US011028528B2

(12) **United States Patent**
Goodson et al.

(10) **Patent No.: US 11,028,528 B2**
(45) **Date of Patent: Jun. 8, 2021**

(54) **CLOTHES DRYER FIRE REDUCTION SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **16/890,095**

(22) Filed: **Jun. 2, 2020**

(65) **Prior Publication Data**

US 2020/0291565 A1 Sep. 17, 2020

Related U.S. Application Data

(63) Continuation-in-part of application No. 16/200,121, filed on Nov. 26, 2018, now Pat. No. 10,669,668.

(60) Provisional application No. 62/591,544, filed on Nov. 28, 2017.

(51) **Int. Cl.**

F26B 7/00	(2006.01)
D06F 58/30	(2020.01)
D06F 58/38	(2020.01)
D06F 103/52	(2020.01)

(52) **U.S. Cl.**

CPC ***D06F 58/30*** (2020.02); ***D06F 58/38*** (2020.02); *D06F 2103/52* (2020.02)

(58) **Field of Classification Search**

CPC D06F 58/44; D06F 58/30; D06F 58/38; D06F 2103/52

USPC 34/389, 380, 381

See application file for complete search history.

(56) **References Cited**

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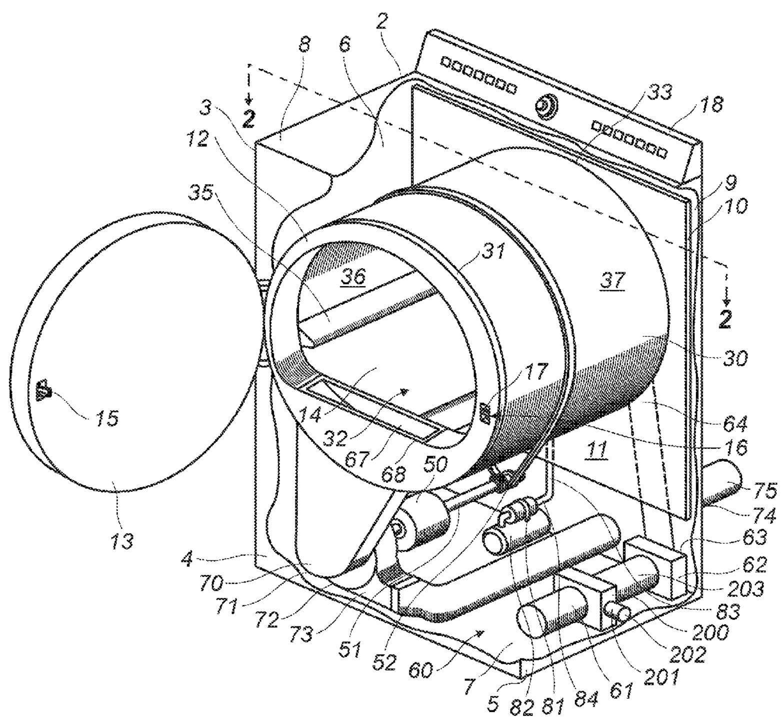
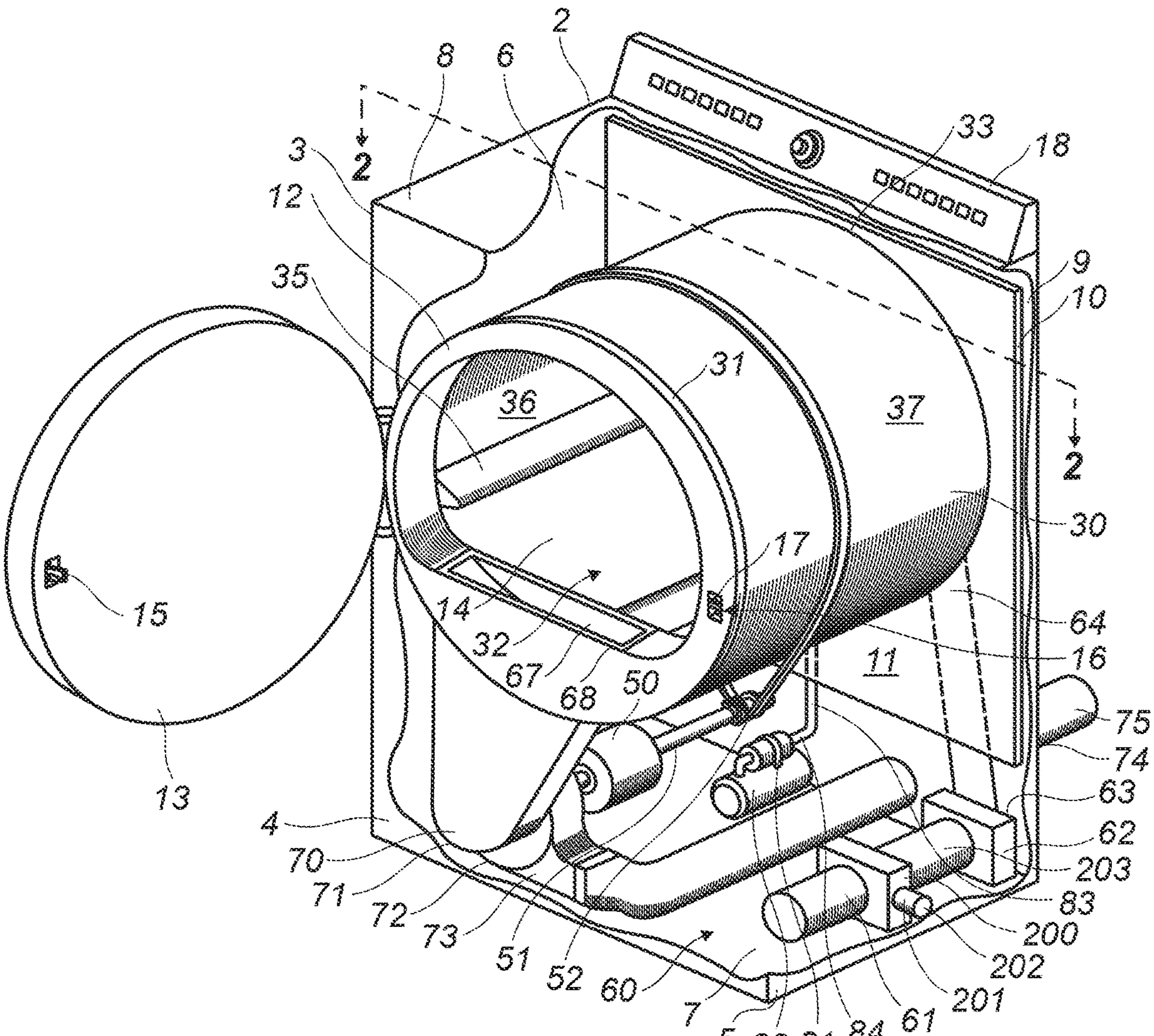
(57) **ABSTRACT**

A clothes dryer apparatus and system that reduces the buildup of electric charges within a dryer drum by introducing ions. The system monitors the voltage within the drum by taking measurements on voltage sensor assembly. The sensor assembly obtains a voltage when two areas of a fabric, or two separate items of the clothing, contact the sensor. If a threshold voltage is obtained, an ion generator introduces cations and anions into the drum of the dryer to neutralize the static charge of the clothing. The reduction of static electricity increases efficiency as the clothing items do not stick together which permits better heat flow and increases safety by reducing the amount of electrical charge within the drum.

15 Claims, 5 Drawing Sheets

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64
16
11
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75
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63
62
203
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82
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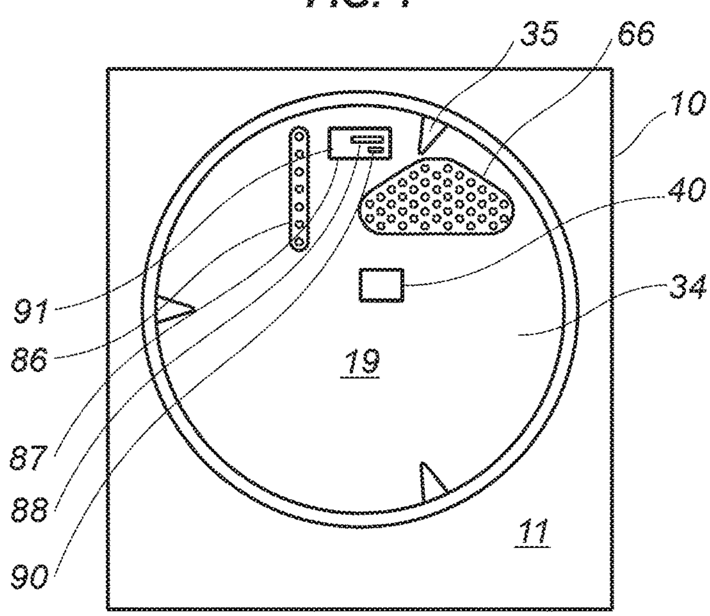
84
61

FIG. 1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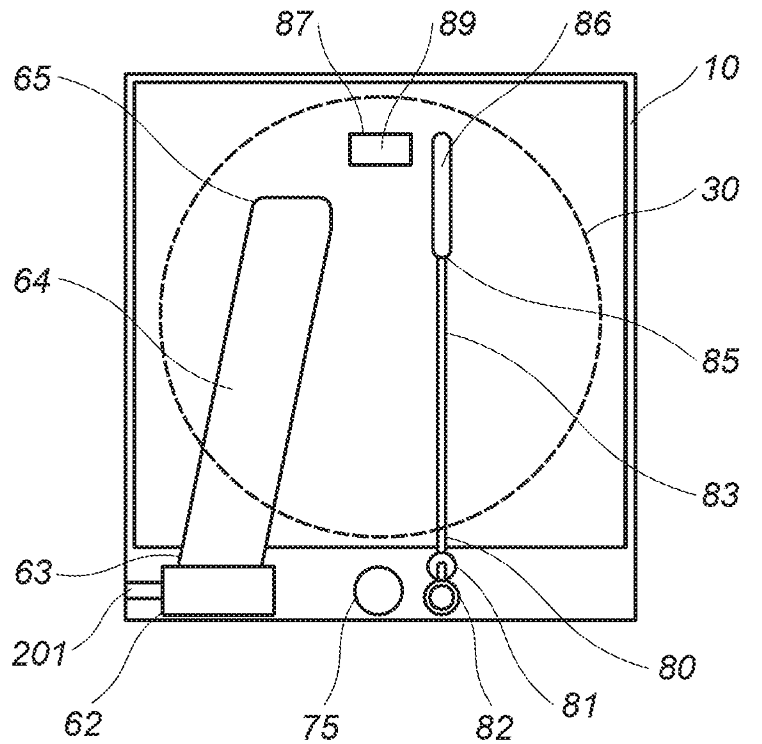
90
11

FIG. 2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64
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201
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81
80

FIG. 3

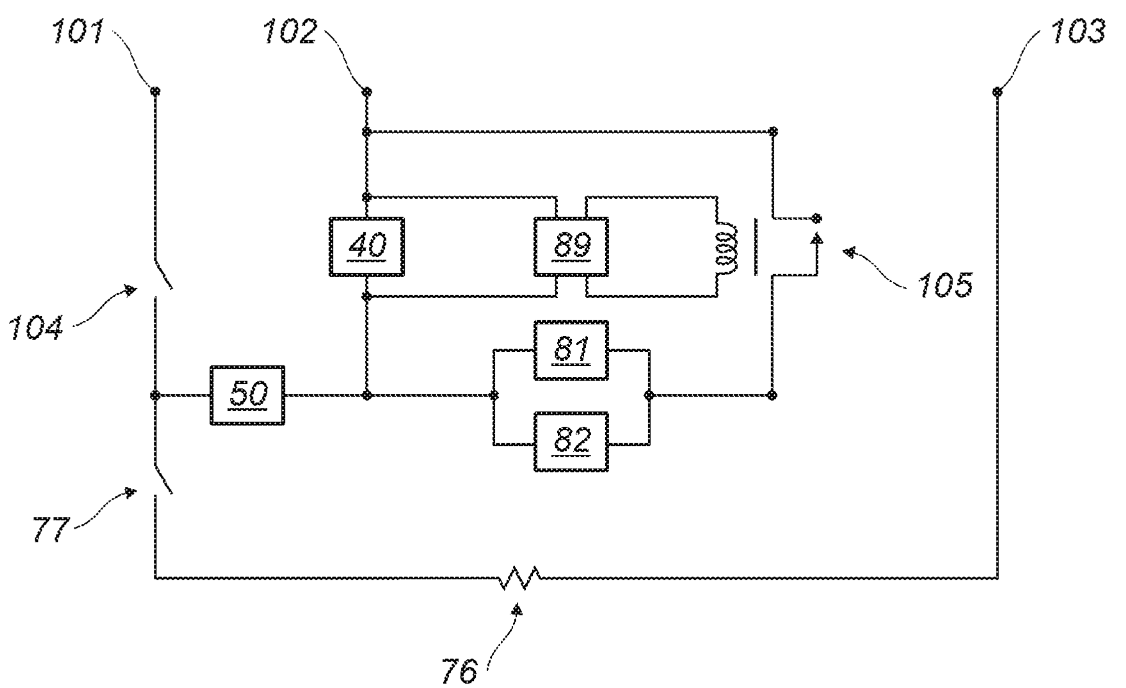
101
102
103
40
89
105
104
81
50
82
77
76

FIG. 4

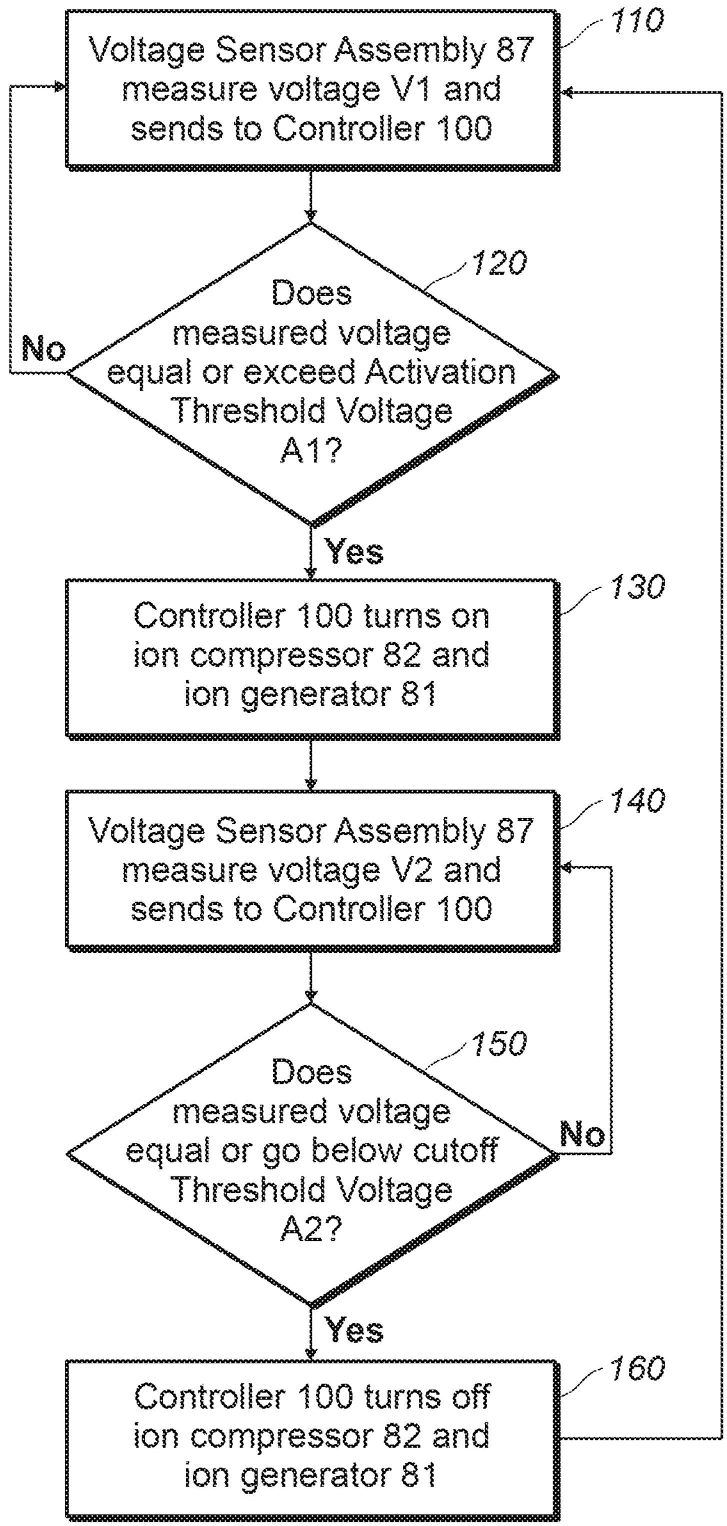
110
Voltage Sensor Assembly 87 measure voltage V1 and sends to Controller 100
120
Does measured voltage equal or exceed Activation Threshold Voltage A1?
No
Yes
130
Controller 100 turns on ion compressor 82 and ion generator 81
140
Voltage Sensor Assembly 87 measure voltage V2 and sends to Controller 100
150
Does measured voltage equal or go below cutoff Threshold Voltage A2?
No
Yes
160
Controller 100 turns off ion compressor 82 and ion generator 81

FIG. 5

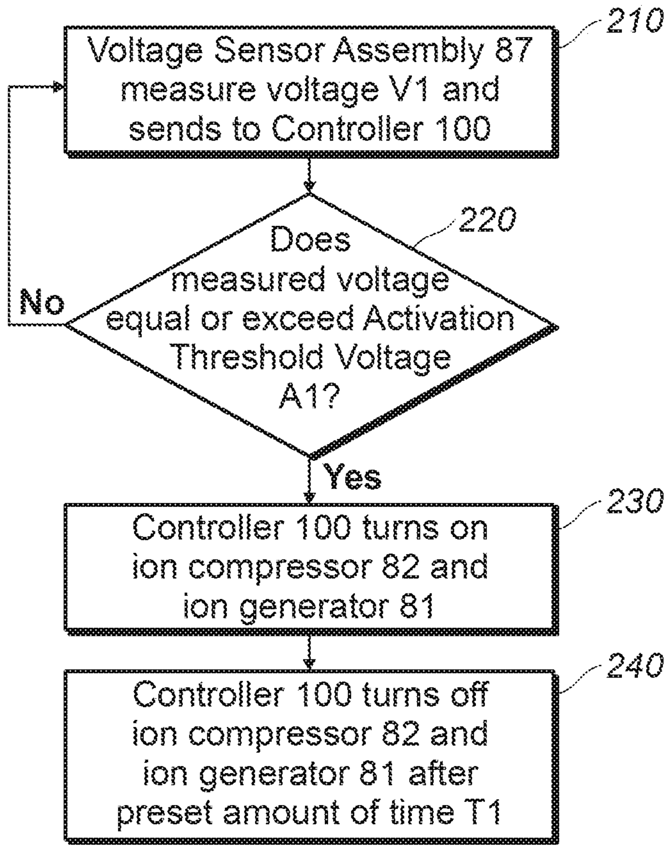
Voltage Sensor Assembly 87 measure voltage V1 and sends to Controller 100
210
Does measured voltage equal or exceed Activation Threshold Voltage A1?
220
No
Yes
Controller 100 turns on ion compressor 82 and ion generator 81
230
Controller 100 turns off ion compressor 82 and ion generator 81 after preset amount of time T1
240

FIG. 6

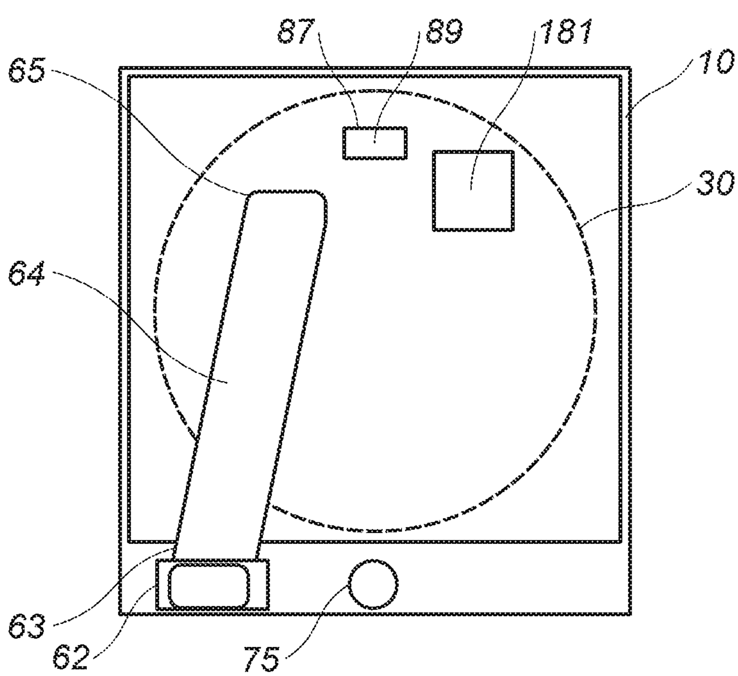
87
89
181
65
10
30
64
63
62
75

FIG. 7

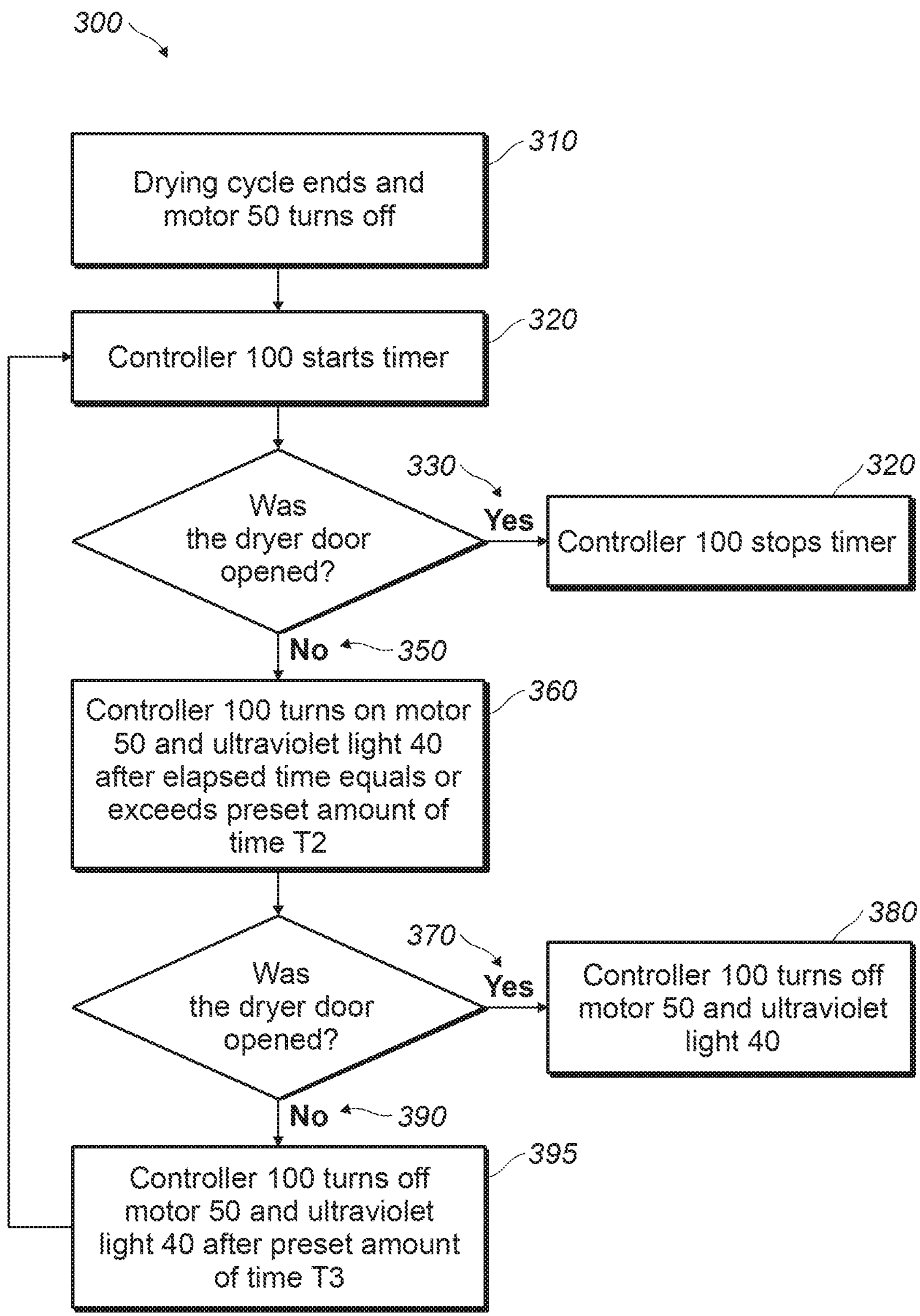
300
Drying cycle ends and motor 50 turns off
310
Controller 100 starts timer
320
Was the dryer door opened?
330
Yes
Controller 100 stops timer
320
No
350
Controller 100 turns on motor 50 and ultraviolet light 40 after elapsed time equals or exceeds preset amount of time T2
360
Was the dryer door opened?
370
Yes
Controller 100 turns off motor 50 and ultraviolet light 40
380
No
390
Controller 100 turns off motor 50 and ultraviolet light 40 after preset amount of time T3
395

FIG. 8

CLOTHES DRYER FIRE REDUCTION SYSTEM

CROSS-REFERENCES TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application Ser. No. 62/591,544 filed Nov. 28, 2017 entitled Improved Clothes Dryer and U.S. patent application Ser. No. 16/200,121 filed Nov. 26, 2018 and set to issue as U.S. Pat. No. 10,669,668. The contents of each of the above applications are incorporated by reference herein.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to clothes dryers, and more specifically, a system to prevent fire by reducing the buildup of static electricity during the drying cycle and by reducing the potential for spontaneous combustion.

2. Description of the Related Art

A clothes dryer generally comprises a cabinet, a drum, motor, mechanism for spinning the drum, a heating element, and electronic controls. The user inserts damp clothes into the dryer drum. The clothes dryer is then powered on, and the drum rotates causing the clothes to tumble while a stream of heated ambient air is blown into the drum and contacts the clothes. The heated air removes water from the clothes over time.

The tumbling of the clothes creates friction between pieces of drying fabric by causing different pieces of clothing and different layers of the same piece of clothing to rub against each other. The coulomb friction caused by the clothes rubbing together causes electrical charges to be built up and stored within the fabric of the clothes. Some fabrics receive electrons causing them to have a negative charge whereas other fabrics donate electrons causing them to have a positive charge.

The buildup of static electric charges in the drying fabric causes the clothes to clump together based on the attraction between a positively charged clothing item to a negatively charged clothing item. The clumping together impedes circulation of the heated air throughout the drum making it more difficult and time consuming for the heated air to effectively dry the clothes. As a result, the user must increase the temperature of the heated air or increase the length of the drying cycle in order to dry the clothes. These options increase the risk of fire as the static charge may ignite the oxygen contained in the ambient air. Further, these options are not energy efficient.

In addition, it is not uncommon for clothes to be left overnight (or even longer) undisturbed in a clothes dryer after the drying cycle is completed. Even after the dryer shuts off, the undisturbed mass of hot clothes, or portions thereof, may continue to self-heat depending on the presence of certain fats/oils that were not removed during the washing process. This heat can continue to build up on the clothes which can promote spontaneous combustion and a resultant fire.

One product design intended to reduce clothes clumping during the drying cycle was the introduction of metal fins in the drum. See U.S. Pat. No. 4,190,874. However, the metal fins create inefficiencies by absorbing the heat that should be delivered to the damp clothes. U.S. Pat. No. 5,416,983 teaches the use of conductive material in order to reduce static electricity build-up in the drum but this is inefficient as it relies on necessary contact with the clothes in order to dissipate the static electricity. During a cycle in the dryer, the clothes do not all touch the drum continuously resulting in inefficient static reduction. Another solution is to use anti-clump fabric sheets that are separately purchased by the consumer and put into the drum with the clothes. However, this solution generates extra expense for the user and requires the user to remember to purchase and insert the sheets.

The aforementioned solutions are imperfect and there remains a need to develop a clothes dryer with the ability to efficiently eliminate static electricity build up during the drying cycle.

BRIEF SUMMARY OF THE INVENTION

The present invention is a dryer with the capability to monitor electrical charge within the drum and turn off the flow of heated air when the electrical charge reaches a designated threshold. Once the threshold is reached, ion rich air is introduced into the drum through an ion generator. The ion rich air interacts with and neutralizes the built-up static electric charge within the drum and the clothes. The ion rich air stream penetrates the fabric layers allowing contact with the interior fabric layers. This increases the amount of contact between the ion rich air and static electricity resulting in increased neutralization of the static electricity and more effective de-clumping of the clothes which increases surface area of the clothing to allow for more efficient moisture removal.

The present invention further reduces the potential for an internal fire by decreasing the amount of oxygen in the air necessary for combustion. At or around sea level, the composition of ambient air is generally 78 percent nitrogen, 21 percent oxygen, and the remaining one percent consisting of other gaseous compounds. Ambient air has a sufficient amount of oxygen to sustain and feed a fire. An oxygen generator is used to concentrate oxygen from ambient air. The concentrated oxygen is then vented outside the dryer unit and may be vented outside the dwelling. The remaining air, now reduced of oxygen, is heated and flows into the drum to dry the clothes. In the preferred embodiment, the heated air has a percentage of oxygen between zero percent and fifteen percent. This reduces the combustibility of the air within the drum. Additionally clothes heated and dried in the absence of, or reduced presence, of oxygen last longer.

The present invention further reduces the potential for an internal fire by decreasing the conditions necessary for spontaneous combustion. A controller measures the time between the completion of the drying cycle and when the dryer door is opened as detected by the door sensor. If a sufficient time has passed without the door opening, the controller turns on the drum to permit it to rotate for a designated period of time without introduction of heat. The tumbling of clothes permits exposure to the air within the drum allowing any entrapped heat to dissipate. At the same time, a light radiation source (UV light or LED) is turned on during the additional tumbling cycle. Any moisture remaining within the clothes creates an environment for microbes to grow which generates heat. The visible and invisible optical radiation generated by the light helps destroy microbes. Thus, the tumbling after drying aerates the clothes, dissipates entrapped heat, and destroys microbes reducing the potential for spontaneous combustion.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** is a partially broken perspective view of a clothes dryer with an embodiment of the clothes dryer static electricity reduction system.

FIG. **2** is a front view of a vertical cross section of the drum with interior panel through line **2-2** in FIG. **1**.

FIG. **3** is a rear view of a clothes dryer with an embodiment of the clothes dryer static electricity reduction system.

FIG. **4** is a partial circuit diagram of an embodiment of the clothes dryer static electricity reduction system.

FIG. **5** is a flow chart showing the operation of an embodiment of the clothes dryer static electricity reduction system.

FIG. **6** is a flow chart showing the operation of an alternative embodiment of the clothes dryer static electricity reduction system.

FIG. **7** is a rear view of a clothes dryer with a second embodiment of the clothes dryer static electricity reduction system.

FIG. **8** is a flow chart showing the operation of an embodiment of the heat dissipation cycle of the clothes dryer static electricity reduction system.

DETAILED DESCRIPTION OF THE INVENTION

As seen in FIG. **1**, an embodiment of the clothes dryer static electricity reduction system **1** is positioned within a generally standard dryer **2** having a cabinet **3**, drum **20**, motor **50**, heater/blower system **60**, and ion generator system **80**. The cabinet **3** of the disclosed embodiment comprises a front panel **4**, first side panel **5**, second side panel **6**, bottom panel **7**, top panel **8** and rear panel **9** arranged in a generally cuboid box-like shape. An interior panel **10** is positioned within the cabinet **3**. The front panel **4** further comprises a drum receptacle **12**, door **13**, and an opening **14**. The door **13**, when closed, covers the opening **14**. A drum latch **15** is positioned on the interior of the door **13**. A latch receptacle **16** is positioned on the drum receptacle **12** and capable of receiving the door latch **13** in such a manner that the door **13** is shut against the door receptacle **12**. A door sensor **17** is in communication with the latch receptacle **16** and can determine if the door is open or closed. As seen in FIG. **1**, the drum receptacle **12** is shown separate from the front panel **4** but is generally integral with the first panel **4**. Alternatively, the interior panel **10** and the rear panel **9** may be the same.

The drum **30** is positioned inside the cabinet **3** between the front panel **4** and the interior panel **10**. The drum **30** is cylindrically shaped with a front circular edge **31** defining an open front end **32** and a rear circular edge **33** defining an open rear end **34**. The drum **30** rests on a wheel assembly (not shown) which is well known in the art. The front circular edge **31** seals against the drum receptacle **12** such that the drum **30** may rotate while the drum receptacle **12** remains stationary. A portion of the open front end **32** corresponds with opening **14**. The door **13**, when closed, covers the open front end **32**. The rear circular edge **33** of the drum **30** seals against the front surface **11** of the interior panel **10** such that the drum **30** may rotate while the interior panel **10** remains stationary. Connections of the drum to the interior panel **10** and the drum receptacle **12** are well known in the art. A portion **19** of the front surface **11** of the interior panel **10** is exposed to the interior of the drum **30** through the open rear end **34**.

In the disclosed embodiment, a motor **50** having a drive shaft **51** is mounted to the bottom panel **7** of the cabinet **3**. A drive belt **52** wraps around the outer surface **37** of the drum **30** and is rotatably attached to the drive shaft **51**. In operation, the motor **50** spins the drive shaft **51** ultimately causing the drive belt **52** (and drum **30**) to spin. Such operation is well known in the art and may include idler pulleys and other mechanisms that control revolution of the drum **30**.

The drum **30** has baffles **35** protruding from the interior surface **36** of the drum **30**. In an embodiment of the clothes dryer static electricity reduction system, the baffles **35** are constructed from a plastic material impregnated with carbon fiber or aluminum shards. A typical dryer has three baffles **35** that run longitudinally (extending from the front circular edge **31** to the rear circular edge **33**) and are generally spaced one hundred and twenty degrees relative to another.

An ultraviolet light **40** is mounted to the interior panel **10** such that it emanates light into the interior of the drum **30**. The ultraviolet light **40** may be an LED light, non-visible laser, or other ultraviolet source. The ultraviolet light **40** may be of sufficient strength to kill, sterilize, and/or limit growth of mold and mildew within the drum **30** and/or clothes within the drum **30**.

The heater and blower system of a typical dryer are well known in the art and further modified to reduce the potential for a fire. The air supply intake **61** is fluidly connected to an oxygen concentrator **200**. An exhaust conduit **201** extends from the oxygen concentrator **200** to an oxygen outlet **202**. The oxygen outlet **202** is positioned within the first side panel **5** where it may exhaust gas outside the interior cabinet of the dryer **1** and may be connected to a conduit that connected to an outlet outside the dwelling. The heater air supply intake **203** extends from the oxygen concentrator **200** to the heater housing **62**. The oxygen concentrator **200** extracts oxygen (O_2) from the ambient air and exhausts the oxygen through the exhaust conduit **201** and out the oxygen outlet **202**. The remaining ambient air, generally comprising nitrogen (N_2) is then supplied to the heater housing **62** through the heater air supply intake **203**. In the preferred embodiment, the oxygen concentration of the air fed into the heater is less than 15 percent and preferably close to zero percent.

A heating element **76** is positioned within heater housing **62** and is controlled by a thermostat **77**. The first end **63** of the drum inlet conduit **64** is fluidly connected to the heater housing **62** and the second end **65** of the drum inlet conduit **64** is fluidly connected to the drum inlet **66** of the interior panel **10**. The drum inlet **66** is in fluid communication with the interior of the drum **30**. A drum outlet **67** is in fluid communication with the interior of the drum **30** and positioned within the drum receptacle **12**. A lint catcher **68** may be placed within the drum outlet **67**. The first end **69** of the drum outlet conduit **70** is fluidly connected to the drum outlet **67** and the second end **71** of the drum outlet conduit **70** is fluidly connected to the blower housing **72**. A blower wheel is positioned within the blower housing **72** and connected to the drive shaft **51**. The first end **73** of the exhaust conduit **74** is fluidly connected to the blower housing **72**. The exhaust conduit **74** extends through the rear panel **9** of the cabinet **3** and terminates in an outlet **75**. The outlet **75** may be fluidly connected to an additional conduit that routes exhaust outside a room. One skilled in the art understands that the location and design of the heat and exhaust system components varies between different styles and brands of dryers.

As seen in FIGS. **1-3**, the ion generator system **80** comprises an ion generator **81** fluidly connected to an air compressor **82**. The ion generator system **80** further comprises a non-metallic conduit **83** with the first end **84** in fluid communication with the ion generator **81** and the second end **85** of the non-metallic conduit **83** is fluidly connected to the ion inlet **86** of the interior panel **10**. The ion inlet **86** is in fluid communication with the interior of the drum **30**. The ion generator system **80** further comprises a voltage sensor assembly **87** further comprising a sensor **88** and a voltmeter **89**. In the disclosed embodiment, the sensor is mounted on the interior face **11** of the interior panel **10** such that it can measure voltage from within the drum **30**. In the disclosed embodiment the sensor **88** comprises two metal contact strips **90** imposed on a polymer block **91**. The voltmeter detects the voltage differential between the two metal contact strips **90**. In the disclosed embodiment the ion generator is a balanced ion generator generating cations and anions. The voltage sensor assembly **87** may be integral with ion generator **81** or a separate component. One skilled in the art understands the location and design of the sensor **88** may be varied depending on the components of the dryer and the sensor may be positioned in numerous locations so long as a voltage may be measured on clothing between two contact strips, regardless of where the contact strips are within the dryer. For example, the sensor may be the same type of voltage sensor utilized in existing dryers to determine moisture content of the clothes.

A controller **100** (identified in FIG. **5**), or other logic board including processors, is in electronic communication with a control panel **18** on the cabinet **3**, the door latch sensor **17**, the heater/blower system **60**, and the ion generator system **80**. As found in industry standard dryers, the controller **100** may also be in electronic communication with various additional sensors and able to control the heater/blower system **60** based on inputs from the control panel **18**, sensors of operation, and safety sensors related to performance of the heater/blower system **60**. A power supply powers the light **40**, motor **50**, heater/blower system **60**, the ion generator system **80**, and the controller **100**. Various additional relays, as known in the art, may be utilized such as a relay or switch between the controller **100** and the light **40**, motor **50**, heating element **76**, thermostat **77**, ion generator **81**, and/or air compressor **82**. Electronically, the ion system **80** may have other controls such as the light **40**, ion generator **81**, and/or air compressor **82** may not be able to turn on unless the motor **50** is operating.

FIG. **4** is a partial circuit diagram of the dryer **2**. The supply conductors **101**, **102**, and **103** provide the power input for the dryer **2** with supply conductors **101** and **103** as **120** volt legs and supply conductor **102** as the neutral leg. Switch **104** is an on/off switch that controls power to the clothes dryer static electricity reduction system **1** and dryer **2**. The supply conductors **101** and **103** provide two hundred and forty volts to the heating element **76** and thermostat **77** and one hundred and twenty volts to the motor **50**, ion generator **81**, air compressor **82**, ultraviolet light **40**, and voltmeter **89**. A relay **105** is in electrical communication with the voltmeter **89** and when a certain threshold voltage is exceeded, be the relay **105** is activated to complete the circuit for power to flow to the ion generator **81** and air compressor **82**.

It should be readily appreciated the circuitry may be configured in a multitude of ways to require certain precursors such that the motor **50** must be on before the ion generator **81**, air compressor **82**, ultraviolet light **40**, and/or voltmeter **89** may operate. Conversely, the circuitry may be configured such that the air compressor **82** is always operating when the drum **30** to provide a continued flow of air to cool the ion generator **81** even when the ion generator **81** is not generating ions.

The operation of the clothes dryer static electricity reduction system is described in reference to FIGS. **1-5**. The user opens the drum door **14** and inserts damp clothes and/or other materials into the drum **30** and closes the door **14**. Using the control panel **18**, the user selects the desired heating and dryer cycle. The standard heater/blower system **60** operates by powering the motor which rotates the drive shaft **51**. The rotation of the drive shaft **51** causes the drive belt **52** to rotate which in turn causes the drum **30** to spin. Furthermore, the rotation of the drive shaft **51** also causes the blower wheel within the blower housing **72** to turn. The rotation of the blower wheel draws air from the drum **30** through the lint catcher **68** and drum outlet conduit **70**. In turn, this causes air to be drawn into the drum through the drum inlet conduit **64** from the heater element housing **62** and the air inlet **61**. Once the air passes through the blower housing **72**, the blower wheel pushes the air through the exhaust conduit **74** and through the exhaust outlet **75**.

The controller **100** operates the thermostat **77** which controls the heating element **76**. If the heating element **76** is on, the air passing over the heating element **77** is heated prior to entering the drum inlet conduit **64** and ultimately the drum **30**. The heated air passes over and through the damp clothes causing the moisture in the clothes to evaporate in the heated air. Clothes that are not clumped together dry faster as the clothes have more surface area for the heated air to contact. The moisture content of the air passing thorough the exhaust conduit **74** may be measured for dryer performance and may alter the cycle time based on predetermined settings from the control panel **18** and/or logic within the controller **100**. Alternatively, the heating element may be off and then unheated air is drawn into the drum **30**.

As the drum **30** spins, friction is created as the clothes rub against each other, and/or as layers of one piece of clothing rub against other layers. This friction creates a buildup of static electrical charge which is stored in the fabric of the clothes. Some portions of the clothes gain electrons and other lose electrons resulting in the clothes, or layers of a clothing article, to cling together due to the positive and negative charges attracting to each other. In the disclosed embodiment, the baffles **35** are impregnated with conductive material in order to cancel some of the static electrical charge. More specifically, the conducive polymer composition of the baffles **35** serves as a "short" circuiting member so as to cause charge cancellation on the portions of the drying clothing that make contact with the electrically conductive baffles **35**. However, baffles **35** cannot generally absorb electric charge at the rate it is being generated as the static electric charge in the clothes increases over time.

As seen in FIG. **5**, during operation and while the drum **30** is rotating, the ion system **80** continuously measures the electrical charge within the drum **30**. As the drum spins, the clothes tumble and periodically contact the two metal contact strips **90** of the sensor **88**. Upon contact, the voltmeter measures **110** the voltage and electronically sends the voltage measurement V**1** to the controller **100**. The controller **100** compares **120** the absolute value of the measured voltage V**1** to a predetermined activation threshold voltage

A1. The predetermined activation threshold voltage **A1** may be set to at 200 volts. If the absolute value of the measure voltage **V1** is less than the predetermined activation threshold voltage **A1** then measurements **110** are repeated. If the measured voltage **V1** is equal to or exceeds the predetermined activation threshold voltage **A1** then the controller **100** activates the ion generator **81** and air compressor **82** via electronic signal **130**. As seen in FIGS. **1-4**, when the ion generator **81** and air compressor **82** are turned on, the air compressor **82** forces air through the conduit **83**. The ion generator **81** creates ions and introduces those ions into the air stream of the conduit **83**. The air compressor may modulate the air flow to create varied levels of ion penetration into the clothes. The ion rich air is forced through the ion inlet **86** where it enters the drum **30**. The ions in the ion rich air interact with the cations and anions of the electrically charged clothing to neutralize the charge.

Referring back to FIG. **5**, the voltmeter **89** to measures voltage obtained from the sensor **88** during the operation of the ion generator **81** and air compressor **82** and sends the measured voltage **V2** to the controller **100**. The controller **100** compares **150** the absolute value of the measured voltage **V2** to a predetermined cutoff threshold voltage **A2**. The predetermined cutoff threshold voltage **A2** may be the same as the predetermined activation threshold voltage **A1** or lower. If the absolute value of the measured voltage **V2** is greater than the predetermined cutoff threshold voltage **A2** then the measurements **140** are repeated. If the measured voltage **V2** is equal to or less the predetermined cutoff threshold voltage **A2** then the controller **100** shuts off the ion generator **81** and air compressor **82** via electronic signal **160**. The voltmeter then measures **110** the voltage and electronically sends the voltage measurement **V1** to the controller **100** and the cycle is repeated.

In a modification to the above, the controller **100** may not turn off the ion generator **81** and air compressor **82** until the predetermined threshold cutoff voltage **A2** is reached and the ion generator **81** and air compressor **82** have run for a predetermined amount of time.

The activation and run cycle of the ion generator **81** and air compressor **82** may be modified by settings on the control panel **18** and/or preprogrammed in the controller **100**. In an alternative embodiment as disclosed in FIG. **6**, the voltmeter measures **210** the voltage and electronically sends the voltage measurement **V1** to the controller **100**. The controller **100** compares **220** the absolute value of the measured voltage **V1** to a predetermined activation threshold voltage **A1**. If the absolute value of the measure voltage **V1** is less than the predetermined activation threshold voltage **A1** then measurements **210** are repeated. If the measured voltage **V1** is equal to or exceeds the predetermined activation threshold voltage **A1** then the controller **100** activates the ion generator **81** and air compressor **82** via electronic signal **230**. The controller **100** automatically turns off the ion generator **81** and air compressor **82** after a preset amount of time **T1**. After the ion cycle is terminated in this situation, the voltmeter measures **210** the voltage and the cycle is repeated.

In alternative embodiments, the heating element may be turned off while the ion generator **81** and ion compressor **82** are in operation.

As seen in FIG. **7**, an alternative embodiment of the present invention does not utilize an air compressor in conjunction with the ion generator. Instead, the ion generator **181** is positioned on the interior panel **10** in direct communication with the ion inlet **86**. In this embodiment, the voltage sensor assembly **87** may be integral with ion generator **181** or a separate component. In this embodiment, the controller **100** is programmed to turn on the ion generator **181** via electronic signal when the voltage, as determined by the voltmeter **89**, reaches a predetermined activation threshold voltage **A1** as disclosed in FIGS. **4** and **5**. When the ion generator **181** is turned on, the ions are in direct contact with the ion inlet **86** where the ions are dispersed into the drum **30** by diffusion. The ions in the ion rich air interact with the cations and anions of the electrically charged clothing to neutralize the charge. During the operation of the ion generator **81** and air compressor **82**, the voltmeter **89** continues to measure voltage obtained from the sensor **88**. Once the voltage drops below the predetermined cutoff threshold voltage **A2**, the controller **100** sends an electronic signal to turns off the ion generator **181**. The predetermined cutoff threshold voltage **A2** may be the same as the predetermined activation threshold voltage **A1** or lower. Furthermore, the controller **100** may not turn off the ion generator **110** until the predetermined threshold cutoff voltage **A2** exists for a certain period of time such that the voltage measurements must remain below the predetermined cutoff threshold voltage **A2** for a predetermined period of time. Ion generator **110** may be controlled by the controller **100** in the same manner as described for the embodiment encompassing an air compressor **82**.

An exemplar source of ions is the ion generator made by Keyence, including the SJ series. Some ion generators have internal static sensing circuits, which would negate the need for voltage measuring circuit which would permit the voltage sensor assembly **87** to be integral with the ion generator **81**, **110**. In accordance with standard dryer fire safety, the last ten minutes or so of clothes drying makes use of tumbling only to help dissipate trapped/entrained heat flux within the fabric layers. This "cooling off" cycle remains subject to static electrical build up. By injecting the neutralizing ions during the cooling off period, the layers of fabric can better cool off in that they do not stick together as much.

While use of a controller or processor to control the operation of the ion generator **81**, **100** is preferred, other circuit mechanisms may be employed such as causing an SPDT relay to energize, based on a preset voltage reading, that transfers power from the heating element to the ion generator based on the movement of the coil.

As seen in FIG. **8** the heat dissipation cycle **300** selectively operates the motor **50** and ultraviolet light **40** depending on certain events. Once the drying cycle ends **310**, meaning the drum **30** is no longer rotating, the controller **100** starts a timer **320**. If the controller **100** receives a signal that the door **14** was opened **330**, as detected by the door latch sensor **17**, then the controller **100** stops the timer **340**. If the door is opened, it is presumed the clothes were removed and/or ambient air was introduced into the drum **30** through door opening **13**. If the controller **100** receives a signal that the door **14** was not opened **350**, as through the failure to detect the opening of the door **14** by the door latch sensor **17**, then the controller **100** turns on the motor **50** which permits the drum **30** to rotate and the ultraviolet light **40** after the elapsed time as determined by the timer equals or exceeds a preset amount of time **T2** **360**. In the preferred embodiment, the preset amount of time **T2** may be 30 minutes but any elapsed time period may be useful to assist in dissipating entrapped heat and microbe growth. If the controller **100** receives a signal that the door **14** is opened while the motor **50** and the ultraviolet light **40** are operating **370**, then the controller **100** turns off the motor **50** and the ultraviolet light **40** **380**. If the door is not opened while the motor **50** and ultraviolet light **40** are operating **390**, the controller **100** turns off the motor **50** and ultraviolet light **40** after a preset amount of time T**3** **395**. In the preferred embodiment, the preset amount of time T**3** may be 10 seconds but may be longer depending on dampness of clothes, amount of heat dissipation cycles **300** executed, or user preferences. The controller **100** then restarts the timer **320** and the heat dissipation cycle **300** is repeated.

It should be readily appreciated the heat dissipation cycle **300** may operate in a multitude of matters including linking the heat dissipation cycle **300** with a wrinkle resistant cycle, limiting the number of heat dissipation cycles **300**, utilizing only the motor **50** and not utilizing the ultraviolet light **40**, utilizing only the ultraviolet light **40** and not the motor **50**, or utilizing the ultraviolet light **40** separate from motor **50**. Furthermore, the preset amount of time T**2** and preset amount of time T**3** may be variable and/or dependent upon the number of heat dissipation cycles **300** executed. For example, the preset amount of time T**2** may be shorter for the first heat dissipation cycle **300** and increase in length as more heat dissipation cycles **300** are executed. Moreover, the preset amount of time T**3** may be longer the first heat dissipation cycle **300** and decrease in length as more heat dissipation cycles **300** are executed.

The embodiment has been described with reference to a standard dryer cabinet. Those skilled in the art understand that the static electricity reduction system disclosed can be modified to be used in any dryer. The components can be arranged differently and mounted in different places within the interior of the dryer. Additionally, the source of heat could be a fueled gas burner, as opposed to a resistance heater. The conductive polymer fins can also be made from a conductive metal. It is also anticipated that some clothes/fibers may dry better if both heated air and injection of ions by way of compressed air are carried out simultaneously.

The invention claimed is:

1. A fire reduction system for a clothes dryer comprising:

an oxygen generator having an ambient air intake, an oxygen gas outlet, and a nitrogen gas outlet wherein the oxygen generator separates the ambient air into an oxygen gas rich composition which exits through the oxygen gas outlet and a nitrogen gas rich composition which exits through the nitrogen gas outlet;

a heater fluidly connected to the nitrogen outlet; and

a drum fluidly connected to the heater.

2. The fire reduction system for a clothes dryer of claim **1** wherein the nitrogen gas rich composition is less than fifteen percent oxygen.

3. The fire reduction system for a clothes dryer of claim **2** further comprising:

a voltage sensor positioned to measure the voltage of at least a portion of the clothing within the drum;

an ion source in fluid communication the interior of the drum; and

a controller in electrical communication with the voltage sensor and the ion source.

4. The static electricity reduction system for a clothes dryer of claim **3** wherein the controller activates the ion source upon the voltage sensor measuring a predetermined activation threshold voltage.

5. The static electricity reduction system for a clothes dryer of claim **4** wherein the controller deactivates the ion source upon the voltage sensor measuring a predetermined cutoff threshold voltage.

6. The static electricity reduction system for a clothes dryer of claim **5** wherein the controller deactivates the ion source upon the passage of a predetermined amount of time.

7. The static electricity reduction system for a clothes dryer of claim **4** wherein the controller deactivates the ion source upon the passage of a predetermined amount of time.

8. The static electricity reduction system for a clothes dryer of claim **4** further comprising a heat source in fluid communication with the interior of the drum wherein the controller deactivates the heat source is programmed to cycle between periods in which the heat source is on and the ion source is off, and periods in which the heat source is off and the ion source is on.

9. The static electricity reduction system for a clothes dryer of claim **3** wherein the ion source further comprises an ion generator fluidly connected to an air compressor.

10. The static electricity reduction system for a clothes dryer of claim **9** wherein the air compressor is a modulating air compressor.

11. The static electricity reduction system for a clothes dryer of claim **3** wherein a non-metallic conduit connects the ion source to the drum.

12. The static electricity reduction system for a clothes dryer of claim **9** wherein a non-metallic conduit connects the ion source to the drum.

13. The static electricity reduction system for a clothes dryer of claim **3** further comprising an ultraviolet light source in visual communication with the interior of the drum.

14. The static electricity reduction system for a clothes dryer of claim **3** further comprising at least one baffle within the drum wherein the baffle contains a conductive material.

15. The static electricity reduction system for a clothes dryer of claim **14** wherein the baffle is a plastic material containing carbon fiber or aluminum shards.

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