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P. E. GELDHOF ET AL  
CLOTHES DRIER

2,546,925

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3 Sheets-Sheet 1

Fig-1

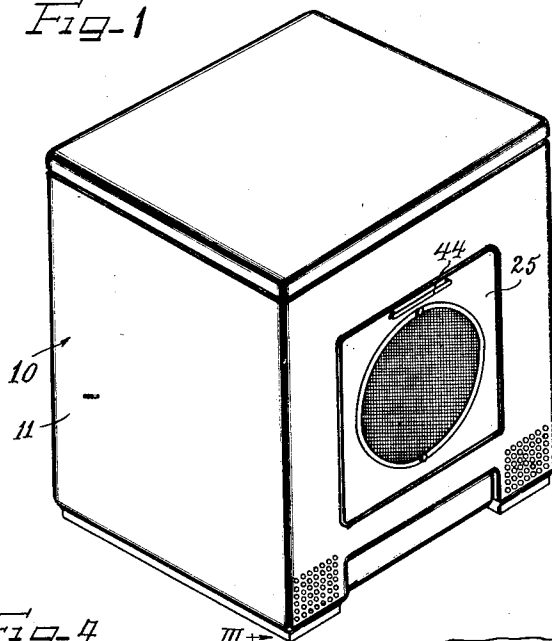


Fig-3

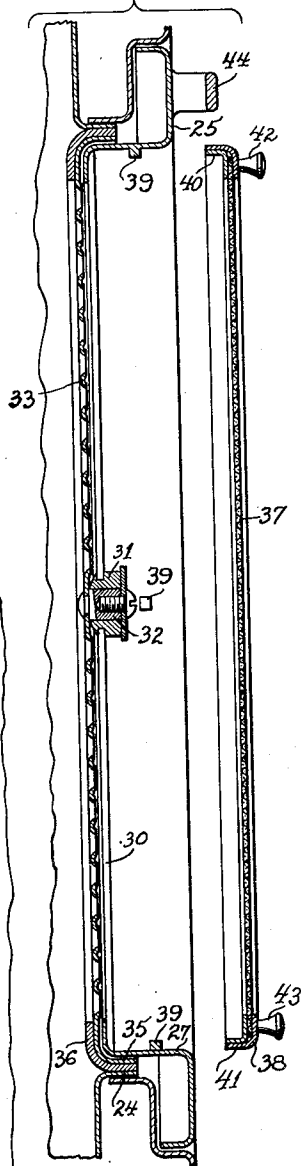
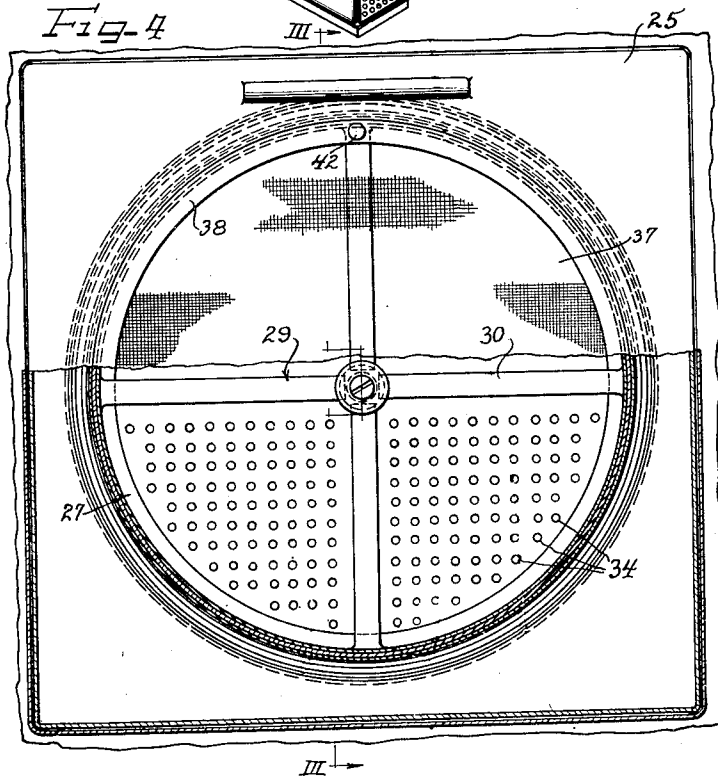


Fig-4



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3 Sheets-Sheet 2

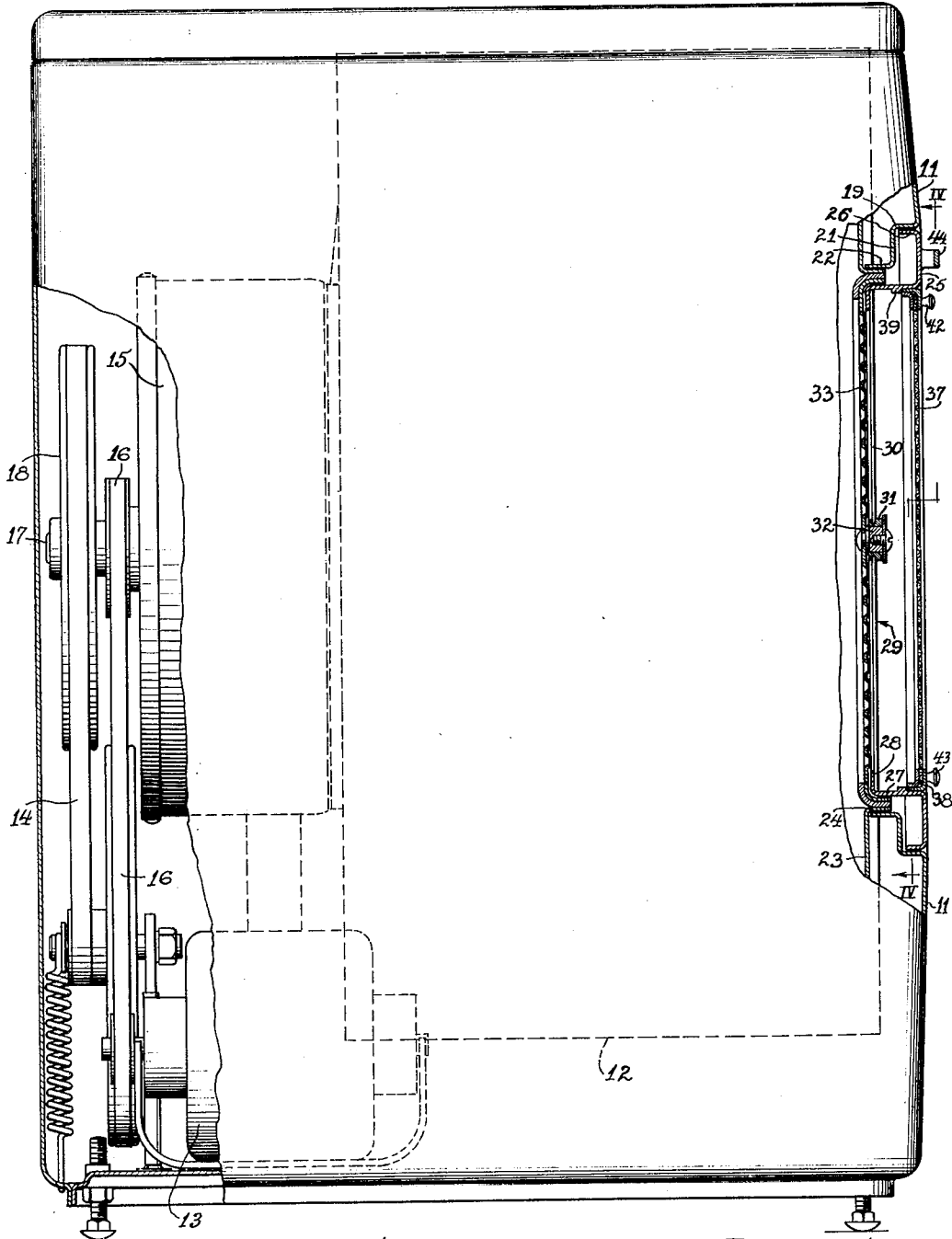


Fig. 2

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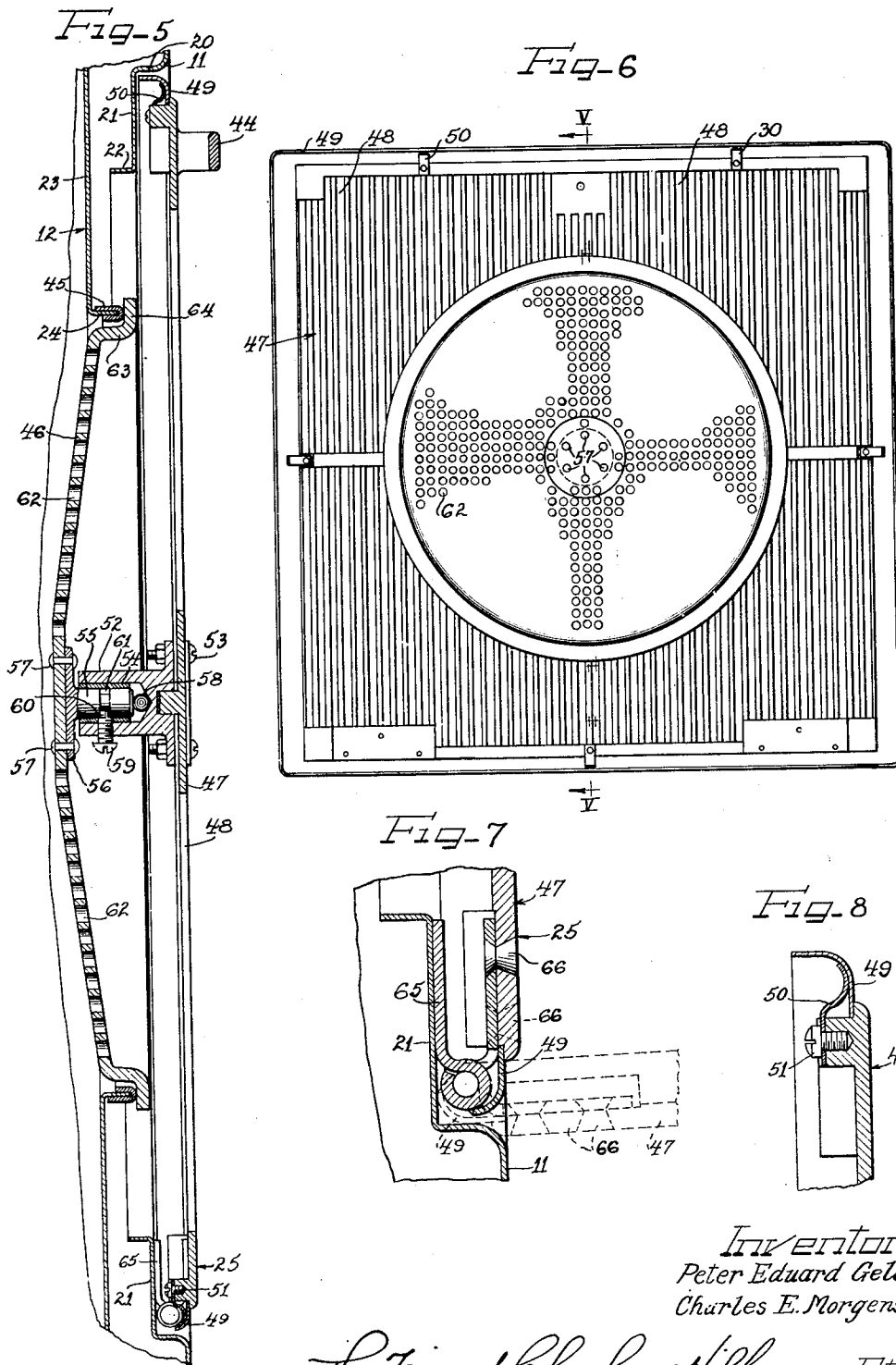
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CLOTHES DRIER

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3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,546,925

## CLOTHES DRIER

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3 Claims. (Cl. 34—82)

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This invention relates to a clothes drier and more particularly to a small compact unitary clothes drier of the type which is suitable for ordinary household use in conjunction with any laundry machine or washing apparatus.

One type of clothes drier which is supplied for household use includes a rotating drum through which heated air is circulated. In any clothes drier of this general category it is necessary to have a door through which the clothes may be introduced and withdrawn from the rotating drum. One of the difficulties in the past has been that the friction of the clothes against the door while the drum is rotated causes a great deal of lint to be produced and necessarily is harsh on the clothes which are being dried. One of the principal features and objects of the present invention is to provide a clothes drier having a novel door construction in which means is provided for overcoming this disadvantage which has heretofore been present in clothes driers.

A further object of the present invention is to provide a novel clothes drier having a rotating panel on the inner side of the door through which the clothes are introduced whereby the rotating panel rotates with the clothes and prevents rough frictional wear on the clothes.

Another and further object of the present invention is to provide a novel cabinet structure for clothes or article containing apparatus.

The novel features which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention itself, however, both as to its organization, manner of construction and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

Figure 1 is an isometric view of a clothes drier embodying the novel features and characteristics of the present invention;

Figure 2 is a side elevational view with part of the outer shell broken away and with certain of the parts in section;

Figure 3 is an enlarged sectional view of the door and its relationship with the drum as shown in Figure 2 of the drawings;

Figure 4 is an enlarged front elevational view of the door with the lower part thereof broken away to show the revolving plate mounted on the door;

Figure 5 is an enlarged vertical sectional view of a modified form of door structure;

Figure 6 is a rear view of the casting forming

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the door in Figure 5 (on a reduced scale from Figure 5) as well as the revolving disk;

Figure 7 is an enlarged fragmentary view of the door hinge shown in the lower part of Figure 5; and

Figure 8 is an enlarged fragmentary view of the outer door frame and outer casting.

Referring now to the first embodiment of the invention illustrated in Figures 1 to 4 of the drawings, there is shown therein a clothes drier 10 including an outer shell or cabinet 11 in which is mounted a rotating drum 12 which is arranged to receive the clothes or other articles to be dried. The drum 12 is mounted for rotation about a horizontal axis and is arranged to be driven by a motor 13 through a belt drive 14. The particular means for heating the air and circulating the air through the structure forms no part of the present invention, and for the purposes of this case it will be sufficient to say that heating means is located in a tubular shell 15 and that a fan (not shown) is arranged to be driven by the motor through the belt drive 16, the fan being mounted coaxially with the drum shaft 17 which is driven through the belt drive 16 by virtue of a pulley 18 mounted on the shaft 17.

The shell 11 of the casing 10 is provided with an opening in the front wall thereof opposite the open end of the drum 12. This opening is defined by a flange 19 which extends first rearwardly as at 20, then toward the center of the opening as at 21, and finally rearwardly again as at 22. The drum 12 has an end wall 23 which is provided with a forwardly turned lip 24 which is inside of the rearwardly extending flange 22 of the shell 11. Since the drum 12 rotates with respect to the casing 11 the lip 24 is slightly spaced from the rearwardly extending flange 22.

In order to have access to the drum 12 so as to be able to introduce clothes and other articles into the drum through the opening defined by the lip 24, a door 25 is provided for the cabinet 10. This door 25 is arranged to be nested within the flange portion 20 of the shell 11 so as to be seated substantially against the flange portion 21. While a slight space is shown between the door and this flange portion 21, as is evidenced by the spacing between the rearwardly turned flange 26 on the door 25, it will be understood that this will enable a gasket or rubber cushioning element to be disposed there. The cushioning element, however, has been omitted for purposes of clarity in illustrating the structural features of the device.

The door 25 may be of any given shape from

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the standpoint of its general outline, and for purposes of illustration has been indicated as being substantially square. Within the central portion of this door 25 is a relatively large opening defined by a rearwardly extending flange 27 which terminates in an inwardly facing lip 28. Secured to this inwardly facing lip is a spider 29 which may, for example, be composed of a plurality of radially inwardly extending arms 30. In the center of the spider 29 is mounted a bearing 31 in which a journal member 32 is journaled. The journal member 32 is carried on a perforated plate 33 which extends completely across the rear of the circular opening defined by the rearwardly extending flange 27 of the door 25. It will thus be apparent that the perforated plate 33 is arranged for rotation within the bearing 31 carried by the spider 29 on the door 25.

In the particular embodiment of the invention illustrated in Figures 1 to 4 of the drawings, the perforated plate 33 is in the form of a sheet having a large number of holes 34 punched therein. The side of the plate 33, which is the upper side of the plate when the punchings are made, is disposed so as to face toward the drum 12. This prevents any sharp or ragged edges being disposed on the side where the clothes are located. The perforated plate 33 has a forwardly turned outer marginal flange 35 on which a packing ring or gasket 36 is carried. The gasket 36, when the door 25 is closed, is squeezed into snug engagement with the forwardly extending lip 24 of the drum 12. It will therefore be apparent that since the axis of the bearing 31 is coaxial with the shaft 17 of the drum 12, the perforated plate 33 rotates with the drum. There is therefore no relative motion of the perforated plate 33 with respect to the drum 12 and hence harmful frictional engagement between the door of the casing 10 and the clothes carried in the drum 12 is substantially eliminated. There will, of course, be a certain amount of lint removed from the clothes due to their fluffing around within the drying drum 12. This lint will, of course, be carried by the forced circulation of air produced by the fan (not shown) rotated by the fan belt 16 through the perforations 34 in the disk 33. In order to catch this lint and prevent the same from being thrown about the room in which the drier is located, a lint catcher in the form of a fine screen 37 is carried in a screen frame 38 which may be fitted in along the shoulder provided by the rearwardly extending flange 27 of the door 25. This frame 38 is limited in its inward movement by a stop means in the form of protuberances 39 formed on the rearwardly extending flange portion 27. The screen 37 has a retaining ring 40 forced within the rearwardly extending flange portion 41 of the frame 38. Upper and lower knobs or handle members 42 and 43 are provided for withdrawing the screen frame 38 and screen 37 from the door 25 to remove the lint from between the screen 37 and the perforated plate 33 after the machine has been in operation for a while.

The door 25 may be hinged in any suitable manner (not shown), it being preferably hinged at the bottom and having a handle portion 44 at the top for effecting an opening of the door.

In Figures 5 to 8 of the drawings we have illustrated a modified form of the present invention. As is shown in Figure 5, the shell 11 is provided with an opening defined by a rear-

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wardly extending flange portion 20, a radially inwardly extending flange portion 21 and a rearwardly extending lip 22. In this particular instance the radially inward extending flange portion 21 is shown as being slightly greater in extent than that shown in the first form of the invention, but it is to be understood that this may be varied through wide limits without departing from the spirit and scope of the present invention. The front wall 23 of the drum 12 is provided with a forwardly extending lip 24 having a rubber yieldable gasket or bead 45 against which the rotatable member 46 is carried by the door 25 is seated.

The door 25, in this illustrated embodiment of the invention, is in the form of a casting 47 having a plurality of vertical louvres or openings 48 therethrough, through which the air circulates. The casting 47 is secured in an outer door frame member 49 by means of clamping fingers 50 which are bolted or otherwise secured to the casting as at 51 (see Figure 8).

A bearing supporting member 52 is bolted as at 53 to the casting 47, this bearing retaining member being axially bored as is clearly shown in Figure 5. Within this axial bore of the member 52 is disposed a bearing sleeve 54 which is arranged to receive a stud shaft 55 which extends forwardly from a base portion 56 which is riveted as at 57 to the casting 46. The stud shaft 55 is provided with a thrust bearing in the form of a steel ball 58 which is disposed between the conical surface of the inner end of the bore in the member 52 and the end of the stud shaft 55. The stud shaft 55 is retained in place within the bearing 54 by means of a retaining bolt 59 which has a reduced end 60 which extends into a recess portion 61 of the stud shaft 55.

The casting 46 is in the form of a very shallow cone which is provided with a large number of openings 62 extending axially therethrough. It will thus be apparent that the central portion of the casting 46 extends further into the drum 12 than does the outer portion thereof. This casting 46 is also provided with a forwardly extending flange portion 63 which terminates in a radially outwardly extending lip portion 64 which is seated against the gasket 45 of the revolving drum 12 when the door 25 is closed.

As may be seen best in Figure 7 of the drawings, the door 25 is hinged along its bottom edge by a pair of hinges 65. These hinges 65 are spot welded or otherwise suitably secured to the radially inwardly extending flange portion 21 of the shell 11 and are riveted as at 66 to the casting 47 of the door 25. The rivet heads are ground down to make a fiat surface to improve the appearance on the outside of the door and to present a fiat surface on the inside of the door, whereby the door may be used as a shelf when it is open.

It will be understood that means is provided so that the door, when lowered to a horizontal position, will remain in that position while clothes are withdrawn from or introduced into the drum 12. It will further be understood that when the door 25 is closed the lip portion 64 of the casting 46 is tightly seated against the gasket 45 on the drum 12 whereby the casting 46 rotates with the drum 12.

From the above description it will be apparent that by providing a revolvable panel on the inner face of the door of a clothes drier of the drum rotating type, frictional wear on the clothes or other articles being dried is very substantially reduced. It will further be observed from the above

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description, that a novel housing structure is provided for clothes driers or other similar types of housing structures.

While we have shown certain particular embodiments of our invention and have described particular methods of operation, it will, of course, be understood that we do not wish to be limited thereto, since many modifications may be made, and we therefore contemplate, to cover all such modifications as fall within the scope of our invention, as defined by the appended claims.

We claim as our invention:

1. In a clothes drier of the rotatable drum type wherein heated air is passed through the drum while clothes are being tumbled therein, the combination which includes a housing, a clothes drum mounted for rotation in said housing, said drum having an end wall with an axially disposed opening therein, a door in said housing opposite the open end of said drum, said door having a main frame portion and a perforated inner wall member rotatably mounted on said main frame portion, the axis of rotation of said inner wall member being coaxial with the axis of rotation of said drum, and a screen having a relatively fine mesh with respect to the perforations in said wall member mounted in said main frame exteriorly of said inner wall member, whereby frictional resistance between said door and the clothes is minimized by the rotation of said inner wall member, and lint is trapped between said inner wall member and said screen.

2. In a clothes drier of the rotatable drum type wherein heated air is passed through the drum while clothes are being tumbled therein, the combination which includes a housing, a clothes drum mounted for rotation in said housing, said drum having an end wall with an axially disposed opening therein, a door in said housing opposite the open end of said drum, said door having a main frame portion and a perforated inner wall member rotatably mounted on said main frame portion, the axis of rotation of said inner wall member being coaxial with the axis of rotation of said drum, and a screen removably mounted in said main frame exteriorly of said inner wall member and spaced therefrom, said screen having relatively small openings therein

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as compared with the perforations in said inner wall member, whereby frictional resistance between said door and the clothes is minimized by the rotation of said inner wall member and lint is trapped between said inner wall member and said screen.

3. In a clothes drier of the rotatable drum type wherein heated air is passed through the drum while clothes are being tumbled therein, the combination which includes a housing, a clothes drum mounted for rotation in said housing, said drum having an end wall with an axially disposed opening therein, said housing having an opening therein opposite the open end of said drum, said housing having a recessed shoulder adjacent said opening therein, a door mounted for movement into and out of said opening in said housing and arranged to be seated when in closed position on said shoulder, whereby the exterior surface of said door is substantially flush with the exterior surface of said housing, said door having a main frame portion and a perforated inner wall member rotatably mounted on said main frame portion, the axis of rotation of said inner wall member being coaxial with the axis of rotation of said drum, said door also having a filter screen outer panel portion in the plane of the exterior surface of said door.

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CHARLES E. MORGENSTERN.

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