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(54) **INTERNAL FITTING SEAL**

(57) Seal (1), in particular an internal fitting seal, fixable to a flue (2) of a combustion appliance (3), in particular a gas boiler, the seal (1) having a main body (4) comprising a front section (5) comprising a covering flange (6), a rear section (7) comprising at least a sealing

lip (8), and a fixing section (9) located between the front section (5) and the rear section (7), wherein the fixing section (9) comprises fixing means (10) used for fixing the seal (1) to an external surface (11) of the flue (2) of the combustion appliance (3).

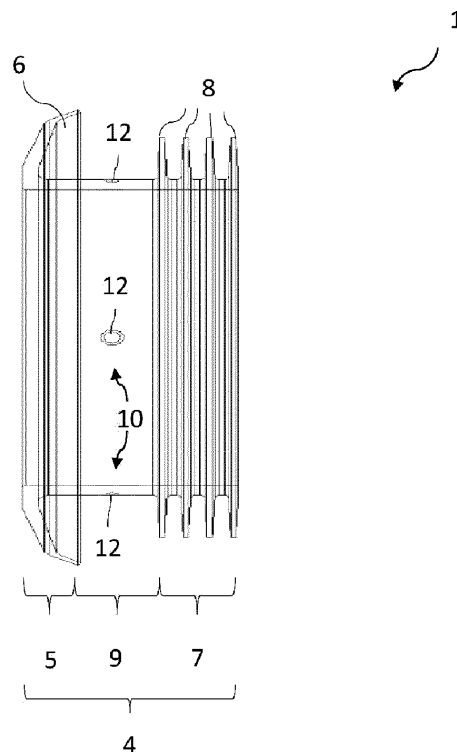


FIG. 1

Description

[0001] The invention relates to a seal, in particular to an internal fitting seal fixable to a flue of a combustion appliance. Additionally, the invention relates to an apparatus for a combustion appliance, in particular a direct flue elbow comprising said seal and to a combustion appliance comprising said seal or said apparatus. Also, the invention relates to a retrofit kit for a combustion appliance comprising said seal or said apparatus and a method for retrofitting a combustion appliance.

[0002] Installing a combustion appliance, such as a gas boiler, especially replacing old appliances, can be extremely time consuming due to several safety requirements that need to be fulfilled. For example, it is necessary to correctly install the flue assembly in order to avoid emission of toxic gases, when the combustion appliance is installed in a closed room. Accordingly, a safe sealing assembly is needed. For this purpose, it is usually required more than one person using scaffoldings and/or ladders to adapt existing covers and seals for the new system and create suitable environmental seal from the outside. In many cases, it is necessary to modify the masonry of the building containing the combustion assembly by repairing exterior bricks.

[0003] It is therefore desirable to obtain a safe and relatively low-cost sealing assembly to be installed to a flue of a combustion appliance that facilitates the installation work of a combustion appliance, particularly in a closed room. It is furthermore desirable that the sealing can be mounted relatively quickly and by a reduced number of specialized personnel, without affecting the safety requirements. In addition, it is desirable that the sealing assembly can be used to an already existing combustion appliance without the necessity of damage the masonry of the building.

[0004] Prior art fails to address the problem of simplifying the mounting of the sealing assembly for a flue conduit when installing a new gas boiler or when adapting an old gas boiler. Also, the prior art documents are not suitable to provide a solution that is cost effective and safe.

[0005] The object of the invention is therefore to provide a seal that is easy to implement, cost-effective, safe, and in particular easy and efficient to mount.

[0006] The object is solved by a seal, in particular an internal fitting seal, fixable to a flue of a combustion appliance, in particular a gas boiler, the seal having a main body comprising: a front section comprising a covering flange, a rear section comprising at least a sealing lip, and a fixing section located between the front section and the rear section, wherein the fixing section comprises fixing means used for fixing the seal to an external surface of the flue of the combustion appliance.

[0007] Thanks to the present seal, a boiler flue assembly can be installed by a single person from the interior of the property, thereby creating an environmental seal for the outside. In fact, with this configuration it is possible

to fix the seal to the flue before fitting, thereby resulting in the removal of the need to physically get to the outside of the property. In addition, the need to repair the exterior brick and fit the external black cover is no longer required.

5 This also removes the need to hire additional personal to do the install from the exterior of the property at the same time, removing additional risk and cost.

[0008] In order to facilitate the production of the seal, the main body can be a one piece element and/or can be deformable. In particular the main body can be configured so that it can deform when the seal is pushed through a hole of a wall which has a slightly smaller dimension, in particular cross section, than the seal.

10 **[0009]** In addition, the main body can be made of a material suitable for molding, in particular is made of rubber. Accordingly, the seal can be manufactured by injection molding, i.e. by one shot injection rubber mold. The rubber can have a shore hardness comprised between A40 and A80, in particular A60. In this way, the main body of the seal is deformable in such a way that the metal flue with the seal fixed to it can be passed through the hole in the wall from the interior of the property till the front flange. When passed the wall, the seal can reassume the original shape and can be arranged flush with the external wall. Here the seal is also acting as an aesthetic cover to hide any brickwork/external surface damaged that may have occurred during the installation. In particular, the front section of the main body can act as an aesthetic cover and a rear section can act as an environmental seal. It is noted that the external aesthetic seal is merged here with the environmental seal. Therefore, there is no need to fit (external) existing covers and seals using for example cement. This reduces the installation time and costs.

25 **[0010]** In one example, the fixing means can comprise one or more openings. The opening can be a through hole or a dimple, in particular a receptacle, wherein a dimple is a small hollow place, in particular having a diameter of 2 to 5 mm. Advantageously, the openings can be disposed equidistant around the main body. In this way, the seal can be fixed to the flue of the combustion appliance by using screws passing through the openings. The flue can be made of a metallic material.

30 **[0011]** According to an example, the main body can be ring shaped. Also, the front section can have a greater diameter than the rear section. In this way, the front section can better act as an aesthetic cover, as already mentioned. In particular, the front section can shield from the wind, UV and some rain/water entrance. In addition, in the axial direction, the length of the front section can be smaller than the length of the rear section. A longer rear section ensures a better environmental sealing of this section. To better adapt the seal to the flue, the front section, the rear section and the fixing section can be shaped having a rotational symmetry.

45 **[0012]** In another example, the main body has an internal opening with an internal diameter comprised between 50 mm (millimeter) and 150 mm, in particular 100

mm or 127 mm. These dimensions fit with existing wall bore sizes of 50mm and 150mm, in particular 100 mm or 127 mm. Seals having a main body with a smaller internal diameter can be used for retrofitting installations and seals having a main body with a greater internal diameter can be used for new installations.

[0013] The rear section comprises at least a sealing lip. This lip is used to prevent the external environmental conditions from passing through the wall bore. The number of sealing lips can be varied. With only one sealing lip, there is the risk of not creating a correct environmental seal. This is because the installer must be more precise and accurate with the measuring and cutting/setting of the flue length. By adding the number of lips, a better environmental seal can be obtained. Also, the sealing lips can aid in keeping the flue concentric. The more lips are present, the more they centralize the flue in position. However, too many sealing lips can create undesired friction between the wall the seal, thereby becoming a hindrance and preventing installation.

[0014] In one example, the rear section comprises four sealing lips. Four lips are considered a perfect compromise between a good environmental sealing and a reduced friction with the wall.

[0015] In another aspect of the invention, an apparatus for a combustion appliance, in particular a direct flue elbow, is provided. The apparatus comprises a flue having a first end connectable to the appliance for receiving a flue gas from said appliance and a second end for the outlet of the flue gas, the second end being configured for discharging the fuel gas in the external environment, and the inventive seal fixable at the second end of the flue.

[0016] According to one aspect of the invention, a combustion appliance, in particular a gas boiler, is provided, the combustion appliance comprising an inventive seal or the inventive apparatus. Examples of combustion appliances can include furnaces, water heaters, boilers, direct/in-direct make-up air heaters, power/jet burners and any other residential, commercial or industrial combustion appliance.

[0017] In another aspect of the invention, retrofit kit for a combustion appliance, in particular a gas boiler is provided. The kit comprises at least an inventive seal or at least an inventive apparatus and means for installing the seal at a flue of the combustion appliance or for installing the apparatus in the combustion appliance. The fixing means it can be for example connecting elements such as screws or pins to fix the seal to the flue or to fix the apparatus to a component of the appliance. Advantageously, the kit can comprise two inventive seals of different size, i.e. two seals having a main body with two different internal diameters, between 50 mm and 150 mm, in particular 100 mm or 127 mm.

[0018] In a further aspect of the invention, a method for retrofitting a combustion appliance, in particular a gas boiler is provided. The method comprises:

fixing at least an inventive seal to a flue of the combustion appliance, or
installing an inventive apparatus in the combustion appliance.

[0019] In one example, the method comprises passing the flue through an opening in a wall after fixing the seal to said flue.

[0020] In the figures, the subject-matter of the invention is schematically shown, wherein identical or similarly acting elements are usually provided with the same reference signs.

Figure 1 shows a schematic representation of a seal according to an example.

Figure 2 shows a schematic representation of a seal applied to a flue of a combustion appliance according to an example.

Figure 3 shows a schematic representation of an apparatus according to an example.

[0021] With reference to Figure 1, an internal fitting seal 1 is shown. The seal 1 is a one-piece structure made for example of rubber. The seal 1 has a main body 4 comprising a front section 5, a rear section 7 and a fixing section 9 located between the front section 5 and the rear section 7. All these sections, and therefore the main body of the seal 1, have a shape with rotational symmetry, for example are ring-shaped with a central opening or internal opening (not shown in the figure) so that a flue conduit 2 can be inserted in the seal 1 through said internal opening. The front section 5 is provided with a covering flange 6 that acts as an aesthetic seal cover. The rear section 7 comprises four sealing lips 8 arranged equidistant at one end of the main body 4. The lips 8 serve to correctly center the seal 1 when fixed to the flue and to ensure an environmental sealing. The fixing section 9 comprises fixing means 10 distributed along the surface of the fixing section. In particular, the fixing means 10 are openings 12. These openings 12 can be dimples, in particular receptacles, or through holes and are four and are arranged at 90 degrees apart to mechanically fix the seal 1 to the flue 2, for example by using screws.

[0022] Figure 2 illustrates the application of the internal fitting seal 1 to the flue 2 of a combustion appliance 3. The combustion appliance 3 is located inside a closed room 19 that is separated from the external environment by a partitioning wall 17. The seal is fixed to the flue 2 for example by screwing screws through the openings 12. In particular, the flue 2 is inserted into a central opening of the seal 1 and the seal 1 is fixed to an external surface 11 of the flue 2, i.e., the fixing section 9 that is in contact with said internal surface 11 is fixed through the fixing means 10. It is noted that the seal 1 is fixed at a terminal end of the flue 2. Once the seal 1 is fixed to the flue 2, the flue is passed through an opening provided in

a partitioning wall 17. The flue 2 is pushed through the wall 17 until the front section 5, i.e. the covering flange 6 of the seal 1, exits the hole in the wall 17 and can be positioned flush with the external side of the wall 17. This is the only part of the seal 1 that is located outside the wall 17 after installation. Advantageously, the dimensions of the covering flange 6 are, in particular slightly, greater than the dimensions of the hole in the wall, so that the covering flange 6 is deformed when passing through the hole of the wall 17 but can function as covering seal once outside the hole. On the other hand, after installation, the other sections of the main body 4 of the seal 1 are located inside the hole of the wall 17 and act respectively as fixing element (fixing section 9) and as environmental seal (rear section 7). It is noted that the entire process of fixing the seal 1 and installing the flue 2 of the combustion appliance 3 outside the room 19 can be carried out by remaining inside the room 19. Also, the installation can be carried out also by a single operator in a short time without the necessity of a ladder or scaffold and without the necessity of repairing damages to the external side of the wall 17.

[0023] Figure 3 illustrates a more detailed example of the application of the seal 1. In particular, the figure 3 shows the apparatus 13 that is a direct flue elbow. The apparatus 13 is composed by a flue 2 and the seal 1 fixed to the flue 2. In particular, the flue 2 comprises a first end 14 connectable to the appliance 3 for receiving a flue gas from the appliance 3. The appliance is for example a gas boiler. For the purpose of connecting the apparatus to the combustion appliance, the apparatus can comprise a connecting flange 18 at the first end 14 and suitable connecting elements, such as screws or pins, can be used. The flue 2 comprises also a second end 15 for the outlet of the flue gas. In particular, the second end 15 is configured for discharging the fuel gas in the external environment. The seal 1 is fixed to the second end 15 of the flue 2. As clearly shown in the figure, the seal 1 is fixed to the flue 2 by means of screws. According to the example of figure 3, the flue 2 passes through two walls 17 before exiting in the external environment. In principle, the flue 2 can pass any number of walls 17. The important aspect is that the seal 1 need to be fixed at a terminal end (i.e. the second end 15) of the flue 2. In the figure, the double function of the seal 1 is also clarified. At one hand, the front section 5, i.e. the covering flange 6, acts as a covering seal and, on the other hand, the rear section 7, i.e. the sealing lips 8, acts as an environmental seal. The apparatus 15 can easily be used to retrofit an existing combustion appliance 3, by simply connecting the apparatus 13 to the appliance 3, thereby replacing an existing flue assembly.

Reference Signs

[0024]

1. Seal

2. Flue
3. Combustion appliance
4. Main body
5. Front section
6. Covering flange
7. Rear section
8. Sealing lip
9. Fixing section
10. Fixing means
11. External surface
12. Opening
13. Apparatus
14. First end
15. Second end
16. Retrofit kit
17. Wall
18. Flange
19. Closed room

Claims

1. Seal (1), in particular an internal fitting seal, fixable to a flue (2) of a combustion appliance (3), in particular a gas boiler, the seal (1) having a main body (4) comprising:
 - a front section (5) comprising a covering flange (6);
 - a rear section (7) comprising at least a sealing lip (8); and
 - a fixing section (9) located between the front section (5) and the rear section (7),
 wherein the fixing section (9) comprises fixing means (10) used for fixing the seal (1) to an external surface (11) of the flue (2) of the combustion appliance (3).
2. Seal (1) according to claim 1, **characterized in that** the main body (4) is a one piece element.
3. Seal (1) according to any one of claims 1 to 2, **characterized in that** the main body (4) is made of a material suitable for molding, in particular is made of rubber.
4. Seal (1) according to claim 3, **characterized in that** the main body (4) is made of rubber having a shore hardness comprised between A40 and A80.
5. Seal (1) according to any one of claims 1 to 4, **characterized in that** the fixing means (10) comprise one or more openings (12).
6. Seal (1) according to any one of claims 1 to 5, **characterized in that** the opening (12) is a through hole or a dimple, in particular a receptacle.

7. Seal (1) according to claim 5 or claim 6, **characterized in that** the openings (12) are disposed equidistant around the main body (4). 5
8. Seal (1) according to any one of claims 1 to 7, **characterized in that** 5
- a. the main body (4) is ring shaped; and/or
 - b. the front section (5) has a greater diameter than the rear section (7); and/or 10
 - c. in the axial direction, the length of the front section (5) is smaller than the length of the rear section (7); and/or
 - d. the front section (5), the rear section (7) and the fixing section (9) are shaped having a rotational symmetry. 15
9. Seal (1) according to claim 8, **characterized in that** the main body (4) has an internal opening with an internal diameter comprised between 50 mm and 150 mm, in particular 100 mm or 127 mm. 20
10. Seal (1) according to any one of claims 1 to 9, **characterized in that** the rear section (7) comprises four sealing lips (8). 25
11. Apparatus (13) for a combustion appliance (3), in particular a direct flue elbow, comprising:
- a flue (2) having a first end (14) connectable to the appliance (3) for receiving a flue gas from said appliance (3) and a second end (15) for the outlet of the flue gas, the second end (15) being configured for discharging the fuel gas in the external environment, and 30
 - a seal (1) according to any one of the claims 1 to 10 fixable at the second end (15) of the flue (2). 35
12. Combustion appliance (3), in particular a gas boiler, comprising the seal (1) according to any one of claims 1 to 10 or the apparatus (13) according to claim 11. 40
13. Retrofit kit (16) for a combustion appliance (3), in particular a gas boiler, comprising at least a seal (1) according to any one of claims 1 to 10 or at least an apparatus (13) according to claim 11 and means for installing the seal (1) at a flue (2) of the combustion appliance (3) or for installing the apparatus (13) in the combustion appliance (3). 45 50
14. Method for retrofitting a combustion appliance (3), in particular a gas boiler, comprising fixing at least a seal (1) according to any one of claims 1 to 10 to a flue (2) of the combustion appliance (3), or installing an apparatus (13) according to claim 11 in the combustion appliance (2). 55
15. Method according to claim 14, further comprising passing the flue (2) through an opening in a wall (17) after fixing the seal (1) to said flue (2).

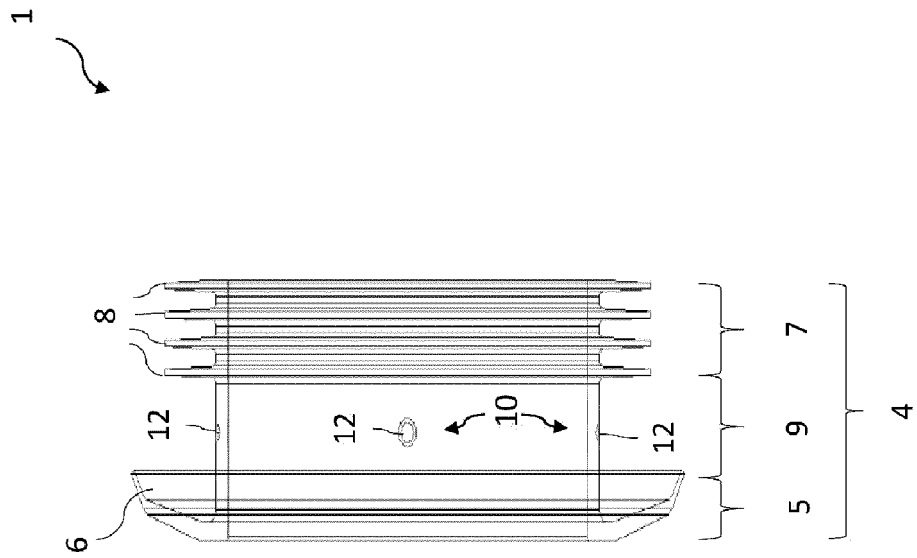


FIG. 1

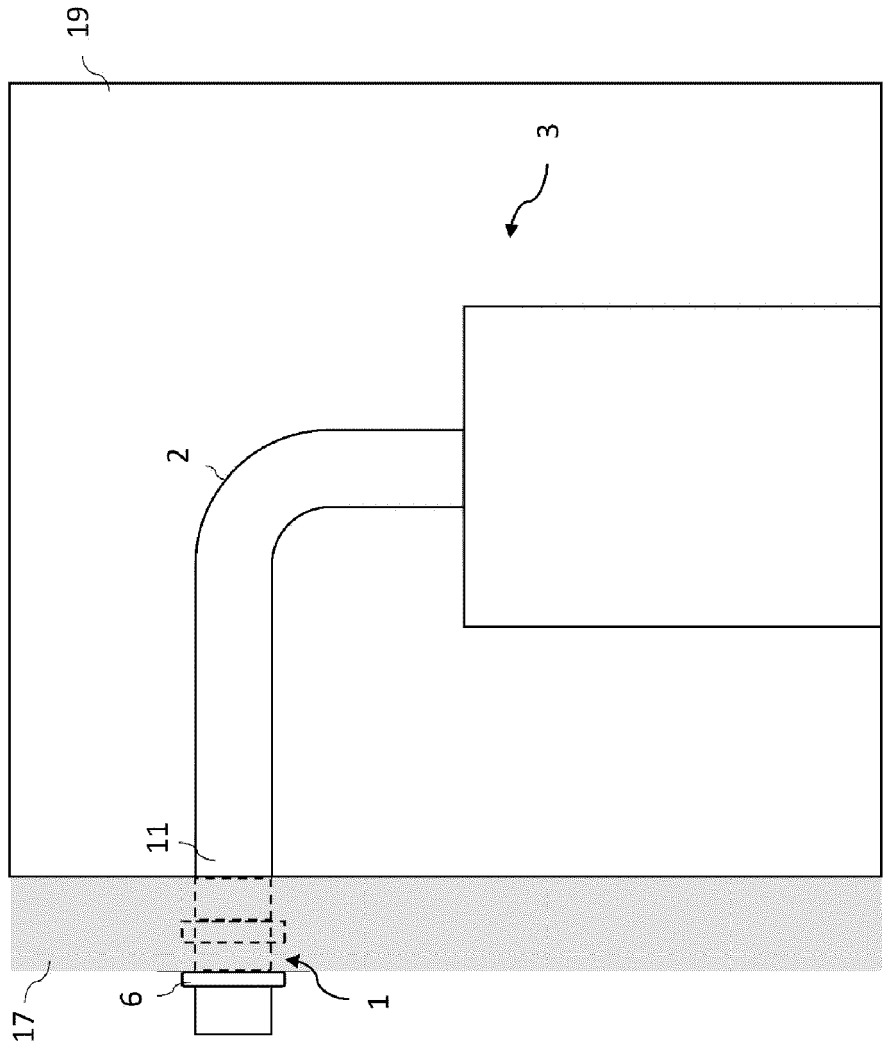


FIG. 2

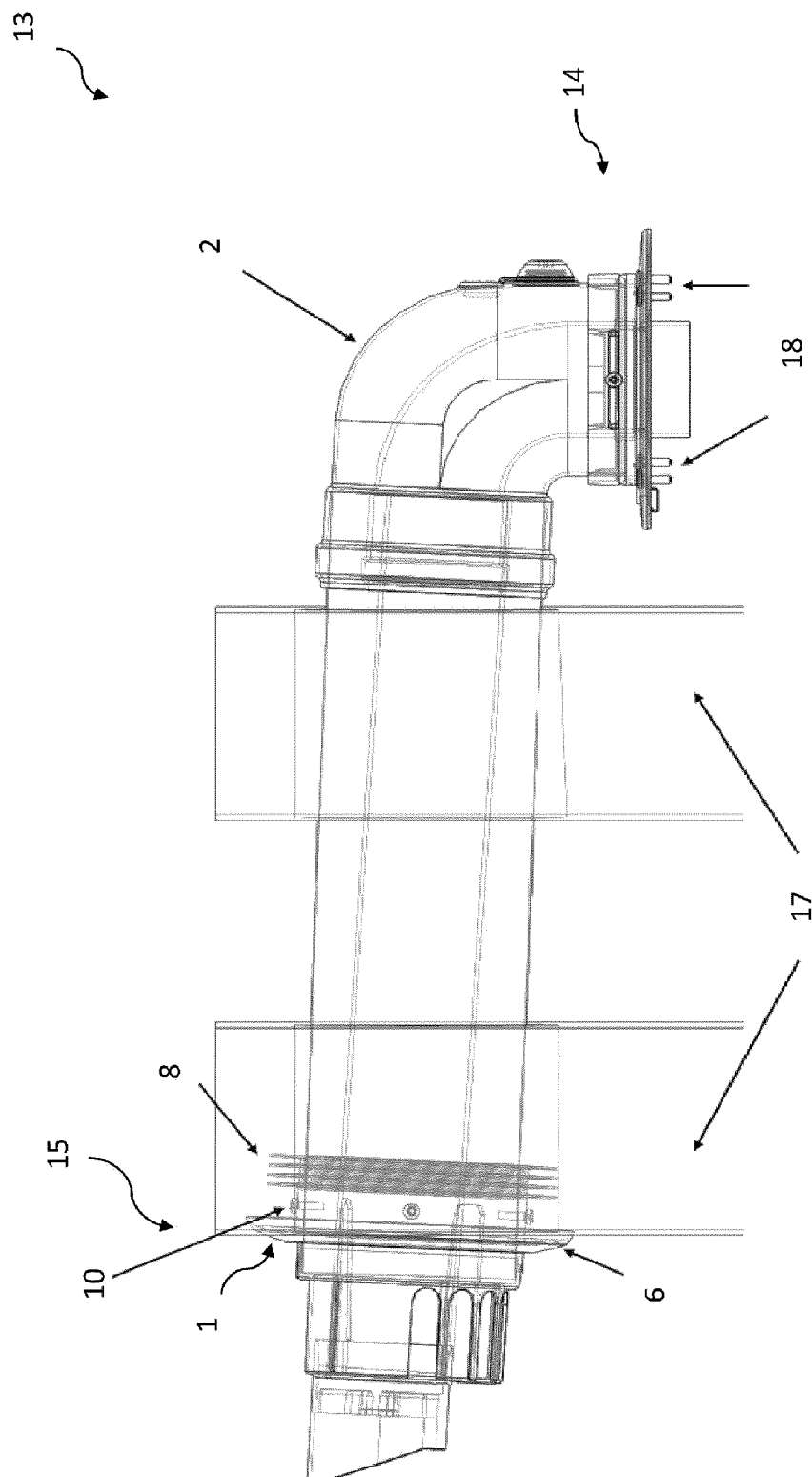


FIG. 3



EUROPEAN SEARCH REPORT

Application Number

EP 21 18 7847

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
			F23J
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 January 2022	Examiner Hauck, Gunther
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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