

(19)



(11)

EP 4 293 282 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

08.07.2026 Bulletin 2026/28

(51) International Patent Classification (IPC):

F23D 11/00 ^(2006.01) **F23D 11/40** ^(2006.01)
F23D 14/02 ^(2006.01) **F23N 5/08** ^(2006.01)

(21) Application number: **23165324.7**

(52) Cooperative Patent Classification (CPC):

F23D 14/02; F23D 11/001; F23D 11/404;
F23N 5/082; F23D 2208/10; F23D 2900/11403;
F23N 2229/00; F23N 2239/04; F23N 2239/06;
F23N 2241/04; F23N 2900/05005

(22) Date of filing: **30.03.2023**

(54) **WATER HEATING DEVICE WITH UV-FLAME SENSOR**

WASSERHEIZVORRICHTUNG MIT UV-FLAMMENSENSOR

DISPOSITIF DE CHAUFFAGE D'EAU AVEC DÉTECTEUR UV DE FLAMME

(84) Designated Contracting States:

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR

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(30) Priority: **13.06.2022 KR 20220071768**

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Patentanwälte Rechtsanwälte

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(43) Date of publication of application:

20.12.2023 Bulletin 2023/51

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of priority to Korean Patent Application No. 10-2022-0071768, filed in the Korean Intellectual Property Office on June 13, 2022.

TECHNICAL FIELD

[0002] The present invention relates to a water heating device.

BACKGROUND

[0003] A water heating device, such as a boiler, heats water that flows in an interior thereof, and provides heating or hot water based on the heated water. A burner that induces a combustion reaction in an interior thereof to heat water that is introduced into the interior of the water heating device is provided, and heat generated in the interior of the water heating device may heat the water through the combustion reaction. Because the combustion reaction occurs in the interior of the water heating device, a flame detecting sensor that may sense the interior to monitor an emergency situation, such as a fire, may be provided.

[0004] According to a conventional technology, when excessive heat or the combustion gas due to the combustion reaction in the interior of the water heating device is delivered to the flame detecting sensor, the flame detecting sensor cannot be properly used, for example, soot may be generated or a board may be damaged.

[0005] The European Patent Applications EP 3 736 491 A1, EP 3 734 151 A1, KR 2020 01 27 764 A, KR 2020 0127765 A and KR 2020 0128322 A of the Applicant disclose a water heating device which has the features of the preamble of claim 1.

SUMMARY

[0006] The present invention has been made to solve the above-mentioned problems occurring in the prior art while advantages achieved by the prior art are maintained intact.

[0007] The invention is defined as a water heating device according to claim 1. Advantageous embodiments of the invention are defined in claims 2 and 3.

[0008] The present invention provides a water heating device that may minimize an influence of heat received by a flame detecting sensor or soot due to a combustion reaction in an interior of a water heating device.

[0009] The technical problems to be solved by the present invention are not limited to the aforementioned problems, and any other technical problems not mentioned herein will be clearly understood from the following description by those skilled in the art to which the present invention pertains.

[0010] According to the present invention, a water heating device including a combustion chamber provided with an interior space, in which a combustion reaction occurs, a burner configured to cause the combustion reaction in the interior space, a heat exchanger including a heat exchange pipeline, in which water flows along an interior thereof, and configured to heat the water by using heat generated by the combustion reaction, a flame detecting sensor configured to sense flames generated in the interior space and detect physical characteristics of the flames by receiving ultraviolet rays generated in the interior space, an upper housing covering an upper side of the interior space, and having a mounting hole such that the flame detecting sensor is mounted therein, a flame tube including a tube part configured to surround at least some of the flames on a lower side of the upper housing, and an extending part surrounding a sensing hole formed at a location corresponding to the mounting hole such that the flames are sensed by the flame detecting sensor, and extending from the tube part toward the mounting hole, and a tube packing disposed between an inner surface of the upper housing, which defines the mounting hole and the extending part, wherein the extending part is inserted into the mounting hole such that the mounting hole and the sensing hole are communicated with each other and wherein the tube packing defines a flow path of a combustion gas generated by the combustion reaction from the sensing hole to the mounting hole and is disposed between the extending part and the inner surface of the upper housing. The tube packing is disposed to surround at least a portion of an end of the extending part and at least a portion of an end of the flame detecting sensor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description taken in conjunction with the accompanying drawings:

FIG. 1 is a longitudinal sectional view of a water heating device according to an embodiment of the present invention;

FIG. 2 is a perspective view illustrating an upper housing according to an embodiment of the present invention;

FIG. 3 is an enlarged longitudinal sectional view illustrating a part of a water heating device according to an embodiment of the present invention;

FIG. 4 is a perspective view illustrating a flame tube according to an embodiment of the present invention;

FIG. 5 is a longitudinal sectional view illustrating a mounting hole according to an embodiment of the present invention;

FIG. 6 is a side view illustrating a state, in which a sensor packing and a support member are mounted

on a flame detecting sensor and a glass is mounted, according to an embodiment of the present invention; and

FIG. 7 is a side sectional view illustrating that a flame detecting sensor, a tube packing, a sensor packing, and a support member are disposed in a mounting hole, according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0012] Hereinafter, some embodiments of the present invention will be described in detail with reference to the exemplary drawings. Throughout the specification, it is noted that the same or like reference numerals denote the same or like components even though they are provided in different drawings. Further, in the following description of the present invention, a detailed description of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear.

[0013] FIG. 1 is a longitudinal sectional view illustrating a water heating device 1 according to an embodiment of the present invention. FIG. 2 illustrates a perspective view of an upper housing 200 according to an embodiment of the present invention.

[0014] Referring to FIG. 1, the water heating device 1 includes a combustion chamber 100. The combustion chamber 100 includes an interior space 110, in which a combustion reaction occurs. The interior space 110 is a space, in which flames and a combustion gas are generated by the combustion reaction. The combustion chamber 100 may include a combustion guide 120. The combustion guide 120 may be configured to reverse a flow direction of the combustion gas that is generated by the combustion reaction and flows to a lower side, upwards. A flow direction of the combustion gas may be reversed upwards and thus the combustion gas may circulate. As the combustion gas circulates, distribution of temperatures may become uniform as a temperature of the interior space 110 becomes lower as compared with a case, in which ignition occurs in a situation, in which simply only air and a fuel are present. Furthermore, an amount of nitrogen oxides that may be generated at a high temperature may be reduced.

[0015] The water heating device 1 includes the upper housing 200. The upper housing 200 is disposed to cover an upper side of the interior space 110. The upper housing 200 is configured such that at least a flame detecting sensor 400, which will be described below, is mounted thereon.

[0016] The water heating device 1 includes a burner 300. The burner 300 is configured to cause a combustion reaction in the interior space 110. The burner 300 ignites a fuel (e.g., an oil type or a gas type) and air in the interior space 110 to cause a combustion reaction, and flames and the combustion gas is formed in the interior space 110 by the combustion reaction.

[0017] The burner 300 may include an ignition plug 310. For example, the ignition plug 310 may ignite a mixture material, in which the ejected fuel and the ejected air are mixed. The ignition plug 310 may generate an electric spark, and a mixture material may be ignited by the electric spark. The ignition plug 310 may generate the electric spark in the interior space 110 through an ignition plug hole (e.g., an ignition plug hole 310-1 of FIG. 4). The burner 300 may include a fuel nozzle 320. For example, the fuel nozzle 320 may be a nozzle that may inject the fuel into the interior space 110. The fuel nozzle 320 may be disposed to pass through the upper housing 200. The burner 300 may include an air nozzle 330. For example, the air nozzle 330 may inject air into the interior space 110. The air nozzle 330 may be formed to surround the fuel nozzle 320. The air nozzle 330 may inject the air through an air injection hole 330-1 formed between the air nozzle 330 and an outer surface of the fuel nozzle 320.

[0018] The water heating device 1 includes the flame detecting sensor 400. The flame detecting sensor 400 may be a UV sensor that detects physical characteristics of the flames by receiving ultraviolet rays generated in the interior space 110. The flame detecting sensor 400 may detect whether a combustion reaction occurs in the interior space 110, presence of flames, and physical characteristics of the flames.

[0019] Referring to FIG. 2, the upper housing 200 includes a mounting hole 210. For example, the mounting hole 210 is a hole, into which the flame detecting sensor 400 is inserted to sense the flames in the interior space 110. The flame detecting sensor 400 is disposed to be inserted into the mounting hole 210 to pass through the upper housing 200. The upper housing 200 may include a temperature sensor mounting part 201. For example, the temperature sensor mounting part 201 may be a hole that is configured such that at least a portion of the temperature sensor that may sense the temperature of the interior space 110 passes through the upper housing 200. The temperature sensor may be disposed such that at least a portion thereof is inserted into the temperature sensor mounting part 201 to pass through the upper housing 200. The upper housing 200 may include a fuel nozzle hole 320-1. For example, the fuel nozzle hole 320-1 may be a hole, into which the fuel nozzle 320 is inserted to inject the fuel into the interior space 110. The fuel nozzle hole 320-1 may be a hole that is configured such that the fuel nozzle 320 passes through the upper housing 200. However, the present invention is not limited to the above description.

[0020] Referring to FIG. 1, the water heating device 1 includes a flame tube 500. The flame tube 500 includes a tube part 510 that is formed to surround at least some of the flames that may be generated in the interior space 110. The tube part 510 surrounds at least a portion of an ignition space that is configured such that the mixture material of the fuel and the air are ignited, and surrounds at least some of the flames that are generated through ignition. The ignition space may be a partial space in-

cluded in the interior space 110, and may be a space that is defined while being surrounded by an inner space of the tube part 510.

[0021] The flame tube 500 includes an extending part 520 that extends from the tube part 510 toward the mounting hole 210. A sensing hole 521 is formed in the extending part 520. The sensing hole 521 may be communicated with the ignition space that is defined while being surrounded by the inner surface of the tube part 510.

[0022] The water heating device 1 includes a heat exchanger 600. The heat exchanger 600 includes a heat exchange pipeline, in which water flows along an interior thereof. The heat exchanger 600 may cause the combustion gas (or heat generated through the combustion reaction) and the water that flows in the heat exchange pipeline to exchange heat, and as illustrated, may be formed at a lower portion of the water heating device 1.

[0023] FIG. 3 is an enlarged longitudinal sectional view of a portion of the water heating device 1 according to an embodiment of the present invention. FIG. 4 illustrates a perspective view of the flame tube 500 according to an embodiment of the present invention. The contents described in the above-described embodiment may be applied to the present embodiment in the same or similar way.

[0024] Referring to FIG. 3, the mounting hole 210 is a hole that is provided in the upper housing 200 such that the flame detecting sensor 400 is mounted therein, and the flame detecting sensor 400 is inserted into the mounting hole 210 to sense the interior space 110. The flame detecting sensor 400 may sense the interior space 110 through the sensing hole 521. The sensing hole 521 (or the extending part 520) is formed at a location corresponding to the mounting hole 210, in the extending part 520 of the flame tube 500, such that the flame detecting sensor 400 senses the interior space 110. In detail, the sensing hole 521 and the mounting hole 210 are formed on a sensing path (e.g., a direction, in which the mounting hole 210 extends) of the flame detecting sensor 400. The mounting hole 210 and the sensing hole 521 are communicated with each other. The extending part 520 is extended to be inserted into the mounting hole 210, and the sensing hole 521 communicates with the mounting hole 210. As the extending part 520 is inserted into the mounting hole 210, the combustion gas and the soot generated in the interior space 110 may be prevented from flowing to the mounting hole 210, through other parts than the extending part 520.

[0025] Referring to FIG. 4, the flame tube 500 includes the tube part 510 and the extending part 520. The extending part 520 extends from the tube part 510 toward the mounting hole 210. The extending part 520 extends toward the mounting hole 210 at a location corresponding to the mounting hole 210. The extending part 520 may include a discharge hole 522. For example, the discharge hole 522 may be formed to pass through a side part of the extending part 520. The discharge hole 522 may pass

through the side part of the extending part 520 to be communicated with the sensing hole 521. The discharge hole 522 may be a hole that is provided in the extending part 520 such that the combustion gas that flows in the sensing hole 521 is discharged. The extending part 520 may include the discharge hole 522 and may prevent the combustion gas from being excessively introduced into the mounting hole 210 as a portion of the combustion gas may be discharged in a process of the combustion gas passing through the sensing hole 521. According to the above description, thermal damage to the flame detecting sensor 400, which may occur due to the combustion gas, or generation of soot may be restrained.

[0026] The flame tube 500 may include a fuel nozzle mounting part 530. For example, the fuel nozzle mounting part 530 may be configured such that the fuel nozzle 320 is mounted thereon. As a detailed example, a fuel nozzle mounting hole 531 may be formed in the fuel nozzle mounting part 530, and at least a portion of the fuel nozzle 320 may be mounted to pass through the fuel nozzle mounting hole 531. The fuel nozzle 320 may be mounted on the fuel nozzle mounting part 530 to inject the fuel for generating the combustion reaction in the interior space 110 (or an ignition space that is a partial space of the interior space 110). As another example, the fuel nozzle 320 may pass through the fuel nozzle hole 320-1 of the upper housing 200 to be mounted on the fuel nozzle mounting part 530. The above description of the fuel nozzle mounting part 530 and the fuel nozzle mounting hole 531 are exemplary, and the present invention may not be limited thereto. Furthermore, locations or shapes of the fuel nozzle mounting part 530 and the fuel nozzle mounting hole 531 illustrated in FIG. 4 are exemplary, and may be differently implemented according to designs.

[0027] The water heating device 1 includes a tube packing 410. For example, the tube packing 410 may be disposed between the mounting hole 210 and the extending part 520. The tube packing 410 is disposed between an inner surface (e.g., a second opening inner-surface 121 that will be described below) of the upper housing 200, which defines the mounting hole 210, and the extending part 520. The tube packing 410 defines a flow path from the sensing hole 521 of the combustion gas generated by the combustion reaction to the mounting hole 210. The tube packing 410 is disposed between the inner surface (e.g., the second opening inner-surface 121 that will be described below) and the extending part 520 (or between the extending part 520 and the flame detecting sensor 400) to define a flow path, in which the combustion gas that flows along the extending part 520 in the interior space 110 (or the ignition space that is a partial space of the interior space 110) of the tube part 510 flows. Furthermore, the tube packing 410 may restrain the circulating combustion gas from flowing to the mounting hole 210. For example, the flow direction of the combustion gas may be reversed by the combustion guide 120, and thus the combustion gas may flow in a direction that

faces the mounting hole 210. In this case, the tube packing 410 may prevent introduction of the combustion gas by restricting the flow path of the combustion gas to the mounting hole 210. Because the tube packing 410 prevents the introduction of the combustion gas, thermal damage to the flame detecting sensor 400, which may occur due to the combustion gas, or generation of soot may be restrained.

[0028] FIG. 5 illustrates a longitudinal sectional view of the mounting hole 210 according to an embodiment of the present invention. The contents described in the above-described embodiment may be applied to the present embodiment in the same or similar way.

[0029] The mounting hole 210 is formed in the upper housing 200 such that the flame detecting sensor 400 is mounted on the upper housing 200. For example, the mounting hole 210 may be formed to have a shape corresponding to an outskirt of the flame detecting sensor 400.

[0030] The mounting hole 210 may be defined by opening inner-surfaces 211 and 212 of the inner surface of the upper housing 200. For example, the first opening inner-surface 211 may define a first hole part 211-1 of the mounting hole 210, and the second opening inner-surface 212 may define a second hole part 212-1 of the mounting hole 210. The mounting hole 210 may include the first hole part 211-1 and the second hole part 212-1 defined by the opening inner-surfaces 211 and 212, and the first hole part 211-1 and the second hole part 212-1 may be communicated with each other. The second hole part 212-1 may extend from the first hole part 211-1 to the interior space 110.

[0031] The first hole part 211-1 and the second hole part 212-1 may have different cross-sectional areas. For example, the first hole part 211-1 may have a first cross-sectional area, and the second hole part 212-1 may have a second cross-sectional area that is smaller than the first cross-sectional area. The first hole part 211-1 and the second hole part 212-1 may have different cross-sectional areas with respect to a border that distinguishes them. For example, the first cross-sectional area of the first hole part 211-1 corresponding to a border of the first hole part 211-1 and the second hole part 212-1 may be larger than the second cross-sectional area of the second hole part 212-1 corresponding to the border. The first opening inner-surface 211 and the second opening inner-surface 212 may define a step. For example, when compared with the first opening inner-surface 211, the second opening inner-surface 212 may protrude toward the mounting hole 210 such that a step is formed on the first opening inner-surface 211 and the second opening inner-surface 212.

[0032] FIG. 6 is a side view illustrating a state, in which a sensor packing 420 and a support member 430 are mounted on the flame detecting sensor 400 and a glass 440 is mounted, according to an embodiment of the present invention. FIG. 7 is a side sectional view illustrating that the flame detecting sensor 400, the tube packing

410, the sensor packing 420, and the support member 430 are disposed in the mounting hole 210, according to an embodiment of the present invention. Hereinafter, a description will be made with reference to FIGS. 6 and 7.

[0033] The flame detecting sensor 400 may include a main part 401. For example, the main part 401 may include a main board 401-1. The main board 401-1 may be a printed circuit board. The flame detecting sensor 400 may include a sub part 402. For example, the sub part 402 may be a part that extends from the main part 401 toward the sensing hole 521. The sub part 402 may include a sub part end 402-1. The sub part end 402-1 may include a lens 435. A cross-sectional area of the main part 401 may be larger than a cross-sectional area of the sub part 402. The sub part 402 may extend from the main part 401 to include the sub part end 402-1 at an end thereof, and may include a sub board that electrically connects the main board 401-1 and the sub part end 402-1 (or the lens 435) in an interior thereof. In the flame detecting sensor 400, the sub part 402 including the sub part end 402-1 may extend toward the sensing hole 521 to minimize thermal damage to the main part 401 that senses the flames that may be generated in the interior space 110, due to heat or the combustion gas, or an influence of soot. The flame detecting sensor 400 may include a slide preventing pattern 403. For example, the slide preventing pattern 403 may be formed on the sub part 402, and the support member 430 described below may be disposed at a location corresponding to the slide preventing pattern 403.

[0034] The water heating device 1, as described above, includes the tube packing 410. The tube packing 410 at least partially surrounds the extending part 520 and the flame detecting sensor 400. According to the invention, the tube packing 410 is disposed to surround at least a portion of an end of the extending part 520 and at least a portion of an end of the flame detecting sensor 400. A diameter of the tube packing 410 may be larger than a diameter of an end of the extending part 520 and a diameter of the flame detecting sensor 400 (or an end of the sub part 402). As a detailed example, an inner diameter of the tube packing 410 may be larger than an outer diameter of the end of the extending part 520 and an outer diameter of the end of the flame detecting sensor 400. Alternatively, the inner diameter of the tube packing 410 may be smaller than or equal to the outer diameter of the end of the extending part 520 and the outer diameter of the end of the flame detecting sensor 400 such that the tube packing 410 is elastically fixed. However, the present invention is not limited to the above description, and may be variously implemented according to designs.

[0035] The water heating device 1 includes the sensor packing 420. For example, the sensor packing 420 may be disposed between an outer surface of the flame detecting sensor 400 and the opening inner-surfaces 211 and 212. As a detailed example, the sensor packing 420 may be disposed between the first opening inner-surface 211 that defines the first hole part 211-1 and the

sub part 402 of the flame detecting sensor 400. The sensor packing 420 may be disposed to surround at least a portion of the sub part 402. The sensor packing 420 may be disposed to contact the first opening inner-surface 211, and may be disposed to contact the sub part 402 while contacting the first opening inner-surface 211. The sensor packing 420 may include an elastic member. The sensor packing 420 may be disposed as described above, and may restrain the combustion gas or the soot from passing through the mounting hole 210. Because the combustion gas or the soot may be restrained from passing through the mounting hole 210, thermal damage to the main board 401-1 of the flame detecting sensor 400 or diffusion of the soot also may be restrained.

[0036] The water heating device 1 may include the support member 430. For example, the support member 430 may be disposed between the sensor packing 420 and the main part 401. The support member 430 may be disposed between the first opening inner-surface 211 that defines the first hole part 211-1 and the sub part 402 of the flame detecting sensor 400. The support member 430 may be disposed to support the sensor packing 420 on an opposite side to the interior space 110 with respect to the sensor packing 420. In a different description, the support member 430 may be disposed on an opposite side to a side that faces the extending part 520 with respect to the sensor packing 420. The support member 430 may be disposed to at least partially surround the sub part 402. The support member 430 may support the sensor packing 420. The support member 430 may be configured to restrain movement of the sub part 402. For example, the support member 430 may surround the sub part 402, and may be disposed on the slide preventing pattern 403 such that movement thereof is restrained at a surrounded location. Because the support member 430 is disposed on the slide preventing pattern 403, a relative movement of the support member 430 to the sub part 402 may be restrained further when compared with the sensor packing 420. Furthermore, the support member 430 may have a groove 430-1 on an inner surface thereof such that movement thereof with respect to the sub part 402 is restrained. For example, the support member 430 may include the groove 430-1 formed on the inner surface thereof in a lengthwise direction of the flame detecting sensor 400, and a disposition form thereof is not particularly restricted. The groove 430-1 formed on an inner surface of the support member 430 may protrude from the sub part 402 of the flame detecting sensor 400 to an outside, and may be stopped by a protruding part 404 formed along a lengthwise direction thereof. Because the groove 430-1 of the support member 430 is stopped by the protruding part 404 of the sub part 402, the support member 430 may be prevented from being rotated about the sub part 402 whereby the support member 430 may be prevented from deviating from the flame detecting sensor 400 or an inner surface of the support member 430 may be prevented from being worn. Due to the above-described

disposition, the support member 430 may prevent the flame detecting sensor 400 from being pushed out by elasticity of the sensor packing 420, or prevent the sensor packing 420 from being pushed out, or prevent damage to the sensor packing 420.

[0037] The water heating device 1 may include a soot preventing glass 440. For example, the soot preventing glass 440 may be provided at the sub part end 402-1. The glass 440 may be disposed between the lens 435 provided at the sub part end 402-1 and the sensing hole 521. The glass 440 may have a size, by which the sub part end 402-1 (or the lens 435) is covered, and may be disposed to a side that is close to the sensing hole 521 of the sub part end 402-1. For example, the glass 440 may have a size of an outer diameter corresponding to an inner diameter of the sub part end 402-1. Furthermore, the outer diameter of the glass 440 may be formed to be larger than an outer diameter of the lens 435, but the present invention is not limited thereto. The glass 440 may be a quartz glass, by which diffusion or adsorption of the soot may be restrained, and may be a complex glass including the quartz glass. Because the glass 440 is disposed around the sub part end 402-1 (or the lens 435), diffusion or adsorption of the soot may be restrained whereby it may be more advantageous for the flame detecting sensor 400 to sense the flames.

[0038] According to the embodiments of the present invention, thermal damage to the flame detecting sensor or generation of soot due to the combustion gas may be restrained.

[0039] According to the embodiments of the present invention, a durability of the flame detecting sensor may be enhanced.

[0040] An emergency situation may be effectively monitored by restraining damage to the flame detecting sensor.

[0041] The above description is a simple exemplification of the present invention, and the present invention may be variously corrected and modified by those skilled in the art to which the present invention pertains without departing from the essential features of the present invention. Accordingly, the technical scope of the present invention should be construed by the attached claims.

Claims

1. A water heating device (1) comprising:

- a combustion chamber (100) provided with an interior space (110), in which a combustion reaction occurs;
- a burner (300) configured to cause the combustion reaction in the interior space;
- a heat exchanger (600) including a heat exchange pipeline, in which water flows along an interior thereof, and configured to heat the water by using heat generated by the combustion

reaction;

a flame detecting sensor (400) configured to sense flames generated in the interior space and detect physical characteristics of the flames by receiving ultraviolet rays generated in the interior space;

an upper housing (200) covering an upper side of the interior space, and having a mounting hole (210) such that the flame detecting sensor is mounted therein;

a flame tube (500) including a tube part (510) configured to surround at least some of the flames on a lower side of the upper housing, and an extending part (520) surrounding a sensing hole (521) formed at a location corresponding to the mounting hole such that the flames are sensed by the flame detecting sensor, and extending from the tube part toward the mounting hole; and

a tube packing (410) disposed between an inner surface of the upper housing, which defines the mounting hole and the extending part,

wherein the extending part is inserted into the mounting hole such that the mounting hole and the sensing hole are communicated with each other and wherein the tube packing defines a flow path of a combustion gas generated by the combustion reaction from the sensing hole to the mounting hole and is disposed between the extending part and the inner surface of the upper housing

characterized in that

the tube packing is disposed to surround at least a portion of an end of the extending part and at least a portion of an end of the flame detecting sensor.

2. The water heating device of claim 1, wherein a side part of the extending part is through to define a discharge hole (522) that communicates an outside and the sensing hole (521) with each other.
3. The water heating device of claim 1, wherein an inner diameter of the tube packing (410) is larger than an outer diameter of the end of the extending part (520) and an outer diameter of the end of the flame detecting sensor (400).

Patentansprüche

1. Wasserheizvorrichtung (1), umfassend:

einen Brennraum (100), der mit einem Innenraum (110) versehen ist, in dem eine Verbrennungsreaktion vor sich geht;

einen Brenner (300), der dazu eingerichtet ist, die Verbrennungsreaktion in dem Innenraum zu

verursachen;

einen Wärmetauscher (600), der eine Wärmeaustauschleitung umfasst, in der Wasser entlang einem Inneren derselben strömt, und dazu eingerichtet ist, das Wasser durch Nutzung von Wärme zu erwärmen, die durch die Verbrennungsreaktion erzeugt wird;

einen Flammenerkennungssensor (400), der dazu eingerichtet ist, im Innenraum erzeugte Flammen zu erfassen und physikalische Eigenschaften der Flammen durch Empfang von im Innenraum erzeugten UV-Strahlen zu erkennen;

ein oberes Gehäuse (200), das eine Oberseite des Innenraums bedeckt und eine Montagebohrung (210) derart aufweist, dass der Flammenerkennungssensor darin montiert ist;

ein Flammrohr (500), umfassend einen Rohrteil (510), der dazu gestaltet ist, mindestens einen Teil der Flammen auf einer unteren Seite des oberen Gehäuses zu umschließen, und einen sich verlängernden Teil (520), der eine Messöffnung (521) umschließt, die an einer der Montagebohrung entsprechenden Stelle derart ausgebildet ist, dass die Flammen vom Flammenerkennungssensor erfasst werden, und der sich von dem Rohrteil in Richtung der Montagebohrung erstreckt; und

eine Rohrpackung (410), die zwischen einer Innenfläche des oberen Gehäuses, das die Montagebohrung definiert, und dem sich verlängernden Teil angeordnet ist, wobei der sich verlängernde Teil derart in die Montagebohrung eingefügt ist, dass die Montagebohrung und die Messöffnung miteinander in Verbindung stehen, und wobei die Rohrpackung einen Strömungsweg eines durch die Verbrennungsreaktion erzeugtes Brenngases von der Messöffnung zur Montagebohrung definiert und zwischen dem sich verlängernden Teil und der Innenfläche des oberen Gehäuses angeordnet ist,

dadurch gekennzeichnet, dass

die Rohrpackung derart angeordnet ist, dass sie zumindest einen Abschnitt eines Endes des sich verlängernden Teils und zumindest einen Abschnitt eines Endes des Flammenerkennungssensors umschließt.

2. Wasserheizvorrichtung nach Anspruch 1, wobei ein Seitenteil des sich verlängernden Teils durchbrochen ist, um eine Auslassbohrung (522) zu definieren, die eine Verbindung zwischen einer Außenseite und der Messöffnung (521) herstellt.

3. Wasserheizvorrichtung nach Anspruch 1, wobei ein Innendurchmesser der Rohrpackung (410) größer als ein Außendurchmesser des Endes des sich verlängernden Teils (520) und ein Außendurchmesser

des Endes des Flammenerkennungssensors (400) ist.

Revendications

1. Dispositif de chauffage d'eau (1) comprenant :

une chambre de combustion (100) pourvue d'un espace intérieur (110), dans lequel se produit une réaction de combustion ;
 un brûleur (300) conçu pour provoquer la réaction de combustion dans l'espace intérieur ;
 un échangeur de chaleur (600) comprenant une conduite d'échange de chaleur, dans laquelle de l'eau s'écoule le long d'un intérieur correspondant, et conçu pour chauffer l'eau à l'aide de la chaleur générée par la réaction de combustion ;
 un capteur de détection de flamme (400) conçu pour capter des flammes générées dans l'espace intérieur et pour détecter des caractéristiques physiques des flammes par réception de rayons ultraviolets générés dans l'espace intérieur ;
 un boîtier supérieur (200) recouvrant un côté supérieur de l'espace intérieur et présentant un trou de montage (210) de telle sorte que le capteur de détection de flamme est monté en son sein ;
 un tube à flamme (500) comportant une partie tube (510), conçue pour entourer au moins certaines des flammes sur un côté inférieur du boîtier supérieur, et une partie d'extension (520) entourant un trou de capture (521) formé à un emplacement correspondant au trou de montage, de telle sorte que les flammes sont captées par le capteur de détection de flamme, et s'étendant à partir de la partie tube vers le trou de montage ; et
 une garniture (410) de tube disposée entre une surface interne du boîtier supérieur, qui définit le trou de montage, et la partie d'extension, la partie d'extension étant insérée dans le trou de montage de telle sorte que le trou de montage et le trou de capture sont en communication l'un avec l'autre et la garniture de tube définissant un trajet d'écoulement d'un gaz de combustion généré par la réaction de combustion à partir du trou de capture vers le trou de montage et étant disposée entre la partie d'extension et la surface interne du boîtier supérieur,
caractérisé en ce que
 la garniture de tube est disposée pour entourer au moins une section d'une extrémité de la partie d'extension et au moins une section d'une extrémité du capteur de détection de flamme.

2. Dispositif de chauffage d'eau selon la revendication

1, une partie latérale de la partie d'extension étant percée afin de définir un trou d'évacuation (522) qui fait communiquer un extérieur et le trou de capture (521) l'un avec l'autre.

3. Dispositif de chauffage d'eau selon la revendication 1, un diamètre interne de la garniture (410) de tube étant supérieur à un diamètre externe de l'extrémité de la partie d'extension (520) et à un diamètre externe de l'extrémité du capteur de détection de flamme (400).

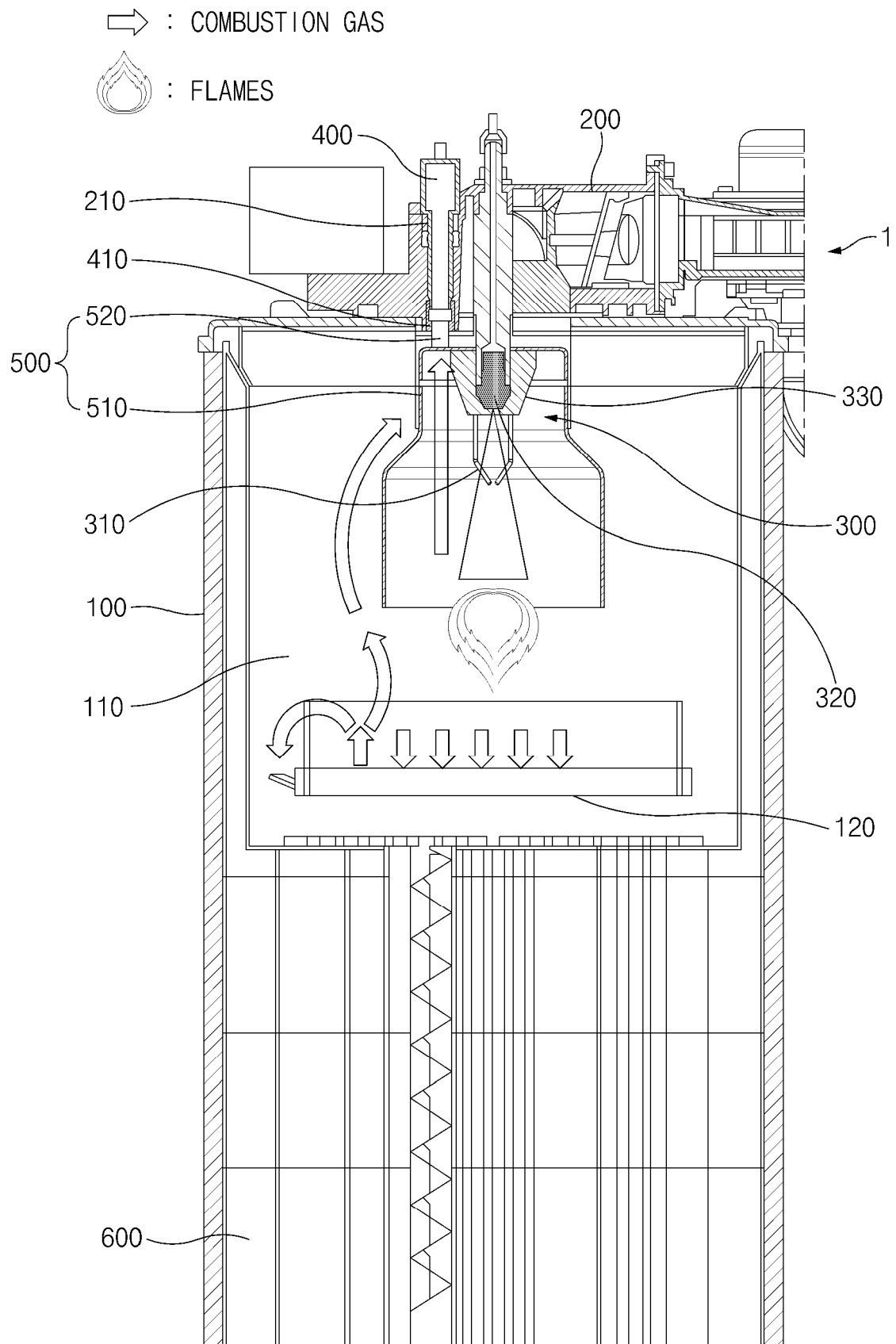


FIG.1

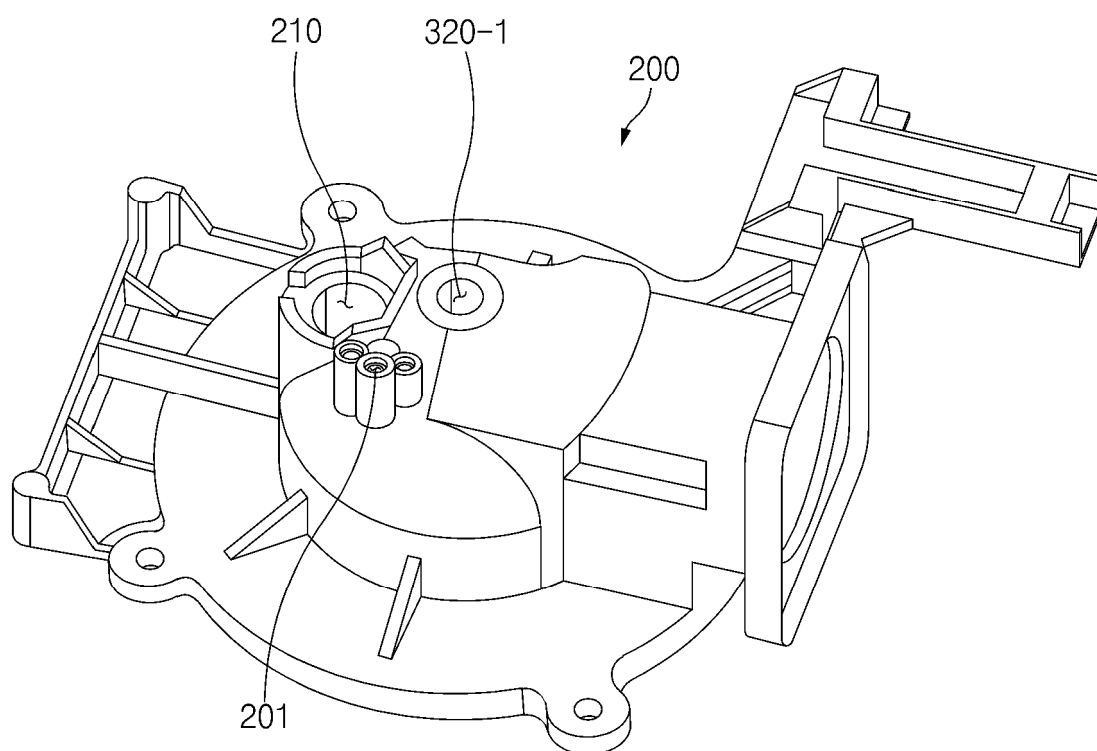


FIG.2

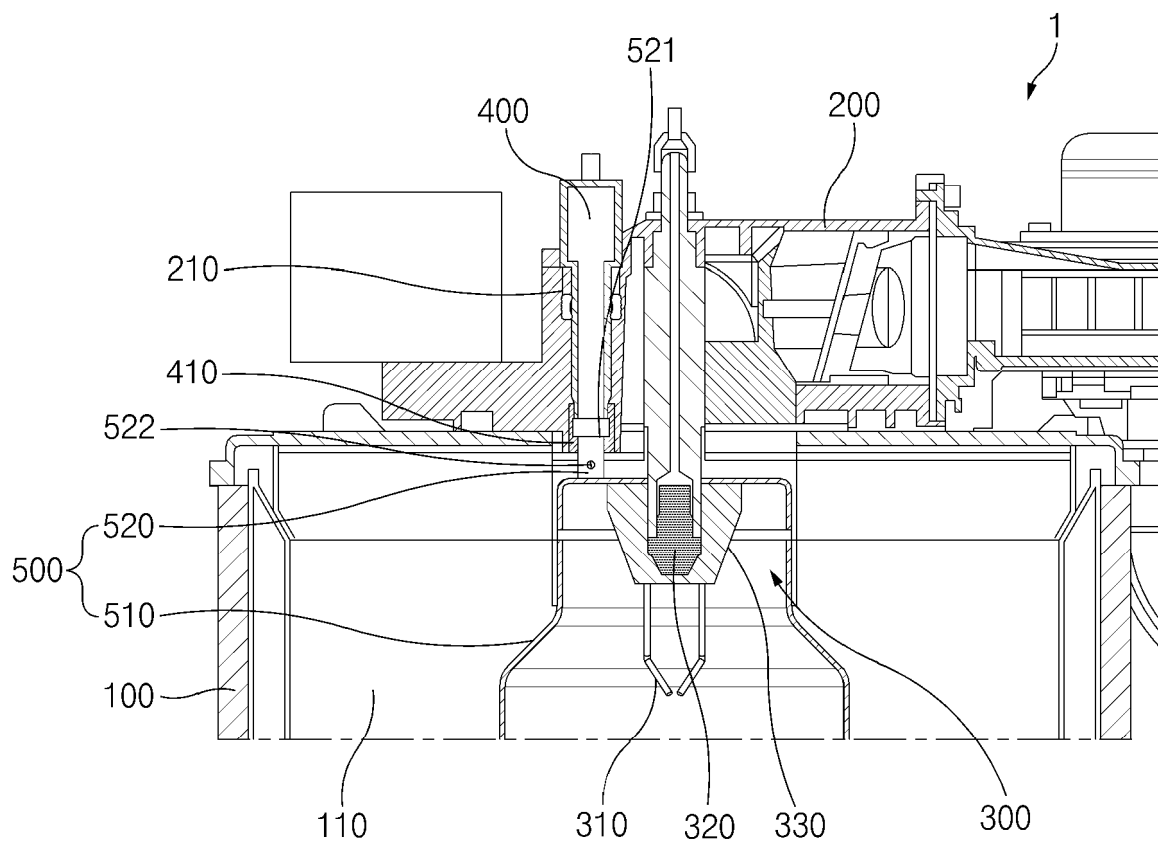


FIG.3

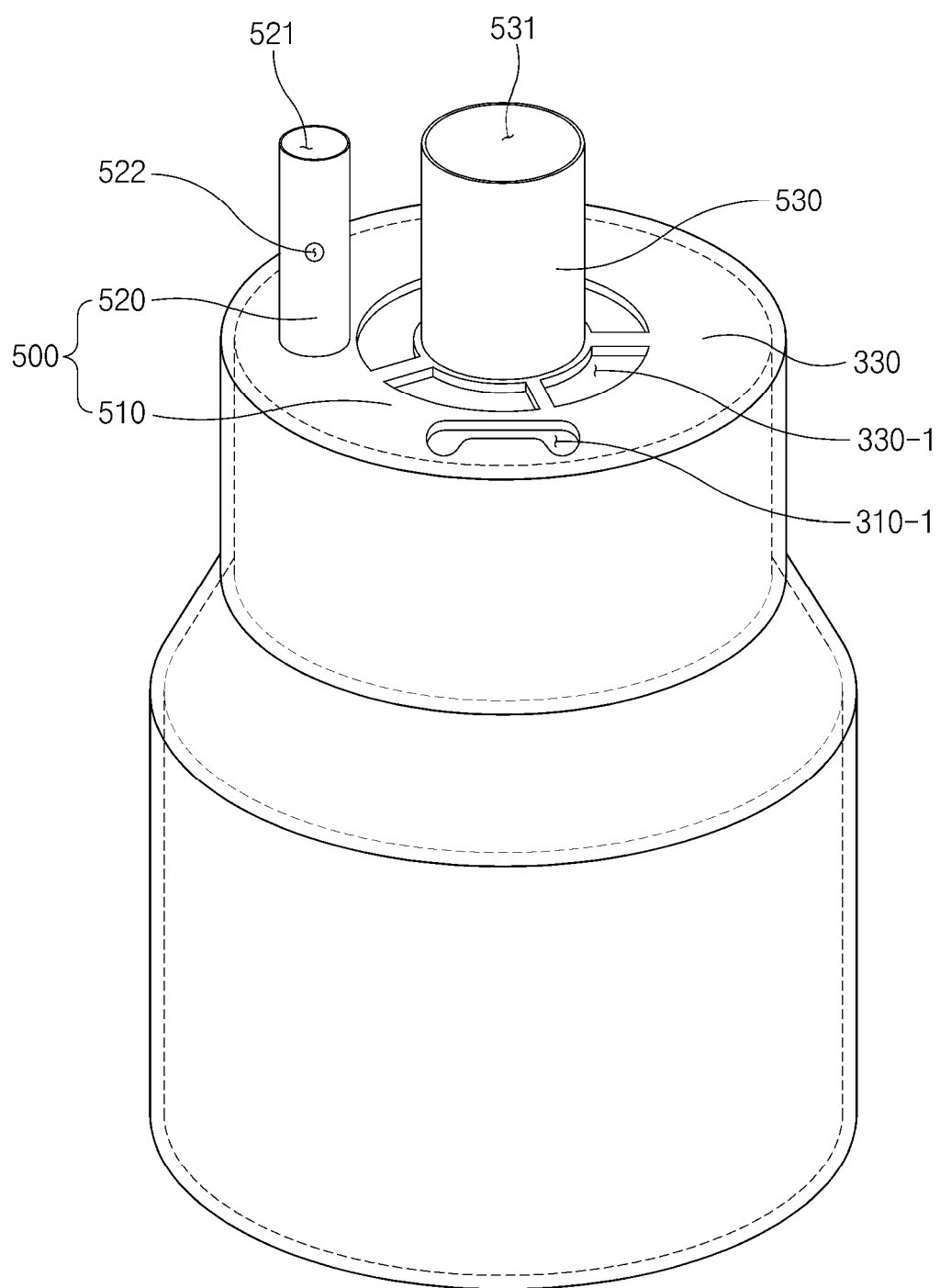


FIG. 4

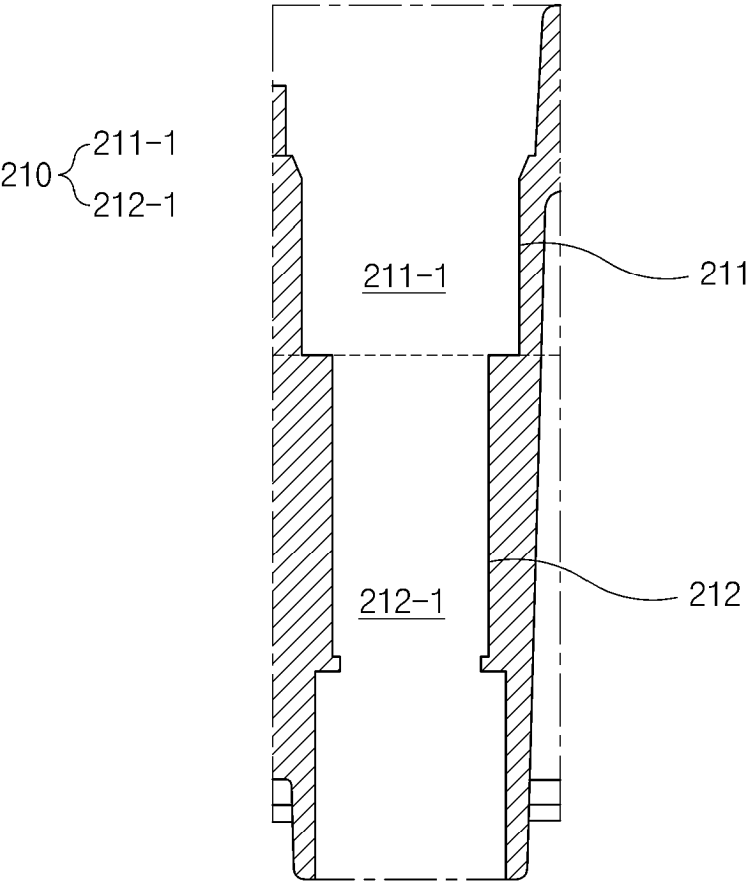


FIG.5

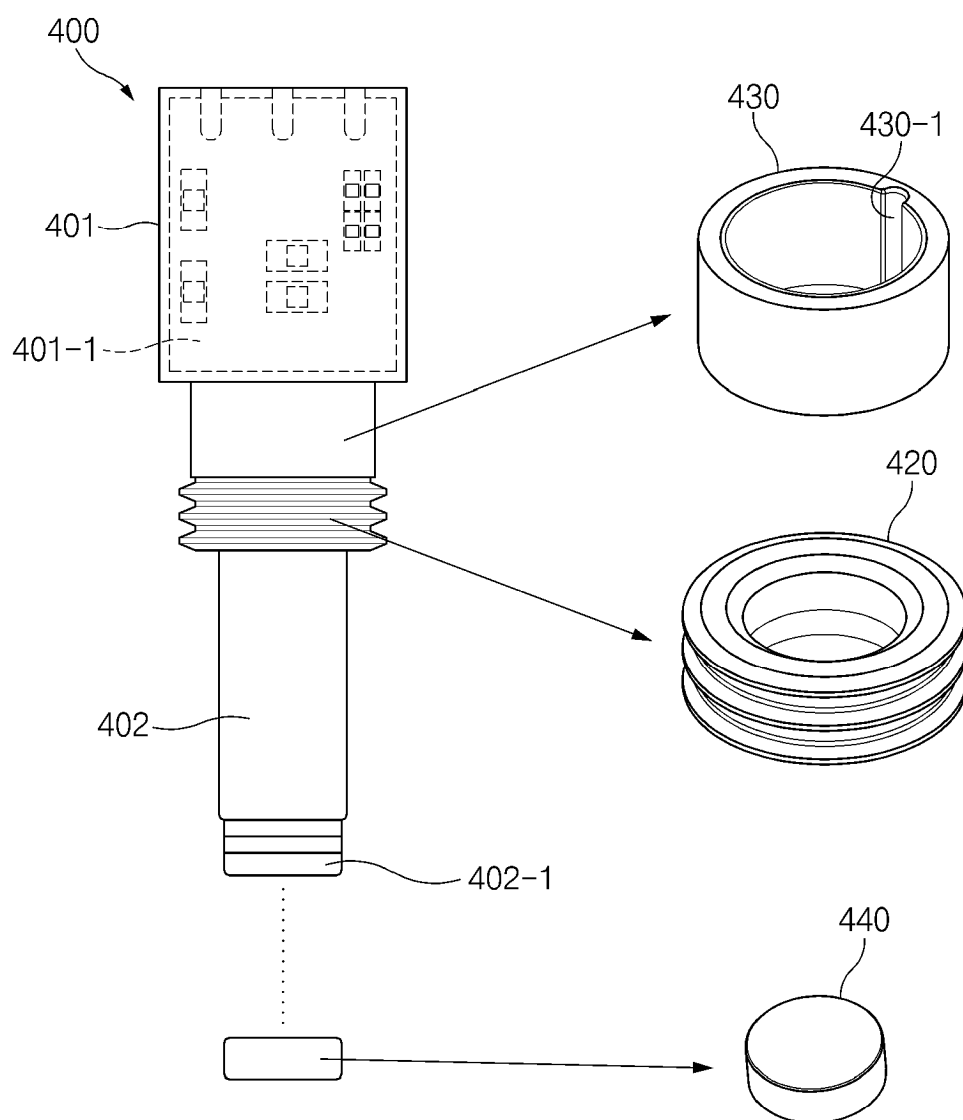


FIG.6

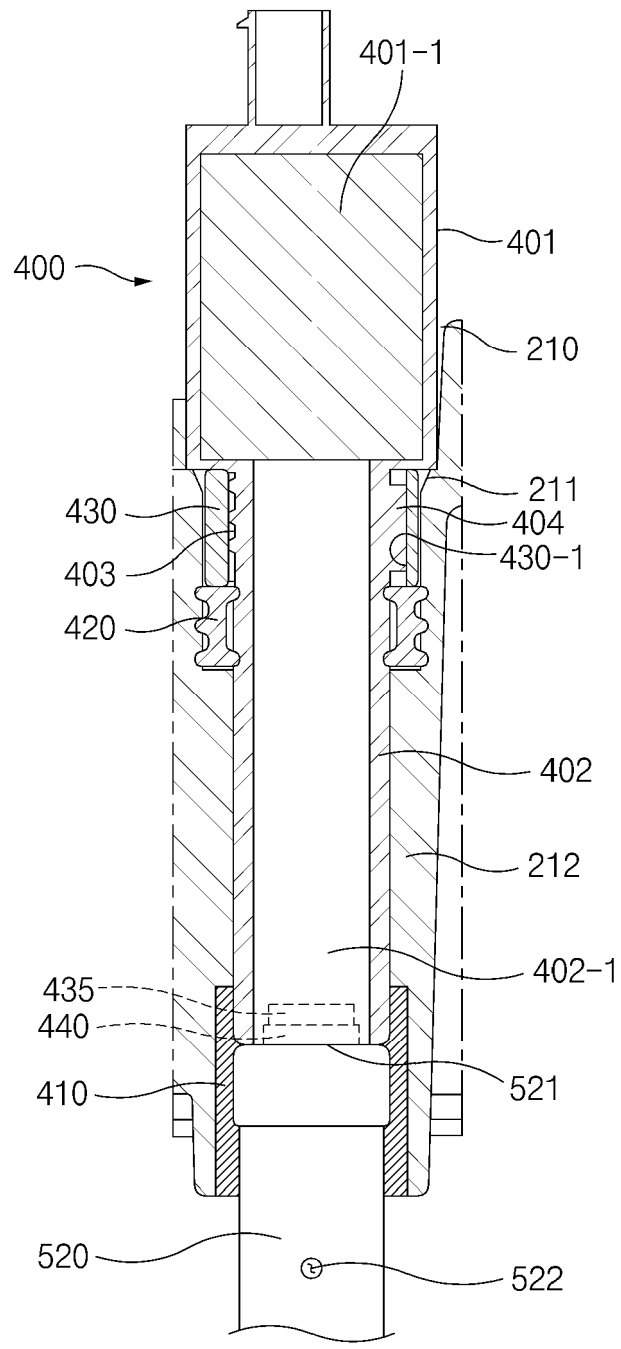


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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