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(54) CLOTHING TREATMENT DEVICE

KLEIDUNGSBEHANDLUNGSVORRICHTUNG

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(56) References cited:
EP-A1- 2 860 297
EP-A1- 2 860 299
WO-A2-2006/126804
DE-A1-102007 003 869
JP-A- 2007 195 942
JP-A- 2008 075 903
JP-A- 2009 213 693
JP-A- 2011 092 540
US-A1- 2011 219 824

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Description

TECHNICAL FIELD

[0001] The present invention relates to a clothing treatment device which washes, spin-dries and/or dries clothing according to the preamble of claim 1.

BACKGROUND ART

[0002] Recently, there has been developed a washing machine which sterilizes clothing by supplying steam to clothing (see PTL 1, for example).

[0003] The washing machine described in PTL 1 is configured such that steam is generated by a heater immersed in water and the generated steam is supplied to a drum in which clothing is housed.

[0004] However, steam is generated by directly evaporating water by the heater and hence, a pressure of steam supplied to the drum is low. Accordingly, it takes time to fill a space in the drum with steam. On the other hand, an attempt to generate a large amount of steam for shortening time, there arises a drawback that a large amount of electric power becomes necessary.US 2011/0219824 A1 discloses the features set forth in the preamble portion of claim 1.

[0005] This prior-art document proposes to boil water to be evaporated. The whole chamber has to be heated to boil the water to be evaporated. Furthermore, the conduits for supplying water and for discharging steam are welded to the upper case of this know steam generator.

Citation List

Patent Literature

[0006] PTL 1: European Patent No. 1883727 specification

SUMMARY OF THE INVENTION

[0007] **To overcome the above-mentioned drawback, a clothing treatment** device of the present invention includes in addition to the features listed up in the preamble of claim 1 those features mentioned in the characterizing portion of claim 1.

[0008] According to the above-mentioned constitution, the steam generator has a wall surface which defines the chamber for generating the steam. The water supply mechanism injects water to the wall surface heated by the heater. The injected water hits the wall surface heated by the heater so that the water becomes water vapor. In this case, a pressure in a chamber of the steam generator is sharply increased due to vapor pressure generated when water becomes water vapor, and water vapor is injected into a housing tub in which clothing is housed.

[0009] Due to such a constitution, unlike the related art where clothing is placed in vapor atmosphere by leaking vapor, steam is directly supplied to clothing by injecting steam of high pressure. As a result, it is possible to realize a clothing treatment device which can supply steam to clothing at a high supply efficiency.

[0010] Further, the inlet port and the connection tube are connected to each other by the fixing member, and the discharge port and the discharge tube are connected to each other by the fixing member. Accordingly, heat generated by the steam generator is not directly transferred to the connection pipes and the discharge tubes. As a result, it is possible to suppress the thermal deformation and the thermal deterioration of the connection tube or the discharge tube thus enhancing reliability of the clothing treatment device.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

FIG. 1 is a schematic longitudinal cross-sectional view of a washing machine exemplified as a clothing treatment device according to an exemplary embodiment of the present invention.

FIG. 2 is a schematic perspective view of the washing machine according to the exemplary embodiment with a part shown in a see through manner.

FIG. 3 is a schematic perspective view of a steam supply mechanism which is housed in a casing of the washing machine according to the exemplary embodiment.

FIG. 4A is a schematic perspective view of a steam generating part of the steam supply mechanism of the exemplary embodiment.

FIG. 4B is a schematic perspective view of the steam generating part of the steam supply mechanism of the exemplary embodiment.

FIG. 5 is a schematic perspective view of the mounting structure for connecting a lid portion of the steam generating part and the casing to each other in the exemplary embodiment.

FIG. 6A is a schematic perspective view of a steam generator in the steam generating part of the exemplary embodiment.

FIG. 6B is a schematic perspective view of the steam generator in the steam generating part of the exemplary embodiment.

FIG. 6C is a schematic perspective view of the steam generator in the steam generating part of the exemplary embodiment.

FIG. 7 is a schematic perspective view of a body portion of the steam generator of the exemplary embodiment.

FIG. 8 is a schematic developed perspective view of the steam generator of the exemplary embodiment.

FIG. 9 is a schematic perspective view of a lid portion of the steam generator of the exemplary embodiment.

FIG. 10 is a schematic plan view of the body portion

of the steam generator of the exemplary embodiment.

FIG. 11 is a schematic view of a water supply mechanism of the steam supply mechanism of the exemplary embodiment.

FIG. 12 is a schematic back view of a front portion of a housing tub of the washing machine of the exemplary embodiment.

FIG. 13 is an explanatory view schematically showing the relationship between an intermittent operation of a pump of the water supply mechanism and a temperature inside a chamber space in the exemplary embodiment.

FIG. 14 is an explanatory view schematically showing a change in a temperature of water which is supplied to a water tub of the washing machine of the exemplary embodiment.

FIG. 15 is a block diagram schematically showing a control of a door body based on a temperature of the steam generator of the exemplary embodiment.

DESCRIPTION OF EXEMPLARY EMBODIMENT

[0012] Hereinafter, a clothing treatment device of an exemplary embodiment of the present invention is described with reference to drawings. The present invention is not limited by the exemplary embodiment. Hereinafter, the description is made by taking a washing machine as an example of a clothing treatment device. Further, terms indicating the directions used in the description made hereinafter such as "upward", "downward", "leftward" and "rightward" are used merely for the clarification of the description and do not limit the principle of the clothing treatment device in any way. Further, the principle of the clothing treatment device is also applicable to a device which has an ability of washing and drying clothing and a device which dries clothing.

EXEMPLARY EMBODIMENT)

<Constitution of washing machine>

[0013] Hereinafter, the constitution of a washing machine of an exemplary embodiment of the present invention is described by also referencing FIG. 1.

[0014] FIG. 1 is a schematic longitudinal cross-sectional view of a washing machine exemplified as a clothing treatment device of the exemplary embodiment of the present invention.

[0015] As shown in FIG. 1, washing machine 100 of this exemplary embodiment includes at least: casing 110; and housing tub 200 for housing clothing inside casing 110. Housing tub 200 includes rotary drum 210 having peripheral wall 211 which surrounds axis of rotation RX and which has an approximately circular cylindrical shape (including a circular cylindrical shape), and water tub 220 which houses rotary drum 210.

[0016] Casing 110 is constituted of: front wall 111 in which a put-in opening through which clothing is put into housing tub 200 is formed; rear wall 112 disposed opposite to front wall 111; casing ceiling wall 113 which extends approximately horizontally (including horizontally); casing bottom wall 114 disposed opposite to casing ceiling wall 113; a left wall and a right wall described later and the like. In such structure, rotary drum 210 and water tub 220 of housing tub 200 are opened toward front wall 111.

[0017] Washing machine 100 further includes door body 120 which is mounted on front wall 111 of casing 110. Door body 120 is rotatable between a closed position where door body 120 closes the put-in opening formed in front wall 111 and an open position where door body 120 opens the put-in opening. Due to such a constitution, a user can put clothing into housing tub 200 through the put-in opening formed in front wall 111 after rotating door body 120 to the open position. Thereafter, the user moves door body 120 to the closed position, and the washing machine 100 washes the clothing already put into washing machine 100. FIG. 1 shows a state where door body 120 is at the closed position.

[0018] Rotary drum 210 includes peripheral wall 211 and bottom wall 212, and is rotated about axis of rotation RX which extends between front wall 111 and rear wall 112 of casing 110. Clothing put into housing tub 200 moves inside rotary drum 210 along with the rotation of rotary drum 210. Due to such an operation, clothing is subjected to various processing such as washing processing, rinsing processing and/or spin-drying processing. Bottom wall 212 of rotary drum 210 is disposed in a state where the bottom wall 212 faces door body 120 at the closed position.

[0019] Water tub 220 is constituted of at least bottom portion 221, and front portion 222. Bottom portion 221 surrounds bottom wall 212 and a portion of peripheral wall 211 of rotary drum 210. Front portion 222 is disposed between bottom portion 221 of water tub 220 and door body 120, and surrounds a remaining portion of peripheral wall 211 of rotary drum 210 which front portion 222 faces.

[0020] Housing tub 200 includes rotary shaft 230 which is mounted on bottom wall 212 of rotary drum 210, and extends toward rear wall 112 of casing 110 along axis of rotation RX. Accordingly, rotary shaft 230 is provided such that rotary shaft 230 penetrates bottom portion 221 of water tub 220 and projects into a space formed between water tub 220 and rear wall 112.

[0021] Washing machine 100 includes motor 231 which is mounted on a lower side of water tub 220, pulley 232 which is mounted on rotary shaft 230 which is exposed to the outside of water tub 220, and belt 233 which transmits power of motor 231 to pulley 232. Further, when motor 231 is operated, power of motor 231 is transmitted to rotary shaft 230 by way of belt 233 and pulley 232. As a result, rotary drum 210 rotates inside water tub 220.

[0022] Washing machine 100 further includes packing structure 130 disposed between front portion 222 of wa-

ter tub 220 and door body 120. When door body 120 is rotated to the closed position, packing structure 130 is compressed by door body 120. As a result, due to compressed packing structure 130, the watertight sealing structure is formed between door body 120 and front portion 222.

[0023] Washing machine 100 includes water supply port 140 which is connected to a faucet (not shown in the drawing), and distribution part 141 for distributing water introduced into washing machine 100 through water supply port 140. Water supply port 140 is disposed in a state where the water supply port 140 projects upward from casing ceiling wall 113, and distribution part 141 is disposed between casing ceiling wall 113 and housing tub 200.

[0024] As shown in FIG. 1, washing machine 100 includes a detergent housing part (not shown in the drawing) in which a detergent is housed, and steam supply mechanism 300 which injects steam to housing tub 200 (described later). Distribution part 141 includes a plurality of water supply valves for selectively supplying water to housing tub 200, detergent housing part and steam supply mechanism 300 through water supply passages (not shown in the drawing). It is needless to say that known techniques applied to washing machines are applicable to the supply of water to housing tub 200 and the detergent housing part.

<Constitution of steam supply mechanism>

[0025] Hereinafter, the constitution of the steam supply mechanism of the washing machine according to the exemplary embodiment of the present invention is described using FIG. 2 and FIG. 3 while also referencing FIG. 1.

[0026] FIG. 2 is a schematic perspective view of the washing machine of the exemplary embodiment with a part shown in a see-through manner. FIG. 3 is a schematic perspective view of the steam supply mechanism which is housed in the casing of the washing machine of the exemplary embodiment.

[0027] Casing 110 is indicated by a dotted line in FIG. 2 and FIG. 3, and housing tub 200 is not shown in FIG. 3. An arrow in FIG. 3 schematically shows the water supply passages which connect the respective parts to each other.

[0028] As shown in FIG. 2 and FIG. 3, steam supply mechanism 300 includes at least water supply valve 310 which is used as a part of distribution part 141, and water storage tank 320 which is disposed below housing tub 200. Water supply valve 310 controls the supply of water to water storage tank 320. That is, when water supply valve 310 is opened, water is supplied to water storage tank 320 from water supply port 140. When water supply valve 310 is closed, the supply of water to water storage tank 320 is stopped.

[0029] Steam supply mechanism 300 further includes pump 330 which is mounted on water storage tank 320, and steam generating part 400 which receives water discharged from pump 330. Pump 330 performs an operation to supply water to steam generating part 400 intermittently or continuously. During an intermittent water supply operation, pump 330 supplies a proper amount of water which is adjusted such that steam is generated instantaneously to steam generating part 400 described later. On the other hand, when water is continuously supplied to steam generating part 400 by pump 330, it is possible to wash away an impurity (scale) or the like contained in water used for steam generation from steam generating part 400.

[0030] As shown in FIG. 2, steam supply mechanism 300 further includes steam communication tube 340 which extends downward from steam generating part 400. As described above by also referencing FIG. 1, front portion 222 of water tub 220 includes peripheral wall portion 223 which surrounds peripheral wall 211 of rotary drum 210, and annular portion 224 shown in FIG. 2 which forms the watertight sealing structure in cooperation with packing structure 130. Steam communication tube 340 of steam supply mechanism 300 is connected to peripheral wall portion 223 of front portion 222. Due to such a constitution, steam generated in steam generating part 400 is supplied to housing tub 200 through steam communication tube 340. It is preferable that steam communication tube 340 be formed such that at least a portion of steam communication tube 340 is formed into a bellows shape, for example, so as to prevent vibrations generated by the rotation of housing tub 200 from being transmitted to steam generating part 400.

[0031] As described above, in steam supply mechanism 300 of this exemplary embodiment, it is possible to forcibly supply water to steam generator 420 (see FIG. 8) disposed inside steam generating part 400 from water storage tank 320 by pump 330. Accordingly, steam generator 420 can be disposed above water storage tank 320. On the other hand, when the supply of water to steam generator 420 from water storage tank 320 is performed without providing pump 330, it is necessary to feed water in water storage tank 320 to steam generator 420 by the action of gravity. Accordingly, it is always necessary to dispose steam generator 420 below water storage tank 320. That is, by disposing pump 330, water can be forcibly supplied to steam generator 420 from water storage tank 320 by making use of pressure generated by pump 330. Accordingly, the restriction imposed on the relationship in the vertical direction between steam generator 420 and water storage tank 320 in disposing steam generator 420 and water storage tank 320 can be eliminated. As a result, the degree of freedom in the arrangement of water storage tank 320 and steam generator 420 is increased and hence, the space inside casing 110 can be effectively utilized.

[0032] Although steam generator 420 is disposed above water storage tank 320 as shown in FIG. 2, water can be supplied to steam generator 420 from water storage tank 320 by pump 330 without causing any problems.

[0033] When water flows into steam generator 420 inadvertently due to a factor such as an unexpected failure, steam more than necessary is generated. However, by disposing pump 330 as in the case of this exemplary embodiment, water storage tank 320 can be disposed below steam generator 420. Accordingly, even when pump 330 stops due to a trouble such as a failure so that the supply of water to steam generator 420 cannot be controlled, there is no possibility that water stagnating in a hose which makes water storage tank 320, pump 330 and steam generator 420 communicate with each other flows into steam generator 420 inadvertently. As a result, the generation of steam more than necessary can be prevented in advance.

[0034] On the other hand, in the constitution where pump 330 is not provided, it is always necessary to dispose steam generator 420 below water storage tank 320. Accordingly, when a failure occurs in a control part such as an open/close valve for controlling the supply of water to steam generator 420 from water storage tank 320, for example, the supply of water to steam generator 420 cannot be controlled. Further, water is inadvertently supplied to steam generator 420 from water storage tank 320 which is disposed above steam generator 420 due to the action of gravity. However, by disposing pump 330 as in the case of this exemplary embodiment, it is possible to prevent the occurrence of the case in advance where water is inadvertently supplied from steam generator 420 disposed above water storage tank 320.

[0035] In this exemplary embodiment, as shown in FIG. 2, steam generator 420 of steam generating part 400 is disposed above housing tub 200. Usually, an impurity contained in water supplied to steam generator 420 adheres to or precipitates on a wall surface of chamber space 430 which is defined by outer chamber wall 431, inner chamber wall 432 and upper surface 429 of body portion 423, and lower surface 434 of lid portion 424 which constitute steam generator 420 at the time of evaporating water. Then, because of such adhesion or precipitation of the impurity, the impurity is deposited on the wall surface which defines chamber space 430. In this case, the heat transfer between the wall surface of chamber space 430 and supplied water is not performed properly due to the impurity and hence, water supplied to steam generator 420 is minimally evaporated.

[0036] However, by disposing steam generator 420 above housing tub 200, an impurity which adheres to or precipitates on the wall surface is discharged or falls below steam generator 420 due to a pressure or the action of gravity at the time of evaporating water. Accordingly, an impurity can be easily discharged to housing tub 200 from the inside of chamber space 430. As a result, it is possible to prevent the deposition of an impurity which adheres to or precipitates on the wall surface of chamber space 430 of steam generator 420. Further, the lowering of an ability of evaporating water caused by the deposition of an impurity can be prevented in advance.

[0037] Further, in this exemplary embodiment, as shown in FIG. 2, as viewed from front wall 111 of casing 110, water storage tank 320 is disposed in a left lower space of casing 110, and steam generator 420 is disposed in a right upper space of casing 110. That is, steam generator 420 and water storage tank 320 are disposed at approximately symmetrical positions (including completely symmetrical positions) with respect to the center axis of housing tub 200 (axis of rotation RX).

[0038] In the case of a general washing machine, a detergent housing part (not shown in the drawing) which houses a detergent is disposed on either a left side or a right side of an upper front portion of casing 110. Accordingly, a space which is defined by casing 110 and housing tub 200 having approximately circular cylindrical shape (including a circular cylindrical shape) excluding a position occupied by the detergent housing part can be effectively used as a space for disposing water storage tank 320 and steam generator 420. For example, in the case where the detergent housing part is disposed on a left side of the upper front portion of casing 110, as shown in FIG. 2, water storage tank 320 is disposed on a rear side of the left lower portion of casing 110. In this case, when steam generator 420 is disposed on a front side of the right upper portion of casing 110, a space defined between an inner surface of casing 110 having an approximately rectangular box shape (including a rectangular box shape) and an outer peripheral surface of housing tub 200 can be effectively used for disposing water storage tank 320 and steam generator 420. As a result, a design size of water storage tank 320 and a design size of steam generator 420 can be set to values which allow housing of water storage tank 320 and steam generator 420 having maximally large sizes in the space defined in washing machine 100.

[0039] In the case where the detergent housing part is at the position described above, water storage tank 320 may be disposed at a position approximately symmetrical with the detergent housing part with respect to the center axis of housing tub 200 (axis of rotation RX), and steam generator 420 may be disposed at a position approximately symmetrical with water storage tank 320 with respect to horizontal plane HP which includes axis of rotation RX of housing tub 200. Also in this case, the space inside casing 110 can be effectively used in the same manner as described above.

[0040] In the case where the detergent housing part is at the position described above, water storage tank 320 may be disposed below the detergent housing part, and steam generator 420 may be disposed above water storage tank 320. In this case, steam generator 420 may be disposed at a position approximately symmetrical with water storage tank 320 with respect to a vertical plane which includes axis of rotation RX of housing tub 200. As a result, the space inside casing 110 can be effectively used in the same manner as described above.

[0041] In the case where axis of rotation RX of housing tub 200 is inclined in the longitudinal direction of casing 110 (for example, in the case where axis of rotation RX

of rotary drum 210 is inclined upward from rear wall 112 to front wall 111), water storage tank 320 and steam generator 420 may be disposed at approximately symmetrical positions with respect to axis of rotation RX of housing tub 200 or with respect to horizontal plane HP which includes axis of rotation RX. For example, water storage tank 320 and steam generator 420 are disposed at approximately symmetrical positions with respect to a vertical plane which passes the approximately center (including the center) in the longitudinal direction of casing 110. Due to such an arrangement, an inner space defined between the inner surface of casing 110 and the outer peripheral surface of housing tub 200 can be effectively used for disposing water storage tank 320 and steam generator 420.

[0042] Next, the constitution of steam generating part 400 of steam supply mechanism 300 is described using FIG. 4A, FIG. 4B, and FIG. 6A to FIG. 6C while referencing FIG. 3.

[0043] FIG. 4A and FIG. 4B are schematic perspective views of the steam generating part of the steam supply mechanism of the exemplary embodiment. FIG. 6A to FIG. 6C are schematic perspective views of the steam generator of the steam generating part of the exemplary embodiment.

[0044] As shown in FIG. 4A and FIG. 4B, steam generating part 400 includes casing 410 having an approximately rectangular box shape (including rectangular box shape), and steam generator 420 which is housed in casing 410. Casing 410 includes: vessel portion 411 which has bottom wall portion 414 and houses steam generator 420; and lid portion 412 which is constituted of upper wall 415 covering vessel portion 411 and lid portion peripheral wall 416 on which projecting member 417. Opening portion 413 is formed on bottom wall portion 414 of vessel portion 411.

[0045] Steam generator 420 is connected to pump 330 by way of connection tube 421 and a tube (not shown in the drawing), and is connected to steam communication tube 340 by way of discharge tube 422.

[0046] As shown in FIG. 6A to FIG. 6C, connection tube 421 and discharge tube 422 of steam generator 420 are fixed to fixing member 450 having an approximately planar shape (a plate shape, for example), and fixing member 450 is fixed to body portion 423 of steam generator 420. Due to such a constitution, connection tube 421 and discharge tube 422 are fixed to steam generator 420 in a stable manner.

[0047] Connection tube 421 and discharge tube 422 are connected away from (in a spaced-apart manner from) steam generator 420 by fixing member 450. Due to such a constitution, it is possible to suppress heat generated by steam generator 420 from being transferred to connection tube 421 and discharge tube 422. As a result, thermal deformation and thermal deterioration of connection tube 421 and discharge tube 422 can be suppressed.

[0048] As shown in FIG. 6C, inlet port 437 (described later) and connection tube 421 are sealed air-tightly by first sealing member 451, and discharge port 438 (described later) and discharge tube 422 are sealed air-tightly by second sealing member 452. Due to such a constitution, it is possible to prevent leakage of steam, water and the like.

[0049] It is preferable that fixing member 450 be made of metal such as iron or stainless steel, for example. In this case, thermal conductivity of iron or stainless steel which is used for forming fixing member 450 is lower than thermal conductivity of steam generator 420 which is formed using a material such as aluminum, for example. Accordingly, the thermal conduction from body portion 423 (that is, steam generator 420) to fixing member 450 is suppressed. Due to such a constitution, thermal deformation and thermal deterioration of connection tube 421 and discharge tube 422 connected to fixing member 450 can be further suppressed. Connection tube 421 and discharge tube 422 fixed to fixing member 450 are disposed so as to project downward through opening portion 413 formed on bottom wall portion 414 of steam generating part 400.

[0050] Next, the mounting structure for mounting steam generating part 400 of steam supply mechanism 300 on casing 110 of washing machine 100 is described using FIG. 5 by also referencing FIG. 3 and FIG. 4A.

[0051] FIG. 5 is a schematic perspective view of the mounting structure for connecting the lid portion and the casing of the steam generating part of this exemplary embodiment to each other.

[0052] Firstly, as shown in FIG. 3, casing 110 is constituted of at least: front wall 111; rear wall 112; right wall 115 which is formed in a raised manner between front wall 111 and rear wall 112; and left wall 116 which is formed opposite to right wall 115. Casing 110 further includes first reinforcing frame 117 which is disposed along an upper edge of right wall 115, and second reinforcing frame 118 which is disposed along an upper edge of front wall 111.

[0053] As shown in a lower side of FIG. 5, lid portion 412 which forms a portion of steam generating part 400 includes: upper wall 415 having an approximately rectangular shape (including a rectangular shape); lid portion peripheral walls 416 which project downward (toward a casing 410 side) from edge portions of upper wall 415; and projecting member 417 which projects frontward (toward a front wall 111 side of casing 110) from lid portion peripheral wall 416.

[0054] Then, first reinforcing frame 117 which is mounted on casing 110 of washing machine 100 and upper wall 415 of lid portion 412 of steam generating part 400 are connected to each other by first mounting member 151 shown at an upper right side of FIG. 5. On the other hand, second reinforcing frame 118 and projecting member 417 are connected to each other by second mounting member 152 shown at an upper left side of FIG, 5.

[0055] That is, lid portion 412 of steam generating part 400 and casing ceiling wall 113 of casing 110 are mounted in a spaced-apart manner from each other by way of

first mounting member 151 and second mounting member 152 which are mounted on lid portion 412 in an upwardly projecting manner. As a result, it is possible to alleviate (suppress) the transfer of heat generated by steam generating part 400 to casing 110. Next, the constitution of steam generator 420 of steam generating part 400 is described in detail using FIG. 6A to FIG. 6C.

[0056] As shown in FIG. 6A to FIG. 6C, steam generator 420 is constituted of : body portion 423 having an approximately rectangular shape (including a rectangular shape); lid portion 424 which is disposed on body portion 423; and a linear heater 425 such as a sheathed heater which is disposed inside body portion 423 through peripheral surface 428 of body portion 423, for example. In this exemplary embodiment, body portion 423 and lid portion 424 are formed using a material such as aluminum, for example, having higher thermal conductivity than a material used for forming fixing member 450 described above. Due to such a constitution, body portion 423 and lid portion 424 are efficiently and properly heated by heater 425.

[0057] As shown in FIG. 6B, thermister 426 is further mounted on body portion lower surface 427 of body portion 423 of steam generator 420. In the same manner, the above-mentioned connection tube 421 and discharge tube 422 which are fixed to fixing member 450 are also mounted on body portion lower surface 427 of body portion 423 which constitutes steam generator 420.

[0058] Heater 425 is controlled based on temperature information obtained by thermister 426. Due to such a control, a temperature of body portion 428 and a temperature of lid portion 424 are held at approximately fixed temperatures (including fixed temperatures). A thermostat which controls the turning on and off of electricity power to heater 425 at a predetermined temperature may be used in place of thermister 426. In this case, the substantially the same effect can be obtained.

[0059] Next, the constitution of body portion 423 which constitutes steam generator 420 is described using FIG. 6B and FIG. 7.

[0060] FIG. 7 is a schematic perspective view of the body portion of the steam generator of this exemplary embodiment.

[0061] As shown in FIG. 6B and FIG. 7, body portion 423 includes body portion lower surface 427, peripheral surface 428, and upper surface 429. Thermister 426, connection tube 421 and discharge tube 422 are mounted on body portion lower surface 427, wherein connection tube 421 and discharge tube 422 are mounted on body portion lower surface 427 by way of fixing member 450. Heater 425 is disposed on peripheral surface 428.

[0062] Further, body portion 423 is formed on upper surface 429 in a raised manner toward lid portion 424 which constitutes one side of steam generator 420 thus forming chamber space 430 having an approximately triangular shape (including a triangular shape), for example. Chamber space 430 is formed in such a manner that the chamber space 430 is defined by outer chamber wall 431 and inner chamber wall 432 having an approximately J shape (including a J shape), for example, which defines a steam flow passage inside chamber space 430.

[0063] Next, the constitution and the operation of steam generator 420 are described using FIG. 8 and FIG. 9 by also referencing FIG. 3, FIG. 6B and FIG. 7.

[0064] FIG. 8 is a schematic developed perspective view of the steam generator of this exemplary embodiment. FIG. 9 is a schematic perspective view of the lid portion of the steam generator of this exemplary embodiment.

[0065] As shown in FIG. 8, steam generator 420 includes packing ring 433 made of a heat-resistance rubber or the like, for example, which is mounted on body portion 423 in a state where the steam generator 420 surrounds the outer periphery of outer chamber wall 431.

[0066] As shown in FIG. 8 and FIG. 9, lid body 424 includes lower surface 434 which faces body portion 423, and shield wall 435 which has the substantially same shape (including the same shape) as outer chamber wall 431 of body portion 423.

[0067] By pushing lid portion 424 to body portion 423, shield wall 435 of lid portion 424 compresses packing ring 433. As a result, air-tightness of chamber space 430 of steam generator 420 is maintained.

[0068] Inlet port 437 is formed in body portion 423. Inlet port 437 is formed so as to allow water supplied through connection tube 421 connected to body portion lower surface 427 by way of fixing member 450 to flow into the inside of chamber space 430. Inlet port 437 is formed at the approximately center (including the center) of chamber space 430, and the periphery of inlet port 437 is surrounded by inner chamber wall 432.

[0069] Steam generator 420 of this exemplary embodiment is constituted as described above.

[0070] Next, the operation of steam generator 420 is described in detail.

[0071] Firstly, when a predetermined amount of water is supplied to steam generator 420 from water storage tank 320 by pump 330, water is injected upward (toward a lid portion 424 side) through connection tube 421 and inlet port 437. Water injected into chamber space 430 of steam generator 420 impinges on inner chamber wall 432, upper surface 429 of body portion 423 surrounded by inner chamber wall 432 and/or lower surface 434 of lid portion 424 which is positioned above inlet port 437. At this point of time, steam generator 420 is heated by heater 425 (for example, approximately 200°C) thus having high thermal energy.

[0072] Then, the water supply operation is performed intermittently using pump 330 of steam supply mechanism 300 so that a proper amount of water is supplied into the inside of chamber space 430 of steam generator 420 (for example, approximately 2cc/time). Accordingly, water injected upward from inlet port 437 of steam generator 420 is instantaneously evaporated by thermal energy which steam generator 420 possesses.

[0073] Further, due to the instantaneous evaporation

of water, an inner pressure of chamber space 430 is sharply increased. An impurity which is contained in water supplied to steam generator 420 adheres to or precipitates on the wall surface which constitutes chamber space 430 when water evaporates. However, the adhered or precipitated impurity receives an action of pressure generated by the sharp rise of an inner pressure of chamber space 430 at the time of evaporation of water. As a result, the impurity is easily discharged outside chamber space 430.

[0074] Next, the constitution of the heater mounted on body portion 423 of steam generator 420 is described in detail using FIG. 10 by also referencing FIG. 6B.

[0075] FIG. 10 is a schematic plan view of the body portion of the steam generator of this exemplary embodiment.

[0076] As shown in FIG. 10, heater 425 is disposed so as to extend along an approximately U-shape (including a U-shape) passage formed inside body portion 423. Due to such an arrangement, heater 425 surrounds inlet port 437 to which connection tube 421 is mounted. Accordingly, a temperature of inner chamber wall 432 and a temperature of a region surrounded by inner chamber wall 432 become the highest temperature inside chamber space 430 due to heating by heater 425. As a result, water injected into the inside of chamber space 430 through inlet port 437 is instantaneously evaporated.

[0077] Inner chamber wall 432 is disposed inside chamber space 430 defined by outer chamber wall 431 in a state where inner chamber wall 432 extends in an approximately J-shape. That is, a spiral-shaped flow passage is formed in the chamber space 430 by inner chamber wall 432. Discharge port 438 is formed in body portion 423 at a position in the vicinity of a terminal end of the flow passage through which water or steam passes. Due to such a constitution, steam generated in the space surrounded by inner chamber wall 432 moves toward discharge port 438 along with the increase of an inner pressure of chamber space 430. Then, steam which arrives at discharge port 438 is discharged downward in the vertical direction through discharge tube 422 mounted on discharge port 438.

[0078] Heater 425 is disposed such that heater 425 extends in an approximately U-shape (including a U-shape) along an outside passage of the spiral-shaped flow passage. Due to such a constitution, steam generated in the space surrounded by inner chamber wall 432 moves toward discharge tube 422 while being heated. Accordingly, high-temperature steam is discharged from discharge tube 422 of steam generator 420.

<Constitution of water supply mechanism>

[0079] Hereinafter, the constitution and the operation of the water supply mechanism of the washing machine of the exemplary embodiment of the present invention are described using FIG. 11.

[0080] FIG. 11 is a schematic view of the water supply mechanism of the steam supply mechanism of this exemplary embodiment.

[0081] As shown in FIG. 11, water supply mechanism 500 which injects water to chamber space 430 of steam generator 420 includes water supply valve 310, water storage tank 320, pump 330, connection tube 421, water level sensor 321 for measuring a water level in water storage tank 320 and the like all of which are described previously. Water supply valve 310 performs the supply of water to water storage tank 320 or the cutting off of the supply of water to water storage tank 320 corresponding to a water level detected by water level sensor 321.

[0082] Water supply valve 310 may be controlled corresponding to an operation time and/or an operation pattern (an intermittent water supply operation and/or a continuous water supply operation) of pump 330. For example, an amount of water supplied from water supply valve 310 may be adjusted such that water storage tank 320 becomes empty when an operation of pump 330 is finished. Due to such a constitution, even when an outside air temperature becomes low, water in water storage tank 320 is minimally frozen. As a result, the reliability of washing machine 100 can be further enhanced.

[0083] Pump 330 supplies water stored inside water storage tank 320 to chamber space 430 of steam generator 420 through connection tube 421. In the intermittent water supply operation performed using pump 330, for example, a supply amount, a supply time, a supply interval and the like are adjusted such that water injected into the inside of chamber space 430 is instantaneously evaporated.

[0084] On the other hand, as described above, when water is evaporated inside chamber space 430 of steam generator 420, there exists a possibility that an impurity contained in water is deposited inside chamber space 430. In this case, the continuous water supply operation by pump 330 is adjusted such that water flows inside chamber space 430 at a flow speed sufficient for washing away the deposited impurity. Due to such a constitution, it is possible to effectively remove an impurity. As a result, it is possible to prevent lowering of a heat exchange efficiency between steam generator 420 and water in advance.

[0085] Discharge tube 422 of steam generator 420 is connected to steam communication tube 340. Due to such a constitution, steam generated inside chamber space 430 due to the intermittent water supply operation by pump 330 and water which flows inside chamber space 430 due to the continuous water supply operation of pump 330 can be made to flow into the housing tub 200 through discharge tube 422 and steam communication tube 340.

[0086] The water supply mechanism of the steam supply mechanism of washing machine 100 of this exemplary embodiment is configured as described above.

<Supply of steam and water to housing tub>

[0087] Hereinafter, the operation of supplying steam and water to be supplied to the housing tub of the washing machine of the exemplary embodiment of the present invention is described using FIG. 12 by also referencing FIG. 1 and FIG. 11.

[0088] FIG. 12 is a schematic back view of a front portion of the housing tub of the washing machine of this exemplary embodiment.

[0089] Firstly, as shown in FIG. 1, annular portion 224 of front portion 222 of water tub 220 includes: inner surface 225 which faces rotary drum 210; and outer surface 226 which faces front wall 111 of casing 110. FIG. 12 mainly shows inner surface 225 of annular portion 224 formed on front portion 222 of water tub 220 .

[0090] As shown in FIG. 12, the above-mentioned steam supply mechanism 300 further includes: branched tube 351 which is mounted on inner surface 225; nozzle 352 which is disposed above branched tube 351; and steam tube 353 which connects branched tube 351 and nozzle 352 to each other. Steam communication tube 340 is connected to branched tube 351 through peripheral wall portion 223 of water tub 220.

[0091] Due to the above-mentioned constitution, steam and water generated by steam generator 420 are supplied to the inside of housing tub 200.

[0092] Next, the flow operation of steam and water generated by steam generator 420 is described.

[0093] Firstly, steam generated inside chamber space 430 of steam generator 420 flows into steam communication tube 340 through discharge tube 422 along with the increase of a pressure inside chamber space 430. Thereafter, the steam flows into branched tube 351 from steam communication tube 340.

[0094] The steam which arrives at branched tube 351 has a high temperature and hence, the steam is guided to steam tube 353 and flows into nozzle 352 disposed above branched tube 351. Lastly, the steam is injected into the inside of rotary drum 210 of housing tub 200 from nozzle 352.

[0095] In this exemplary embodiment, steam generated inside chamber space 430 is guided to nozzle 352 through discharge tube 422, steam communication tube 340, branched tube 351 and steam tube 353. That is, pump 330 which performs intermittent water supply operation injects a proper amount of water into the inside of chamber space 430 which is heated by heater 425 and has a high temperature and hence, water is instantaneously evaporated. At this point of time, an inner pressure of chamber space 430 of steam generator 420 is sharply increased due to the evaporation of the water. Accordingly, generated steam is injected from nozzle 352 at a high pressure. As a result, as shown in FIG. 1 and FIG. 12, steam is injected such that steam traverses an inner space of housing tub 200 in the vertical direction.

[0096] Branched tube 351 which introduces steam into steam tube 353 from steam communication tube 340 includes: main tube 354 which is connected to steam communication tube 340; upper sub tube 355 which is bent upward from main tube 354; and lower sub tube 356 which is bent downward from main tube 354. Steam or water flows into main tube 354 through steam communication tube 340. Upper sub tube 355 is connected to steam tube 353, and forms an upwardly extending passage through which steam moves toward nozzle 352.

[0097] On the other hand, different from upper sub tube 355, lower sub tube 356 forms a downwardly extending passage. To be more specific, when the continuous water supply operation is performed by pump 330, mainly water flows into branched tube 351 through steam communication tube 340. Then, water which flows into branched tube 351 flows downward through lower sub tube 356 due to the action of gravity.

[0098] As shown in FIG. 12, main tube 354 and upper sub tube 355 of branched tube 351 are connected to each other at an included angle of $\theta 1$ which is an obtuse angle, while main tube 354 and lower sub tube 356 are connected to each other at an included angle of $\theta 2$ which is an acute angle. Since the included angle $\theta 2$ is an acute angle, a flow loss from main tube 354 to lower sub tube 356 is relatively large. Accordingly, steam which flows into the inside of main tube 354 minimally flows into lower sub tube 356, and the steam mainly flows into upper sub tube 355. On the other hand, upper sub tube 355 forms the upwardly extending flow passage and hence, due to the action of gravity, water which flows into main tube 354 minimally flows into upper sub tube 355 and the water mainly flows into lower sub tube 356. As a result, the flow passage for steam and the flow passage for water can be properly separated from each other by branched tube 351.

<Intermittent operation by pump>

[0099] Hereinafter, the intermittent operation of the pump which supplies water to the steam generating part of the washing machine of the exemplary embodiment of the present invention is described using FIG. 13 by also referencing FIG. 8 and FIG. 11.

[0100] FIG. 13 is an explanatory view schematically showing the relationship between an intermittent operation by the pump of the water supply mechanism and a temperature inside the chamber space in the exemplary embodiment.

[0101] As shown in FIG. 13, in this exemplary embodiment, a period during which pump 330 is operated (ON period) is set shorter than a period during which pump 330 is stopped (OFF period). Accordingly, a proper amount of water can be injected into the inside of chamber space 430 of steam generator 420 in steam generating part 400. It is needless to say that a length of the ON period and a length of the OFF period in Fig. 13 are relative values, and these lengths may be changed corresponding to a capacity of chamber space 430, an amount of heating by the heater, and a required amount

of steam.

[0102] To be more specific, pump 330 supplies a predetermined amount of water to chamber space 430 in the ON period. The supplied water is evaporated so as to generate steam. At this point of time, as shown in FIG. 13, due to heat of vaporization attributed to a change in phase from water to steam, a temperature in chamber space 430 is temporarily lowered. However, in this exemplary embodiment, by setting the OFF period to a relatively long period, heater 425 can sufficiently increase a temperature in chamber space 430 during the OFF period. As a result, it is possible to continue the supply of high-pressure steam to housing tub 200 during a period where pump 330 performs the intermittent operation.

[0103] That is, a temperature in chamber space 430 is sufficiently increased during the OFF period. Then, in the ON period, a proper amount of water which can be evaporated instantaneously by thermal energy which steam generator 420 including chamber space 430 possesses is supplied to chamber space 430 (for example, approximately 2cc/time). Accordingly, it is possible to favorably continue the supply of high-pressure steam to housing tub 200.

<Effect of steam in washing step>

[0104] Hereinafter, effects of steam supplied to the housing tub through the steam supply mechanism of the exemplary embodiment of the present invention, particularly, effects of steam in washing step are described using FIG. 14 by also referencing FIG. 1, FIG. 8, and FIG. 11.

[0105] FIG. 14 is an explanatory view schematically showing a temperature change in water supplied to the water tub of the washing machine of the exemplary embodiment.

[0106] Firstly, as shown in FIG. 1, hot water heater 160 for heating water supplied to the inside of water tub 220 is disposed in a lower portion of water tub 220. As shown in FIG. 14, when washing step is started, a predetermined amount of water is supplied to water tub 220. During the supply of water, a temperature of water contained in clothing inside water tub 220 takes an approximately fixed value (including a fixed value).

[0107] Thereafter, water inside water tub 220 is heated using hot water heater 160. At this point of time, hot water heater 160 generates a large amount of heat value and hence, a temperature of water contained in clothing inside water tub 220 is sharply increased. When a temperature of water reaches a predetermined temperature, heating of water inside water tub 220 is stopped.

[0108] Thereafter, in this exemplary embodiment, washing step is carried out by introducing steam into the inside of housing tub 200 through steam supply mechanism 300.

[0109] A dotted line after heating is stopped shown in FIG. 14 indicates a change in temperature of water contained in clothing when the heating by hot water heater 160 is stopped so that steam is not supplied. A solid line after heating is stopped indicates a change in temperature of water contained in clothing when heating by hot water heater 160 is stopped so that steam is supplied to housing tub 200.

[0110] That is, in this exemplary embodiment, in washing step, high-temperature steam is directly supplied to housing tub 200 in a state where the steam is injected to clothing. Accordingly, lowering of a temperature of water contained in clothing inside water tub 220 is alleviated (suppressed) by high-temperature steam. Further, power consumption of heater 425 used in steam generator 420 is smaller than that of hot water heater 160 mounted on water tub 220. As a result, heat retention by the supply of high-temperature steam can be realized with low power consumption compared to the case where heat retention of water inside water tub 220 is performed using hot water heater 160. Accordingly, in washing step, it is preferable that high-temperature steam be supplied to the housing tub by performing intermittent water supply operation using pump 330 after hot water heater 160 is stopped.

<Effects of steam in spin-drying step>

[0111] Hereinafter, effects of steam supplied to the housing tub through the steam supply mechanism of the exemplary embodiment of the present invention, particularly, such effects of steam in spin-drying step are described by using FIG. 1, FIG. 11 and FIG. 12.

[0112] In spin-drying step, rotary drum 210 is rotated at a high speed by motor 231. As shown in FIG. 1, a large number of small holes 219 are formed in peripheral wall 211 of rotary drum 210.

[0113] Accordingly, clothing housed inside rotary drum 210 is pressed to peripheral wall 211 due to a centrifugal force, and moisture contained in clothing is discharged to the outside of rotary drum 210 through small holes 219. As a result, clothing is properly spin-dried.

[0114] At this point of time, fibers of spin-dried clothing are liable to be bonded together by hydrogen bonding, and hydrogen bonding of fibers becomes a factor which causes wrinkles in clothing.

[0115] In view of the above, in this exemplary embodiment, steam is supplied to the inside of rotary drum 210 in spin-drying step. Due to such supply of steam, hydrogen bonding of fibers can be released by steam. As a result, the generation of wrinkles in clothing can be decreased.

[0116] That is, during a period where clothing is subjected to spin-drying processing, it is preferable to supply high-temperature steam to the inside of rotary drum 210 by performing an intermittent water supply operation using pump 330. To be more specific, by performing the intermittent water supply operation using pump 330, steam is injected into the inside of rotary drum 210 from nozzle 352 at a high pressure. Steam injected from nozzle 352 traverses housing tub 200. Then, the injected

steam is uniformly blown out to clothing which is rotating in a state where clothing is stuck on peripheral wall 211 of rotary drum 210. Due to such processing, hydrogen bonding of fibers can be released by steam over the whole clothing inside rotary drum 210. As a result, the generation of wrinkles in clothing can be effectively suppressed.

(Step of cooling steam generator)

[0117] Hereinafter, step of cooling the steam generator of the exemplary embodiment of the present invention is described using FIG. 8 and FIG. 11.

[0118] Usually, it is preferable to cool steam generator 420 when processing of clothing using steam is finished.

[0119] In view of the above, to cool steam generator 420, the unnecessary injection of high-temperature steam into the inside of housing tub 200 is prevented.

[0120] To be more specific, firstly, to cool steam generator 420, the supply of electric power to heater 425 is stopped. Thereafter, continuous water supply operation is started using pump 330. Due to such a water supply operation, water continuously flows into the inside of chamber space 430 of steam generator 420 from water storage tank 320. Water which flows into the inside of chamber space 430 takes heat away from steam generator 420 and, thereafter, flows into the inside of housing tub 200 from steam communication tube 340 through branched tube 351. As a result, it is possible to cool steam generator 420 within a short period.

[0121] Next, a control of the door body of the exemplary embodiment of the present invention is described using FIG. 15 by also referencing FIG. 1 and FIG. 6B. Such a control is performed for preventing door body 120 from being inadvertently opened by a user when high-temperature steam is present inside housing tub 200.

[0122] FIG. 15 is a block diagram schematically showing the control of the door body based on a temperature of the steam generator of this exemplary embodiment.

[0123] As shown in FIG. 15, washing machine 100 of this exemplary embodiment includes: locking mechanism 121 which locks door body 120 at a closed position; and control part 122 for controlling locking using locking mechanism 121 and releasing of such locking. It is needless to say that the known structures of washing machines are utilized as mechanical and electric mechanisms used in locking mechanism 121.

[0124] As shown in FIG. 6B, steam generator 420 includes thermister 426.

[0125] As shown in FIG. 15, thermister 426 detects a temperature of body portion 423 of steam generator 420, and outputs a signal corresponding to a detected temperature to control part 122.

[0126] At this point of time, control part 122 maintains locking of door body 120 using locking mechanism 121 until a signal outputted from thermister 426 becomes a signal corresponding to a predetermined temperature or below. Due to such an operation, until a temperature of steam generator 420 becomes a predetermined temperature or below, the inner space of housing tub 200 is isolated from the outside. As a result, it is possible to prevent a user from being exposed to high-temperature steam in advance thus realizing safe and highly reliable washing machine 100.

INDUSTRIAL APPLICABILITY

[0127] The present invention is preferably applicable to a device which processes clothing using steam.

REFERENCE MARKS IN THE DRAWINGS

[0128]

100	washing machine
110	casing
111	front wall
112	rear wall
113	casing ceiling wall
114	casing bottom wall
115	right wall
116	left wall
117	first reinforcing frame
118	second reinforcing frame
120	door body
121	locking mechanism
122	control part
130	packing structure
140	water supply port
141	distribution part
151	first mounting member
152	second mounting member
160	hot water heater
200	housing tub
210	rotary drum
211	peripheral wall
212	bottom wall
219	small hole
220	water tub
221	bottom portion
222	front portion
223	peripheral wall portion
224	annular portion
225	inner surface
226	outer surface
230	rotary shaft
231	motor
232	pulley
233	belt
300	steam supply mechanism
310	water supply valve
320	water storage tank
321	water level sensor
330	pump
340	steam communication tube
351	branched tube

352 nozzle
353 steam tube
354 main tube
355 upper sub tube
356 lower sub tube
400 steam generating part
410 casing
411 vessel portion
412 lid portion
413 opening portion
414 bottom wall portion
415 upper wall
416 lid portion peripheral wall
417 projecting member
420 steam generator
421 connection tube
422 discharge tube
423 body portion
424 lid portion
425 heater
426 thermister
427 lower surface of main body
428 peripheral surface
429 upper surface
430 chamber space
431 outer chamber wall
432 inner chamber wall
433 packing ring
434 lower surface
435 shield wall
437 inlet port
438 discharge port
450 fixing member
451 first sealing member
452 second sealing member
500 water supply mechanism

Claims

1. A clothing treatment device (100) comprising:

a housing tub (200) for housing clothing; and
a steam supply mechanism (300) for supplying steam to the housing tub (200), wherein
the steam supply mechanism (300) includes:

a steam generator (420) having a wall surface (429) which defines a chamber for generating the steam;
a heater (425) for heating the wall surface (429); and
a water supply mechanism (500) for supplying water to the chamber, and
the steam generator (420) includes:

an inlet port (437) into which the water from the water supply mechanism (500) flows through a connection tube (421); and
a discharge port (438) from which the steam evaporated in the chamber moves toward a discharge tube (422),

characterized in that:

the supplied water is injected to the wall surface (429) of the chamber of the steam generator (420) by a pump (330) of the water supply mechanism (500),
an evaporation of the water in the chamber is performed on the wall surface (429) heated by the heater (425);
the inlet port (437) and the connection tube (421) are connected to each other by a fixing member (450),
the discharge port (438) and the discharge tube (422) are connected to each other by said fixing member (450), and the thermal conductivity of a material used for forming the fixing member (450) is lower than a thermal conductivity of a material used for forming the steam generator (420).

2. The clothing treatment device (100) according to claim 1, wherein the connection tube (421) and the discharge tube (422) are fixed to the fixing member (450), and the fixing member (450) is fixed to the steam generator (420).

3. The clothing treatment device (100) according to claim 1 or 2, wherein the fixing member (450) is formed of metal.

4. The clothing treatment device (100) according to claim 1, wherein the water supply mechanism (300) adjusts an amount of the water such that the water which hits the wall surface is instantaneously evaporated.

5. The clothing treatment device (100) according to claim 1, wherein the water supply mechanism (300) intermittently supplies the water to the chamber.

Patentansprüche

1. Wäschebehandlungsvorrichtung (100), die Folgendes umfasst:

einen Aufnahmebottich (200) zum Aufnehmen von Wäsche; und
einen Dampfzufuhrmechanismus (300) zum Zuführen von Dampf zu dem Aufnahmebottich (200), wobei

der Dampfzufuhrmechanismus (300) Folgendes umfasst:

einen Dampfgenerator (420), der eine Wandoberfläche (429) besitzt, die eine Kammer für die Erzeugung des Dampfes definiert;
eine Heizeinrichtung (425) zum Erhitzen der Wandoberfläche (429); und
einen Wasserzufuhrmechanismus (500) zum Zuführen von Wasser zu der Kammer, und

der Dampfgenerator (420) Folgendes umfasst:

einen Einlassanschluss (437), in den das Wasser durch ein Verbindungsrohr (421) von dem Wasserzufuhrmechanismus (500) strömt; und
einen Auslassanschluss (438), aus dem sich der in der Kammer erzeugte Dampf zu einem Auslassrohr (422) bewegt,

dadurch gekennzeichnet, dass:

das zugeführte Wasser zu der Wandoberfläche (429) der Kammer des Dampfgenerators (420) durch eine Pumpe (330) des Wasserzufuhrmechanismus (500) eingespritzt wird,
eine Verdampfung des Wassers in der Kammer an der Wandoberfläche (429), die durch die Heizeinrichtung (425) erhitzt wird, ausgeführt wird;
der Einlassanschluss (437) und das Verbindungsrohr (421) durch ein Befestigungselement (450) miteinander verbunden sind,
der Auslassanschluss (438) und das Auslassrohr (422) durch das Befestigungselement (450) miteinander verbunden sind und
eine spezifische Wärmeleitfähigkeit eines Materials, das für die Bildung der Befestigungskammer (450) verwendet wird, niedriger als eine spezifische Wärmeleitfähigkeit eines Materials, das zum Bilden des Dampfgenerators (420) verwendet wird, ist.

2. Wäschebehandlungsvorrichtung (100) nach Anspruch 1, wobei das Verbindungsrohr (421) und das Auslassrohr (422) an dem Befestigungselement (450) befestigt sind und das Befestigungselement (450) an dem Dampfgenerator (420) befestigt ist.

3. Wäschebehandlungsvorrichtung (100) nach Anspruch 1 oder 2, wobei das Befestigungselement (450) aus Metall gebildet ist.

4. Wäschebehandlungsvorrichtung (100) nach Anspruch 1, wobei der Wasserzufuhrmechanismus (300) eine Wassermenge einstellt, derart, dass das Wasser, das auf die Wandoberfläche auftrifft, sofort verdampft wird.

5. Wäschebehandlungsvorrichtung (100) nach Anspruch 1, wobei der Wasserzufuhrmechanismus (300) das Wasser der Kammer intermittierend zuführt.

Revendications

1. Dispositif de traitement de vêtements (100) comprenant :

une cuve de réception (200) pour recevoir des vêtements ; et
un mécanisme d'alimentation en vapeur (300) pour fournir de la vapeur à la cuve de réception (200),
où
le mécanisme d'alimentation en vapeur (300) inclut :

un générateur de vapeur (420) ayant une surface de paroi (429) qui délimite une chambre pour générer de la vapeur ;
un chauffage (425) pour chauffer la surface de paroi (429) ; et
un mécanisme d'alimentation en eau (500) pour fournir de l'eau à la chambre, et
le générateur de vapeur (420) inclut :

un orifice d'entrée (437) dans lequel entre l'eau provenant du mécanisme d'alimentation en eau (500) via un tube de connexion (421) ; et
un orifice de décharge (438) à travers lequel la vapeur s'étant évaporée dans la chambre se déplace vers un tube de décharge (422) ; et
caractérisé en ce que

l'eau fournie est injectée à travers la surface de paroi (429) de la chambre du générateur de vapeur (420) par une pompe (330) du mécanisme d'alimentation en eau (500),
une évaporation de l'eau dans la chambre se produit sur la surface de paroi (429) chauffée par le chauffage (425) ;
l'orifice d'entrée (437) et le tube de connexion (421) sont connectés l'un à l'autre par un organe de fixation (450),
l'orifice de décharge (438) et le tube de décharge (422) sont connectés l'un à l'autre par ledit organe de fixation (450), et
la conductivité thermique d'un matériau uti-

lisé pour former l'organe de fixation (450) est inférieure à une conductivité thermique d'un matériau utilisé pour former le générateur de vapeur (420).

2. Dispositif de traitement de vêtements (100) selon la revendication 1, où le tube de connexion (421) et le tube de décharge (422) sont fixés à l'organe de fixation (450) et l'organe de fixation (450) est fixé au générateur de vapeur (420).

3. Dispositif de traitement de vêtements (100) selon la revendication 1 ou 2, où l'organe de fixation (450) est formé de métal.

4. Dispositif de traitement de vêtements (100) selon la revendication 1, où le mécanisme d'alimentation en eau (300) ajuste une quantité d'eau de telle manière que l'eau qui atteint la surface de paroi s'évapore instantanément.

5. Dispositif de traitement de vêtements (100) selon la revendication 1, où le mécanisme d'alimentation en eau (300) fourni l'eau à la chambre de manière intermittente.

FIG. 1

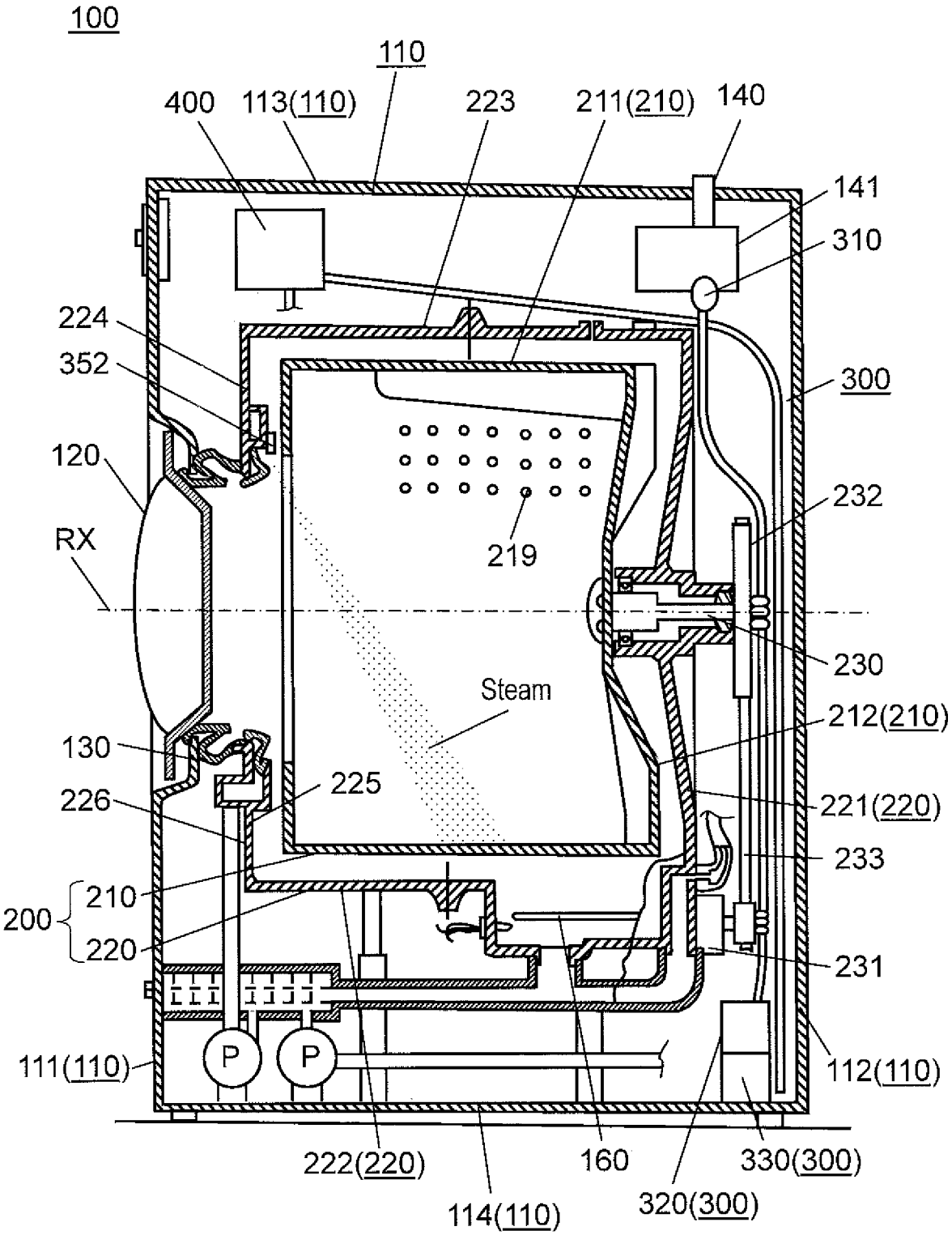

100
110
400
113(110)
223
211(210)
140
141
310
224
352
300
120
232
RX
219
230
Steam
212(210)
130
225
221(220)
226
233
210
200
220
231
111(110)
P
P
112(110)
222(220)
160
330(300)
320(300)
114(110)

FIG. 2

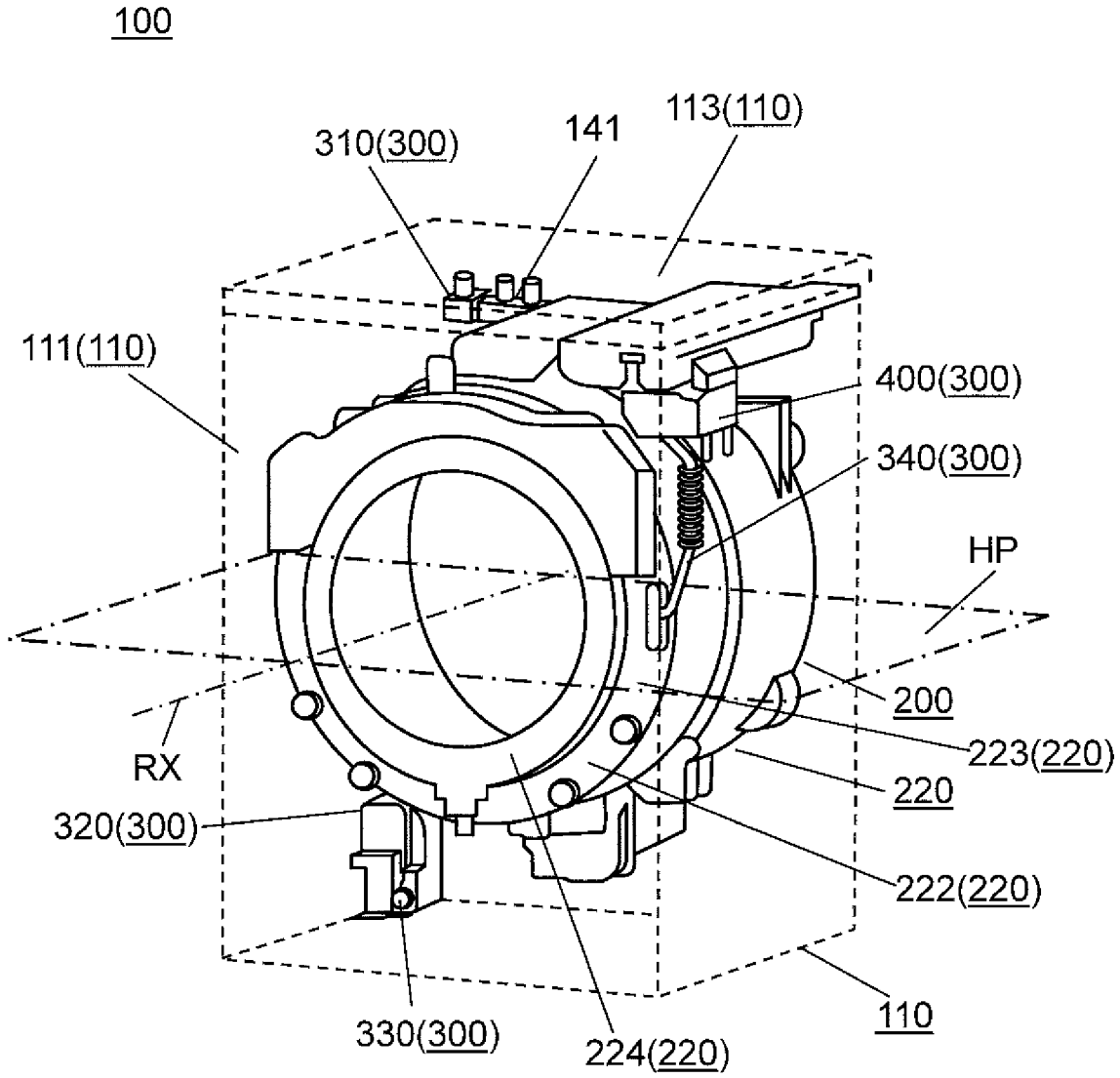

100
310(300)
141
113(110)
111(110)
400(300)
340(300)
HP
200
223(220)
220
222(220)
RX
320(300)
330(300)
224(220)
110

FIG. 3

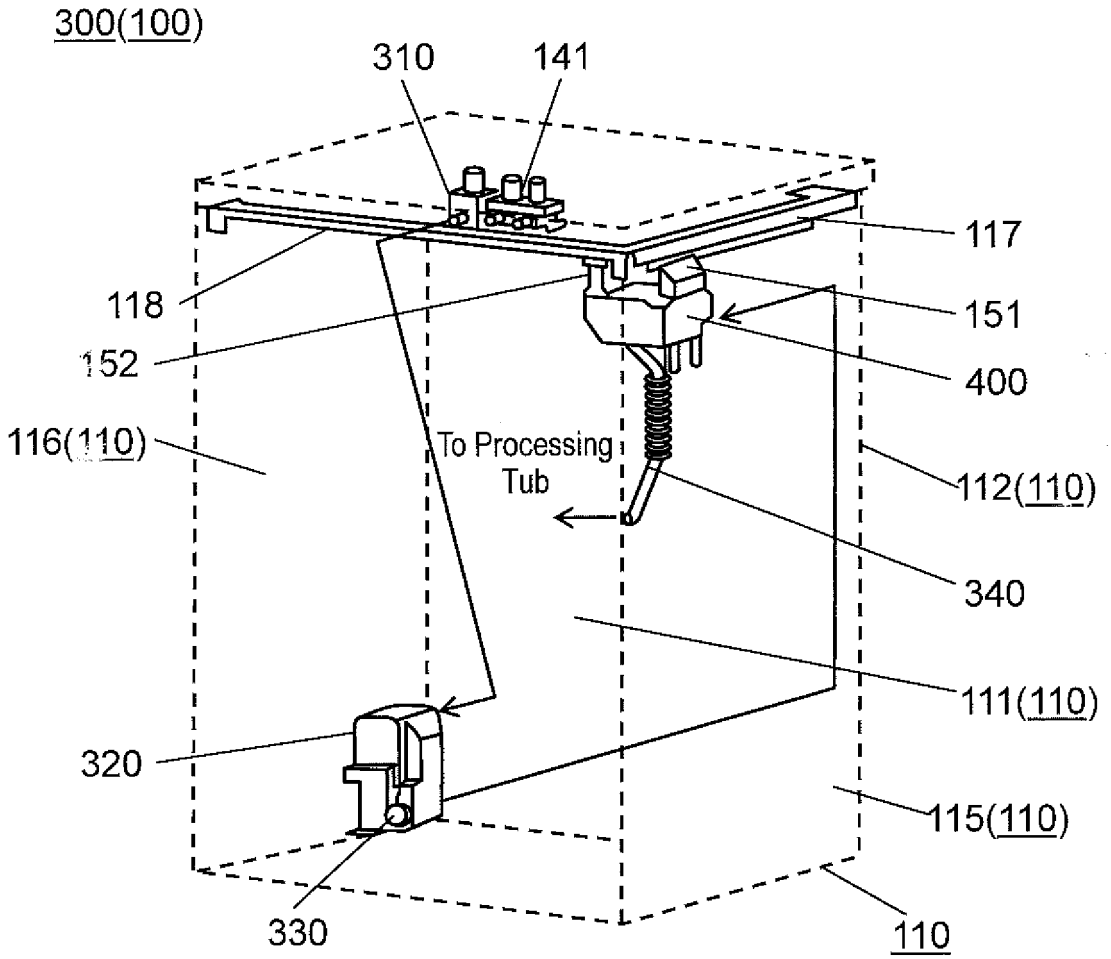

300(100)
310
141
117
118
151
152
400
116(110)
To Processing Tub
112(110)
340
111(110)
320
115(110)
330
110

FIG. 4A

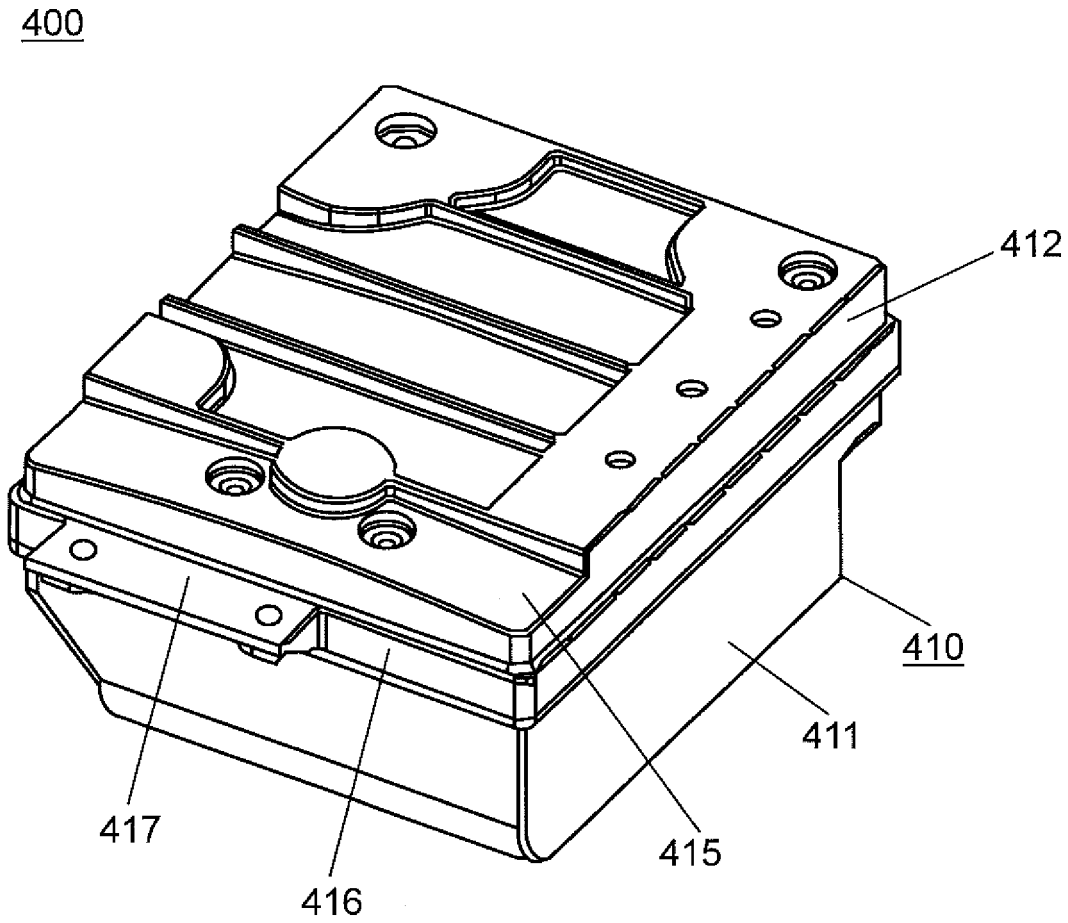


FIG. 4B

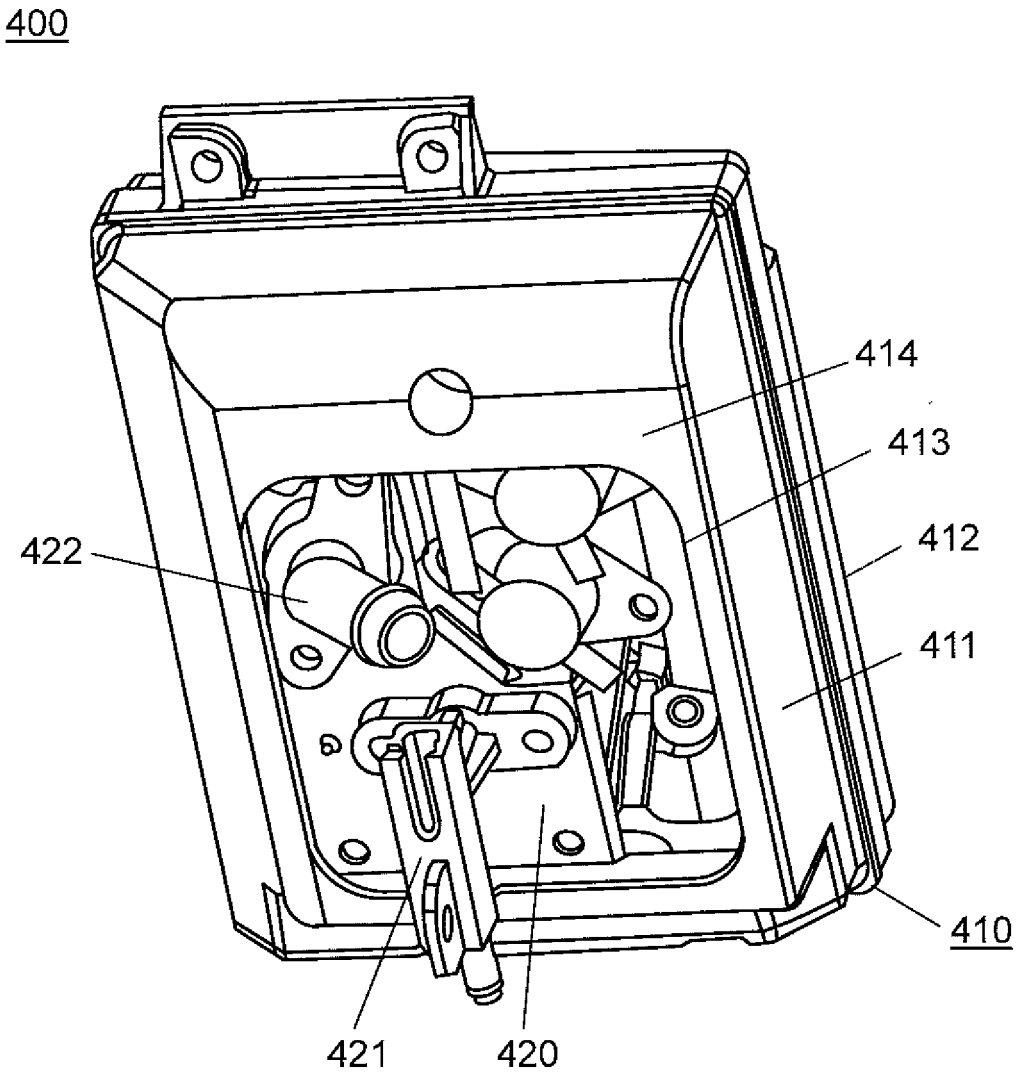


FIG. 5

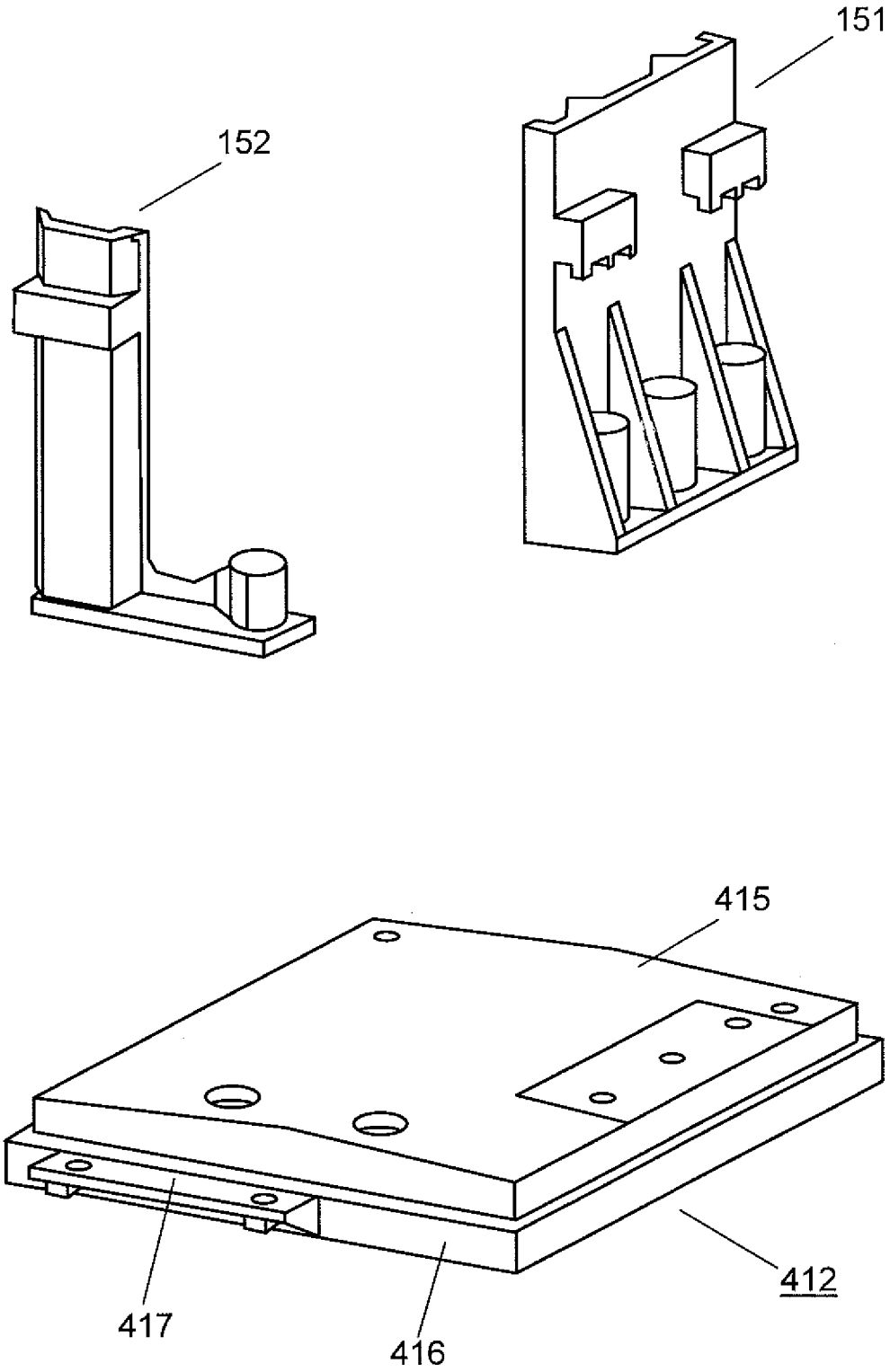


FIG. 6A

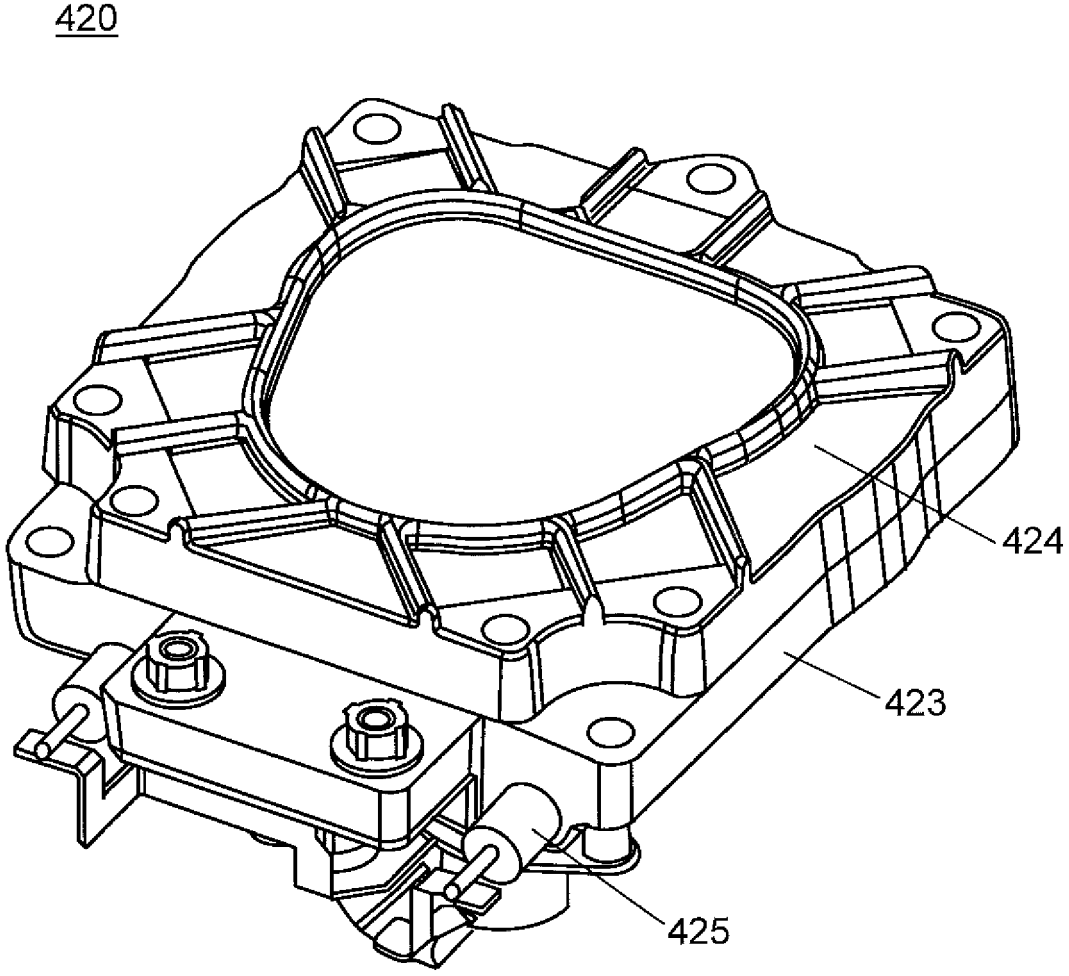


FIG. 6B

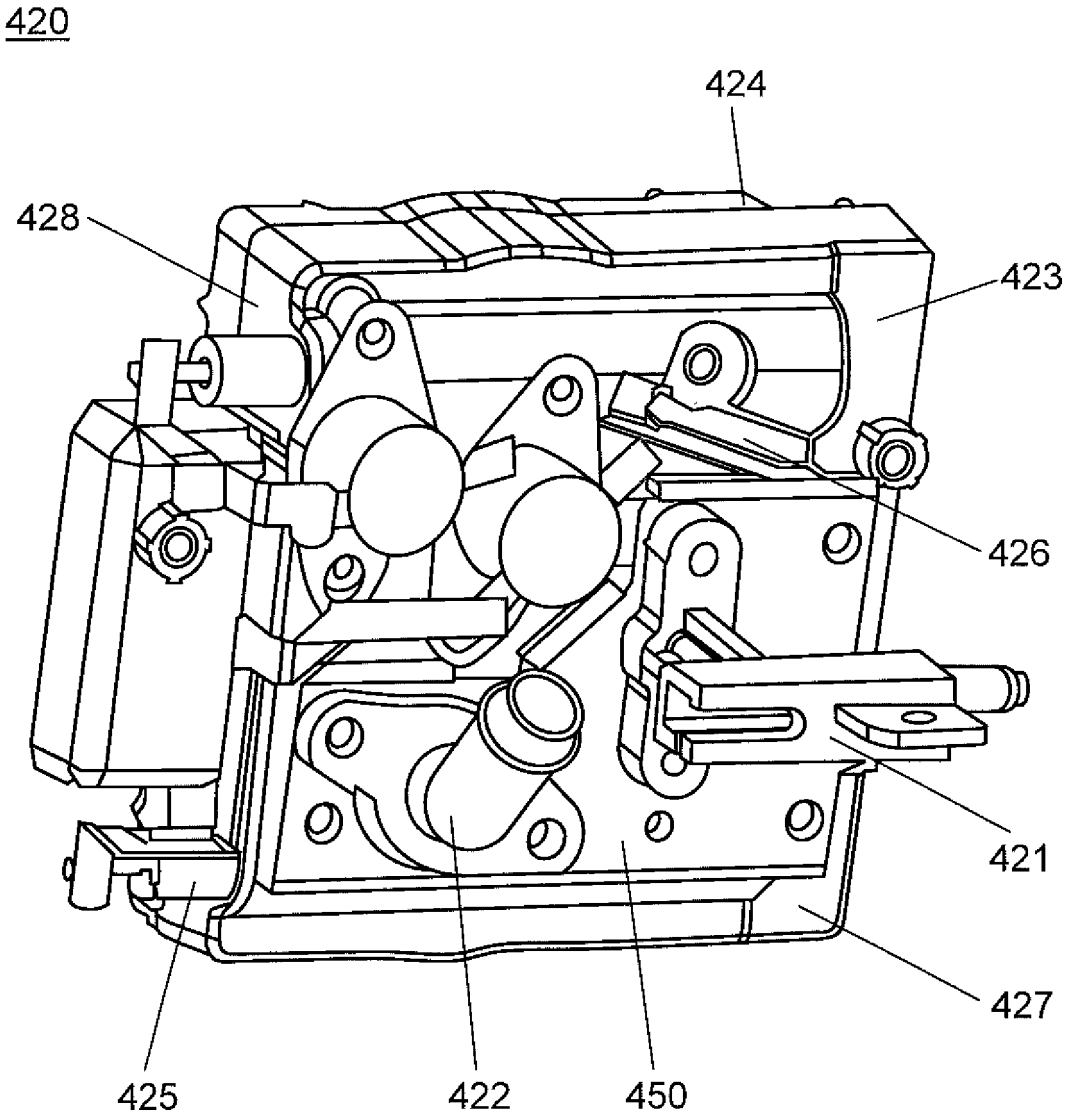


FIG. 6C

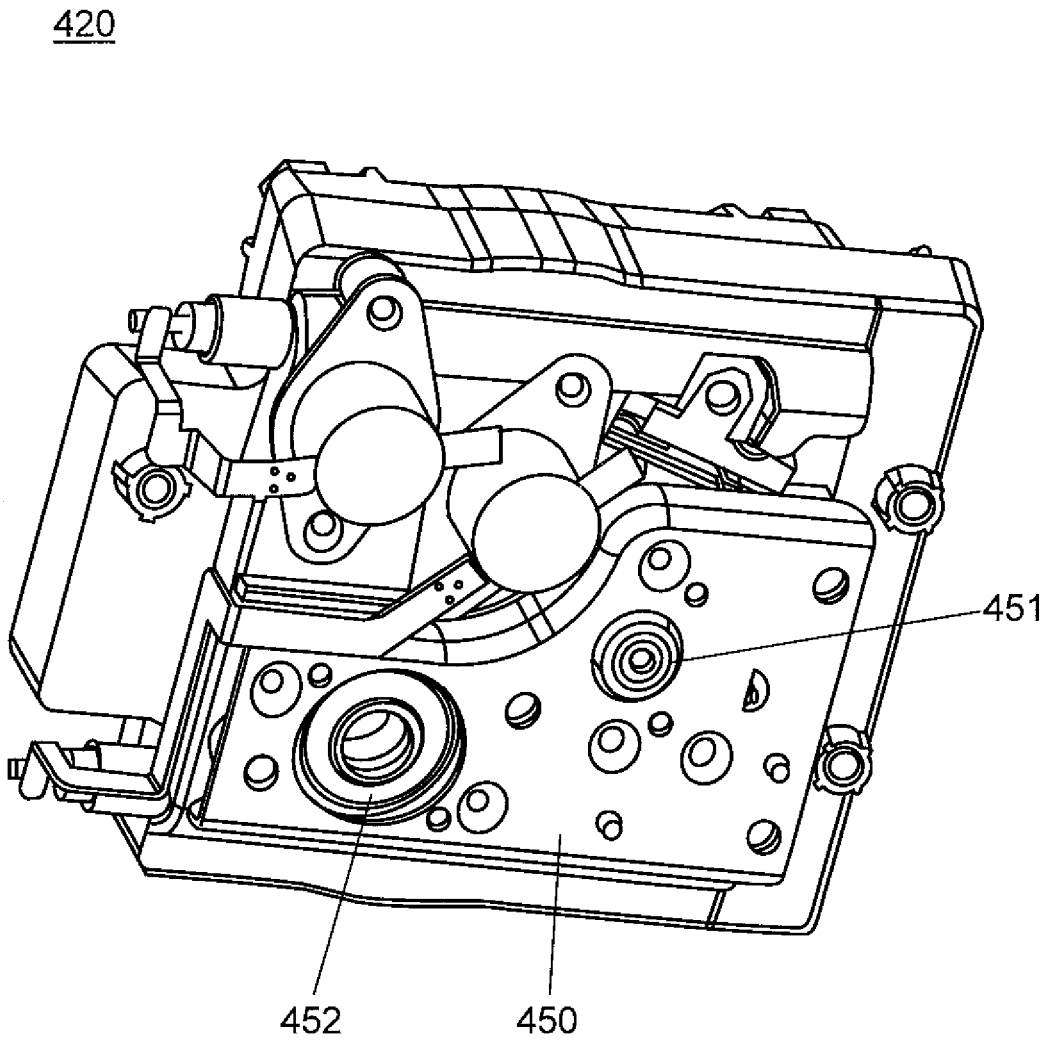


FIG. 7

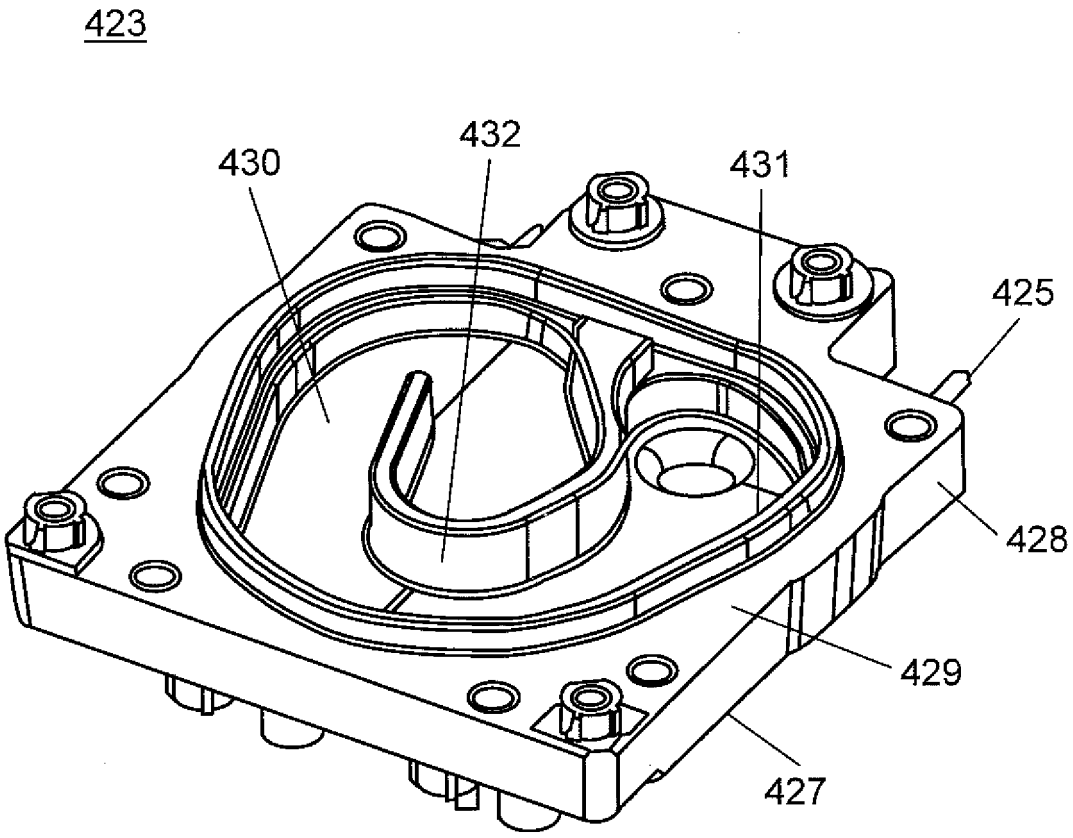


FIG. 8

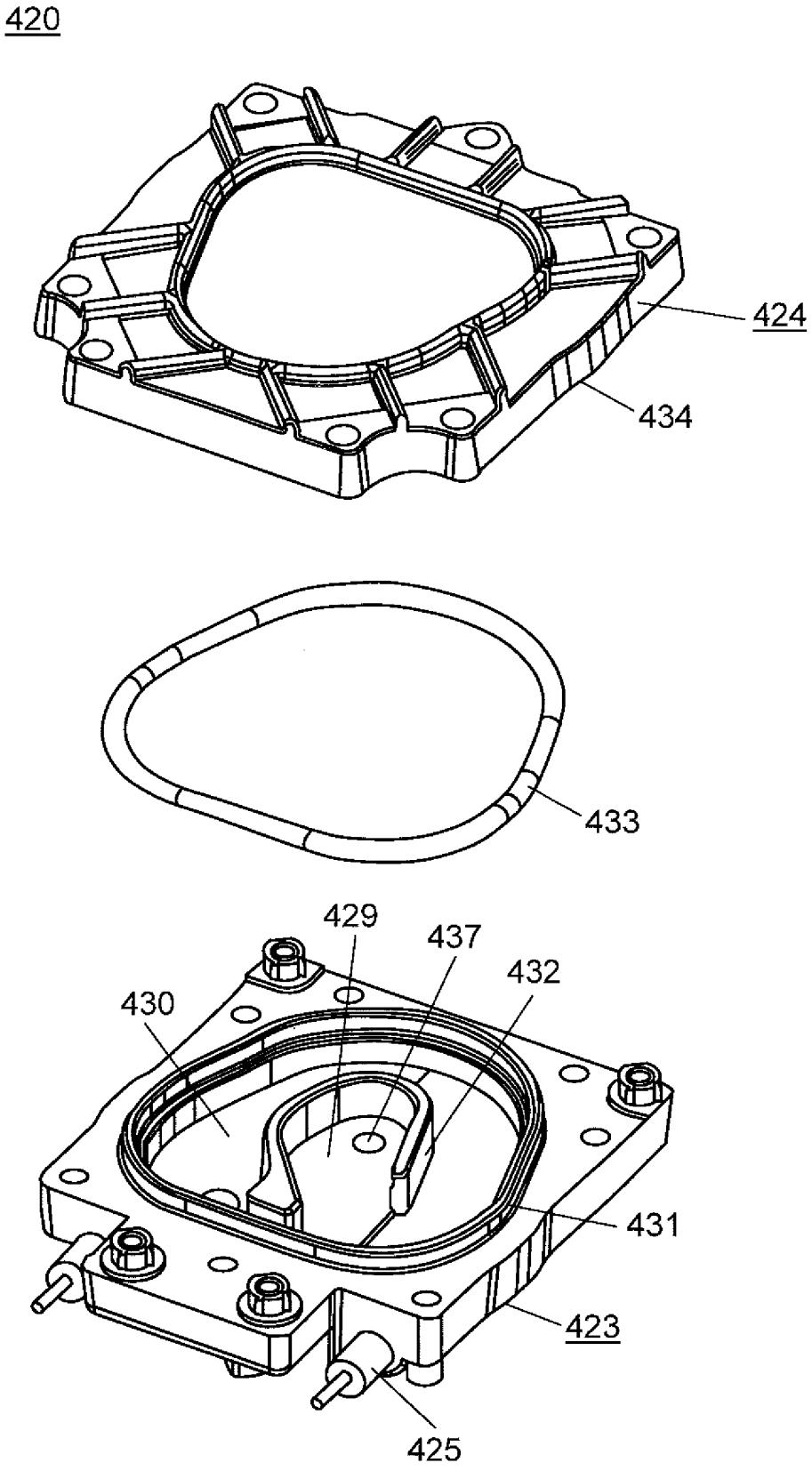


FIG. 9

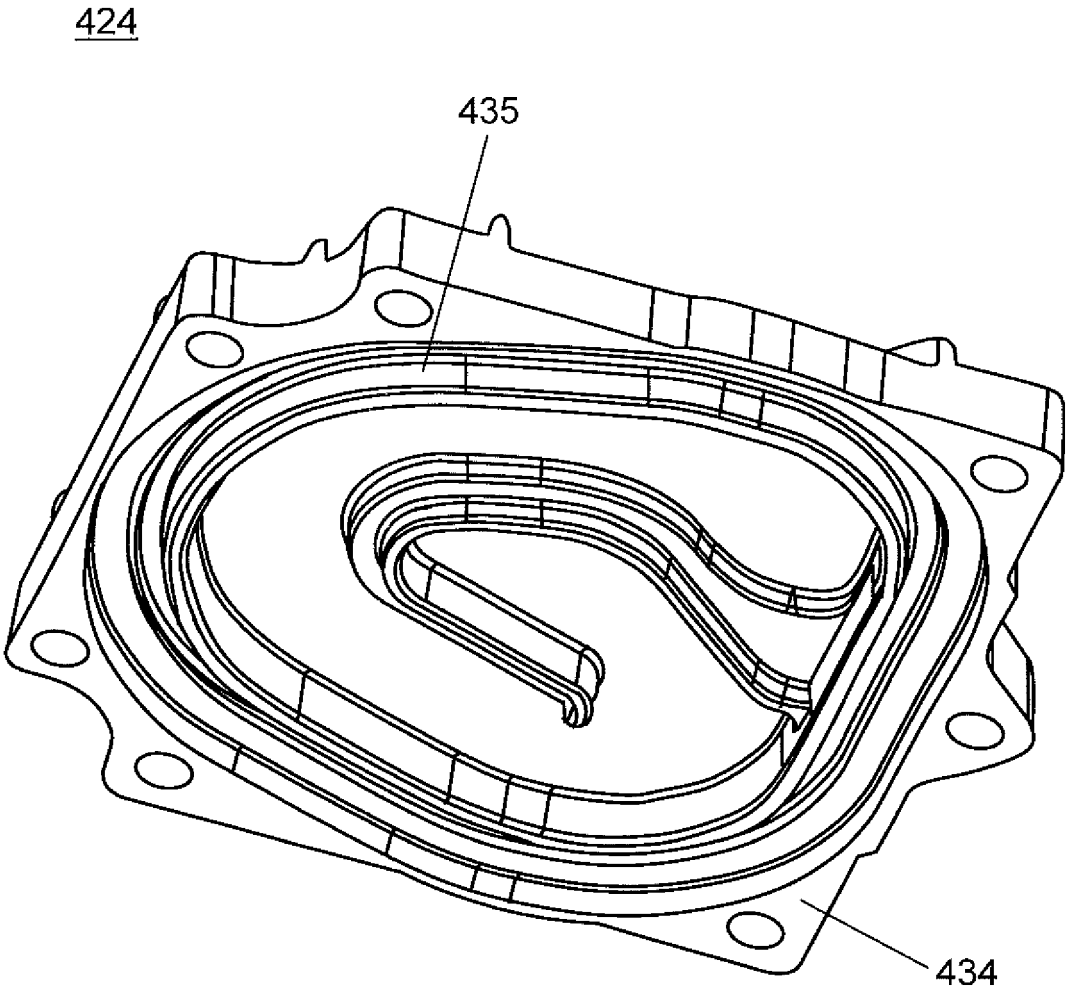


FIG. 10

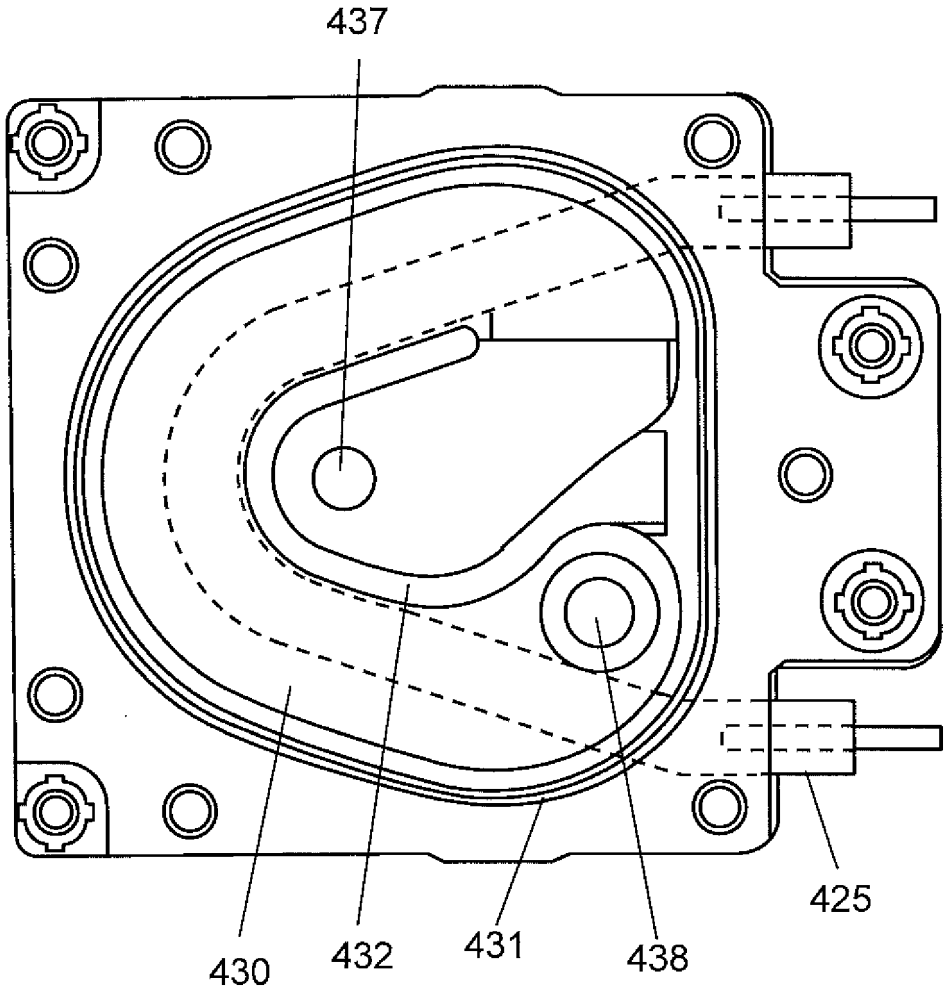


FIG. 11

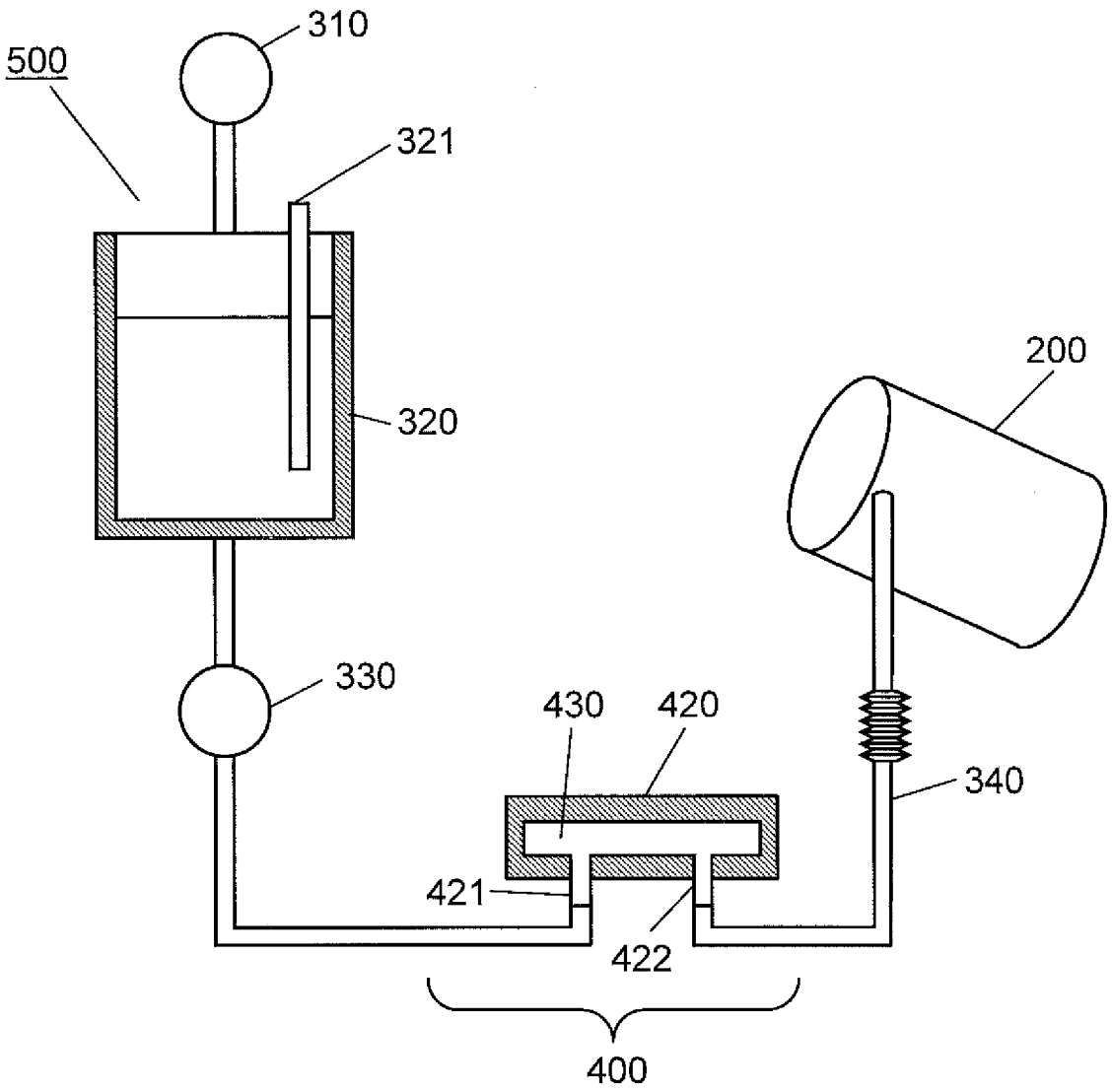


FIG. 12

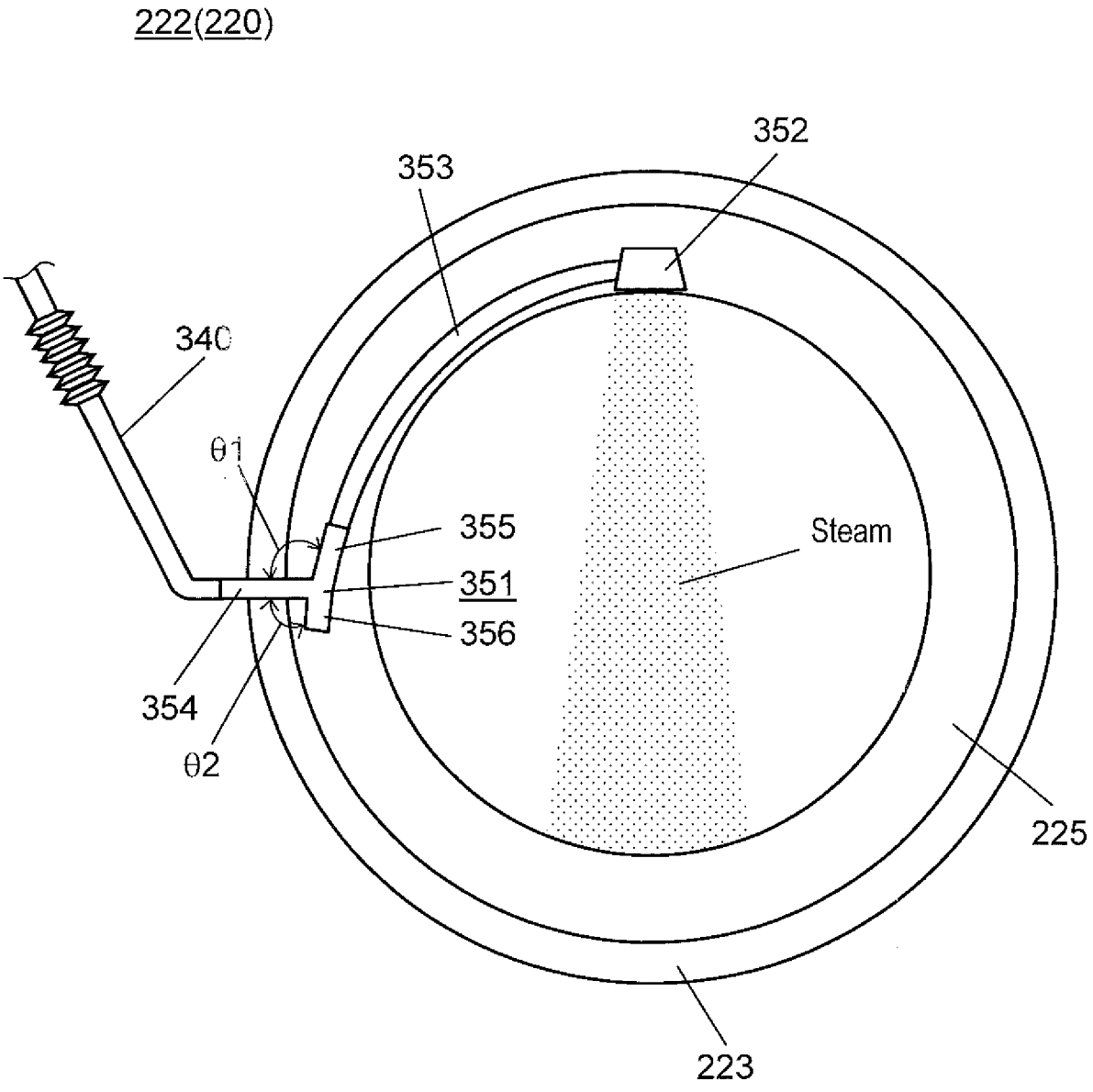


FIG. 13

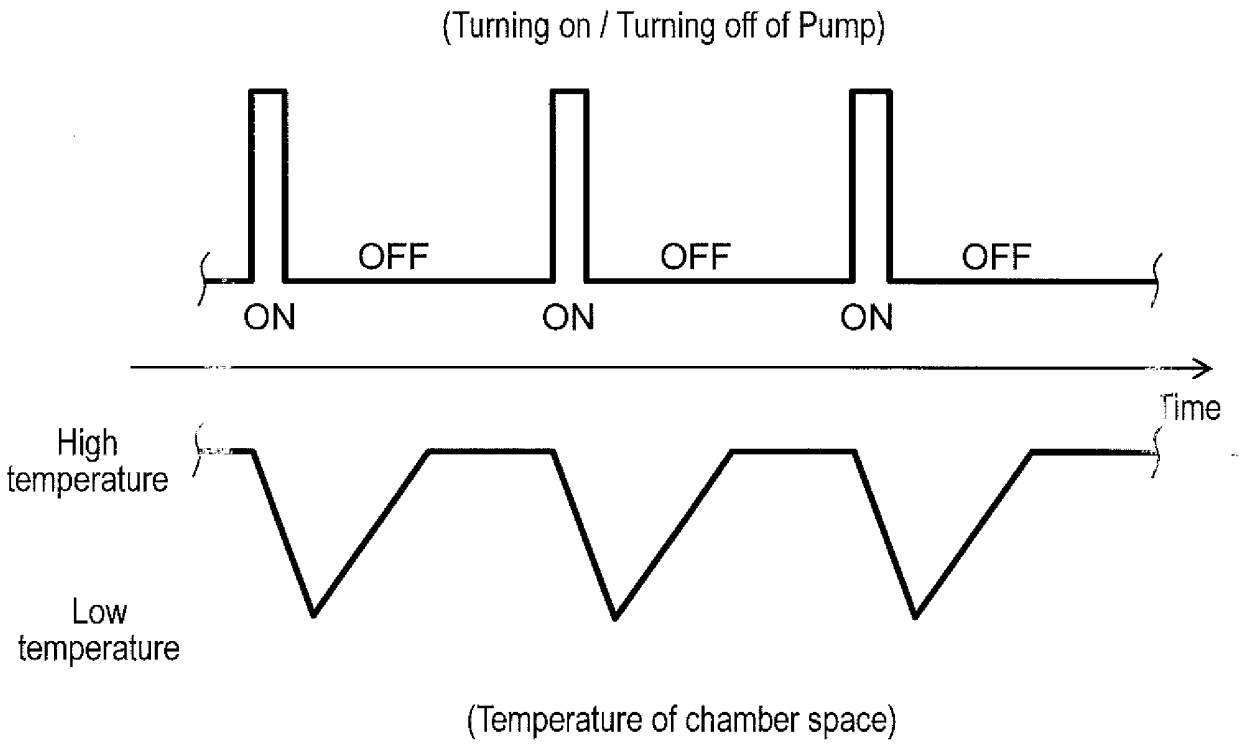

(Turning on / Turning off of Pump)
OFF
OFF
OFF
ON
ON
ON
Time
High temperature
Low temperature
(Temperature of chamber space)

FIG. 14

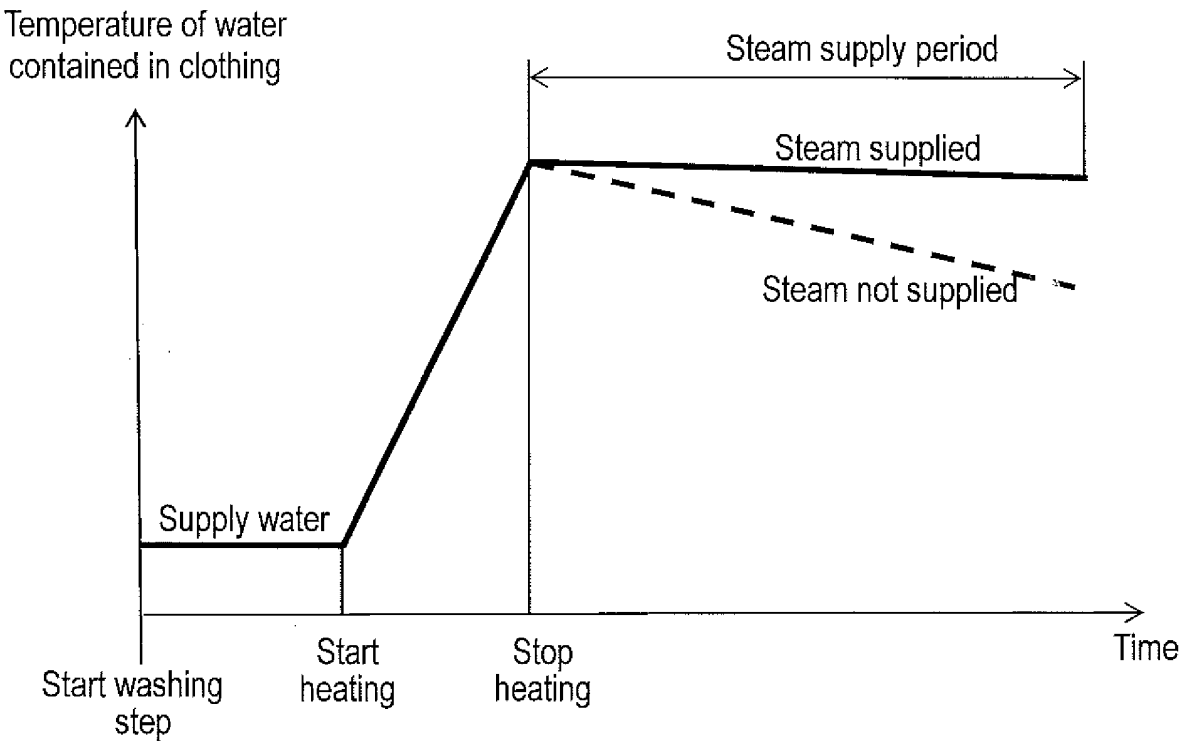
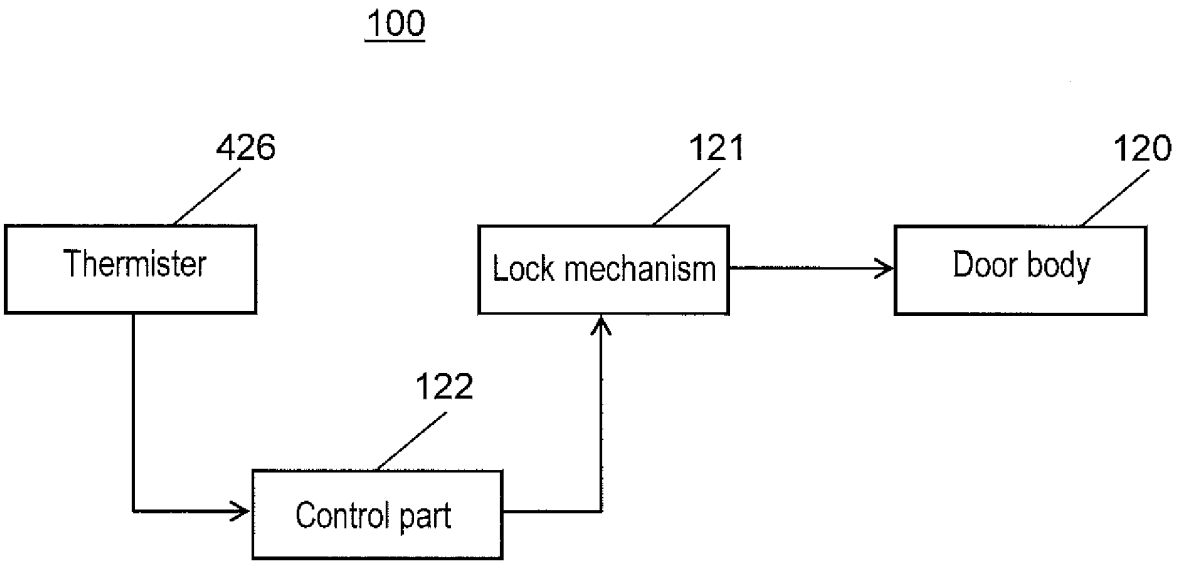

Temperature of water contained in clothing
Steam supply period
Steam supplied
Steam not supplied
Supply water
Start washing step
Start heating
Stop heating
Time

FIG. 15


100
426
Thermister
121
Lock mechanism
120
Door body
122
Control part

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20110219824 A1 **[0004]**
- EP 1883727 A **[0006]**