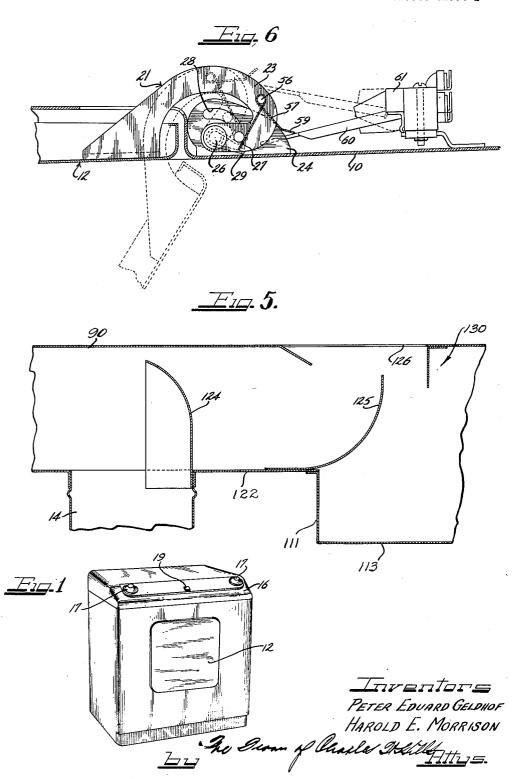
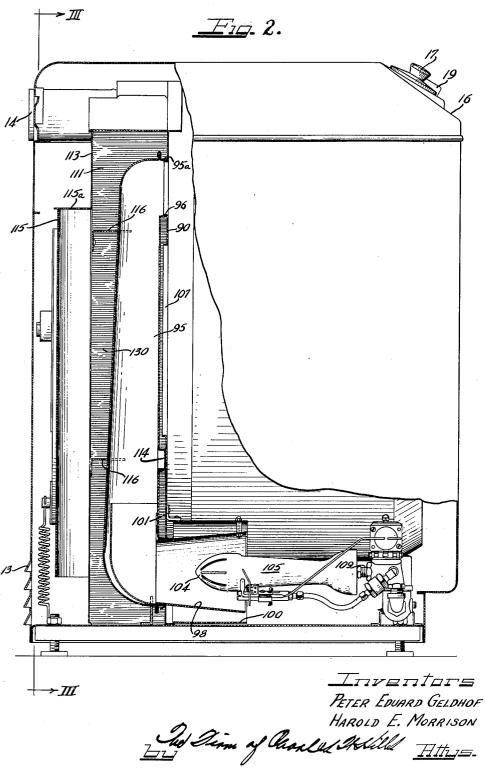
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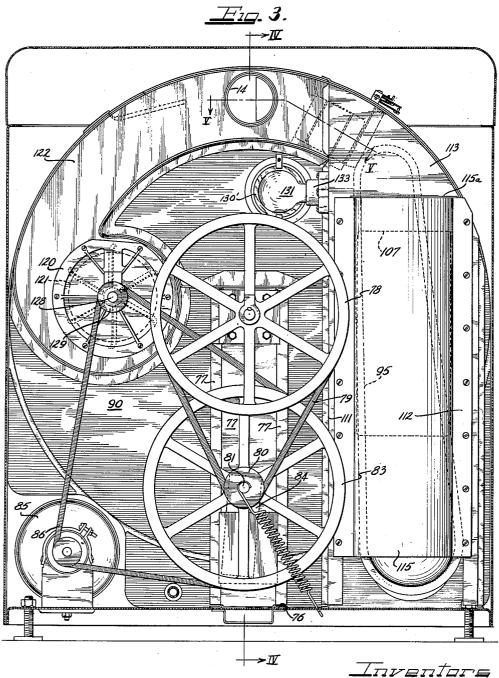
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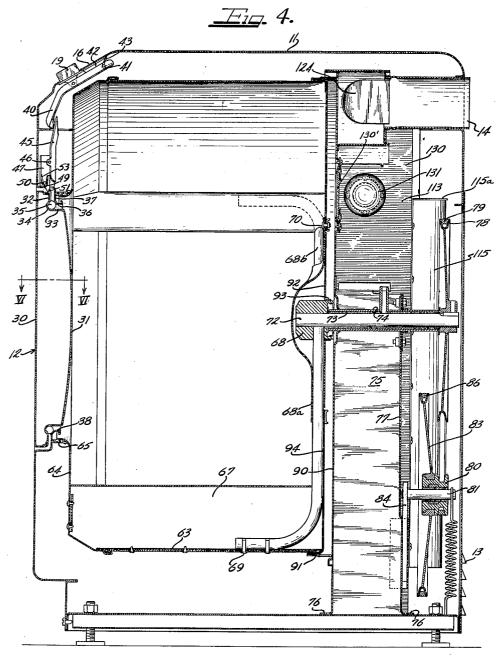
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UNITED STATES PATENT OFFICE

2,635,354

GAS-HEATED DRIER

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7 Claims. (Cl. 34—131)

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This invention relates to a gas drier, and more particularly, to a small drier of the type where the clothes are tumbled in a rotating drum which is provided with heated air from a gas burner within the casing of the drier.

It is a particular object of this invention to provide a novel means for heating air and circulating it through the drum of the drier.

Another object of this invention is to provide a novel method of regulating the relative quan- 10 tities of fresh air and of recirculating air that are circulated through the drum.

A still further object of this invention is to provide a drier with novel means for heating air whereby the articles in the drier are heated by 15 radiant heat from the heated air conduit as well as by direct contact with heated air.

The novel features which we believe to be characteristic of our invention are set forth with particularity in the appended claims. Our invention 20 itself, however, both as to its organization, manner of construction and method of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in connection with 25 the accompanying drawings, in which:

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

of this invention with parts broken away to disclose the construction;

Figure 3 is a vertical sectional view taken on line III—III of Figure 2;

line IV—IV of Figure 3;

Figure 5 is a horizontal sectional view taken substantially on line V-V of Figure 3: and

Figure 6 is a horizontal sectional view taken substantially on line VI-VI of Figure 4.

The clothes drier 10 illustrated in the various figures of the drawings is of the size commonly employed for household use and includes a cabinet 11 having a clothes door 12 (Figures 1 and of air intake louvers 13 for the air which is to be circulated through the drier are provided in the rear wall of the cabinet 11, while a discharge port or flue 14 in the rear wall permits the escape of air after it has passed through the drier and 50 over the clothes.

The cabinet || has a slanted upper portion |6 on the front wall on which is mounted a temperature control knob 17, a timer control knob 18 and a push-button 19 for opening the door 12. 55 a clockwise direction, resists the pivoting action

The door 12 is mounted on two spaced apart, concealed hinge assemblies 21, Figure 6. Each hinge assembly comprises a hook-shaped plate 23 secured to the inside of the door 12, and a plate 24 secured to the inside of the front wall of the cabinet 10. The plates 23 and 24 are pivotally secured together by means of a pin 26. A stop pin 27, carried by the plate 23, is movable in an arcuate slot 28 of the plate 24. A spring 29, disposed about the pin 26, has one leg bearing against the front wall of the cabinet and another leg bearing against the stop pin 27 and is effective to help urge the door to an open position when the push-button 19 is moved to release po-

The door 12 has a front wall 30 (Figure 4) and a rear wall 31 which are spaced apart with the front wall 30 flush in its closed position with the front wall of the casing and the rear wall 31 having a central portion substantially flush with the forward wall of the rotating drum.

The door 12 is also provided with an offset shoulder 32 which cooperates with a wall portion 33 to define a recessed groove 34 in which a resilient seal ring 35 is disposed. When the door closes, the seal ring is seated against a shoulder 36 formed on a recess annular flange 37 which is bent inwardly from the front wall of the casing to define a circular opening 38 through Figure 2 is a side elevational view of the drier 30 which the clothes may be inserted into the drum.

The door is opened by means of the lever 40 which is pivoted on a pin 41 mounted on a bracket 42 secured to the inner wall of the casing. The lever 40 is actuated when the push-button 19 is Figure 4 is a vertical sectional view taken on 35 pushed inwardly. The spring 43 disposed about pin 41 has one leg abutting the inner wall of the cabinet and the other leg abutting a flange portion of the lever 40 tending to urge the lever clockwise to move the push-button to the closed position.

A second lever 45 is pivotally mounted on a pin 46 which is secured in an angle member 47 mounted on the casing. When the lever 40 is pivoted counterclockwise upon its pivot pin 41 4) mounted in the front wall thereof. A plurality 45 by means of the push-button 19, the lever 45 is urged in a clockwise direction about the pivot pin 46 for contacting a dog 49 which is pivotally mounted on a pin 50 secured to the angle member 47. As the dog 49 rotates counterclockwise about the pivot pin 50, its lower end moves out of contact with an abutment arm 51 projecting above the upper end of the door 12. A spring 53, having one leg abutting the flange of the angle member 47 and another leg tending to urge the dog 49 in of the lever 45. When the door is closed, the spring 53 moves the dog 49 to a latching position and, through the linkages 45 and 40, helps the spring 43 to urge the push-button 19 into closed

As best seen in Figure 6, one of the hinge assemblies 21 carries a pin 56 around which a spring 57 is disposed. One leg of the spring 57 abuts the stop pin 27, while the other leg bears against a pivoting lever 60 which is arranged to control 10 the operations of the drum and the burners through a control switch 61. It is seen in dotted lines that when the door is moved to an open position, the switch is urged by a spring in the switch 61 to a circuit-breaking position. When 18 the door is closed, the spring: 57 contacts the lever 60 and moves the contacts of the switch 61 to a closed position. Thus, when the door is open, the main motor and the timer motor are deenergized and the valve to the burner is closed. 20 However, a light in the drier casing is lit and gas is supplied to the pilot light.

A clothes drum 63, Figure 4, is of a generally cylindrical configuration having a forward or front wall 64 with a clothes receiving opening 65:25 through which the clothes may be inserted into the drum. It will be noted in Figure 4 that the circular opening 38 defined by the inturned flange 37 of the front wall of the cabinet is disposed inside the circular opening 65 on the front 30

wall of the drum.

For the purpose of tumbling the clothes inside the drier, there is provided a plurality of shelves 67 which are disposed longitudinally in the drier and extend radially inwardly from the side wall 35 of the drum. These shelves may be secured in any convenient manner, as by welding, to the drum.

The drum 63 is rotated by means of a spider assembly 68 which has arm members 68a, 68b, 40 and a third arm (not shown). The hub portion of the spider 68 has a central aperture receiving a drive shaft 12 in rigid driving engagement. The arms of the spider assembly 68 are secured to the drum by means of bolts 69 through the side walls of the drum and rivets 70 through the 45rear wall thereof.

The drive shaft 12 is journaled in a sleeve bearing 73 which is disposed in a tubular guide member 74 secured at the upper end of a support structure 75. The support structure 75, as best 50 seen in Figure 4, comprises elongated upstanding plates 77 of generally rectangular configuration which are secured to define a box-like support structure. At its lower end, the support structure 75 has inturned leg portions 76 which are 55 secured, as by welding, to the base of the cabinet.

The drive shaft 72 is rotated by means of a pulley 78 (Figure 3) which is driven through a V-belt 79 from a small pulley 80, which is inte- 60 grally formed with a large pulley 83 and freely journaled on a shaft 81. The shaft 81 is secured to a bracket 84 supported from the support structure 75.

In this invention, the air which is circulated 65 through the drum is directed into and out of the drum through the annular opening in the rear wall thereof. To obtain this circulation the peripheral wall of the drum is imperforate and the front wall of the drum is sealed to the front wall 70 of the cabinet. The peripheral edge of the drum is also sealed to establish a circulation of air into and out of the drum through the rear wall thereof and to prevent cool or unheated air from passing into the drum around the edge thereof. To ef- 75 which furnishes a supply of radiantly heated air.

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fect this sealing action, there is provided a bulkhead 90, Figures 3 and 4, which extends substantially from the base of the cabinet to the upper end of the drum and has an upper semi-cylindrical surface which corresponds to the outline of the rear wall of the drum but is slightly larger than the diameter of the drum. A band 91 is secured to the rearmost edge of the side walls of the drum and has a portion projecting longitudinally away from the drum for close contact against the bulkhead 90. Thus, a substantial seal is effected around the periphery of the drum.

The rear wall of the drum comprises a central circular disk portion 92 which has an inturned flange portion 93 secured around the hub portion of the spider 68. A ring-like screen 94 covers the back wall of the drum between the side walls and the central disk portion 92. The outer end of this screen member may be disposed between the band 91 and the side walls of the drum. It will be recognized that there is thus provided on the rear wall of the drum an annular outer screen ring which will permit the entrance of heated air to the rear portion of the drum.

Heated air is directed into the rear of the drum by means of a duct 95 which is disposed in a substantially vertical direction in the cabinet along one side thereof, as seen in Figures 2 and 3. At the upper end, the duct 95 is provided with a tubular portion 95a which has a telescoping engagement with a circular flange 96 in the bulkhead 90. At its lower end, the duct 95 communicates with the combustion chamber 98 which has walls diverging toward the opening in the lower end of the duct 95. A substantially cylindrical guide tube 100 is secured around the combustion chamber 98 at the lower end of the bulkhead by means of an angle brace 101. The guide tube 100 encircles the combustion chamber 98 and forms an air intake spaced forwardly of the bulkhead 90, directing air forwardly along the outer wall of the combustion chamber 98 and into the forward end thereof, and with said combustion chamber forms an air tunnel extending beneath and to one side of the drier drum and is intersected by the extended lower margins thereof. Connectors 102 hold the combustion chamber 98 in position with its rearward end disposed in a flanged portion 102 of the duct 95. The combustion end 104 of a typical gas burner 105 is disposed in the combustion chamber 98 and has a connection 109 at its forward end for communication through a main supply valve [] [with a source of gas.

The control and igniter circuit for the gas burner 105 and the piping connections thereto, as well as the control circuit for the motor 85, door switch 61 and the other electrical parts of device are not herein shown or described in detail since they form the subject matter of a divisional application Serial No. 208,708, filed January 31, 1951.

It is to be noted in Figures 2 and 3 that an opening 107 of substantially rectangular configuration is provided in the bulkhead 90 directly adjacent one wall of the flue or duct 95. Thus, the air immediately adjacent the duct 95 will be heated by radiation from the duct and will move through the opening 107 into the rear portion of the drum. Therefore, it will be recognized that heated air is provided to the rear end of the drum not only through the opening defined by the flange 96 which communicates directly with the duct 95, but also through the opening 187

A support structure is provided for the duct 95 in the form of two side plates [11] and [12, Figure 3, and a rear plate 113 secured together to form a three-sided, generally vertical, support structure. The flat plate 113 is provided with an 5 opening which is covered by an arcuate cover member 115 secured to the plate 113. A lid portion 115a, Figure 3, covers the upper end of the member 115. A recess portion 114, Figure 2, in the forward portion of the duct maintains the 10 duct in spaced relation behind the bulkhead, while a pair of spacer elements 116 secured to the rear wall 113, have arcuate contact surfaces which bear against the duct and urge it against the bulkhead.

It is a feature of this invention that a definite portion of the air in the drum which has been used for drying the clothes is drawn therefrom and recirculated back through the drum to an opening in the rear wall thereof. It will be 20 understood that since, in drying the clothes, the air picks up a good deal of moisture and lint, it is not possible to recirculate all of the air which is exhausted from the drum. It has been found that if approximately one-third of the air is re- 25 circulated through this drum, a maximum effec-

tiveness of operation can be attained.

A blower 120, Figure 3, is mounted on the rear face of the bulkhead 90. This blower draws air out of the drum through an opening 121 in the 30 bulkhead. A substantially rectangular duct 122 is secured to the back of the bulkhead enclosing the blower 120. This duct has a substantially arcuate configuration conforming to the configuration of the upper portion of the bulkhead. 35 At the upper end of the duct 122, the discharge flue 14 extends outwardly through the cabinet to permit a portion of the recirculated air to escape through the flue. As best seen in Figures 4 and 5, a scoop-like member 124 extends substantially 40 across duct 122 for intercepting a portion of the air and directing it outwardly through the flue 14.

Another portion of the air passes around the end of the scoop 124 and is directed by means of a baffle 125 through an opening 126 in the 45 bulkhead 90 which leads to the drum. The blower 120 has a shaft 128 which is rotated by means of a pulley 129 and the V-belt 86 which

is driven from the motor 85.

The duct 122 extends upwardly from the 50 blower 120 transversely across the top of the bulkhead 122 and conforms generally to the form of the top portion thereof and has communication at its end opposite said blower with a chamber or conduit 130, which encircles the duct 95. 55 The chamber 130 is defined by the enclosing walls III, II2 and II3. Air radiantly heated by the duct 95 flows upwardly along this chamber 130 through the opening 126 into the drier drum through the rear wall thereof by convection cur- 60 rents and the aspirating effect of the air under pressure from the blower. Thus, air is drawn from the rear portion of the drum through the opening 12! and is circulated through the duct 122. A portion of the air is directed out of the 65 flue 14, while another portion, possibly one-third thereof, is directed into the drum through the opening 126 in the rear wall of the bulkhead.

In order to illuminate the inside of the washing machine to facilitate removal of dry clothes 70 therefrom, there is provided in the wall of the bulkhead directly opposite one of the screen portions of the drum, a window 130', Figure 4, which has a lamp bulb 131 positioned in close relation thereto. The bulb is mounted in a socket 133 75 ing from said blower communicating with another

which is supported from the wall of the upright support member 113.

From the above description, it will be apparent that the present invention provides an extremely compact, efficient clothes drier of the household type. The efficient and economical operation of the machine is likewise coupled with a very high degree of safety.

We claim as our invention:

1. In a clothes drier, a cabinet having a front wall having a clothes receiving opening therein and a door closing said opening, a drier drum rotatably mounted within said cabinet and having an imperforate cylindrical wall, a front wall having a clothes receiving opening therein confronting said door, means sealing said front wall of said drum to said front wall of said cabinet on the outside of the clothes receiving opening therein, said drum also having a rear wall having an annular air circulating opening therein, a bulkhead extending along said rear wall of said drum and having a plurality of air circulating openings therein in communication with said annular opening in said rear wall of said drum, means sealing said rear wall of said drum to said bulkhead adjacent the margin thereof, a blower on said bulkhead communicating with one of said air circulating openings in said bulkhead, an exhaust duct leading from said blower out through a wall of said cabinet, an inlet air duct extending vertically along said bulkhead and communicating with the interior of said drum through another of the openings in said bulkhead, a motor within said cabinet beneath and to one side of said drum, means driven by said motor for rotatably driving said drum and blower, and the intake for said intake duct extending along said cabinet beneath said drum on the opposite side of said drum from said motor and having communication with said intake air duct at the lower end thereof.

2. In a clothes drier, a cabinet having a front wall having a clothes receiving opening therein and a door closing said opening, a drier drum rotatably mounted within said cabinet and having an imperforate cylindrical wall, a front wall having a clothes receiving opening therein confronting the clothes receiving opening in said cabinet, means sealing said front wall of said drum to said front wall of said cabinet on the outside of said clothes receiving opening, said drum also having a rear wall having an annular air circulating opening therein; a bulkhead extending along said rear wall of said drum and having a plurality of air circulating openings therein in communication with said annular opening in said bulkhead, means sealing said rear wall of said drum to said bulkhead adjacent the peripheral margin of said drum, an intake air duct extending vertically along said bulkhead and communicating with one of said air circulating openings therein, said intake air duct having an opening at the lower end thereof and an intake extending therefrom along one side wall of said cabinet beneath said drum, heating means in communication with said intake, a chamber extending vertically along said intake air duct and spaced therefrom, an exhaust blower in communication with another opening in said bulkhead, an air duct extending from said exhaust blower transversely along said bulkhead and communicating with said chamber extending along said intake air duct, an exhaust air duct leading from said air duct leading from said blower out through a wall of said cabinet, said air duct leadof said openings in said bulkhead, and deflecting means in said last mentioned air duct deflecting only a part of the air exhausted from said drum out through said exhaust duct and recirculating a part of the air back into said drum, and also directing air from said chamber into said drum.

3. In a clothes drier, a cabinet, a drier drum rotatably mounted within said cabinet and having a front wall having a clothes-receiving opening therein, confronting a front wall of said cabi- 10 net and sealed thereto, said drum also having a rear wall having an annular air circulating opening therein, a bulkhead extending along the rear wall of said drum and sealed thereto, a blower on said bulkhead communicating with said annu- 15 lar opening in said drum, an exhaust duct leading from said blower out through a wall of said cabinet, an inlet opening in said bulkhead communicating with said annular opening in said drum, an intake air duct extending along said bulkhead 20 and communicating with said inlet opening, said drum having a diameter substantially equal to the inside dimensions between the side walls of said cabinet and slightly less than the vertical height of said cabinet, and the intake for said intake 25 duct extending along one side wall of said cabinet beneath said drum and intersected by a horizontal line drawn tangent to the lower margin of said drum.

4. In a clothes drier, a cabinet, a drier drum 30 rotatably mounted in said cabinet and having a front wall having a clothes-receiving opening therein confronting a front wall of said cabinet and sealed thereto, a door in said front wall of said cabinet closing said opening and affording 35 access thereto, said drum having a rear wall having an annular air circulating opening therein, a bulkhead extending along the rear wall of said drum and sealed thereto, a blower mounted on said bulkhead and confronting said annular open- 40 ing in said drum, an exhaust duct leading from said blower out through a wall of said cabinet, an inlet opening in said bulkhead confronting said annular opening in said drum, a duct for heated air extending along the rear of said bulkhead and conducting the heated air to said inlet opening, said drum having an outside diameter slightly less than the inside dimensions of said cabinet and taking up a greater part of the space between the side and top and bottom walls of said cabinet, 50and an air intake tunnel connected with said duct for heated air and extending along one side wall of said cabinet beneath and to one side of said drum and intersected by the extended lower margins thereof and opening to the front wall of 55said cabinet.

5. In a clothes drier, a cabinet, a drier drum rotatably mounted in said cabinet and having a front wall having a clothes-receiving opening therein and confronting the front wall of said cabinet and sealed thereto, a door in said cabinet closing said opening and affording access thereto, said drum having a rear wall having an annular opening therein, a bulkhead extending vertically along the rear wall of said drum and sealed to the periphery thereof, a blower mounted on said bulkhead and communicating with said annular opening in said drum, an exhaust duct leading from said blower out through a wall of said cabinet, an intake opening in said bulkhead spaced 70 from said blower and confronting said annular opening in said drum, an intake air duct extending vertically along one side of the rear wall of said bulkhead, the outside diameter of said drum being slightly smaller than the inside dimensions 75

of said cabinet and said drum taking up a greater part of the space within said cabinet, a heating element extending along one wall of said cabinet to one side of said drum and intersected by a horizontal plane extending along the lower margins of said drum, and an air intake tunnel surrounding said heating element and communicating with said air intake duct and opening along said heating element toward the front of said cabinet.

6. In a clothes drier, a cabinet, a drier drum rotatably mounted within said cabinet and having a front wall having a clothes-receiving opening therein confronting a front wall of said cabinet and sealed thereto, a door in said cabinet closing said opening to said drum and affording access to said opening, said drum having a rear wall having an annular air circulating opening therein, a bulkhead extending along the rear wall of said drum and sealed thereto, a blower on said bulkhead communicating with said annular opening in said drum, an exhaust duct leading from said blower out through a wall of said cabinet, an inlet opening in said bulkhead confronting said annular opening in said drum and spaced from said blower, an air intake duct communicating with said intake opening and extending vertically along the rear of said bulkhead adjacent one side thereof, a motor mounted on the bottom of said cabinet toward one side wall thereof and intersected by the extended lower margins of said drum, drive connections from said motor to said drum and blower, for rotatably driving said drum and blower, and an intake tunnel for heated air extending along the opposite side wall of said cabinet from said motor beneath said drum and intersected by the laterally extended lower margins thereof, said intake tunnel opening to the front of said cabinet and drawing fresh air into said cabinet and circulating it over said motor to the front of said bulkhead.

7. In a clothes drier, a cabinet, a drier drum rotatably mounted within said cabinet and having a front wall having a clothes-receiving opening therein confronting a front wall of said cabinet and sealed thereto, a door in said cabinet closing said opening and affording access to said drum, said drum having a rear wall having an annular opening therein, a bulkhead extending along the rear wall of said drum and sealed thereto, a blower mounted on said bulkhead and communicating with said annular opening in said drum, an exhaust duct leading from said blower out through a wall of said cabinet, an inlet opening in said bulkhead confronting said annular opening in said drum and spaced from said blower, an intake air duct communicating with said intake opening and mounted on the rear of said bulkhead and extending vertically along one side thereof, a motor extending along one wall of said cabinet beneath said drum and intersected by the extended lower margins of said drum, drive connections from said motor to said drum and blower for rotatably driving said drum and blower, a heating element extending in the space beneath said drum along the opposite side of said cabinet from said motor, and an air intake tunnel communicating with said heating element and said air intake duct and opening to the front of said cabinet and intersected by the extended lower margins of said drum.

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