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(54) **CONVERTIBLE DRYING FROM VENTING TO CONDENSING IN COMBINATION WASHER-DRYER**

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(57) **ABSTRACT**

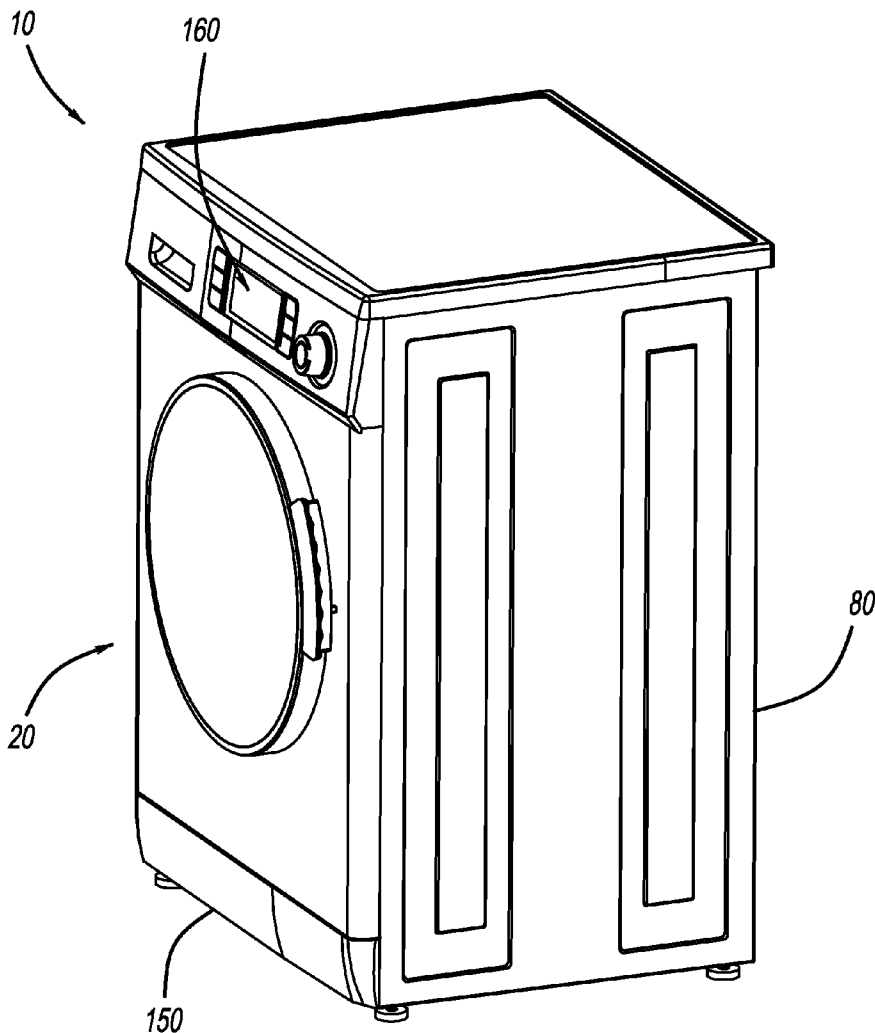
Related U.S. Application Data

(60) Provisional application No. 61/843,560, filed on Jul. 8, 2013.

A laundry dryer containing a combination of a vented and condenser dryer, in which during a process of venting, air is drawn from the surrounding, heated and blown into the drum and then exhausted through an air duct to the exterior, and during condensing drying, hot air and a fine mist of cold water are introduced into the drum and the hot air is cooled using a condensing process and the residual water is removed by a pump.

Publication Classification

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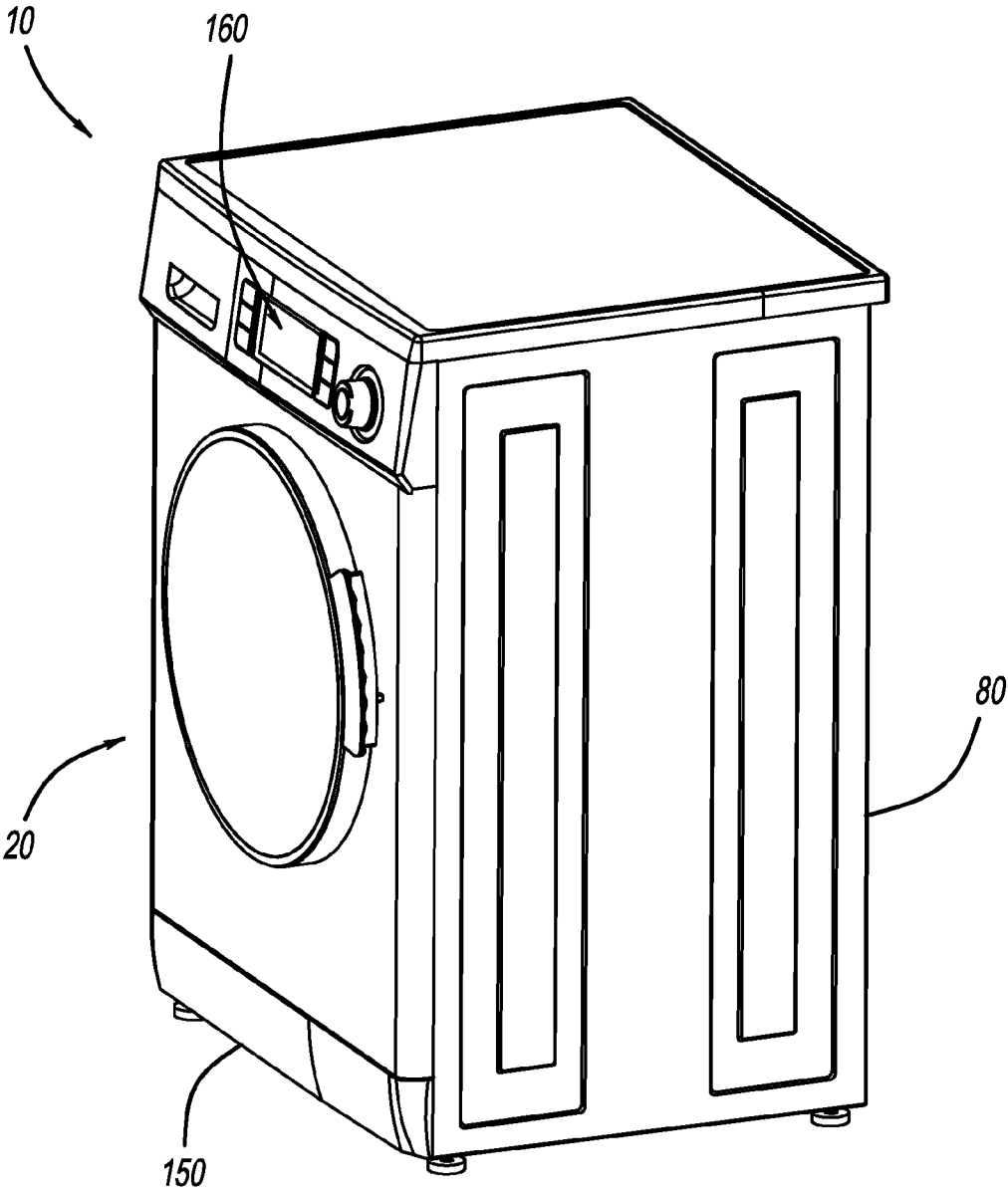


FIG - 1

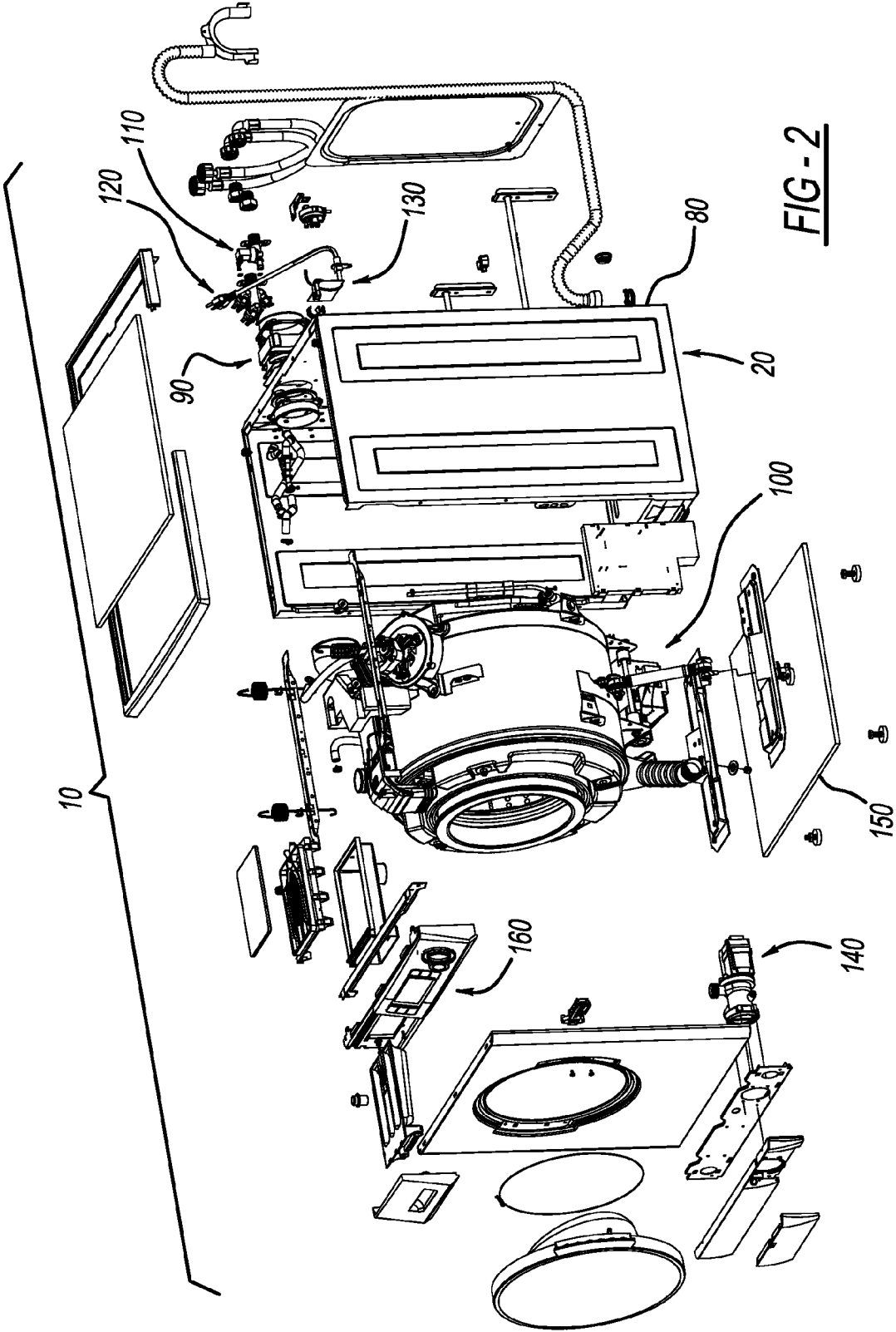


FIG-2

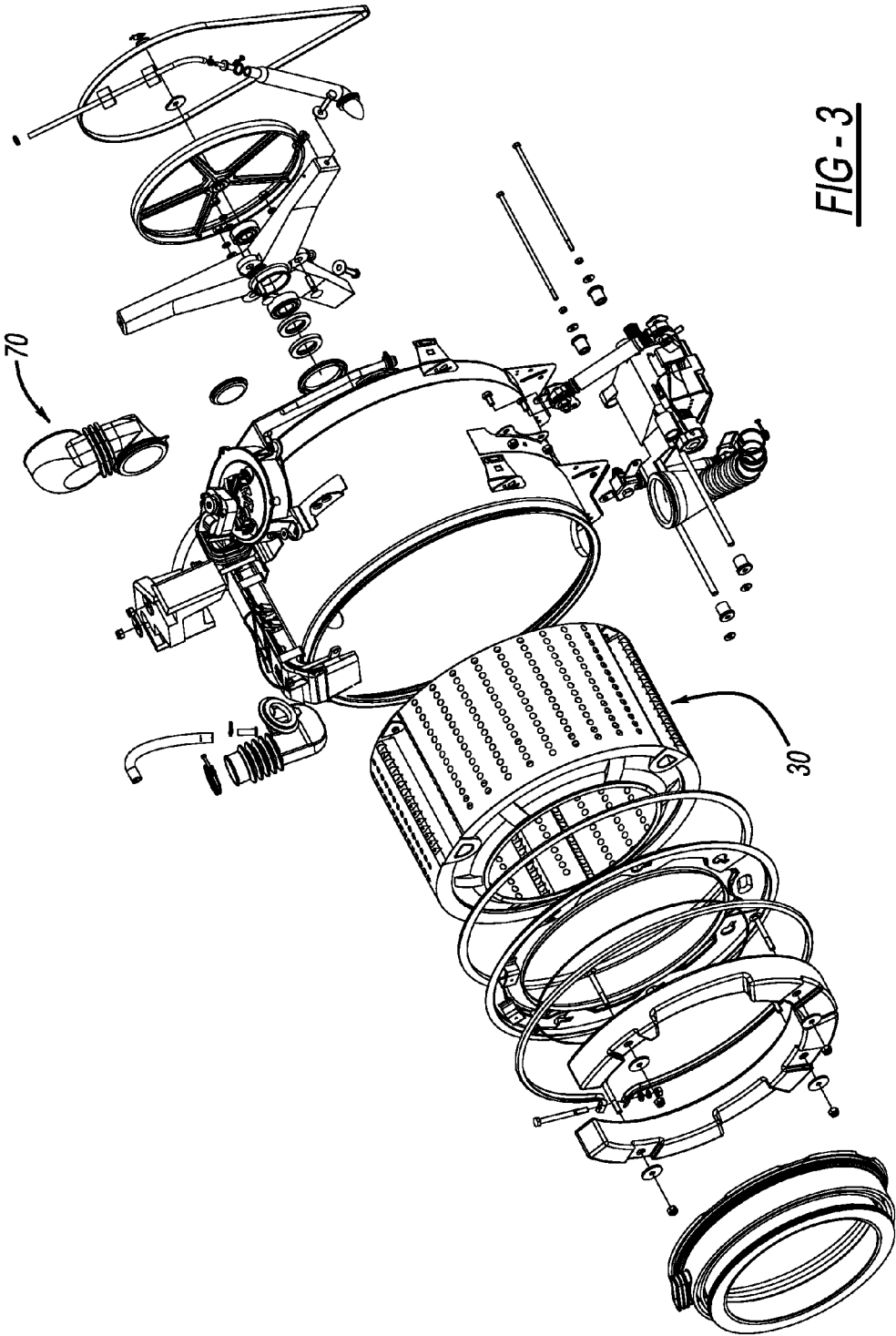
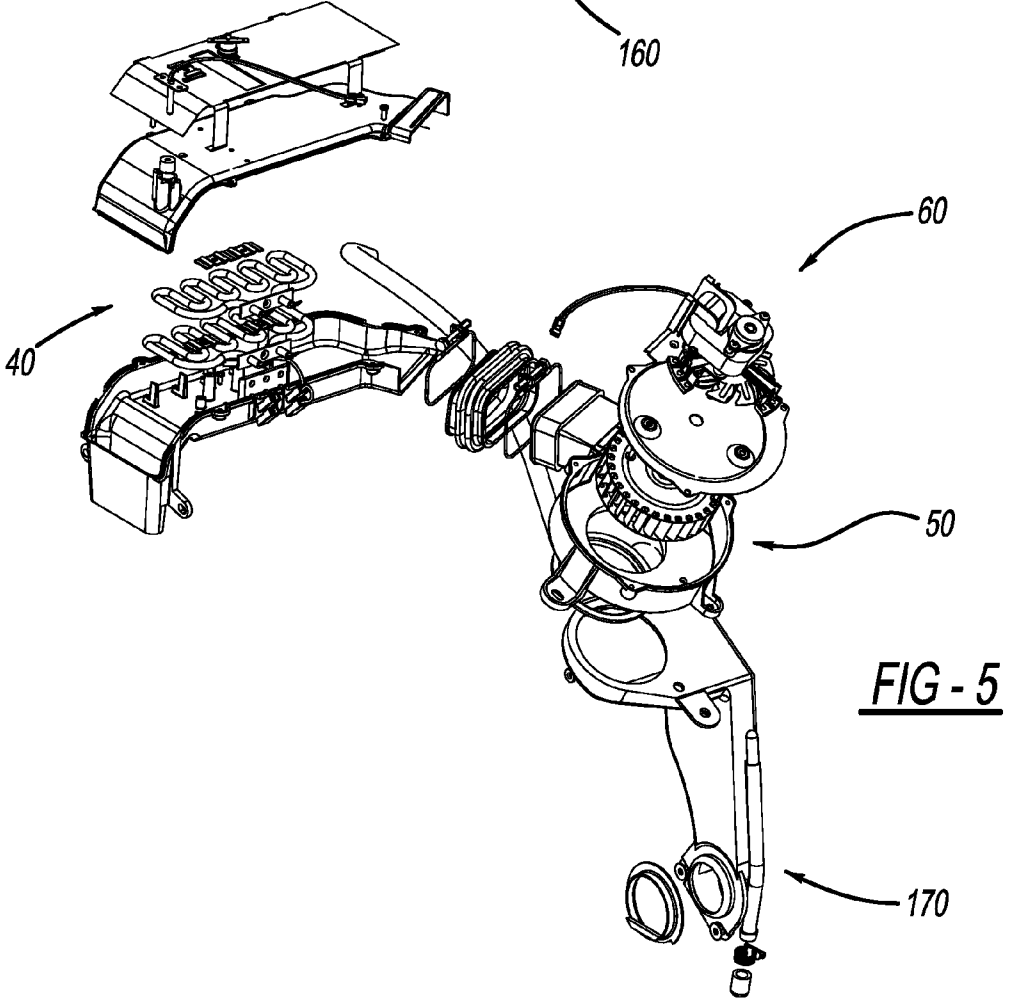
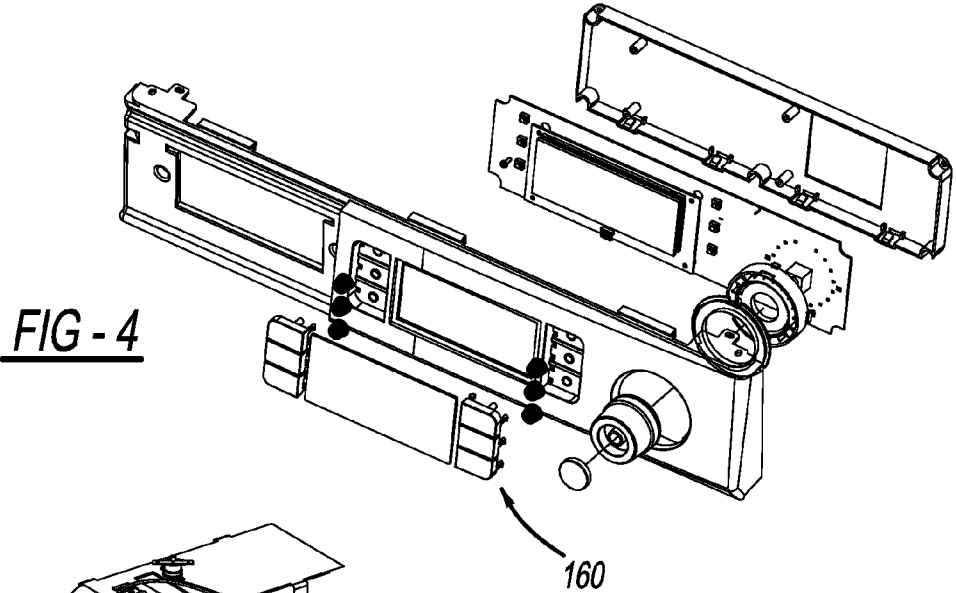


FIG-3



CONVERTIBLE DRYING FROM VENTING TO CONDENSING IN COMBINATION WASHER-DRYER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The instant application claims priority to U.S. Provisional Patent Application Ser. No. 61/843,560, filed Jul. 8, 2013, pending, the entire specification of which is expressly incorporated herein by reference.

FIELD OF INVENTION

[0002] The present invention provides a single appliance dryer combining a drying mechanism of both a vented dryer and condenser dryer with switchable controls that allow converting the drying mechanism.

BACKGROUND OF THE INVENTION

[0003] In a vented dryer, air is drawn from the surrounding area (e.g., the laundry room), then heated and blown through the clothes as the drum tumbles them about. This hot air evaporates some of the water in the damp fabrics, and the resultant moisture-laden air is then exhausted through a vent duct to the outside. U.S. Patent Publication No. 2009/0119943 describes an illustrative vented laundry dryer, the entire specification of which is expressly incorporated herein by reference.

[0004] The condenser, or ventless, dryer removes humidity by using two separate air flows. Air re-circulates inside the machine and is heated. Then, it is passed through the damp clothes where it picks up moisture. Damp air is then passed through the condenser in one direction, while the room air is passed through the condenser in the other direction. This causes the moisture in the air to condense into water which is then pumped to the water tank or out through the hose. In a condenser dryer, only heat is released, and all moisture is contained within the dryer. The condensed water can be either pumped away to a drain line (e.g., into a standpipe shared with the clothes washer) or stored in a container within the dryer to be emptied later (note: not all models offer both options). An illustrative condensation washer dryer with an additional feature of sealing of the processed air guidance, mechanical stability, production and assembly technology is described in U.S. Pat. No. 7,984,568, the entire specification of which is expressly incorporated herein by reference.

[0005] Accordingly, there exists a need for a new and improved system and method for overcoming one or more of the above-described disadvantages.

SUMMARY OF THE INVENTION

[0006] The present invention provides a single appliance dryer combining a drying mechanism of both a vented dryer and condenser dryer with switchable controls that allow converting the drying mechanism. The dryer combines two drying mechanisms of (1) venting in which hot air is introduced into the drying chamber and exhausted through an air duct to the exterior of the dryer, and (2) condensing (or ventless) in which hot air and a fine mist of cold water are introduced into the drying chamber, the hot air is cooled using a condensing process and the residual water is removed by a pump at the base of the clothes dryer.

[0007] In accordance with one aspect of the present invention, a laundry dryer containing a combination of a vented and

condenser dryer is provided, in which during a process of venting, air is drawn from the surrounding, heated and then blown into the drum and then exhausted through an air duct to the exterior, and during condensing drying, hot air and a fine mist of cold water are introduced into the drum and the hot air is cooled using a condensing process and the residual water is removed by a pump. The dryer is provided with an electronically controlled switch on the control panel, facilitating switching between the two functions, i.e., venting and condensing. A dryer of present invention is further provided with a blower fan to the exterior of the dryer to push the hot air from the drying chamber.

[0008] In accordance with another aspect of the present invention, a laundry dryer is provided, comprising:

[0009] a housing;

[0010] a rotating drum contained within the housing, wherein the drum is selectively operable to rotate in a clockwise direction and in a counter-clockwise direction on a timer schedule;

[0011] a heater selectively operable to heat air blown into the drum;

[0012] a blower and a blower motor selectively operable to drive air into the drum;

[0013] an exhaust hose from the drum to a back portion of the dryer selectively operable to push exhausting hot air to an exterior of the system;

[0014] an optional fan attached to the exterior of the dryer at an opening of the exhaust hose to the back portion of the system;

[0015] a drum motor selectively operable to rotate the drum in the clockwise and counter-clockwise directions;

[0016] a valve system including a cold water valve portion and a condensing valve portion;

[0017] a pump at a base portion of the dryer to draw out and expel a water condensate from the drum; and

[0018] an electronic controller.

[0019] In accordance with still another aspect of the present invention, the fan is adapted for pushing the exhausting hot air from a drying chamber.

[0020] In accordance with yet another aspect of the present invention, the electronic controller is adapted for switching from a vented state of operation to a condenser state of operation.

[0021] In accordance with still yet another aspect of the present invention, the cold water valve is adapted for operating in a drying cycle and drawing cold water into the dryer.

[0022] In accordance with a further aspect of the present invention, the condensing valve is adapted for taking a cold water input from the cold water inlet valve and converting it to a fine mist.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] FIG. 1 is a schematic view of an illustrative laundry dryer system, in accordance with a first embodiment of the present invention;

[0024] FIG. 2 is an exploded view of the laundry dryer system depicted in FIG. 1, in accordance with a second embodiment of the present invention;

[0025] FIG. 3 is an exploded view of the drum assembly of the laundry dryer system depicted in FIG. 1, in accordance with a third embodiment of the present invention;

[0026] FIG. 4 is an exploded view of the electronic controller of the laundry dryer system depicted in FIG. 1, in accordance with a fourth embodiment of the present invention; and

[0027] FIG. 5 is a detail view of the drying chamber assembly of the laundry dryer system depicted in FIG. 1, in accordance with a fifth embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0028] The present appliance unit is a standard tumble dryer and can be used as a vented and condenser dryer.

[0029] According to an exemplary embodiment, a laundry dryer is provided, comprising: a housing; a rotating drum contained within the housing wherein the drum rotating in clockwise direction and in counter-clockwise on a timer schedule; a heater to heat the air blown into the drum; a standard blower and motor to drive air into the drum; a hose from the drum to the back of the dryer to push the exhausting hot air to the exterior of the dryer; an optional fan attached to the exterior of the dryer at the opening of the exhaust hose to the back of the dryer; a motor to operate the drum clockwise and counter-clockwise; a cold water valve which being adapted for operating in the dry cycle and drawing cold water into the dryer; a condensing valve which being adapted for taking cold water input from the water inlet valve and converting it to a fine mist; a pump at the base of the dryer to draw out and expel the water condensate from the drum; and an electronic controller to facilitate the dryer to be switched from vented to condensing states.

[0030] According to another exemplary embodiment, the present invention provides a single appliance dryer combining a drying mechanism of both a vented dryer and condenser dryer with switchable controls that allow converting the drying mechanism. The dryer combines two drying mechanisms of (1) venting, in which hot air is introduced into the drying chamber and exhausted through an air duct to the exterior of the dryer; and (2) condensing (or ventless), in which hot air and a fine mist of cold water are introduced into the drying chamber, the hot air is cooled using a condensing process and the residual water is removed by a pump at the base of the clothes dryer.

[0031] According to yet another exemplary embodiment, a dryer is provided with an electronically controlled switch on the control panel, facilitating switching between the two functions, i.e., venting and condensing. A dryer of the present invention is further provided with a blower fan to the exterior of the dryer to push the hot air from the drying chamber. The traditional venting mechanism requires a heating element and an impeller (or blower) powered by a motor to push hot air to push hot air into the tumble drying chamber, which exhausts the hot air to the exterior of the dryer using air flow.

[0032] In a present combination washer-dryer, during the drying cycle, cold water is used to condense the moisture evaporated from the clothes, which again is pumped away through the drain line. So, during condensation, the dryer needs extra water. While during the cycle of the venting mechanism, hot air is introduced into the drying chamber and blown through the clothes. This hot air evaporates some of the water in the damp fabrics.

[0033] Referring to FIGS. 1-5, there is shown an illustrative laundry dryer system generally at 10. The system 10 includes portions and components that provide both a washing function and a dryer function in a single unit. The system 10 includes a housing 20, a rotating drum 30 contained within the housing 10. The drum 30 is selectively operable to rotate in a clockwise direction and in a counter-clockwise direction on a timer schedule (e.g., via a timer mechanism). A heater 40 is selectively operable to heat air blown into the drum 30. A

blower 50 and a blower motor 60 are selectively operable to drive air into the drum 30. An exhaust hose 70 from the drum 30 to a back portion 80 of the dryer portion of the system 10 is selectively operable to push exhausting hot air to an exterior of the dryer portion of the system 10. An optional fan 90 is attached to the exterior of the dryer portion of the system 10 at an opening of the exhaust hose 70 to the back portion 80 of the dryer portion of the system 10. A drum motor 100 is selectively operable to rotate the drum 30 in the clockwise and counter-clockwise directions. A valve system 110 includes a cold water valve portion 120 and a condensing valve portion 130 that are selectively controlled by one or more solenoids that are selectively operable to permit functioning of the respective valve portions 120, 130. A pump 140 at a base portion 150 of the dryer portion of the system 10 is operable to draw out and expel a water condensate from the drum 30. An electronic controller 160 is also provided.

[0034] The fan 90 is adapted for pushing the exhausting hot air from a drying chamber portion 170.

[0035] The electronic controller 160 is adapted for switching from a vented state of operation to a condenser state of operation.

[0036] The cold water valve portion 120 is adapted for operating in a drying cycle and drawing cold water into the dryer portion of the system 10.

[0037] The valve system 110 is adapted for taking a cold water input from the cold water inlet valve portion 120 and converting it to a fine mist.

What is claimed is:

1. A laundry dryer system, comprising:

- a housing;
- a rotating drum contained within the housing, wherein the drum is selectively operable to rotate in a clockwise direction and in a counter-clockwise direction on a timer schedule;
- a heater selectively operable to heat air blown into the drum;
- a blower and a blower motor selectively operable to drive air into the drum;
- an exhaust hose from the drum to a back portion of the dryer selectively operable to push exhausting hot air to an exterior of the system;
- an optional fan attached to the exterior of the dryer at an opening of the exhaust hose to the back portion of the system;
- a drum motor selectively operable to rotate the drum in the clockwise and counter-clockwise directions;
- a valve system including a cold water valve portion and a condensing valve portion;
- a pump at a base portion of the dryer to draw out and expel a water condensate from the drum; and
- an electronic controller.

2. The dryer as claimed in claim 1, wherein the fan is adapted for pushing the exhausting hot air from a drying chamber portion.

3. The dryer as claimed in claim 1, wherein the electronic controller is adapted for switching from a vented state of operation to a condenser state of operation.

4. The dryer as claimed in claim 1, wherein the cold water valve portion is adapted for operating in a drying cycle and drawing cold water into the dryer.

5. The dryer as claimed in claim 1, wherein the valve system is adapted for taking a cold water input from the cold water inlet valve portion and converting it to a fine mist.

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