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(54) MULTIPLE-PIPE INSTANT HEATING TYPE STEAM GENERATOR AND APPLICATION THEREOF

(57) A multiple-pipe instant heating type steam generator comprises a steam generator body and a steam generator inner container. The steam generator inner container is sealedly disposed in a cavity of the steam generator body. A first brass mouthpiece is disposed at the lower end of the steam generator body, and a second brass mouthpiece is disposed at the upper end of the steam generator inner container. The steam generator inner container is mainly formed by fixedly connecting an end cover to a cylinder structure. A plurality of inner channels is evenly formed in the outer surface of the cylinder structure. The second brass mouthpiece is connected to the end cover and is communicated with the plurality of inner channels by means of shunting pipes. A plurality of outer channels is formed in the inner wall of the cavity of the steam generator body. The plurality of outer channels corresponds to the plurality of inner channels in a one-to-one manner to form a plurality of water flow and vaporization pipelines having round cross sections. The first brass mouthpiece is communicated with the plurality of water flow and vaporization pipelines having round cross sections and accordingly is communicated with the second brass mouthpiece. The steam generator has a simple structure, a long service life and high safety.

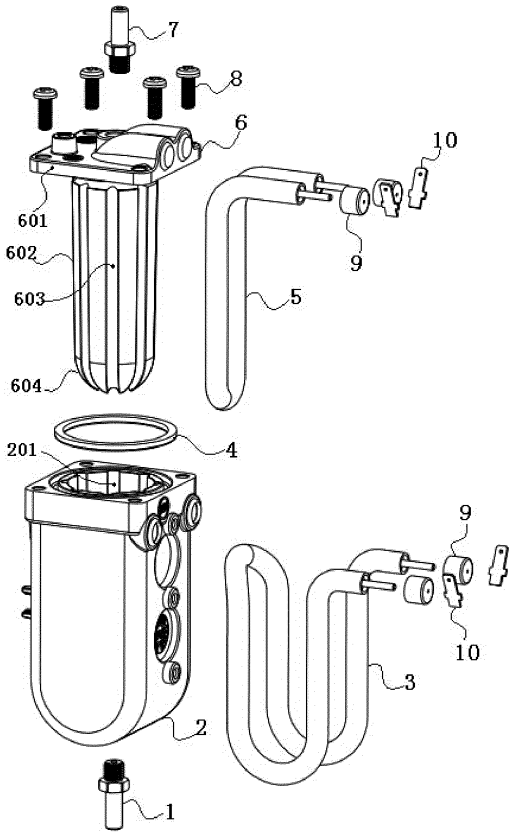

Figure 1

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Description

BACKGROUND OF THE INVENTION

1. **Field of the Invention**

[0001] The invention relates to the field of steam type cleaning device, and more particularly, to an instant heating type steam generator for a steam type cleaner.

2. **Description of the Related Art**

[0002] The existing steam cleaner product often adopts an instant heating type steam generator and a boiler type steam generator. However, most of the instant heating type steam generators available in the market generally have such problems as short life service, inadequate water vaporization and excessive pressure inside the steam generator. Excessive pressure inside the steam generator will lead to the result that a safety valve opens frequently, and steam keeps coming out for a period of time after the shutdown. It has potential safety hazard, such as a user get scaled by the steam; and the inadequate water vaporization will result in unnecessary waste of energy and a poorer effect of generating steam. While the short service life has a direct influence on the steam cleaner using such steam generator, making the steam cleaner has a short service life as well. At present, European countries have introduced an updated safety standard-C1.22.106, for this type of product for the sake of user's safety. The modification of the standard is to cover all the steam cleaners (the original standard is only for a pressure type steam cleaner), wherein if the temperature of the steam or water drop exceeds 50°C within 3 seconds after a switch is released, the device should stop spraying steam/water; when in a non-steaming state, all the steam cleaners, except for a instant steam cleaner, should be equipped with a device allowing the switch of the cleaner to be locked; for the pressure type steam cleaner, when a boiler pressure is greater than 35KPa, a lid through which water is added should not be opened; in order to avoid the damage caused by the spraying of the hot steam and the hot water, as for the pressure type steam cleaner, the lid through which water is added must not be opened until the pressure inside the boiler reduces to atmospheric pressure (hereinafter referred to as "3- second stop criterion", details can be seen in (Steam Cleaner EN60335-2-54_A11 2012 standard updated)). The standard is so strict that the existing instant heating type steam generator cannot conform to the requirements.

[0003] In addition, the boiler type steam generator keeps steam stable, and meets the above-mentioned 3-second stop criterion, however, it takes longer time to generate the steam, and pressure inside the boiler type steam generator is higher. The improper use of a safety helmet or poor adjustment will result in a steam jet and leak accident, scalding human body. The use of such boiler type product also has great limitations (be upright and side-erected slightly), and its processing, manufacturing, assembly process are complex, which cause high defect rate and high costs.

SUMMARY OF THE INVENTION

[0004] For the deficiencies of the prior art, the purpose of the present invention is to provide a multiple-pipe instant heating type steam generator with simple structure, convenient processing, long service life, sufficient vaporization and in compliance with the "3-second stop criterion."

[0005] The other purpose of the invention is to provide a steam cleaning device equipped with the multiple-pipe instant heating type steam generator.

[0006] To achieve the above technical purposes, and achieve the above technical effects, the invention is implemented by the following solutions.

[0007] A multiple-pipe instant heating type steam generator, comprises a steam generator body and a steam generator inner container, the steam generator inner container is sealedly disposed in a cavity of the steam generator body, a first brass mouthpiece is disposed at the lower end of the steam generator body, and a second brass mouthpiece is disposed at the upper end of the steam generator inner container, wherein the steam generator inner container is mainly formed by fixedly connecting an end cover to a cylinder structure, a plurality of inner channels is evenly formed in the outer surface of the cylinder structure, the second brass mouthpiece is connected to the end cover and is communicated with the plurality of inner channels by means of shunting pipes, a plurality of outer channels is formed in the inner wall of the cavity of the steam generator body, the plurality of outer channels corresponds to the plurality of inner channels in a one-to-one manner to form a plurality of water flow and vaporization pipelines having round cross sections, the first brass mouthpiece is communicated with the plurality of water flow and vaporization pipelines having round cross sections and accordingly is communicated with the second brass mouthpiece.

[0008] Further, the lower part of the cylinder structure of the steam generator inner container is of a bullet shape.

[0009] Further, the shunting pipes comprise three parts, the first part is a longitudinal pipe communicated with the second brass mouthpiece, the second part is an annular pipe communicated with the plurality of water flow and vaporization pipelines having round cross sections, and the third part is a horizontal pipe communicated with the first part and the second part.

[0010] Further, an inner container heating tube is embedded in the cylinder structure of the steam generator inner container, two ends of the inner container heating tube are respectively provided with a silicone sheath and a terminal.

[0011] Further, a body heating tube is embedded in

the wall of the cavity of the steam generator body, two ends of the body heating tube are respectively provided with a silicone sheath and a terminal.

[0012] Further, a plurality of threaded holes are arranged in the end cover of the steam generator inner container, correspondingly, a plurality of threaded holes are arranged on an end surface of the steam generator body, the end cover of the steam generator inner container and the end surface of the steam generator body are sealedly connected by a way in which a bolt is screwed to the threaded hole.

[0013] Further, a silicone seal ring is arranged between the end cover of the steam generator inner container and the end surface of the steam generator body.

[0014] Preferably, eight inner channels are arranged in the outer surface of the cylinder structure; eight outer channels are arranged in the inner wall of the cavity of the steam generator body, the eight outer channels corresponds to the eight inner channels in a one-to-one manner to form eight water flow and vaporization pipelines having round cross sections.

[0015] A steam cleaning device equipped with the multiple-pipe instant heating type steam generator, the second brass mouthpiece serves as a water inlet to connect an inlet pipe, the first brass mouthpiece serves as a steam outlet to connect a steam pipe or a steam nozzle

[0016] A steam cleaning device equipped with the multiple-pipe instant heating type steam generator, the first brass mouthpiece serves as a water inlet to connect an inlet pipe, the second brass mouthpiece serves as a steam outlet to connect a steam pipe or a steam nozzle.

[0017] Comparing with the prior art, the solutions mentioned above have the following beneficial effects:

1. The multiple-pipe instant heating type steam generator of the present invention is easy to manufacture and assemble due to its simple structure, thereby reducing the production cost. Specifically, the multiple-pipe instant heating type steam generator of the present invention consists of two components, one of which is the steam generator and the other of which is the steam generator inner container, wherein both the steam generator and the steam generator inner container can be made by one-time die-casting molding process. Therefore, an operator only needs to screw the threads of the two components; meanwhile, component simplification also greatly improves the product yield and increases steam generator lifetime.

2. In the multiple-pipe instant heating type steam generator of the present invention, a plurality of water flow and vaporization pipelines formed by the inner and outer channels between the steam generator inner container and the steam generator body is arranged evenly, so that the same rate of flow of water is vaporized in each pipeline respectively, and it can be rapid vaporized, rapid discharged, in order to stop the steam supply within 3 seconds after the generator is shut down.

3. In the multiple-pipe instant heating type steam generator of the present invention, the water flow and vaporization pipelines have round cross sections (the half of the round cross section is in the steam generator body and the other half of the round cross section is in the steam generator inner container). As the adhesive force which the limescale is attached to the inner wall of the round pipelines is reduced, the limescale being stuck in this steam generator is minimized, thus greatly increasing the useful life of the product.

4. The invention comprises a steam cleaning device equipped with the multiple-pipe instant heating type steam generator, when the second brass mouthpiece serves as a water inlet to connect an inlet pipe, the first brass mouthpiece serves as a steam outlet to connect a steam pipe or a steam nozzle, further to the advantage of the multiple-pipe instant heating type steam generator described above, the team cleaning device can generate the steam faster; when the first brass mouthpiece serves as a water inlet to connect the inlet pipe, the second brass mouthpiece serves as a steam outlet to connect a steam pipe or a steam nozzle, further to the advantage of the multiple-pipe instant heating type steam generator described above, the team cleaning device can greatly increase the useful life of the product.

BRIEF DESCRIPTIONS OF THE DRAWINGS

[0018] The accompanying drawings, together with the specification, illustrate exemplary embodiments of the present disclosure, and, together with the description, serve to explain the principles of the present invention.

Figure 1 is an exploded view of a multi-pipe instant heating steam generator of the present invention.

Figure 2 is an assembly diagram of a multi-pipe instant heating steam generator of the present invention.

Figure 3 is a section view taken along direction A-A in Figure 2.

Figure 4 is a section view taken along direction B-B in Figure 2.

DETAILED DESCRIPTION

[0019] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like reference numerals refer to like elements through-

out.

[0020] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," or "includes" and/or "including" or "has" and/or "having" when used herein, specify the presence of stated features, regions, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components, and/or groups thereof.

[0021] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and the present disclosure, and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0022] As used herein, "around", "about" or "approximately" shall generally mean within 20 percent, preferably within 10 percent, and more preferably within 5 percent of a given value or range. Numerical quantities given herein are approximate, meaning that the term "around", "about" or "approximately" can be inferred if not expressly stated.

[0023] As used herein, the term "plurality" means a number greater than one.

[0024] Hereinafter, certain exemplary embodiments according to the present disclosure will be described with reference to the accompanying drawings.

[0025] The present invention will be described in detail below with reference to the accompanying drawings, in conjunction with the embodiments.

Embodiment 1:

[0026] As shown in Figures 1 and 2, a multiple-pipe instant heating type steam generator, comprises a steam generator body 2 and a steam generator inner container 6, the steam generator inner container 6 is sealedly disposed in a cavity of the steam generator body 2, a first brass mouthpiece 1 is disposed at the lower end of the steam generator body 2, and a second brass mouthpiece 7 is disposed at the upper end of the steam generator inner container 6, wherein the steam generator inner container 6 is mainly formed by fixedly connecting an end cover 601 to a cylinder structure 602, a plurality of inner channels 603 is evenly formed in the outer surface of the cylinder structure 602, the second brass mouthpiece 7 is connected to the end cover 601 and is communicated with the plurality of inner channels 603 by means of shunting pipes 605, a plurality of outer channels 201 is formed in the inner wall of the cavity of the steam generator body 2, the plurality of outer channels 201 corresponds to the plurality of inner channels 603 in a one-to-one manner to form a plurality of water flow and vaporization pipelines 12 having round cross sections, the first brass mouthpiece 1 is communicated with the plurality of water flow and vaporization pipelines 12 having round cross sections and accordingly is communicated with the second brass mouthpiece 7.

[0027] Further, as shown in Figure 1, the lower part of the cylinder structure 602 of the steam generator inner container 6 is of a bullet shape 604.

[0028] Further, as shown in Figures 3 and 4, the shunting pipes 605 comprise three parts, the first part is a longitudinal pipe 6051 communicated with the second brass mouthpiece 7, the second part is an annular pipe 6052 communicated with the plurality of water flow and vaporization pipelines 12 having round cross sections, the third part is a horizontal pipe 6053 communicated with the first part and the second part.

[0029] Further, as shown in Figures 2 and 3, an inner container heating tube 5 is embedded in the cylinder structure 602 of the steam generator inner container 6, two ends of the inner container heating tube 5 are respectively provided with a silicone sheath 9 and a terminal 10.

[0030] Further, as shown in Figures 2 and 3, a body heating tube 3 is embedded in the wall of the cavity of the steam generator body 2, two ends of the body heating tube 3 are respectively provided with a silicone sheath 9 and a terminal 10.

[0031] Further, as shown in Figure 1, a plurality of threaded holes are arranged in the end cover 601 of the steam generator inner container 6, correspondingly, a plurality of threaded holes are arranged on an end surface of the steam generator body 2, the end cover 601 of the steam generator inner container 6 and the end surface of the steam generator body 2 are sealedly connected by a way in which a bolt 8 is screwed to the threaded hole.

[0032] Further, as shown in Figure 1, a silicone seal ring 4 is arranged between the end cover 601 of the steam generator inner container 6 and the end surface of the steam generator body 2.

Embodiment 2:

[0033] A multiple-pipe instant heating type steam generator as described in Embodiment 1, wherein eight inner channels 603 are arranged in the outer surface of the cylinder structure 602; eight outer channels 201 are arranged in the inner wall of the cavity of the steam generator body 2, the eight outer channels 201 corresponds to the eight inner channels 603 in a one-to-one manner to form eight water flow and vaporization pipelines 12 having round cross sections.

Embodiment 3:

[0034] A steam cleaning device equipped with the multiple-pipe instant heating type steam generator as described in Embodiment 2, wherein the second brass mouthpiece 7 serves as a water inlet to connect an inlet pipe, the first brass mouthpiece 1 serves as a steam outlet to connect a steam pipe or a steam nozzle.

Embodiment 4:

[0035] A steam cleaning device equipped with the multiple-pipe instant heating type steam generator as described in Embodiment 2, wherein the first brass mouthpiece 1 serves as a water inlet to connect an inlet pipe, the second brass mouthpiece 7 serves as a steam outlet to connect a steam pipe or a steam nozzle.

[0036] The foregoing is only the preferred embodiments of the invention, not thus limiting embodiments and scope of the invention, those skilled in the art should be able to realize that the schemes obtained from the content of specification and figures of the invention are within the scope of the invention.

Claims

1. A multiple-pipe instant heating type steam generator, comprises a steam generator body (2) and a steam generator inner container (6), the steam generator inner container (6) is sealedly disposed in a cavity of the steam generator body (2), a first brass mouthpiece (1) is disposed at the lower end of the steam generator body (2), and a second brass mouthpiece (7) is disposed at the upper end of the steam generator inner container (6), wherein the steam generator inner container (6) is mainly formed by fixedly connecting an end cover (601) to a cylinder structure (602), a plurality of inner channels (603) is evenly formed in the outer surface of the cylinder structure (602), the second brass mouthpiece (7) is connected to the end cover (601) and is communicated with the plurality of inner channels (603) by means of shunting pipes (605), a plurality of outer channels (201) is formed in the inner wall of the cavity of the steam generator body (2), the plurality of outer channels (201) corresponds to the plurality of inner channels (603) in a one-to-one manner to form a plurality of water flow and vaporization pipelines (12) having round cross sections, the first brass mouthpiece (1) is communicated with the plurality of water flow and vaporization pipelines (12) having round cross sections and accordingly is communicated with the second brass mouthpiece (7).

2. The multiple-pipe instant heating type steam generator according to claim 1, wherein the lower part of the cylinder structure (602) of the steam generator inner container (6) is of a bullet shape (604).

3. The multiple-pipe instant heating type steam generator according to claim 1, wherein the shunting pipes (605) comprise three parts, the first part is a longitudinal pipe (6051) communicated with the second brass mouthpiece (7), the second part is an annular pipe (6052) communicated with the plurality of water flow and vaporization pipelines (12) having round cross sections, and the third part is a horizontal pipe (6053) communicated with the first part and the second part.

4. The multiple-pipe instant heating type steam generator according to claim 1, wherein an inner container heating tube (5) is embedded in the cylinder structure (602) of the steam generator inner container (6), two ends of the inner container heating tube (5) are respectively provided with a silicone sheath (9) and a terminal (10).

5. The multiple-pipe instant heating type steam generator according to claim 1, wherein a body heating tube (3) is embedded in the wall of the cavity of the steam generator body (2), two ends of the body heating tube (3) are respectively provided with a silicone sheath (9) and a terminal (10).

6. The multiple-pipe instant heating type steam generator according to claim 1, wherein a plurality of threaded holes are arranged in the end cover (601) of the steam generator inner container (6), correspondingly, a plurality of threaded holes are arranged on an end surface of the steam generator body (2), the end cover (601) of the steam generator inner container (6) and the end surface of the steam generator body (2) are sealedly connected by a way in which a bolt (8) is screwed to the threaded hole.

7. The multiple-pipe instant heating type steam generator according to claim 6, wherein a silicone seal ring (4) is arranged between the end cover (601) of the steam generator inner container (6) and the end surface of the steam generator body (2).

8. The multiple-pipe instant heating type steam generator according to any one of claims 1 to 7, wherein eight inner channels (603) are arranged in the outer surface of the cylinder structure (602); eight outer channels (201) are arranged in the inner wall of the cavity of the steam generator body (2), the eight outer channels (201) corresponds to the eight inner channels (603) in a one-to-one manner to form eight water flow and vaporization pipelines (12) having round cross sections.

9. A steam cleaning device equipped with the multiple-pipe instant heating type steam generator according

to claim 8, wherein the second brass mouthpiece (7) serves as a water inlet to connect an inlet pipe, the first brass mouthpiece (1) serves as a steam outlet to connect a steam pipe or a steam nozzle.

10. A steam cleaning device equipped with the multiple-pipe instant heating type steam generator according to claim 8, wherein the first brass mouthpiece (1) serves as a water inlet to connect an inlet pipe, the second brass mouthpiece (7) serves as a steam outlet to connect a steam pipe or a steam nozzle.

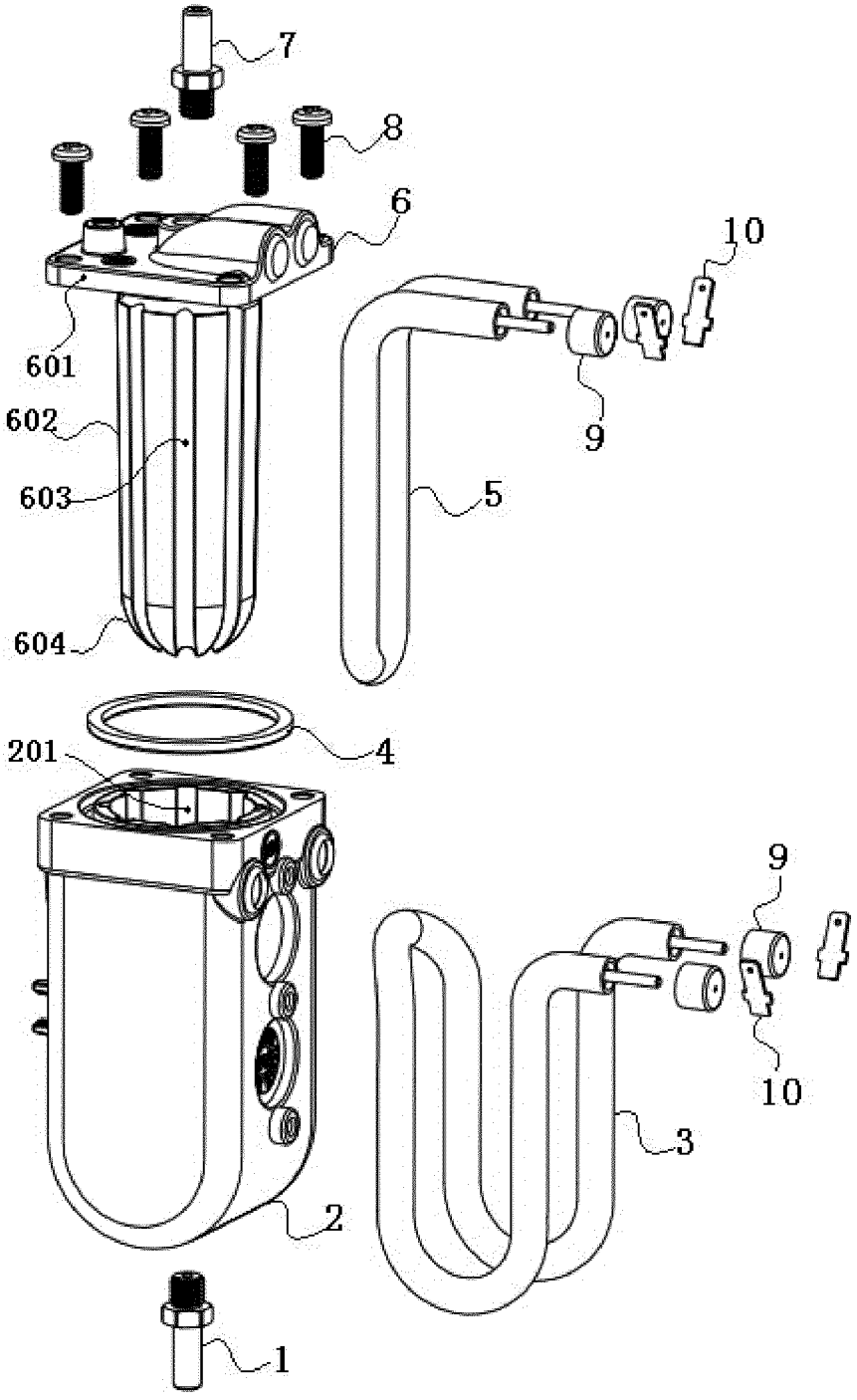

Figure 1

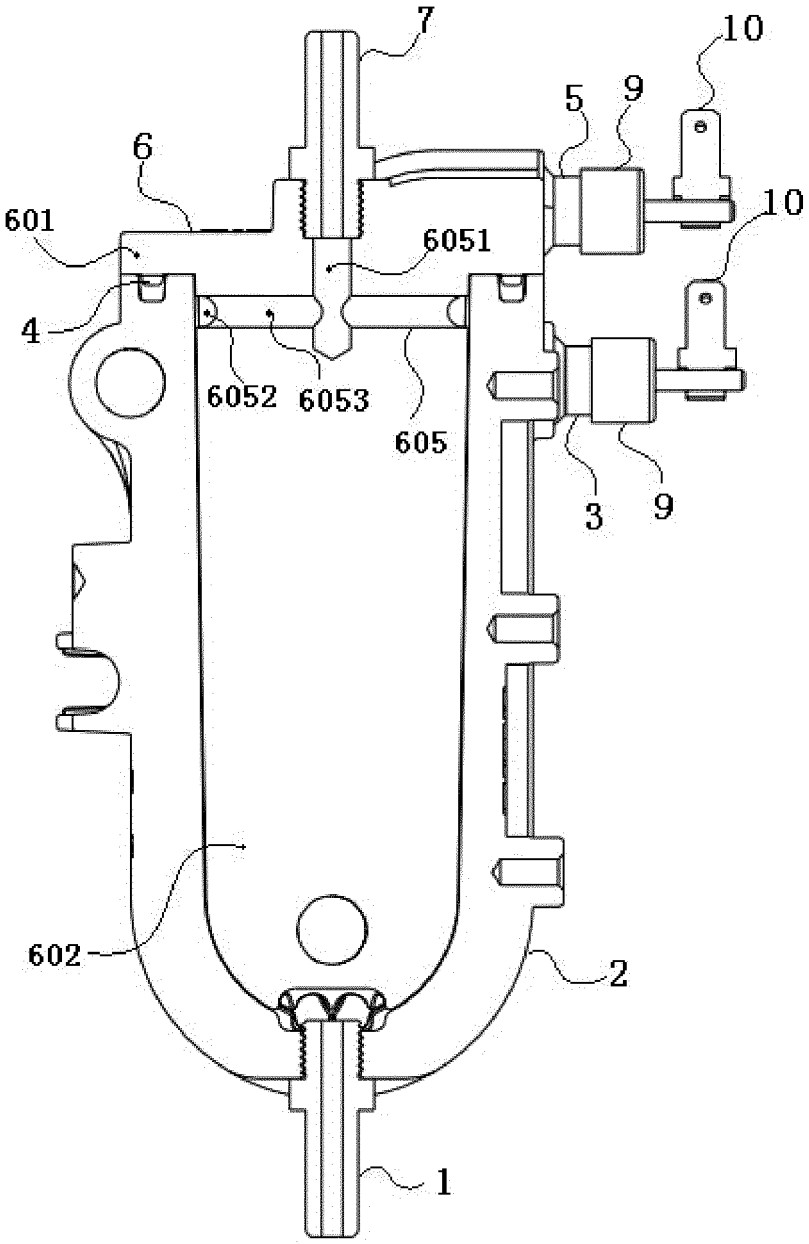

Figure 2

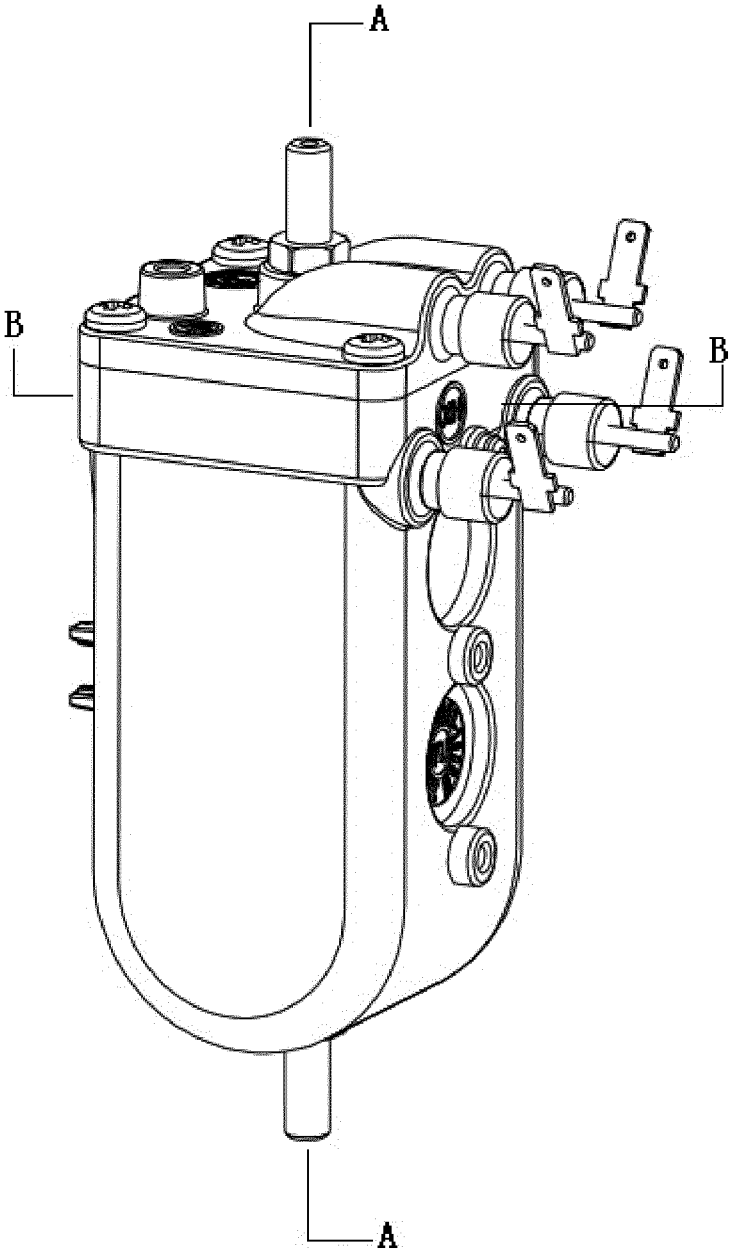

Figure 3

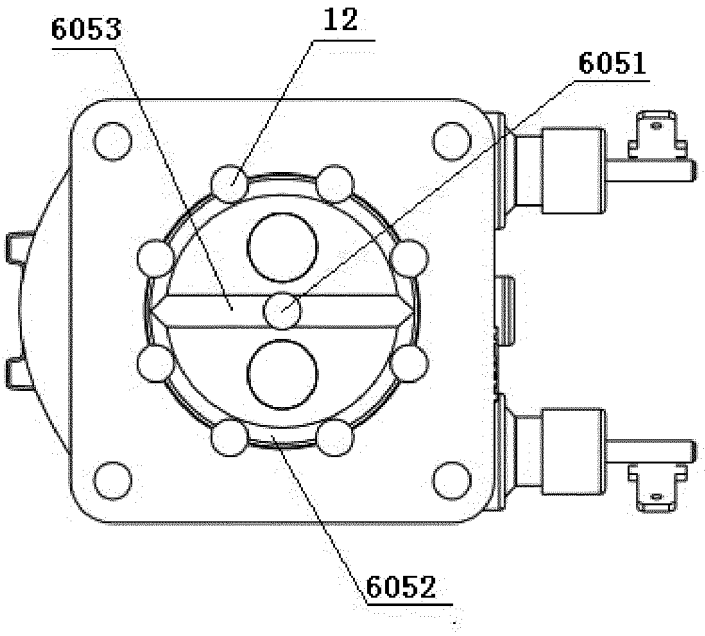

Figure 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/083397

A. CLASSIFICATION OF SUBJECT MATTER

F22B 1/28 (2006.01) i; B08B 3/02 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F22B 1; B08B 3; F23C 11

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, CPRS, CNKI: steam generator, liner, concave, groove, coil, heating pipe, evaporator?, passage?, heater?, nozzle, inlet, outlet, core

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 204693360 U (SUZHOU OS ELECTRIC CO., LTD.), 07 October 2015 (07.10.2015), claims 1-10	1-10
PX	CN 104832901 A (SUZHOU OS ELECTRIC CO., LTD.), 12 August 2015 (12.08.2015), claims 1-10	1-10
X	CN 2663806 Y (JIANG, Liyuan), 15 December 2004 (15.12.2004), description, page 2, line 13 to page 6, line 9, and figures 1-5	1-2, 4-10
A	US 4780076 A (ARKANSAS PATENTS INC.), 25 October 1988 (25.10.1988), the whole document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 August 2016 (05.08.2016)	**01 September 2016 (01.09.2016)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **HAN, Bing** Telephone No.: (86-10) **62084871**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/083397

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 204693360 U	07 October 2015	None	
CN 104832901 A	12 August 2015	None	
CN 2663806 Y	15 December 2004	None	
US 4780076 A	25 October 1988	None	

Form PCT/ISA/210 (patent family annex) (July 2009)