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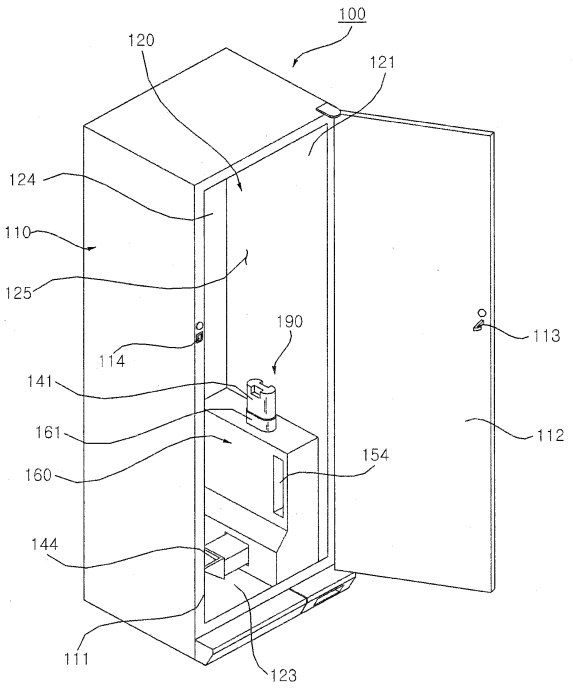
(54) Fabric processing apparatus

(57) A fabric processing apparatus (100) is provided that is capable of refreshing fabric articles and then maintaining the refreshed state of the fabric articles while they remain stored in a processing space (125) of the apparatus. Condensed fluid generated in the processing space (125) and in a condensing chamber, and fluid remaining in a steam supplying device (140) after processing, are directed to a storage unit (171) through corresponding fluid discharging channels (174,175). The flow of fluid through the fluid discharging channels (174,175) is controlled by corresponding fluid discharge valves (176,177) so that moisture and odors generated by fluid accumulated in the storage unit (171) cannot flow back into processing space (125) and contaminate the refreshed fabric articles.

FIG. 1



EP 1 967 640 A1

Description

[0001] This invention relates to a fabric processing apparatus and, more particularly, to a fabric processing apparatus that prevents odors and moisture from re-entering a processing space.

[0002] In general, a fabric processing apparatus is an apparatus for refreshing fabric articles such as, for example, clothing, bedding, linens and the like. Such an apparatus may remove wrinkles and odors using steam, hot air, refreshing chemicals and the like. Odors and moisture removed from the fabric articles should be contained once removed so as to prevent re-contamination of the fabric articles and improve performance and reliability of the fabric processing apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The embodiments will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

[0004] FIG. 1 is a perspective view of a fabric processing apparatus according to an embodiment as broadly described herein;

[0005] FIG. 2 is a sectional view of the fabric processing apparatus shown in FIG. 1;

[0006] FIG. 3 is a perspective view of a refreshing unit of the fabric processing apparatus shown in FIG. 1;

[0007] FIG. 4 is an exploded perspective view of the refreshing unit shown in FIG. 3;

[0008] FIG. 5 is a schematic flow diagram of the fabric processing apparatus shown in FIG. 1;

[0009] FIG. 6 is a perspective view of a fluid discharging device of the fabric processing apparatus shown in FIG. 1;

[0010] FIG. 7 is a sectional view of a fabric processing apparatus according to another embodiment as broadly described herein;

[0011] FIG. 8 is a schematic flow diagram of the fabric processing apparatus shown in FIG. 7; and

[0012] FIG. 9 is a flowchart of the operation of a fabric processing apparatus as embodied and broadly described herein.

DETAILED DESCRIPTION

[0013] A fabric processing apparatus and embodied and broadly described herein may include a processing space that receives fabric articles to be refreshed. The fabric articles may be placed in the processing space, and steam may be supplied to the processing space. Then, dry air may be supplied to the processing space to dry the fabric articles. This application of steam and dry air removes contamination sources from the fabric articles to reduce the number of times a particular article must be washed, and removes wrinkles from the articles to reduce or eliminate the need for ironing.

[0014] During processing, steam supplied to the processing space may be condensed, leaving residual condensed fluid in the processing space after the articles are completely processed. Therefore, a fabric processing apparatus may include a fluid discharging device that gathers and discharges the condensed fluid. Odors and the like absorbed by the steam/condensed fluid during processing should be kept from flowing back into the processing space as the condensed water/residual fluid is gathered by the discharging device to prevent the odors from re-contaminating the processed fabric articles.

[0015] Referring to FIG. 1, a fabric processing apparatus 100 as embodied and broadly described herein may include an outer case 110 that defines an external surface of the fabric processing apparatus 100, and an inner case 120 provided in the outer case 110 that defines a fabric processing space 125. An inlet 111 through which fabric articles may be received into and discharged from the processing space 125 may be formed on the front surface of the outer case 110. A door 112 that opens and closes the inlet 111 may be rotatably coupled to the outer case 110.

[0016] An opening and closing sensor that senses the opening and closing of the door 112, and a locking device that prevents unwanted opening of the door 112, may be provided with the door 112 and the outer case 110, as shown in FIG. 1. The locking device may include, for example, a door latch 113 provided on a rear surface of the door 112 and a door switch 114 provided on a corresponding front surface of the outer case 110. The positions of the latch 113 and the switch 114 may be adjusted and/or reversed as appropriate for a particular fabric processing apparatus. The door latch 113 may be inserted into the door switch 114 when the door 112 is closed to provide a locking force of a predetermined magnitude so that the door latch 113 is not released from the door switch 114. The locking device may include other structures as appropriate.

[0017] The fabric processing apparatus 100 may also include a control panel 116 that may be used to control the operation of the apparatus 100. In the embodiment shown in FIG. 2, the control panel 116 is provided in the door 112. Other locations may also be appropriate. For example, the control panel 116 may be provided in either the outer case 110 or the inner case 120. The control panel 116 may include a manipulating unit 115 to manipulate operation of the apparatus 100 through the control panel 116.

[0018] Referring to FIGs. 1 and 2, the inner case 120 may be smaller than the outer case 110 so that the inner case 120 fits within the outer case 110. The inner case 120 may include two side surface units 121 that form the opposite lateral side surfaces of the processing space 125, a top surface unit 122 that forms the top surface of the processing space 125, a bottom surface unit 123 that forms the bottom surface of the processing space 125, and a rear surface unit 124 that forms the rear surface of the processing space 125.

[0019] A hanging unit 126 on which fabric articles may

be hung in the processing space 125 may be provided in the inner case 120. In the embodiment shown in FIG. 2, the hanging unit 126 includes a rod 126a having its opposite ends connected to the opposite lateral side surface units 121 so as to extend horizontally across the processing space 125, and a plurality of racks 126b provided on the rod 126a to accommodate fabric articles for processing. The racks 126b may be fixed to the rod 126a and separated from each other by a predetermined distance. Alternatively, the racks 126b may be movable along the rod 126a. In alternative embodiments, the hanging unit 126 may include a plurality of racks 126b directly mounted in the inner case 120, and/or racks 126b having various different structures. Likewise, a plurality of hanging units 126 may be provided in the processing space 125.

[0020] A discharge hole 127 may guide air from the inner case 120 to an air discharging duct 130 that extends through the outer case 110 to discharge air from the inner case 120 to the outside of the outer case 110. In addition, an air suction duct 131 may extend through the outer case 110 to an air receiving hole 128 to guide outside air into the inner case 120. The air discharging hole 127 and air discharging duct 130 form an air discharging channel, and the air suction duct 131 and air receiving hole 128 form an air suction channel. Each of these channels may be formed of a hose, a pipe, ducting, or other material as appropriate.

[0021] The fabric processing apparatus 100 may include a refreshing unit 190 that generates the steam and dry air used to refresh the fabric articles in the processing space 125. The refreshing unit 190 may include a steam supplying device 140 (see FIG. 5) that supplies steam to the processing space 125 to remove wrinkles and odors from articles in the processing space 125. The steam supplying device 140 may include a supply tank 141 that stores fluid, a steam housing 142 that receives fluid from the tank 141, a steaming heater 143 provided in the steam housing 142 to heat the fluid in the steam housing 142 and to generate steam, and a steam nozzle 144 that injects the steam generated by the steaming heater 143 into the processing space 125.

[0022] A flow of fluid along a supplying channel 145 that extends from the supply tank 141 to the steam housing 142 may be regulated by a supplying valve 146. A steam channel 147 that guides the steam generated by the steam housing 142 to the steam nozzle 144 may be formed between the steam housing 142 and the steam nozzle 144. A level sensor 148 that senses the level of fluid supplied to the steam housing 142 through the supplying channel 144 may be provided in the steam housing 142. The steaming heater 143 may include a sheath heater that penetrates a portion of the steam housing 142. Other types of heaters may also be appropriate.

[0023] The refreshing unit 190 of the fabric processing apparatus 100 may also include a dry air supplying device 150 to supply dry air to the processing space 125. The dry air supplying device 150 draws outside air in through the air suction duct 131 and the air receiving hole 128, generates high temperature dry air, and supplies the dry air to the processing space 125. The dry air supplying device 150 may include a drying housing 151 connected to the air receiving hole 128, a blower fan 152 provided in the drying housing 151, and a drying heater (not shown) that heats air as it flows through the drying housing 151 and is discharged to the processing space 125 through a discharging hole 154.

[0024] The drying housing 151 may be, for example, a duct shaped member in which the blower fan 152 and the drying heater are mounted. A suction hole 153 may be formed in a side of the drying housing 151 to correspond to the air receiving hole 128 so as to suction outside air in through the air suction duct 131. The discharging hole 154 may be formed on the other side of the drying housing 151 to discharge high temperature dry air into the processing space 125.

[0025] A case 160 may be provided in the processing space 125 to house the steam supplying device 140 and the dry air supplying device 150. In the embodiment shown in FIGs. 1 and 3, the case 160 is positioned in the lower portion of the inner case 120. Other positions for the case 160, both within the inner case 120 and outside of the outer case 110, may also be appropriate. A tank coupling unit 161 may detachably couple the tank 141 to the case 160 so that fluid may be easily supplemented and exchanged. In alternative embodiments, the tank 141 may be connected to an external source through an additional channel and valve so that fluid may be automatically resupplied as necessary. In addition, the case 160 may include on one side thereof a hole through which the steam nozzle 144 of the steam supplying device 140 may extend. The discharging hole 154 of the dry air supplying device 150 may be provided on the other side of the case 160. Other arrangements may also be appropriate, based on the arrangement of the various components within the case 160.

[0026] The fabric processing apparatus 100 may also include a fluid discharging device 170 that discharges condensed and residual fluid accumulated the inner case 120 to the outside. The discharging device 170 may include a storage unit 171 that may be detachably coupled to the outer case 110. The storage unit 171 may include a space for storing the condensed and residual fluid. Fluid discharging channels may guide the condensed and residual fluid from the inner case 120 and the steam supplying device 140 to the storage space of the storage unit 171, and fluid discharging valves provided along the fluid discharging channels may regulate the flow of fluid to the storage unit 171 to prevent odors and moisture from flowing from the storage unit 171 back into the processing space 125.

[0027] In the embodiment shown in FIGs. 1 and 3, the storage unit 171 is detachably coupled to the lower part of the outer case 110, corresponding to the rest of the refreshing unit 190, and is in the form of a drawer. A gripping groove 172 may be provided on a front surface

of the storage unit 171 to facilitate removal and replacement of the storage unit 171. A level sensor 173 that senses the level of fluid accumulated in the storage unit 171 may also be provided in the storage unit 171. Condensed fluid generated the inner case 120 may be stored in the storage unit 171 when the processing apparatus 100 operates, and residual fluid from the steam supplying device 140 may be stored in the storage unit 171 when the processing apparatus 100 stops operating. When the fluid collected in the storage unit 171 reaches a set level or is left for a set time, the storage unit 171 may be detached from the outer case 110, emptied, and replaced.

[0028] Referring to FIG. 5, the water discharging channels may include a first fluid discharging channel 174 that guides condensed fluid from the inner case 120 to the storage unit 171, and a second fluid discharging channel 175 that guides residual fluid from the steam housing 142 of the steam supplying device 140 to the storage unit 171. One end of the first discharging channel 174 may be connected to the bottom surface unit 123 of the inner case 120, and one end of the second discharging channel 175 may be connected to the bottom surface of the steam housing 142. In certain embodiments, the bottom surface unit 123 may be inclined downward toward the end of the first discharging channel 174 connected thereto, and the bottom surface of the steam housing 142 may be inclined downward toward the end of the second discharging channel 175 connected thereto.

[0029] The fluid discharging valves may include a first fluid discharging valve 176 provided on the first discharging channel 174 to regulate the flow of condensed fluid between the inner case 120 and the storage unit 171, and a second fluid discharging valve 177 provided on the second discharging channel 175 to regulate the flow of fluid between the steam housing 142 and the storage unit 171.

[0030] The first discharging valve 176 may be opened when the processing apparatus 100 operates, and may be closed when the processing apparatus 100 stops operating. That is, when the steam supplying device 140 or the dry air supplying device 150 operates, the first discharging valve 176 may be opened so that condensed fluid may be essentially continuously discharged from the inner case 120 to the storage unit 171. On the other hand, when the steam supplying device 140 or the dry air supplying device 150 stops operating, the first discharging valve 176 may be closed to block the first discharging channel 174 and prevent any moisture and odors generated by the fluid collected in the storage unit 171 from flowing backward into the processing space 125.

[0031] The second discharging valve 177 may be closed when the processing apparatus 100 operates, and may be opened when the processing apparatus 100 stops operating. That is, when the steam supplying device 140 or the dry air supplying device 150 operates, the second discharging valve 177 may be closed to prevent the fluid in the steam housing 142 from leaking out of the steam housing 142 and into the storage unit 171. On the other hand, when the steam supplying device 140 or the dry air supplying device 150 stops operating, the second discharging valve 177 may be opened so that any fluid remaining in the steam housing 142 may be discharged to the storage unit 171. The second discharging valve 177 may be closed again when a pre-set open time for the second discharging valve 177 is reached while the processing apparatus 100 remains inoperative. Therefore, when residual fluid in the steam housing 142 is discharged to the storage unit 171, the second discharging valve 177 may be closed to prevent moisture and odors generated by the fluid collected in the storage unit 171 from flowing backward into the processing space 125, or back into the steam housing 142, where it could be used during a subsequent steaming operation.

[0032] Another example of the fluid discharging valves of the fluid discharging device 170 are shown in FIG. 6. More specifically, fluid discharging valves may be independently provided on the plurality of fluid discharging channels, as illustrated in FIG. 5, or a valve assembly 180 may be connected to the plurality of fluid discharging channels at the storage unit 171, as illustrated in FIG. 6.

[0033] The valve assembly 180 may include a valve body 181 that is connected to the storage unit 171, and a fluid discharging valve 182 connected to the first and second discharging channels 174 and 175. For this purpose, the fluid discharging valve 182 may include an outlet 183 connected to the valve body 181 and two inlets 184 and 185 that correspond to the first and second discharging channels 174 and 175. The discharging valve 182 may include first and second discharging valves that share the outlet 183 and that correspond to the inlets 184 and 185.

[0034] Operation of a fabric processing apparatus as embodied and broadly described herein will now be described.

[0035] First, the processing apparatus 100 operates the steam supplying device 140 to supply steam to the processing space 125, and then operates the dry air supplying device 150 to supply dry air to the processing space 125 when the steaming process is completed. The fabric articles arranged in the processing space 125 are refreshed by the steaming process and the drying process. Hereinafter, the steaming process and the drying process will be described in more detail.

[0036] In the steaming process, fluid is supplied from the fluid supply tank 141 to the steam housing 142, and the fluid in the steam housing 142 is heated by the steaming heater 143 to generate steam. The steam flows to the steam nozzle 144 along the steam channel 147 and is injected to the inner case 120 through the steam nozzle 144 to remove wrinkles and odors from the fabric articles in the processing space 125.

[0037] The drying process may be carried out after the steaming process has been completed. In the drying process, the blower fan 152 of the dry air supplying device 150 is operated, and dry air is introduced into the drying

housing 151 through the air receiving hole 128 and the air suction duct 131. This dry air is heated by the drying heater, and the dry, heated air is discharged into the processing space 125 through the discharging hole 154 of the drying housing 151. The high temperature dry air absorbs moisture from the fabric articles that have been refreshed by the steam supplied during the steaming process. Moisture laden air is discharged to the outside of the processing space 125 through the air discharging hole 127 and the air discharging duct 130.

[0038] During the steaming process, the high temperature steam supplied by the steam supplying device 140 may be condensed so that condensed fluid is generated in the inner case 120. This may occur because the temperature of the inner case 120 may be lower than the temperature of the steam at an initial stage of the steaming process. When this happens, the inner case 120 may be saturated with moisture at a latter portion of the steaming process. In addition, the condensed fluid may also be generated in the inner case 120 during the drying process. This may occur because, although dry air is supplied to the inner case 120, the temperature in the vicinity of the air discharging hole 127 of the inner case 120 may be relatively low, causing the humid air discharged through the air discharging hole 127 to be condensed.

[0039] As described above, when condensed fluid generated during the operation of the fabric processing apparatus 100 accumulates in the inner case 120, this condensed fluid may significantly increase the drying load for the drying process which is to follow. Therefore, the first fluid discharging valve 176 of the fluid discharging device 170 is opened so that the condensed fluid in the inner case 120 may be discharged to the storage unit 171. More specifically, condensed fluid generated during the steaming process and the drying process may flow to the lower side of the inner case 120 along the inner surface of the inner case 120 and may be discharged to the first fluid discharging channel 174 connected to the bottom surface unit 123 of the inner case 120. Then, the condensed fluid flows along the first fluid discharging channel 174 to the first fluid discharging valve 176. At this time, since the first fluid discharging valve 176 is opened, the condensed fluid may flow into the storage unit 171. Therefore, since it is possible to prevent accumulation of condensed fluid in the processing space 125 and subsequent deterioration of the efficiency of the drying process, a drying time may be reduced and energy may be conserved.

[0040] In addition, during the steaming process, the second fluid discharging valve 177 remains closed to prevent the fluid stored in the steam housing 142 from leaking into the second fluid discharging channel 175. That is, when the second fluid discharging valve 177 is closed during operation of the processing apparatus 100, the fluid is stably stored in the steam housing 142, thus preventing waste. Further, the steaming heater 143 does not sink in the fluid in the steam housing 142, but is exposed to the outside to prevent the steaming heater 143 from being overheated. Therefore, the stability and reliability of the steam supplying device 140 may be enhanced.

[0041] When operation of the fabric processing apparatus 100 is stopped, the first and second fluid discharging valves 176 and 177 may be closed to prevent odors and moisture from flowing backward into the inner case 120 or the steaming housing 142. When operation of the apparatus 100 is first stopped, the second fluid discharging valve 177 may be opened for a set time to allow residual fluid to be drained from the steaming housing 142. After the set time has elapsed, the second fluid discharging valve 177 may be closed to prevent backflow as described above.

[0042] When the apparatus 100 stops operating and the first fluid discharging valve 176 is closed, it is possible to prevent odors and moisture generated by the fluid collected in the storage unit 171 from being introduced into the inner case 120 through the first fluid discharging channel 174. Therefore, it is possible to prevent the fabric articles refreshed by the steaming process and the drying process from being re-contaminated by odors and moisture flowing backward into the inner case 120.

[0043] In the case where the processing apparatus 100 has stopped operating and the second fluid discharging valve 177 is opened for the set time, the residual fluid in the steam housing 142 is discharged to the storage unit 171 along the second fluid discharging channel 175. Therefore, it is possible to prevent the fluid remaining after the steaming process from being left in the steaming housing 142 for a long time. When fluid is left in the steaming housing 142 for a long time after operation has stopped, moisture and odors generated by this residual fluid may be introduced into the inner case 120, or steam may be generated from this rotten residual fluid in a subsequent steaming process. When the second fluid discharging valve 177 is closed after the set time has elapsed and fabric articles are kept in the processing space 1.25 for a long time, it is possible to prevent moisture and odors generated by the fluid accumulated in the storage unit 171 from flowing backward through the second fluid discharging channel 175.

[0044] FIG. 7 is a sectional view of a clothes processing apparatus according to another embodiment as broadly described herein, and FIG. 8 is an associated schematic flow diagram. The fabric processing apparatus 200 illustrated in FIGs. 7 and 8 is different from the fabric processing apparatus 100 illustrated in FIGs. 1 to 5 in that it may include a condensing chamber 229. The condensing chamber 229 may be formed between the inner case 120 and the outer case 110, and may be connected to the storage unit 171 by a third fluid discharging channel 278 and a third fluid discharging valve 279. The condensing chamber 229 may condense humid air discharged from the processing space 125.

[0045] The condensing chamber 229 may be formed between the rear surface unit 124 of the inner case 120 and a corresponding inner surface of the outer case 110.

Condensed air from the condensing chamber 229 may be introduced into the processing space 125 through the air receiving hole 128 formed in the lower part of the rear surface unit 124. Air and moisture from the processing space 125 may be discharged into the condensing chamber 229 through the air discharging hole 127 formed in the rear part of the top surface unit 122.

[0046] When humid air is introduced into the condensing chamber 229 from the processing space 125 through the air discharging hole 127, the humid air exchanges heat with the relatively low temperature outer air using the outer case 110 as a heat exchanging medium, causing the humid air to be condensed. The outer case 110 may be formed of a material having high thermal conductivity such as, for example, steel and aluminum, to improve heat exchange performance with the humid air.

[0047] The fabric processing apparatus 200 may also include a fluid discharging device 270 that discharges condensed fluid generated in the inner case 120 and the condensing chamber 229, as well as residual fluid in the steam supplying device 140. The fluid discharging device 270 may include the storage unit 171 as described above, fluid discharging channels as described above that guide the condensed and residual fluid from the inner case 120, the condensing chamber 229, and the steam supplying device 140 to the storage space of the storage unit 171, and fluid discharging valves as described above that regulate the flow of fluid through the channels to prevent odors and moisture from flowing backward into the processing space 125from the storage unit 171.

[0048] The fluid discharging channels may include the first fluid discharging channel 174 that guides condensed fluid generated in the inner case 120 to the storage unit 171, the second fluid discharging channel 175 that guides residual fluid in the steaming housing 142 of the steaming supplying device 140 to the storage unit 171, and a third fluid discharging channel 278 that guides condensed fluid generated in the condensing chamber 229 to the storage unit 171. The first and second fluid discharging channels 174 and 175 may have the same structure as the first and second fluid discharging channels of the fabric processing apparatus 100 illustrated in FIG. 5. One end of the third fluid discharging channel 278 may be connected to the bottom surface of the condensing chamber 229. The bottom surface of the condensing chamber 229 may be inclined downward toward the portion thereof connected to the third fluid discharging channel 278.

[0049] The fluid discharging valves may include the first fluid discharging valve 176 provided on the first fluid discharging channel 174 to regulate the flow of condensed fluid between the inner case 120 and the storage unit 171, the second fluid discharging valve 177 provided on the second fluid discharging channel 175 to regulate the flow of fluid between the steam housing 142 and the storage unit 171, and a third fluid discharging valve 279 provided on the second fluid discharging channel 175 to regulate the flow of condensed fluid between the condensing chamber 229 and the storage unit 171. The first and second fluid discharging valves 176 and 177 may have the same structure as the first and second fluid discharging valves of the fabric processing apparatus 100 illustrated in FIG. 5.

[0050] The third fluid discharging valve 279 may be opened when the processing apparatus 200 operates and may be closed when the processing apparatus 200 stops operating. That is, when the steam supplying device 140 or the dry air supplying device 150 operates, the third fluid discharging valve 279 may be opened so that the condensed fluid generated in the condensing chamber 229 may be discharged to the storage unit 171. On the other hand, when the steam supplying device 140 or the dry air supplying device 150 stops operating, the third water discharging valve 279 may be closed to prevent moisture and odors generated by the fluid collected in the storage unit 171 from flowing backward into the processing space 125 through the condensing chamber 229.

[0051] The fluid discharging device 270 may have a similar structure to the structure of the fluid discharging device 170 illustrated in FIG. 6. That is, a valve assembly connected to the first, second, and third water discharging channels 177, 178, and 279 may be provided with the storage unit 171.

[0052] Operation of the fabric processing apparatus as embodied and broadly described herein will now be described with reference to FIG. 9. First, the steam supplying device 140 is operated to generate steam and to supply steam to the processing space 125 (S100). At this time, the first discharging valve 176 is opened so that any condensed fluid generated in the processing space 125 may be directed to the storage unit 171 through the first discharging channel 174 (S200). If the fabric processing apparatus is also equipped with a condensing chamber 229, as shown in FIGs. 7 and 8, then the third discharging valve 279 is also opened at this time so that condensed fluid from the condensing chamber 229 may be directed to the storage unit 171 through the third discharging channel 278 (S250).

[0053] Upon completion of the steam cycle (S300), the steam supplying device 140 is turned off, and the dry air supplying device 150 is turned on (S400) to begin the drying cycle. Upon completion of the drying cycle (S500), the dry air supplying device 150 is turned off (S600), and the first discharging valve 176 and the third discharging valve 279 are closed (S700) to prevent any moisture and odors generated by fluid collected in the storage unit 171 from flowing back into the processing space 125. At this point, the steaming and drying cycles of the fabric processing apparatus have been completed, and the apparatus enters a storage mode in which fabric articles are held in the processing space until removal.

[0054] Once the dry air supplying device 150 is turned off and the first and third discharging valves 176 and 279 have been closed (S600, S700), the second discharging valve 177 is opened to drain any fluid remaining in the steaming housing 151 into the storage unit 171 (S800).

Once a predetermined amount of time has elapsed (S900), the second discharging valve 177 is closed to prevent any moisture and odors generated by fluid collected in the storage unit 171 from flowing hack into the steam housing 151 and being used in a subsequent steaming operation.

[0055] Additional details regarding the structure and functionality of fabric treatment/refreshing apparatuses can be found in Korean Patent Application Nos. 37889/2006, 43405/2006, 131041/2006 and 131040/2006, the entirety of which are incorporated herein by reference.

[0056] In a fabric processing apparatus as embodied and broadly described herein, since the fluid discharging valves are provided on the plurality of fluid discharging channels that discharge condensed and residual fluid to the storage unit so that the fluid discharging channels are closed by the fluid discharging valves when the processing apparatus stops operating, it is possible to prevent odors and moisture generated by fluid accumulated in the storage unit from flowing back into the processing space along the fluid discharging channels.

[0057] Additionally, condensed fluid in the processing space may be discharged to the storage unit when the processing apparatus operates so that an operation load on the processing apparatus may be reduced, and odors and moisture generated by fluid accumulated in the storage unit may be prevented from flowing back into the processing space when the processing apparatus stops operating, thus improving the operation reliability of the processing apparatus.

[0058] A fabric processing apparatus as embodied and broadly described herein may include a case that limits a processing space in which fabric articles are accommodated therein, a steam supplying device that supplies steam to the processing space, a storage unit connected to the processing space by a first water discharging channel and connected to the steam supplying device by a second water discharging channel, and first and second water discharging valves provided on the first and second water discharging channels to intermit a flow of water discharged to the storage unit and to prevent a bad smell and moisture from flowing backward from the storage unit.

[0059] The fabric processing apparatus may also include a dry air supplying device that supplies dry air to the processing space. The first water discharging valve is opened when the steam supplying device or the dry air supplying device operates and is closed when the steam supplying device or the dry air supplying device stops operating. The second water discharging valve is closed when the steam supplying device operates and is opened when the steam supplying device stops operating. The second water discharging valve is closed when a time for which the second water discharging valve is opened when the steam supplying device stops operating is no less than a set time.

[0060] The case may include an outer case to a lower part of which the storage unit is detachably provided and an inner case provided in the outer case to limit the processing space and the first water discharging channel is connected to the lower part of the inner case. The steam supplying device may include a steaming housing that receives water from an outside to store the received water, a steaming heater provided in the steaming housing to heat the water in the steaming housing and to generate steam, and a steam nozzle that injects the steam generated by the steaming heater to the processing space. The second water discharging channel is connected to the lower part of the steaming housing.

[0061] A fabric processing apparatus in accordance with another embodiment as broadly described herein may include a case that limits a processing space in which fabric articles are accommodated and a condensing chamber that condenses humid air in the processing space therein, a steam supplying device that supplies steam to the processing space, a storage unit connected to the processing space by a first water discharging channel, connected to the steam supplying device by a second water discharging channel, and connected to the condensing chamber by a third water discharging channel, and first, second, and third water discharging valves provided on the first, second, and third water discharging channels to intermit a flow of water discharged to the storage unit and to prevent a bad smell and moisture from flowing backward from the storage unit.

[0062] The fabric processing apparatus may also include a dry air supplying device that suctions air in the condensing chamber to supply dry air to the processing space. The first and third water discharging valves are opened when the steam supplying device or the dry air supplying device operates and is closed when the steam supplying device or the dry air supplying device stops operating. The second water discharging valve is closed when the steam supplying device operates and is opened when the steam supplying apparatus stops operating. The second water discharging valve is closed when a time for which the second water discharging valve is opened when the steam supplying device stops operating is no less than a set time.

[0063] The case may include an outer case to a lower part of which the storage unit is detachably provided and an inner case provided in the outer case to limit the processing space and to form a condensing chamber between the inner case and the outer case. The first water discharging channel is connected to the lower part of the inner case. The third water discharging channel is connected to the lower part of the condensing chamber. In addition, the steam supplying device may include a steaming housing that receives water from an outside to store the received water, a steaming heater provided in the steaming housing to heat me water in the steaming housing and to generate steam, and a steam nozzle that injects the steam generated by the steaming heater to the processing space. The second water discharging channel is connected to the lower part of the steaming

housing.

[0064] A fabric processing apparatus in accordance with another embodiment as broadly described herein may include a case that limits a processing space in which fabric articles are accommodated therein, a steam supplying device that supplies steam to the processing space, a storage unit to which condensed water generated by the processing space is received through a first water discharging channel and to which water that remains in the steam supplying device is received through a second water discharging channel, and a valve assembly connected to the storage unit and the first and second water discharging channels to intermit a flow of water discharged to the storage unit and to prevent a bad smell and moisture from flowing backward from the storage unit.

[0065] The valve assembly may include a valve body that is connected to the storage unit and in which a channel is formed and a water discharging valve including an outlet connected to the valve body and two inlets corresponding to the first and second water discharging channels. The processing apparatus may also include a condensing chamber formed in the case to condense humid air received from the processing space. Condensed water generated by the condensing chamber is received to the storage unit through a third water discharging channel. The water discharging valve of the valve assembly may include an outlet connected to the valve body and three inlets corresponding to the first, second, and third water discharging channels.

[0066] Any reference in this specification to "one embodiment," "an embodiment," "example embodiment," "certain embodiment," "alternative embodiment," etc., means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment as broadly described herein. The appearances of such phrases in various places in the specification are not necessarily all referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with any embodiment, it is submitted that it is within the purview of one skilled in the art to effect such feature, structure, or characteristic in connection with other ones of the embodiments.

[0067] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various numerous variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. A fabric processing apparatus, comprising:

a case that defines a processing space configured to receive fabric articles for processing;
a steam supplying device that selectively supplies steam to the processing space;
a dry air supplying device that selectively supplies dry air to the processing space;
a storage unit that receives fluid from the processing space and the steam supplying device;
a first discharging channel that extends between the processing space and the storage unit;
a second discharging channel that extends between the steam supplying device and the storage unit;
a valve system that regulates a flow of fluid between the processing space and the storage unit, and between the steam supplying device and the storage unit, so as to selectively allow fluids to flow from the processing space and the steam supplying device into the storage unit, and to prevent fluids and odors in the storage unit from flowing into the processing space and the steam supplying device.

2. The apparatus of claim 1, wherein the valve system comprises:

a first discharging valve provided with the first discharging channel, wherein the first discharging valve regulates a flow of fluid between the processing space and the storage unit; and
a second discharging valve provided with the second discharging channel, wherein the second discharging valve regulates a flow of fluid between the steam supplying device and the storage unit.

3. The apparatus of claim 2, wherein the first discharging valve is open when the steam supplying device or the dry air supplying device operates, and the first discharging valve is closed when the steam supplying device and the dry air supplying device stop operating and/or
wherein the first discharging valve is open during operation of the apparatus to direct condensed fluid accumulated in the processing space through the first channel and into the storage unit, and the first discharging valve is closed when the apparatus is not operating to prevent moisture and odors generated by fluid collected in the storage unit from flowing back through the first discharging channel and into the processing space.

4. The apparatus of claim 2 or 3, wherein the second

discharging valve is closed when the steam supplying device operates, and the second discharge valve is open when the steam supplying device stops operating, and/or
wherein the second discharging valve is closed during operation of the apparatus to maintain fluid in the steam supplying device for generation of steam during operation, and the second discharging valve is opened when the apparatus stops operation so as to drain residual fluid from the steam supplying device through the second discharging channel and into the storage unit.

5. The apparatus of claim 4, wherein the second discharging valve remains open for a predetermined amount of time after the apparatus stops operating, and is closed after the predetermined amount of time has elapsed so as to prevent moisture and odors generated by fluid collected in the storage unit from flowing back through the second discharging channel and into the processing space and/or
wherein the second discharging valve remains closed while the steam, supplying device operates and is opened as soon as the steam supplying device stops operating, and wherein the second discharging valve remains open for a predetermined amount of time after the steam supplying device stops operating and is closed after the predetermined amount of time has elapsed.

6. The apparatus of any of claims 1 to 5, wherein the case comprises:

an outer case; and
an inner case provided within the outer case so as to define the processing space.

7. The apparatus of claim 6, wherein the steam supplying device comprises:

a housing that receives and stores fluid from an external source;
a heater provided in the housing that heats fluid stored in the housing to generate steam; and
a nozzle that injects steam generated by the heater into the processing space.

8. The apparatus of claim 6 or 7, wherein the storage unit is detachably coupled to a lower portion of the outer case, and wherein the first discharging channel extends from a lower portion of the inner case to the storage unit, and the second discharging channel extends from a lower portion of the housing to the storage unit.

9. The apparatus of any of claims 1 to 5, wherein the storage unit is detachably coupled to a lower portion of the outer case, and wherein the first discharging channel extends from a lower portion of the case to the storage unit, and the second discharging channel extends from a lower portion of the steam supplying device to the storage unit.

10. The apparatus of claim 9, wherein the valve system comprises:

a regulating device that regulates a flow of fluid between the case and the storage unit, and between the steam supplying device and the storage unit, through the first and second discharging channels, respectively, wherein the regulating device includes a first inlet, a second inlet, and an outlet; and
a body portion that extends from the outlet of the regulating device to the storage unit, wherein a discharging end of the first discharging channel is coupled to the first inlet of the regulating device, and a discharging end of the second discharging channel is coupled to the second inlet of the regulating device.

11. The apparatus of any of claims 2 to 4, further comprising:

a condensing chamber that receives air discharged from the processing space and condenses the discharged air;
a third discharging channel that extends between the condensing chamber and the storage unit so as to direct fluid from the condensing chamber into the storage unit; and
a third discharging valve provided with the third discharging channel, wherein the third discharging valve regulates a flow of fluid between the condensing chamber and the storage unit.

12. The apparatus of claim 11, wherein the first and third discharging valves are open when the steam supplying device or the dry air supplying device operate, and are closed when the steam supplying device or the dry air supplying device stop operating.

13. The apparatus of claim 8, further comprising:

a condensing chamber formed between the inner and outer cases, wherein the condensing chamber receives air discharged from the processing space and condenses the discharged air through heat exchange with the outer case;
a third discharging channel that extends between the condensing chamber and the storage unit so as to direct fluid from the condensing chamber into the storage unit; and
a third discharging valve provided with the third discharging channel, wherein the third discharg-

ing valve is open when the steam supplying device or the dry air supplying device operates so as to direct condensed fluid from the condensing chamber into the storage unit.

14. A method of operating a fabric processing apparatus having a case that defines a processing space in which fabric articles are received for processing, the method comprising:

operating a steam supplying device and supplying steam to the processing space;
opening a first discharging valve and directing fluid from the processing space through a first discharging channel and into a fluid storage unit;
turning off the steam supplying device after a first predetermined amount of time has elapsed and a steam cycle is complete;
turning on a dry air supplying device and supplying dry air to the processing space;
turning off the dry air supplying device after a second predetermined amount of time has elapsed and a drying cycle is complete, and closing the first discharging valve;
opening a second discharging valve and directing fluid from the steam supplying device through a second discharging channel and into the fluid storage unit; and
closing the second discharging valve after a third predetermined amount of time has elapsed.

15. The method of claim 14, further comprising:

opening a third discharging valve when the first discharging valve is opened;
discharging humid air from the processing space into a condensing unit, and condensing the humid air in the condensing unit; and
directing condensed fluid from the condensing unit through a third discharging channel and into the fluid storage unit.

16. The method of claim 15, wherein closing the first and third discharging valves comprises blocking respective portions of the first and third discharging channels so as to prevent moisture and odors generated by fluid collected in the storage unit from flowing back through the first and third discharging channels and into the processing space.

17. The method of any of claims 14 to 16, wherein opening the second discharging valve comprises draining residual fluid remaining in the steam supplying device when the apparatus has stopped operating into the storage unit through the second discharging channel, and closing the second discharging valve comprises blocking a portion of the second discharging channel so as to prevent moisture and odors generated by fluid collected in the storage unit from flowing back through the second discharging channel and into the steam supplying device.

FIG. 1

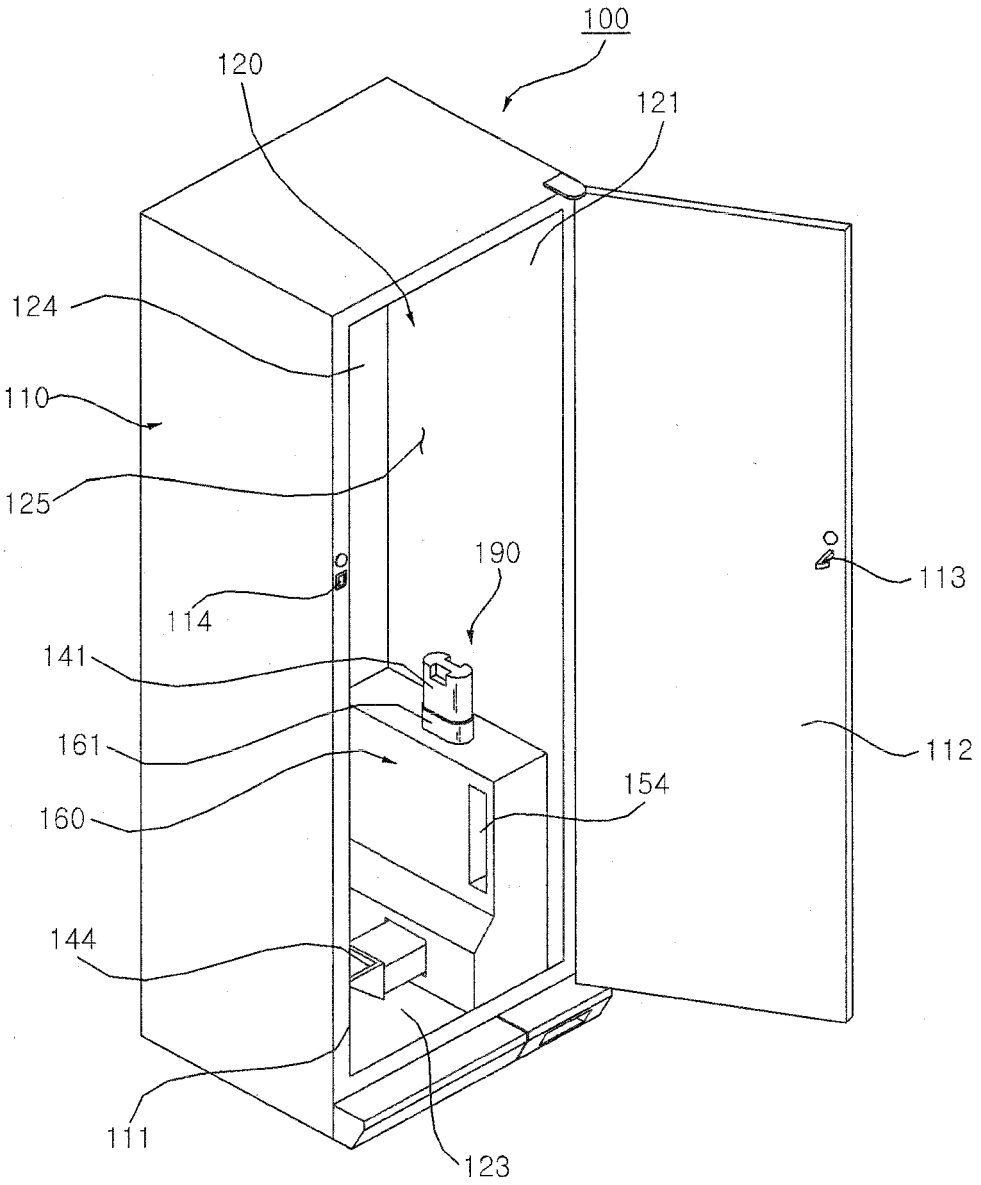

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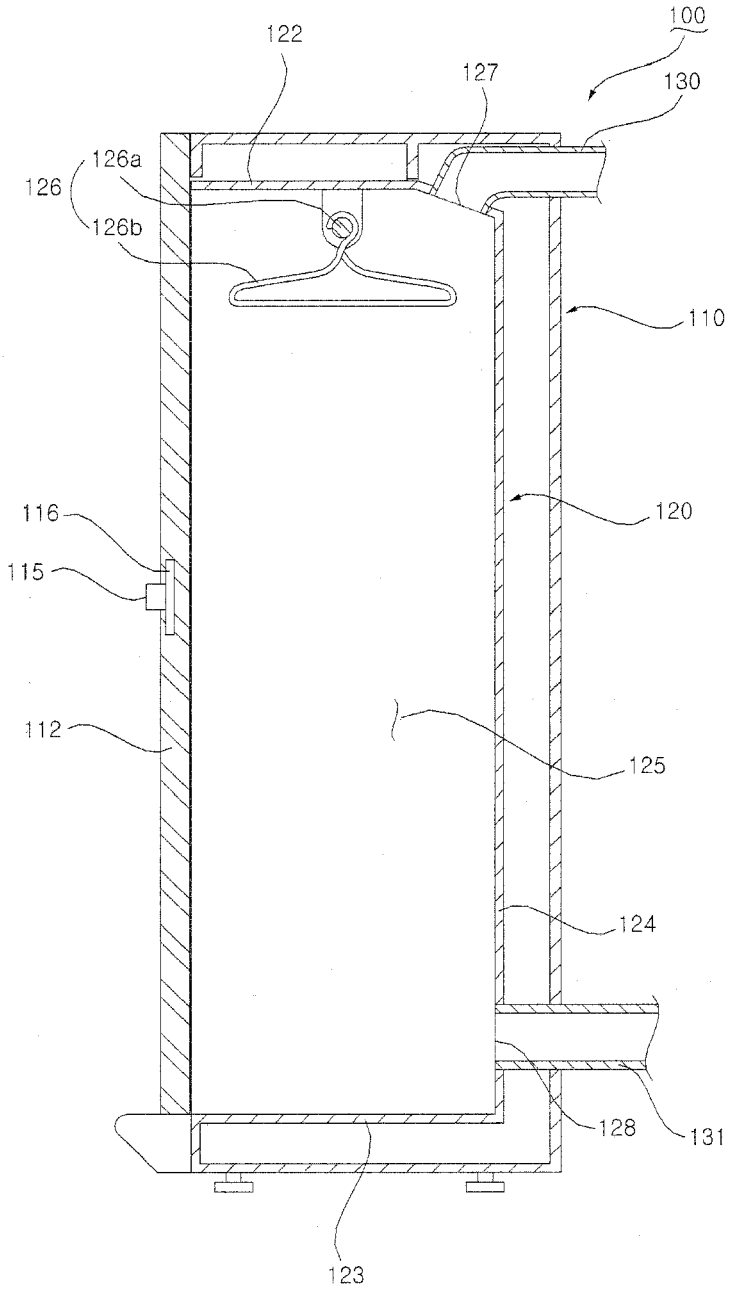
FIG. 2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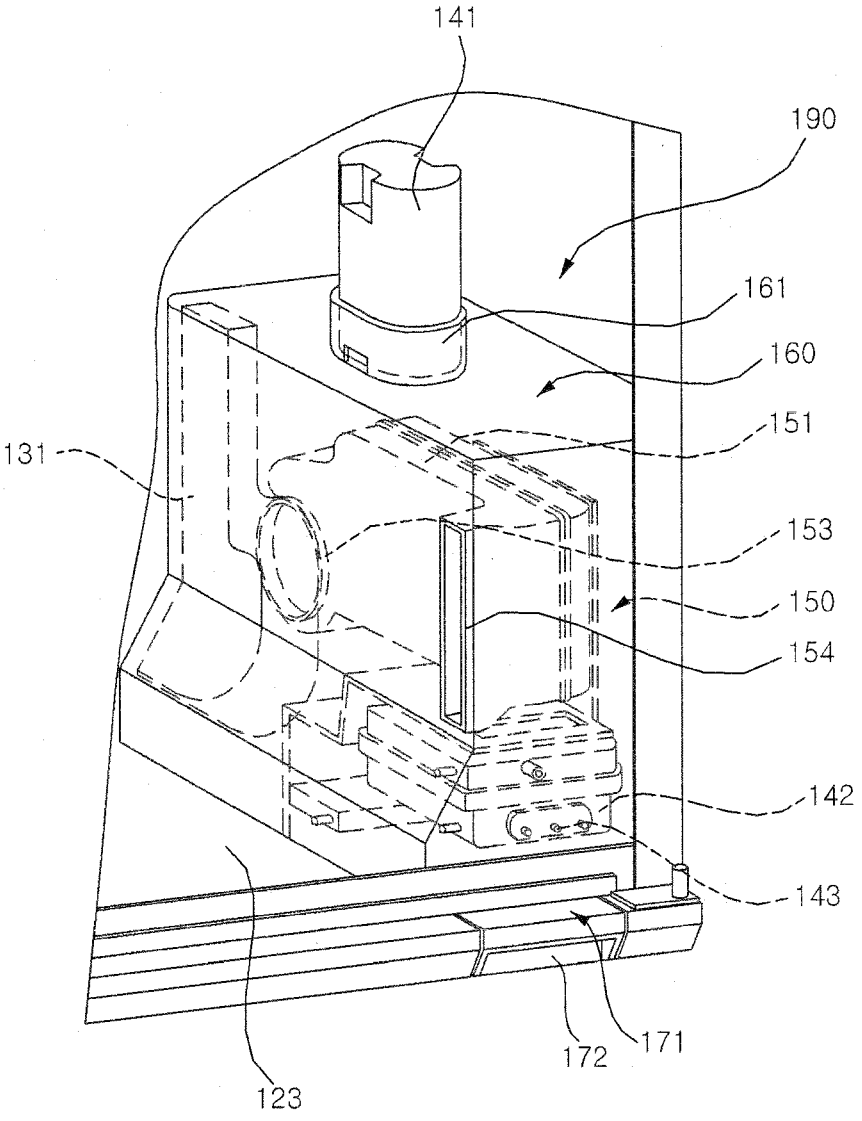

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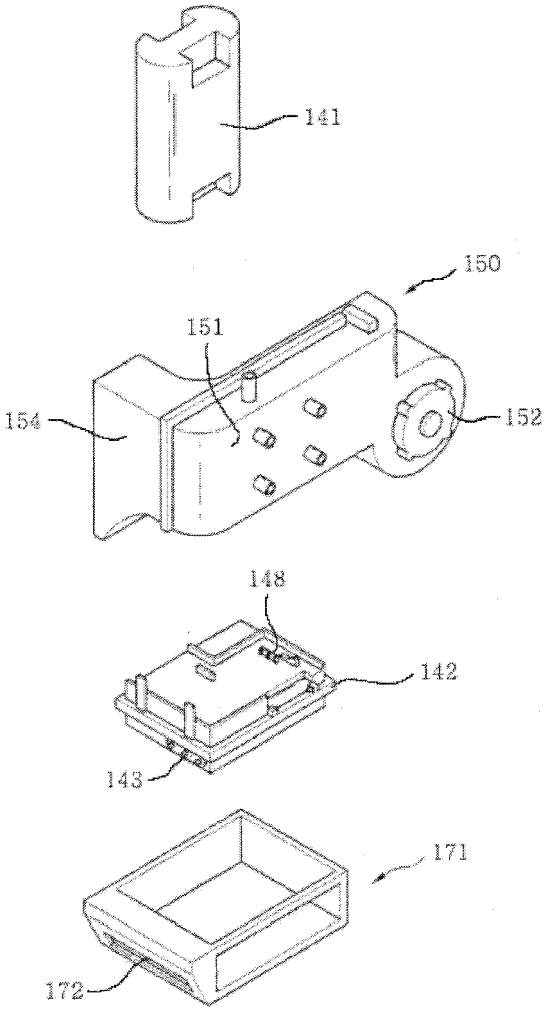

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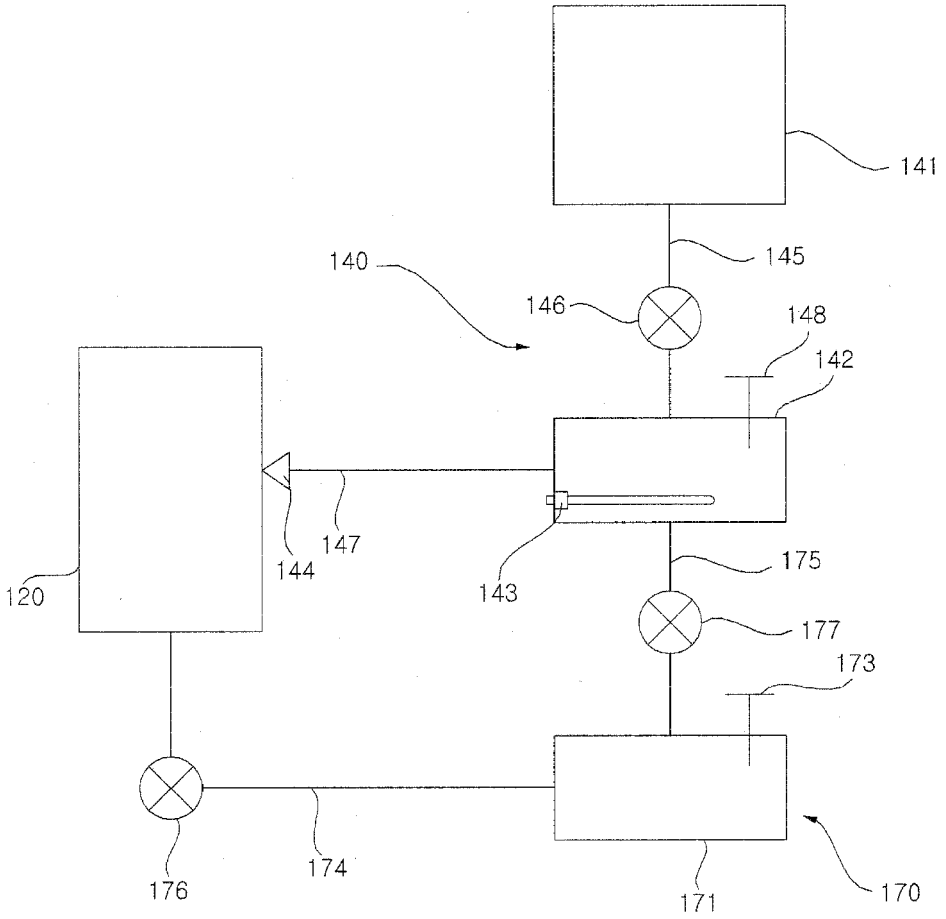
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FIG. 6

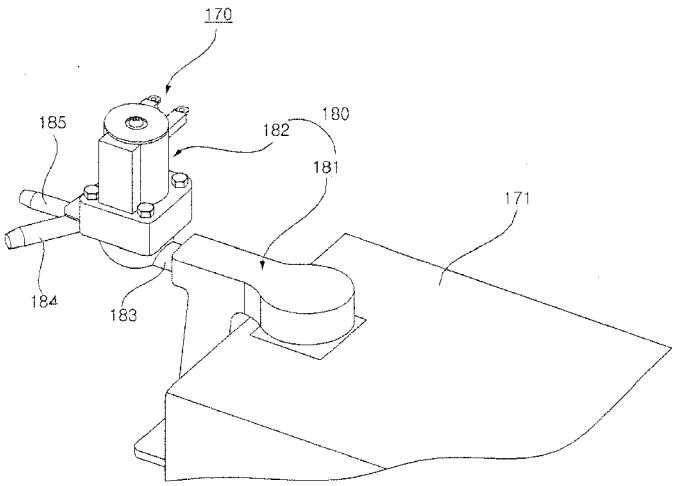

FIG. 7

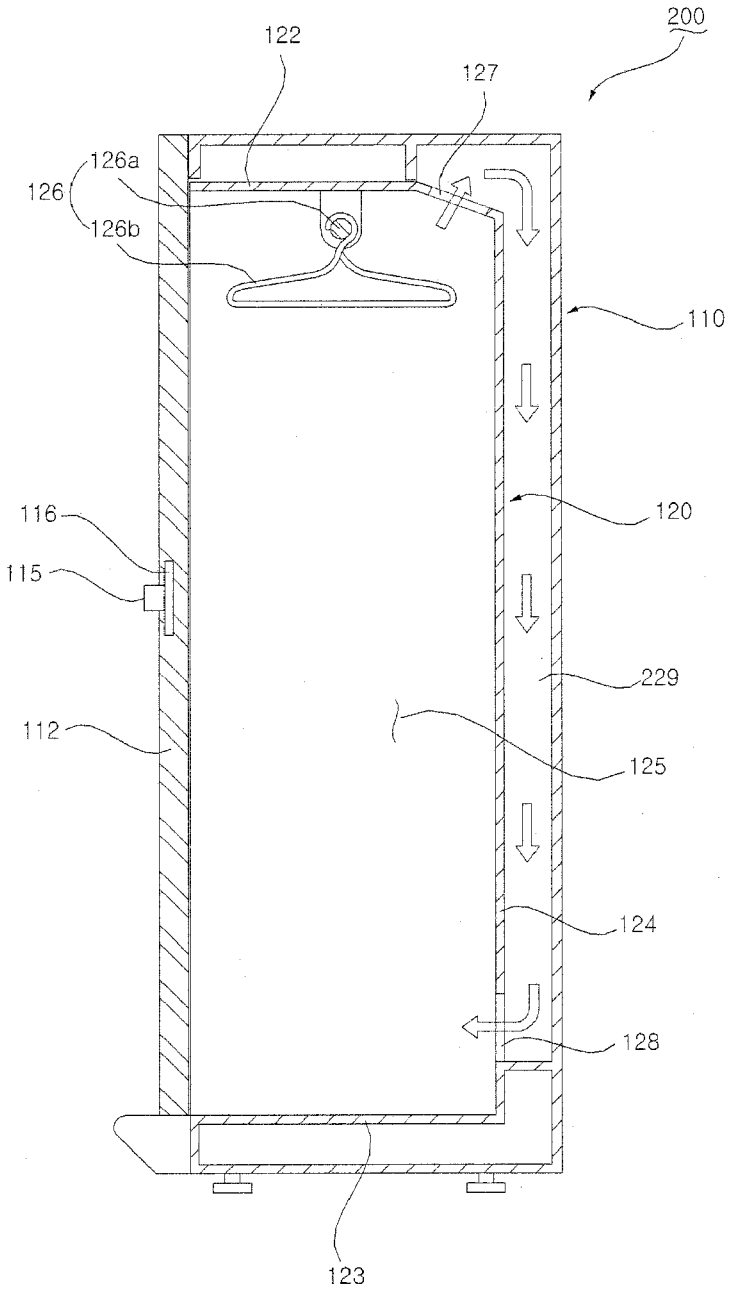
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FIG. 8

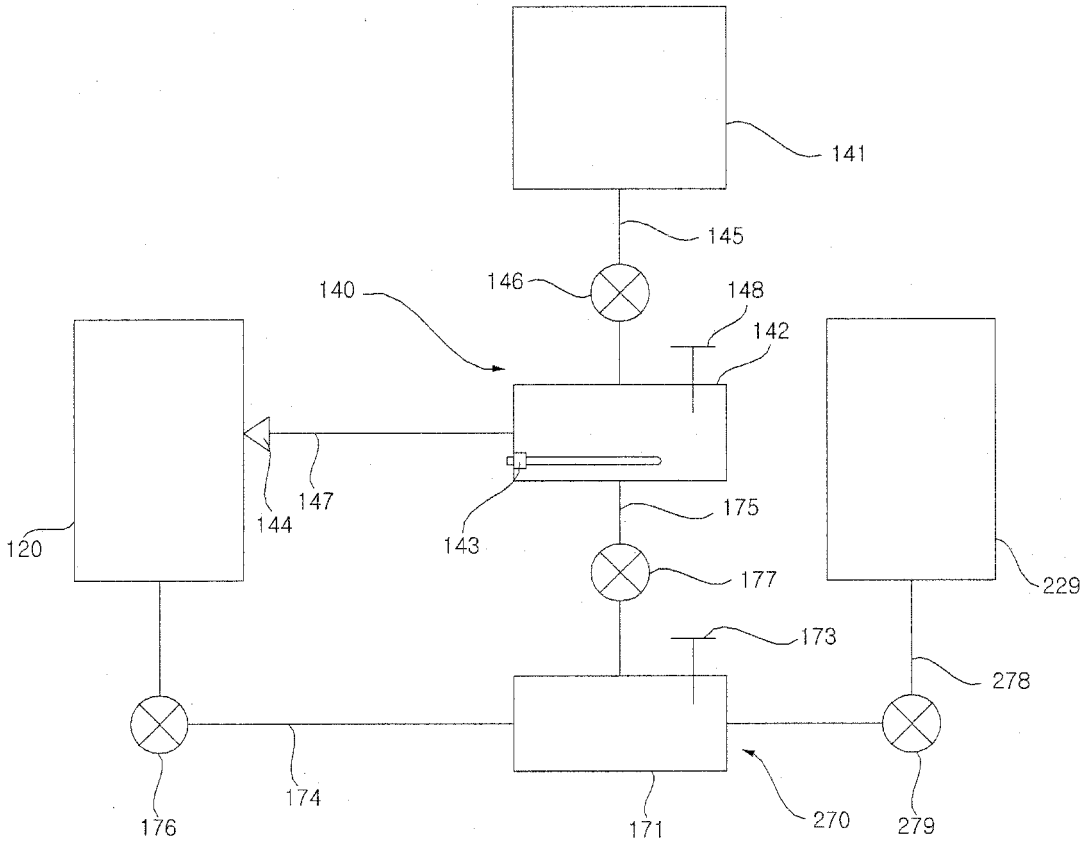
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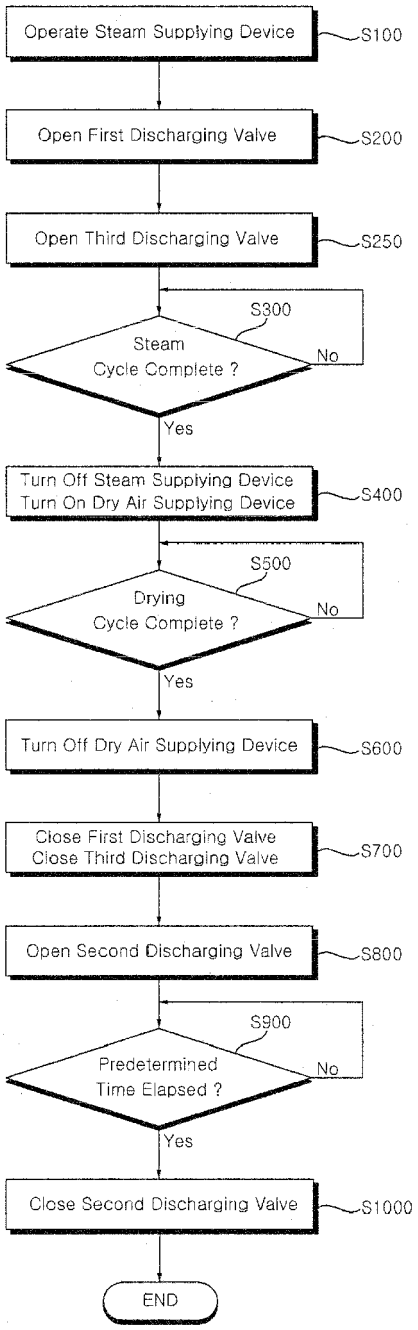
FIG. 9


Operate Steam Supplying Device
S100
Open First Discharging Valve
S200
Open Third Discharging Valve
S250
S300
Steam Cycle Complete ?
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Turn Off Steam Supplying Device
Turn On Dry Air Supplying Device
S400
S500
Drying Cycle Complete ?
No
Yes
Turn Off Dry Air Supplying Device
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Close Third Discharging Valve
S700
Open Second Discharging Valve
S800
S900
Predetermined Time Elapsed ?
No
Yes
Close Second Discharging Valve
S1000
END

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 15 2246

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 03/074778 A (CEVIK AYLA [TR]) 12 September 2003 (2003-09-12) * page 16, line 15 - page 26, line 12; figures 4-7 *	1-17	INV. D06F58/10
A	US 2 845 786 A (CHRISMAN ERNEST L) 5 August 1958 (1958-08-05) * column 3, line 45 - column 5, line 56; figure 9 *	1-17	
A	US 3 899 108 A (FRAUENDORF MANFRED) 12 August 1975 (1975-08-12) * column 7, line 16 - column 10, line 40; figures 1,5 *	1-17	
A	US 5 305 484 A (FITZPATRICK JOHN S [IE] ET AL) 26 April 1994 (1994-04-26) * column 8, line 48 - column 10, line 19; figures 7,9,10 *	1-17	
A	US 5 359 786 A (VIERLING PAUL F [DE]) 1 November 1994 (1994-11-01) * the whole document *	1-17	TECHNICAL FIELDS SEARCHED (IPC) D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 June 2008	Bichi, Marco

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