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(54) GAS APPLIANCE SYSTEM WITH DETECTION OF CORRECT INSTALLATION OF FLUE PIPE

(57) The present invention discloses a gas appliance system (100) including a gas appliance and a first flue pipe (21), wherein the gas appliance includes a housing (10), a control unit (15) disposed in the housing, and a flue hood (13) connected with the first flue pipe. The system further includes a switch assembly electrically connected with the control unit, and the switch assembly is activated when the first flue pipe is connected to the flue hood to a predetermined position. By employing the switch assembly electrically connected with the control unit, a reliable connection between the gas appliance and the flue pipe assembly can be always monitored and assured.

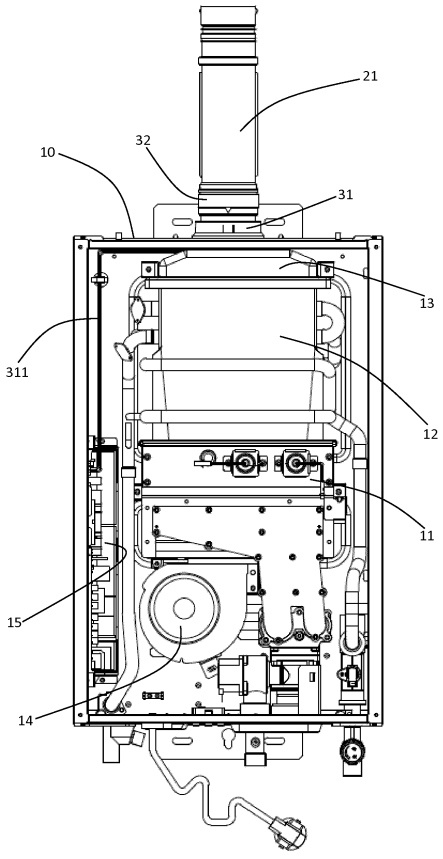

Fig. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of household gas appliance, and more particularly to a flue hood installation mechanism for gas appliance.

BACKGROUND OF THE INVENTION

[0002] Domestic gas appliances generally include gas water heaters, gas boilers, gas stoves and so on. A domestic gas appliance typically has a flue hood and a number of flue pipes connected with the flue hood for collecting combustion products (containing carbon monoxide and nitrogen oxides) of the gas appliance and exhausting them outside. The number of flue pipes are generally connected in series, and these pipes are produced in accordance with appropriate safety standards by recognized suppliers and properly assembled in users' home according to corresponding specifications. However, in consideration of cost, dealers may adopt non-standard pipes or hire workers without professional training to assemble the pipes, which may result in instability of the pipe connection and cause risks of gas leakage.

[0003] Chinese published patent application CN103615806A discloses flue pipes with electrical conductors. When the flue pipes are connected in series, the electrical conductors of each pipe are connected with each other and further electrically connected to a controller of a gas water heater. In this way, when there exists a mechanical connection problem of the flue pipes, the electrical connection of the conductors will be broken accordingly. Thus, the controller of the appliance will take certain security measures, such as stop running of the appliance.

[0004] Nevertheless, flue pipes are generally designed according to certain standard and each has a fixed length, thus on installation, the flue pipe assembly consists of a number of flue pipes chosen according to users' actual situation to form an appropriate overall length of the pipe assembly. However, due to actual situation of different users' home varies widely, usually some of flue pipes with the fixed length has to be cut short to adjust the overall length of the flue pipe assembly, obviously, this kind of length adjustment could not be applied to the flue pipe with an electrical conductor.

[0005] In the course of actual installation, a number of flue pipes are usually connected in series to form a flue pipe assembly, and then the flue pipe assembly is fixed to a wall, after that, the flue pipe assembly is connected to a flue hood of the gas appliance. As the possibility that the flue pipe assembly becomes loosen after being fixed to the wall is small, designers consider more about ensuring a reliable connection between the gas appliance and the flue pipe assembly.

SUMMARY OF THE INVENTION

[0006] It is an object of present invention to provide a gas appliance system that can detect a reliable connection between a gas appliance and a flue pipe assembly.

[0007] According to one aspect of the present invention there is provided a gas appliance system including a gas appliance and a first flue pipe, wherein the gas appliance includes a housing, a control unit disposed in the housing, and a flue hood connected with the first flue pipe. The system further comprises a switch assembly electrically connected with the control unit, and the switch assembly is activated when the first flue pipe is connected to the flue hood to a predetermined position.

[0008] Preferably, the switch assembly includes a proximity switch and a detector, wherein one of the proximity switch and the detector is fixed relative to the housing, and the other of the proximity switch and the detector is retained to the first flue pipe. In the course of the first flue pipe being connected to the flue hood, the proximity switch is activated when the detector approaches the proximity switch to a predetermined distance.

[0009] Preferably, the switch assembly includes a connecting ring encircling one end of the first flue pipe, and the flue hood is connected to the end of the first flue pipe, and the detector is disposed at the connecting ring. The switch assembly further includes a fixing ring retained to the housing and surrounding a part of the flue hood extending out of the housing, and the proximity switch is disposed at the fixing ring and electrically connected to the control unit via electrical wires.

[0010] Preferably, the connecting ring has a lug portion projecting radially from a main body thereof and extending vertically downward, and the detector is disposed in the lug portion. The fixing ring has a nose portion projecting radially from a main body thereof, and the proximity switch is disposed in the nose portion, and the nose portion further defines a groove therein. In the course of the first flue pipe being connected to the flue hood, the predetermined distance for the proximity switch to be activated is reached when the lug portion at least partially enters the groove of the nose portion.

[0011] In one embodiment, when the proximity switch is activated, the detector is located inside the groove.

[0012] In an alternative embodiment, when the proximity switch is activated, the detector is located outside the groove.

[0013] Preferably, the proximity switch includes a reed switch and the detector includes a main magnet.

[0014] In an alternative embodiment, the detector includes a main magnet, and the proximity switch includes a reed switch and an auxiliary magnet disposed beside the reed switch.

[0015] Preferably, the system further includes a second flue pipe connectible to the first flue pipe; wherein the first flue pipe includes a first pipe section, a second pipe section partially encircling the first pipe section, and a first positioning assembly disposed at a connection re-

gion of the first pipe section and the second pipe section for restricting the first pipe section to move along a specific direction with respect to the second pipe section.

[0016] Preferably, the first positioning assembly includes a guiding slot provided in a wall of the second pipe section, and a first positioning member disposed in the first pipe section, wherein the first positioning member has a first protrusion protruding into the guiding slot, thereby restricting the first pipe section to move along the specific direction with respect to the second pipe section.

[0017] In one embodiment, the first positioning member is configured to fit with an inner wall of the first pipe section.

[0018] Preferably, the first positioning member takes form of an arc-shaped elastic sheet, and the first protrusion is formed on the elastic sheet and protrudes radially outwardly, and the first protrusion has a part further protruding into the guiding slot of the second pipe section under the effect of the elastic force of the elastic sheet.

[0019] In an alternative embodiment, the first positioning member includes a longitudinally extending tubular body and a first spring located inside the tubular body in a compressed state; wherein the tubular body has an opening defined at an longitudinal end thereof, and the first protrusion has a bottom portion located in the tubular body elastically pressed by the first spring and a head portion protruding through the opening and entering the guiding slot of the second pipe section.

[0020] Compared with the state of art, the present invention has the advantages that: a switch assembly is employed for detecting whether the first flue pipe and the flue hood are correctly and reliably connected; wherein the switch assembly is electrically connected with the control unit, when the first flue pipe is connected to the flue hood to a predetermined position, the switch assembly is activated, then the control unit can get to know that a reliable connection between the gas appliance and the flue pipe assembly has achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] For a more complete understanding of the present invention, and the advantages thereof, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a schematic plan view of a gas appliance system including a gas appliance and a flue pipe assembly in accordance with one embodiment of present invention;

Fig. 2 is a schematic plan view of the gas appliance system shown in Fig. 1, wherein a front cover of the gas appliance is removed to show the internal structure of the gas appliance;

Fig. 3 is an exploded perspective view of the gas appliance system shown in Fig. 2;

Fig. 4 is a schematic side cross-sectional view of the gas appliance system shown in Fig. 1;

Fig. 5 is similar to Fig. 4, showing a schematic side cross-sectional view of a gas appliance system in accordance with another embodiment of present invention;

Fig. 6 is a schematic cross-sectional view of part of a flue pipe assembly of the gas appliance system shown in Fig. 1, in which a first flue pipe and a second flue pipe are connected together;

Fig. 7 is similar to Fig. 6, in which the first flue pipe and the second flue pipe are separated from each other;

Fig. 8A is a schematic perspective view of the first flue pipe shown in Figs. 6 and 7;

Fig. 8B is a schematic cross-sectional view of the first flue pipe shown in Fig. 8A taking along an axial direction;

Fig. 9A is a schematic perspective view of the first flue pipe shown in Fig. 8A after being stretched;

Fig. 9B is a schematic cross-sectional view of the first flue pipe shown in Fig. 9A taking along the axial direction;

Fig. 10 is a schematic perspective view of a second positioning member in the flue pipe assembly shown in Fig. 6;

Fig. 11 is a schematic perspective view of a first positioning member in the flue pipe assembly shown in Fig. 6;

Fig. 12 is similar to Fig. 8B, which shows a schematic cross-sectional view of a first flue pipe taking along the axial direction in accordance with an alternative embodiment of present invention;

Fig. 13 is a schematic perspective view of a first positioning member in the first flue pipe shown in Fig. 12;

Fig. 14 is a schematic perspective view of a second positioning member in the first flue pipe shown in Fig. 12.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Reference will now be made to the drawing figures to describe the preferred embodiments of the present invention in detail. However, the embodiments can not be used to restrict the present invention. Changes such as structure, method and function obviously made to those of ordinary skill in the art are also protected by the present invention.

[0023] As shown in Fig. 1 and Fig. 2, the gas appliance system 100 includes a gas water heater, and the gas water heater discharges flue gas through a flue pipe assembly composed by a number of flue pipes. The gas water heater includes a housing 10, a burner 11 for combustion of mixture of gas and air, a heat exchanger 12, a flue hood 13, a fan 14, and a control unit 15. The burner 11, the heat exchanger 12, the flue hood 13, the fan 14, and the control unit 15 are all contained in the housing

10. The heat generated by the combustion of the burner 11 is absorbed by water flowing through the heat exchanger 12, and the flue gas generated by the combustion is driven by the fan 14 and collected by the flue hood 13, the flue gas is further discharged through the pipe assembly connected with the flue hood 13. The control unit 15 is electrically connected with electrical components contained in the housing 10 for detecting operating parameters of the gas water heater and controlling the operation of the water heater in accordance with the detected parameters. The control unit 15 may be a logic control circuit in which a number of electronic components are connected in a certain wiring manner, or may incorporate a microcontroller (MCU) which stores program instructions, or may be an integrated chip with a proprietary use, such as Field-Programmable Gate Array (FPGA), etc.. Since the construction and working principle of the gas water heater are well known to those skilled in the art, the applicant will not describe them in details here.

[0024] With reference to Figs. 3 and 4, the flue pipe assembly includes a number of flue pipes connected in series, and the flue pipe may be a straight pipe, such as a first flue pipe 21, or an elbow pipe, such as a second flue pipe 22. Wherein the flue hood 13 has a part extending out of a top of the housing 10, and the first flue pipe 21 is connected with the exposed part of the flue hood 13. Of course, in other embodiments, the second flue pipe 22 may also be directly connected with the flue hood 13. A switch assembly is electrically connected with the control unit 15 for detecting whether the first flue pipe 21 and the flue hood 13 are correctly and reliably connected, that is, the switch assembly is activated when the first flue pipe 21 is connected to the flue hood 13 to a predetermined position. The switch assembly may use a mechanical contact switch or a non-contact switch, preferably a non-contact proximity switch. Specifically, the switch assembly may include a proximity switch and a detector, wherein one of the proximity switch and the detector is fixedly disposed relative to the housing 10, and the other of the proximity switch and the detector is retained to the first flue pipe 21. In the course of connecting the first flue pipe 21 and the flue hood 13, when the detector approaches to the proximity switch to a predetermined distance, which means the first flue hood 21 is connected with the flue hood 13 to a right position where a reliable connection can be assured, at this time, the proximity switch is activated. For example, the proximity switch that is normally in an open state is triggered to be closed, so that the control unit 15 can know that the first flue pipe 21 and the flue hood 13 are reliably connected, then shows relevant confirmation message through a display module. Conversely, once the connection between the first flue pipe 21 and the flue hood 13 causes a problem and the proximity switch is turned off, the control unit 15 will be reported and show the related fault message through the display module.

[0025] In the embodiment as shown in Fig. 3 and Fig. 4, the switch assembly includes a connecting ring 32 encircling one end 210 of the first flue pipe 21, and the flue hood 13 is connected to the end of the first flue pipe 21. The connecting ring 32 has a lug portion 34 projecting radially from a main body thereof and extending vertically downward, and the detector is received in the lug portion 34. The switch assembly also includes a fixing ring 31 retained to the housing 10 and surrounding a part of the flue hood 13 extending out of the housing. The fixing ring 31 has a nose portion 33 projecting radially from an outer surface of its main body. The proximity switch is disposed in a receiving portion 331 provided at one side of the nose portion 33, and is electrically connected with the control component 15 through electrical wires 311. A groove 332 is defined in the other side of the nose portion 33. During the connection of the first flue pipe 21 and the flue hood 13, the predetermined distance for the proximity switch to be activated is reached when the lug portion 34 at least partially enters the groove 332. In this embodiment, the proximity switch includes a reed switch 3311 which is disposed on a circuit board. The electrical wires 311 are led out from the circuit board and connected to the control unit 15. The detector includes a main magnet 341, which can utilize common magnetic material, such as a ferrite magnet. When the main magnet 341 approaches the reed switch 3311 to a predetermined distance, the originally separated two magnetic reeds (not shown) in the reed switch 3311 are attracted by the magnetic field, so that the circuit is turned on, which is detected by the control unit 15 and the control unit 15 comes to know that the first flue pipe 21 and the flue hood 13 are reliably connected.

[0026] Refer to Fig. 4, in this embodiment, after the first flue pipe 21 is installed to the flue hood 13 to the predetermined position, the lug portion 34 partially enters the groove 332 of the nose portion 33, however the main magnet 341 is positioned outside of the groove 332, and the distance from the main magnet 341 to the reed switch 3311 may exceed 10 mm. In order to ensure that the reed switch 3311 can be activated at this time, an auxiliary magnet 3312 is provided in the receiving portion 331 of the nose portion 33 and beside the reed switch 3311 for reducing the pull-in value of the reed switch 3311, i.e., increasing the sensitivity of the reed switch. In other words, although the main magnet 341 is a little bit farther away from the reed switch 3311, the magnetic reeds within the reed switch 3311 can also be attracted with the assistance of the auxiliary magnet 3312. Of course, in other embodiments, the main magnet 341 may also utilize strong magnetic material, such as a neodymium-iron-boron magnet, so that the reed switch can be closed without the auxiliary magnet even if the main magnet is a biter far away from the reed switch. As shown in Fig. 5, in another embodiment, an elbow-type flue pipe, such as a second flue pipe 22, may be directly connected with the flue hood 13. At this time, the lug portion 34 of the connecting ring can extend completely into the grove 332 of the nose portion of the fixing ring, and the main magnet

341 is located completely inside the groove 332. Since the main magnet 341 is positioned so close to the reed switch 3311, which can cause the reed switch to be activated without the auxiliary magnet. The term "second flue pipe" is mainly used to distinguish it from the "first flue pipe" in this invention, but it does not specifically refer to any specific flue pipe, like a straight pipe or an elbow pipe, that is, the first flue pipe 21 mentioned in above embodiments can be also called "second flue pipe" in other embodiments, vice versa.

[0027] Once the first flue pipe 21 and the flue hood 13 are unintentionally released, the distance between the main magnet 341 and the reed switch 3311 increases, which causes the magnetic field applied to the reeds to be removed. Under the action of the elastic restoring force of the reeds, the reeds return to their original position, which results in the reed switch open, thereby breaking the electric circuit, then the control unit 15 detects the broken of the circuit and executes the corresponding measures. In the above embodiments, the reed switch is examplified to illustrate the application of the proximity switch. However, in other embodiments, the proximity switch may take other forms, such as an eddy current proximity switch, a capacitive proximity switch, a hall proximity switch, or a photoelectric proximity switch, and so on. Since these types of proximity switch are all well known to those skilled in the art, and no creative work is needed to apply these types of proximity switch to the present invention with reference to the example of reed switch as described above, so the applicant will not describe them in details here.

[0028] Refer to Figs. 6 to 11, the first flue pipe 21 and the second flue pipe 22 may be connected in an axial direction of the first flue pipe. The first flue pipe 21 has a first pipe section 211 and a second pipe section 212 partially encircling the first pipe section. The first pipe section 211 and the second pipe section 212 are relatively movable in the axial direction, so as to make the total length of the first and the second flue pipes adjustable. A first positioning assembly is disposed at a connection region of the first pipe section 211 and the second pipe section 212 to restrict the first pipe section 211 to move along the specific direction with respect to the second pipe section.

[0029] The first positioning assembly includes a guiding slot disposed in the circumferential wall of the second pipe section 212. In a specific embodiment, an axially extending rib 2121 is stamped from the circumferential wall of the second pipe section 212, and the guiding slot is defined in the rib 2121. The first positioning assembly further includes a first positioning member 41 disposed and extending radially in the first pipe section 211. The first positioning member 41 includes a longitudinally extending tubular body and a first spring 412 located inside the tubular body in a compressed state. The tubular body has an opening defined at a longitudinal end thereof. A first protrusion 411 protrudes outside of the first pipe section 211 radially, and it has a bottom portion located in the tubular body elastically pressed by the first spring 412 and a head portion protruding through the opening and entering the guiding slot of the second pipe section 212. When there is a need for adjusting the length of the flue pipe, the first pipe section 211 and the second pipe section 212 are pulled in opposite directions, and with the engagement between the first protrusion 411 of the first positioning element located in the first pipe section 211 and the guiding slot defined in the second pipe section 212, the first pipe section 211 moves in the axial direction with respect to the second pipe section 212. With reference to Fig. 11, the first protrusion 411 has a vertical side, by this means, when the first protrusion 411 moves to the end of the guiding slot of the second pipe section 212, the vertical side of the first protrusion 411 abuts against the end of the slot, thereby restricting further movement of the first pipe section 211 with respect to the second pipe section 212 to avoid a separation of the first and the second pipe sections.

[0030] A second positioning assembly is provided in the connection area of the first flue pipe 21 and the second flue pipe 22. The second positioning assembly includes a second positioning member 42 extending radially inside one of the first flue pipe 21 and the second flue pipe 22. The second positioning member 42 has a second protrusion 421 protruding out of the circumferential wall of the flue pipe. The other of the first flue pipe 21 and the second flue pipe 22 is provided at the connection area a bulge 221 encircling its end. As shown in Fig. 6, Fig. 7 and Fig. 10, in a specific embodiment, the second positioning member 42 includes a longitudinally extending tubular body and a second spring 422 located in the tubular body in a compressed state. The tubular body is provided with a conical recess 423 at a longitudinal end thereof. The second protrusion 421 has a bottom located in the tubular body and elastically pressed by the second spring 422, and a head protrudes out of the conical recess 423. When assembling the first flue pipe 21 and the second flue pipe 22, the second protrusion 421 located in the first flue pipe 21 is manually pressed and retracted into the pipe body of the second positioning member 42, then, the second flue pipe 22 is sleeved onto the first flue pipe 21 and further axially moved with respect to the first flue pipe 21 until the second protrusion 421 enters into the bulge 221 of the second flue pipe. At this time, the first flue pipe and the second flue pipe are completely connected, and the first and the second flue pipes will not become loose due to the interference of the second protrusion 421 and the inner wall of the bulge 221. In a preferred embodiment, the second protrusion 421 of the second positioning member has an arc-shaped portion protruding out of the outer surface of the first flue pipe 21. With this structure, when the first and second flue pipes 21 and 22 are pulled with greater force to move in opposite directions, the second protrusion 421 will be pressed radially into the tubular body of the second positioning member 42 by the inner wall of the bulge 221, and passes through the end of the second flue pipe 22

and then comes out of the second flue pipe 22. In this way, the first and the second flue pipes 21, 22 can be disassembled, thereby facilitating the maintenance and replacement of the flue pipes.

[0031] With reference to Figs. 12 to 14 that show an alternative embodiment. Similar to the aforementioned embodiments, the first flue pipe 21 has a first pipe section 211 and a second pipe section 212 partially encircling the first pipe section. The first pipe section 211 can move with respect to the second pipe section 212 in an axial direction thereof, so that the total length of the first and the second flue pipes can be adjusted. A first positioning assembly is disposed at a connection region of the first pipe section 211 and the second pipe section 212 to restrict the first pipe section 211 to move with respect to the second pipe section 212 in a specific direction.

[0032] The first positioning assembly includes a guiding slot provided in a wall of the second pipe section 212. The second pipe section 212 is provided with a rib 2121 stamped from the wall thereof extending in the axial direction. The guiding slot is defined in the rib 2121. In this embodiment, there are two guiding slots, which are symmetrically distributed on the wall of the second pipe section 212 along the central axis of the second pipe section 212. The first positioning assembly further includes a first positioning member 45 disposed in the first pipe section 211. As shown in Fig. 13, the first positioning member 45 takes form of an arc-shaped elastic sheet, preferably, the elastic sheet is in C-shaped, and its arc surface can fit well with an inner wall of the first pipe section 211. This elastic sheet can be made of 304 stainless steel (SUS304), and it can be made to have good elasticity by heat treatment after being molded, in this way, it can be restored to its original shape even after being largely elastically deformed. The elastic sheet 452 has an arc-shaped body 4521, a pair of end portions 4522 at both ends of the body, and a recess 4523 provided near each end portion. The purpose of the recess 4523 is to facilitate a clamp (not shown) to hold the elastic sheet when the first positioning member 45 is assembled into the first pipe section 211.

[0033] The first positioning member 45 further includes two first protrusions 451 formed on the body 4521 of the elastic sheet and distributed near the opposite end portions 4522. After the first pipe section 211 and the second pipe section 212 are being connected, the first protrusion 451 protrudes out of the outer wall of the first pipe section 211 and further enters into the guiding slot of the second pipe section 212 under the elastic force of the elastic sheet. When the total length of the flue pipes needs to be adjusted, the first pipe section 211 and the second pipe section 212 are pulled in opposite directions, with the engagement of the first protrusion 451 of the first positioning member in the first pipe section 211 and guiding slot defined in the second pipe section 212, the first pipe section 211 is limited to move in the axial direction with respect to the second pipe section 212. Refer to Fig. 13, the first protrusion 451 has a vertical side, with this structure, when the first protrusion 451 is moved to the end of the guide slot of the second pipe section 212, the vertical side of the first protrusion abuts against the end of the guiding slot, thereby restricting further movement of the first pipe section 211 relative to the second pipe section 212 to avoid a separation thereberween.

[0034] A second positioning assembly is provided in the connection area of the first flue pipe 21 and the second flue pipe 22. The second positioning assembly includes a second positioning member 46 disposed inside one of the first flue pipe 21 and the second flue pipe 22. The second positioning member 46 has a second protrusion 461 protruding out of the circumferential wall of the flue pipe. The other of the first flue pipe 21 and the second flue pipe 22 is provided at the connection area a bulge 221 encircling its end (with reference to Figs. 6 and 7). As shown in Fig. 14, in this embodiment, the second positioning member 46 has a configuration quite similar to that of the first positioning member 45. The second positioning member 46 is an arc-shaped elastic sheet that can fit well with the inner wall of the flue pipes. The elastic sheet 462 has an arc-shaped body 4621, a pair of end portion 4622 at both ends of the body, and a pair of recesses 4623 disposed near the end portions 4622.

[0035] The second positioning member 46 also includes two second protrusions 461 disposed on the body 4621 of the elastic sheet and distributed near the opposite end portions 4522. After the first flue pipe 21 and the second flue pipe 22 are completely connected, the first flue pipe 21 and the second flue pipe 22 will not become loose due to the interference of the second protrusion 461 and the inner wall of the bulge 221. In a preferred embodiment, the second protrusion 461 of the second positioning member has an arc-shaped portion protruding into the bulge 221. By this means, when the first and second flue pipes 21 and 22 are pulled with greater force to move in opposite directions, the second protrusion 461 will be pressed radially into the pipe body of the flue pipe where the second positioning member 46 is located by the inner wall of the bulge 221, and finally comes out of the second flue pipe 22. Thus, the first and the second flue pipes 21, 22 can be disassembled, thereby facilitating the maintenance and replacement of the flue pipes.

[0036] Compared with the foregoing embodiment as shown in Figs. 6 to 11, since the first and second positioning members can both fit well with the inner wall of the flue pipes, it is convenient for users or maintenance people to regularly use tools to extend into the flue pipes to clean the inner walls of the pipes.

[0037] It is to be understood, however, that even though numerous, characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosed is illustrative only, and changes may be made in detail, especially in matters of number, shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broadest general meaning of the terms in which

the appended claims are expressed.

Claims

1. A gas appliance system (100) comprising a gas appliance and a first flue pipe (21), wherein the gas appliance comprises a housing (10), a control unit (15) disposed in the housing, and a flue hood (13) connected with the first flue pipe (21); **characterized in that** the system further comprises a switch assembly electrically connected with the control unit (15), and said switch assembly is activated when the first flue pipe (21) is connected to the flue hood (13) to a predetermined position.

2. A gas appliance system according to claim 1, **characterized in that** the switch assembly includes a proximity switch and a detector, wherein one of said proximity switch and said detector is fixed relative to the housing (10), and the other of said proximity switch and said detector is retained to the first flue pipe (21); in the course of the first flue pipe being connected to the flue hood, the proximity switch is activated when the detector approaches the proximity switch to a predetermined distance.

3. A gas appliance system according to claim 2, **characterized in that** the switch assembly comprises a connecting ring (32) encircling one end of the first flue pipe (21), and the flue hood (13) is connected to said end of the first flue pipe, and the detector is disposed at the connecting ring; the switch assembly further comprises a fixing ring (31) retained to the housing and surrounding a part of the flue hood (13) extending out of the housing, and the proximity switch is disposed at the fixing ring (31) and electrically connected to the control unit (15) via electrical wires.

4. A gas appliance system according to claim 3, **characterized in that** the connecting ring has a lug portion (34) projecting radially from a main body thereof and extending vertically downward, and the detector is disposed in said lug portion; the fixing ring has a nose portion (33) projecting radially from a main body thereof, and the proximity switch is disposed in the nose portion, and the nose portion further defines a groove (332) therein; in the course of the first flue pipe being connected to the flue hood, said predetermined distance for the proximity switch to be activated is reached when the lug portion (34) at least partially enters said groove (332) of the nose portion.

5. A gas appliance system according to claim 4, **characterized in that** when the proximity switch is activated, the detector is located inside said groove.

6. A gas appliance system according to claim 4, **characterized in that** when the proximity switch is activated, the detector is located outside said groove.

7. A gas appliance system according to claim 2, 3, 4, or 5, **characterized in that** the proximity switch comprises a reed switch (3311) and the detector comprises a main magnet (341).

8. A gas appliance system according to claim 2, 3, 4, or 6, **characterized in that** the detector comprises a main magnet (341), and the proximity switch comprises a reed switch (3311) and an auxiliary magnet (3312) disposed beside the reed switch.

9. A gas appliance system according to claim 1, **characterized in that** the system further comprises a second flue pipe (22) connectible to the first flue pipe (21); wherein the first flue pipe comprises a first pipe section (211), a second pipe section (212) partially encircling the first pipe section, and a first positioning assembly disposed at a connection region of the first pipe section and the second pipe section for restricting the first pipe section to move along a specific direction with respect to the second pipe section.

10. A gas appliance system according to claim 9, **characterized in that** the first positioning assembly comprises a guiding slot provided in a wall of the second pipe section (212), and a first positioning member (41, 45) disposed in the first pipe section (211), wherein the first positioning member has a first protrusion (411, 451) protruding into the guiding slot, thereby restricting the first pipe section to move along the specific direction with respect to the second pipe section.

11. A gas appliance system according to claim 10, **characterized in that** the first positioning member (45) is configured to fit with an inner wall of the first pipe section.

12. A gas appliance system according to claim 11, **characterized in that** the first positioning member (45) takes form of an arc-shaped elastic sheet, and the first protrusion (451) is formed on said elastic sheet and protrudes radially outwardly, and the first protrusion has a part further protruding into the guiding slot of the second pipe section (212) under the effect of the elastic force of said elastic sheet.

13. A gas appliance system according to claim 10, **characterized in that** the first positioning member (41) comprises a longitudinally extending tubular body and a first spring (412) located inside the tubular body in a compressed state; wherein the tubular body has an opening defined at an longitudinal end thereof, and the first protrusion (411) has a bottom

portion located in the tubular body elastically pressed by the first spring and a head portion protruding through the opening and entering the guiding slot of the second pipe section (212).

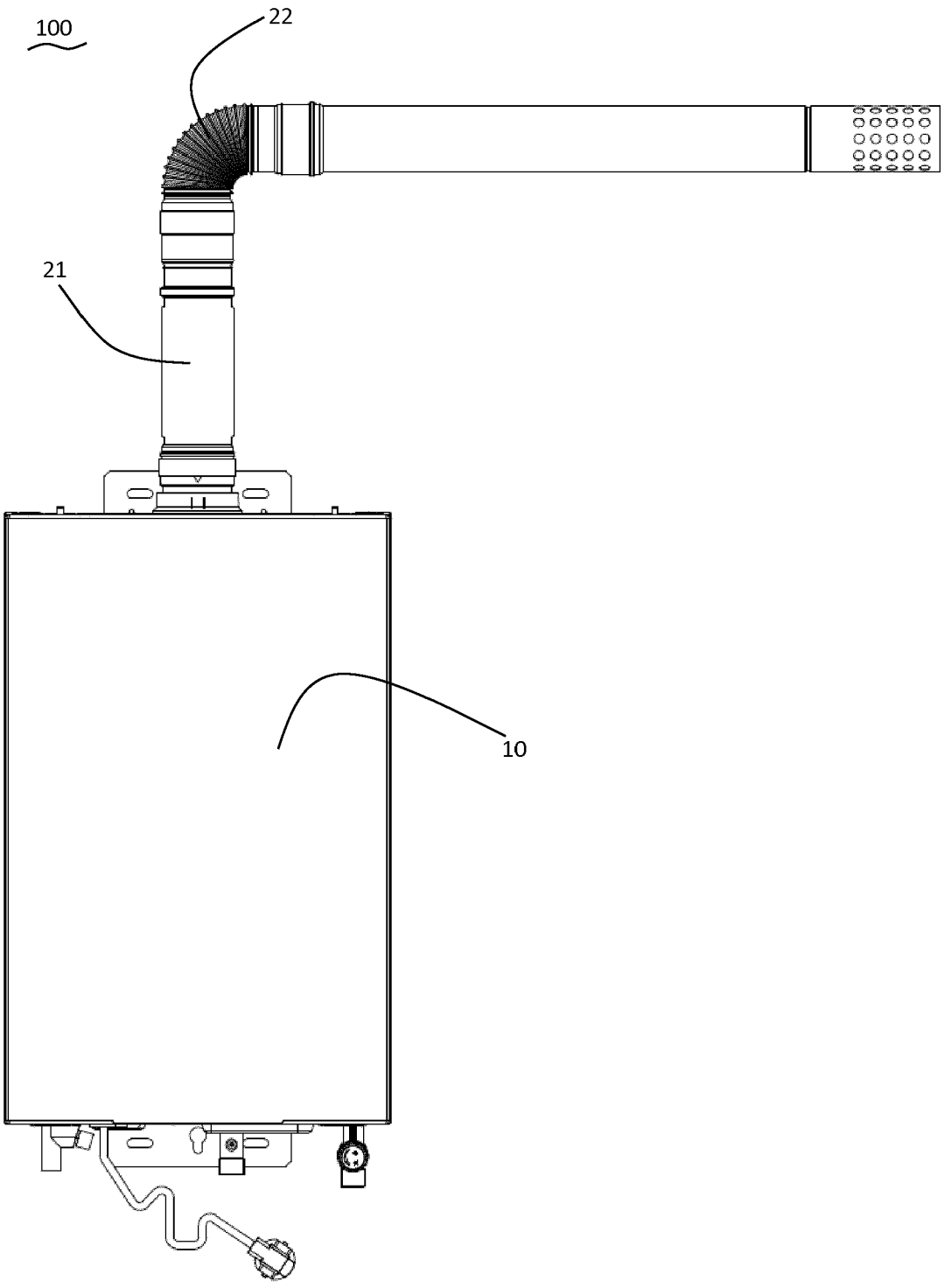


Fig. 1

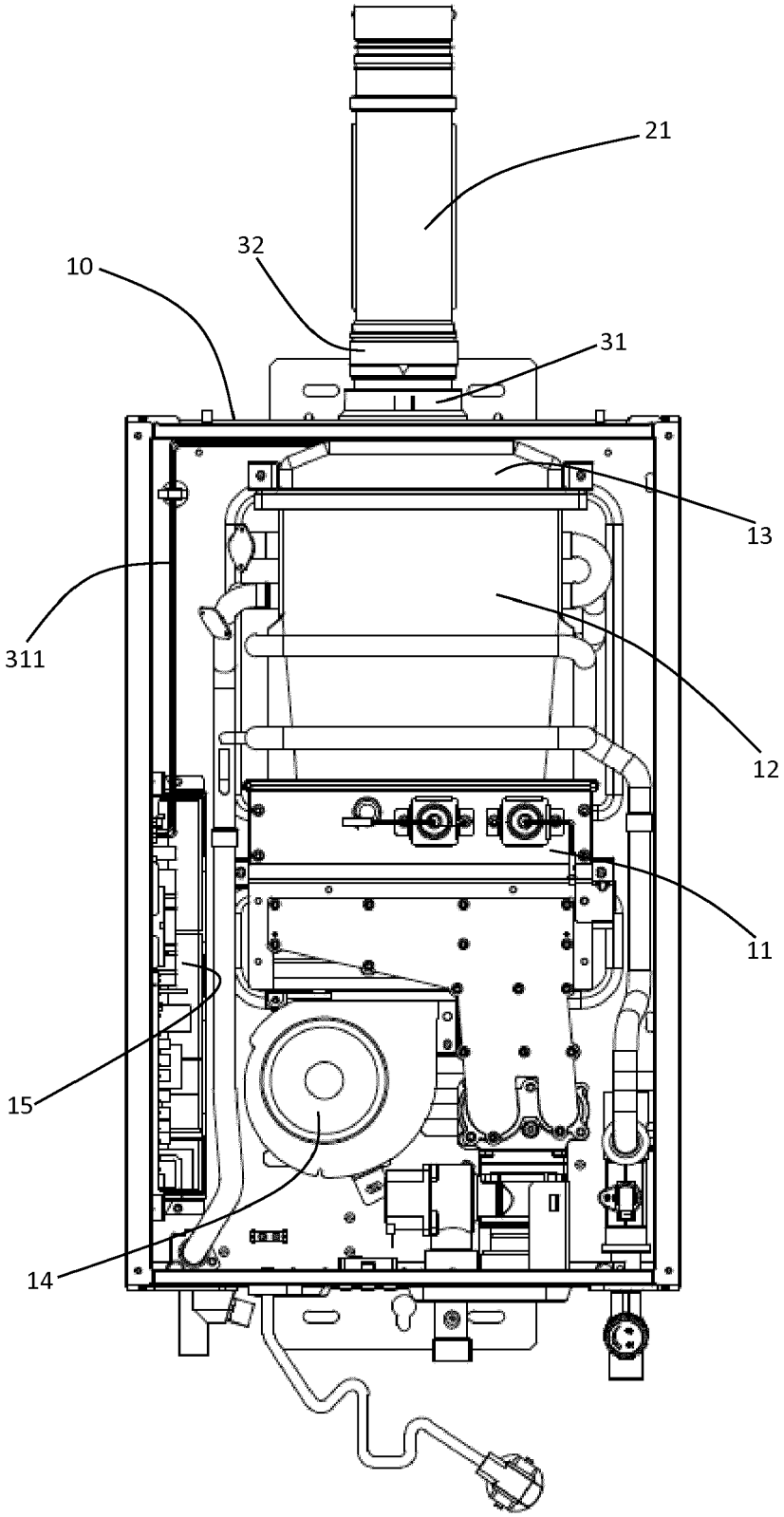


Fig. 2

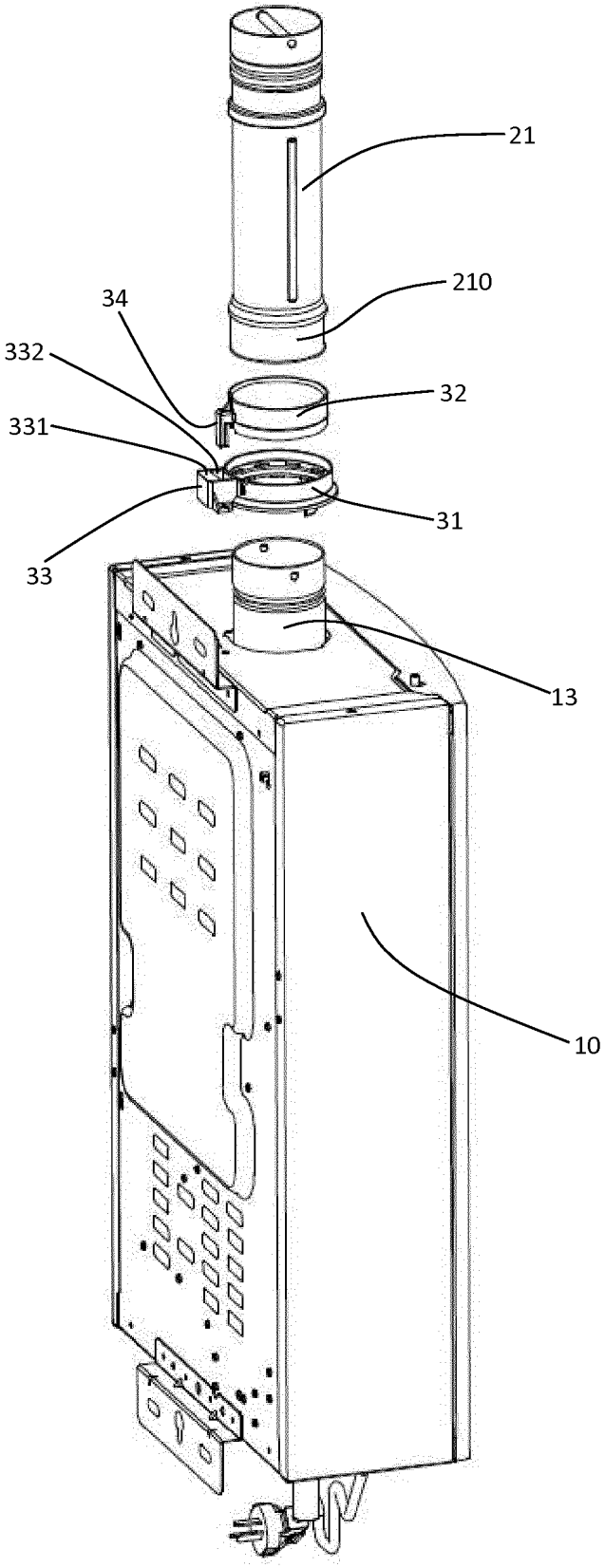


Fig. 3

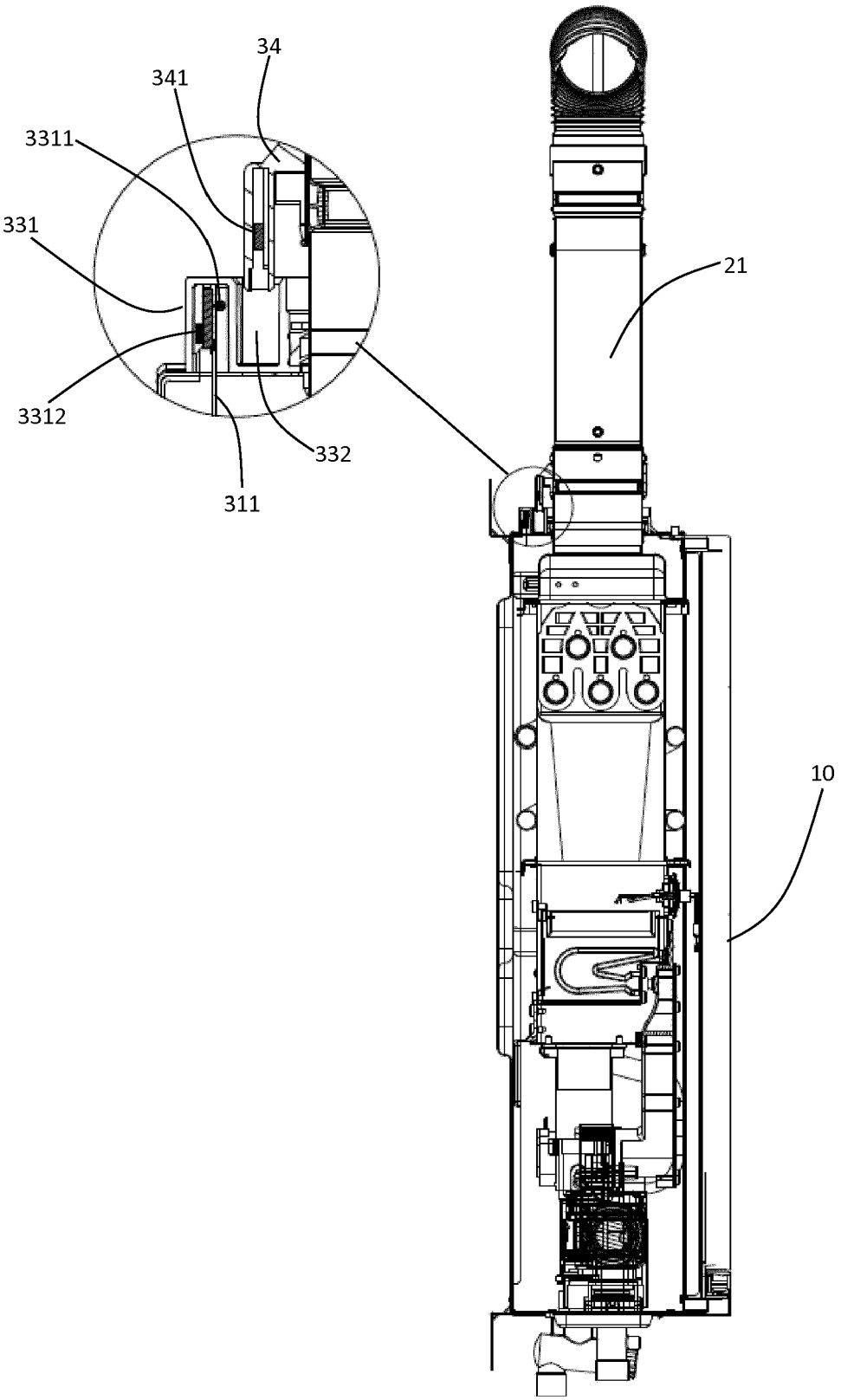


Fig. 4

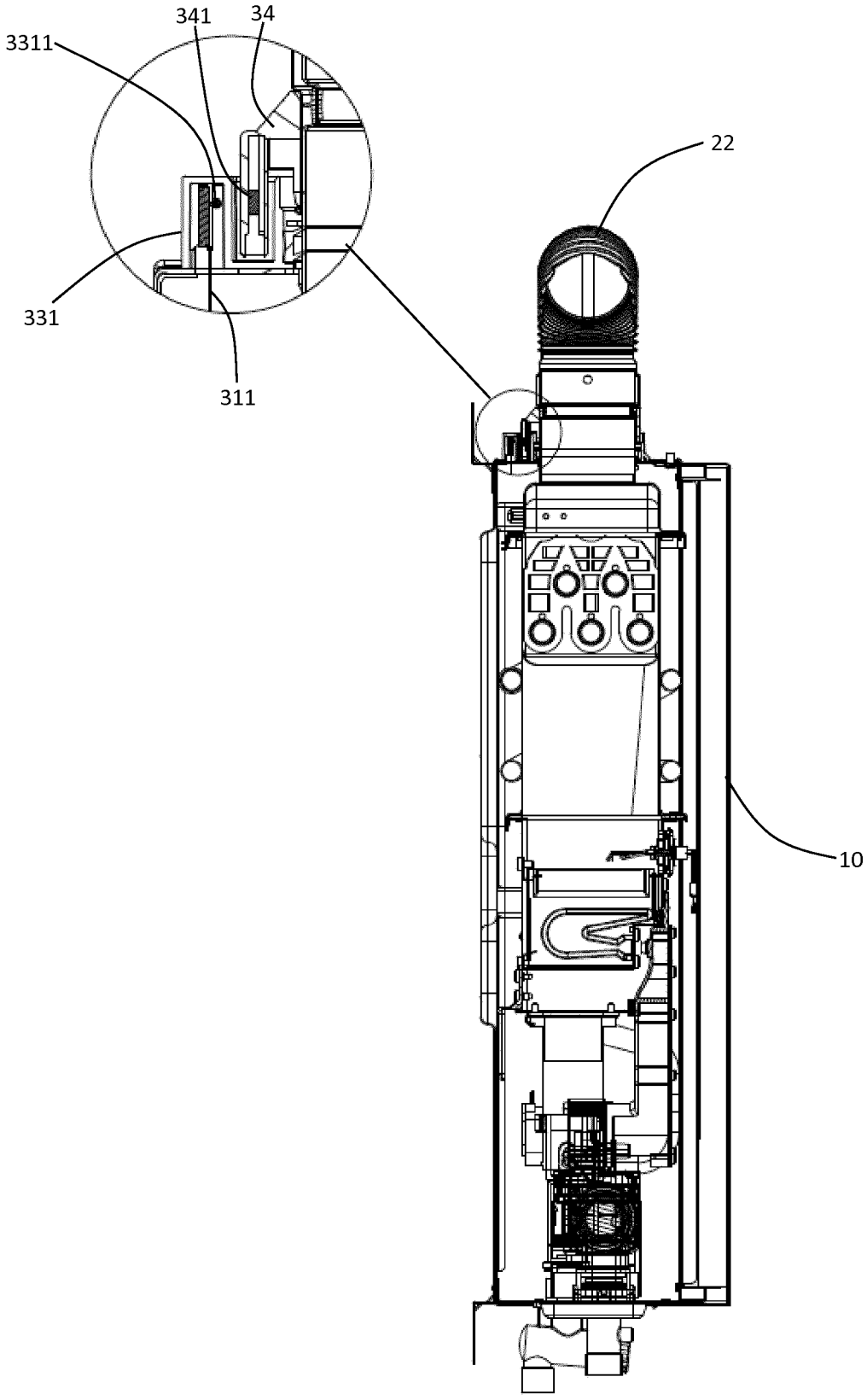


Fig. 5

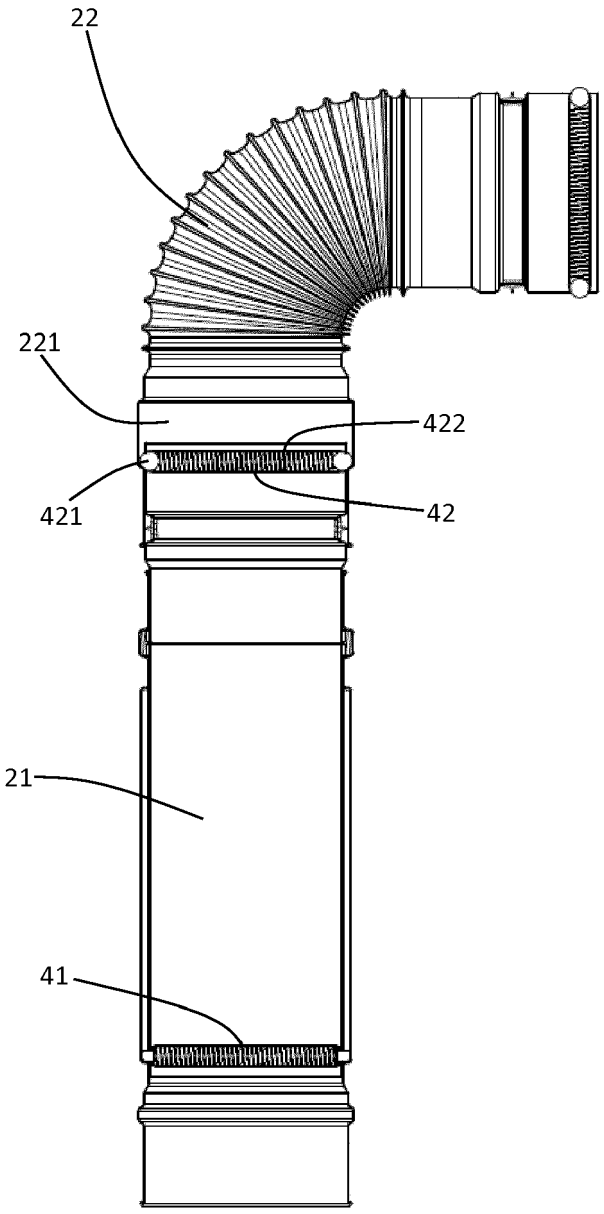


Fig. 6

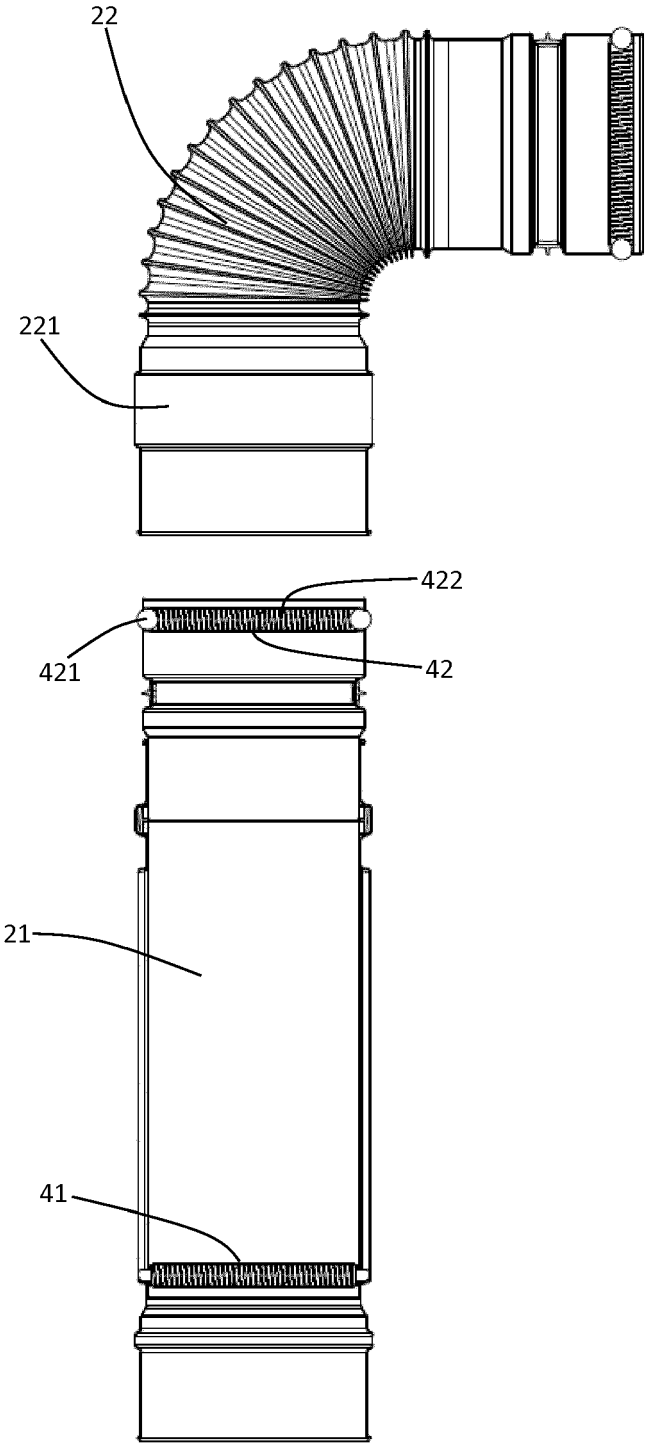


Fig. 7

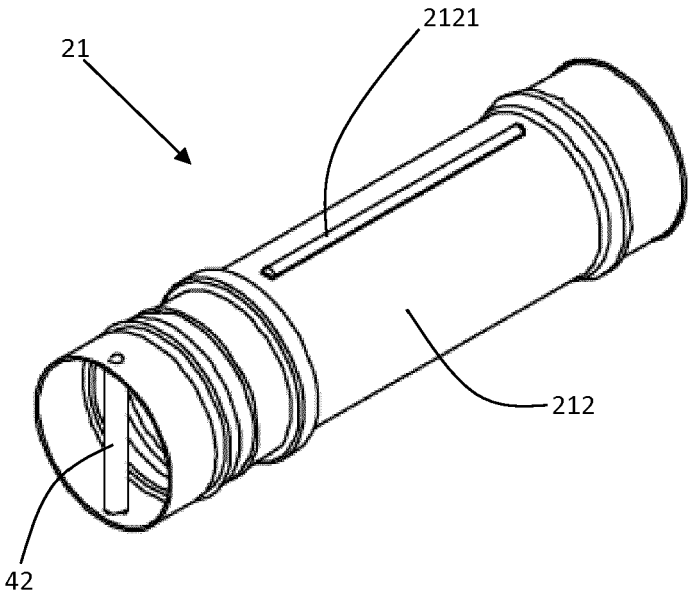


Fig. 8A

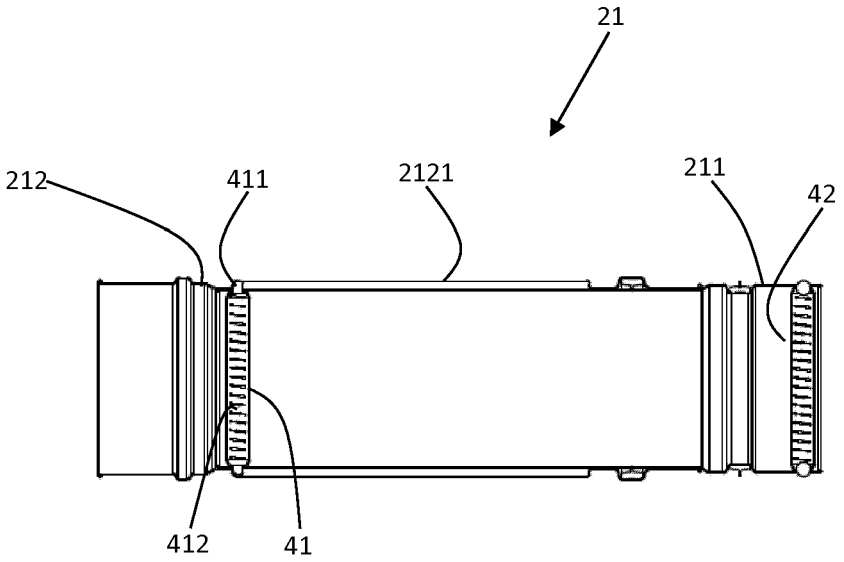


Fig. 8B

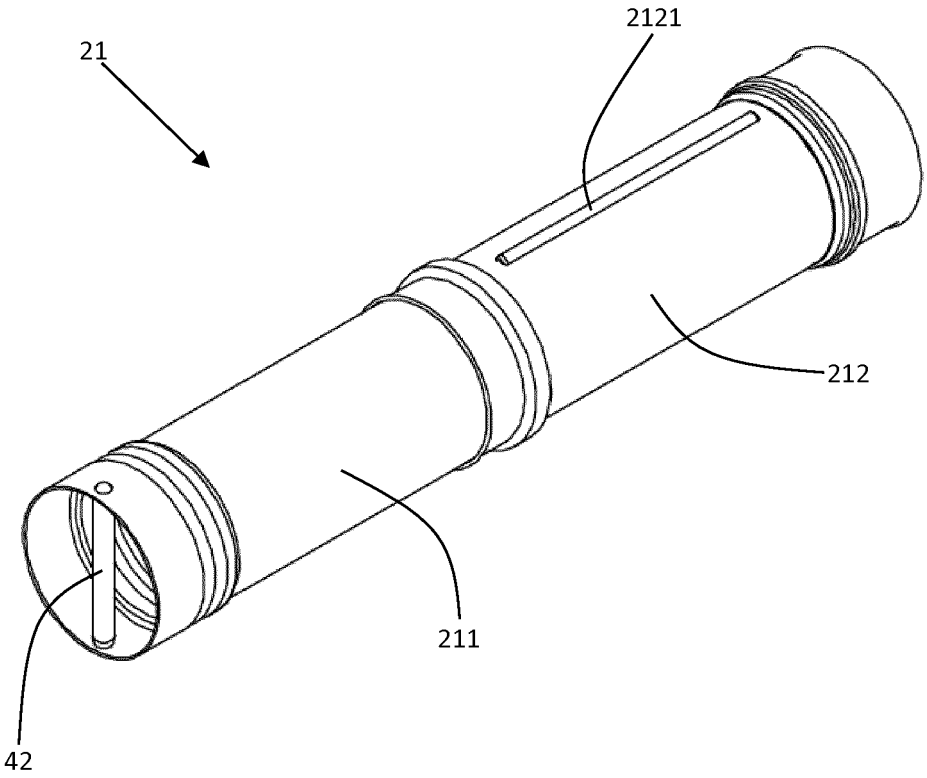


Fig. 9A

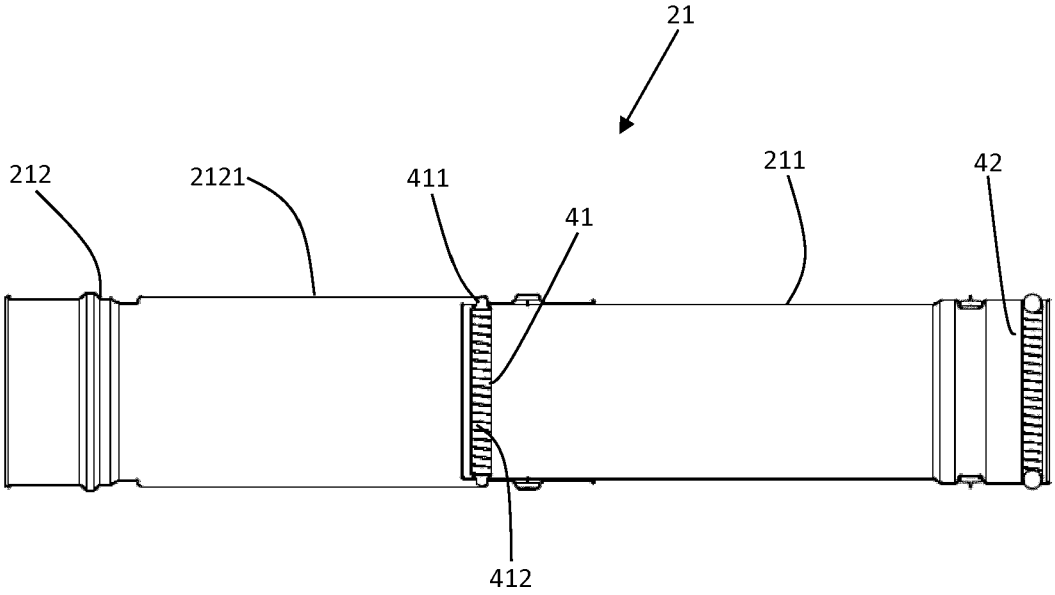


Fig. 9B

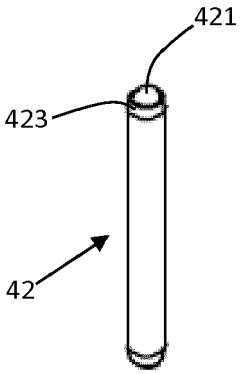
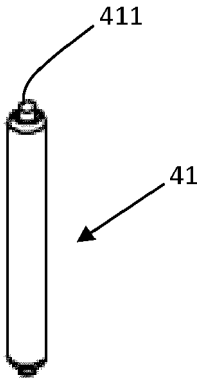


Fig. 10



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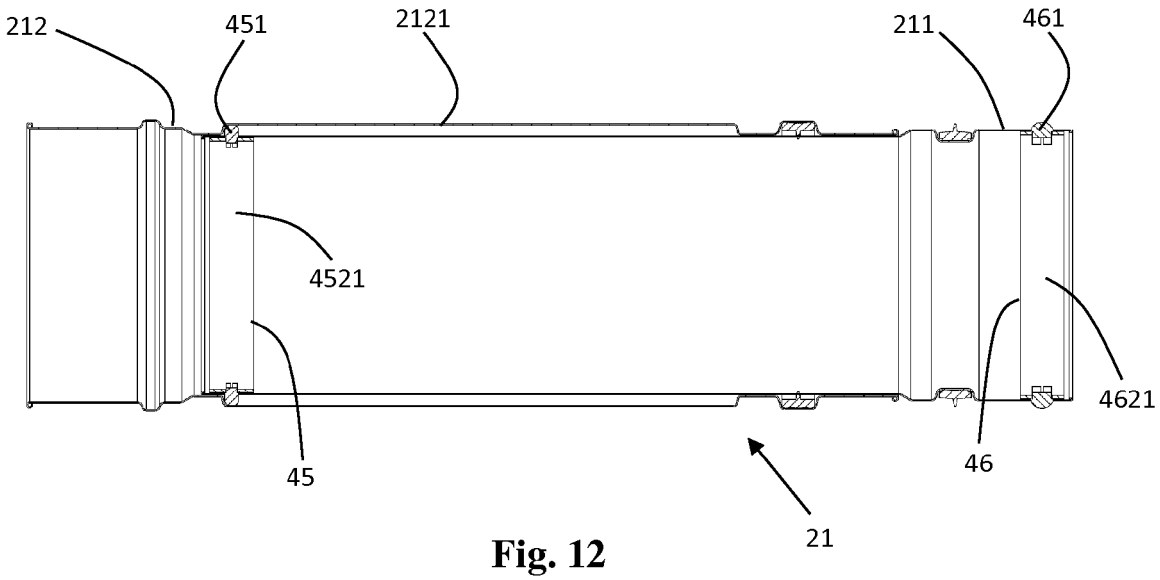
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Fig. 12

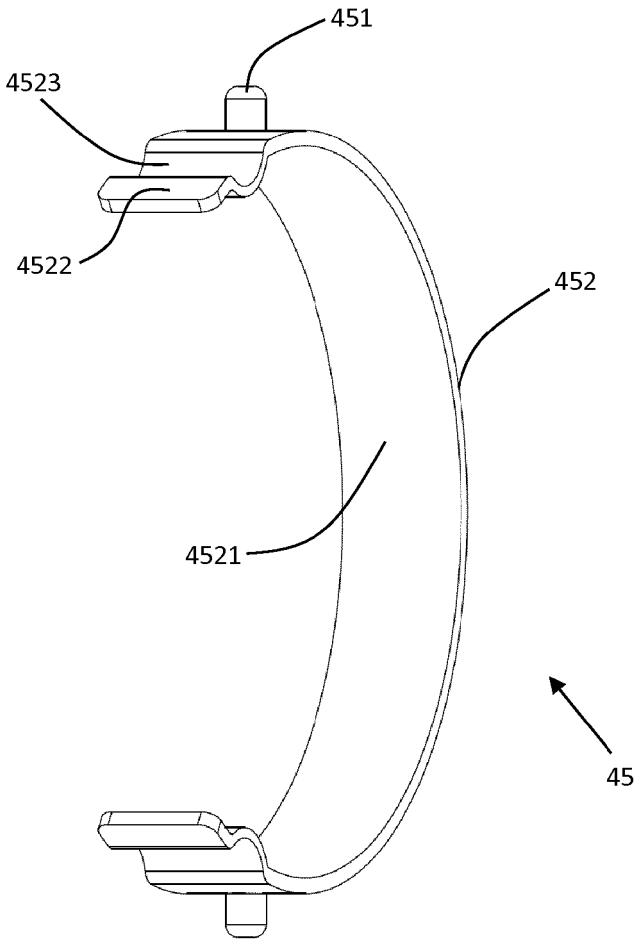
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Fig. 13

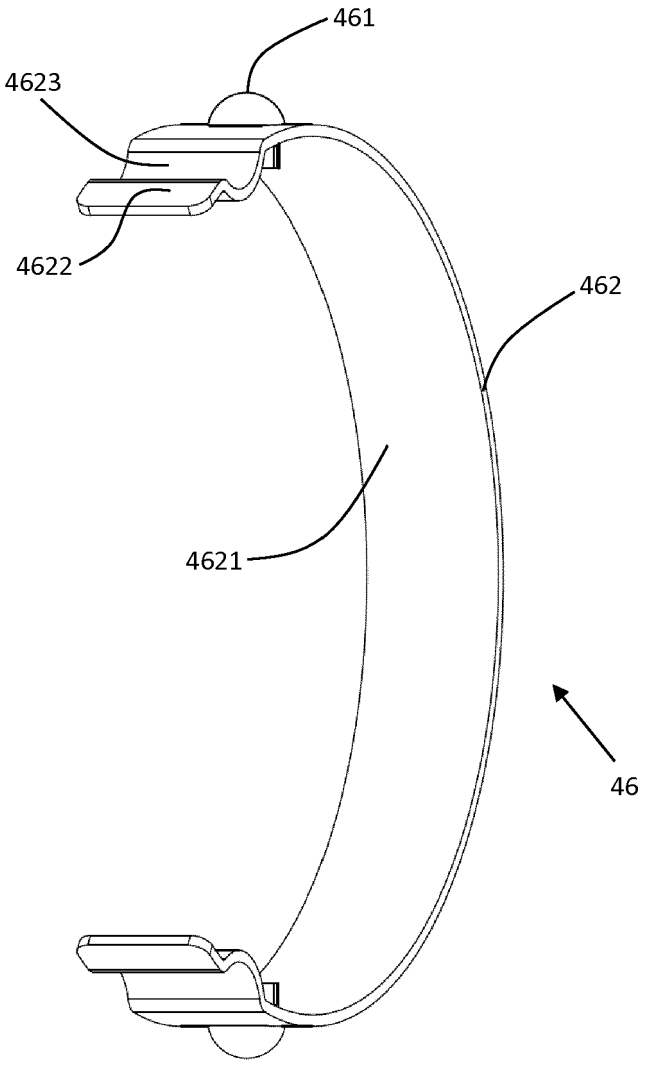

Fig. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 8904

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 029 373 A1 (VAILLANT WUXI HEATING EQUIPMENT CO LTD [CN]) 8 June 2016 (2016-06-08) * paragraph [0001]; figures 1-10 * * paragraph [0022] - paragraph [0028] * * paragraph [0029] *	1-13	INV. F23J13/04
A	EP 3 040 612 A1 (VAILLANT WUXI HEATING EQUIPMENT CO LTD [CN]) 6 July 2016 (2016-07-06) * paragraph [0001]; figures 1-10, 17-18 * * paragraph [0022] - paragraph [0029] * * paragraphs [0034], [0035] *	1-13	
A	JP 2000 035217 A (RINNAI KK) 2 February 2000 (2000-02-02) * the whole document *	1	
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TECHNICAL FIELDS SEARCHED (IPC)

F23J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 August 2018	Hauck, Gunther

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28-08-2018

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