Dec. 2, 1952 P. E. GELDHOF 2,619,736

BULKHEAD DRIER

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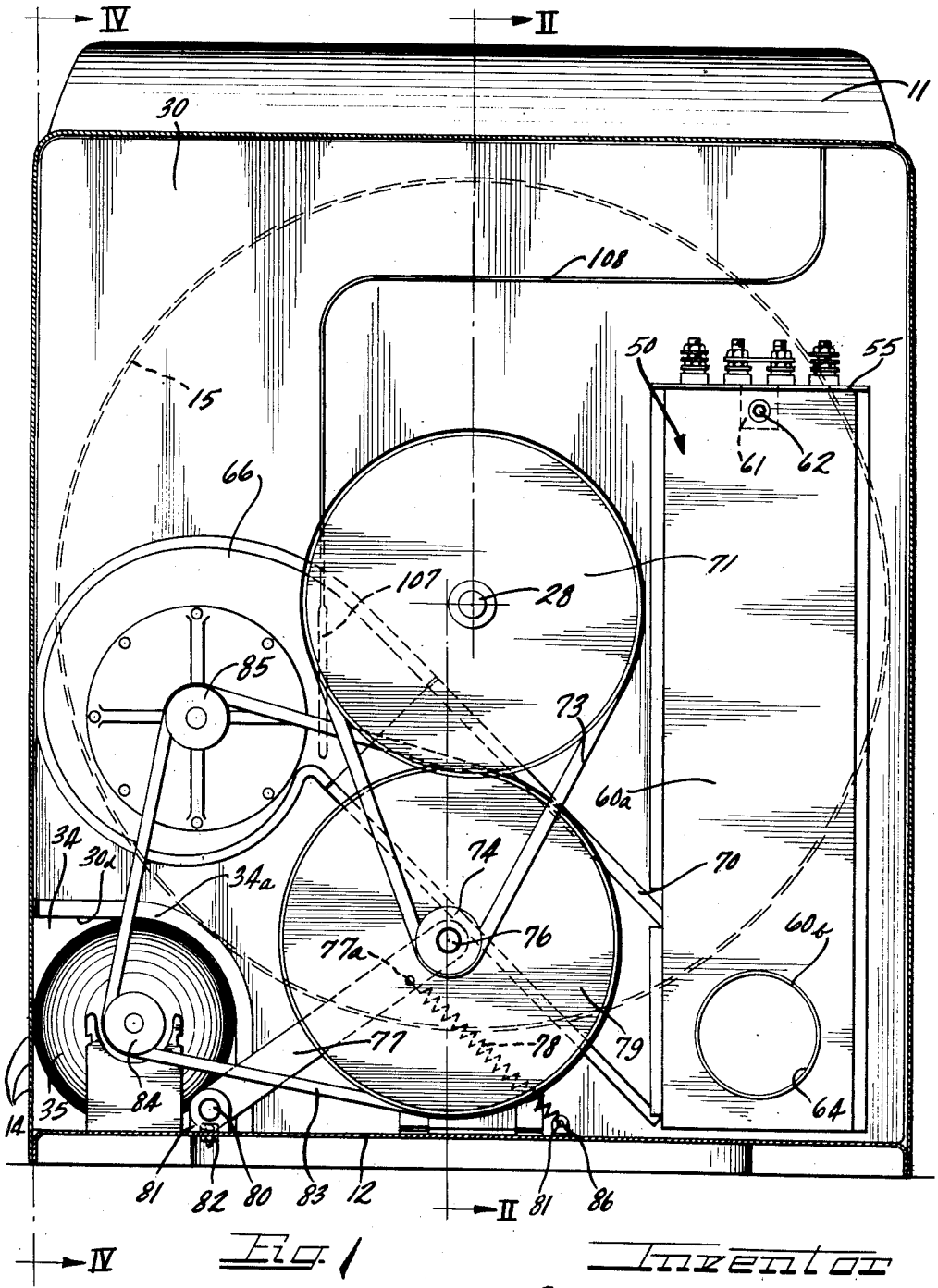


Fig. 1

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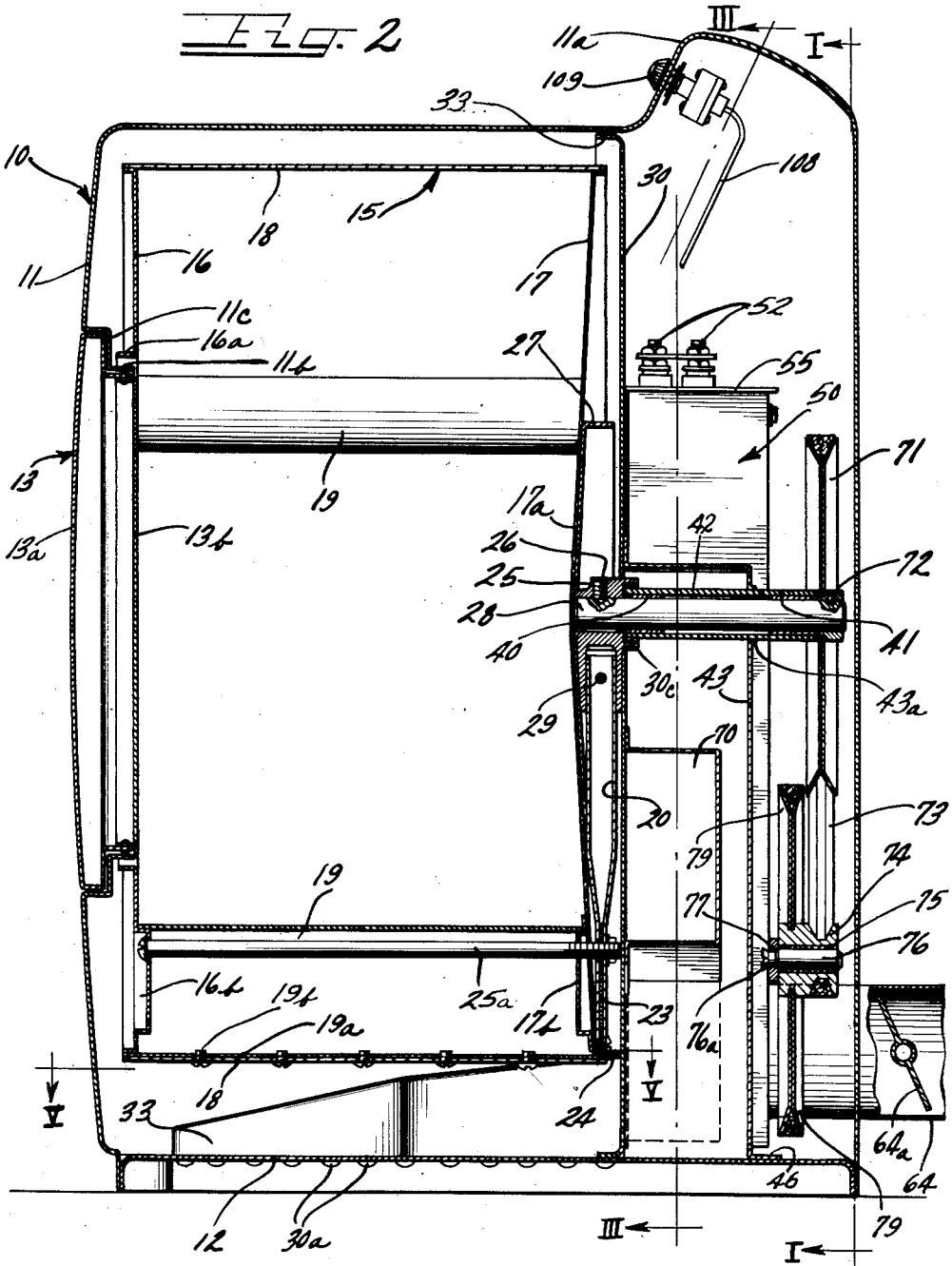
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BULKHEAD DRIER

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Fig. 2



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BULKHEAD DRIER

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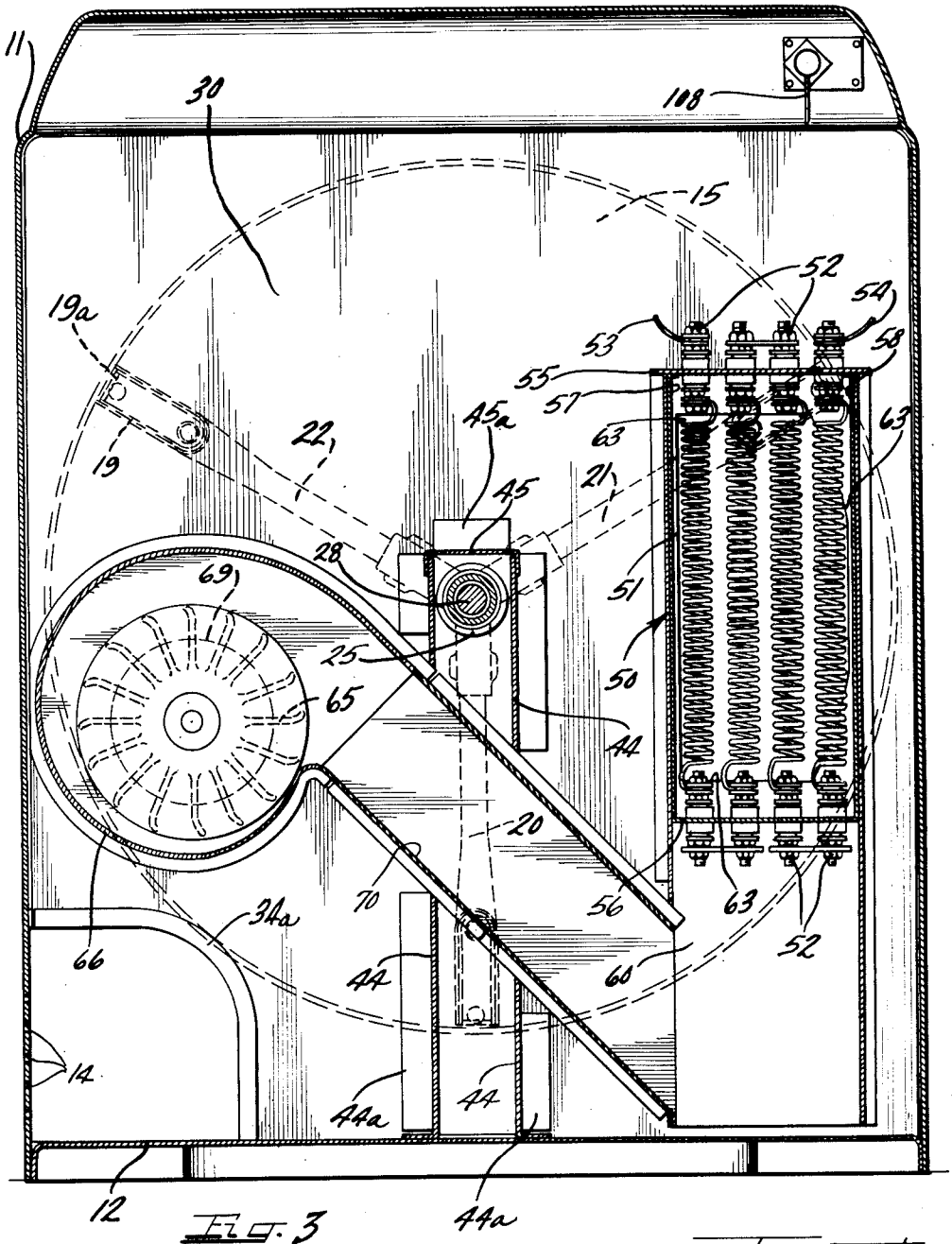


Fig. 3

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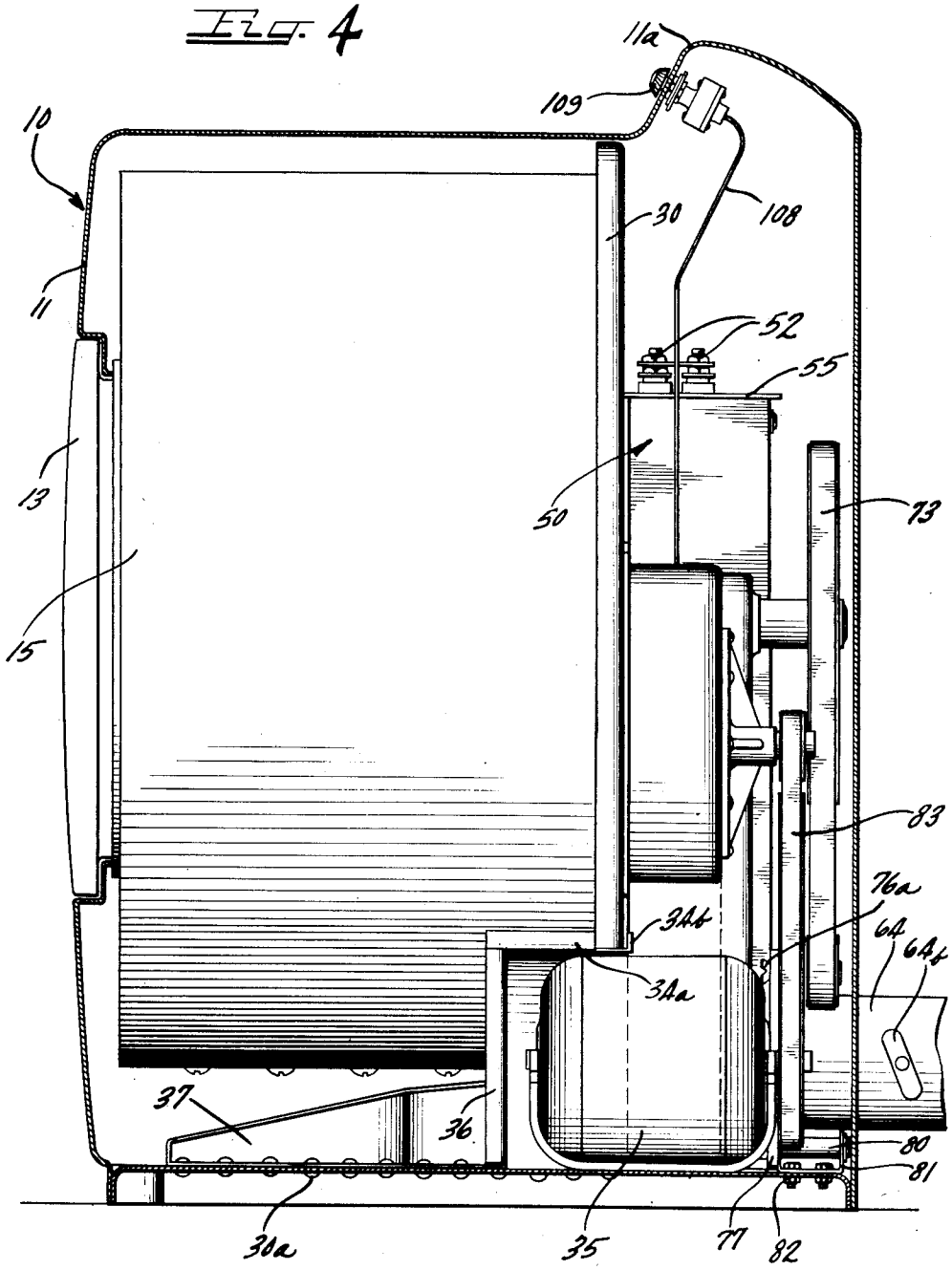
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BULKHEAD DRIER

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Fig. 4



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BULKHEAD DRIER

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Fig. 6

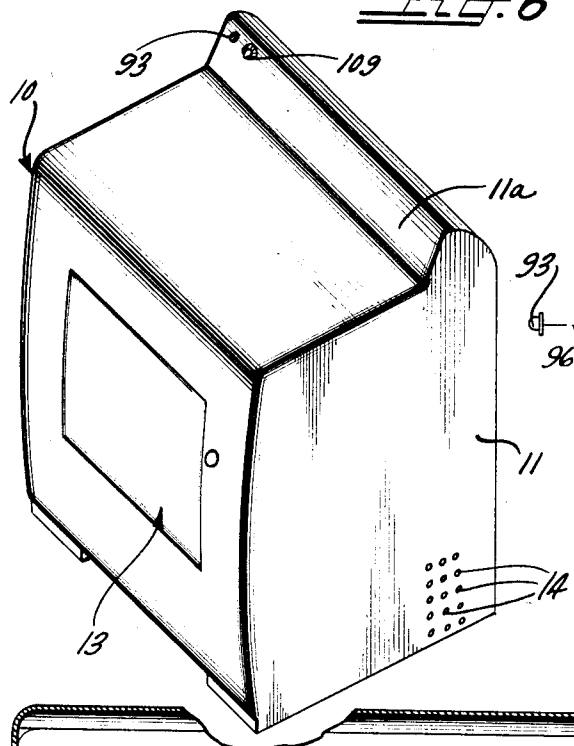
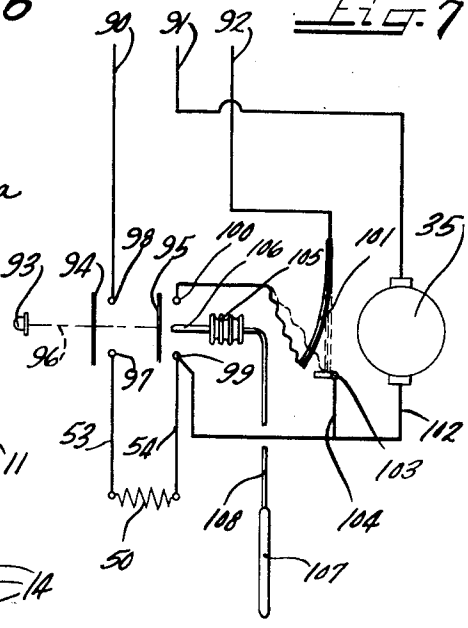


Fig. 7



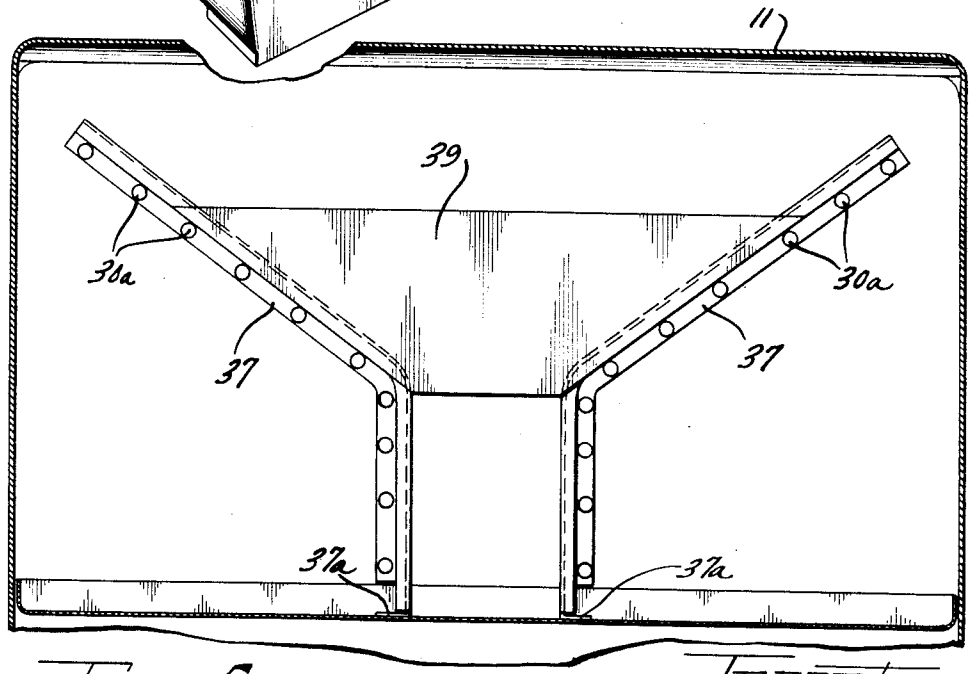


Fig. 5

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Patented Dec. 2, 1952

2,619,736

UNITED STATES PATENT OFFICE

2,619,736

BULKHEAD DRIER

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Application January 18, 1947, Serial No. 722,875

5 Claims. (Cl. 34—131)

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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 connection with any laundry machine or washing apparatus.

One type of clothes drier which is supplied for household use includes a drum mounted for rotation in a closed housing through which heated air is circulated.

It is one of the principal features and objects of the present invention to provide a novel clothes drier of this general category which gives greatly improved results with a minimum expenditure of energy.

It is a further object of the present invention to provide a drier of the rotating drum type having a novel bulkhead construction for directing the flow of air through the casing of the drier.

Another object of this invention is to provide in a drier novel means for heating air whereby the articles in the drier are heated by radiant heat from the heater unit as well as by direct contact with heated air.

A further object of the present invention is to provide in a clothes drier a novel electric control circuit for allowing the air-circulating fan in the drum to be rotated for a definite time after the heating unit has been de-energized, thus preventing excessive temperatures in the drier when the clothes are at rest.

A still further object of this invention is the provision of valve means for regulating the relative quantities of fresh air and of recirculated air that are heated and circulated through the drying compartment.

Another and further object of this invention is to provide a clothes drier having novel structural features.

Another and still further object of this invention is to provide a novel belt-tightening means for the drive mechanism of the drier.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention 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 the accompanying drawings, in which:

Figure 1 is a rear elevational view of a clothes drier embodying the novel principles and teachings of the present invention with the rear panel of the device removed, as indicated by line I—I of Figure 2;

Figure 2 is a vertical sectional view taken substantially on line II—II of Figure 1;

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

Figure 4 is a vertical sectional view taken on line IV—IV of Figure 1;

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Figure 5 is a horizontal fragmentary sectional view taken substantially on line V—V of Figure 2;

Figure 6 is a perspective view of a clothes drier embodying the novel features characteristic of the present invention, looking downwardly thereon at the right hand corner thereof; and

Figure 7 is a diagrammatic sketch of the electrical control circuit of the present invention.

As illustrated in Figures 1 to 6 of the drawings, reference numeral 10 indicates a clothes drier which includes an outer casing or cabinet 11 in which is mounted a rotating drum 15 arranged to receive clothes or other articles to be dried.

The top and sides of the casing 11 may conveniently be a unitary structure secured as by welding to a bottom plate 12 of the casing. The rear portion of the top of the casing is extended upwardly as at 11*a* to afford an instrument panel for the control members of the drier.

An opening is provided in the front wall of the casing 11 substantially opposite the drum 15, which opening is defined by a flange 11*b* extending axially rearwardly from a recessed portion 11*c* of the front wall. This opening is arranged to be closed by a door 13 including a solid outer panel 13*a* and a solid inner panel 13*b* suitably secured together at their marginal overlapping edges. The door is equipped with concealed hinges (not shown) and is movable upon being closed into the recess 11*c* of the wall, thus permitting the outer panel 13*a* to lie substantially flush with the front wall of the casing.

As best seen in Figure 6, a plurality of air inlet holes 14 is provided at the lower rear portion of the side member of the cabinet. The function of these air inlet holes will be described hereinafter.

The rotating drum 15 comprises a front wall 16, a rear perforated wall or screen member 17, and an enclosing peripheral casing 18 which is suitably secured, as by welding, to the front and rear wall members. An opening, defined by the forwardly turned lip 16*a* is provided in the front wall 16 of the rotating drum. The lip 16*a* of the drum and the flange 11*b* of the casing 11 are disposed in overlapping, spaced relation, as is clearly shown in Figure 2. Thus, there is formed an annular passageway between the casing and the drum for the entrance of air into the front part of the rotating drum.

The opening in the front wall of the rotating drum defined by the lip 16*a* also provides an access port through which the clothes to be dried may be placed in the drum when the door 13 is swung open.

The rear screen member 17, which also acts as an inlet for heated air entering the rotating drum, has a dished-in central portion 17*a* which is structurally reinforced by means of a pan-shaped member 27, welded or otherwise suitably

secured to the outside surface thereof. On the inner surface of the rotating drum 15, there is provided a plurality of vanes 19 which extend inwardly and serve the dual purpose of tumbling the clothes as the drum rotates, while acting as bracing members between the front and rear walls of the drum. These vanes 19 are formed of sheet metal in a U-shape (Figure 3). A member 19*a*, secured across the open end of the vane 19, is attached as by set screws 19*b* to the peripheral member 18 of the drum 15. As seen in Figure 2, indented portions 16*b* of the front wall 16 of the drier and inwardly extending members 17*b* secured to the inner side of the screen member 17 act as guides around which the U-shaped vanes 19 are disposed for support.

The rotating drum 15 is also provided with a frame or spider in the form of three radially extending supporting arms, 20, 21 and 22. The inner ends of these arms are secured to a hub 25 which is fastened by a set screw 26 to a shaft 28 extending therethrough and abutting the rear screen member 17 of the drum 15. Each individual arm 20, 21 and 22 is fixed to the hub 25 by a pin 29.

Each arm 20, 21 and 22 is formed of a sheet metal tube which is flexed at its outer end, as at 23. The flat portion is bolted to the drum 15 by a small bolt 24 and a large bolt 25*a*, which extends clear through the drum from one end to the other. The flange at which the outer edge of the arms 20, 21 and 22 are secured to the drum are directly opposite to the points where the vanes 19 are secured, allowing the large through bolts 25*a* to be conveniently enclosed under the U-shaped vane 19 away from possible contact with the clothes in the drum.

For the purpose of directing the flow of air through the drier casing, and also to provide a journal support for the hub 25 which supports the shaft 28, there is provided a bulkhead 30. This bulkhead 30 is substantially a solid sheet member which is adapted to be positioned across the inside of the casing directly behind the rear end of the drum 15. A forwardly turned peripheral edge 33, extending around the bulkhead 30, affords a means by which the bulkhead is secured, as by welding, to the lower casing member 12. While the lower edge of the bulkhead is secured to the casing, the other three marginal portions of the bulkhead do not abut the casing, being so arranged that there is provided a slight clearance, such, for example, as approximately $\frac{1}{16}$ of an inch, between the member and the casing. The space so provided on these three sides of the bulkhead affords a passageway through which fresh air entering the casing at the rear of the bulkhead through the inlet holes 14 in the casing is drawn to the front of the casing for subsequent entry into the front end of the drum 15.

Near the center of the bulkhead, there is provided an aperture 30*c* which is adapted to support for rotation therein the hub member 25.

Looking at the rear of the bulkhead, as in Figure 1, it is seen that the lower left-hand corner of the bulkhead is provided with a cut-out portion 30*d* for accommodating a compartment 34 for a motor 35. This compartment 34 is formed by an arc-shaped cover member 34*a* which has an upwardly extending rear flange 34*b* secured as by welding to the bulkhead, and a front panel 36 suitably positioned across the front end of the compartment to form a substantially air-tight structure as seen in Figure 4.

At its lower end, additional support is provided for the bulkhead 30 by a pair of diverging legs 37, Figures 2 and 5, which have rear flanges 37*a* suitably secured to the bulkhead. Each leg 37 is made of a single channel member bent at an angle and having its lower flange secured by rivets 30*a* to the lower casing member 12. A cross member 39 is secured between the two legs 37, being welded to their upper flanges, for providing lateral support thereto.

The shaft 28 is disposed for rotation in a pair of bearing sleeves 40 and 41, which may conveniently be of the self-lubricating or oil-impregnated type. These bearing sleeves are positioned at opposite ends of a stationary sleeve 42 which is rigidly secured as by welding to a flange 43*a* of a support member 43. This support member 43 is substantially of box-like construction (Figures 2 and 3), having side members 44 secured by a flange 44*a* to the bulkhead 30, and a top member 45 secured to the bulkhead by flange 45*a*. At its lower end, the support member 43, has a rearwardly extending flange 46 by which it is secured to the casing member 12.

Means for heating of the air which is circulated through the drum 15 is provided by an electric heating unit 50 comprising a plurality of heater coils 51 connected in series through suitable terminals 52, and supplied with power through conductors 53 and 54. In order that the coils may be easily removed for cleaning, they are mounted in a frame structure including a top plate 55, a bottom plate 56, and side plates 57 and 58. This frame structure is adapted to be slid down into a vertical box-like air chamber 60, and to be supported therein by means of the outer end of the top plate 55 which extends over the edges of the widewall of the chamber 60. A locking strip 61, having a tapped hole therein, depends from the rearmost edge of the top plate 55 for a close fitting contact with the inner sides of the rear wall 60*a* of the air chamber 60. The rear wall has a suitable aperture adapted to receive a bolt 62 therethrough, which bolt may be screwed into the tapped hole of the locking strip 61 for securing the heater coil assembly in place.

The box-like air chamber 60 is secured as by welding along its side flange to the bulkhead 30 at the right-hand side of the bulkhead, as seen in the rear view (Figure 3). Directly in front of the heating coil, there is provided a port 63 in the bulkhead. Thus, air passing over the heating coils 51 can move forwardly through the port 63 in the bulkhead and then through the screen member 17 at the rear of the drum 15.

In the lower portion of the rear wall 60*a* there is provided an exhaust port 60*b* which is arranged to receive a tube or pipe 64 extending rearwardly through the rear wall of the casing and having a butterfly valve 64*a* disposed across the inside of the tube. This valve has an exterior manual control handle 64*b* for positioning the valve across the passageway of the tube. It will be readily seen that since the tube 64 is the only place through which air can leave the casing, the position of the butterfly valve 64*a* will determine the amount of air leaving the casing. Thus, since the amount of fresh air taken in depends upon how much of the air in the drier is permitted to escape, the amount of fresh air is also controlled by regulating the butterfly valve 64*a*.

Rotation of the shaft 28, and consequently, the drum 15, is accomplished through a drive mechanism including a pulley wheel 71 which is secured to the shaft by means of a set screw 72.

As best shown in Figures 1 and 2, the pulley wheel 71 is driven by a suitable belt 73 from a relatively small pulley wheel 74 which is mounted for rotation on a bearing sleeve 75 disposed about an axle 76. The axle 76 is attached for pivotal movement in an idler arm 77 by means of an end 76a which is peened over the edge thereof. The wheel 74 is also the hub of an idler pulley wheel 79 which, therefore, is also adapted to rotate about the axle 76.

As illustrated in Figures 1 and 4, the idler arm 77 is secured at its lower end for pivoting about a pin 80 in a U-shaped bracket 81 which is adjustably mounted by means of bolts 82 in slots in the lower casing member 12. Near the upper end of the idler arm 77, a coil spring 78 is fastened in a hole 77a, having its other end anchored in an upright lug 86 secured to the casing member 12. The spring 78 thus tends to swing the idler arm 77 clockwise about the shaft 80, causing the pulley wheel 74 to move downwardly and, thus, put a tension on the pulley belt 73.

The idler pulley 79 is driven by means of a belt 83 which is also disposed over a motor drive pulley 84 and a blower driven pulley 85. As is readily seen in Figure 1, the downward pull of the spring 78 also will put a tension on the belt 83.

It is to be particularly noted that the motor 35 drives the blower 65 at approximately motor speed, since the pulleys 84 and 85 are approximately the same size. However, the drum 15 which rotates on the shaft 28 is driven at a greatly reduced speed through the large pulleys 79 and 71.

Air is forced over the heating coils 51 by a blower 65 which is suitably mounted in a housing 66, taking suction from the rear of the drum 15 through an inlet port 69 located therein. An enclosed conduit 70 connects the blower discharge to the vertical air chamber 69, directing air thereto near its lower end. It is to be noted in Figure 2 that the conduit 70 is located between the bulkhead 30 and the support member 43.

Figure 7 of the drawings illustrates the novel electrical control circuit of this invention. The drier is arranged to be energized from a single phase, three-wire source of alternating current represented by the power supply conductors 90, 91 and 92. These conductors 90, 91 and 92 may be understood to be the conventional 220—110 volt public utility power supply which is brought into a large number of homes today, particularly where electric heating devices are used.

By way of example, the voltage drop between conductors 90 and 92 may be 220 volts, while the voltage drop between conductors 90 and 91, as well as between conductors 91 and 92, may be 110 volts.

A push-button 93 is mounted on the instrument panel 11a of the casing 11 where it is conveniently located to be depressed when the control circuit is to be energized.

More particularly, when the push-button 93 is depressed, a pair of bridging contacts 94 and 95 which are insulated from each other, but mounted on a common actuating member 96, move into circuit-closing position to connect the electric heater 50 across the power supply conductors 90 and 92, thus connecting the heater unit 50 to a source of 220 volts.

As is illustrated in Figure 7 of the drawings, the bridging contact 94 is arranged to engage the stationary contacts 97 and 98, while the bridging contact 95 is arranged to engage the stationary contacts 99 and 100.

The heater unit 50 is connected to stationary contacts 97 and 99 through conductors 53 and 54. The power supply conductor 90 is directly connected to the stationary contact 98, while the power supply conductor 92 is connected to the stationary contact 100 through a thermostatic bimetal switch 101. It will thus be observed that the heating current passes directly through the bimetal switch element 101. It will be understood that the temperature increase, due to the passage of current therethrough, will cause the thermostatic switch element 101 to move from its full line position to its dotted line position as shown in Figure 7 of the drawings.

The purpose and function of this thermostatic bimetal switch 101 will presently be explained in describing the operation of the control circuit.

At the same time that the heater 50 is connected across the power supply conductors 90 and 92, the electric motor 35 is connected across the power supply conductors 91 and 92, thereby to energize the motor 35 from a source of 110 volts.

More particularly, one side of the motor 35 is directly connected to the power supply conductor 91, while the other side of the motor is connected through a conductor 102 to the stationary contact 99 by the bridging contact switch 95. Thus, with the bridging contact 95 in engagement with its associated stationary contacts 99 and 100, the motor is connected to the power source through the thermostatic bimetal switch element 101. The motor 35, however, is also connected to a stationary contact 103 through conductor 104.

A Sylphon bellows 105 having an actuating finger 106 is provided to open the bridging contacts 94 and 95 after the temperature of the air being withdrawn from the drum 15 by the suction blower 65 has risen to a predetermined temperature level.

A bulb 107 containing a heat transfer fluid is connected through a long tube 108 to the bellows 105. As may be seen best in Figure 1 of the drawings, the bulb 107 is located in the scroll casing of the blower 65. It is to be understood that the bellows 105 will expand as the temperature of the bulb 107 is raised, and that after this expansion has reached a predetermined point, it will cause the finger 106 to engage the push-button actuation mechanism including the member 96 and the bridging contacts 94 and 95 and open the respective circuits of the bridging contacts 94 and 95.

Due to the opening of the bridging contact 94, the heating unit 50 is completely out of the circuit, but it will be observed that the motor 35 continues to run due to the fact that it is now energized from the power supply conductors 91 and 92 through the stationary contact 103 and the bimetal thermostatic element 101.

As the thermostatic element 101 begins to cool off, due to the fact that the heavy heating current which energizes the heating unit 50 is no longer passing therethrough, it gradually moves from its dotted line position to its full line position.

The stationary contact 103 is preferably made relatively wide so that there is a wiping action between the end of the bimetal element 101 and the stationary contact 103. This enables the motor to remain energized for a predetermined period of time after de-energization of the heater 50. This, of course, is a very desirable, and even necessary, feature in any clothes drier; for if the

drum immediately stops rotating upon de-energization of the heating unit, there is a tendency to injure the clothes being dried.

It has been found, on the other hand, that if the drum continues to rotate for a predetermined period of time after de-energization of the heating unit, no damage to the clothes occurs. By way of example, and not by way of limitation, this time may be of the relative order of magnitude of approximately two minutes. It will, of course, be appreciated that the time may be predetermined by the relative width of the stationary contact 103, or, in other words, the length of time that the end of the bimetal element 101 moves before becoming disengaged from the stationary contact 103.

The temperature of the air to which the clothes in the drum 15 are subjected is arranged to be selectively controlled through a suitable selector knob 109 mounted on the panel 11*a* adjacent the push-button 93.

Since the actual mechanical construction of this selector mechanism forms no part of the present invention, it has not been illustrated in detail, but it will be understood that angular movement of the selector 109 variably changes the relative spacing between the finger 106 of the bellows 105 and the bridging contact assembly. Thus, when a higher temperature is desired, the finger 106 is moved relatively farther away so that it has a greater distance to travel before engaging the bridging contact assembly to open the same.

The drier of this invention is put into operation in the following manner. The desired temperature of the heated air is selected on the control knob 109, and the butterfly valve 64*a* is regulated to permit a portion of the air to be exhausted. It will be appreciated that it is not desirable to introduce 100% fresh air over the heater coils, since this would require the expenditure of a great deal of electrical energy in raising the temperature from room temperature to the desired drying temperature. Also, it is recognized that in order to prevent the recirculation of odors picked up from the clothes, it is desirable that a certain percent of fresh air be introduced at all times.

When the above adjustments have been made and the clothes have been placed in the drier through the door 13, the push-button 93 on the control panel is depressed, thus energizing the heater coil and setting the motor 35 in operation.

Referring to Figure 3, it is seen that the blower 65 immediately begins to draw air out of the drum 30 through the port 69 and forces the air down the conduit 70 to the lower end of the vertical air chamber 60 in which the heater coils are located. A portion of this air is permitted to escape through the exhaust 64, depending upon the positioning of the butterfly valve 64*a*. The main body of air will be forced upwardly in the chamber 60, over the heating coils, through the opening 63 in the bulkhead 30, and then into the drum through the screen member 17. Since the blower 65 is thus forcing air into the heater near one side of the drum and drawing it out at the other side, it is evident that the heated air will be thoroughly circulated around the clothes being tumbled in the rotating drum. Since the opening 63 in the bulkhead wall is of considerable size, the radiant heat from the heater coil will also contact the clothes in the drier and thus accelerate the drying process.

As previously explained, there is an opening on three sides of the bulkhead 30 between the bulkhead and the casing of approximately $\frac{1}{16}$ of an inch. Since this opening is small, there is a relatively low pressure area maintained on the forward side of the bulkhead due to the suction action of the blower. There will, therefore, be a pressure differential existing between the front and rear portions of the drum which will tend to draw fresh air from behind the bulkhead, forwardly through the opening between the bulkhead and the casing, and into the annular opening in the front of the drum.

The flow of fresh air between the casing and the drum tends to maintain the casing relatively cool and prevents it from obtaining objectionably high temperatures. Also, the air coming in the inlet holes 14 must pass over the motor 35 and thus cools the motor.

From the foregoing description, it is evident that there is provided in this invention a drier which through the use of an efficient air heating and circulating system and a novel electrical control circuit will effectively dry clothes or other articles placed therein.

While I have shown a particular embodiment of my invention and described a particular method of operation, it will, of course, be understood that I do not wish to be limited thereto, since many modifications may be made, and I, therefore, contemplate by the appended claims, to cover all such modifications as are within the true spirit and scope of my invention.

I claim as my invention:

1. 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 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 also having a rear wall having an imperforate central portion forming a support means for said drum and having an annular drying air circulation opening on the outside of said imperforate central portion of said wall and extending to a position adjacent the periphery of said drum and forming a major portion of the area of said rear wall, an upright partition mounted within said housing and confronting the rear wall of said drum and forming a bulkhead establishing a circulation of air through said drum, said bulkhead having a plurality of air circulating openings therein in communication with said annular opening in said rear wall of said drum, 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 passing from said drum to the atmosphere.

2. In a clothes drier, a housing having a front wall having a clothes-receiving opening therein, a door on said front wall sealing said opening when closed, a rotatable clothes drying drum within 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 also having a rear wall having an imperforate central portion forming a support

means for said drum, and an annular air circulation opening on the outside of said imperforate central portion of said front wall and extending to a position adjacent the periphery of said drum and forming a greater portion of the area of said rear wall, a partition mounted within said housing and confronting the rear wall of said drum and forming a bulkhead establishing a circulation of air through said drum and having a plurality of air circulation openings therein in communication with said annular opening in said rear wall of said drum, a shaft extending rearwardly from said imperforate central portion of said drum and rotatably supported on said partition for rotatably supporting said drum, a motor within said housing, means driven by said motor for rotatably driving said drum, said partition being spaced from the walls of said housing for the circulation of air thereby and into said drum through said clothes-receiving opening and also having air ducts leading to and from said openings for establishing a circulation of air into and out of said drum, heating means communicating with one of said air ducts, a blower communicating with the other of said air ducts and said other air duct leading from said blower to the outside of said housing, and directing the air discharged from said drum to the atmosphere.

3. In a clothes drier, a housing having a front wall having a clothes-receiving door therein, a door hinged to said front wall and sealing said opening when closed, an upright partition within said housing spaced a substantial distance from said front wall and having elongated diverging bracing legs extending along the bottom of said housing and secured thereto, a drum rotatably mounted between said partition and front wall, 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 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 rear wall, said partition forming a bulkhead establishing a circulation of air through said drum and having a plurality of air circulating openings therein in communication with said annular opening in said rear wall of said drum, and air ducts leading to and from said openings for establishing a circulation of air into and out of said drum, heating means within said housing and communicating with one of said ducts, the other of said ducts leading through said housing and the outside thereof for discharging the spent air to atmosphere, an upright support spaced rearwardly of said partition and extending parallel thereto, a shaft extending through said partition and support and rotatably supported by said partition and support, a motor within said housing, means driven by said motor for driving said shaft and drum, a suction blower mounted in the other of said ducts in communication with one of the openings in said bulkhead and the interior of said drum, and a drive connection from said motor to said blower for simultaneously rotating said blower with said drum.

4. In a clothes drier, a casing 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 casing and having an imperforate periphery, 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 and supported on the bottom of said housing, means rotatably supported by said bulkhead for rotatably supporting said drum, 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 suction blower associated with the other of said openings in said bulkhead and drawing air into and withdrawing air from said drum, and an air duct leading from said blower to the outside of said housing.

5. In a clothes drier, a casing having a front wall having a clothes-receiving opening therein and a door sealing said opening when closed, an upright partition within said casing spaced a substantial distance from said front wall, said partition having elongated diverging bracing legs extending therefrom along the bottom of said housing and secured thereto, a support spaced rearwardly of said partition, a shaft rotatably supported by said partition and support, a drum supported on the inside of said shaft in the space between said partition and front wall of said housing, a pulley on the outside of said shaft, a motor for driving said pulley, said drum having an imperforate periphery, 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, said partition confronting said perforate rear wall and having a plurality of openings therein in communication with the interior of 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 suction blower associated with the other of said openings, means driven by said motor for driving said blower simultaneously with said drum to draw air into and withdraw air from said drum, and an air duct leading from said blower to the outside of said housing.

PETER EDUARD GELDHOF.

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