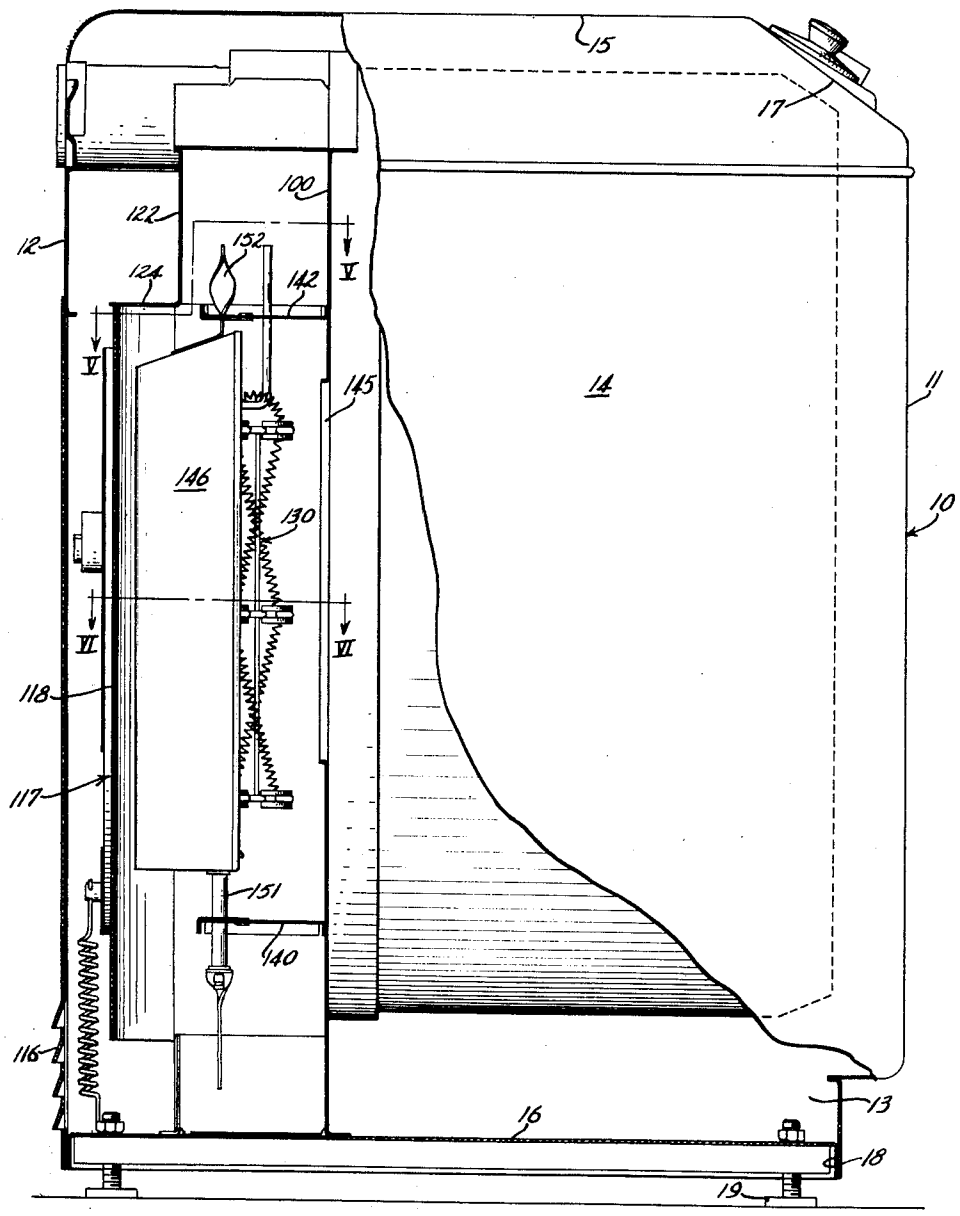
Dec. 2, 1952 P. E. GELDHOF ET AL 2,619,734

ELECTRICALLY HEATED DRIER

Filed May 4, 1949 6 Sheets-Sheet 1

Fig. 1



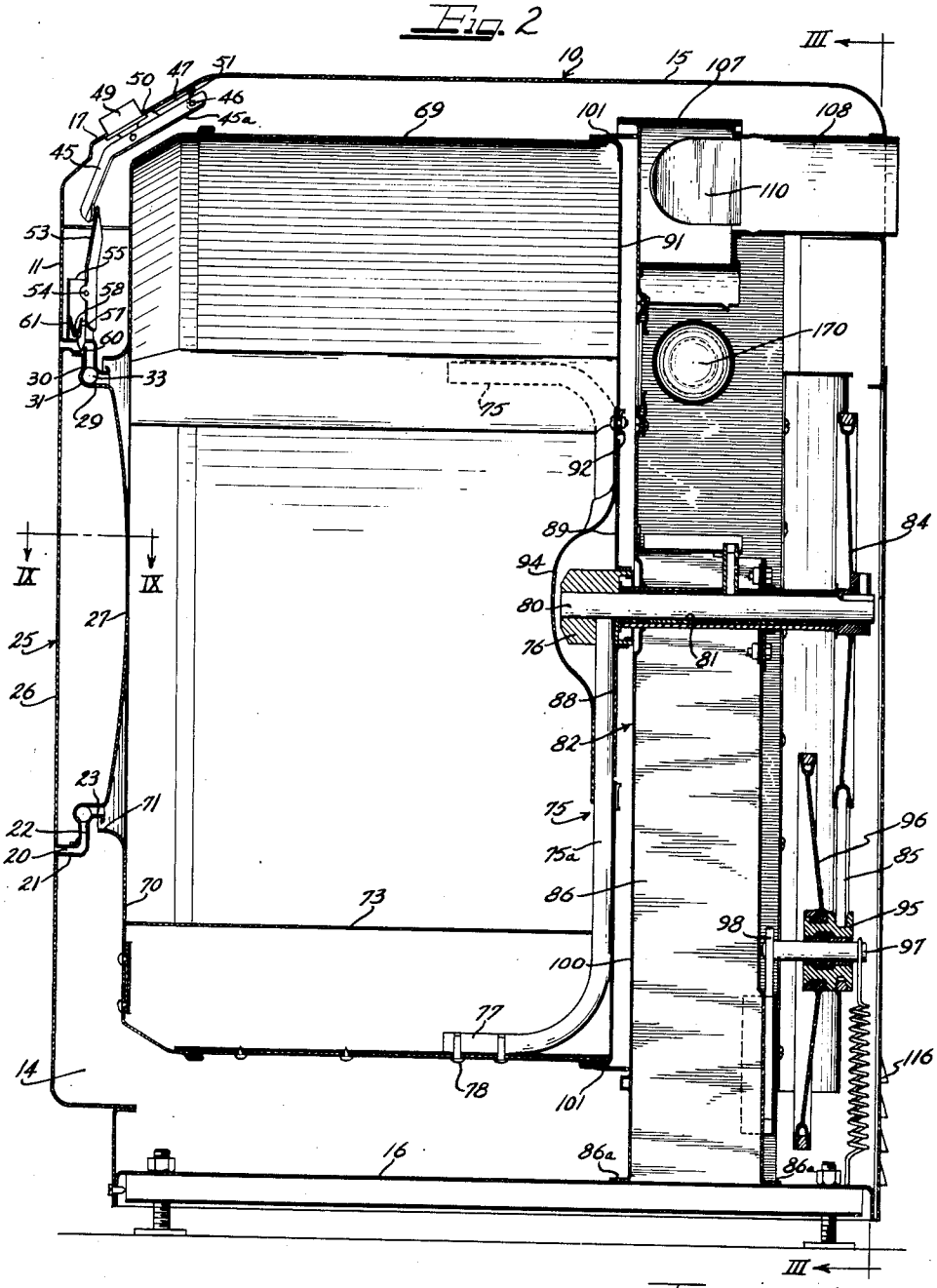
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ELECTRICALLY HEATED DRIER

Filed May 4, 1949 6 Sheets-Sheet 2

Fig. 2



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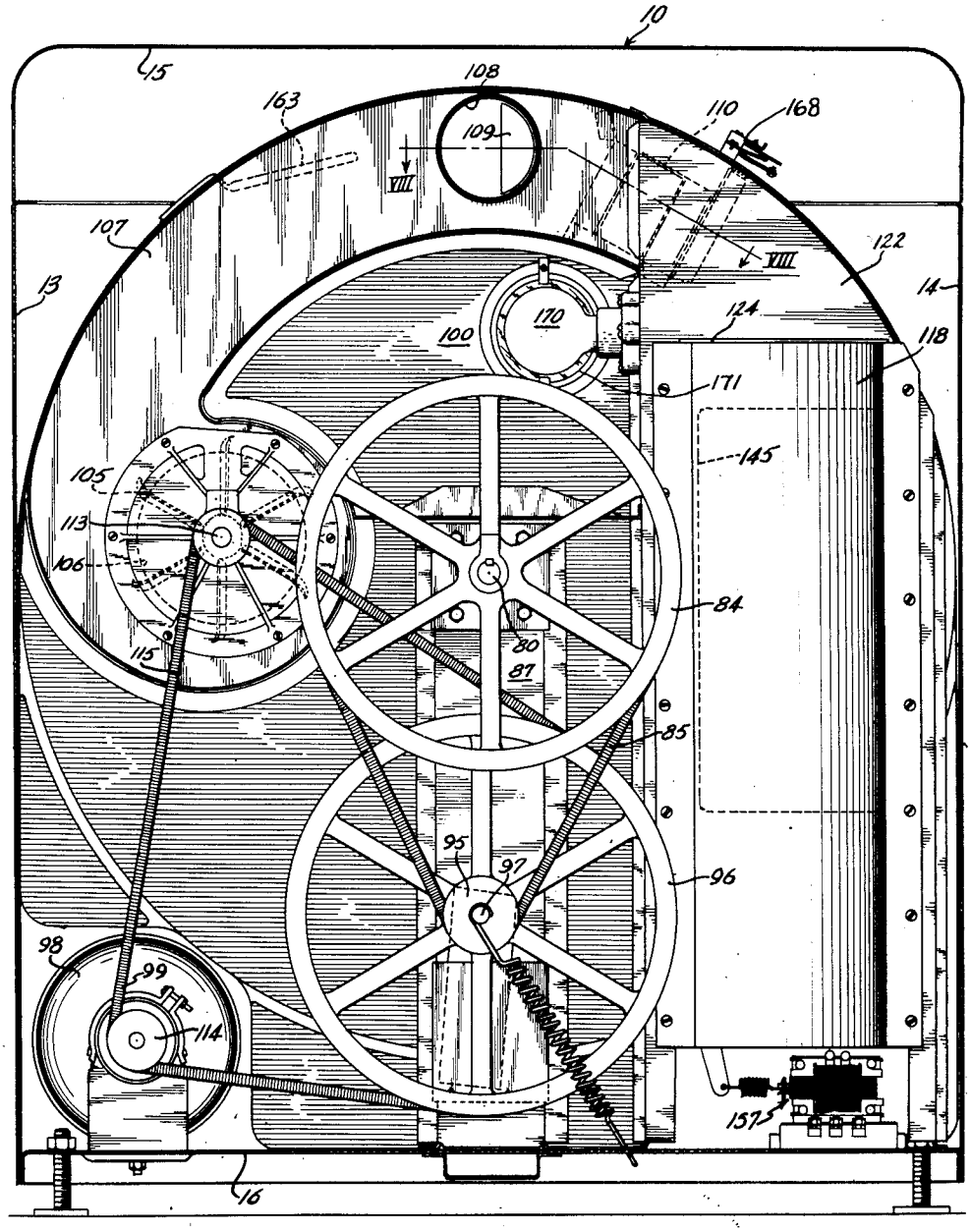
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ELECTRICALLY HEATED DRIER

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Fig. 3



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ELECTRICALLY HEATED DRIER

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Fig. 4

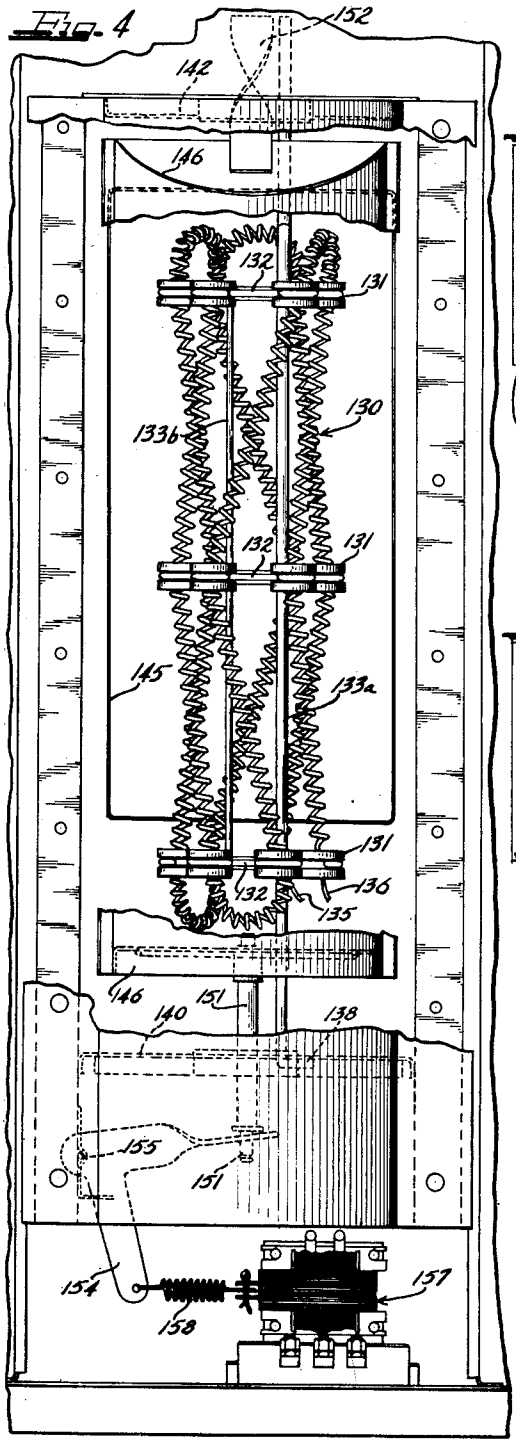


Fig. 5

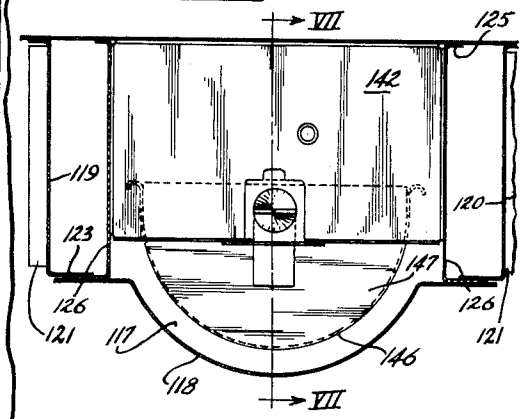
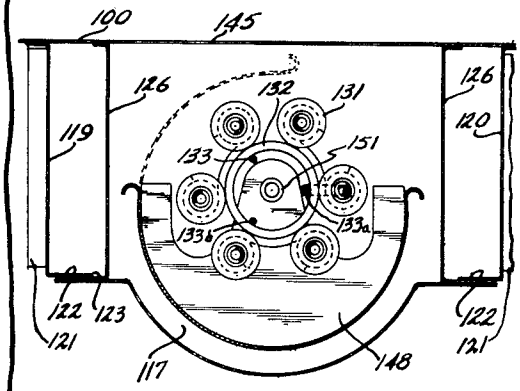


Fig. 6



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ELECTRICALLY HEATED DRIER

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Fig. 9

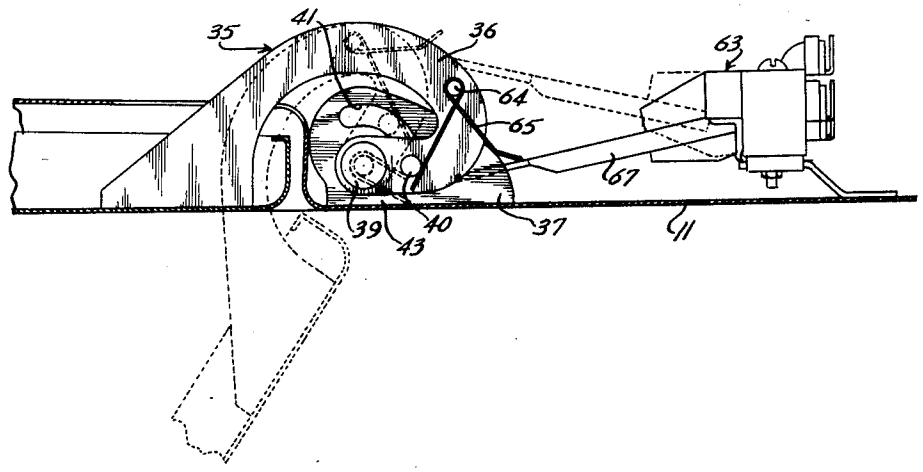


Fig. 8

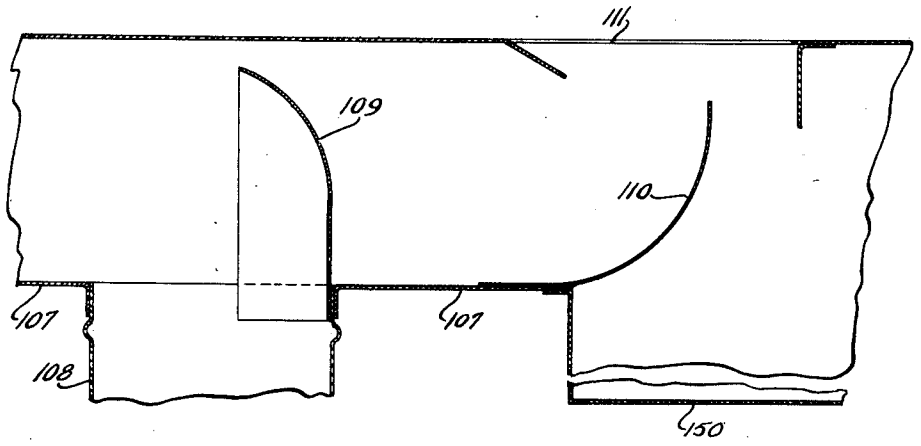
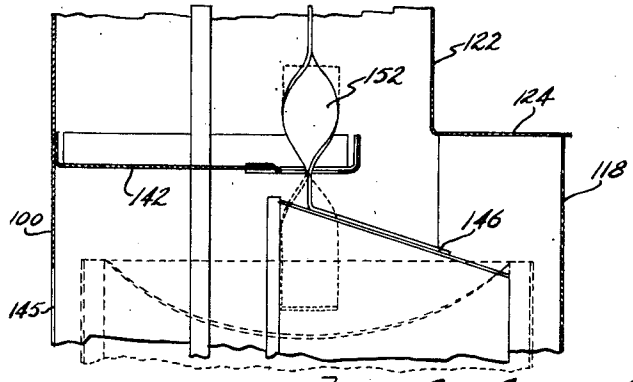


Fig. 7



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ELECTRICALLY HEATED DRIER

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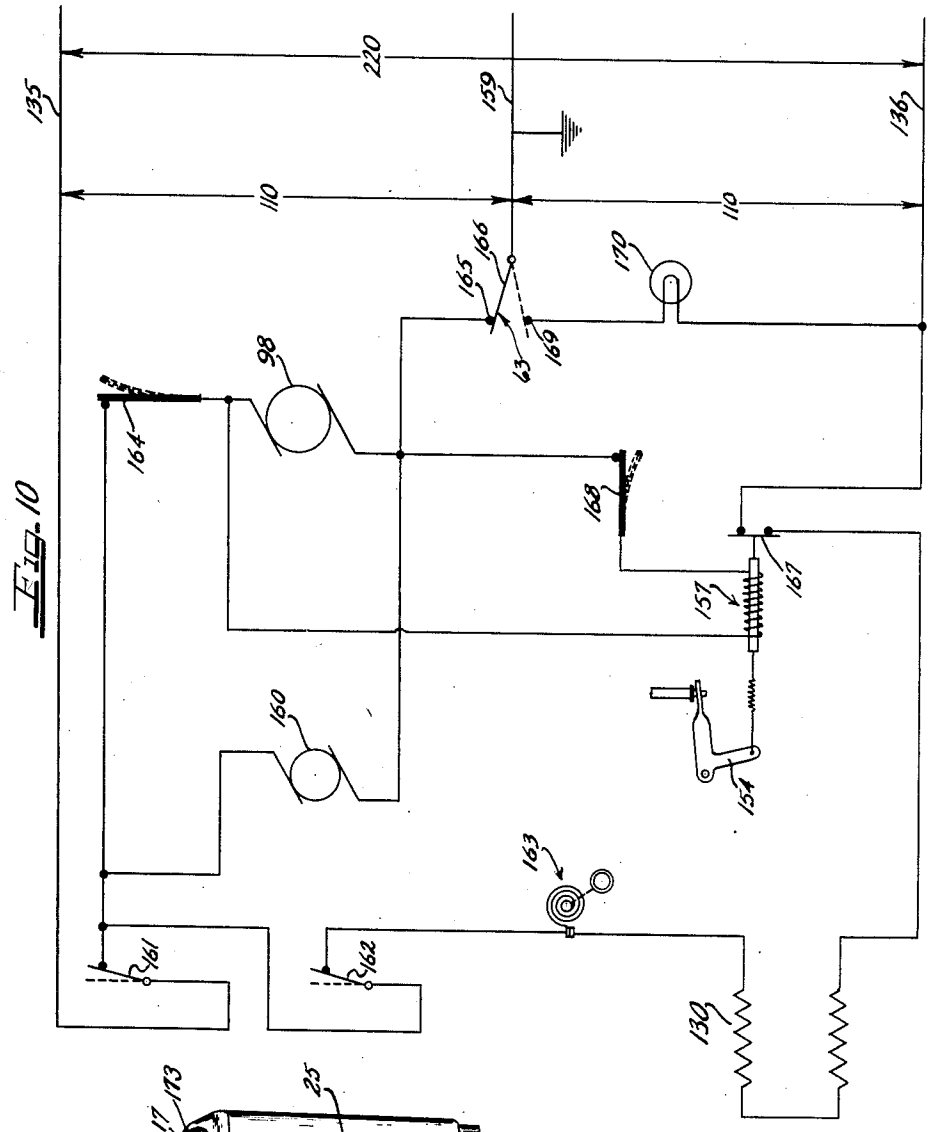


Fig. 10

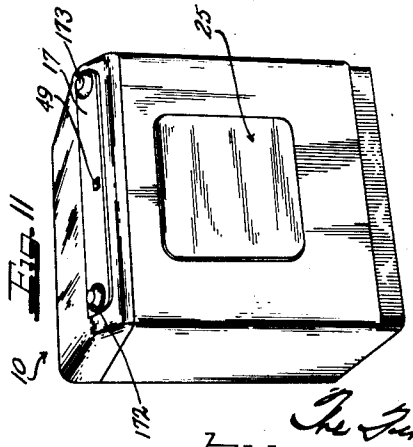


Fig. 11

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Patented Dec. 2, 1952

2,619,734

UNITED STATES PATENT OFFICE

2,619,734

ELECTRICALLY HEATED DRIER

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Application May 4, 1949, Serial No. 91,358

14 Claims. (Cl. 34—44)

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This invention relates to an electrically-heated drier, and more particularly, to a small drier of the type where clothes are tumbled in a rotating drum which is provided with heated air by means of an electric element mounted within the casing of the drier.

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

Another object of this invention is to provide a novel control circuit for a drier featuring improved means for coordinating the starting and stopping of the drum, the circulation of air through the drum, the energization of the heating element and the control of the temperature of the air in the drum.

Another object of this invention is to provide a novel means for regulating the relative quantities of fresh air and of recirculated air that is circulated through the drum.

A still further object of this invention is to provide in a drier, novel means for heating air whereby the articles in the drier are heated directly from the electric element by radiant heat emitted therefrom.

A still further object of this invention is to provide novel means for shielding the clothes in the drier from the radiant heat emmited from the electric heating element when the drum is stopped and the clothes are in a stationary position therein.

According to the general features of this invention, there is provided a drum mounted in a box-like casing for rotation about a substantially horizontal axis. Air is circulated through the drum by means of a blower that draws air out of the drum through an opening in the back wall thereof and redirects a portion of the withdrawn air back into the drum while expelling the other portion of the air to the atmosphere. The air currents set up by the blower in the drum also cause fresh air to be drawn into the casing through inlet louvers, then over an electric heating element and finally into an opening in the rear wall of the drum for circulation over the clothes being dried therein and finally for withdrawal from the drum by means of the blower. The electric coils are so located that radiant heat therefrom is directed into the drum for direct drying of the clothes therein.

A special feature of this invention is the provision of a rotatable shield that is arranged for automatic movement into a position between the drum and the heating coil when the drum is stopped, thus preventing overheating and possible scorching of the clothes in the drum.

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Other and further features, objects and advantages of the present invention will be obvious to one skilled in the art from the following detailed description of the annexed sheets of drawings.

On the drawings:

Figure 1 is a side elevational view of a drier constructed in accordance with the teachings of the present invention with part of the case broken away to disclose the construction;

Figure 2 is a vertical sectional view of the drier of Figure 1 taken on the longitudinal axis of the drier;

Figure 3 is a vertical sectional view looking at the rear of the drum and taken on line III—III of Figure 2;

Figure 4 is a fragmentary elevational view of the right-hand portion of the machine illustrated in Figure 3 with parts of the casing broken away to more clearly illustrate the heating coil and its mounting;

Figure 5 is a horizontal sectional view taken substantially on line V—V of Figure 1;

Figure 6 is a horizontal sectional view taken on line VI—VI of Figure 1 showing the shield member featured in this invention in a revolved position in dotted line;

Figure 7 is a fragmentary vertical sectional view taken on line VII—VII of Figure 5;

Figure 8 is a horizontal sectional view taken substantially on line VIII—VIII of Figure 3;

Figure 9 is a fragmentary horizontal sectional view on line IX—IX of Figure 2;

Figure 10 is a schematic wiring diagram of the control circuit; and

Figure 11 is an isometric view of a clothes drier embodying the novel features of the present invention.

A drier embodying the teachings of the present invention is shown in Figures 1, 2 and 3 and includes a casing 10 having a front wall 11, a rear wall 12, side walls 13 and 14, a top panel 15, and a base or bottom panel 16. These wall members may be secured together or integrally formed and may conveniently have rounded marginal edges with the portion of the casing between the top panel and the front wall being slanted to provide an inclined surface 17.

The base 16 is provided with a marginal skirt portion 18 which may be secured as by welding to the adjacent side, front and end wall panels. A plurality of foot members 19, having threaded shanks, are engaged in the bottom wall 16 for the purpose of adjustably supporting the drier in a level position.

The front wall 11 has a centrally located

opening 20 defined by a flange 21 which extends around the opening and is bent at its inner end to define a shoulder portion 22 and a second flange 23. A door assembly 25 (Figure 2) is mounted in the opening in the wall 11 and comprises a front wall panel 26 and a rear wall 27 which are secured together and are spaced apart, with the front wall 26 flush, in its closed position, with the front wall 11 of the casing. The door has a side wall portion 29 and an offset shoulder 30 which cooperate to define a groove 31 in which is disposed a resilient ring 33. When the door is in its closed position, the ring 33 is in abutting, sealing contact with that portion of the casing between the shoulder 22 and the wall portion 23.

The door is mounted on two spaced apart, concealed hinge assemblies 35 (Figure 9). Each hinge assembly comprises a hook-shaped plate 36 secured to the inside of the door 25 and a plate 37 secured to the inside of the front wall of the cabinet 11. The plates 36 and 37 are pivotally secured together by means of a pin 39. A stop pin 40, carried by the plate 36, is movable in an arcuate slot 41 of the plate 37. A spring 43, disposed about the pin, has one leg bearing against the front wall of the cabinet and another leg bearing against the stop pin 40 and is effective to urge the door to an open position when the latching means, to be described hereinafter, is released.

The door is opened by means of a lever 45 (Figure 2), which is pivotally mounted on a pin 46 disposed in a bracket 47 secured to the inclined wall portion 17 of the casing. The lever 45 is actuated by a push-button 49 projecting through an opening 50 in the wall portion 17. A spring 51 is disposed about the pin 46 and has one leg abutting the inner wall of the cabinet and the other leg abutting a flange portion 45a of the lever 45 tending to urge the lever clockwise to move the push-button 49 to its initial position.

A second lever 53 is pivotally mounted on a pin 54 which is secured in an angle member 55 mounted on the casing. When the lever 45 is pivoted counterclockwise upon the pin 46 by means of the push-button 49, the lever 53 is urged in a clockwise direction about the pivot pin 54 for contacting a dog 57 which is pivotally mounted on a pin 58 secured to the angle member 55. As the dog 57 rotates counterclockwise about the pivot pin 58, its lower end moves out of contact with an abutment arm 60 projecting above the upper end of the door 25. A spring 61, having one leg abutting the flange of the angle member 55 and another leg tending to urge the dog 57 in a clockwise direction, resists the pivoting action of the lever 53. When the door is closed, the spring 61 moves the dog 57 to a latching position and, through the linkages 53 and 45, help the spring 51 to urge the push-button 49 toward its initial position.

When the door of the drier is open for insertion or removal of clothes therefrom, it is desirable that the drum stop rotating and that the timing cycle be temporarily interrupted. To obtain this effect, a control switch assembly 63 (Figure 9) is mounted on the inner side of the front wall of the drier. This control switch has various leads and switch elements incorporated therein which are arranged for connection in a control circuit which will be described hereinafter. As is seen in Figure 9, one of the hinge assemblies 35 carries a pin 64 around which a spring 65 is disposed. One leg of the spring 65 abuts the stop pin 40 while the other leg bears

against a pivoting lever 67 which is arranged to control the operation of the switch 63. Thus, it is seen, in dotted lines in Figure 9, that when the door is moved to an open position, the switch is urged by a spring (not shown) in the switch assembly 63 to a circuit-breaking position. When the door is closed, the spring 65 contacts the lever 67 and moves the contacts of the switch 63 to a closed position.

Referring to Figure 2, it is seen that a drum 69 is mounted inside of the casing 10 for rotation about a horizontal axis. This drum is of generally cylindrical shape having a front wall 70 with an opening 71 therein defined by an outturned ledge portion into which the flange portion 23 of the front wall telescopes. The rear wall 27 of the door 25 also, in its closed position, extends into the opening 71. A plurality of radially extending vanes 73 extends longitudinally along the inner wall of the drum 69. These vanes contact the clothes in the drier and raise them along the side of the drier and then drop them down the center causing a tumbling action of the clothes. The drum is mounted on a spider assembly 75 which includes three arm members 75a that extend radially outwardly from a hub 76 in which they are secured and have bent outer end portions 77 secured as by rivets 78 to the wall of the drum. The hub 76, carrying the three arms 75a, is secured as by a key to a shaft 80 which is journaled in a bearing sleeve 81 disposed at the upper end of a support pedestal 82. At one end, the shaft 80 is keyed to a pulley 84 which is driven through a V-belt 85 in a manner to be described hereinafter.

The support pedestal 82 comprises elongated upstanding plates 86 which are of generally rectangular configuration and are secured together to define a box-like support structure. This support structure may be secured in any siutable manner to the bottom wall 16 of the drier casing, as by foot members 86a.

A substantially circular disk 88 is secured, as by welding, to the rear portions of the three arms 75a to form the relatively small rear wall for the drum. The disk 88 cooperates with the casing of the drum to define a large annular opening extending around the disk. A screen member 91 is disposed over this annular opening being secured thereon by any suitable means as by clips 92. This large annular opening covered by the screen 91 is, of course, used to introduce heated air to the drum and to withdraw air therefrom.

A cup-like shield 94 is secured to the disk 89 forming a protection member over the hub 76 to prevent clothes from being wound on the hub 76.

The pulley 84 is driven by a V-belt 85 from a small pulley 95 which is integrally formed on the hub portion of a large pulley 96 and is freely journaled on a shaft 97. The shaft 97 is secured to a bracket 98 which is supported from the support pedestal 82.

In this invention, the air which is circulated through the drum is directed into the drum through the large annular opening in the rear wall thereof. It is, therefore, advantageous to seal the peripheral edges of the drum in order that no cool air or unheated air which is in the casing around the drum be allowed to pass into the drum around the edges thereof. To effect this sealing action, there is provided a bulkhead 100 (Figures 2 and 3) from the base of the cabinet to substantially the upper end of the drum having 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 101 is secured to the rearmost edge of the side wall of the drum and has a rear portion projecting longitudinally away from the drum for close contact against the bulkhead 100. Thus, a substantial seal is effected around the periphery of the drum. Any air which is introduced into the drum must, therefore, be directed through the bulkhead first.

To promote circulation of air through the drum and to cause the recirculation of air into the drum, there is mounted on the rear face of the bulkhead 100 a blower 105 (Figure 3). This blower draws air out of the drum through an opening 106 in the bulkhead. A substantially rectangular duct 107 is secured to the back of the bulkhead enclosing the blower 105. This duct has a substantially arcuate configuration conforming to the configuration of the upper portion of the bulkhead. At the upper end of the duct 107, a discharge flue 108 extends outwardly through the rear wall of the cabinet to permit a portion of the recirculated air to escape through the flue. As best seen in Figures 3 and 8, a scoop-like member 109 extends substantially across the duct 107 for intercepting a portion of the air and directing it outwardly through the flue 108.

Another portion of the air passes around the end of the scoop 109 and is directed by means of a baffle 110 through an opening 111 in the bulkhead 100 which leads to the drum.

The blower 105 has a shaft 113 which is rotated by means of a pulley 114 through a V-belt drive 115. The pulley 114 is keyed to the shaft of the motor 98.

As seen in Figure 1, air enters the casing of the drier through a series of louvers 116 disposed in the lower portion of the rear wall of the drier. To support a conduit for heated air, there is provided a U-shaped support plate including a pair of spaced walls 119 and 120 which extend from the vicinity of the top of the drier casing to the lower wall 16 and are secured thereto as by welding or riveting foot portions 121 thereon. The side walls 119 and 120 are joined by a rear wall 122 which has an opening 123 therein. A fragmentary cylindrical cover 118 is secured to the U-shaped support plate opposite the opening 123. A bent-up lip 124, Figure 7, of the wall 122 is disposed across the top of the cover 118. The U-shaped support plate has flanges 125 (Figure 5) welded to the bulkhead 100. A pair of plates 126 are spaced from the side walls 119 and 120 and, together with the cover 118, define a heated air conduit.

The air in passing upwardly through this conduit passes over an electrical heating element 130 which is mounted therein. The electrical heating element 130 is wound between a plurality of spools 131 which are secured about spacer rings 132. Vertical rods 133, 133*a*, and 133*b* are welded to the spacer rings 132 and thus hold these rings in spaced relation and provide a unitary electric heating element. This heating element may have leads 135 and 136 for connection to a source of current.

The rod 133*a* is larger than the other two rods and extends below the heating element assembly proper and has a foot portion 138 which is secured to a bracket 140 supported from the bulkhead wall. At its upper end, the rod 133*a* has an offset portion which projects through a second bracket 142 which is also secured on the bulkhead 100. Thus, the electrical heating element 130 has a unitary structure mounted in a substantially vertical position on brackets extending from the rear wall of the bulkhead 100.

The bulkhead 100 is provided with an opening 145 directly adjacent the heating element 130 so that the clothes in the drum may be dried by radiant heat directly emanating from the unit 130.

In order to prevent scorching of the clothes by this direct radiant heat when the drum is idle and the clothes are no longer tumbling, there is provided a rotatable shield 146 which has, as best seen in Figures 5 and 6, a substantially semi-cylindrical form. At its upper end, the shield 146 has a closure plate 147 secured thereto and at its lower end, a plate 148 is secured across the shield and has central opening 150 into which is secured a depending rod 151 (Figure 1), which is slidably journaled in an aperture in the support bracket 140. The upper closure plate 147 carries a twister element 152 which has a twisted blade portion extending through a slot in the bracket 142.

Since the shield 146 is provided with a twister element 152 at its upper end, it will be readily recognized that raising and lowering of the shield will cause a rotating movement thereof about an axis defined by the rod 151. To impart upward movement to the shield 146, there is provided a bell crank 154 (Figure 4) which is pivotally mounted on a pin 155 and has one arm arranged to be actuated by a solenoid-operated control mechanism 157 through a spring element 158 and the other arm apertured to receive the lower end of the rod 151. The spring element 158 is sufficiently heavy to pivot the bell crank upon actuation of the solenoid-operated control mechanism 157 and yields when the shield 146 is at the extreme ends of its paths of travel, to serve as a cushioning element and to reduce noise in the operation of said shield.

In Figures 1 and 6, the shield 146 is shown in its upper position with the shield disposed on the rear side of the heating element 130 permitting radiant heat from the element to pass into the drum. When the solenoid in the switch 157 is deenergized, the shield drops by gravity and the twister arm 152 will cause the shield 146 to be rotated counterclockwise, as seen in Figure 6, to the dotted position. In this position, it is seen that more than half of the opening 145 in the bulkhead 100 is cut off from the radiant heating effect of the element 130.

As seen in Figures 1 and 3, the upper end of the wall 122 provides an upper end portion of the conduit and has a flat flange 124 which closes the upper portion of the conduit above the fragmental circular shield member 118. Thus, air passing upwardly through the conduit 117 will pass over the heating element 130 and continue in its upward passage into the upper duct defined by the wall 122 and the bulkhead 100. It is to be noted that the wall 122 is offset from the outer wall of the duct 107. However, the two passages merge so that air passing up conduit will be directed through the opening 111 (Figure 8) which leads through the bulkhead and into the drier. Thus, heated air is also directed into the drum at an upper peripheral portion of the rear walls thereof.

It is, of course, obvious that some heated air will pass through the opening 145 directly in front of the heating element 130.

The energization and control circuit of the drier will be best understood by reference to Figure 10 of the drawings. As is well known to

those skilled in the art, it is highly desirable to energize the heating coils of the unit from a relatively high voltage source, but it is also desirable to have the control elements energized from a relatively low voltage source. This may be conveniently had for household use through a conventional three-wire, single-phase power supply as usually furnished by the public utility companies, and so arranged that either 220 volts or 110 volts may be obtained.

As shown in Figure 10, the conventional power supply is indicated by the power supply conductors 135, 136 and 159, the latter being the grounded neutral of the system. It will thus be understood that there is a 220-volt drop between power supply conductors 135 and 136 but only a 110-volt drop between the conductor 135 and the grounded center conductor 159, and 110 volts between the conductor 136 and the grounded center conductor 159.

In addition to the main driving motor 98, an auxiliary timer motor 160 is provided which has associated therewith two timer switches 161 and 162. Even though only diagrammatically illustrated, it is to be understood that the switches 161 and 162 are closed when the timer is adjusted for initiation of its timing operation and are further arranged so that they will open at predetermined later times. The switch 161 is further arranged so that it will remain closed for a predetermined period of time after the switch 162 opens for a reason which will be presently apparent.

A thermostat 163 is provided inside of the withdrawal duct 107 so that it is sensitive to the temperature of the air being withdrawn from the clothes drum. This thermostat member is arranged to be adjustably set to open and close at some predetermined desired temperature level to which the clothes are to be dried.

Referring again to Figure 10, the heating coil 130 is connected across conductors 135 and 136 through timer switch 161 and 162, thermostatic switch 163, and relay switch 167. It will thus be apparent that the heating coil 130 is energized from a 220-volt supply.

The main motor 98 is energized through timer switch 161, a motor safety switch 164 and door switch 63 through its stationary contact 165 and its movable contact 166. It will thus be apparent that the main drive motor is connected across conductors 135 and 159 to be energized from a 110-volt supply. The timer motor 160 is connected in parallel with the main motor 98 and is thus connected from conductor 135 through timer switch 161 and door switch 63 to conductor 159.

The relay or solenoid-operated control member 157 is connected across conductors 135 and 159 through timer switch 161, motor switch 164, a high temperature safety switch 168 and door switch 63. The safety switch 168 may be heat operated bi-metal switch located at the top of the duct 107, as shown in Figure 3, and is set to operate at a higher temperature than the temperature at which the main thermostatic switch 163 operates, to open the circuit to the heating coil 130 where the switch 163 may fail to open. It will thus be apparent that whenever the timer is adjusted to initiate a timing cycle and the door switch 63 is closed, the relay or solenoid-operated control member 157 is energized, thus maintaining its associated relay switch 167 closed, as well as rocking the bell crank member 154 so as to hold the shield 146 in its retracted or non-shielding position.

During normal cyclic operation of the drier, the thermostatic switch 163 will open and close to maintain a preselected desired temperature within the drying drum 69. It will be observed that this in no way effects the operation of either the main driving motor 98 or the timer motor 160.

If, for any reason, the main thermostatic switch 163 fails to open, or if the temperature within the drying drum 69 rises above a predetermined safe temperature for the clothes, the safety switch 168 will open to deenergize the circuit of the heating coil 130 and to permit rotational movement of the shield 146 by movement of the bell crank 154 in a clockwise direction. This removes the heat from the drum and shields the heating coil 130 from radiating any heat directly to the clothes. The main motor 98 and the timer motor 160 remain energized due to the fact that the timer switch 161 and the door switch 63 are still closed.

A further safety provision is provided through the motor switch 164 to shut off operation of the machine in the event the motor becomes overheated. The motor switch 164 may be a bi-metal heat operated switch located at the base of the machine adjacent the motor 98 (not shown). In this event, the motor safety switch 164 opens which deenergizes the relay 157 to open the relay switch 167 of the heating coil circuit. It will also deenergize the main motor 98. The shield 146 will thus rock into its shielding position with an opening of the motor safety switch.

From the above, it will be observed that it is in position to stop the main motor 98 without immediately rotating the shield into its protecting position and also deenergize the heating coil 130.

The door switch 63 is of the single-pole, double-throw type and is so arranged that when the door is opened the movable contact element 166 closes against the lower stationary contact 169 to energize the lamp 170 across the other low voltage line circuit. This light 170 is suitably mounted adjacent a window 171 in the bulkhead and provides illumination for the interior of the drum so as to facilitate the insertion and removal of clothes.

In operating the machine, the main thermostatic switch 163 may be set to the desired temperature under control of a control knob 172, shown in Figure 11 as being located on the outside of the inclined surface 17 of the top panel of the drier casing 10. The timer motor 160 may also be set to operate for the desired time interval, under control of a knob 173 on the inclined surface 17 of the top panel 15. The controlling connections from the knobs 171 and 173 to the thermostatic switch 163 and the timer motor 160 may be of any forms well known to those skilled in the art and are not herein shown or described, since they form no part of my invention.

When the thermostatic switch 163 is set to the required temperature and the timer motor 160 is set to operate for the desired time interval, and the drier drum 69 is filled with clothes, the door 25 may then be closed to close the door switch 63 through the contact 165. The timer being set, the switches 161 and 162 will close. A circuit will then be completed to the timer motor 160 and main motor 98 through the conductor 135 timer operated switch 161 safety switch 164 for the main motor, and to the return through the

door switch 63 and conductor 159. At the same time the heating coil 130 will be energized through the timer switches 161 and 162, the thermostatically operated switch 163 and to the return through the relay switch 167 and conductor 136. The solenoid or the relay switch 167 will be energized to close said switch through the temperature control safety switch 168, herein shown as being connected in parallel with the motor 98.

Thus, assuming the thermostatically operated switch 163 and timer motor are properly adjusted, as soon as the drier door is closed the motor 98 will be rotatably driven to drive the drier drum and the timer motor 160 will rotate to control the cycle of operation of the drier, and the heating coil 130 will be energized.

Upon the completion of the drying cycle the timer switch 162 will first open to break the circuit to the heating coil 130 due to the delayed timing of the opening of the switch 161, and allow the drier drum to cool while still being rotated by the main motor 98. The timer operated switch 161 will then open and disconnect the circuit to the timer motor 160 and main motor 98. If the door should be opened at any time, the door switch 63 will open the circuit through the contact 165, disconnecting the motors 160 and 98 from the main line circuit and also de-energizing the solenoid to the relay 167, causing said relay to open. A circuit will also be completed through the contact 169 to light the light 170.

If at any time, the thermostatic switch 163 should open due to excessive temperatures within the drier drum, the heating coil 130 will be disconnected from the circuit, but the main motor 98 and the timer motor 160 will continue to rotate, rotating the drier drum and circulating air therethrough, preventing overheating or burning of the clothes.

If the thermostatically operated switch 163 should fail to operate in response to excessive temperatures, the safety switch 168 will then open, breaking the circuit to the solenoid and opening the relay 167 to disconnect the heating coil 130 from the circuit.

In a like manner, if at any time the main motor 98 should stop due to overheating, the safety switch 164 will open, disconnecting said motor from the circuit and also de-energizing the solenoid to the relay 167, causing said relay to open and disconnect the heating coil 130 from the circuit.

From the above description, it will be apparent that the present invention provides an extremely economical and efficient clothes drier for household use, as well as other similar purposes, and at the same time, provides a maximum degree of safety both for the operator of the machine and for the clothes or other articles being dried.

We claim as our invention:

1. In a clothes drier, a housing, a drum rotatable in said housing and having an opening at one end, a heating element mounted in said housing adjacent said opening and a shield extending along said heating element in position to normally deflect heat through said opening and mounted for pivotal movement to a position between said heating element and said opening.

2. In a clothes drier, a housing, a drum rotatable in said housing and having an opening at one end, a heating element mounted in said housing adjacent said opening, a shield mounted in said housing for pivotal and vertical slidable movement and extending along said heating element, means holding said shield in position to normally deflect heat through said opening, and means releasing said holding means to allow said shield to move by gravity to a position between said heating element and said opening.

3. In a clothes drier, a housing, a drum rotatable in said housing and having an opening at one end, a heating element mounted in said housing adjacent said opening, a shield extending along said heating element in position to normally deflect heat through said opening and being mounted for pivotal movement to a position between said heating element and said opening, means holding said shield in position to deflect heat through said opening and means for holding said holding means in a holding position and operable to release said holding means to allow said shield to move in response to a temperature rise above a predetermined level in said drum.

4. In a clothes drier, a housing, a drum rotatable in said housing and having an opening at one end, a heating element mounted in said housing adjacent said opening, a shield extending along said heating element in position to normally deflect heat therefrom into said opening and mounted for vertical and rotatable movement to a position between said heating element and said opening by gravity, means holding said shield in an elevated position including a solenoid and means responsive to the stoppage of said drum to break the circuit to said solenoid and release said holding means and allow said shield to drop and pivotally move into position between said heating element and said opening and to deenergize said heating element.

5. In a clothes drier, a housing, a drying drum rotatably mounted in said housing and having an opening at one end thereof, spaced projecting plate members on said housing, a shield mounted in said plate members adjacent the opening in said drum for vertical and rotational movement with respect thereto, one of said plate members having a slot therein, a flat member uniformly twisted about the axis of said shield secured to said shield and projecting through said slot, a heating element in said housing adjacent said drum, means for moving said shield vertically in one direction and causing said twister element to rotate said shield into a position between said heating element and the opening in said drum, and means for vertically moving said shield in another direction to cause said twister element to rotate said shield to initial unshielding position.

6. In a clothes drier, a housing, a drum rotatable in said housing having an annular opening at one end, a bulkhead disposed in said housing adjacent the rear wall of said drum sealing said end of said drum from the interior of the housing, said bulkhead having a plurality of openings therein, a heater mounted in said housing immediately adjacent a first opening in said bulkhead for heating the clothes in said drum directly by radiation from the heater, a shield mounted in said housing for movement in one direction into position to deflect heat from said heater through an opening in said bulkhead and in another direction into position to shield clothes from said heater and means energized by the circuit for driving said drum for moving said shield into one position and releasing said shield to move into another position by gravity between said bulkhead and said heater for shielding the clothes from the radiant heat of said heater when the drum is not rotating.

7. In a clothes drier, a housing, a drum ro-

tatable in said housing having an annular opening at one end of sufficient cross-sectional area for the circulation of sufficient air into and out of said drum to effect drying, a bulkhead disposed substantially vertically in said housing having a plurality of openings in communication with the interior of the drum through said annular opening, a heater mounted in said housing immediately adjacent a first opening in said bulkhead for heating the clothes in the drum by radiation, a conduit disposed substantially vertically in said housing around said heater element and in communication at an upper end portion thereof and in communication with a second opening in said bulkhead for directing air heated by contact with the heater into said drum.

8. In a clothes drier, a housing, a drum mounted in said housing for rotation about a horizontal axis having an annular opening at one end thereof of sufficient cross-sectional area for the circulation of sufficient air into and out of said drum to effect drying, a bulkhead disposed substantially vertically in said housing adjacent said annular opening having a plurality of openings therein in communication with the interior of said drum through said annular opening, an electrical heating element mounted in said housing immediately adjacent a first opening in said bulkhead for heating the clothes in said drum directly by radiation from the heating element, a blower mounted on said bulkhead having its suction side disposed in communication with a second of said openings, and a duct connecting the pressure side of the blower to a third opening in said bulkhead.

9. In a clothes drier, a housing having a front wall having a clothes receiving opening therein and a door sealing said opening when closed, a cylindrical drum rotatably journaled in said housing having an imperforate periphery and having a front wall adjacent the front wall of said housing with a clothes receiving opening therein registering with said door, and a perforate rear wall for the circulation of drying air through said drum, a bulkhead adjacent and extending parallel to said rear wall, means sealing said bulkhead with said drum adjacent the periphery thereof, said bulkhead having a plurality of openings therein in communication with said drum through said rear wall, heating means within said housing, an air duct connecting said heating means with one of said openings in said bulkhead, a blower associated with the other of said openings and drawing air into and withdrawing air from said drum, and an air duct leading from said blower to the outside of said housing.

10. In a clothes drier, a housing having a front wall having a clothes receiving opening therein, a door sealing said opening when closed, a drum rotatably journaled in said housing, said drum having an imperforate periphery, a front wall confronting the front wall of said housing and having a clothes receiving opening therein registering with said door, and a rear wall having an imperforate central portion forming a support means for said drum, and an annular drying air circulation opening on the outside of said imperforate central portion of said rear wall and extending to a position adjacent the periphery of said drum, and forming a greater portion of the area of said wall, a partition mounted within said housing and confronting the rear wall of said drum and forming a bulkhead having a plurality of openings therein in communication with said annular opening in said rear wall of said drum, for establishing a circulation of air into and out of said drum, means sealing said bulkhead and said rear wall of said drum on the outside of said annular opening, heating means communicating with one of said openings in said bulkhead, suction means communicating with another of said openings in said bulkhead, and an air duct leading from said suction means to the outside of said housing and directing the air discharged from said drum to the atmosphere.

11. In a clothes drier having a drying drum mounted for rotation in a housing and having an air circulating opening at one end thereof, a heater element disposed close to said air circulating opening, a shield extending along said heater element in position to normally deflect heat through said opening into said drum and mounted in said housing for slidable and rotary movement from an elevated heat deflecting position to a lower position between said heating element and said opening, a uniformly twisted flat twister member twisted about the axis of rotation of said shield and slidably connecting said shield to said housing and imparting rotary movement to said shield upon vertical movement thereof, and a vertically movable member connected with said shield, for moving said shield vertically and causing said twister member to rotate said shield upon vertical movement thereof.

12. A drier comprising a housing having a drum mounted therein for rotation about a horizontal axis, said drum having a loading opening at the forward end thereof and having a rear wall having an annular air circulating opening therein of an area large enough to circulate sufficient air through said drum to effect drying, a bulkhead disposed substantially vertically in said housing adjacent the rear wall of said drum and forming a bearing support therefor, a sealing member connected between said drum and bulkhead outside of the limits of said annular air circulating opening, for sealing said rear wall of said drum from the interior of said housing, said bulkhead having a plurality of openings therein in communication with the interior of said drum through said annular opening, a heater mounted in said housing immediately adjacent one of said openings in said bulkhead for heating the clothes in said drum directly by radiation from the heater, and a discharge duct leading from another opening of said bulkhead and having a blower therein operable to withdraw air from said drum.

13. A drier comprising a housing having a drum mounted therein for rotation about a horizontal axis, said drum having a loading opening at the forward end thereof and having a rear wall having an annular air circulating opening therein of sufficient area for the circulation of sufficient air through said drum to effect drying, a bulkhead disposed substantially vertically in said housing adjacent the rear wall of said drum, means interposed between said drum and said bulkhead outside of said annular air circulating opening for sealing said rear wall from the interior of said housing, said bulkhead having a plurality of openings registering with said annular opening for communication with the interior of the drum, a heater mounted in said housing immediately adjacent one of said openings in said bulkhead for heating the clothes in said drum directly by radiation from the heater, and a rotatable shield extending along said heater and journalled in said housing for rotation about a substantially vertical axis, and means controlled by rotation of said drum for moving said shield in position

to radiate heat through said bulkhead and annular opening and into position between said heater and said bulkhead for shielding the clothes in the drum from the radiant heat from said heater when said drum is not rotating.

14. In a clothes drier, a housing, a drum rotatable in said housing and having an annular opening at one end thereof of sufficient area for the circulation of sufficient air through said drum to effect drying, a vertical bulkhead in said housing confronting said annular opening, a sealing member on said drum having sealing engagement with said bulkhead outside of the limits of said annular opening for sealing said drum from the interior of said housing, said bulkhead having a plurality of openings therein in communication with the interior of said drum through said annular opening, a discharge duct leading from one of said openings in said bulkhead and having a blower therein operable to withdraw air from said drum, a heater mounted in said housing immediately adjacent another of said openings in said bulkhead for heating the clothes in

said drum directly by radiation from the heater, and said blower drawing air past said heater into said drum through a third opening in said bulkhead.

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