

Nov. 25, 1958

P. W. DOUGLAS
LAUNDRY DRYING MACHINES

2,861,355

Filed Sept. 23, 1955

4 Sheets-Sheet 1

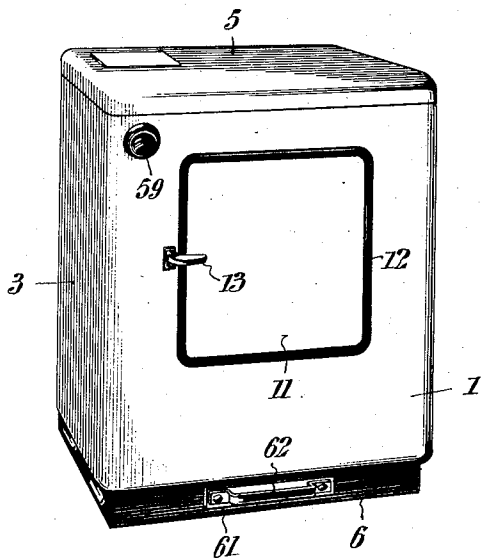


FIG. 1.

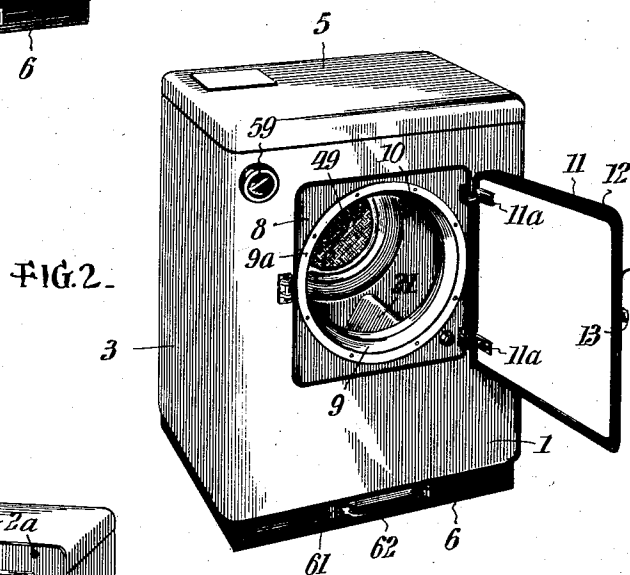


FIG. 2.

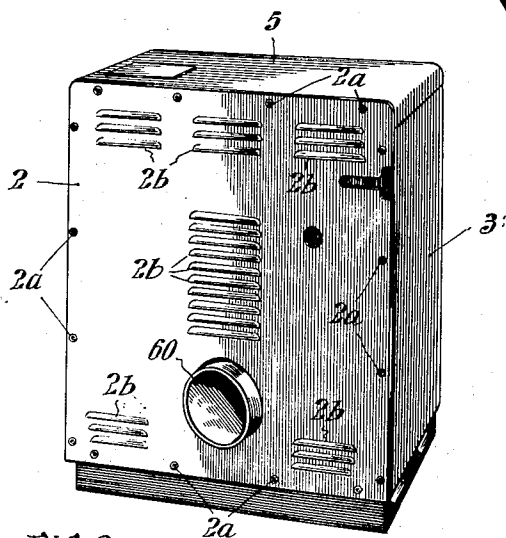


FIG. 3.

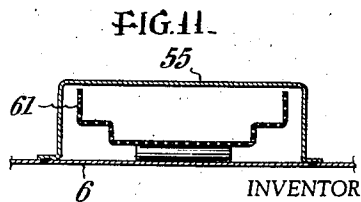


FIG. 4.

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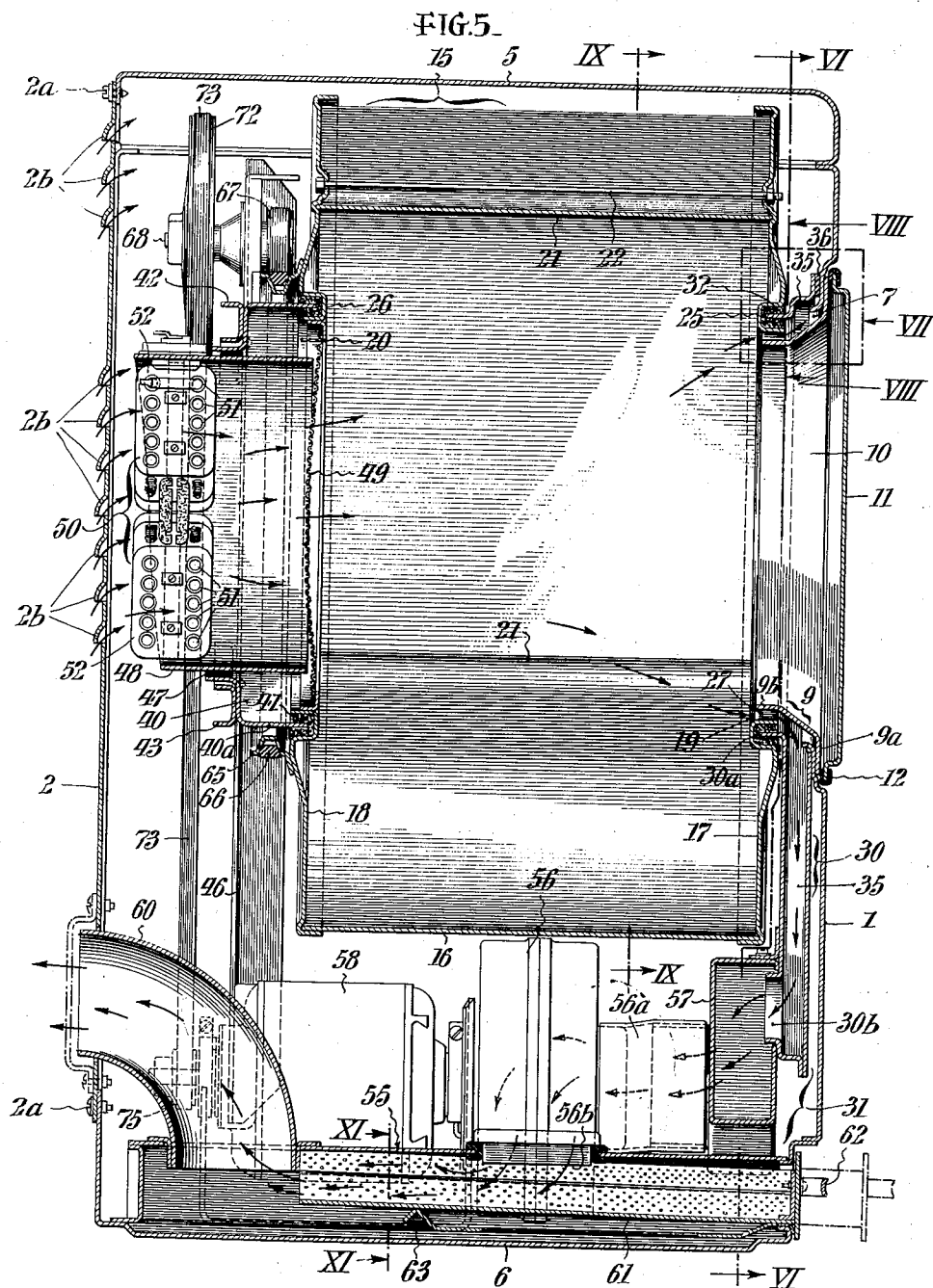
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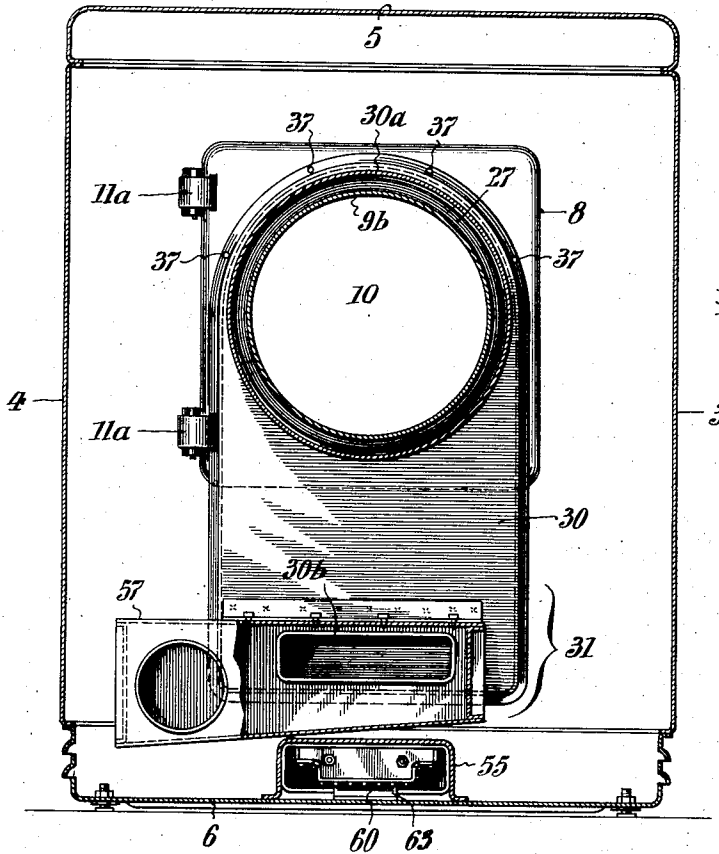


FIG. 6.

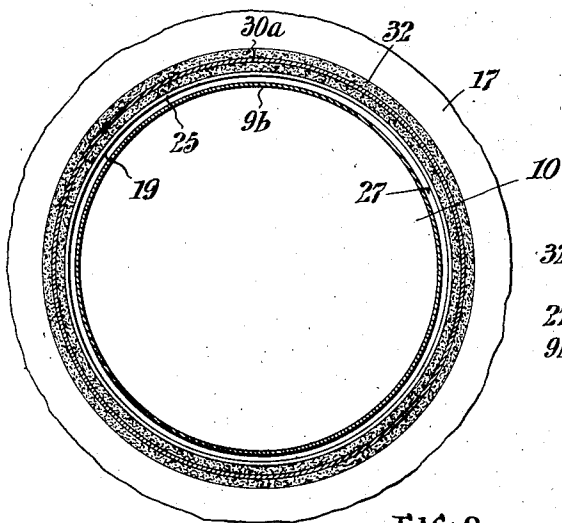


FIG. 8.

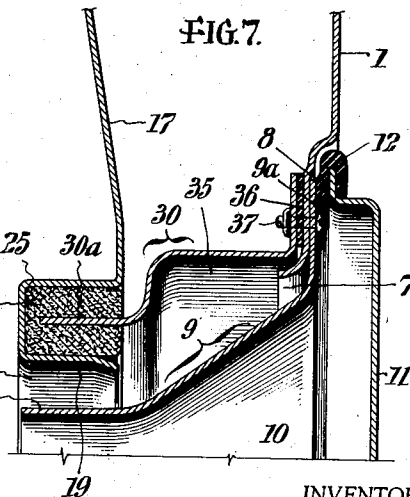


FIG. 7.

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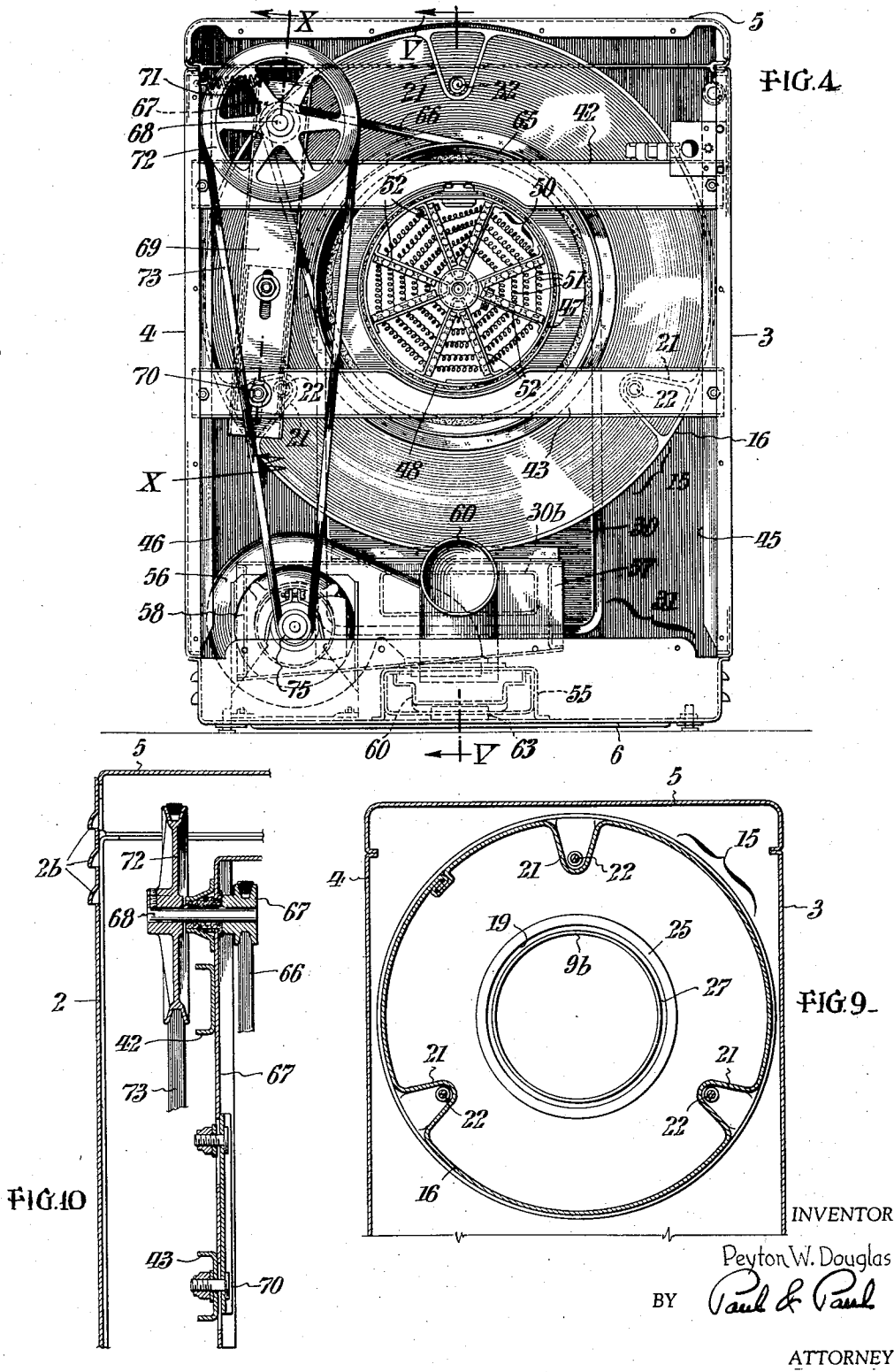
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LAUNDRY DRYING MACHINES

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Application September 23, 1955, Serial No. 536,164

20 Claims. (Cl. 34—82)

This invention relates to laundry drying machines. More particularly, it is concerned with laundry drying machines of a type wherein wet clothes or other materials to be dried are tumbled about in a rotating drum through which pre-heated air is continually passed from one end to the other and finally discharged, with the absorbed moisture, from the machine.

The chief aim of my invention is to provide a laundry drying machine of the kind referred to which is simple and compact in construction; which is highly efficient both from the standpoints of the time required to effect the drying and the power consumed in pre-heating the air and driving the drum; which is immune against the possibility of easy derangement over long protracted periods of use; and which, withal, requires but a minimum space for its accommodation.

How the foregoing and other objects and attendant advantages are realized in practice will appear from the following detailed description of the attached drawings, wherein:

Fig. 1 is a perspective view of my improved laundry drying machine as seen from the front.

Fig. 2 is a view similar to Fig. 1 of the machine but with the door opened for access to the drum for introduction of the clothes or other material to be dried after washing.

Fig. 3 shows the machine as seen from the rear.

Fig. 4 shows the rear elevation of the machine with the back panel or wall of its casing removed.

Fig. 5 is a vertical section of the machine taken as indicated by the angled arrows V—V in Fig. 4.

Fig. 6 is a vertical section taken as indicated by the angled arrows VI—VI in Fig. 5.

Fig. 7 is a fragmentary view in section in the region outlined by the rectangle VII in Fig. 5, drawn to a larger scale to better illustrate important details of construction.

Figs. 8 and 9 are fragmentary views in section taken as indicated respectively by the angled arrows VIII—VIII and IX—IX in Fig. 5.

Fig. 10 is a fragmentary sectional view taken as indicated by the angled arrows X—X in Fig. 4; and

Fig. 11 is a fragmentary view in section taken as indicated by the angled arrows XI—XI in Fig. 5.

As herein exemplified, the laundry drying machine of my invention comprises a quadrangular cabinet of which the front wall 1, the back wall 2, the side walls 3 and 4, the top 5 and the bottom 6 are all struck or die stamped from suitably stiff sheet metal, and all, except the back wall (which is removable) are rigidly united along mutually abutting edges as by welding, said back wall being secured by screws 2a and provided with louvered air inlet apertures 2b, see Figs. 3 and 5. The front wall 1 of the casing has a circular opening 7 which is marginally recessed inwardly as at 8 to receive the outer peripheral flange 9a of an inwardly-coned ring 9 which defines the loading opening 10 of the dryer. The loading opening 10 is normally closed by a door 11 which

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is supported by concealed hinges 11a (Figs. 2 and 6), said door being dished in cross section and fashioned to oblong configuration in correspondence with the shape of the recess 8, and being provided perimetrically with a U section sealing gasket 12 of rubber or the like. A retractable latch 13 is relied upon to normally lock the door 11 in closed position.

Horizontally arranged within the casing is a rotary drum 15 whereof the cylindric wall 16 is imperforate, and whereof the circular end heads 17 and 18 are likewise so except for having relatively large axial openings 19 and 20 respectively in line with the loading opening 10 of the casing. As best shown in Figs. 4 and 5, hollow inwardly extending projections 21 are provided at equidistant points around the cylindrical wall 16 of the drum 15, and that the end heads 17 and 18 of the drum are held assembled with said wall by tie rods 22 passed through said projections. From Figs. 5, 6, 7 and 8, it will be further noted that outwardly-open channel section flanges 25 and 26 are formed circumferentially about the axial openings 19 and 20 respectively in the end heads 17 and 18 of the drum for a purpose presently explained, and, moreover, that the flange 9b of the ring 9 extends into the opening 19 with intervention of circumferential clearance space 27 thereabout. At its front end, the drum 15 is rotatively supported by an annular flange 30a (Figs. 5 and 7) on the inner wall of the vertical component 30 of a duct 31, said flange extending into the circular groove of non-metallic bearing material 32 such as oil-saturated felt or the like recessed into the annular channel 25 around the opening 19 in the drum head 17. The component 30 of the duct 31 extends around the top of the flange ring 9 and then downwardly within the casing in the interval between the front wall 1 of the latter and the confronting end head 17 of the drum 15, thereby forming an air flow passage 35 which is in communication with the interior of the drum by way of the annular clearance 27, the felt bearing material serving as an air seal between the interior of the drum and the interior of the casing at that region. It is to be understood that the flange ring 9a and the component 30 of the duct 31 are rigidly fixed in place to the front wall of the casing, with interposition of a gasket 36, by screw bolts 37 after the manner best shown in Figs. 6 and 7. At its rear end, the drum 15 is rotatively supported by an annulus 40 having a circumferential flange 40a which extends into the circular groove of non-metallic bearing material 41 (like the material 32) lodged in the annular channel 26 around the opening 20 the head 18 of said drum. As further shown in Figs. 4 and 5, the annulus 40 is rigidly sustained between a pair of transverse channel section beams 42 and 43 which, at opposite ends, are bolted fast to upright angle bars 45 and 46 affixed respectively to the opposite side walls 3 and 4 of the casing within the latter. Held coaxially within the annulus 40, with interposition of a sealing ring 47, is a tubular shroud 48 by way of which outside air entering through the louvered apertures 2b in the back wall 2 of the casing can pass into the drum 15. A screen 49 set into the opening 20 in the rear end head 18 of the drum 15 is relied upon to prevent displacement of the material being dried into the shroud 48 as it is tumbled about in the drum by action of the projections 21. Disposed within the shroud 48 is an electric heating unit 50, of which the resistance wire coil 51 is spiralized and supported by radiating spokes 52, for heating the air as it passes into the drum 15.

Referring again to Figs. 4, 5 and 6, the duct 31 has a component 55 which extends horizontally of the bottom of the casing from the front toward the rear of the latter. Fixedly supported in the bottom of the casing adjacent the side wall 4 is a suction blower 56 with its inlet 56a

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connected to an intermediate component 57 of the duct 31 which is in communication, by way of a port 30b at the lower end of the vertical component 30 of said duct, which has its outlet 56b connected into the top of the horizontal component 55 of said duct, the shaft of the blower being directly coupled to one end of the shaft of an adjacently-positioned electric motor 58. For control of the motor 58, a manual start and stop switch 59 is provided at the front of the casing, see Figs. 1 and 2. After traversing the horizontal component 55 of the duct 31, the moisture-laden air passes out through the back wall 2 of the casing by way of an elbow 60.

Disposed in the horizontal component 55 of the duct 31, see Figs. 5 and 11, is a lint trap in the form of a drawer 61 with perforated sides, said drawer being removable from the front of the casing, as shown in broken lines in Fig. 5 by pull upon a grasp 62 provided for this purpose. A leaf spring 63 is provided to yieldingly retain the drawer 61 within the casing.

In accordance with my invention, the motor 58 is utilized also as the power means for driving the drum 15 at reduced speed through the transmission means about to be described. A V-grooved ring pulley 65 (Figs. 4 and 5) welded or otherwise rigidly secured to the outer face of the end head 18 of the drum 15 and freely surrounding the annulus 40 is connected, by a belt 66, to a small pulley 67 on a shaft 68 which is rotatively supported in a bearing at the top end of an arm 69 fulcrumed at 70 on the channel bar 43. The belt 66 is maintained taut by pull of the spring at 71 upon the upper end of the arm 69. Also secured to the shaft 68 is a larger pulley 72 (Figs. 4, 5 and 10) which, by means of another V-belt 73, is connected to a small pulley 75 on the shaft of the motor 58.

Operation

After loading of the drum 15 through the opening 10 and shutting the door 11, the switch 59 is closed to start the motor 58. As the drum 15 rotates, the material is tumbled about and opened up by action of the projections 21 and exposed to air which, by the blower 56 is drawn into the machine through the apertures 2b in the rear wall 2 and heated by the heating unit 50 before entering the rear end of the drum 15 by way of the shroud 48. After traversing the material in the drum 15, the moisture-laden air passes from the drum through the annular interspace 27 into the vertical component 30 of the duct 31 and from thence through the medial duct component 57, through the blower 56 and through the horizontal duct component 55, and is finally discharged at the rear of the machine through the elbow 60. As the air flows through the horizontal component 55 of the duct 31, the entrained lint is caught within the drawer 61, the discharge from the dryer being therefore substantially free of dust.

Due to the simplicity and compactness of its construction, it will be apparent from the foregoing that the machine of my invention is highly efficient in its operation, requires but a minimum of space for its accommodation, and, moreover, is immune against easy derangement over protracted periods of use. While the preferred embodiment of this invention has been described in some detail, it will be obvious to one skilled in the art that various modifications may be made without departing from the invention as hereinafter claimed.

Having thus described my invention, I claim:

1. In a laundry drying machine, a casing having a loading opening in one of its side walls and a door for said opening; a drum rotatively supported within the casing, said drum having an imperforate circumferential wall and end heads coaxial with the loading opening in the aforesaid casing wall, said end heads having axial openings therein; an annular flange at the inner side of the aforesaid casing wall surrounding the loading opening

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and extending inwardly, with circumferential clearance thereabout, into the opening in the confronting head of the drum; a duct in the interval between the aforesaid casing wall and said confronting end head of the drum, said duct surrounding the aforesaid flange in sealed relation with said end head and communicating with the interior of the drum by way of said clearance; an air blower connected to the duct; and means for pre-heating air taken from the exterior for propulsion through the drum by action of the blower.

2. In a laundry drying machine, a casing having a loading opening in one of its walls and a door for said opening; a drum rotatively supported within the casing, said drum having an imperforate circumferential wall and end heads respectively coaxial with the loading opening in the aforesaid casing wall, said end heads having axial openings therein; an annular flange at the inner side of the aforesaid casing wall surrounding the loading opening and extending inwardly, with circumferential clearance thereabout, into the opening in the confronting end head of the drum; a duct having a portion in an interval between the aforesaid casing wall and said confronting end head of the drum partly surrounding the aforesaid flange in sealed relation with said end head and communicating with said drum through said clearance, and a portion leading to an outlet in a wall of the casing; a blower for causing air from the exterior to pass through the drum and the communicating duct; and a heater adjacent the opening in the opposite end of the drum.

3. A laundry drying machine according to claim 2, wherein the blower is interposed in the duct and the air after having traversed the drum is discharged by way of the duct, and further including a removable lint trap disposed in the duct beyond the blower as considered with respect to the direction of air flow.

4. A laundry drying machine according to claim 2, the loading opening is in the front wall of the casing; wherein the drum is horizontally arranged; and wherein the duct leads to an opening in the rear wall of the casing.

5. A laundry drying machine according to claim 2, wherein the loading opening is in the front wall of the casing; wherein the drum is horizontally arranged; and wherein the duct extends downwardly of the front wall of the casing and then horizontally of the bottom of the casing to an opening in the rear wall of the casing.

6. A laundry drying machine according to claim 2, wherein the loading opening is in the front wall of the casing; wherein the drum is horizontally arranged; wherein the duct extends downwardly of the front wall of the casing and then horizontally of the bottom of the casing to an opening in the rear wall of the casing; and wherein the blower is interposed in the horizontal portion of the duct.

7. A laundry drying machine according to claim 2, wherein the loading opening is in the front wall of the casing; wherein the drum is horizontally arranged; wherein the duct extends downwardly of the front wall of the casing and then horizontally of the bottom of the casing to an opening in the rear wall of the casing; wherein a lint trap is disposed in the horizontal portion of the duct and is removable from the front of the casing.

8. A laundry drying machine according to claim 2, wherein a stationarily-supported shroud within the casing is axially aligned with the opening in the air entrant end of the drum.

9. A laundry drying machine according to claim 2, wherein a stationarily-supported shroud within the casing is axially aligned with the opening in the air entrant end of the drum; and wherein the heater is electrical and comprises a spiral of resistance wire sustained by radially-arranged spoke arms within said shroud.

10. A laundry drying machine according to claim 2,

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further including an electric motor; and transmission means through which the drum and the blower are driven from the motor.

11. A laundry drying machine according to claim 2, wherein the loading opening is in the front wall of the casing; wherein the drum is horizontally arranged; wherein the duct extends downwardly of the front wall of the casing and then horizontally of the bottom of the casing to an opening in the rear wall of the casing; wherein the blower is interposed in the horizontal portion of the duct; and further including an electric motor with its shaft coupled to the shaft of the blower; and a speed-reducing belt transmission whereby the drum is driven from the motor.

12. In a laundry drying machine, a casing having a loading opening in its front wall and a door for said opening; a horizontally-arranged rotary drum having an imperforate cylindrical wall and end heads respectively with axial openings and with non-metallic bearing material or felt or the like lodged in outwardly-open channels circumferentially of said openings; an annular flange at the inner side of the aforesaid casing wall surrounding the loading opening in the frontal casing wall and engaged in a circular groove in the bearing material at one end head of the drum; an annulus stationarily-supported within the casing and having a circumferential flange engaged in a circular groove in the bearing material at the other end head of the drum; a ring surrounding the loading opening in the front wall of the casing and having a flange projecting, with provision of an annular clearance into the axial opening in the corresponding end of the drum; a duct having a portion in an interval between the frontal wall of the casing and the confronting end head of the drum, partly surrounding the annular flange of the ring on said wall, and a portion leading to an outlet in another wall of the casing; a blower interposed in the duct whereby air from the exterior is drawn into the drum through the opening in the rear head of said drum; and a heater adjacent the axial opening in the rear head of said drum.

13. A laundry drying machine according to claim 12, further including a removable lint trap disposed in the duct beyond the blower as considered with respect to the direction of air flow.

14. A laundry drying machine according to claim 12, wherein the duct extends downwardly of the front wall

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of the casing and then horizontally of the bottom of the casing to an outlet in the rear wall of the casing.

15. A laundry drying machine according to claim 12, wherein the duct extends downwardly of the front wall of the casing and then horizontally of the bottom of the casing to an outlet in the rear wall of the casing; and wherein the blower is interposed in the horizontal portion of the duct.

16. A laundry drying machine according to claim 12, wherein the duct extends downwardly of the front wall of the casing and then horizontally of the bottom of the casing to an outlet in the rear wall of the casing; and wherein a lint trap is disposed in the horizontal portion of the duct and is removable from the front of the casing.

17. A laundry drying machine according to claim 12, wherein a stationarily-supported shroud within the casing is axially aligned with the opening in the rear or air entrant end of the drum; and wherein the heater is disposed within said shroud.

18. A laundry drying machine according to claim 12, wherein a stationarily-supported shroud within the casing is axially aligned with the opening in the rear or air entrant end of the drum; and wherein the heater is electrical and comprises a spiral of resistance wire sustained by radially-arranged spoke arms within said shroud.

19. A laundry drying machine according to claim 12, further including an electric motor; and transmission means through which the drum and the blower are driven from the motor.

20. A laundry drying machine according to claim 2, wherein the duct extends downwardly of the front wall of the casing and then horizontally of the bottom of the casing to an outlet in the rear wall of the casing; wherein the blower is interposed in the horizontal portion of the duct; and further including an electric motor of which the shaft is coupled with the shaft of the blower; and a speed-reducing belt transmission whereby the drum is driven from the motor.

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