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(54) **LAUNDRY TREATING APPLIANCE AND METHOD OF CONTROL**

(57) A laundry treating appliance (10) having a cabinet (12) defining an interior of the laundry treating appliance (10). The laundry treating appliance (10) also having a treating chamber (18) located within the interior and having an access opening and a door (24) movably mounted to the cabinet (12) between opened and closed

positions to selectively open/close the access opening. A door stop assembly (35) carried by one of the cabinet and door and operable between a non-venting position, where the door (24) is movable between the opened and closed positions, and a venting position, where the door (24) is prevented from moving to the closed position.

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Description

BACKGROUND OF THE INVENTION

[0001] Generally, laundry treating appliances such as washing machines, have doors that rotate around a hinge to open and close the interior of the laundry treating appliance. A latch/lock mechanism can be provided to hold the door closed while in operation.

BRIEF SUMMARY

[0002] One exemplary embodiment of the description is a laundry treating appliance that has a cabinet defining an interior of the laundry treating appliance and a treating chamber located within the interior and having an access opening. The laundry treating appliance has a door movably mounted to the cabinet between an open position and a venting position. The door stop assembly has a door stop carried by the cabinet that is moveable between at least a venting position where the door is maintained ajar and a non-venting position where the door is in a closed position. The door stop assembly can engage the door in the venting position and move the door to the closed position in response to a user input.

[0003] Another exemplary embodiment of the description is a laundry treating appliance having a cabinet that defines an interior of the laundry treating appliance. The laundry treating appliance also has a treating chamber located within the interior and has an access opening. A door is movably mounted to the cabinet between at least venting and closed positions to selectively vent/close the access opening. A door stop assembly is carried by the cabinet and is operable between a venting position where the door is prevented from moving to the closed position and a non-venting position where the door is in the closed position. A latch is located on the door. The door stop assembly is operable to engage the latch on the door and move the door from the venting position to the closed position.

[0004] Another exemplary embodiment of the description is a method of preventing closing of an appliance door relative to a cabinet during non-operation of the appliance. The method comprises the step of automatically moving a door stop assembly from a non-venting position, where the door is closed, to a venting position, where the door is prevented from moving to the closed position upon the movement of the door from the closed position to the venting position.

[0005] Another exemplary embodiment of the description is a method of closing an appliance door relative to a cabinet during operation of the appliance. The method comprises the step of receiving a user input at a controller of the appliance and in response to the received user input by the controller, activating a door stop assembly to move a door stop from an extended position, where the door is prevented from moving to a closed position to a retracted position, where the door is closed. Activa-

tion of the door stop assembly causes the door stop to engage a latch on the door and causes the door to move to the closed position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the drawings:

FIG. 1 is a schematic view of a laundry treating appliance in the form of a washing machine.

FIG. 2 is a schematic of a control system of the laundry treating appliance of FIG. 1.

FIG. 3 is a top view of a door assembly with a door stop assembly in a venting position for the laundry treating appliance of FIG. 1.

FIG. 4A is a side view of the door stop assembly of FIG. 3 in a venting position.

FIG. 4B is a side view of the door stop assembly of FIG. 3 moving to a non-venting position.

FIG. 5 is a block diagram illustrating the steps of operating a laundry treating appliance having a door stop assembly.

DETAILED DESCRIPTION

[0007] While this description will reference many different features for a laundry treating appliance, one beneficial and advantageous feature is a door stop assembly that prevents the door of the laundry treating appliance from closing while the appliance is not operating. The door stop assembly allows the door of the appliance to be moved between open and venting positions while the appliance is not in use for loading or unloading laundry. Upon user activation, for example, by powering on the appliance, selecting a cycle, or selecting the start button, the door stop assembly is configured to engage the door when it is in the venting position and close the door so the laundry treating appliance can run the selected wash cycle. Upon completion of the wash cycle, the door stop assembly automatically opens the door to the venting position, and prevents the door from closing without user activation.

[0008] In more detail, FIG. 1 is a schematic view of a laundry treating appliance 10 such as a washing machine. The laundry treating appliance 10 can be any appliance which performs a cycle of operation to clean or otherwise treat items placed therein, non-limiting examples of which include a horizontal clothes washer; a combination washing machine and dryer; a tumbling or stationary refreshing/revitalizing machine; an extractor; a non-aqueous washing apparatus; and a revitalizing machine.

[0009] The laundry treating appliance 10 can include a structural support system comprising a cabinet 12 which defines a housing within which a laundry holding system resides. The cabinet 12 can be a housing having a chassis and/or a frame, defining an interior enclosing components typically found in a conventional washing

machine, such as motors, pumps, fluid lines, controls, sensors, transducers, and the like. Such components will not be described further herein except as necessary for a complete understanding of the invention.

[0010] The laundry treating appliance comprises a tub 14 supported within the cabinet 12 by a suitable suspension system and a drum 16 provided within the tub 14, the drum 16 defining at least a portion of a laundry treating chamber 18. The drum 16 can include a plurality of perforations 20 such that liquid can flow between the tub 14 and the drum 16 through the perforations 20. A plurality of baffles 22 can be disposed on an inner surface of the drum 16 to lift the laundry load received in the treating chamber 18 while the drum 16 rotates. It is also within the scope of the invention for the laundry holding system to comprise only a tub with the tub defining the laundry treating chamber.

[0011] The laundry treating appliance 10 also includes a control system for controlling the operation of the treating appliance 10 to implement one or more cycles of operation. The control system can include a controller 96 located within the cabinet 12 and a user interface 98 that is operably coupled with the controller 96. The user interface 98 can include one or more knobs, dials, switches, displays, touch screens and the like for communicating with the user, such as to receive input and provide output. The user can enter different types of information including, without limitation, cycle selection and cycle parameters, such as cycle options.

[0012] The controller 96 can include the machine controller and any additional controllers provided for controlling any of the components of the treating appliance 10. For example, the controller 96 can include the machine controller and a motor controller. Many known types of controllers can be used for the controller 96. The specific type of controller is not germane to the invention. It is contemplated that the controller is a microprocessor-based controller that implements control software and sends/receives one or more electrical signals to/from each of the various working components to effect the control software. As an example, proportional control (P), proportional integral control (PI), and proportional derivative control (PD), or a combination thereof, a proportional integral derivative control (PID control), can be used to control the various components.

[0013] The laundry treating appliance 10 further includes a door 24 that can be movably mounted to the cabinet 12 between open, venting, and closed positions. In the open position, the door 24 can be opened far enough to allow a laundry to be loaded in drum. In the venting position, the door 24 can be slightly "ajar" to allow airflow into and out of the tub, and in the closed position the door seals against a bellows 26 to close the tub 14 and the drum 16.

[0014] The cabinet 12 can further comprise a door stop assembly 35 having venting and non-venting positions. In the venting position, the door stop assembly 35 prevents the door 24 from moving to the closed position. In

this position, the door 24 can freely move between the open position, for allowing a user to load or unload laundry items, and the venting position, where the door will be maintained in a slightly opened or ajar position. In the non-venting position, the door is in the closed position.

[0015] FIG. 2 is an exemplary schematic of a control system of the laundry treating appliance. As illustrated in FIG. 2, the controller 96 can be provided with a memory 100 and a central processing unit (CPU) 102. The memory 100 can be used for storing the control software that is executed by the CPU 102 in completing a cycle of operation using the treating appliance 10 and any additional software.

[0016] In addition, the controller 96 can be operably coupled with one or more components of the treating appliance 10 for communicating with and controlling the operation of the component to complete a cycle of operation. For example, the controller 96 can be operably coupled with the motor 88, the pump 74, the dispenser 62, the sump heater 84, door stop assembly 35 and other components to control their operation and to implement one or more of the cycles of operation.

[0017] FIG. 3 shows a top view of a laundry treating appliance door assembly with the door stop assembly 35 mounted on the cabinet 12 and in the venting position. In this embodiment, door 24 is hinged to cabinet 12. The cabinet 12 carries the door stop assembly 35 comprised of an actuator 204 and door stop or latch 206. As illustrated, the door stop assembly 35 is in the venting position. In this position, the door stop 206 is in an extended position which ensures a clearance gap 40 is maintained between the door 24 and the cabinet 12. Conversely, when door stop assembly 35 is in the non-venting position, or is moving to the non-venting position, door stop 206 engages door 24 and moves to a retracted position, thereby fully closing door 24 and sealing door 24 against cabinet 12 or bellows 26. Actuator 204 can be operably connected to the controller 96 and to door stop 206 to move the door stop 206 between the extended, venting position, and retracted, non-venting position.

[0018] The door stop assembly 35 including the actuator 204 can automatically be activated by the controller 96 through programmed instructions activated by user input, or by a separate user input on the user interface. For example, the door stop assembly may be activated by a user powering-on the appliance, choosing a wash cycle, or pressing the start button. In addition the door stop assembly 35 can be activated at the end of a wash cycle or at any point during a cycle. In this way, the controller 96 can automatically operably control activation of the door stop assembly 35 between venting and non-venting positions.

[0019] As also shown in FIG. 3, the clearance gap 40 maintains a sufficient gap for acting as both an inlet and outlet for exhaust of air and/or gasses. It is contemplated the clearance gap 40, or the angle between the door 24 and the cabinet 12 or bellows 26, will be greater than or equal to about 2 degrees. Such a gap 40 will allow airflow

(A) to enter and exit the wash chamber. This solution reduces cost of the washing machine 10 by eliminating parts such as hoses, clamps, plastic housing, and other passive ventilation parts typically associates with washing machines.

[0020] FIG. 4A is an exemplary cross-sectional view of the door and door stop assembly taken across line IV-IV in FIG. 3. While FIG. 4 illustrates a door stop assembly 35 and a relating door latching system, it should be understood that there are many ways to implements a door latching system without limiting the scope of the disclosure. In a non-limiting example, the door 24 is in the venting position. In this position, typically in a power down state, the door 24 abuts door stop 206, preventing the door 24 from being fully closed. The door 24 can carry a door catch 220 and the cabinet 12 or bellows 26 can carry door stop assembly 35 comprised of an actuator 204, door stop 206 and latch 212. As shown, door stop 206 is extended, thus preventing door 24 from moving to a closed position. As discussed, in the venting position, the door stop 206 extends an amount sufficient to block the movement of the door 24, thus maintaining the door 24 in a venting position and preventing the door 24 from closing.

[0021] Actuator 204 can be connected to door stop 206, and can be configured to move the door stop 206 between extended and retracted positions. Actuator 204 slidably or rotatably extends and retracts the door stop 206 between extended and retracted positions. The mechanical actuation of actuator 204 can be achieved by any number of mechanical actuators known in the art such as by wax motor, a mechanical cam and rotator, or any similar mechanism that can be deployed or retracted for purposes of opening or maintaining a door in an open position. In addition, it should also be noted that actuator 204 maybe a manual mechanical actuator. In other words, the door stop assembly 35 could also be manually activated by a user.

[0022] FIG. 4B is a cross-sectional view of the door and door stop assembly of FIG. 4A except with the door stop assembly 35 starting to move from the venting position to the non-venting position. It is also contemplated that the door catch 220 can operably connect to door stop 206, such that when the door stop assembly 35 is activated, the door stop 206 engages door catch 220 and causes the door 24 to automatically move to a closed position, i.e. without intervention by the user. Once in the closed, non-venting position, door laundry treating appliance 10 can be operated.

[0023] Alternatively, the actuator 204 can move or slidably retract the door stop 206 into its retracted position without engaging the door. In other words, the retracted position of the door stop 206 is such that it does not extend beyond the length of the catch 220 and allows catch 220 to engage with and catch the latch 212 if a user manually closes the door.

[0024] While exemplary embodiments FIGS. 4A and 4B, illustrate a door stop assembly 35 being carried on

the cabinet 12 or bellows 26, it should be recognized the door stop assembly 35 could be located on the door 24 instead. Also, FIGS. 4A and 4B show that the door 24 carries a catch 220 and the cabinet 12 or bellows 26 carries a latch 212, it is feasible for the door 24 and the cabinet 12 carry opposite elements, or for other closing and latching elements to be provided, without limiting the scope of the disclosure.

[0025] FIG. 5 is a block diagram illustrating an exemplary method of the steps of operating a laundry treating appliance having a door stop assembly. In operation, to start a load of laundry, the door can be in either the venting or open position, illustrated as step 110. Next, the user can load laundry into the washing machine, shown as step 112. If the door is in the open position, the user can load laundry 112 into the washing machine. If the door is in the venting position, the user can open the door and load laundry 112 into the washing machine. After laundry is loaded 112 into the washing machine, the user can move the door to the venting position, shown as step 114. In this position, the door stop is fully extended, thus preventing the door from being pushed completely closed to a non-venting position by the user. Next, the user can power on the washing machine, shown as step 116. As part of the power on step, the user can select the desired wash cycle and any other modifications desired to a specific wash cycle. Finally, the user can press the "Start" button, shown as step 118 to begin operation of the washing machine. Upon pressing the "Start" button, the controller of the washing machine causes the door stop to retract. During the retraction process, the door stop engages the door catch and pulls the door completely closed 54 to the non-venting position, shown as step 120. Once the door is fully closed, the controller locks the door in the closed position, and the wash cycle begins.

[0026] At the completion of a wash cycle, shown as step 130, the controller of the washing machine unlocks the door and causes the door stop to extend. During the extension process, the door stop pushes the door until it is open to the vent position, shown as step 132. Once the door is in the venting position, the user can open the door and unload laundry from the washing, shown as step 134. Finally, once the laundry is unloaded, the user can move the door back to the venting position, shown as step 136. Once again, the user cannot fully close the door as the door stop prevents the door from closing to the non-venting position.

[0027] It should be recognized that the described door stop assembly can be applied to any number of appliances, including washer-dryer combos, horizontal and vertical axis washers, horizontal and vertical axis dryers, refrigerators and other appliances without limiting the scope of disclosure.

[0028] To the extent not already described, the different features and structures of the various embodiments can be used in combination with each other as desired. That one feature may not be illustrated in all of the embodiments is not meant to be construed that it cannot be,

but is done for brevity of description. Thus, the various features of the different embodiments can be mixed and matched as desired to form new embodiments, whether or not the new embodiments are expressly described. All combinations or permutations of features described herein are covered by this disclosure. Further, while the invention has been specifically described in connection with certain specific embodiments thereof, it is to be understood that this is by way of illustration and not of limitation. In addition to the concepts covered by the below claims, the following concepts can also provide the basis for claims in any possible combinations:

[0029] A laundry treating appliance comprising:

a cabinet defining an interior;
 a treating chamber located within the interior and having an access opening;
 a door comprising a catch and movably mounted to the cabinet between at least open, venting, and closed positions to selectively open, vent, and close the access opening; and
 a door stop carried by the cabinet and operable between an extended position that prevents the door from moving to a closed position, and a retracted position that maintains the door in the closed position;
 wherein the door stop is operable to engage the catch and automatically move the door from the venting position to the closed position in response to user initiation of a cycle of operation.

[0030] The laundry treating appliance further comprising a user interface and having the user input operably coupled to the door stop assembly.

[0031] The laundry treating appliance wherein the door stop is automatically activated at the end of a wash cycle.

[0032] The laundry treating appliance wherein movement between the retracted position and extended position occurs automatically.

[0033] The laundry treating appliance further comprising a latch carried by one of the cabinet or door stop assembly and wherein when the door catch is engaged with the latch when the door stop is in the retracted position.

[0034] The laundry treating appliance further comprising an actuator operably coupled to the door stop.

[0035] A method of preventing closing of an appliance door relative to a cabinet during non-operation of the appliance, the method comprising the step of automatically moving a door stop assembly from a non-venting position, where the door is in a closed position, to a venting position, where the door is prevented from moving to the closed position, upon the movement of the door from the closed position to the venting position.

[0036] The method wherein the door stop assembly moves from the non-venting to venting position in response to ending of a wash cycle.

[0037] A method of closing an appliance door relative

to a cabinet during operation of the appliance, the method comprising:

receiving a user input at a controller of the appliance; in response to the received user input by the controller, activating a door stop assembly to move a door stop from an extended position, where the door is prevented from moving to a closed position, to a retracted position, where the door is in a closed position, whereby activation of the door stop assembly causes the door stop to engage a catch on the door moving the door to the closed position.

[0038] The method wherein the user input is based on a user selection of one of power on, cycle select, or start.

[0039] This written description uses examples to disclose the invention, including the best mode, and to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and can include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

Claims

1. A laundry treating appliance (10) comprising:

a cabinet (12) defining an interior of the laundry treating appliance (10);
 a treating chamber (18) located within the interior and having an access opening;
 a door (24) movably mounted to the cabinet (12) between at least open, venting, and closed positions;
 a door stop assembly (35) comprising a door stop (206) carried by the cabinet (12) moveable between at least a venting position where the door is maintained ajar and a non-venting position where the door is in a closed position;
 wherein the door stop (206) is configured to engage the door (24) in the venting position and to automatically move the door (24) to the closed position in response to a user input.

2. The laundry treating appliance (10) of claim 1 wherein the user input is based on a user selection of one of power on, cycle select, or start.

3. The laundry treating appliance (10) of claims 1 or 2 further comprising a user interface (98) and having the user input operably coupled to the door stop as-

sembly (35).

4. The laundry treating appliance (10) of any of claims 1 to 3 wherein the door stop assembly (35) is automatically activated at the end of a wash cycle. 5
5. The laundry treating appliance (10) of any of claims 1 to 4 further comprising a door catch (220) carried by the door (24) and a latch (212) carried by one of the cabinet (12) or door stop assembly (35) and engaging the door catch (220) when the door (24) is closed. 10
6. The laundry treating appliance (10) of claim 5 wherein when the door catch (220) is engaged with the latch (212), the door stop (206) is in a retracted position. 15
7. The laundry treating appliance (10) of any of claims 1 to 6 further comprising an actuator (204) operably coupled to said door stop (206) . 20
8. The laundry treating appliance (10) of claim 7 wherein the actuator (204) is adapted to move the door stop (206) between a retracted position, corresponding to the non-venting position, and an extended position, corresponding to the venting position. 25
9. The laundry treating appliance (10) of claim 8 wherein movement between the retracted position and extended position occurs automatically. 30
10. The laundry treating appliance (10) of claim 9 wherein movement between the retracted position and extended position occurs at the end of a wash cycle. 35

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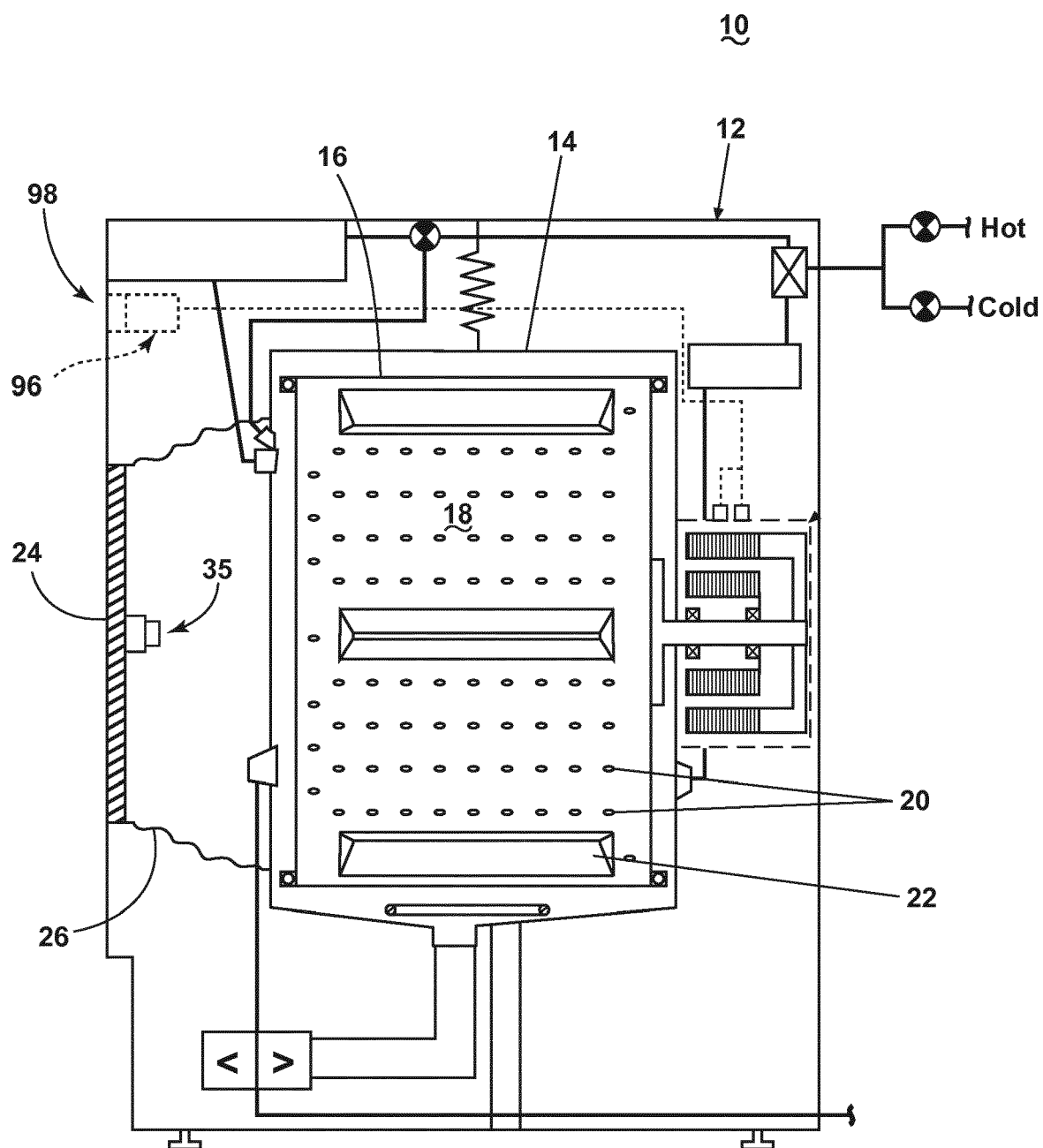


FIG. 1

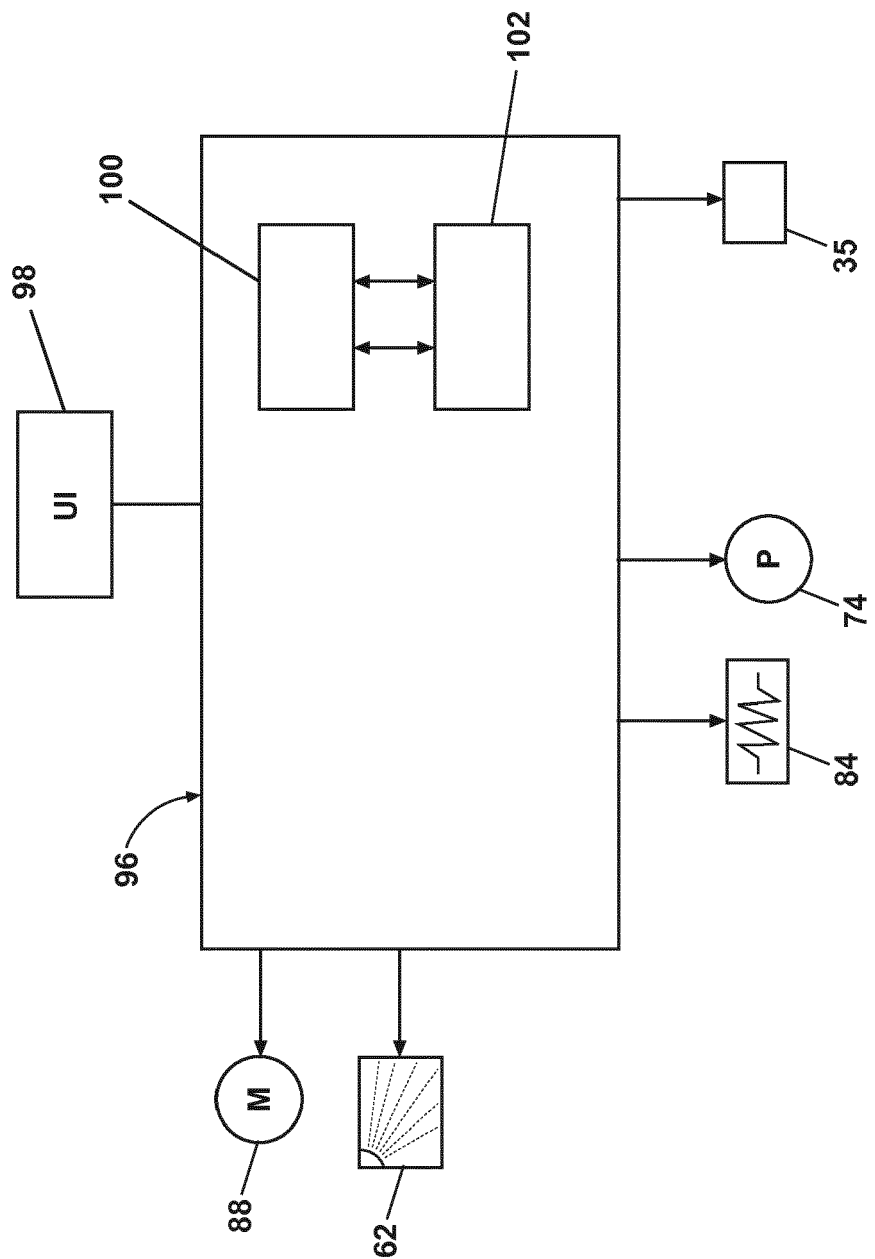


FIG. 2

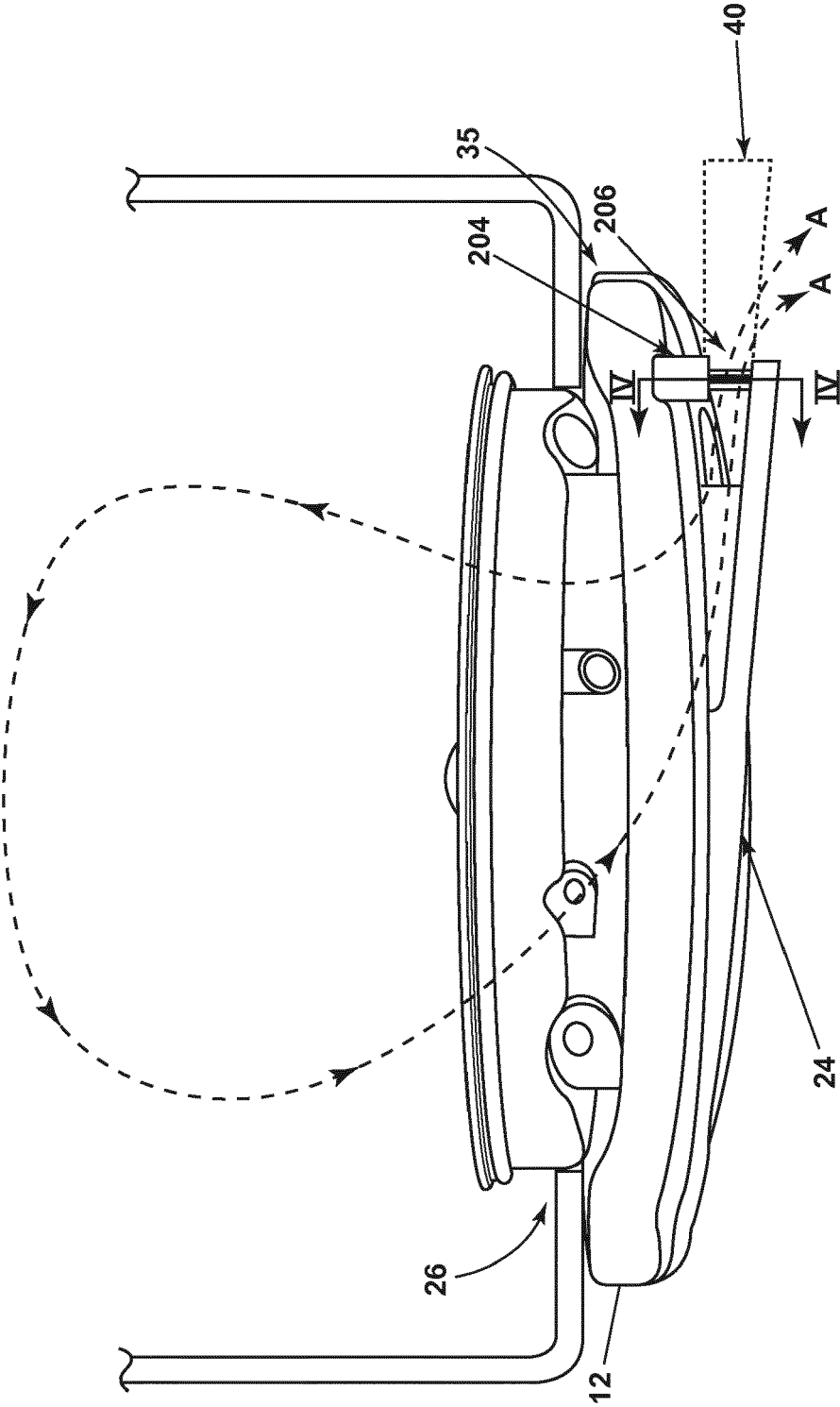


FIG. 3

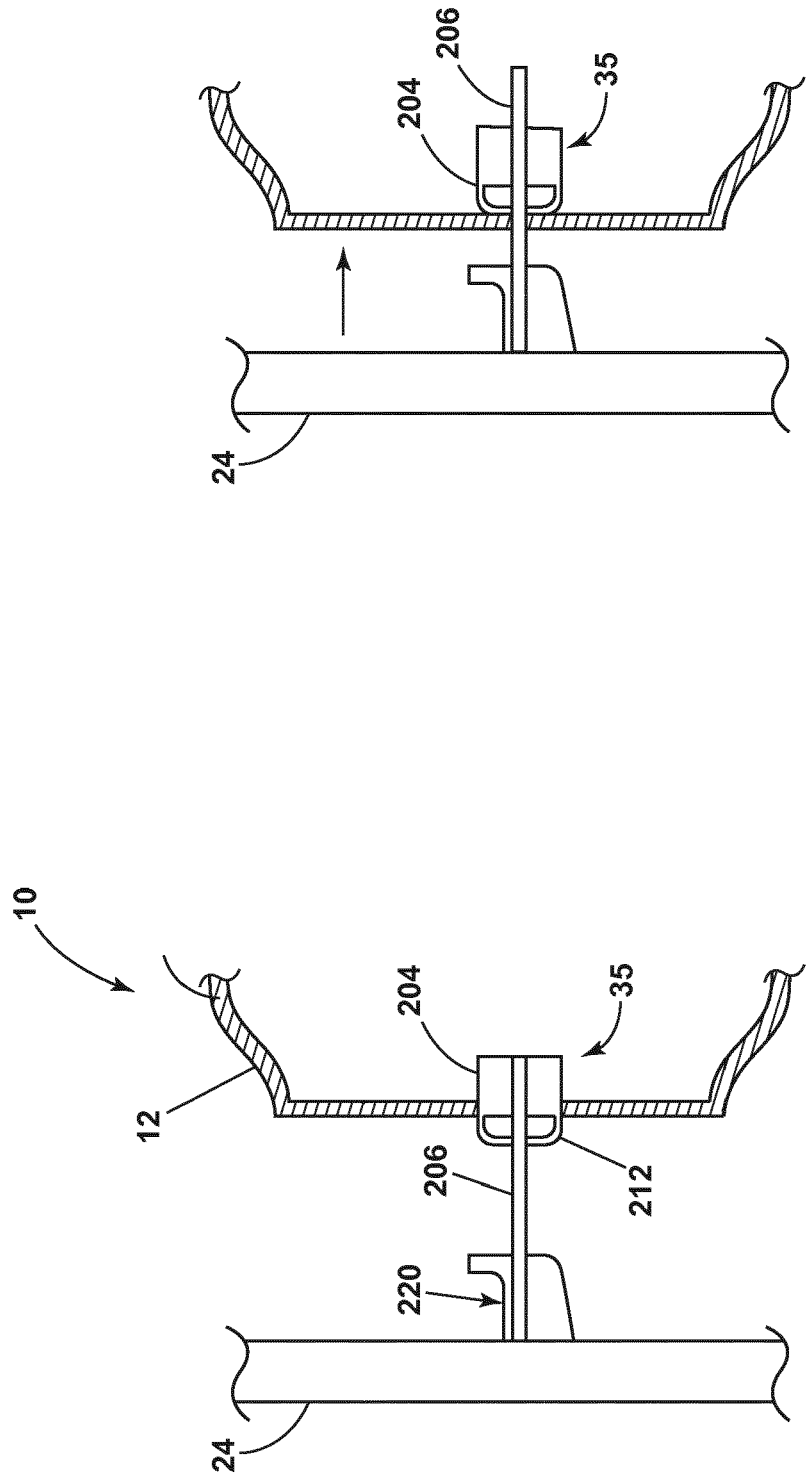


FIG. 4B

FIG. 4A

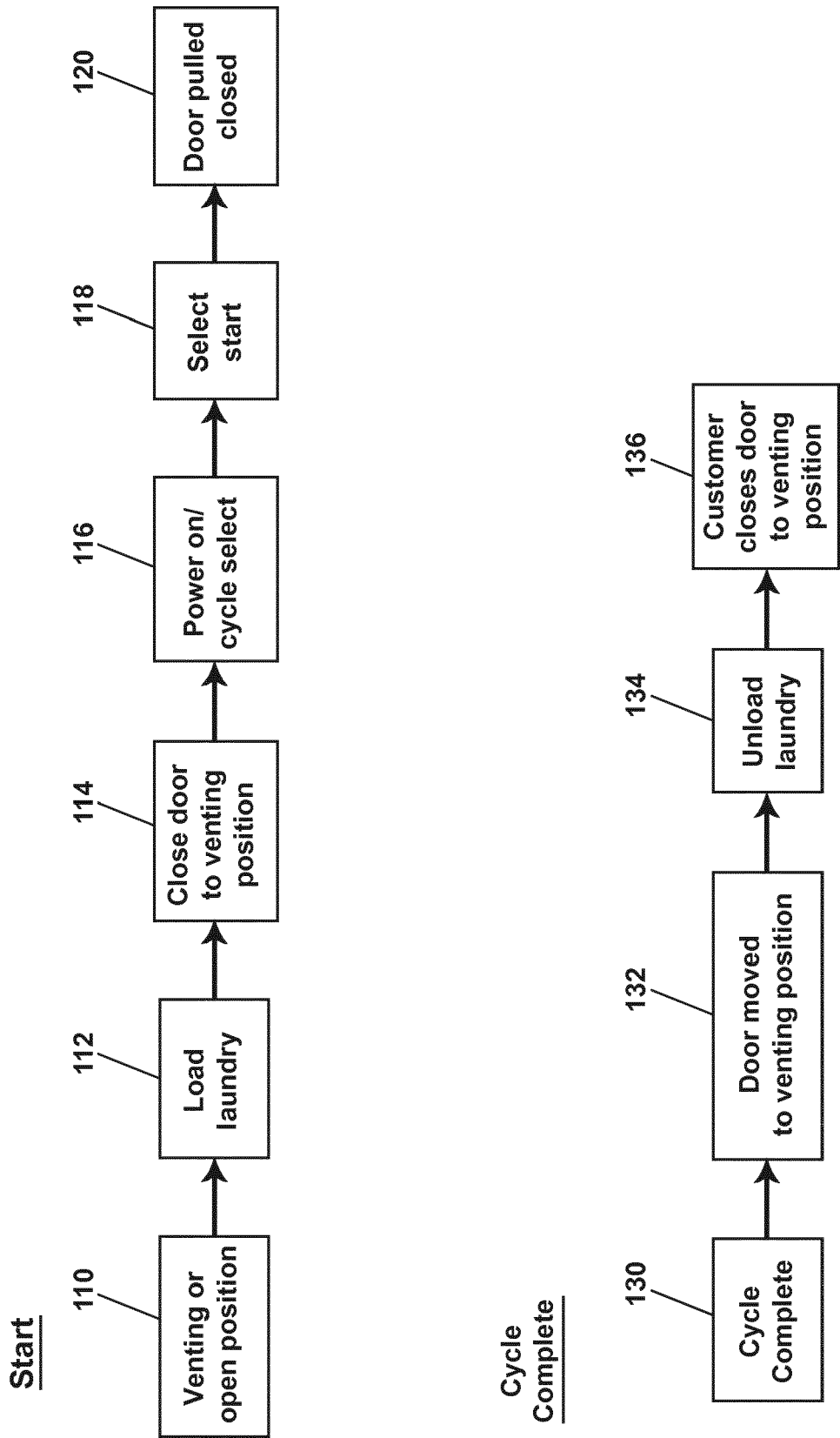


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
Munich		12 December 2018	Stroppa, Giovanni
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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