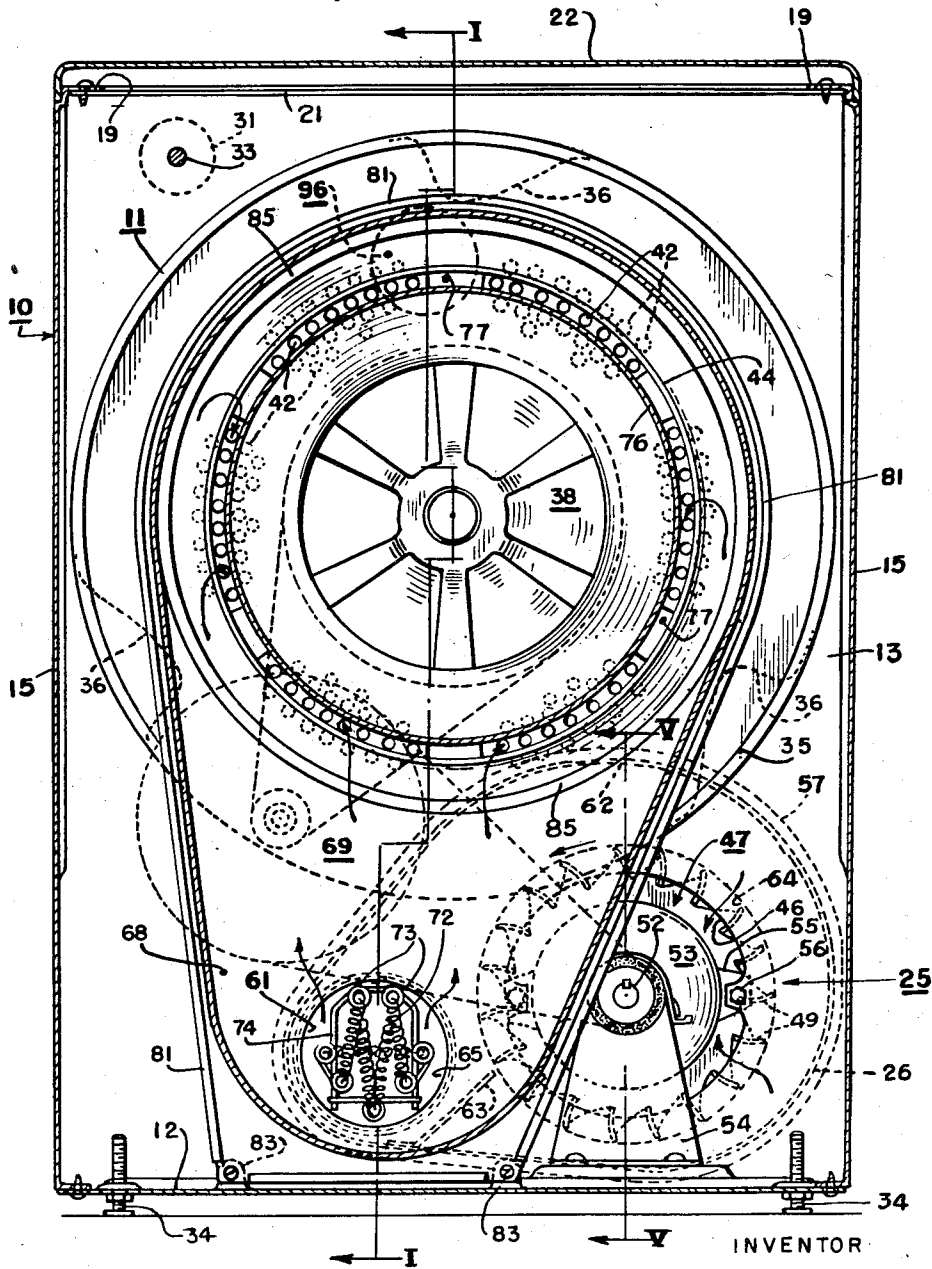
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Filed Oct. 24, 1956

4 Sheets-Sheet 2

FIG. 2.



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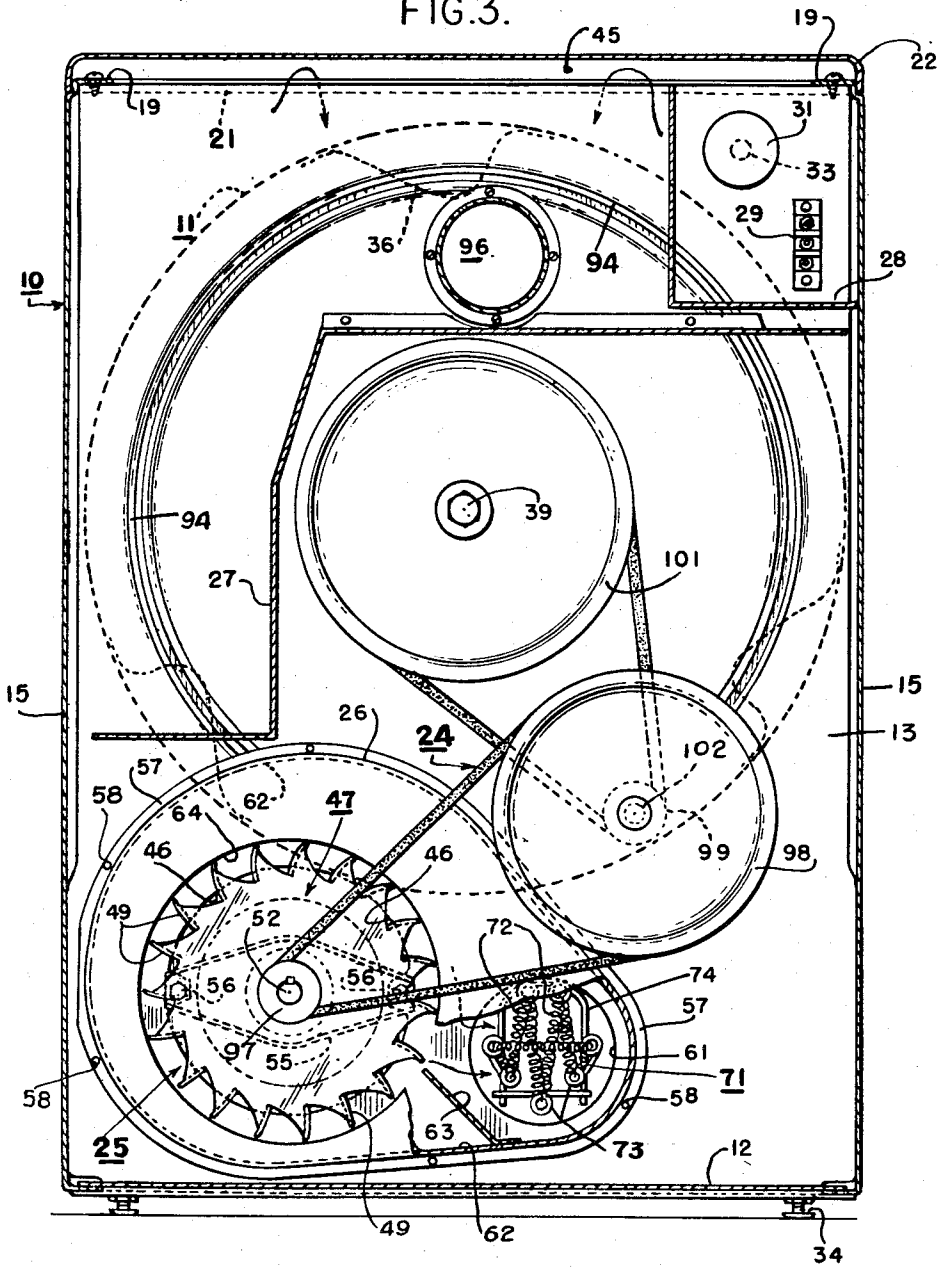
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Filed Oct. 24, 1956

4 Sheets-Sheet 3

FIG. 3.



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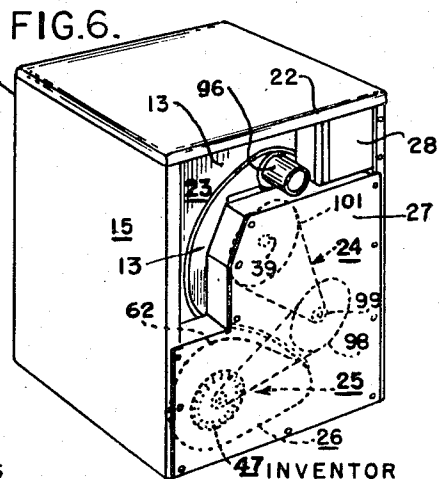
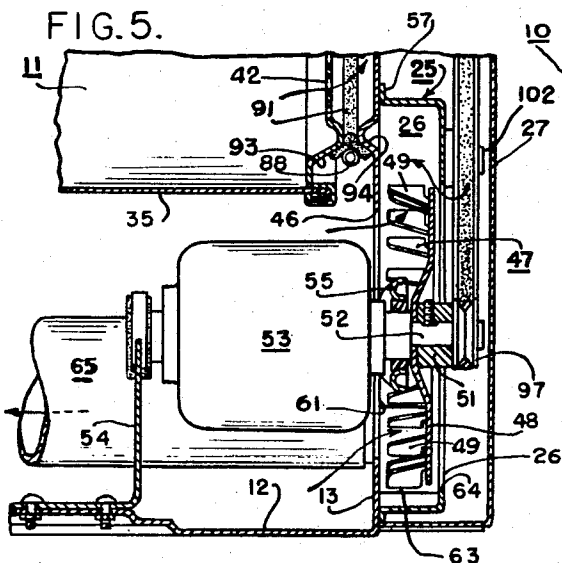
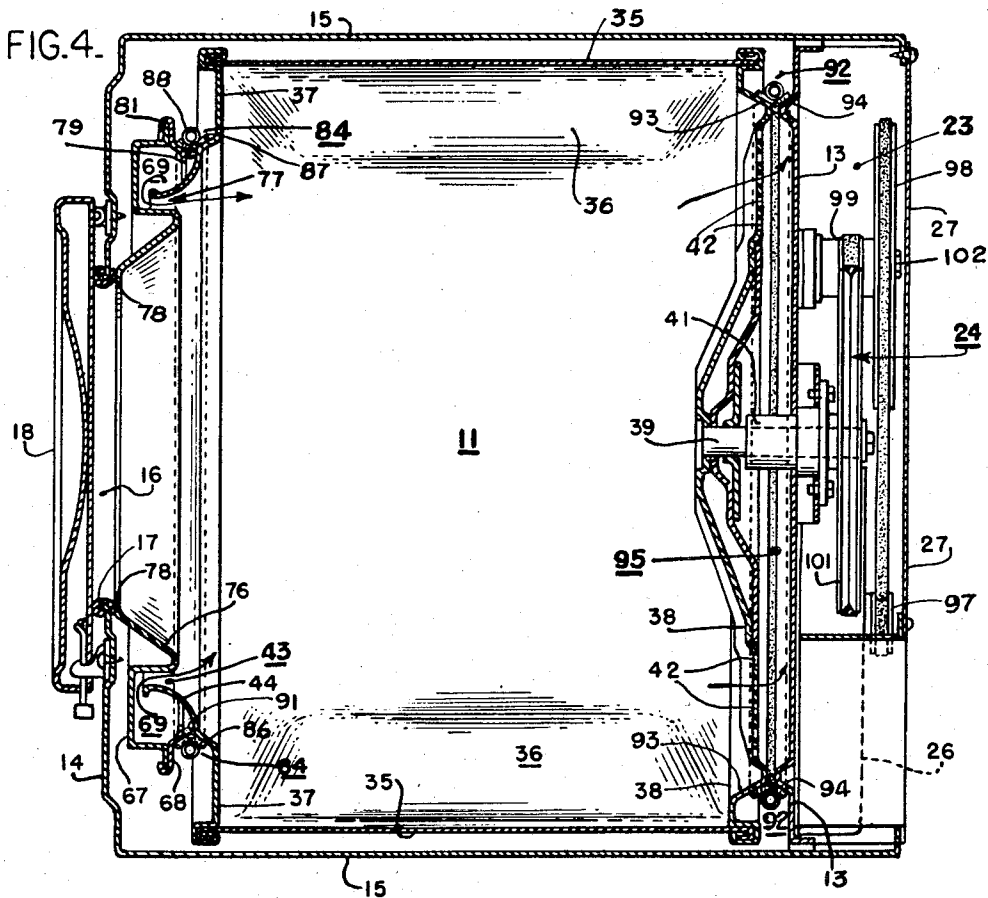
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DRYER FOR FABRICS OR THE LIKE

Filed Oct. 24, 1956

4 Sheets-Sheet 4



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2,830,384

DRYER FOR FABRICS OR THE LIKE

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Application October 24, 1956, Serial No. 618,071

7 Claims. (Cl. 34—133)

This invention relates to a dryer for fabrics or the like and has for an object to provide improved apparatus of this kind.

A further object of the invention is to provide, in a domestic clothes dryer, improved means for heating and translating air, which means may be readily removed from the dryer for replacement or repair.

A further object of the invention is to provide improved sealing means between the rotating basket and the cabinet structure for preventing leakage of air being translated through the basket.

In practicing the invention, a cabinet structure is provided having a base and a vertical wall extending above a rear portion of the base for rotatably supporting a basket in which the fabrics are tumbled during the drying operation. The basket is imperforate except for the access opening at its front end and a series of openings in its rear end for the discharge of moist air from the basket. Means is provided for translating heated air through the access opening of the basket into contact with the fabrics being tumbled therein. The air translating means includes a blower carried on the rear of said basket supporting wall and having a heater secured to the casing thereof. The heater extends forwardly of the blower casing through the supporting wall into a heater duct, the arrangement being such that the blower casing and heater may be readily removed from the supporting wall for servicing. Heated air from said duct enters a plenum chamber structure adjacent the front of the cabinet and passes to the basket for vaporizing water from the fabrics. The humid, vitiated air passes through the series of openings in the rear of the basket to a space intermediate the basket and said supporting wall and thence outwardly of the cabinet to a point of discharge. Respective sealing means are provided between the front and rear ends of the basket and said cabinet for preventing leakage of air at these points. Each sealing means includes spaced, opposed frusto-conical surfaces formed on the basket and the cabinet and engaged by a felted strip of flexible material having a V-shape cross section. An endless helical spring encompasses the strip within the V and seats the strip upon the frusto-conical surfaces throughout their extent.

These and other objects are effected by the invention as will be apparent from the following description taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a vertical, longitudinal section of a dryer, constructed and arranged in accordance with the invention and taken along the line I—I of Fig. 2;

Figs. 2 and 3 are vertical, transverse sections of the dryer and are taken along the respective lines II—II and III—III of Fig. 1;

Fig. 4 is a horizontal section taken along the line IV—IV of Fig. 1;

Fig. 5 is a vertical section taken through the blower along the line V—V of Fig. 2;

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Fig. 6 is a perspective of the dryer as viewed from the rear thereof;

Fig. 7 is an enlarged view of the air seal shown within the broken line circle of Fig. 1; and

Fig. 8 is a view similar to Fig. 7 but showing several parts in elevation.

Referring now to the drawings, a domestic drying machine constructed in accordance with the invention is shown, including a cabinet structure 10 and a basket 11 for containing the fabrics being dried and disposed within the cabinet for rotation about a substantially horizontal axis. The cabinet includes a base plate 12 and a vertical wall 13 extending upwardly from the rear margin of the base plate 12 for the support of the basket 11, as set forth in detail hereinafter. The cabinet further includes a wrapper bent to form a front wall 14 and sidewalls 15, which rest upon the margin of the base 12 and are suitably secured thereto. The front wall 14 has an access opening 16 therein bounded by a gasket 17 secured to the front wall peripherally of the opening. A suitable door 18 hinged to the wall 14 engages the gasket and closes the opening 16 as shown in Fig. 4. The upper margins of the front wall 14 and sidewalls 15 have a flange 19 extending inwardly of the cabinet, which flange 19 rests upon a flange 21 formed on the upper margin of the supporting wall 13 and suitably secured thereto. The front and side walls are indented as best seen in Figs. 1 and 3 for the seating of a top cover 22.

It will be noted that the supporting wall 13 is disposed forwardly of the rear margins of the side walls 15 and top cover 22 so that a space 23 is defined at the rear of the cabinet. This space 23 is employed primarily for housing a belt and pulley transmission, generally indicated at 24, and a blower 25 having a casing 26, further reference to which is made hereinafter (see Fig. 6). The blower 26 and transmission 24 are covered by a housing 27 suitably secured to the cabinet, for example, to the rear margins of the side walls 15. The space 23 may also house a junction box 28 for enclosing the terminal block 29 of the dryer and also its primary control mechanism, for example, a conventional motor driven sequence switch, shown generally at 31. The latter may include a manually operated control knob 32 arranged at the front of the cabinet and connected to the switch 31 by a shaft 33. The cabinet is supported by adjustable feet 34 threaded in the base 12 as is well understood.

Referring now to the basket 11, this element includes an imperforate sidewall 35 having a plurality of vanes 36 extending inwardly thereof for the tumbling of the fabrics during rotation of the basket 11. The basket further includes end walls 37 and 38, the latter being secured in any suitable manner to a shaft 39 journaled in a bearing 41 carried by the supporting wall 13. The end wall 38 has a plurality of openings 42 arranged in an annulus, as best indicated in Fig. 2 for the passage of air and vapor from the basket, further reference to which is made hereinafter. The front wall 37 of the basket 11 has a central access opening 43 disposed therein and aligned with the access opening 16 of the cabinet front wall 14. The opening 43 is formed within an annular, forwardly extending collar portion 44 of the end wall 37. Heated air is translated through the opening 43 into contact with the fabrics tumbled within the basket for the vaporization of water from the fabrics. The vitiated air and water vapor pass from the basket through the openings 42 and thence to a suitable point of discharge, as described hereinafter.

The air heating and translating means will now be described. Air enters the cabinet through the passage defined by the cover 22 and the top of the wall 13 and indicated at 45. The air, passed down around the side wall 35 of the basket enters the casing 26 of the blower

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through an opening 46 formed in the wall 13. The rotor or runner of the blower is shown at 47 and includes a disc 48 having blades 49 formed on one side thereof in an annulus. The runner has a hub 51 secured, as by a set screw, to the shaft 52 of a motor 53. Preferably, the blades 49 are blanked from the peripheral portion of the disc 48 and bent and formed, as shown, so that the disc and blades are integral. The motor 53 is supported at its forward end by a bracket 54 carried by the base plate 12, and at its rear end by a bridge 55 extending diametrically of the opening 46 and bolted at its ends, as shown at 56, to the wall 13. (See Figs. 3 and 5.) The support of the motor 53 upon the bracket 54 and bridge 55 is conventional and need not be further described.

Returning to the blower construction, the casing 26 is pan shaped, being open at one side, and has a flange 57 secured to the wall 13 preferably by self-tapping sheet metal screws 58. The wall 13, therefore, forms one wall of the blower casing 26 and in addition to the inlet opening 46, the wall 13 also contains an air discharge opening 61 for the blower. The casing configuration is best shown in Fig. 3 and includes a volute 62, within which the air, centrifugally discharged from the runner blades 49, passes to the air discharge opening 61, as is well understood. In order to preclude the recirculation of air within the casing 26, a baffle or dam 63 is disposed across the casing 26 in the path of the air translated by the runner, which baffle obstructs the air, causing it to flow through the air discharge opening 61. In order to gain access to the runner 47 for replacement or inspection without removing the casing 26 from the wall 13, an opening 64 may be provided in the casing 26, through which the runner 47 may be passed after it is disconnected from the motor shaft. Some air may be induced through the opening 64 during operation of the blower but it is relatively small compared to the air entering the blower through the inlet 46.

Air discharged from the blower through the opening 61 enters a duct 65 fitted to the wall 13 at its rear end, as shown in Fig. 1, and to an air discharge structure 66 at its forward end. The latter has front and rear walls 67 and 68, respectively, forming a plenum chamber 69 communicating directly with the duct 65. An electric heater 71 of any suitable construction is disposed in the duct 65 for heating the air translated through the duct 65. As shown, the heater 71 includes bare heater wires 72 carried by refractory collars 73, the latter being supported by a metal frame 74 in a conventional manner. In accordance with the present invention, the frame 74 is clamped or otherwise suitably secured at its rear end to the casing 26 of the blower and is removable therewith from the supporting wall 13. The specific means for clamping the frame 74 to the casing 26 is not shown in detail for the sake of clearness and brevity. As shown, in Fig. 1, the terminals of the heater 71, indicated at 75, are carried by the casing 26 and insulated therefrom in any suitable manner.

Referring now to the air discharge structure 66, the front wall 67 is formed with an annular portion 76 spaced within the collar 44 for defining an annular air discharge passage 77 providing communication between the plenum chamber 69 and the basket 11. The annular portion 76 of the wall 67 has a large central access opening 78 aligned with the openings 16 and 43, and the annular wall portion 76 engages the gasket 17 peripherally of the opening 78, as shown. The inner wall 68 of the structure 66 has a large central opening 79 through which the collar 44 projects. The outer peripheries of the walls 67 and 68 are suitably joined, as indicated at 81, and it will be noted that the plenum chamber extends completely around the collar 44 and the annular air discharge passage 77 therein. The structure 66 is positioned and supported within the cabinet by an upper bracket 82 secured to the top flange 19 of the front wall 14 and by a pair

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of ears 83 projecting upwardly from the base 12. The front wall 67 of the structure 66 is spaced from the front wall 14 of the cabinet in order to provide a heat insulating air space therebetween. From the foregoing, it will be apparent that the heated air moving through the plenum chamber 69 is discharged axially within the basket in an annular stream for contact with all portions of the fabrics being elevated and dropped by the rotating vanes 36.

In accordance with the invention, improved sealing means is provided between the front and rear ends of the basket and the stationary cabinet structure in order to prevent leakage of air from the basket to the interior of the cabinet. The front seal is indicated at 84 and is shown enlarged in Figs. 7 and 8. The seal includes respective, opposed frusto-conical faces 85 and 86 formed on the wall 68 and the front wall 37 of the basket. These faces are coaxial and are engaged by a flexible strip 87 preferably formed of a felted material and V-shape in cross-section as shown. The strip 87 is endless and completely encompasses the faces 85 and 86. The strip 87 is held in position by a helical spring 88 formed as a circle and encompassing the strip 87 for biasing the strip uniformly on all portions of the faces 85 and 86. Preferably, the strip is drawn by a stitch 89 intermediate its sides for producing an inwardly extending annular rib 91 which rides in the space intermediate the faces 85 and 86 for retaining the strip 87 in its proper position upon both faces 85 and 86. During rotation of the basket 11, the strip 87 slips relative the face 85 or 86 or both but is held in sealing engagement therewith at all times by the spring 88. Eccentricity of the faces 85 and 86 within limits is compensated for by the flexibility of the strip and spring, and any tendency for the strip to ride laterally from a face 85 or 86 is opposed by the rib 91.

The seal at the rear end of the basket 11 is indicated at 92 generally and includes respective, frusto-conical faces 93 and 94 formed on the rear wall 38 of the basket and the supporting wall 13. The felted strip and spring used with this seal are similar to the corresponding elements of seal 84 and need not be described. The construction and operation of the seal 92 being similar to the seal 84 will not be referred to further.

The region or space intermediate the rear wall 38 of the basket and the wall 13 and within the seal 92, is indicated at 95 and receives the vitiated, humid air discharged through the openings 42. This air is discharged through a conduit 96 to a suitable point of discharge.

Reference will now be made to the transmission 24 for rotating the basket 11. This transmission includes a driving pulley 97 fixed to the motor shaft 52 and belted to an idler wheel 98 having a small pulley 99 rotatable therewith. The latter is belted to a sheave 101 fixed to the shaft 39. The idler wheel 98 and pulley 99 rotate in unison upon a stub shaft 102 carried on the rear of the wall 13. This transmission is clearly illustrated in Figs. 1 to 3 and 6 and is of conventional construction so that it need not be further described. Usually, a belt tightening mechanism is employed with a transmission of the form illustrated, but such mechanism has not been disclosed for the sake of brevity and since it forms no part of this invention. Any suitable belt tightening means may be employed.

In the operation of a dryer as disclosed, the damp fabrics are deposited in the basket and the door 18 is latched closed. The control knob is adjusted to start the motor driven sequence switch for the sequential operation of the motor 53 and heater 71, as is well understood. As the basket 11 is rotated, the fabrics are elevated and dropped by the vanes 36 clear of and across the basket 11. Operation of the blower induces flow of air from the ambient atmosphere through the passage 45 to the interior of the cabinet and thence downwardly around the exterior of the basket to the opening 46 in the supporting wall 13. This flow of air

maintains the outer side walls 14 and 15 of the cabinet cool and heat radiated from the basket 11, the duct 65 and plenum chamber structure 66 is imparted to this stream of air for preheating the air and, therefore, does not represent a loss. The air entering the blower 25 through the opening 46 is translated by the runner 47 through the opening 61 and duct 65 and into heat transfer relationship with the heater 71. The heated air then passes through the plenum chamber and is discharged through the annular passage 77 into the basket in contact with the tumbling fabrics for the vaporization of water therein. The annular stream of air discharged by the passage 77 diverges radially inwardly and outwardly within the basket and contacts the body of moving fabrics, which air is then passed outwardly through the series of openings 42 to the space 95 with the vapor abstracted from the fabrics. Discharge of this vitiated air to the ambient atmosphere is through the duct 96, directly or through a suitable lint trap (not shown). When drying is completed, the motor and heater are deenergized by the timer or thermostatically in accordance with well known practice.

The dryer described heretofore may be inexpensively constructed and readily serviced in the field. The dryer is compact as the usual baffle structure forming the drying chamber is obviated by the basket and seal combination disclosed. In this connection, a domestic dryer capable of drying eight pounds of fabrics may be manufactured for under-counter installation and no more than twenty-five inches in width. Furthermore, the dryer disclosed may be employed for operation superimposed on a domestic washer in inverted position, as disclosed in the application of Earl K. Clark, Serial No. 609,261, filed September 11, 1956, and assigned to the assignee of the present application.

The servicing of the dryer in the field may be readily carried out. It will be noted that the removal of the housing 27 gives access to the transmission and the blower casing. The latter is removable with the heater without disturbing the blower runner or the motor, and the motor and fan assembly is removable without disturbing the blower casing. Furthermore, the removal of the wrapper forming the front and side walls of the cabinet may be readily effected so that all elements of the dryer carried by the base and the rear supporting wall 13 are accessible for inspection in their normal operating positions.

While the invention is disclosed in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What I claim is:

1. In a dryer for fabrics or the like, the combination of a cabinet structure including a base, a rear wall carried by the base and extending upwardly from the rear margin thereof and a wrapper carried by the base and forming a front wall and side walls of the cabinet, a top wall, said front wall having an access opening therein, a substantially cylindrical basket journalled in said rear wall for rotation about a generally horizontal axis, means for conveying heated air through the basket and including a duct extending through the rear wall and having an air heater therein, a blower for translating the air and including a casing carried by the rear side of said rear wall and communicating with said duct, means for admitting air to the casing, means for exhausting vitiated air from the basket and a runner in the casing, means carried by the blower casing and extending within the duct for the support of said heater, a motor supported within the cabinet structure for rotating said runner and a transmission carried on said rear wall and driven by the motor for rotating the basket.

2. In a dryer for fabrics, the combination of a cabinet structure having an upright wall adjacent the rear there-

of and provided with a pair of air passages, a basket for the fabrics journalled in said wall for rotation about a generally horizontal axis, means for circulating heated air through the dryer and including a duct extending forwardly from said wall and communicating with one of said passages, a heater in said duct, a blower casing fixed to the rear side of the wall and enclosing both of said passages, a blower runner disposed in the casing for inducing air through the other of said passages and for translating the air through said one passage and into the duct, a motor driving said runner and a bracket member fixed to the interior of the blower casing and extending into said duct for the support of said heater, said casing, bracket and heater being removable from said wall as a unit.

3. In a clothes dryer, the combination of a casing having a front wall provided with an access opening and a rear wall, a basket structure for containing fabrics, journalled in the rear wall for rotation about a generally horizontal axis and including an imperforate side wall extending forwardly within the casing to adjacent the front wall, said basket having an access opening formed in the front side thereof and registering with the access opening of the casing, an air discharge structure intermediate the front wall of the casing and the front of the basket and including spaced walls forming a plenum chamber therebetween, said chamber being in open communication with the access opening of the basket for the discharge of air to the latter, a seal interposed between the air discharge structure and the basket about the access opening of the latter, a second seal interposed between the rear of the basket and said rear wall of the casing and defining an air space therebetween, said basket having a plurality of openings formed in the rear end thereof for the passage of air to said air space, means for admitting air from the ambient atmosphere to the portion of the casing exteriorly of the basket, means for conveying air from said air space to a point of discharge, air heating means including a duct communicating at one end with said plenum chamber and extending through said rear wall of the casing and a heater in the duct, a blower housing secured to the rear side of said rear wall of the casing and enclosing a fan chamber communicating with the duct, said casing rear wall having an opening communicating with said fan chamber for passage of air admitted to the casing to the fan chamber, a fan in the chamber, a motor arranged within the casing for driving the fan and means driven by the motor for rotating the basket.

4. In a dryer for fabrics, the combination of a casing structure, a basket for containing the fabrics and having a substantially cylindrical, imperforate side wall disposed within the casing, said basket having an access opening in its front end and a plurality of air openings in the rear end thereof, means for rotating the basket about a generally horizontal axis, means for translating heated air through the access opening of the basket for contact with the fabrics and thence through said plurality of air openings, sealing means interposed between the basket and the casing for preventing leakage of heated air to the interior of the casing; said sealing means including opposed, spaced frusto-conical faces formed on the basket and the casing, respectively, said faces being coaxial with respect to the axis of the basket, a continuous circular sealing strip having a V-shape cross section engaging the frusto-conical surfaces and a continuous spring encompassing the strip for maintaining the strip in engagement with the frusto-conical faces.

5. In a dryer for fabrics, the combination of a casing structure, a basket for containing the fabrics and journalled in the casing structure for rotation about a generally horizontal axis, said basket having a substantially cylindrical, imperforate side wall, an access opening formed in one end of the basket and air discharge openings formed in the opposite end, means for translating heated air through the basket for abstracting water from

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the fabrics and sealing means between each end of the basket and the casing for preventing leakage of heated air, being translated through the basket, to the interior of the casing; each of said sealing means including opposed, spaced frusto-conical faces formed on the basket and casing, respectively, and coaxially of the basket, a flexible sealing strip having a V-shape cross section encompassing and engaging said frusto-conical faces and bridging the space therebetween, and an endless convoluted spring encompassing the strip and biasing the latter into engagement with said frusto-conical faces.

6. The combination as claimed in claim 5 wherein said strip is formed of felted material stitched intermediate its side margins to form an annular rib extending inwardly of the strip into the space intermediate said opposed frusto-conical faces.

7. In a dryer for fabrics or the like, the combination of a cabinet structure including a base, an upright supporting wall carried by the base and extending above a rear portion thereof, a wrapper carried by the base and forming a front wall and side walls of the cabinet, said front wall having an access opening therein, a top wall carried by the wrapper and spaced above the upper margin of said upright wall for forming a passage for air translated from the ambient atmosphere to the space within the cabinet, a substantially cylindrical basket jour-

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nalled in the supporting wall for rotation within said space about a generally horizontal axis and having an access opening in the front end thereof registering with the access opening of the wrapper, said basket having an imperforate side wall and a plurality of air discharge openings formed in the rear end thereof, means for translating air admitted to said space downwardly around the side wall of the basket and thence to the interior of the basket through the access opening thereof for the vaporization of moisture from fabrics contained in the basket, means for heating the air, means including said air discharge openings for conveying vitiated air and vapor from the rear of the basket to a point of discharge, said air translating means including a blower carried by said supporting wall and having an inlet communicating with said space within the cabinet and an outlet communicating with the heating means, a motor driving the blower and a transmission carried by the supporting wall and driven by said motor for the rotation of the basket.

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