Sept. 24, 1968 J. R. HUBBARD 3,402,477

DUAL COMPARTMENT LAUNDRY APPARATUS

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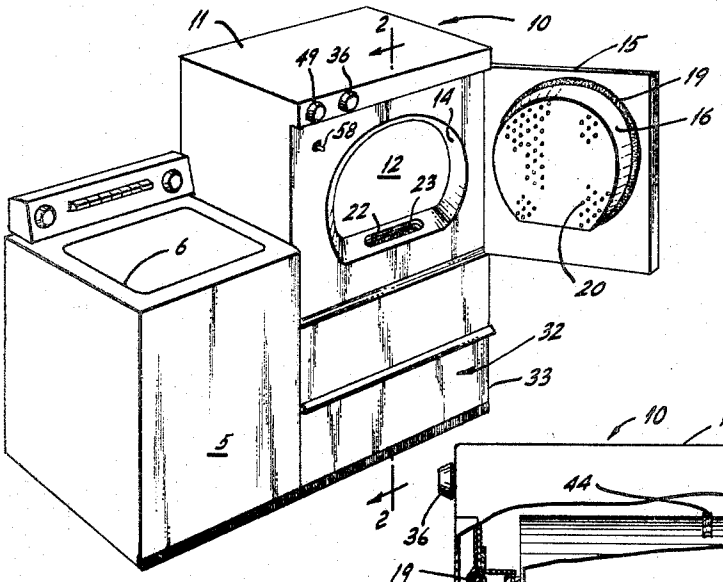


FIG. 1.

FIG. 2.

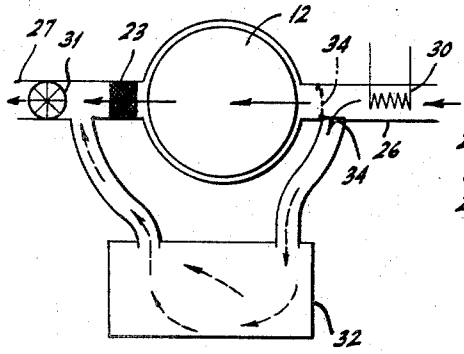
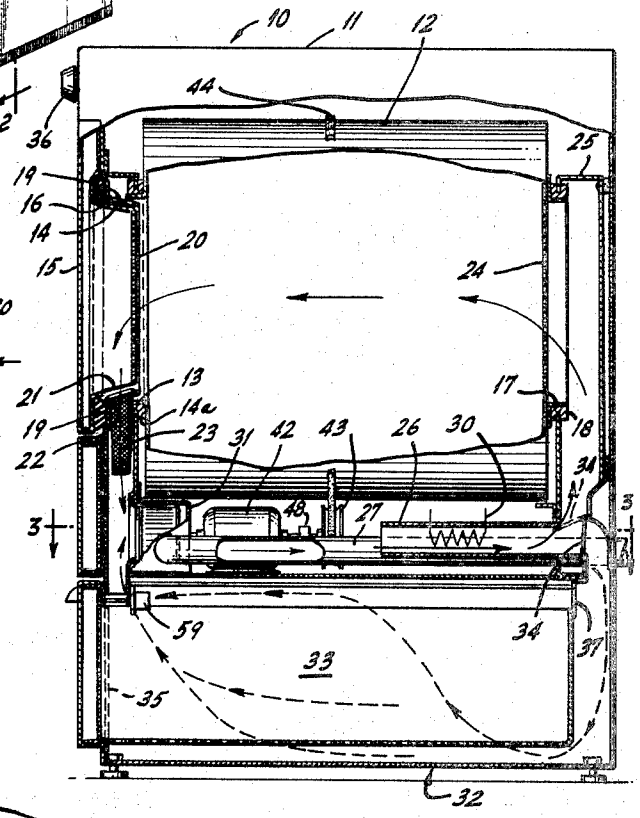


FIG. 4.



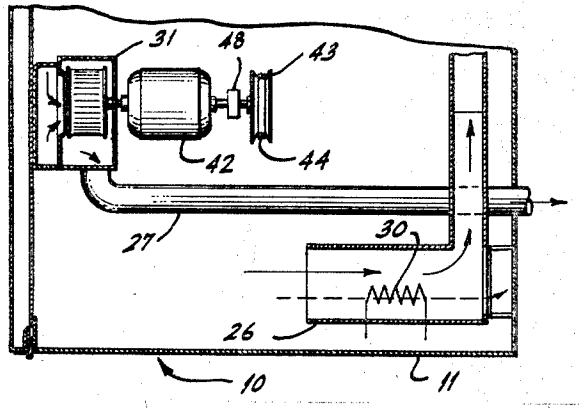


FIG. 3.

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DUAL COMPARTMENT LAUNDRY APPARATUS

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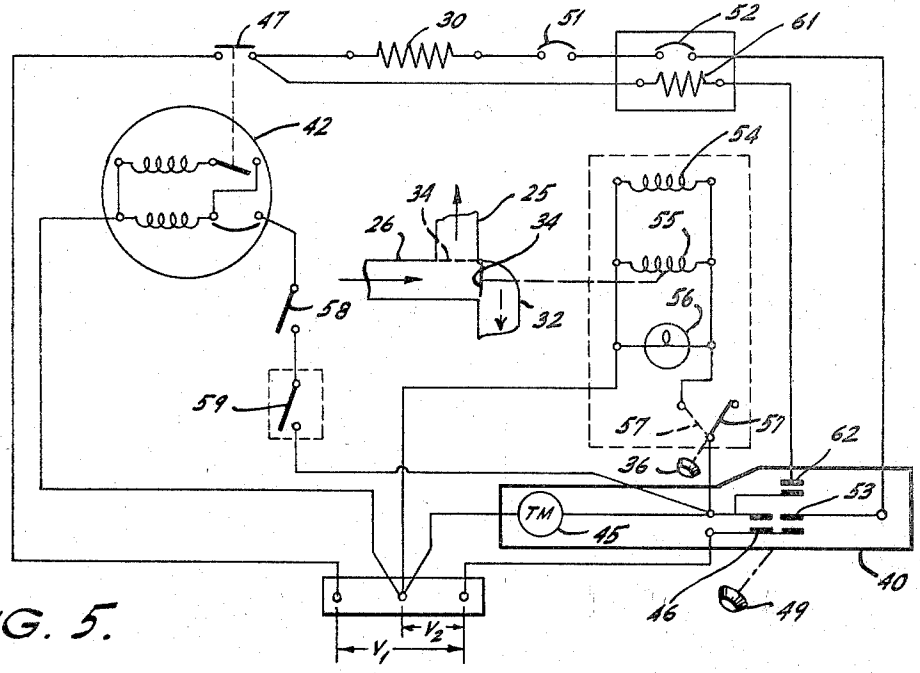


FIG. 5.

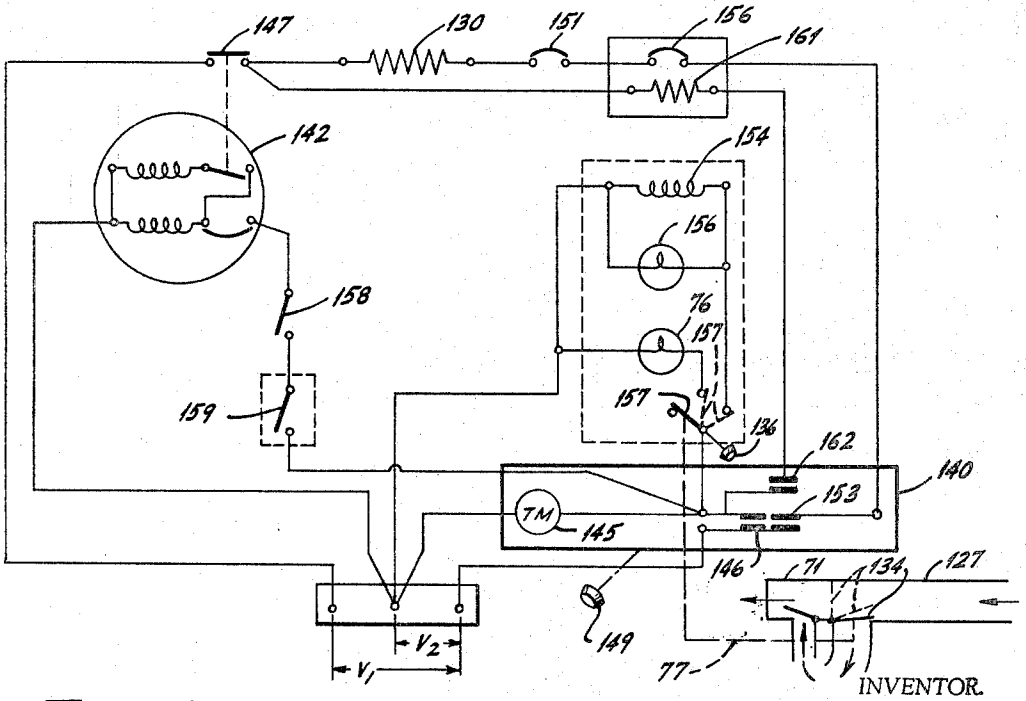


FIG. 6.

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DUAL COMPARTMENT LAUNDRY APPARATUS

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FIG. 7.

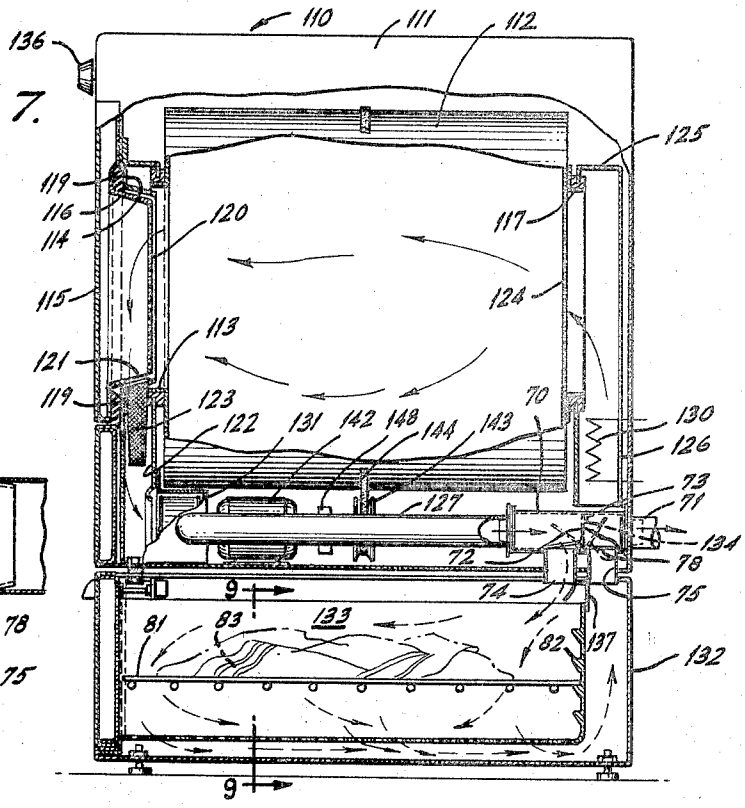
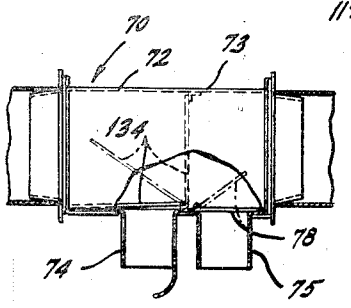


FIG. 8.



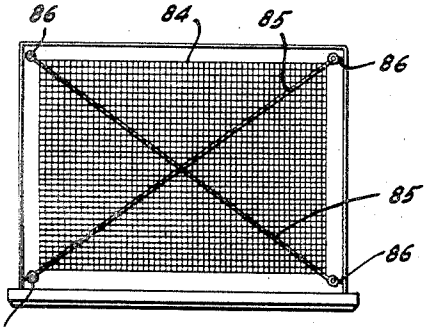


FIG. 10.

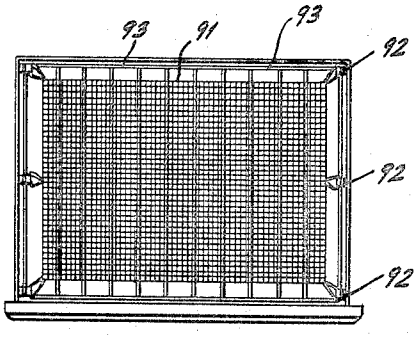


FIG. 12.

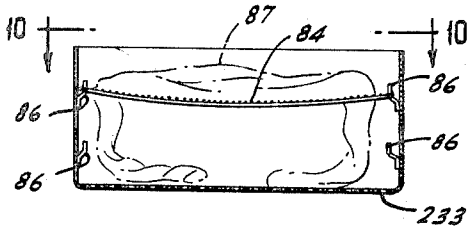


FIG. 9.

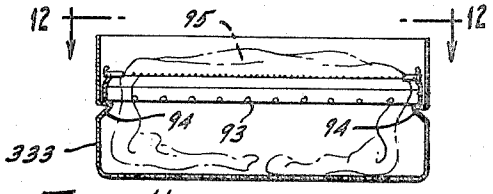


FIG. 11.

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Patented Sept. 24, 1968

3,402,477

DUAL COMPARTMENT LAUNDRY APPARATUS

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Filed Nov. 7, 1966, Ser. No. 592,427
10 Claims. (Cl. 34—44)

ABSTRACT OF THE DISCLOSURE

A laundry dryer includes a pair of compartments for fabrics to be dried, a source of heat, means for moving air in heat exchange with the source of heat to the compartments, and air flow control means selectively operable either to effect air flow through one of the compartments while preventing air flow through the other compartment or to cause air to flow through both compartments simultaneously. One compartment comprises a vented rotatable drum for tumbling fabrics to be dried, and the other compartment is disposed adjacent the one compartment and comprises a stationary region within which fabrics and articles may be placed to dry. The one compartment is embodied in a conventional laundry dryer and the other compartment is embodied in separately handleable cabinet structure adapted to serve as a base for the dryer.

This invention has to do with laundry apparatus, and especially to laundry dryers.

A type of laundry dryer in common use today comprises a rotatable drum in which clothes to be dried are placed, and suitable means is provided for rotating the drum and for circulating heated air through the drum in achievement of the drying operation. However not all articles or types of clothing are suited to this mode of drying, and some must be dried using a minimum of heat and no tumbling. A variety of articles and clothing fall into this category, including, for example, footwear, pillows, stuffed toys, woolen clothing, and woolen blankets, as well as delicate or ornamented fabrics.

It is therefore a general objective of the invention to enhance the utility of a conventional clothes dryer through provision of means cooperable therewith for drying articles and clothing of the aforementioned variety.

It is a more specific objective of the invention to provide an improved clothes dryer capable of drying regular fabrics as well as articles and fabrics requiring such special attention.

It is a still further and more specific objective of the invention to provide an improved auxiliary, stationary drying compartment for a conventional tumble action clothes dryer.

In achievement of the foregoing as well as other objectives, the invention contemplates the provision in a laundry dryer of a pair of compartments for fabrics to be dried, a source of heat, means for moving air in heat exchange with said source of heat and through said compartments, and air flow control means selectively operable either to effect air flow through one of the compartments while preventing air flow through the other compartment, or to effect air flow through both compartments simultaneously.

In further accordance with the invention it is contemplated that one compartment comprise a vented rotatable drum for tumbling fabrics to be dried, and the other compartment be disposed adjacent the one compartment and comprise a stationary region within which fabrics and articles may be placed to dry. In one aspect, the invention contemplates that the one compartment be embodied in a conventional laundry dryer, and that the other compartment be embodied in separately handleable cabinet structure adapted to serve as a base for the dryer.

The manner in which the foregoing as well as other objectives of the invention may best be achieved will be understood from a consideration of the following description taken in light of the accompanying drawing, in which:

FIGURE 1 is a perspective showing of laundry apparatus embodying the invention;

FIGURE 2 is a sectional view, in elevation, of apparatus seen in FIGURE 1, looking generally in the direction of arrows 2—2 applied thereto;

FIGURE 3 is a horizontal section of apparatus seen in FIGURES 1 and 2, looking generally in the direction of arrows 3—3 applied to FIGURE 2;

FIGURE 4 is a diagrammatic showing of the air flow path through apparatus seen in FIGURE 2;

FIGURE 5 is a schematic view of wiring and associated controls for apparatus seen in FIGURES 2 and 3;

FIGURE 6 is a modified wiring diagram for the apparatus seen in FIGURES 2 and 3;

FIGURE 7 is a sectional view, in elevation, of a modified embodiment of the invention, and illustrating an operational feature thereof;

FIGURE 8 is a somewhat enlarged view of a portion of FIGURE 7, and illustrates a constructional feature of the modified embodiment;

FIGURE 9 is a sectional view, in slightly modified form, of a portion of the apparatus shown in FIGURE 7, looking in the direction of arrows 9—9 applied thereto;

FIGURE 10 is a top plan view of apparatus seen in FIGURE 9, looking in the direction of arrows 10—10 applied thereto; and

FIGURES 11 and 12 are views similar to FIGURES 9 and 10, respectively, and illustrate further structural modifications contemplated by the invention.

With more detailed reference to the drawing, and first to FIGURES 1, 2, 3 and 4, a laundry dryer **10** embodying the invention comprises a cabinet **11** provided with a rotatable drum **12** having an opening **13**. The front wall of cabinet **11** is provided with an access opening **14** aligned with drum opening **13**, and a hinged door **15** is disposed over opening **14**. For convenience of illustration, door **15** is shown in open position in FIGURE 1, and in closed position in FIGURE 2. While none has been shown, it will be understood that the suitable latch means is provided to hold door **15** in closed position.

Prior to further detailed consideration of the invention, a washing machine **5** of the conventional top loading type is shown alongside dryer **10** to illustrate an important advantage afforded by the invention. Such advantage stems from disposition of the access door of the elevated dryer substantially at the level of the upwardly facing access opening **6** of the washing machine, whereby loading of the dryer from the washing machine is facilitated.

Turning again to the detailed description, the door **15** includes a conventional gasket **19** that seals against the face of cabinet **11**, and a hollow plug section **16** provided with a perforate panel **20** that extends into opening **14**. A bottom opening **21** in plug section **16** is aligned with an air exhaust duct **22** across which extends a lint filter **23**. Drum opening **13** is defined by a circular flange that extends into sliding engagement with generally circular bearing means **14***a* supported by cabinet **11** along the periphery of access opening **14**. The rear wall **24** of drum **12** is perforate, a shroud **25** supported by cabinet **11** extends over wall **24**, and a circular flange **17** protrudes from wall **24** into generally circular bearing means **18** provided on shroud **25**. The bearing means **14***a* and **18** cooperate with the respective circular front and rear drum flanges to support drum **12** for its rotational movements. It will be understood that sealing strips may be

provided, in the regions of the front and rear bearing means, to ensure against leakage of circulating air as it is caused to flow through the drum.

Shroud **25** communicates with horizontally extending air duct **26** within which there is disposed an electrical heater **30**. A blower **31**, preferably of the centrifugal type, is arranged to energize the several air flow circuits hereinafter to be more fully described. Under conditions of drying in rotatable drum **12** only, and with especial reference to FIGURES 2 and 4, blower **31** withdraws air from drum **12** through its front opening **13** for flow through perforate door panel **20**, lint filter **23**, and duct **22**, thereafter to direct such air through exhaust duct **27**. Air thus withdrawn from drum **12** is replaced by air entering by way of duct **26**, flowing over heater **30**, through shroud **25**, and through the perforate rear wall **24** of the drum. The above-described air circuit is designated generally by solid flow arrows in FIGURE 2 and in the somewhat diagrammatic FIGURE 4.

In especial accordance with the invention, and as is best seen in FIGURE 2, a compartment **32** having top, bottom, side and rear walls is disposed beneath drum **12**, and is provided with a drawer **33** mounted, by known means, for slidable movements into and out of compartment **32** through the open front of the latter. The compartment is closed by the front wall of drawer **33**, which wall includes a peripherally extending gasket **35** that seals against the compartment to render it air-tight when the drawer is closed. As is also best seen in FIGURE 2, and in diagrammatic FIGURE 4, compartment **32** is arranged for selective air flow communication with duct **26** toward its one end and is in air flow communication with duct **22** and the inlet to blower **31** toward its other end. The end and side walls of the drawer are solid, and the bottom wall is perforate. A flange **37** depends from the top of compartment **32** and is engaged by the rear wall of drawer **33** in its closed position to ensure that air will flow through the compartment in the path indicated by broken line arrows.

To provide for selectivity of air flow through one or the other compartments, or through both compartments simultaneously, a damper **34** is hingedly mounted on the shroud inlet for pivotal movements between the positions shown in full broken lines in FIGURES 2 and 4. Pivotal movements of damper **34** are effected by manual operation of a selector knob **36** coupled with suitable electromechanical means that will now be more fully described in connection with FIGURE 5. Such means includes a solenoid **55** operably coupled with damper **34**, as is shown somewhat diagrammatically in FIGURE 5. The construction and arrangement is such that when selector switch **57** is in the illustrated full line position, coil **55** is deenergized and damper **34** is in its illustrated full line position. When switch **57** is in the illustrated broken line position, coil **55** is energized and damper **34** is in its broken line position. For the latter position of switch **57**, and as will be hereinafter described in connection with FIGURE 5, means normally operable to rotate drum **12** is decoupled, so that the drum remains stationary.

Rotation of the drum is achieved by a pulley and belt arrangement, comprising a drive pulley **43** keyed to the shaft of motor **42**, drum **12**, and a conventional drive belt **44** that encircles pulley **43** and drum **12**. A number of known means are available for coupling and decoupling drive motor **42** from drive pulley **43**. One such means which has been found suitable is designated generally by the numeral **48** and comprises a conventional wrapped-spring clutch (not shown) operable by a solenoid **54** (FIGURE 5) to engage and to disengage pulley **43** from drive by the motor shaft. Since the drum drive and the blower drive motor are the same, the full output of motor **42** is directed to blower **31** with resultant improved drying efficiency when using compartment **32** alone.

Means are shown diagrammatically in FIGURE 5 for achieving selective operation of the various components required for the drying cycle. Such means comprises, basically, a high voltage circuit for the electrical heater **30**, a low voltage circuit comprising the drum and blower drive motor **42**, and the various operating controls, solenoid coils, indicator lights, and the like. More particularly, the illustrated circuits are energized by a high voltage source V_1 (e.g., 230 v.) and a low voltage source V_2 (e.g., 115 v.). The timer **40** includes a motor **45** connected to source V_2, in series with the timer switch contacts **46**. Drive motor **42** is connected in series electrical circuit with source V_2, timer switch contacts **46**, a conventional access door actuated switch **58**, and a drawer actuated switch **59**. Heater **30** is connected to source V_1, in series with the drive motor centrifugal switch **47**, the high temperature limit thermostat **51**, the temperature control thermostat **52**, and timer switch contacts **53**. In parallel circuit with one another are the drum drive disconnect solenoid **54**, the damper actuating solenoid **55**, and the indicator lamp **56** for compartment **32**, which parallel circuit is in series electrical circuit with the drying selector switch **57**, timer switch contacts **46**, and source V_2. A bias heater **61** for thermostat **52** is energized by source V_1 through the motor centrifugal switch **47** and timer switch contacts **46** and **62**. Timer **40** is of the conventional type in which the switch contacts are actuated by cam means driven by timer motor **45**, and manual positioning of the cam means is provided for by a control knob **49**.

In operation of the above described apparatus (FIGURES 1 to 5), and assuming that clothing is to be dried in drum **12** only, closing of door **15** closes switch **58**. Since drawer **33** is closed, its switch **59** also will be closed. Also, since compartment **32** is to be idle, knob **36** will have been turned to place switch **57** in its full line position. The control knob **49** is then rotated to close timer switch contacts **46**, **53**, and **62**. This energizes timer motor **45**, heater **30**, motor **42**, and bias heater **61**, initiating the drying cycle. In this cycle of operation, solenoids **54** and **55** are deenergized, so that clutch **48** is conditioned for drive of pulley **43** by motor **42**, and damper **34** is disposed in its full line position. The drying cycle, with air flowing as indicated by the full line arrows, will then be controlled through thermostats **51** and **52** until such time that timer **40** deenergizes the various circuits, as well as its own motor **45**, to terminate the drying cycle.

Considering the operation further, and assuming the clothes, or other articles, are to be dried in auxiliary compartment **32**, only selector knob **36** is moved to place switch **57** in its broken line position. The timer switch contacts **46** and **53**, and **62** are then closed by turning timer knob **49**. This energizes motor **42**, heater **30**, bias heater **61**, timer motor **45**, clutch solenoid **54**, and damper solenoid **55**. Motor **42** is thus decoupled from drive pulley **43**, preventing rotation of drum **12**, and damper **34** is moved to its broken line position. This prevents air flow through the drum, causing it to flow through compartment **33** only, in the flow path indicated by the broken line air-flow arrows.

With reference to FIGURE 7 there is seen an elevational view, in section, of a modified embodiment of the invention in which a conventional dryer **110**, having a slightly different air circulation circuit from dryer **10**, can be modified to accommodate adaptation thereto of an especially provided auxiliary drying chamber **132**.

As was the case with the embodiment of the invention illustrated in FIGURES 1 through 4, the dryer cabinet **11** is provided with a rotatable drum **112** having a front opening **113**. The front wall of cabinet **111** is provided with an access opening **114** aligned with the drum opening **113**, and a hinged door **115** is disposed over the opening **114**. Door **115** includes a hollow plugged section **116** provided with a perforate panel **120** that extends into opening **114**. A bottom opening **121** in the plug section is aligned with an air exhaust duct **122** across which ex-

tends a lint filter **123**. The rear wall **124** of drum **112** is perforate, and a shroud **125** extends over wall **124** and further communicates with a vertically extending duct **126** having an electrical heater **130** therein. A blower **131** is arranged to withdraw air from drum **112** for flow through lint filter **123** through duct **127** from which it is discharged. Air withdrawn from drum **112** is replaced by air drawn from the ambient atmosphere and caused to flow through the duct **126** over heater **130**, thence through the shroud **125** and into drum **112**.

A drawer **133** is positioned to extend into a separately handleable auxiliary drying compartment **132** provided with a pair of openings in its top wall. A separately handleable damper housing **70** is disposed on the bottom of cabinet **111**, one end of which housing is connected to exhaust duct **127** while the other end is ported to the atmosphere through a duct **71**. Housing **70** includes two sections **72** and **73** separated by a pivotal damper **134** movable between the illustrated generally vertical position, an intermediate position indicated by broken lines and a generally horizontal position also indicated by broken lines. Sections **72** and **73** are provided with respective downwardly extending ducts **74** and **75** that extend through corresponding openings in the bottom of cabinet **111** and in the top of compartment **132**. When moved to its generally vertical position, damper **134** prevents air from being discharged straight through duct **71** and forces it to flow downwardly through duct **74** into drawer **133**, thence through the bottom of the drawer, and out of duct **75** for flow through duct **71** to the atmosphere. A pivotal exhaust valve **78** permits flow of exhaust air from compartment **132**, while preventing retrograde flow when the compartment is not in use.

Pivotal movements of damper **134** are effected by manual operation of a knob **136**. The manually operable knob **136** projects from the front wall of cabinet **11**, and, as best seen in FIGURE 6, is connected to switch **157** and to a linkage **77**, such, for example, as a flexible cable coupled at its other end with damper **134**. Manual operation of knob **136** to preselected positions causes the switch **157** and damper **134** to be pivoted, jointly, to one of their illustrated full line and broken line positions.

When moved to its lower, generally horizontal position, damper **134** prevents air flow through compartment **132**, causing it to flow only through drum **112** as it is rotated. When moved to its intermediate position, damper **134** permits air flow through both compartment **132** and drum **112**, as the latter is rotated. Due to sealing engagement between the flange **137** and the rear wall of the drawer, air entering compartment **132** is forced to flow downwardly through the perforate drawer bottom, thence outwardly of the upper open portion of the drawer.

Circuitry is shown in FIGURE 6 for achieving selective operation of the various components required for the drying function in apparatus illustrated in FIGURES 7 and 8. As is the case in FIGURE 5, the diagram comprises basically the same high voltage circuit for the electrical heater and the same low voltage circuit comprising the drum and blower drive motor and timer motor. In view of this identity, elements of FIGURE 6 corresponding to elements shown in FIGURE 5 are designated by like numerals with the prefix **1**. Thus, for example, motor **42** (FIGURE 5) becomes motor **142** (FIGURE 6). The various operating solenoid coils and indicator light circuit elements, as well as some features of operation, differ slightly from that shown in FIGURE 5. In FIGURE 6, for example, the drying selector switch **157** provides, selectively, for drying in rotatable drum **112** only, for drying in both the drum and chamber **132**, or for drying in static drying chamber **132** only. The drying selector switch **157** and the damper positioning cable **77** are operable by the same knob **136**, as is shown in FIGURE 6.

A further understanding of the invention will be had from considering operation of the apparatus illustrated in FIGURES 6, 7 and 8. Assuming first that it is desired to dry clothes in the drum only, knob **136** is turned to the left to place switch **157** its full line position. Concurrently, damper **134** is moved to its full line position. Timer knob **149** is then turned to close timer switch contacts **146**, **153**, and **162**. Motor **142** and heater **130** are then energized, to turn the drum and to direct heated air through the drum in accordance with the air flow path designated by solid line arrows.

If it is desired to dry clothing in both drum **112** and compartment **132**, knob **136** is rotated to turn switch **157** to its intermediate (broken line) position. Concurrently, damper **134** is moved to its intermediate position (broken line). The indicator light **76** is thereby energized, and drying cycle proceeds as before, with air flowing also through compartment **132** in accordance with the broken line flow arrows.

If it is desired to dry clothes in compartment **132** only, knob **136** is turned to move switch **157** to its full right hand, broken line position. This moves damper **134** to its generally vertical position, whereby air will be forced to flow through both the drum and compartment **132**, clutch solenoid **154** will be energized to decouple drum drive pulley **143** from motor **142**, and indicator light **156** will be energized to indicate such operation. The cycle is initiated then by turning tmiber knob **149** to close timer switches **146**, **153**, and **162**, whereby the motor **142**, solenoid **154**, and light **156** are energized.

Further in accordance with the invention, and with reference to FIGURE 7, drawer **133** is provided with a wire rack **81** that may be adjustably positioned on support means **82**. For convenience of illustration, means **82** are shown only on the rear wall. Rack **81** is adapted to support articles for drying as shown, and designated generally by the numeral **83**.

As is further seen in FIGURE 7, flow of air over article **83** supported on rack **81** is ensured by a sealing strip **137** positioned on the top wall of compartment **132** and arranged to engage drawer **133** in its closed position.

Additional forms of article and clothing support are illustrated in detail in FIGURES 9, 10, 11 and 12. In FIGURES 9 and 10, for example, a cloth net **84** reinforced by tapes **85** is supported at its corners by hooks **86** provided in like regions of a drawer **233**. Further by way of example, a sweater **87** (FIGURE 9 only) to be dried is draped over the net in such manner that the body portion is supported by the net, and the sleeves hang over its edges and rest on the perforate floor of the drawer.

In FIGURES 11 and 12, a cloth net **91** is supported along its lateral edges by upwardly extending bent wire portion **92** of a wire rack **93** removably supported in the drawer **333** on ledge portions **94** of the latter. As illustrated diagrammatically in FIGURE 11, a sweater **95** is supported on the cloth net as before, with the arms draped onto the perforate floor of the drawer.

It will be appreciated that the present invention is directed to a unique dryer construction in which an auxiliary drying compartment is joined with a conventional tumble-action dryer, with only slight modification required of the latter. Such a combination enhances the utility of a conventoinal colthes dryer by making it possible to dry different articles under conditions best suited to their drying requirements.

While in the exemplary embodiments reference has been made primarily to the drying of clothes, it will be understood that the auxiliary compartment is suited to drying of a number of articles comprised of materials other than fabrics. It will be further understood that the drawers illustrated in either of the embodiments of the invention are useful as storage bins for wash-aid materials and the like, when not being used for drying clothes or other articles.

The combinations of control switch settings are illustrated by way of example only, and it is to be understood that other combinations are available to the user. For example knobs **49** and **149** each may be set to provide drying

cycles in which respective timer contacts **62** and **162** remain open, removing respective bias heaters **61** and **161** from the circuit. For example, it is usual in the drying of regular or heavier fabrics to deenergize bias heaters **61**, **161**, and to energize same in the drying of wash-and-wear or delicate fabrics. The foregoing, as well as other modifications are contemplated by the scope of the appended claims.

I claim:

1. In a laundry dryer: a vented rotatable drum for tumbling fabrics to be dried; motor means; power transmission means for coupling said motor means to said drum to rotate the same; a blower driven by said motor means; air flow duct means for directing air driven by said blower through said vented drum as it is rotated; a heater in said duct means for heating air prior to flow into said drum; an auxiliary drying compartment adjacent said drum and having air inlet and outlet ports; damper means selectively positionable to direct air from said duct means for flow through said inlet and outlet ports; and means operable to condition said transmission means to prevent rotation of said drum when said damper means is positioned to establish the recited air flow through said auxiliary compartment.

2. A dryer according to claim **1**, and further characterized in that said auxiliary drying compartment comprises: a generally box-shaped housing, said inlet and outlet ports being disposed in the top wall of said housing; a drawer in said housing having an upwardly facing open top, imperforate side walls, and a perforate bottom wall; and means for directing air from said inlet port downwardly into said compartment, through said perforate bottom wall of said drawer, thence upwardly through said outlet port.

3. A dryer according to claim **2**, and characterized in that said auxiliary compartment comprises the base structure for the recited combination.

4. A dryer according to claim **1** and characterized further in that said damper means is further positionable to provide for direction of air through both said auxiliary compartment and said drum, as the latter is caused to rotate.

5. A dryer according to claim **1**, and characterized further in that said drum and said auxiliary compartment are disposed in series air flow circuit with one another.

6. A dryer according to claim **1**, and characterized further in that said auxiliary compartment and said drum are disposed in parallel air flow circuit with one another.

7. In a laundry dryer, a pair of compartments for fabrics to be dried, one compartment comprising a vented rotatable drum for tumbling fabrics to be dried, and the other compartment disposed adjacent the one compartment and comprising a stationary region within which fabrics and articles may be placed to dry, said other compartment further comprising a generally box-shaped housing having an air inlet port and an air outlet port in the top wall thereof, a drawer in said housing having an open top, imperforate side walls, and a perforate bottom wall, and air flow control means selectively operable either to effect air flow through one of the compartments while preventing air flow through the other compartment or to effect air flow through both compartments simultaneously, said means being operable to direct air from said inlet port downwardly in said other compartment through said perforate bottom wall of said drawer and thence upwardly through said outlet port.

8. In a laundry dryer: a first compartment comprising a vented rotatable drum for tumbling fabrics to be dried; a second compartment disposed adjacent the first compartment and comprising a stationary region within which fabrics and articles may be placed to dry, said second compartment further comprising a generally box-shaped housing having air-directing means in an upper region thereof and article support means supported therein and extending across said second compartment; heater means; means for moving air in heat exchange relation with said heater means and through said compartments, said means for moving air further being operable to move air downwardly in said second compartment, through said support means, thence outwardly from said second compartment; and air flow control means selectively operable either to effect air flow through one of the compartments alone, or to effect air flow through both compartments simultaneously.

9. A laundry dryer according to claim **8**, characterized by the further inclusion of cabinet structure for said first compartment, and in that said second compartment comprises base structure for supporting said cabinet structure.

10. A laundry dryer according to claim **9**, and further characterized in that said second compartment includes means defining an access opening, and in that said support means comprises a drawer mounted for extensible and retractible movements through said access opening.

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