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(54) FLUE PIPE ASSEMBLY AND GAS APPLIANCE SYSTEM INCLUDING THE SAME

(57) The present invention discloses a flue pipe assembly for a gas appliance including at least a first pipe section and a second pipe section, and a first electrical conductor and a second electrical conductor attached to the first and the second pipe sections respectively. The first electrical conductor is electrically connected with the second electrical conductor via an electrical connector assembly when the first pipe section is assembled with the second pipe section in a longitudinal direction. The first and the second pipe sections are movably connected in the longitudinal direction to adjust the total length of the flue pipe assembly.

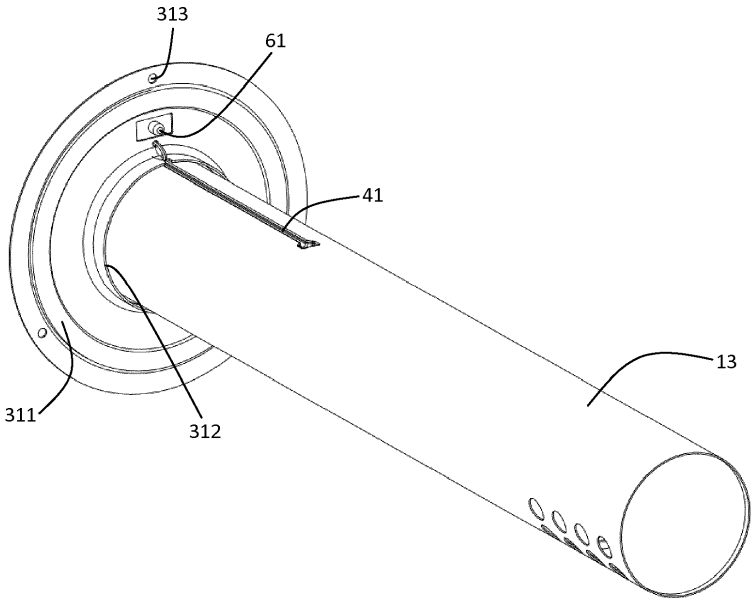

Fig. 7

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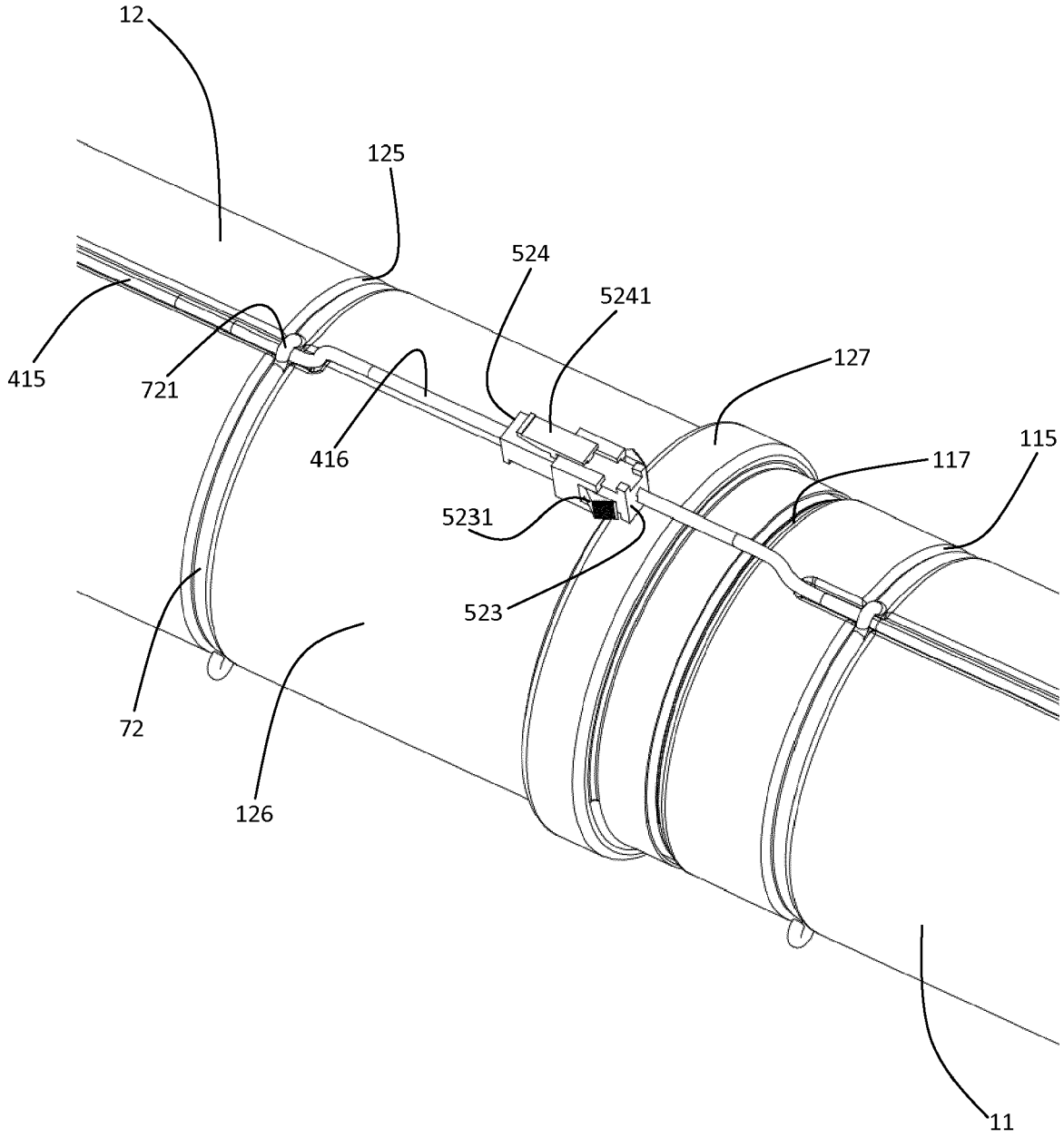


Fig. 17

Description

FIELD OF THE INVENTION

[0001] The present invention relates to fields of domestic gas appliances, and particularly relates to flue pipes for domestic gas appliances and a gas appliance system including the flue pipes.

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 flue pipes generally includes a number of pipe sections connected in series, and these pipe sections 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 pipe sections are connected in series, the electrical conductors of each pipe section 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 pipe sections, 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] The Chinese patent application discloses the conception that the electrical conductors can be used to provide a prompt feedback once a connection problem exists between the pipe sections. Nevertheless, the above solution does not provide reliable mechanical and electrical connection means between the pipe sections.

[0005] In addition, 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.

SUMMARY OF THE INVENTION

[0006] It is an object of present invention to provide a flue pipe assembly, wherein the flue pipe assembly can provide a prompt feedback when there exists a disconnection, and its overall length can be adjusted to suit different installation situations.

[0007] It is another object of present invention to provide a gas appliance system using the flue pipe assembly.

[0008] According to one aspect of the present invention there is provided a flue pipe assembly for a gas appliance including at least a first pipe section and a second pipe section, and a first electrical conductor and a second electrical conductor attached to the first and the second pipe sections respectively. The first electrical conductor is electrically connected with the second electrical conductor via an electrical connector assembly when the first pipe section is assembled with the second pipe section in a longitudinal direction. Wherein, the first and the second pipe sections are movably connected in the longitudinal direction to adjust the total length of the flue pipe assembly.

[0009] Preferably, the first and said second pipe sections have a first connection position and a second connection position along the longitudinal direction; wherein in the first connection position, the first electrical conductor and the second electrical conductor are connected loosely, and in the second connection position, the first electrical conductor and the second electrical conductor are connected in a tensional state.

[0010] Preferably, the first and the second pipe sections respectively have a first end portion and a second end portion adjacent with each other; wherein the diameter of the first end portion is slightly smaller than that of the second end portion, thereby the second end portion being able to surround over the first end portion and allow the first end portion to move in the longitudinal direction with respect to the second end portion.

[0011] Preferably, the first pipe section is provided with a shoulder formed adjacent to the first end portion and has an increased diameter with respect to the first end portion; wherein in the first connection position, the shoulder of the first pipe section abuts against the distal end of the second end portion of the second pipe section.

[0012] Preferably, the electrical connector assembly includes a male connector connected with the first electrical conductor and a female connector connected with the second electrical conductor.

[0013] Preferably, the male and the female connectors are provided with latching members to engage with corresponding parts of the female connector and the male connector respectively to establish a firm connection between the male and the female connectors.

[0014] Preferably, the first and the second pipe section each has a groove longitudinally extending in an outer wall of the pipe section, and the first or the second electrical conductor is partially received in the groove, and

the male and female connectors are respectively connected with parts of the first and the second electrical conductor disposed out of the groove.

[0015] Preferably, the flue pipe assembly further includes a restriction member, and the restriction member fastens the electrical conductors in the groove along a cross-sectional direction perpendicular to the longitudinal direction.

[0016] Preferably, the first and the second pipe sections each has an annular slot circumferentially defined in the outer wall thereof, and the restriction member is received in the annular slot to press the first or the second electrical conductor passing through the annular slot.

[0017] According to another aspect of the present invention there is provided a gas appliance system including a flue pipe assembly aforementioned and a gas appliance including a burner and a flue hood for collecting combustion products produced by the burner. The flue hood is connected with the flue pipe assembly to discharge the combustion products.

[0018] Compared with the state of art, the invention has the advantages that, the total length of the flue pipes can be adjusted by employing the first and the second pipe sections that are movably connected; in addition, the connected electrical conductors of the first and the second pipe sections can be stretched to adapt the adjustment of the length of the flue pipes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] 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 view showing a flue pipe assembly in accordance with a first embodiment of present invention connected with a gas water heater;

Fig. 2 is a perspective view showing two adjacent pipe sections of the flue pipe assembly as shown in Fig. 1 are connected via a first pipe connection mechanism;

Fig. 3 is similar to Fig. 2, wherein a connecting ring of the first pipe connection mechanism is removed;

Fig. 4 is a perspective view showing two separate adjacent pipe sections as shown in Fig. 3;

Fig. 5 is a perspective view showing the connecting ring of the pipe connection mechanism;

Fig. 6 is a perspective view showing an end pipe section is fixedly mounted to a wall via a first wall mounting mechanism;

Fig. 7 is a perspective view showing the end pipe section together with the first wall mounting mechanism as show in Fig. 6 from another aspect;

Fig. 8 is a perspective view showing a flue pipe assembly in accordance with a second embodiment of present invention, wherein two adjacent pipe sections of the flue pipe assembly are connected via a second pipe connection mechanism;

Fig. 9 is a perspective view showing two separate adjacent pipe sections as shown in Fig. 8;

Fig. 10 is a sectional view of the two connected pipe sections as shown in Fig. 8;

Fig. 11 is a schematic view showing a flue pipe assembly in accordance with a third embodiment of present invention, wherein two adjacent pipe sections of the flue pipe assembly are connected via a third pipe connection mechanism;

Fig. 12 is a schematic view of the pipe section as shown in Fig. 11 from another aspect;

Fig. 13 is a schematic sectional view showing a flue pipe assembly in accordance with a fourth embodiment of present invention, wherein an end pipe section is fixedly mounted to a wall via a second wall mounting mechanism;

Fig. 14 is an explosive view of the end pipe section and the second wall mounting mechanism as show in Fig. 13;

Fig. 15 is a schematic sectional view showing a flue pipe assembly in accordance with a fifth embodiment of present invention, wherein an end pipe section is fixedly mounted to a wall via a third wall mounting mechanism;

Fig. 16A-16C are schematic views showing the process of installing the end pipe section as shown in Fig. 15 to the wall via the third wall mounting mechanism;

Fig. 17 is a perspective view showing a flue pipe assembly in accordance with a sixth embodiment of present invention, wherein two adjacent pipe sections are movably connected;

Fig. 18A is a schematic sectional view showing the two adjacent pipe sections of Fig. 17 in a first connection position, wherein conductors and an electrical connector assembly shown in Fig. 17 are removed;

Fig. 18B is a schematic sectional view showing the two adjacent pipe sections of Fig. 17 in a second

connection position, wherein conductors and the electrical connector assembly shown in Fig. 17 are removed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] 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.

[0021] Gas appliances could be fired with combustible gas, such as natural gas, city gas, liquefied petroleum gas, methane, etc., thereby supplying thermal energy for domestic usages. Such as gas water heaters for supplying hot water, gas boilers for supplying hot water and room heating, and gas stoves for cooking. A gas water heater will be exemplified hereinafter for illustrating the flue pipe assembly of present invention.

[0022] Refer to Fig. 1, a gas water heater 80 can be connected with a flue pipe assembly composed of a number of pipe sections to exhaust combustion products, or can be connected with an elbow pipe to exhaust combustion products, which depends on the position for installing the gas water heater in a room and layout of the room. The gas water heater may include a housing, a gas burner, a heat exchanger, a flue hood, and an air supply fan. Heat generated by the gas burner passes through the heat exchanger and is absorbed by cold water flowing through the heat exchanger. The combustion products are driven by the fan and collected by the flue hood, and further discharged outside via the flue pipe assembly which is connected with the flue hood. As the configurations of gas water heaters are well known in the art, a detailed explanation is omitted for sake of brevity.

[0023] Refer to Fig. 2 through Fig. 7, the pipe section can be a straight pipe, such as the pipe sections labeled in 11, 12, 13, can also be an elbow pipe, like the pipe section labeled in 14. Moreover, the pipe section can be an intermediate pipe, such as the pipe sections labeled in 11, 12, 14, can also be an end pipe extending through a wall 90, like the pipe section labeled in 13. Each intermediate pipe section has the same structure, and it has two opposite end portions with complementary configuration, in this way, two adjacent pipe sections can be connected fluently. Each intermediate pipe section 11, 12, 14 has a longitudinally extending slot defined in an outer wall thereof, and an electrical conductor 41 is received in the slot. In this embodiment, the electrical conductor is a cable including two electrical wires 411, 412, and a conductor base 511 is embedded in the outer wall at each end portion of the intermediate pipe section 11, 12, 14. The two electrical wires 411, 412 extend into the conductor base 511 and are respectively electrically connected with two conductive pads 5111, 5112 disposed on an upper surface of each conductor base.

[0024] Fig. 2 through Fig. 5 show a first pipe section 11 and a second pipe section 12 which are positioned adjacent to each other and mechanically and electrically connected via a first pipe connection mechanism. The adjacent end portions of the first and the second pipe sections 11, 12 are provided with guiding post 112 and guiding groove 122 respectively, so that the two adjacent pipe sections can be connected fluently. In this embodiment, the end portion of the second pipe section 12 encircles the end portion of the first pipe section 11. The end portion of the second pipe section 12 circumferentially defines a receiving groove in an inner wall thereof, and a sealing member 101 is received in this receiving groove. In this way, the first and the second pipe sections 11, 12 are sealed at the connection therebetween. In this embodiment, the sealing member 101 is a sealing ring made of rubber material. It would be apparent to those skilled in the art that, in other embodiments, the guiding post and the guiding groove can change positions to each other, and the sealing member can also be disposed on the outer wall of the end portion of the first pipe section 11. In this embodiment, the first and the second pipe section 11, 12 are formed with positioning posts 111, 121 respectively on the outer wall of end portions thereof.

[0025] The pipe connection mechanism includes a fixed connection device for realization of a reliable mechanical connection between the first and the second pipe sections 11, 12. As shown in Fig. 5, the fixed connection device includes a connecting ring 21. This connecting ring 21 has a terminal receiving chamber 211, positioning holes 212, and mounting holes 213. The pipe connection mechanism further includes electrical terminals 512 fixed on the connecting ring 21 for establishing an electrical connection between a first electrical conductor of the first pipe section 11 and a second electrical conductor of the second pipe section 12. In this embodiment, the electrical terminals include two terminals (only one is shown in Fig. 5) both received in the terminal receiving chamber 211. Each electrical terminal 512 has a terminal body and an elastic contacting arm 5121. The terminal body is fixed in the terminal receiving chamber 211 with an insulative layer formed between the electrical terminal 512 and an inner wall of the terminal receiving chamber 211 to avoid an electrical conduction between the electrical terminals 512 and the connecting ring 21.

[0026] In assembling, the connecting ring 21 covers the adjacent end portions of the first and the second pipe sections 11, 12, and the connecting ring 21 is fixed to the first and the second pipe sections 11, 12 via the engagement of the positioning posts 111, 121 and the positioning holes 212. Fastening members (not shown), such as bolts can extend through the mounting holes to fasten the connecting ring 21 to the pipe sections and forming a solid connection between the first and the second pipe sections 11, 12. In the meantime, the two elastic contacting arms 5121 of the electrical terminals 512 contact against the conductive pads 5111, 5112 of the conductor

bases of the first and the second pipe sections 11, 12 respectively, thereby realizing the electrical connection of the first and the second electrical conductors. The mechanical connection between adjacent pipe sections becomes stable and reliable by introducing the pipe connection mechanism, which can reduce the case of disconnection of pipe sections. Even if a disconnection of pipe sections happens or the installing of the flue pipe assembly does not meet the requirements, as a result, the electrical conductors connected in series are broken, then a controller of the gas water heater can sense it and take actions accordingly, such as stop running of the gas water heater to avoid leakage of flue gas.

[0027] Refer to Figs. 6 and 7, a third pipe section, namely an end pipe section 13 extends through a wall and secures to the wall via a wall mounting mechanism. The end pipe section 13 has one end located inside the room and mechanically, electrically connected with an adjacent intermediate pipe section 12 via the pipe connection mechanism as described above. The wall mounting mechanism includes a mounting flange 31 with a central through hole for being passed through by the end pipe section 13. The through hole has a size substantially same as that of a cross section of the end pipe section 13. In this way, in case there is a reverse wind outside, the flue gas discharged outside would not return inner of the room via the gap between the end pipe section and the wall. The mounting flange 31 defines a circular groove at a surface thereof facing the wall for receiving a sealing element 311. In this embodiment, the sealing element is a sealing ring made of rubber material. When the mounting flange 31 is mounted onto the wall, the sealing element 31 forms a sealing between the wall and the flange to avoid the flue gas discharged outside return into the room. The mounting flange 31 defines mounting holes 313, and fastening members, such as bolts extend through the mounting holes 313 to fasten the mounting flange 31 onto the wall.

[0028] As shown in Fig. 7, a switch 61 is disposed at the surface of the mounting flange 31 facing to the wall, and the switch 61 is connected with a third electrical conductor of the end pipe section 13 in series. The switch 41 can be a pressing switch, a reed switch, or other contact switch, can also be a proximity switch, a photoelectric switch, or other non-contact switches. At the time when the mounting flange 31 is fixed to the wall 90, the switch 61 is turned on, and at the same time, an electric current is generated and passes through the parallel wires 411, 412 of the electrical conductor 41 in reverse directions. The end pipe section can be secured to the wall via the wall mounting mechanism, which can reduce the case of disconnection of pipe sections. Even if a disconnection of pipe sections happens or the installing of the flue pipe assembly does not meet the requirement, as a result, the switch is opened, then the controller of the gas water heater can sense it and take actions accordingly, such as stop running of the gas water heater to avoid leakage of flue gas.

[0029] Fig. 8 through Fig. 10 show a flue pipe assembly in accordance with a second embodiment of present invention. The main difference with respect to the first embodiment is that, the connecting ring includes a first portion 221 and a second portion 222. The first and the second portions 221, 222 are separate and fixed to adjacent end portions of the first and the second pipe sections 11, 12 respectively via bolts. The first and the second portions 221, 222 are respectively provided with terminal bases 521, 522. The electrical terminals include a female terminal (not shown) retained in the terminal base 521 and electrically connected to the first electrical conductor 42, and a male terminal 5221 retained in the terminal base 522 and electrically connected to the second electrical conductor 42. Each electrical conductor includes two wires 421. When the first pipe section 11 is connected with the second pipe section 12, the male terminal 5221 electrically contacts the female terminal, and the first portion 221 and the second portion 222 are fastened together via bolts. In addition, a dust-proof cover 223 covers the terminal bases 521, 522 after assembling. Similarly, a sealing member 102 is provided between the first and the second pipe section 11, 12 to ensure a sealing connection therebetween.

[0030] Figs. 11 and 12 show a third embodiment of the flue pipe assembly. In present embodiment, the electrical conductor 41 includes only one electrical wire, and the pipe sections are made of metallic material to perform as the other electrical wire as disclosed in aforementioned embodiments. The fixed connection device includes at least two latching members 231, 232, and these two latching members are both disposed at one end portion of a pipe section. When the first pipe section 11 is connected to the second pipe section 12, the two latching members 231, 232 each latches adjacent end portions of the first and the second pipe sections 11, 12, thereby achieving a reliable mechanical connection between the pipe sections. In this embodiment, the latching members 231, 232 also act as terminals to establish an electrical connection between the electrical conductors of the pipe sections. One latching member 231 is located adjacent to the electrical conductor 43, and it has a different design with respect to the other latching member 232. For example, the latching members have different structures, different size, or different colors. In this way, when connecting two pipe sections, the electrical conductors of the two pipe sections can be connected without mistakes. Similarly, a sealing member 103 is provided between the first and the second pipe section 11, 12 to ensure a sealing connection therebetween.

[0031] Figs. 13 and 14 show a fourth embodiment of the flue pipe assembly. In this embodiment, the wall mounting mechanism includes a mounting flange 321 and a retaining device. The retaining device includes a restricting member 322 encircling the end pipe section 13, an additional flange 323 having a central hole for being passed through by the end pipe section 13, and a circular wedge-shaped piece 324. When the wall mount-

ing mechanism is attached to the wall 90, the mounting flange 321 and the additional mounting flange 323 are located at opposite sides of the wall 90. The mounting flange 321 has one side opposite to the wall 90 abuts against the restricting member 322, and the additional mounting flange 323 has one side opposite to the wall 90 is abut against by the wedge-shaped piece 324. By this means, the end pipe section 13 can be secured to the wall 90 reliably. Similar to the first embodiment, a switch 62 and a sealing member 325 are disposed between the mounting flange 321 and the wall 90.

[0032] Fig. 15 and Figs. 16A-16C show a fifth embodiment of the flue pipe assembly. In this embodiment, the wall mounting mechanism includes a mounting flange 331 and a retaining device. The retaining device includes two restricting devices 332 and a circular wedge-shaped piece 333. Each restricting device 332 includes a first arm 3321 and an second arm 3322 forming an angle therebetween, and an torsion springs 3323 engaged with the first and the second arms 3321, 3322. The first and the second arms 3321, 3322 is able to together rotate on a pivot which is encircled by the torsion spring 3323. Besides, the first arm 3321 is shorter than the second arm 3322. In this embodiment, the switch 63 is provided on the end pipe section 13 and engageable with the first arm 3321.

[0033] Refer to Fig. 16A, under the action of the torsion spring 3323, the first arm 3321 and the second arm 3322 each has a distal end lift up above the end pipe section 13 in a natural state. Refer to Fig. 16B, when the end pipe section 13 extends through the wall 90, the second arm 3322 is pressed by the wall and return to its natural state after lost of interference with the wall. As shown in Fig. 16C, the mounting flange 331 and the wedge-shaped piece 333 are disposed at one side of the wall 90 opposite to the other side where the restricting device 332 positions. Refer back to Fig. 15, when the wall mounting mechanism is mounted to the wall, the mounting flange 331 is abut against by the wedge-shaped piece 333 at its one side, and the mounting flange 331 abuts against the wall 90 at its the other side. At the opposite side of the wall 90, the second arm 3322 is forced to abut against the wall, and the second arm 3321 pressed the switch to activate it on. Similarly, a sealing member 334 is disposed between the mounting flange 331 and the wall 90.

[0034] Fig. 17 shows a sixth embodiment of the flue pipe assembly. In this embodiment, the first and the second pipe sections 11, 12 each has a groove longitudinally extending in the outer wall thereof, and each conductor has a first portion 415 received in the longitudinal groove and a second portion 416 extending out of the groove. A male connector 523 is connected to a distal end of the first electrical conductor of the first pipe section 11, and a female connector 524 is connected to a distal end of the second electrical conductor of the second pipe section 12. A pair of side latching member 5231 and a top latching member 5241 are formed on the male connector 523 and the female connector 524 respectively. When the male connector 523 mates with the female connector 524 to electrically connect the conductors of the first and the second pipe sections 11, 12, the side latching member 5231 of the male connector 523 and the top latching member 5241 of the female connector 524 engage with corresponding parts of the female connector 524 and the male connector respectively to establish a firm connection between the male and female connectors 523, 524.

[0035] The first and the second pipe sections 11, 12 each defines an annular slot 115, 125 circumferentially recessed in the outer wall thereof. A pair of restriction member 72 is received in the annular slots 115, 125 respectively. The restriction member 72 is provided with at least a projection 721 defining a notch for being extended through by the first portion 415 of the conductor. The notch has a size smaller than the cross-sectional dimension of the conductor so that the restriction member 72 can press against the first portion 415 of the conductor in the cross-sectional direction to securely fasten it in the groove of the pipe section.

[0036] The first and the second pipe sections 11, 12 respectively have a first end portion 116 and a second end portion 126 adjacent with each other. The diameter of the first end portion 116 is slightly smaller than that of the second end portion 126, by this means, the second end portion 126 is able to surround over the first end portion 116 and allow the first end portion 116 to move in the longitudinal direction with respect to the second end portion 126. In addition, the first pipe section is provided with a shoulder 117 formed adjacent to the first end portion 116 and has an increased diameter with respect to the first end portion 116.

[0037] Fig. 18A and Fig. 18B respectively shows a first connection position and a second connection position of the first and the second pipe sections 11, 12 movably connected in the longitudinal direction. Refer to Fig. 18A in conjunction with Fig. 17, at the first connection position, the shoulder 117 of the first pipe section 11 abuts against the distal end of the second end portion 126 of the second pipe section 12, meanwhile, the conductors disposed out of the grooves are connected loosely, in other words, the connected conductors disposed between the first annual slot 115 and the second annual slot 125 have a line length larger than the distance between the first and the second annual slots 115, 125. Refer to Fig. 18B, when the first pipe section 11 and the second pipe section 12 move relatively to the second connection position, the total length of the connected first and second pipe sections is increased, at this time, the first end portion 116 is still embedded in the second end portion 126, and the connected conductors disposed out of the grooves are stretched in a tensional state. Under the action of the latching members 5231, 5241 of the electrical connector assembly composed by the connectors 523, 524, the conductors of the first and the second pipe sections 11, 12 are securely connected together. Similar to the aforementioned embodiments, the second end portion 127 has a circumferential bump 127 formed on the side wall

thereof, and a ring gasket made of elastic material (such as rubber) is received in the bump 127. The ring gasket is able to be full of cross-sectional gaps defined between the first and the end portions 116, 126 to avoid a gas leak therebetween.

[0038] 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 flue pipe assembly for a gas appliance comprising at least a first pipe section (11) and a second pipe section (12), and a first electrical conductor (41) and a second electrical conductor (41) attached to the first and the second pipe sections respectively; the first electrical conductor being electrically connected with the second electrical conductor via an electrical connector assembly (523, 524) when the first pipe section is assembled with the second pipe section in a longitudinal direction; **characterized in that**, said first and said second pipe sections are movably connected in the longitudinal direction to adjust the total length of the flue pipe assembly.

2. A flue pipe assembly according to claim 1, **characterized in that** said first and said second pipe sections have a first connection position and a second connection position along the longitudinal direction; wherein in the first connection position, the first electrical conductor and the second electrical conductor are connected loosely, and in the second connection position, the first electrical conductor and the second electrical conductor are connected in a tensional state.

3. A flue pipe assembly according to claim 2, **characterized in that** the first and the second pipe sections (11, 12) respectively have a first end portion (116) and a second end portion (126) adjacent with each other; wherein the diameter of the first end portion is slightly smaller than that of the second end portion, thereby the second end portion being able to surround over the first end portion and allow the first end portion to move in the longitudinal direction with respect to the second end portion.

4. A flue pipe assembly according to claim 3, **characterized in that** the first pipe section is provided with a shoulder (117) formed adjacent to the first end portion and has an increased diameter with respect to the first end portion; wherein in the first connection position, the shoulder of the first pipe section abuts against the distal end of the second end portion of the second pipe section.

5. A flue pipe assembly according to claim 2, **characterized in that** the electrical connector assembly comprises a male connector (523) connected with the first electrical conductor and a female connector (524) connected with the second electrical conductor.

6. A flue pipe assembly according to claim 5, **characterized in that** the male and the female connectors are provided with latching members (5231, 5241) to engage with corresponding parts of the female connector and the male connector respectively to establish a firm connection between the male and the female connectors.

7. A flue pipe assembly according to claim 5, **characterized in that** the first and the second pipe section each has a groove longitudinally extending in an outer wall of the pipe section, and the first or the second electrical conductor is partially received in the groove, and the male and female connectors are respectively connected with parts of the first and the second electrical conductor disposed out of the groove.

8. A flue pipe assembly according to claim 7, **characterized in that** the flue pipe assembly further comprises a restriction member (72), and the restriction member fastens the electrical conductors in the groove along a cross-sectional direction perpendicular to the longitudinal direction.

9. A flue pipe assembly according to claim 8, **characterized in that** the first and the second pipe sections each has an annular slot (115, 125) circumferentially defined in the outer wall thereof, and the restriction member is received in the annular slot to press the first or the second electrical conductor passing through the annular slot.

10. A gas appliance system comprising:

    a flue pipe assembly according to any of the preceding claims; and
    a gas appliance comprising a burner and a flue hood for collecting combustion products produced by the burner, said flue hood being connected with the flue pipe assembly to discharge the combustion products.

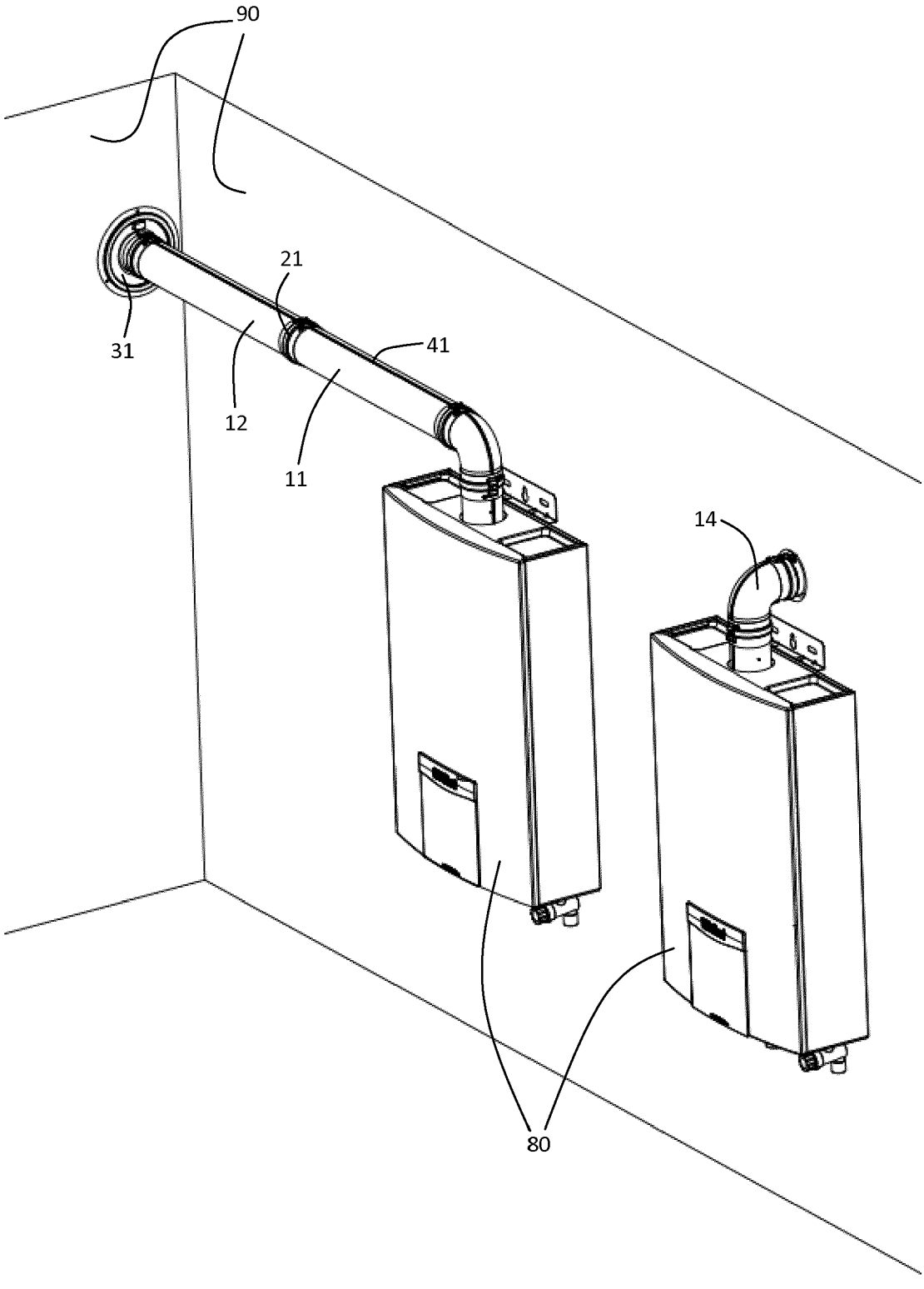


Fig. 1

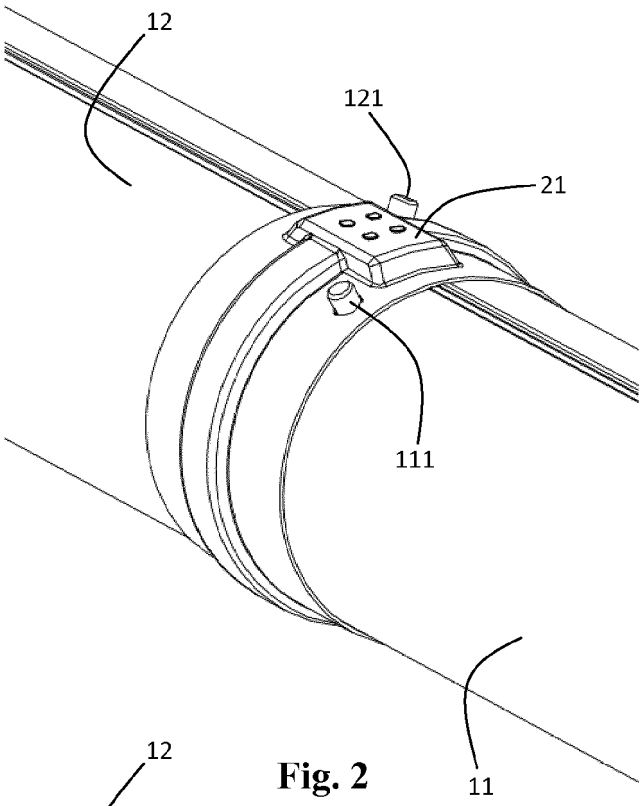


Fig. 2

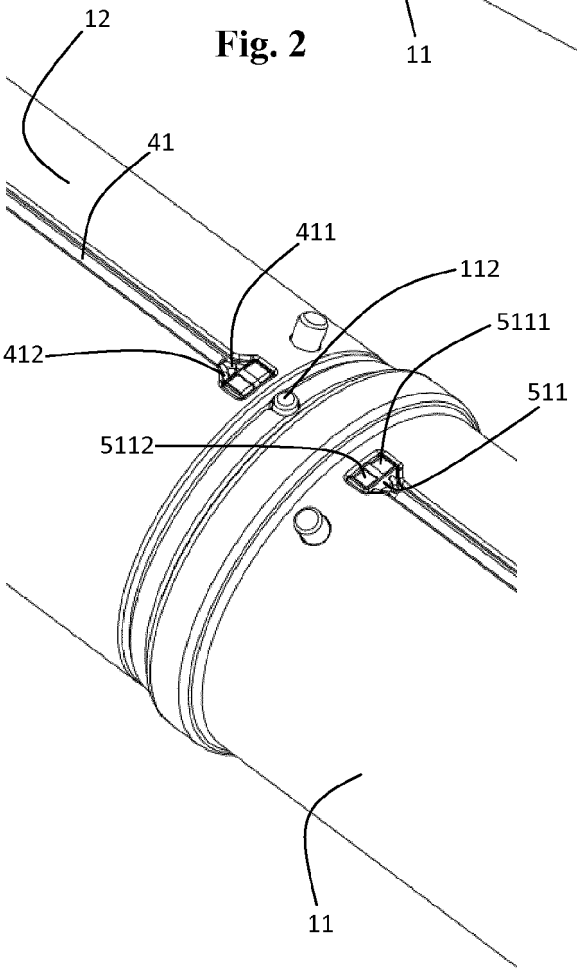


Fig. 3

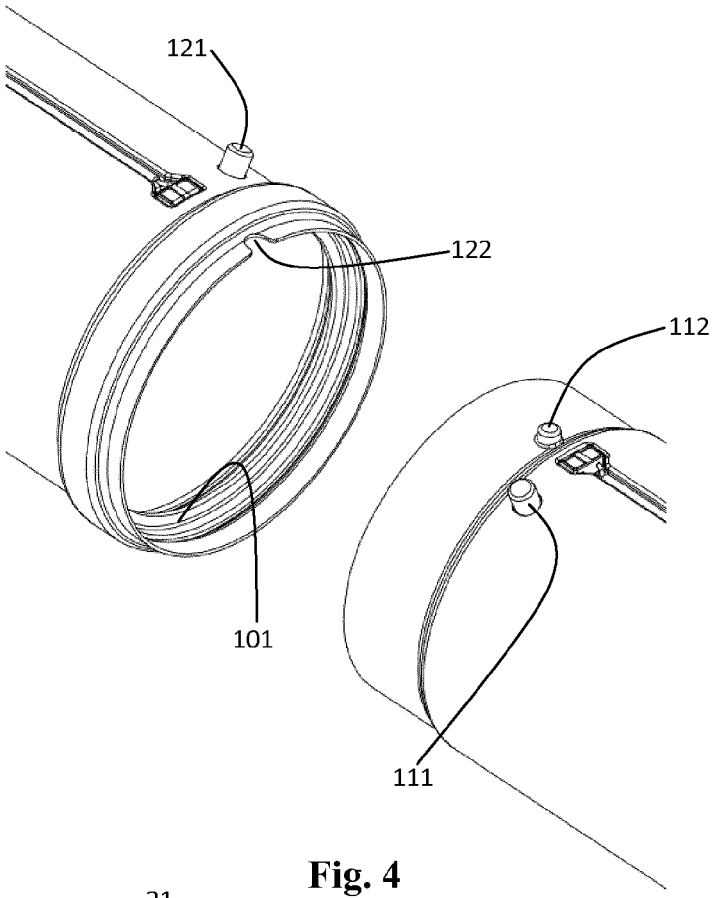


Fig. 4

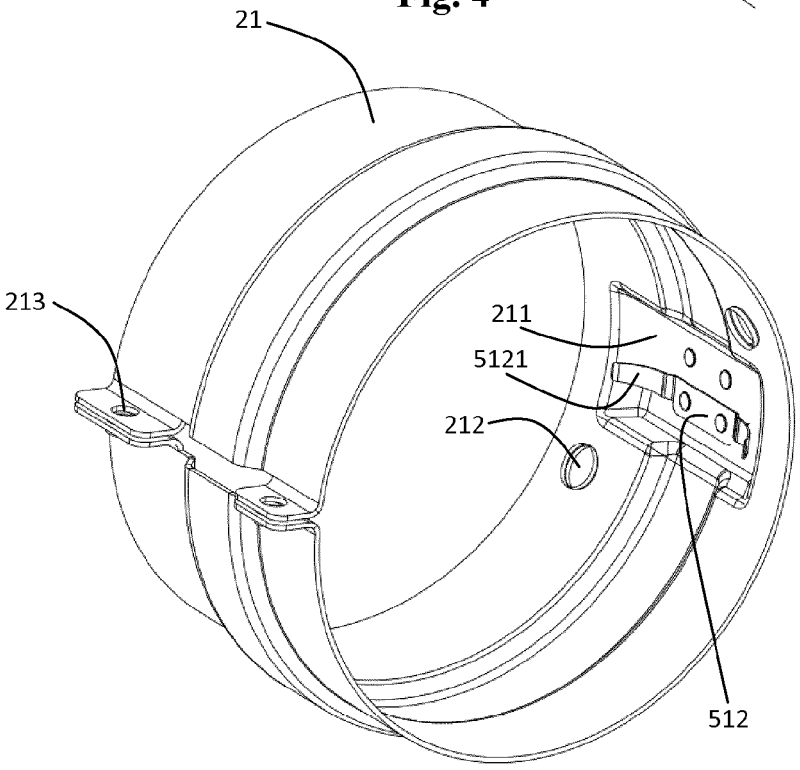


Fig. 5

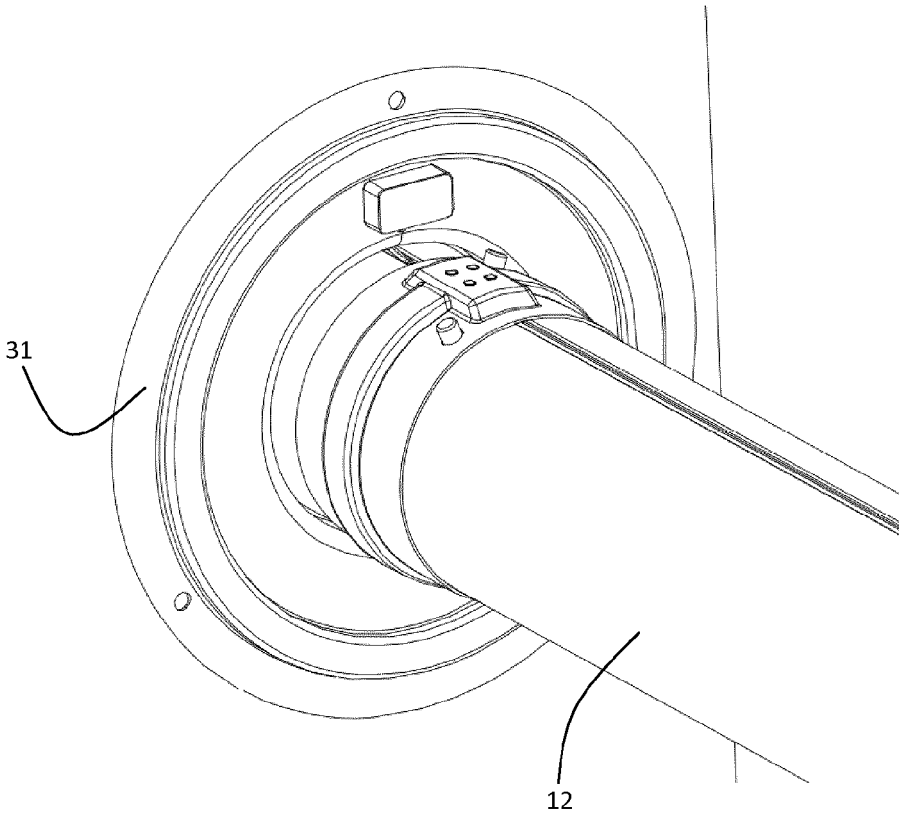


Fig. 6

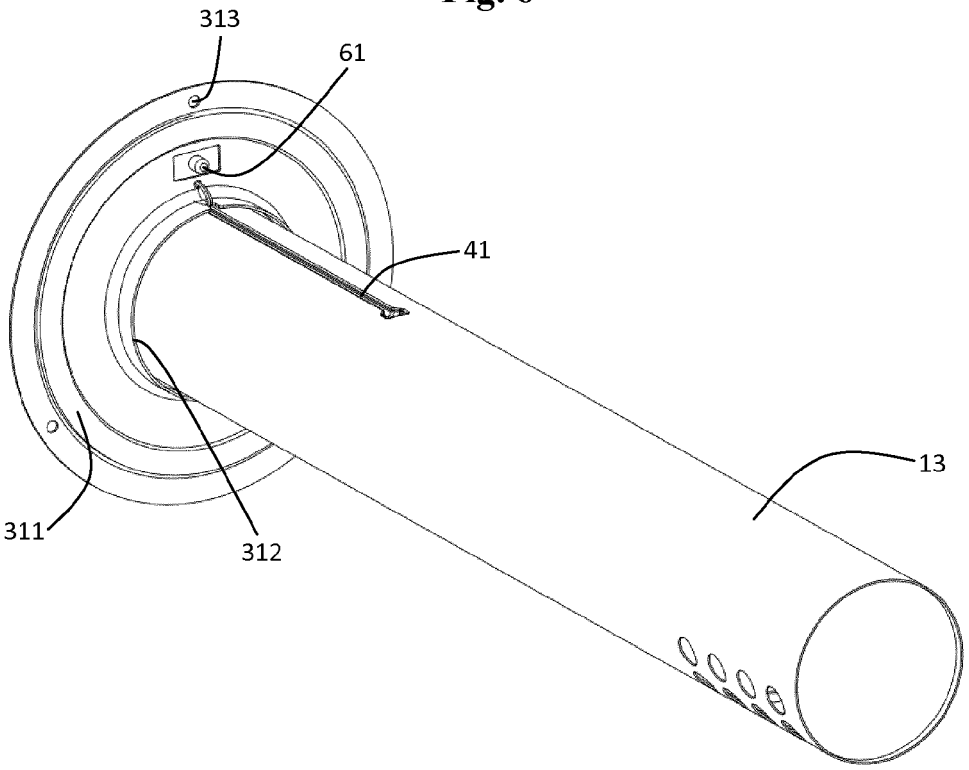


Fig. 7

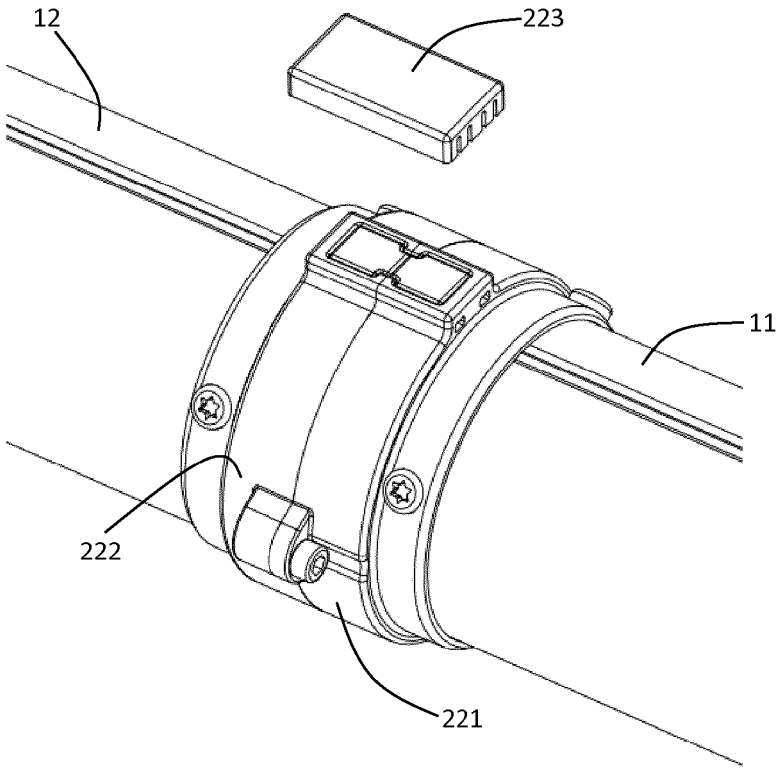


Fig. 8

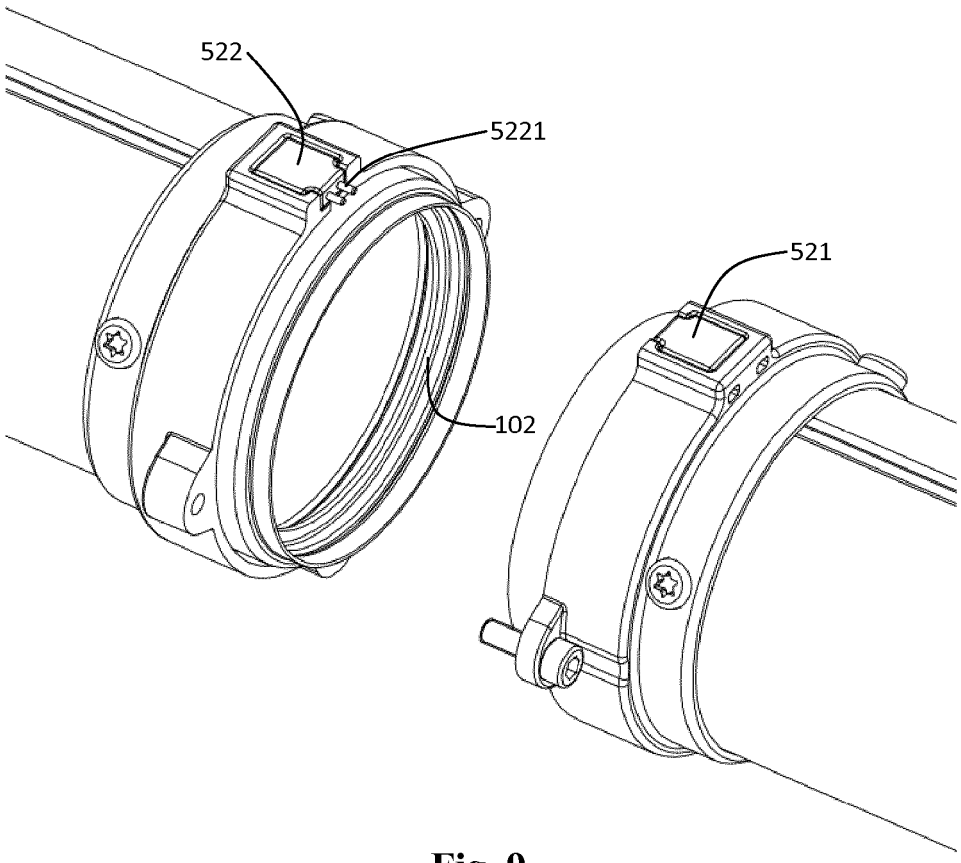


Fig. 9

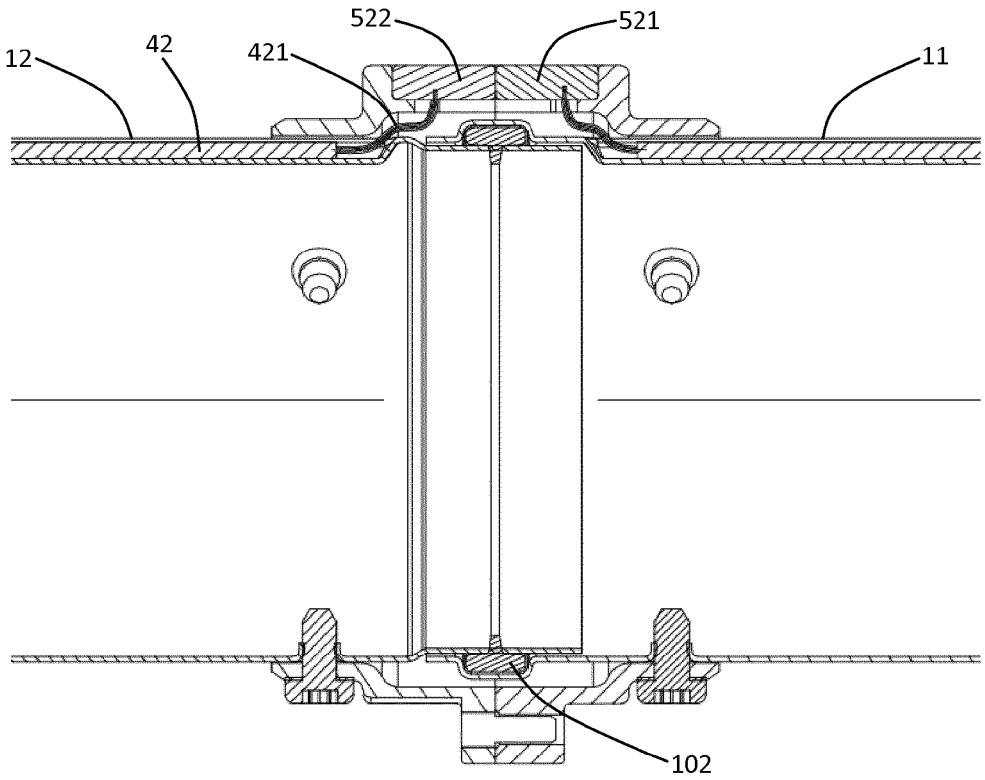


Fig. 10

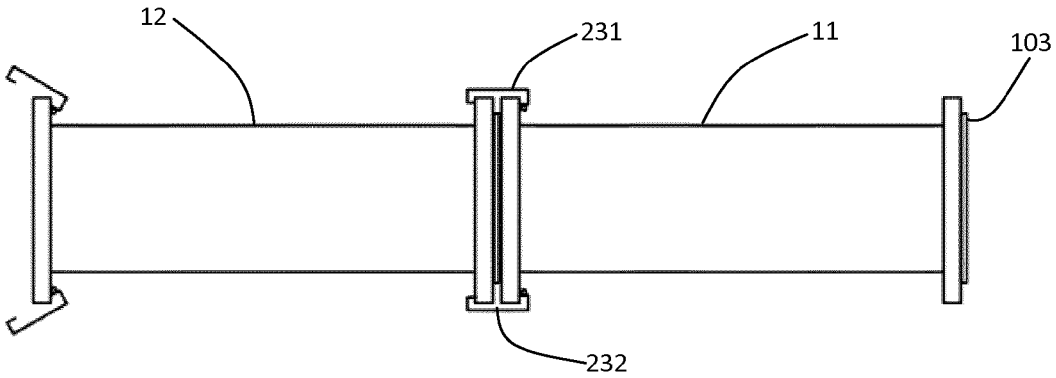
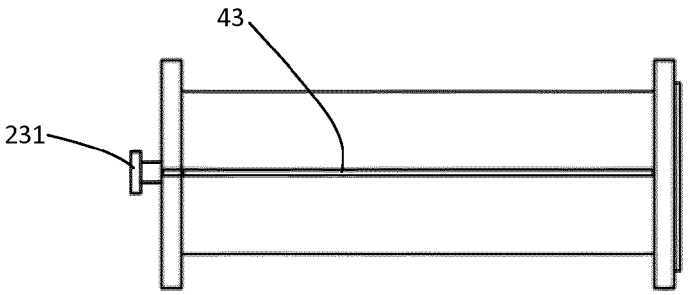


Fig. 11



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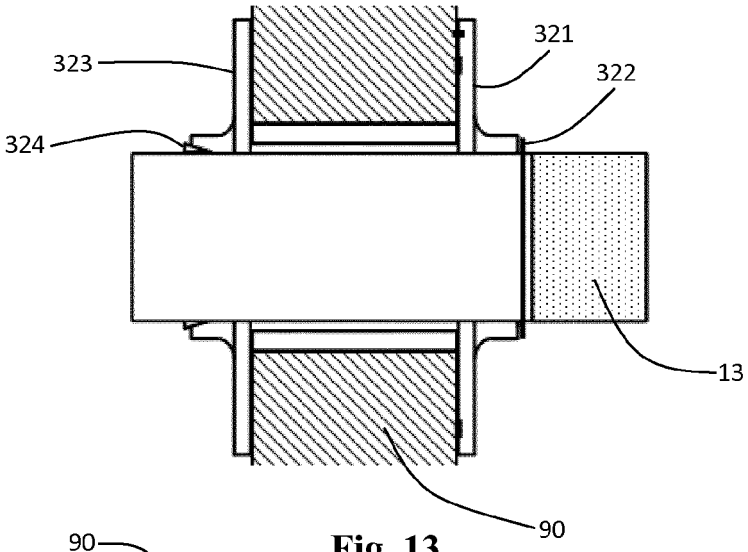

Fig. 13

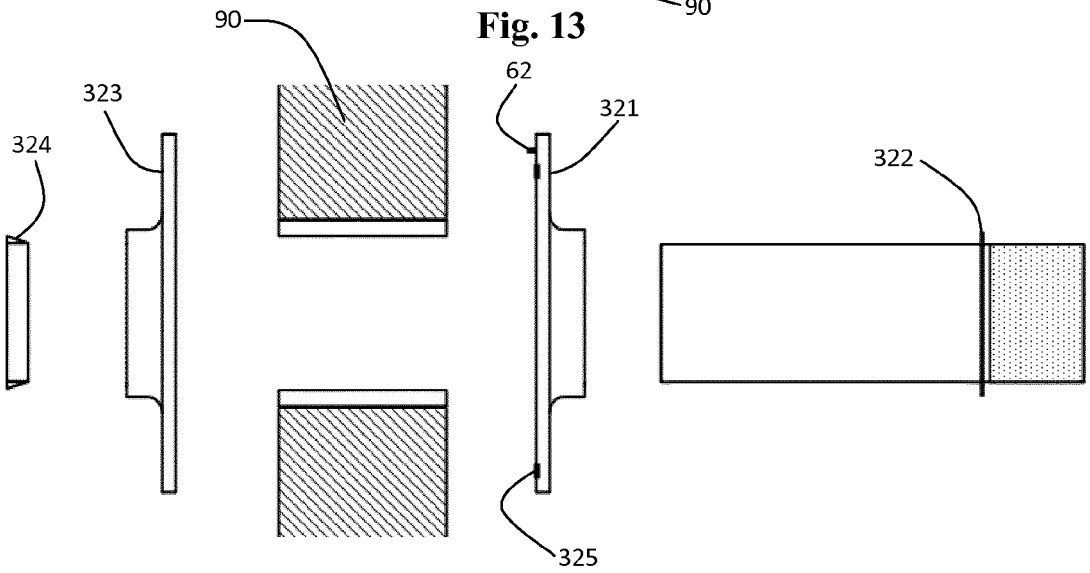

Fig. 14

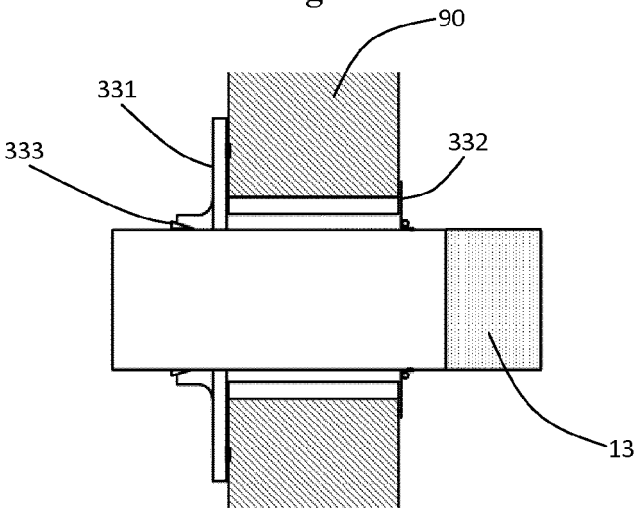

Fig. 15

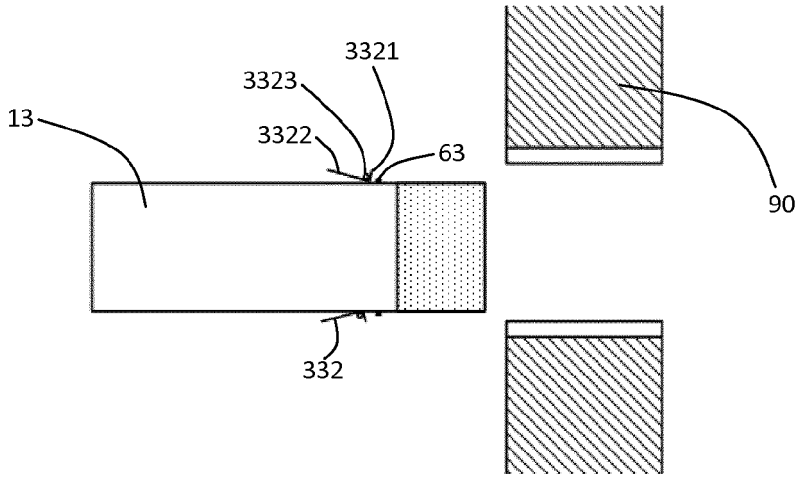

Fig. 16A

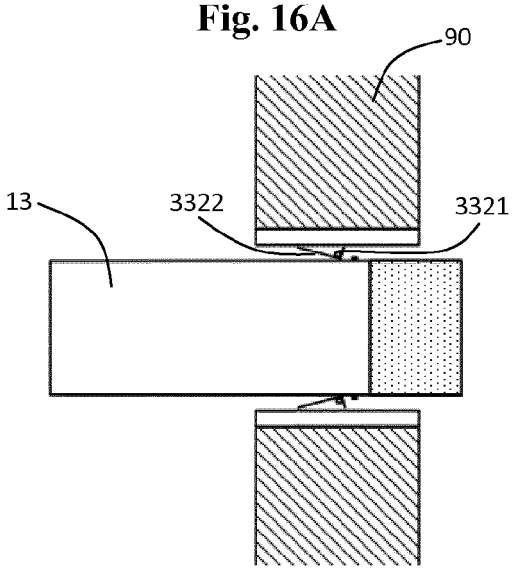

Fig. 16B

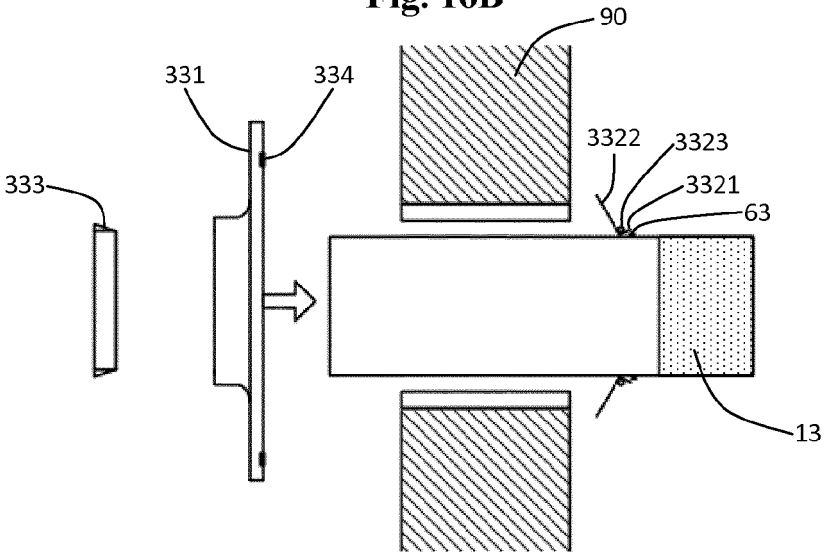

Fig. 16C

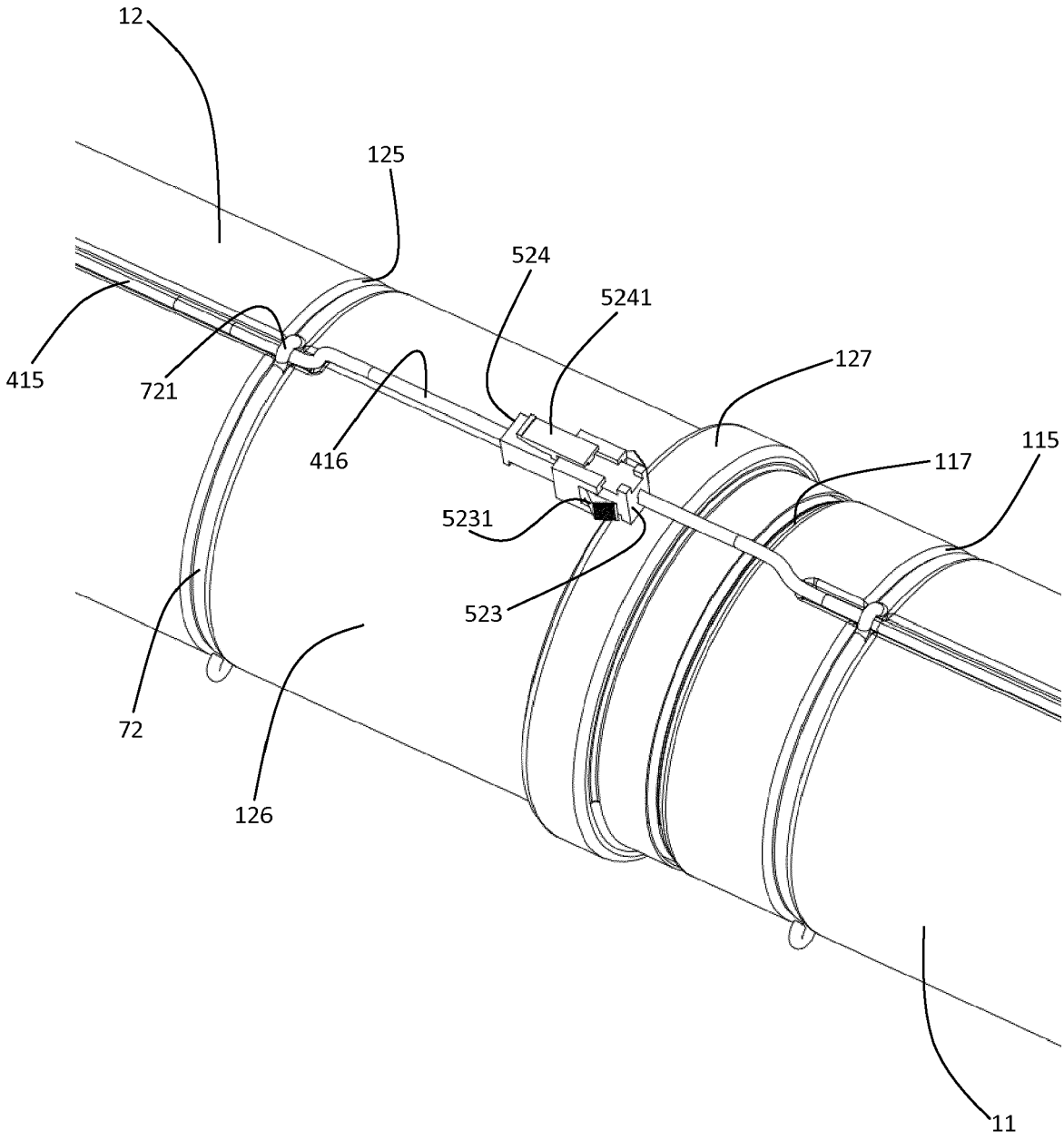

Fig. 17

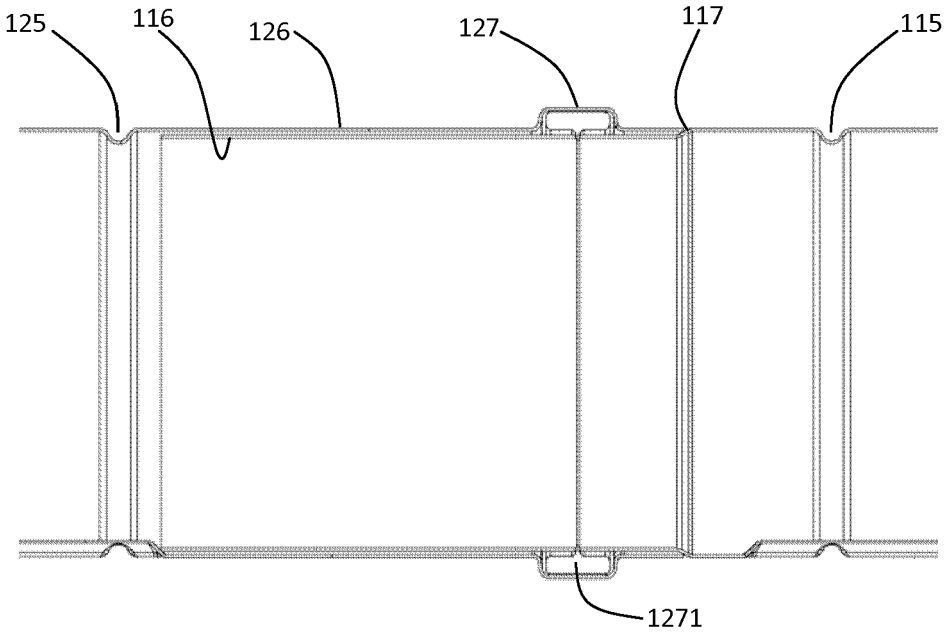

Fig. 18A

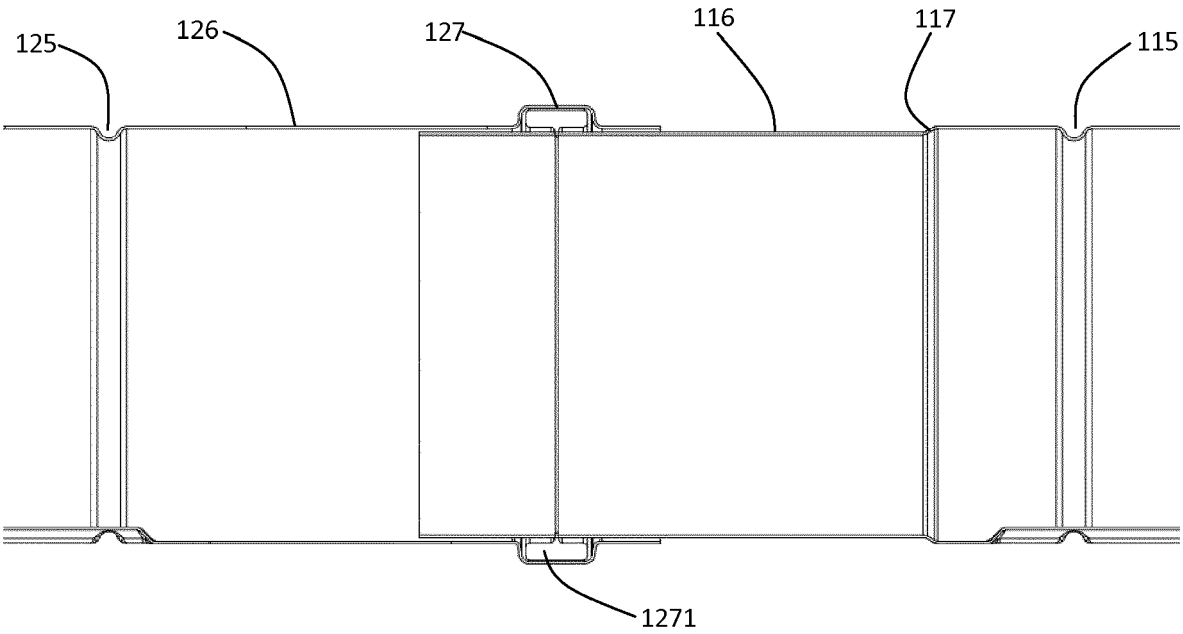

Fig. 18B

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EUROPEAN SEARCH REPORT

Application Number
EP 16 19 6500

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 104 501 190 A (VAILLANT WUXI HEATING EQUIPMENT CO LTD) 8 April 2015 (2015-04-08) * translation; page 5, paragraph 36 - page 6, paragraph 40 * * translation; page 6, paragraph 43 * * figures 1-5,8-10 * -----	1-10	INV. F23J13/04
X	CN 104 501 191 A (VAILLANT WUXI HEATING EQUIPMENT CO LTD) 8 April 2015 (2015-04-08) * translation; page 5, paragraph 36 - page 6, paragraph 40 * * translation; page 6, paragraph 43 * * figures 1-5,8-10 * -----	1-8,10	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 March 2017	Gavriliu, Costin

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