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(54) **GAS WATER HEATER WITH AN ACCESSORY OF EXTERNAL FLUE HOOD**

(57) The present invention discloses a flue hood accessory adapted to be attached to an indoor gas appliance such that the indoor gas appliance can be installed for outdoor use, wherein the gas appliance includes a housing and a flue pipe extending outside the housing. The flue hood accessory includes an outer cover and a fixing mechanism. The outer cover has a cover plate that covers above an outlet of the flue pipe, and a smoke exhaust port provided on the portion of the outer cover other than the cover plate for exhausting flue gas. The fixing mechanism is so configured to detachably fix the outer cover to the housing or the flue pipe of the gas appliance. Existing gas appliances suitable for indoor installation can also be installed for outdoor use by using a detachable flue hood accessory. Therefore, the costs for developing, manufacturing, and usage can be greatly reduced.

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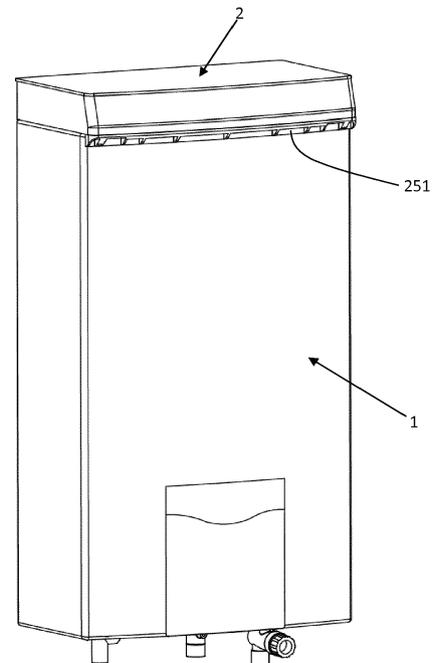


Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of combustion appliance, and more particularly to a flue hood accessory that can be attached to an indoor gas appliance so that the appliance can be installed for outdoor use.

[0002] The invention also relates to an assembly of the aforementioned flue hood accessory and the gas appliance.

BACKGROUND OF THE INVENTION

[0003] Domestic gas appliances generally include gas water heaters and gas boilers. A domestic gas appliance typically has a burner, a heat exchanger, and a pipeline system. The burner normally includes a number of burner plates arranged side by side, and each burner plate has a gas-air mixing passage in which gas and air are mixed and transmitted to a fire hole at the top of the burner plate for being burnt in the combustion chamber to generate heat. The generated heat can be used to heat the water passing through the heat exchanger, and the hot water can then be output through the pipeline system for sanitary use, such as drinking and bathing. In addition to supplying domestic hot water, a gas boiler can also be connected to a heating circuit installed indoors for heating interiors of a room.

[0004] Taking gas water heaters as an example, some gas water heaters are suitable for indoor installation, and some are suitable for outdoor installation. The gas water heater suitable for indoor installation usually discharges flue gas through flue pipes extending through the wall to outdoors; and the gas water heater suitable for outdoor installation usually has smoke exhaust port provided at its front panel for allowing flue gas to be discharged therefrom. Due to the different structures of smoke exhaust mechanisms, gas water heaters suitable for indoor installation cannot be installed outdoors, and vice versa. Therefore, for manufacturers, it is necessary to separately develop and produce the gas water heaters respectively for indoor installation and for outdoor installation; and for users, if they would like to expand the space and need to move the indoor gas water heaters to the outdoors, it is necessary to re-purchase new outdoor gas water heaters to replace old indoor ones. Obviously, this will lead to an increase of costs in production and use of gas water heaters.

SUMMARY OF THE INVENTION

[0005] It is an object of present invention to provide a flue hood accessory that can be attached to a gas appliance that is suitable for indoor installation so that the gas appliance can be installed for outdoor use.

[0006] It is another object of present invention to pro-

vide an assembly of the above flue hood accessory and the gas appliance.

[0007] According to one aspect of the present invention there is provided a flue hood accessory adapted to be attached to an indoor gas appliance such that the indoor gas appliance can be installed for outdoor use, wherein the gas appliance includes a housing and a flue pipe extending outside the housing. The flue hood accessory includes an outer cover and a fixing mechanism. The outer cover has a cover plate that covers above an outlet of the flue pipe, and a smoke exhaust port provided on the portion of the outer cover other than the cover plate for exhausting flue gas. The fixing mechanism is so configured to detachably fix the outer cover to the housing or the flue pipe of the gas appliance.

[0008] Preferably, the flue hood accessory further includes a mounting plate and a sealing ring engaging with the mounting plate, wherein the mounting plate engages with the outer cover and the fixing mechanism such that it can be mounted to the housing of the gas appliance with the sealing ring engaging with the flue pipe of the gas appliance.

[0009] In one embodiment, the flue hood accessory further includes a guiding device disposed in the outer cover, and guiding device includes a guiding shroud having a bending portion with an included angle greater than 90 degrees so that the flue gas exhausted from the flue pipe is discharged out of the outer cover after a turn exceeding 90 degrees.

[0010] Preferably, the guiding device further includes a venting member disposed adjacent to a flue gas discharging end of the guiding shroud, and the smoke exhaust port is defined by the venting member, and the venting member has a vertical portion extending vertically.

[0011] In an alternative embodiment, the flue hood accessory further includes an inner cover disposed in the outer cover for surrounding the flue pipe of the gas appliance, wherein the inner cover has an air inlet for ingress of air required for combustion, and the air inlet is isolated from the smoke exhaust port of the outer cover.

[0012] Preferably, the flue hood accessory further includes a sleeve disposed in the outer cover and extending axially through the inner cover for surrounding over the flue pipe of the gas appliance, and a partition surrounding an outer wall of the sleeve and covering the inner cover to isolate the smoke exhaust port of the outer cover from the air inlet of the inner cover.

[0013] Preferably, the air required for combustion enters the space defined by the outer cover, the inner cover, and the partition from the bottom of the outer cover, and passes through the air inlet and flows into the space defined by the sleeve, the inner cover, and the partition, thereby entering the interior of the housing of the gas appliance.

[0014] In one embodiment, the fixing mechanism includes screws and through holes defined in the outer cover for being passed through by the screws.

[0015] According to another aspect of the present invention there is provided an assembly of a flue hood accessory and a gas appliance. The assembly includes a gas appliance and a flue hood accessory as mentioned above. The gas appliance includes a housing, and a burner and a flue pipe both housed in the housing. The burner burns a mixture of gas and air and generates flue gas. The flue pipe has a portion extending beyond the top of the housing for discharging the flue gas out of the housing. The flue hood accessory is disposed at the top of the housing of the gas appliance and covers above the outlet of the flue pipe.

[0016] Preferably, the housing includes a front panel, a back panel, a top panel, a bottom panel, and a pair of side panels, wherein the front panel is further provided with an air intake port for being passed through by air required for combustion.

[0017] Compared with the state of art, the present invention has the advantages that: Existing gas appliances suitable for indoor installation can also be installed for outdoor use by using a detachable flue hood accessory. Therefore, for manufacturers, it is not necessary to additionally develop and produce gas appliances dedicated to outdoor installation; for users, the gas appliances installed indoors can be directly moved to outdoors for installation by attaching the flue hood accessory. Accordingly, the costs for developing, manufacturing, and usage can be greatly reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] 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 perspective view of an assembly composed of a gas appliance and a flue hood accessory in accordance with a first embodiment of present invention;

Fig. 2 is a perspective view of the assembly shown in Fig. 1, wherein the flue hood accessory is exploded;

Fig. 3 is a schematic cross-sectional view of the assembly shown in Fig. 1 taken along a vertical section;

Fig. 4 is a perspective view of an assembly composed of a gas appliance and a flue hood accessory in accordance with a second embodiment of present invention;

Fig. 5 is an exploded perspective view of the flue hood accessory of the assembly shown in Fig. 4;

Fig. 6 is a schematic cross-sectional view of the flue hood accessory of the assembly shown in Fig. 4 tak-

en along a vertical section;

Fig. 7 is a perspective view of an assembly composed of a gas appliance and a flue hood accessory in accordance with a third embodiment of present invention;

Fig. 8 is a perspective view of an assembly composed of a gas appliance and a flue hood accessory in accordance with a fourth embodiment of present invention;

Fig. 9 is a perspective view of an assembly composed of a gas appliance and a flue hood accessory in accordance with a fifth embodiment of present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] 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.

[0020] Gas water heaters and gas boilers could be fired with combustible gas, such as natural gas, city gas, liquefied petroleum gas, methane, etc., thereby supplying hot water and/or heating living space for domestic sanitary usage and heating purpose. The embodiments to be described below take a gas water heater as an example, however, the present invention is not limited to this, and it can also be applied on gas boilers or other domestic gas appliances.

[0021] Referring to Figs. 1-3, which show an assembly 100 composed of a gas water heater and a flue hood accessory in accordance with a first embodiment of present invention. As shown in Fig. 3, in this embodiment, the gas water heater includes a housing 11; and a burner 12, a heat exchanger 13, and a fan 14 are all housed in the housing 11. A flue pipe 15 extends beyond the top of the housing. A water inlet pipe, a water outlet pipe, and a gas supply pipe are all extend beyond the bottom of the housing 11.

[0022] The housing 11 can be formed by a number of panels, such as a front panel 111, a back panel 112, a top panel 113, a bottom panel 114, and a pair of side panels 115. The appliance is mounted to a wall with its back panel facing the wall. The burner 12 normally includes a burner casing in which burner units, such as a number of burner plates arranged side by side, are typically disposed. Each burner plate is provided with a gas-air mixing chamber where the gas supplied by the gas supply pipe and primary air are mixed, and the gas-air mixture is transmitted to fire holes defined at the top of each burner plate to be burnt and generate hot flue gas.

Since the construction and arrangement of the burner plates are well known to those skilled in the art, the applicant will not describe them in details for sake of simplicity.

[0023] The heat exchanger 13 is mounted above the burner 12. In this embodiment, the heat exchanger can be a fin-tube heat exchanger, that is, the heat exchanger is composed of a number of fins, and a heat-absorbing tube twists and turns through these fins with two ends being connected to the water inlet pipe and the water outlet pipe respectively. The gas-air mixture is combusted in a combustion chamber formed by splicing the burner casing and the heat exchanger casing, and the generated heat is absorbed by the fins and further transmitted to water flowing through the heat-absorbing tube, and then the hot water passes through the water outlet pipe for domestic use, thereby providing users with drinking water, bathing and the like.

[0024] A blower 14 is installed above the heat exchanger 13 for driving the flow of air required for combustion and to cause the flue gas generated by the combustion to enter the flue pipe 15 mounted above the blower 14. The flue pipe 15 extends out of the housing 11 and partially protrudes the top panel 113 of the housing, so that the flue gas can be discharged to the outside of the housing 11.

[0025] As shown in Figs. 1 and 2, the flue hood accessory 2 includes an outer cover, a guiding shroud 24, a mounting plate 22, a seal ring 23, and a venting member 25. In this embodiment, the outer cover is formed by assembling a body 211 and a cover plate 212. In other embodiments, the outer cover may be integrally formed by the two parts. The outer cover is detachably mounted to the top panel 113 of the housing 11 by a fixing mechanism. In this embodiment, the fixing mechanism includes screws (not shown) and through holes 2111 formed in the body 211, so that the screws can pass through the through holes 2111 and engage with corresponding screw holes in the housing, thereby securing the outer cover to the housing. When disassembly is required, the screws are unscrewed so that the outer cover can be detached from the housing. In other embodiments, the fixing mechanism may also take form of a locking assembly with complementary parts respectively disposed on the housing and the outer cover, thereby realizing assembling and disassembling of the outer cover and the housing. After the outer cover is mounted onto the top panel 113 of the housing, the cover plate 212 covers above an outlet of the flue pipe 15, so that the rain and snow can be prevented from intruding into the interior of the appliance through the outlet of the flue pipe.

[0026] The mounting plate 22 is located at the bottom of the outer cover and has through holes 222 for being passed through by the screws of the fixing mechanism so as to fix the outer cover and the mounting plate 22 to the top panel 113 of the housing. The mounting plate is provided with a ring seat 221, and the sealing ring 23 is disposed on the ring seat 221 and provides a central hole

231 for being extended through by the flue pipe 15. The center hole 231 of the seal ring 23 is interference-fitted with the outer wall of the flue pipe to prevent the flue gas from leaking from the outside of the flue pipe. The guiding shroud 24 is disposed within the outer cover and has a flat top portion and an extension portion extending obliquely downward from the top portion. Referring to Fig. 3, a bending portion 241 is formed between the top portion and the extending portion of the guiding shroud 24, and the bending portion 241 defines an included angle greater than 90 degrees, thereby causing the flue gas exhausted from the flue pipe 15 (as the dashed lines shown in Fig. 3) to turn the direction twice and finally to turn over 90 degrees with respect to the direction in which the flue gas is exhausted from the flue pipe 15. Since the direction of the flue gas being discharged from the flue hood accessory is downward as a whole, the rain and snow are prevented from intruding into the shroud or the outer cover through smoke exhaust ports. As a preferred embodiment, the flue hood accessory 2 further includes a venting members 25 disposed adjacent to a flue gas discharging end of the guiding shroud 24. The venting member 25 has a horizontal portion 252 and a vertical portion 253. The venting member 25 is provided with a number of ribs arranged along a longitudinal direction between the horizontal portion 252 and the vertical portion 253 to define a number of smoke exhaust ports 251. The venting member 25 is mounted to an edge of the mounting plate 22, and the edge of the mounting plate 22 is provided with a number of openings corresponding to the smoke exhaust ports 251, so that the flue gas is guided through the shroud 24 to the end of the flow path, and is further discharged to the outside through the openings of the edge of the mounting plate 22 and the smoke exhaust ports 251. The vertical portion 253 of the venting member 25 abuts against the top edge of the front panel 111 of the housing. In this way, the high-temperature flue gas discharged from the smoke exhaust ports 251 can be prevented from directly contacting the front panel sheet to avoid aging of the painted sheet of the front panel.

[0027] Figs. 4 and 6 show an assembly 200 composed of a gas appliance and a flue hood accessory in accordance with a second embodiment of present invention. In this embodiment, the flue hood accessory 3 includes an outer cover that has a cylindrical body 31 and a circular cover 312 that covers the top of the body 31. A number of smoke exhaust ports 311 are provided in the curved side wall of the cylindrical body 31. The flue hood accessory 3 further includes an inner cover 35 disposed within the outer cover and surrounding the flue pipe 15. The inner cover 35 is also in cylindrical shape, and its diameter is smaller than the diameter of the cylindrical body 31. The arcuate side wall of the inner cover 35 is provided with an air inlet 351 for ingress of air required for combustion. A sleeve 33 is disposed in the outer cover and extends axially through the inner cover 35 and surrounds the flue pipe 15. An annular partition 34 can be riveted

over an outer wall of the sleeve 33 and cover the top edge of the inner cover to isolate the smoke exhaust ports 311 of the outer cover from the air inlet 351 of the inner cover.

[0028] Referring to Fig. 6, the flue gas (as shown by dashed lines) is discharged into the outer cover 31 through the flue pipe 15 and the sleeve 33 surrounding over the flue pipe, and then discharged to outdoors through the smoke exhaust ports 311. The air required for combustion (as indicated by the dotted line) enters the space defined by the outer cover, the inner cover 35, and the partition 34 from the bottom of the outer cover, and passes through the air inlet 351 and flows into the space defined by the sleeve 33, the inner cover 35, and the partition 34, thereby entering the interior of the housing 11 of the gas appliance. In this embodiment, the flue hood accessory 3 can be detachably mounted to the top panel 113 of the housing by the same fixing mechanism as described in the first embodiment; in addition, a mounting plate and a sealing ring similar those in the first embodiment can be disposed between the inner cover 35 and the top panel 113 of the housing. Since the fixing mechanism and the arrangement of the mounting plate and the sealing ring are substantially the same as those in the first embodiment, the applicant will not describe them in details for sake of simplicity.

[0029] Fig. 7 shows an assembly 300 composed of a gas appliance and a flue hood accessory in accordance with a third embodiment of present invention. In this embodiment, the flue hood accessory 4 has an outer cover having a cover plate 41 that covers the outlet of the flue pipe 15 and a pair of support legs 42. The support legs are detachably mounted to the top panel 113 of the housing by a fixing mechanism as described in the above embodiments. The space defined by the cover plate 41, the support legs 42, and the top panel 113 of the housing forms a smoke exhaust port 43 for exhausting flue gas from the flue pipe to the outside. Furthermore, the flue hood accessory 4 may include a mounting plate and a seal ring disposed between the support legs 35 and the top panel 113 of the housing. Since the fixing mechanism and the arrangement of the mounting plate and the sealing ring are substantially the same as those in the first embodiment, the applicant will not describe them in details for sake of simplicity.

[0030] Fig. 8 shows an assembly 400 composed of a gas appliance and a flue hood accessory in accordance with a fourth embodiment of present invention. In this embodiment, the flue hood accessory 5 has an outer cover having a body 52 and a cover plate 51 formed on the top of the body to cover the outlet of the flue pipe 15. The body 52 is detachably mounted to the top panel 113 of the housing by a fixing mechanism as described in the above embodiments. A rectangular smoke exhaust port 43 is defined in a front wall of the body 52 for discharging flue gas from the flue pipe to outdoors. Furthermore, the flue hood accessory 4 may further include a mounting plate and a sealing ring disposed between the bottom of

the body 52 and the top panel 113 of the housing. Since the fixing mechanism and the arrangement of the mounting plate and the sealing ring are substantially the same as those in the first embodiment, the applicant will not describe them in details for sake of simplicity.

[0031] Fig. 9 shows an assembly 500 composed of a gas appliance and a flue hood accessory in accordance with a fifth embodiment of the present invention. In this embodiment, the flue hood accessory 6 includes an outer cover having a cylindrical body 62 and a conical cover 61 formed on the top of the body for covering above the outlet of the flue pipe 15. A number of smoke exhaust ports 621 are defined in the side wall of the body 62 for exhausting flue gas from the flue pipe to outdoors. The main difference from the aforementioned embodiments is that, in the present embodiment, an air intake port 110 for being passed through by the air required for combustion is disposed at a lower portion of the front panel 111. Moreover, the flue hood accessory 6 can be detachably mounted to the flue pipe 15 by a fixing mechanism. Since the fixing mechanism is similar to that described in the first embodiment, the applicant will not describe them in details for sake of simplicity. Furthermore, the air intake port provided on the front panel can also be employed in other embodiments.

[0032] Existing gas appliances suitable for indoor installation can also be installed for outdoor use by using a flue hood accessory as described above. Therefore, for manufacturers, it is not necessary to additionally develop and produce gas appliances dedicated to outdoor installation; for users, the gas appliances installed indoors can be directly moved to outdoors for installation by attaching the flue hood accessory. Accordingly, the costs for developing, manufacturing, and usage can be greatly reduced.

[0033] 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 hood accessory (2, 3, 4, 5, 6) adapted to be attached to an indoor gas appliance (1) such that the indoor gas appliance can be installed for outdoor use, wherein the gas appliance comprises a housing (11) and a flue pipe (15) extending outside the housing; **characterized in that** said flue hood accessory comprises:

an outer cover having a cover plate (212, 312,

- 41, 51, 61) that covers above an outlet of the flue pipe, and a smoke exhaust port (251, 311, 43, 53, 621) provided on the portion of the outer cover other than said cover plate for exhausting flue gas; and
 a fixing mechanism for detachably fixing the outer cover to the housing or the flue pipe of the gas appliance.
2. A flue hood accessory according to claim 1, **characterized in that** the flue hood accessory further comprises a mounting plate (22) and a sealing ring (23) engaging with the mounting plate, wherein said mounting plate engages with the outer cover and the fixing mechanism such that it can be mounted to the housing of the gas appliance with said sealing ring engaging with the flue pipe of the gas appliance.
 3. A flue hood accessory according to claim 1, **characterized in that** the flue hood accessory further comprises a guiding device disposed in the outer cover, said guiding device comprises a guiding shroud (24) having a bending portion (241) with an included angle greater than 90 degrees so that the flue gas exhausted from the flue pipe is discharged out of the outer cover after a turn exceeding 90 degrees.
 4. A flue hood accessory according to claim 3, **characterized in that** the guiding device further comprises a venting member (25) disposed adjacent to a flue gas discharging end of the guiding shroud, and said smoke exhaust port (251) is defined by the venting member, and the venting member has a vertical portion (253) extending vertically.
 5. A flue hood accessory according to claim 1, **characterized in that** the flue hood accessory further comprises an inner cover (35) disposed in the outer cover for surrounding the flue pipe of the gas appliance, said inner cover has an air inlet (351) for ingress of air required for combustion, and said air inlet is isolated from the smoke exhaust port (311) of the outer cover.
 6. A flue hood accessory according to claim 5, **characterized in that** the flue hood accessory further comprises a sleeve (33) disposed in the outer cover and extending axially through the inner cover for surrounding over the flue pipe of the gas appliance, and a partition (34) surrounding an outer wall of the sleeve and covering the inner cover to isolate the smoke exhaust port of the outer cover from the air inlet of the inner cover.
 7. A flue hood accessory according to claim 6, **characterized in that** the air required for combustion enters the space defined by the outer cover, the inner cover (35), and the partition (34) from the bottom of the outer cover, and passes through the air inlet (351) and flows into the space defined by the sleeve (33), the inner cover (35), and the partition (34), thereby entering the interior of the housing of the gas appliance.
 8. A flue hood accessory according to claim 1, **characterized in that** the fixing mechanism comprises screws and through holes defined in the outer cover for being passed through by the screws.
 9. An assembly of a flue hood accessory and a gas appliance, **characterized in that** said assembly comprises:
 - a gas appliance (1) comprising a housing (11), and a burner (12) and a flue pipe (15) both housed in the housing; the burner burning a mixture of gas and air and generating flue gas; the flue pipe having a portion extending beyond the top of the housing for discharging the flue gas out of the housing;
 - a flue hood accessory according to any of the preceding claims, said flue hood accessory being disposed at the top of the housing of the gas appliance and covering above the outlet of the flue pipe.
 10. The assembly according to claim 9, **characterized in that** the housing comprises a front panel (111), a back panel (112), a top panel (113), a bottom panel (114), and a pair of side panels (115), wherein the front panel is further provided with an air intake port (110) for being passed through by air required for combustion.

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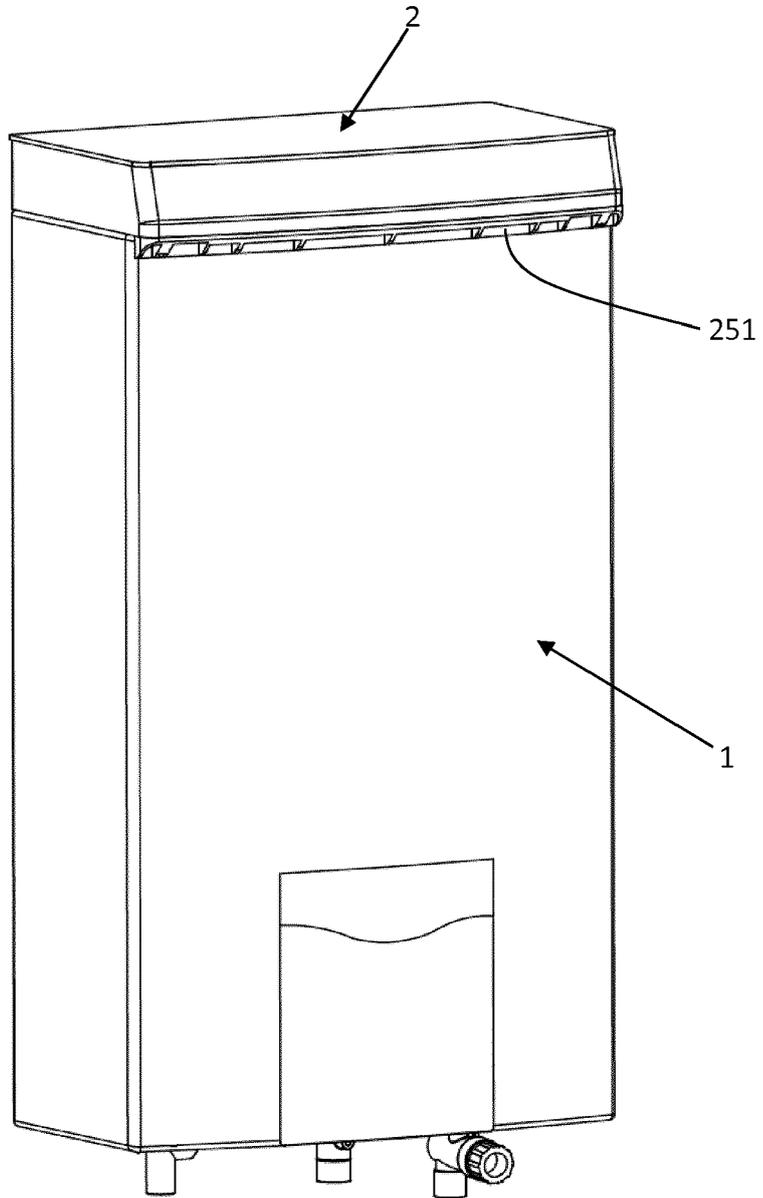


Fig. 1

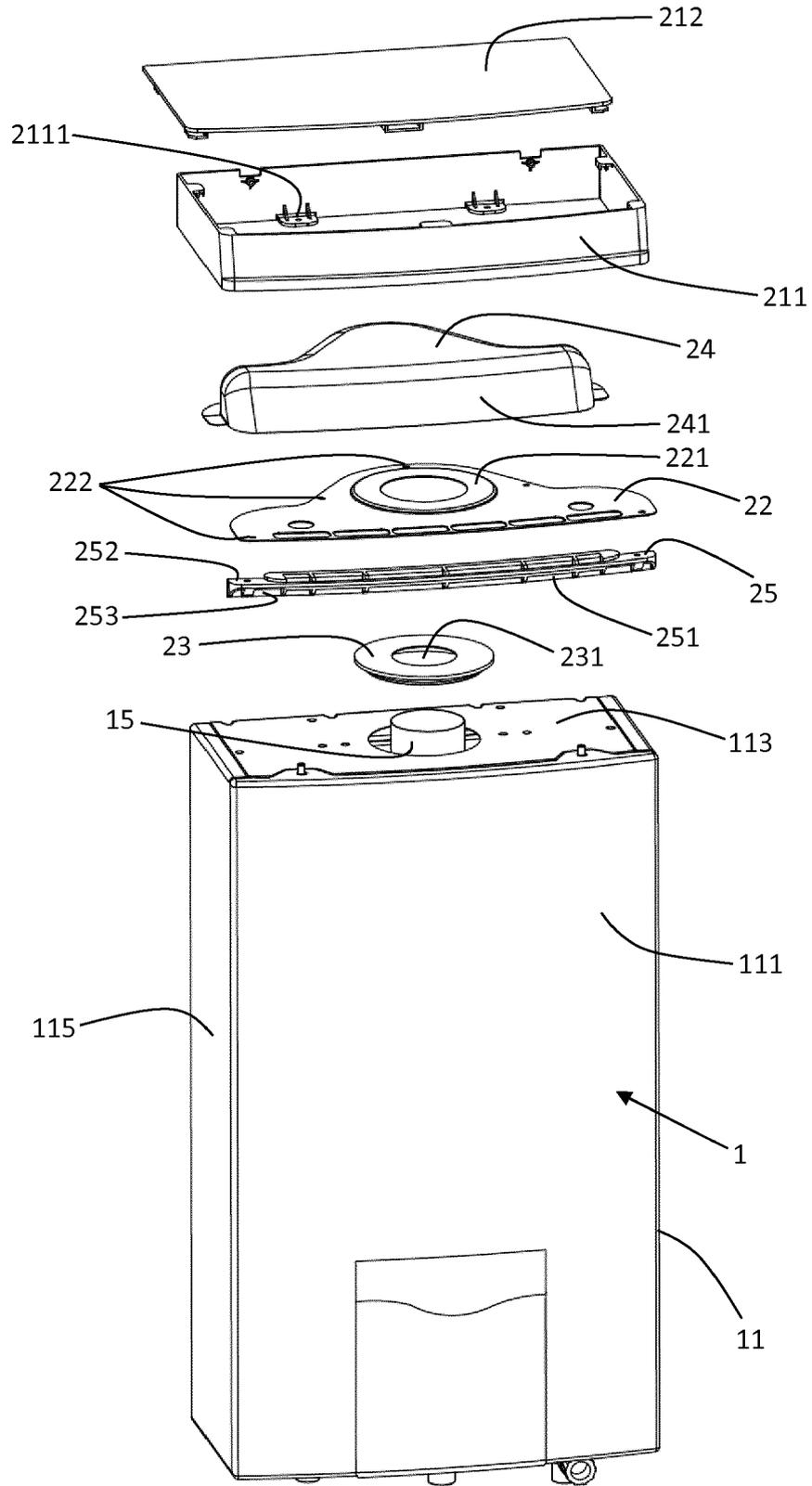


Fig. 2

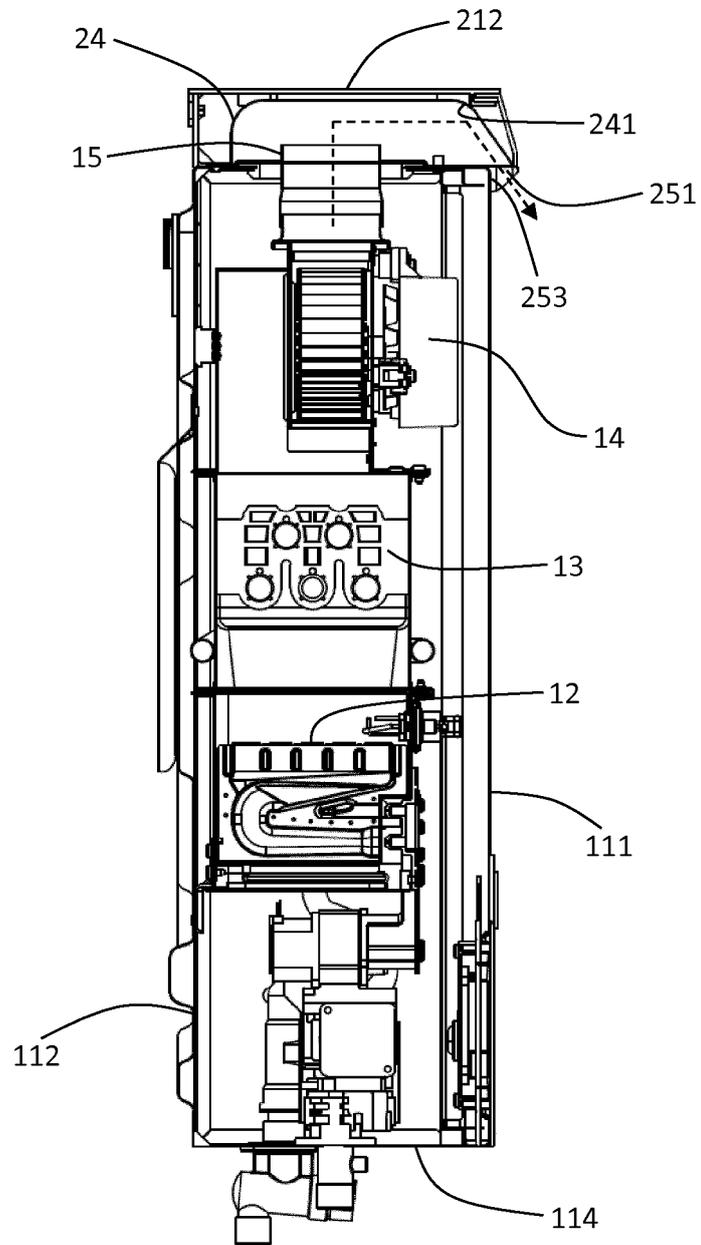


Fig. 3

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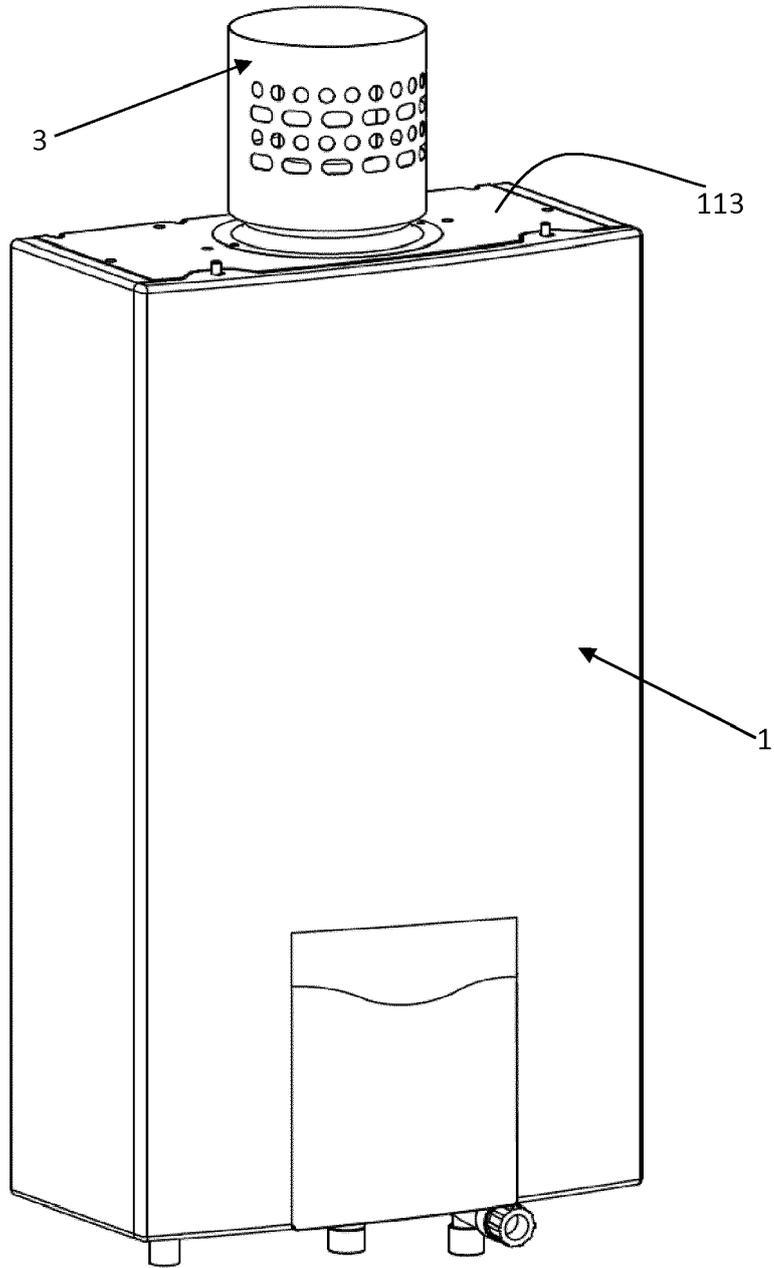


Fig. 4

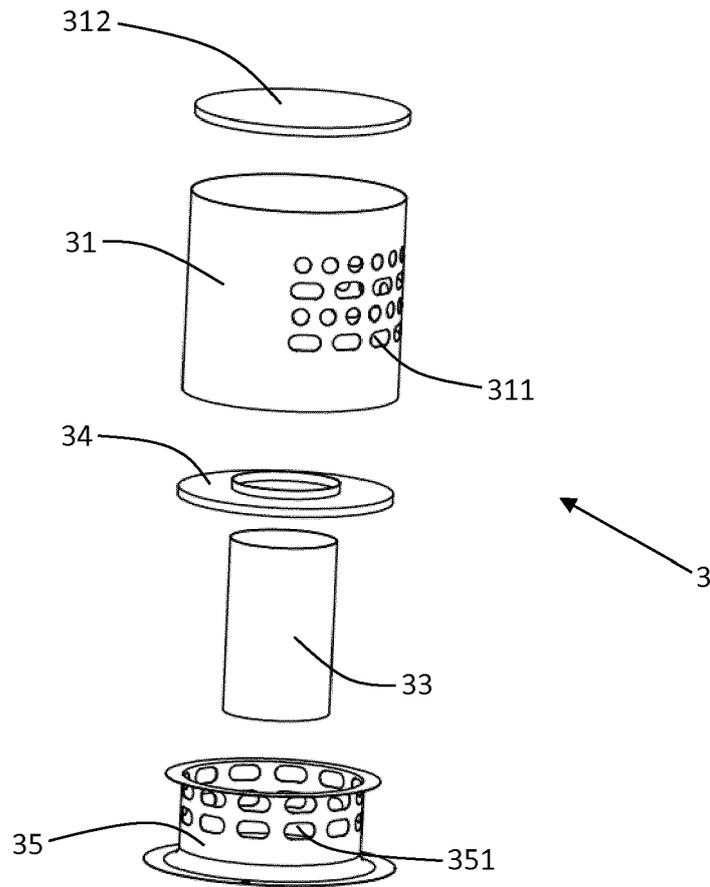


Fig. 5

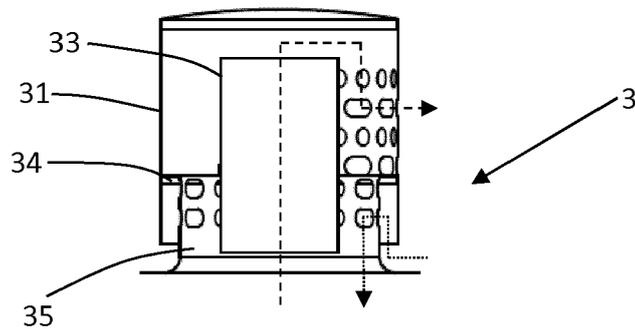


Fig. 6

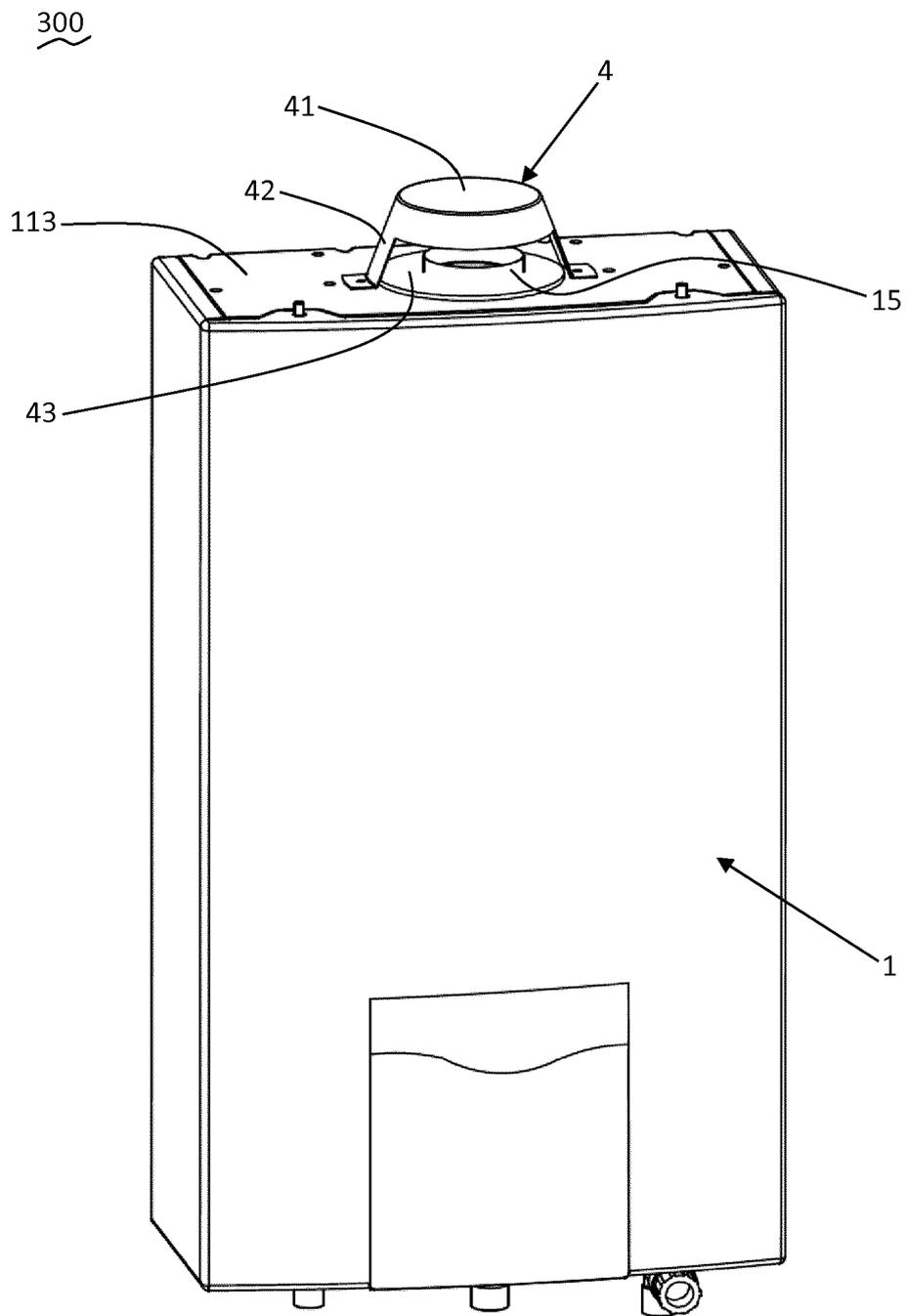


Fig. 7

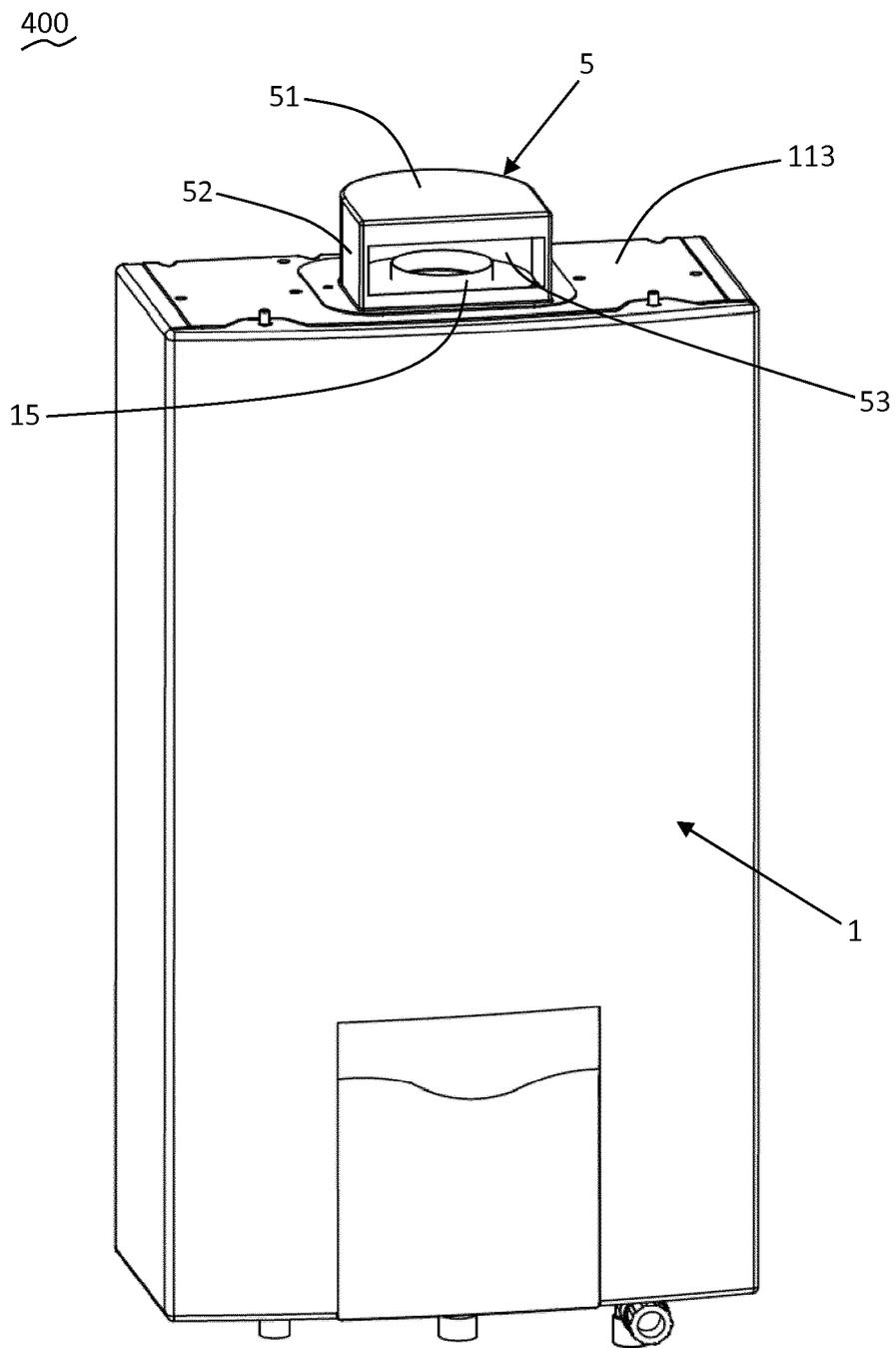


Fig. 8

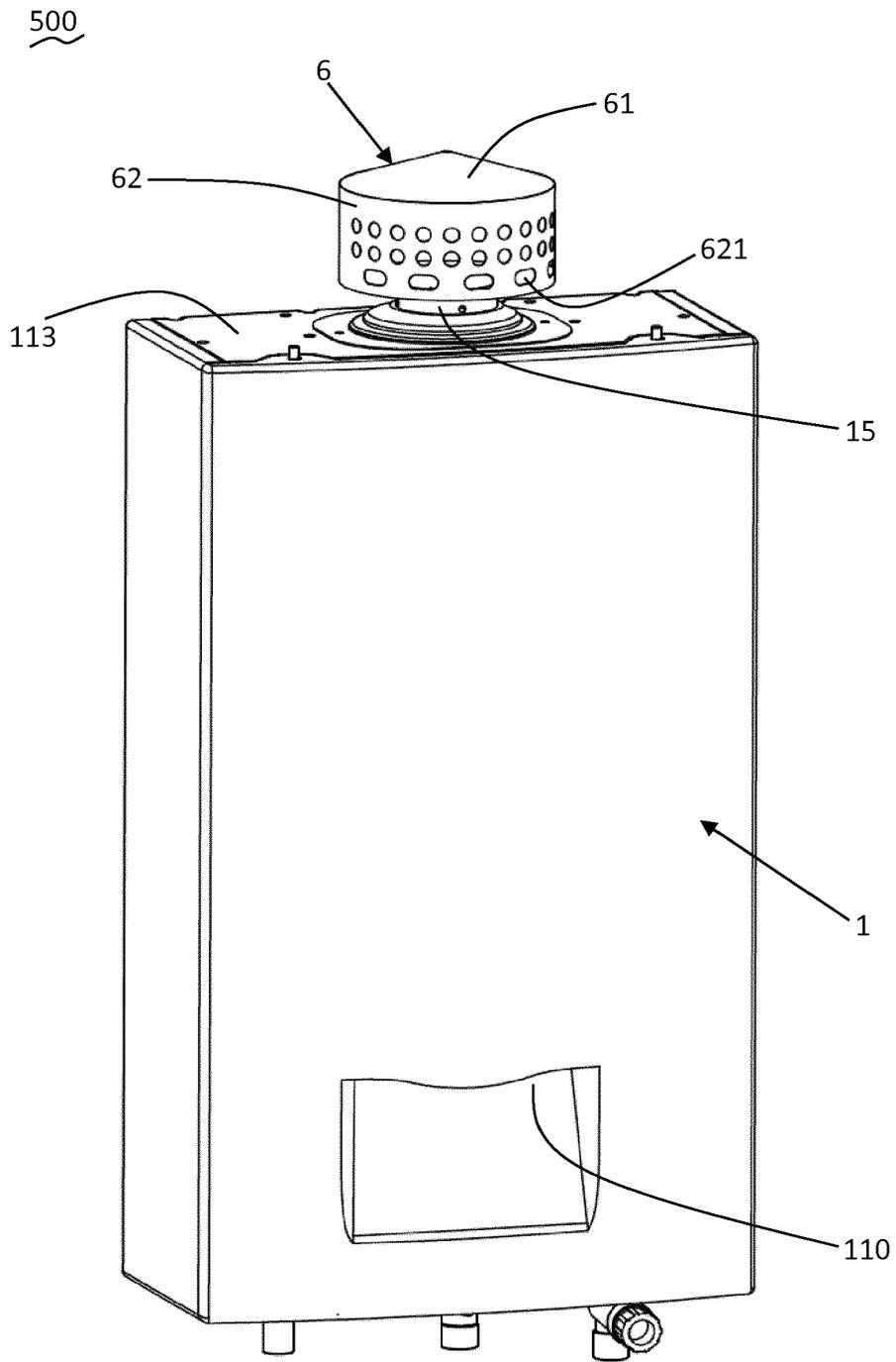


Fig. 9



EUROPEAN SEARCH REPORT

Application Number
EP 18 19 4490

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 January 2019	Examiner Ast, Gabor
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ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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