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(54) **Arrangement for inhibiting radon from entry in a building**

(57) An arrangement, kit and method. The arrangement (1) comprises an inspection chamber (2) arrangeable to ground. The inspection chamber (2) has a periphery wall (3) and open ends (4a, 4b). The periphery wall

(3) is made of material comprising thermoplastic material. A connector element (5) is arranged in the periphery wall (3), the connector element (5) establishing an opening through the periphery wall (3).

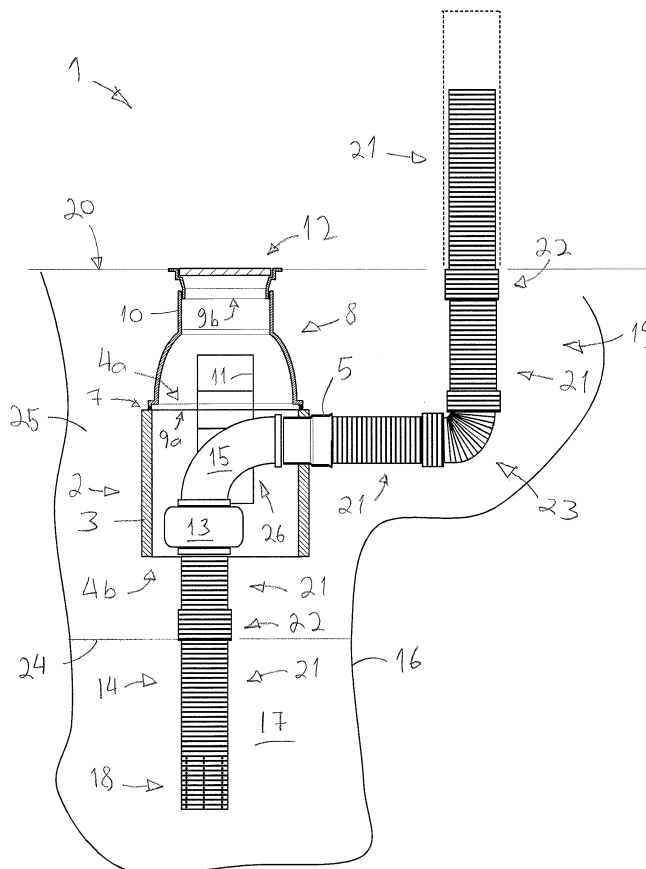


Fig. 2

Description

Background

[0001] The invention relates to an arrangement for inhibiting ingress of radon into a building.

[0002] The invention further relates to a kit comprising an arrangement for inhibiting ingress of radon into a building.

[0003] The invention further relates to a method for inhibiting ingress of radon into a building.

[0004] Radon is an intermediate decay product of uranium and thorium, which is naturally present in rocks and soils.

[0005] When radon filters from the ground externally, it is simply dispersed harmlessly into the atmosphere. However, if radon enters buildings and the concentration of the gas is allowed to accumulate, it can cause serious health problems. Radon enters buildings from structures abutting ground.

[0006] It is known great number of methods and arrangements for inhibiting ingress of radon into buildings. It is known, for instance, to use a radon well excavated next to the building for such purpose. The radon well comprises a suction duct that is connected to a blower. The blower sucks radon from beneath the building through said suction duct and blows it through a discharge duct into the atmosphere.

[0007] There is still need for alternative arrangements for said purpose.

Brief description

[0008] Viewed from a first aspect, there can be provided an arrangement comprising an inspection chamber arrangeable to ground, the inspection chamber having a periphery wall and open ends, the periphery wall made of material comprising thermoplastic material, and a connector element arranged in the periphery wall, the connector element establishing an opening through the periphery wall.

[0009] Thereby an arrangement which is easy in view of maintenance work taking place in the inspection chamber may be achieved.

[0010] Viewed from a further aspect, there can be provided a kit comprising a first amount of pipe elements for constituting the suction duct, a second amount of pipe elements for constituting the discharge duct, at least one socket for joining one of said pipe elements to another of said pipe elements, the first amount of pipe elements, the second amount of pipe elements and the at least one socket satisfying the need of a radon well of a typical building, and wherein the kit is arranged to a packing deliverable to a customer.

[0011] Thereby an arrangement which is easy to deliver may be achieved.

[0012] Viewed from a still further aspect, there can be provided a method for inhibiting ingress of radon into a

building, the method comprising: excavating an excavation to ground next to the building, arranging an arrangement of any of claims 1 to 11 into the excavation, and filling the excavation.

[0013] Thereby a method being easy to carry out may be achieved.

[0014] The arrangement, the kit and the method are characterised by what is stated in the independent claims. Some other embodiments are characterised by what is stated in the other claims. Inventive embodiments are also disclosed in the specification and drawings of this patent application. The inventive content of the patent application may also be defined in other ways than defined in the following claims. The inventive content may also be formed of several separate inventions, especially if the invention is examined in the light of expressed or implicit sub-tasks or in view of obtained benefits or benefit groups. Some of the definitions contained in the following claims may then be unnecessary in view of the separate inventive ideas. Features of the different embodiments of the invention may, within the scope of the basic inventive idea, be applied to other embodiments.

[0015] In one embodiment the connector element is a pipe socket comprising thermoplastic material. An advantage may be that the connector element is easy to connect to pipes and ducts.

[0016] In one embodiment the thermoplastic material of the inspection chamber and/or the connector element comprises polyolefin. An advantage may be that the material is light and durable.

[0017] In one embodiment a blower is arranged inside the inspection chamber, wherein the discharge channel of blower is connected to the inner end of the connector element, and a suction duct is connected to the intake channel of the blower, the suction duct extending from the inspection chamber through second open end of the inspection chamber. An advantage may be that there is no need for arranging the inspection chamber deep underground for sucking radon under the building.

[0018] In one embodiment the arrangement comprises a connecting duct having a bendable structure. An advantage may be that the connecting duct enables variations in the location of the blower within the inspection chamber.

[0019] In one embodiment a first and a second amount of pipe elements in the kit comprise pipe elements having an identical diameter. An advantage may be that the amount of components in the kit is low.

Brief description of figures

[0020] Some embodiments illustrating the present disclosure are described in more detail in the attached drawings, in which

Figure 1 a is a schematic side view of an example arrangement in partial cross-section,
Figure 1 b is a schematic top view of the arrangement

shown in Figure 1a in partial cross-section, Figure 2 is a schematic side view of an example arrangement and method in partial cross-section, Figure 3 is a schematic side view of an example of inspection chamber and extension element, Figure 4 is a schematic side view of a detail of an example arrangement, and Figure 5 is a schematic side view of an example kit.

[0021] In the figures, some embodiments are shown simplified for the sake of clarity. Similar parts are marked with the same reference numbers in the figures.

Detailed description

[0022] Figure 1a is a schematic side view of an example arrangement in partial cross-section and Figure 1b is a schematic top view of the very same arrangement in partial cross-section.

[0023] The arrangement 1 comprises an inspection chamber 2 having a periphery wall 3 and open ends, namely a first end 4a and a second end 4b.

[0024] The periphery wall 3 is of material comprising thermoplastic material. The thermoplastic material may be e.g. polyolefin, such as polyethylene PE or polypropylene, etc.

[0025] The periphery wall 3 may be manufactured by injection moulding, extrusion etc. and it may comprise one or more piece(s).

[0026] The basic form of the inspection chamber 2 is an annular cylinder. The diameter of the inspection chamber 2 may be e.g. 1000 mm.

[0027] Alternatively the basic form may be e.g. polygonal cylinder, truncated cone, spherical etc.

[0028] The inspection chamber 2 further comprises a connector element 5 arranged in the periphery wall 3. The connector element 5 establishes an opening 6 through the periphery wall 3 and it comprises means for receiving a duct both inside and outside of the periphery wall 3.

[0029] The connector element 5 is here a pipe socket that may be attached to the periphery wall 3 by e.g. welding or gluing. In another embodiment the connector element is integrated with the periphery wall 3. The connector element 5 may be manufactured from same materials as the periphery wall 3 and by similar methods.

[0030] The arrangement 1 further comprises an extension element 8 of inspection chamber. The extension element 8 may be made of material comprising thermoplastic material, e.g. of similar material as the inspection chamber 2, and using similar manufacturing methods.

[0031] The extension element 8 is a hollow rotationally symmetrical piece having a first aperture 9a fastenable to the first open end 4a of the inspection chamber, and a second aperture 9b having area smaller than one of the first aperture 9a.

[0032] The extension element 8 comprises a section 10 on the side of the second aperture 9b that has a con-

stant diameter. The inner diameter of the section 10 is preferably enough for maintenance-person to climb down a ladder 11. Inner diameter of the section 10 may be e.g. 600 mm.

[0033] Furthermore, there is a chamber cover 12 closing the second aperture 9b. The chamber cover 12 is openable and may be e.g. of plastic material or metal. According to an embodiment the chamber cover 12 is strong enough to stand traffic by motor vehicles on it.

[0034] The inspection chamber 2 and the extension element 8 will be arranged to an excavation and covered by ground. Therefore, their structure is rigid enough for standing loads caused by ground.

[0035] It is to be noted that the shape and surface structure of the inspection chamber 2 and the extension element 8 may vary. For example, the outer surface thereof may be smooth or it may comprise ribs and/or grooves giving mechanical strength, the wall thereof may comprise cavities or pores etc.

[0036] Figure 2 is a schematic side view of an example arrangement and method in partial cross-section. The arrangement 1 comprises an inspection chamber 2 and an extension element that may be similar to that shown in Figures 1 a and 1 b.

[0037] The arrangement 1 further comprises a blower 13 that is arranged inside the inspection chamber 3. The blower 13 may be e.g. electric blower and its functions are controlled by controlling means known *per se*.

[0038] The output of the blower may be e.g. 300 W which enables an efficient inhibiting ingress of radon not only under typical detached houses but also under typical row houses and apartment houses.

[0039] The intake channel of the blower 13 is connected to a suction duct 14 whereas the discharge channel of the blower 13 is attached to a connecting duct 15. Said connections may be secured by e.g. clamps.

[0040] The blower 13 shown in Figure 2 is mounted vertically so that its intake and discharge channels open downwards and upwards from the blower 13, respectively. In another embodiment at least one of said channels opens sideways from the blower 13.

[0041] The suction duct 14 is directed downward from the blower 13 extending through the second open end 4b of the inspection chamber 2 into an excavation 16. The suction duct 14 may be composed of one or more pipe sections, bends, sockets, socket bends etc.

[0042] The excavation 16 is filled with a radon permeable material 17, such as macadam, gravel, crushed aggregate etc.

[0043] The wall of the suction duct 14 is non-permeable to radon, but at least a section thereof may comprise perforations 18 through which radon can enter the suction duct 14. The end of the suction duct 14 may be open.

[0044] The connecting duct 15 is connected to the inner end of the connector element 5 and secured thereto by e.g. a clamp.

[0045] The connecting duct 15 has a curvilinear shape due to intersecting alignment of the discharge channel

and the connector element 5. The shape of the connecting duct 15 may, of course, vary depending on the locations of the discharge channel of the blower 13 and the connector element 5.

[0046] The connecting duct 15 may have a bendable structure for enabling variations in the location of the blower 13 within the inspection chamber 2.

[0047] The blower 13 is attached to the inspection chamber 2 by the connector element 5 only. This feature gives some adaptability and thus facilitates the installation of the arrangement 1. The blower 13 may be attached, when necessary, to the inspection chamber 2 by a supporting member.

[0048] The arrangement may comprise a silencer for reducing noise caused by the blower and/or gas flow in the ducts. In the embodiment shown in Figure 2, a silencer element 26 is arranged in the connecting duct 15. A silencer element of this type is described more detailed in Figure 4.

[0049] The arrangement 1 also comprises a discharge duct 19 connected to the outer end of the connector element 5. The wall of the discharge duct 19 is non-permeable to radon.

[0050] The discharge duct 19 may be composed of one or more pipe sections, bends, sockets, socket bends etc. The discharge duct 19 shown in figure 2 consists of three pipe sections 21, a socket 22 and a socket bend 23.

[0051] The discharge duct 19 extends first to a direction perpendicular to the periphery wall 3, and then turns upwards extending above the ground level 20.

[0052] The suction duct 14 and the discharge duct 19 shown in Figure 2 are constructed from stiff pipe sections 21. According to another embodiment, the suction duct 14 and/or the discharge duct 19, or at least a section thereof, are made of bendable pipe sections.

[0053] The discharge duct 19 may end in open air outside the building. A structure preventing rain, tree leaves etc. to intrude the discharge duct 19 may be arranged at the end of the discharge duct 19. This structure is shown by broken line in Figure 2.

[0054] The method for inhibiting ingress of radon into a building may comprise the steps described below. It is to be noted, however, that some of the steps may take place in different orders.

[0055] The excavation 16 for the arrangement 1 is excavated next to the building. The depth of the excavation 16 may be for instance in range of 3 - 4 meters or more.

[0056] The distance from the building can be, for instance 5 meters. The distance shall be enough for avoiding any risk of collapse of the building. The distance from which the arrangement is able to suck radon may be dozens of meters.

[0057] A kit comprising materials and elements for arrangement is brought in the vicinity of the excavation 16.

[0058] The suction duct 14 having a selected length is arranged in the excavation 16. The suction duct 14 is then surrounded by radon permeable material 17, apart from the upper end thereof.

[0059] A blanket or film 24 is arranged on the radon permeable material 17. The film 24 reduces or prevents radon to escape upwards from the excavation 16. Therefore, the film 24 may be sealed against the suction duct 14 by e.g. tape.

[0060] Then a layer of filling material 25 is arranged above the film 24. The filling material 25 may be e.g. sand, ground etc.

[0061] The inspection chamber 2 is arranged on said layer of filling material 25, and the blower 13 is connected to the suction duct 14.

[0062] Next the connecting duct 15 is connected to the blower 13 and to the connector element 5. Embodiments of the arrangement where the connecting duct 15 has a bendable structure may facilitate in making connections to the blower 13 and the connector element 5.

[0063] The discharge duct 19 is connected to the connector element 5.

[0064] The optional extension element 8 is arranged on the inspection chamber 2. A seal member 7 may be arranged between the extension element 8 and the inspection chamber 2. The seal member 7 may comprise e.g. sealing strip or sealing compound. The extension element 8 may be attached to the inspection chamber 2 by fastening means, such as bolts, screws, glue, weld etc.

[0065] The excavation 16 is filled with an appropriate filling material 25 such that the aspired ground level 20 is reached and the inspection chamber 8 and the extension element 8 are covered.

[0066] The section 10 of the extension element 8 is cut to correct length if needed, and the chamber cover 12 is attached to the extension element 8.

Figure 3 is a schematic side view of example inspection chamber and extension element. The extension element 8 shown here is a rotationally asymmetrical piece.

Figure 4 is a schematic side view of a connecting duct of an example arrangement. The connecting duct 15 has a bendable structure that e.g. enables variations in the location of the blower 13 with respect to the connector element 5.

[0067] Furthermore, the connecting duct 15 establishes a silencer element 26 that comprises a perforated inner tube 27, a porous muffler material 28 arranged around the perforated inner tube 27, and an outer cover 29 arranged around the muffler material 28.

[0068] The perforated inner tube 27 may be e.g. a corrugated aluminium tube. The porous muffler material 28 may comprise e.g. rock wool. The outer cover 29 may be a film or sheet manufactured of plastic, e.g. of material comprising thermoplastic.

[0069] The structure of the silencer element 26 is not only highly bendable but it has also sufficient ring stiffness.

[0070] Figure 5 is a schematic side view of an example kit. The kit 30 may comprise the inspection chamber 2,

the connector element 5, the extension element 8, the blower 13, a first amount of pipe elements 32a for construction of the suction duct 14, a second amount of pipe elements 32b for construction of the discharge duct 19, an appropriate amount of sockets 22 and socket bends 23 for joining said pipe elements, and clamps, seals etc.

[0071] According to an embodiment the first and the second amount of pipe elements 32a, 32b comprises pipes having identical diameter.

[0072] The first and second amount of pipe elements 32a, 32b and the socket(s) 22 and socket bend(s) satisfy the need of a radon well of a typical building. The building may be e.g. a detached house, a terraced house, a block of flats etc. The kit 30 shown in Figure 5 may be destined for a terraced house or a block of flats and it may comprise, for instance:

Five (5) pipe elements, each 1.2 m long and having diameter of 315 mm,
three (3) pieces sockets, and
one (1) socket bend.

[0073] The kit 30 may be arranged and attached on a pallet 31 and delivered as such to the customer.

[0074] The invention is not limited solely to the embodiments described above, but instead many variations are possible within the scope of the inventive concept defined by the claims below. Within the scope of the inventive concept the attributes of different embodiments and applications can be used in conjunction with or replace the attributes of another embodiment or application.

[0075] The drawings and the related description are only intended to illustrate the idea of the invention. The invention may vary in detail within the scope of the inventive idea defined in the following claims.

[0076] Reference symbols

1 arrangement
2 inspection chamber
3 periphery wall
4a, b open end
5 connector element
6 opening
7 seal member
8 extension element
9a, b aperture
10 section
11 ladder

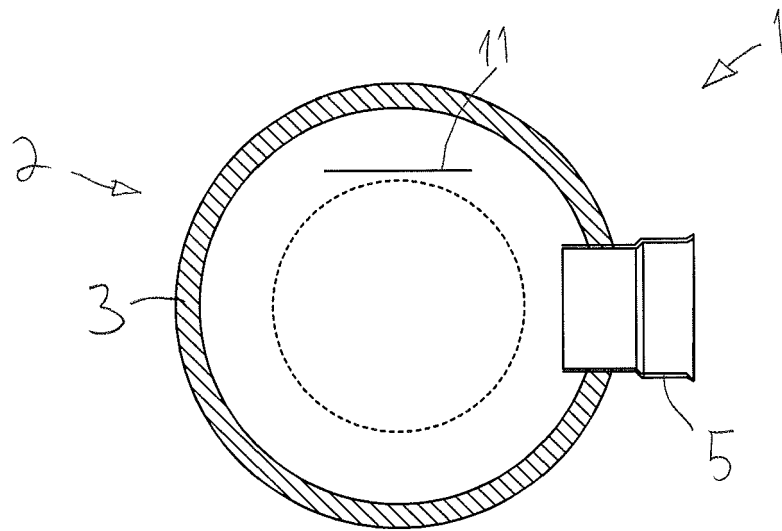
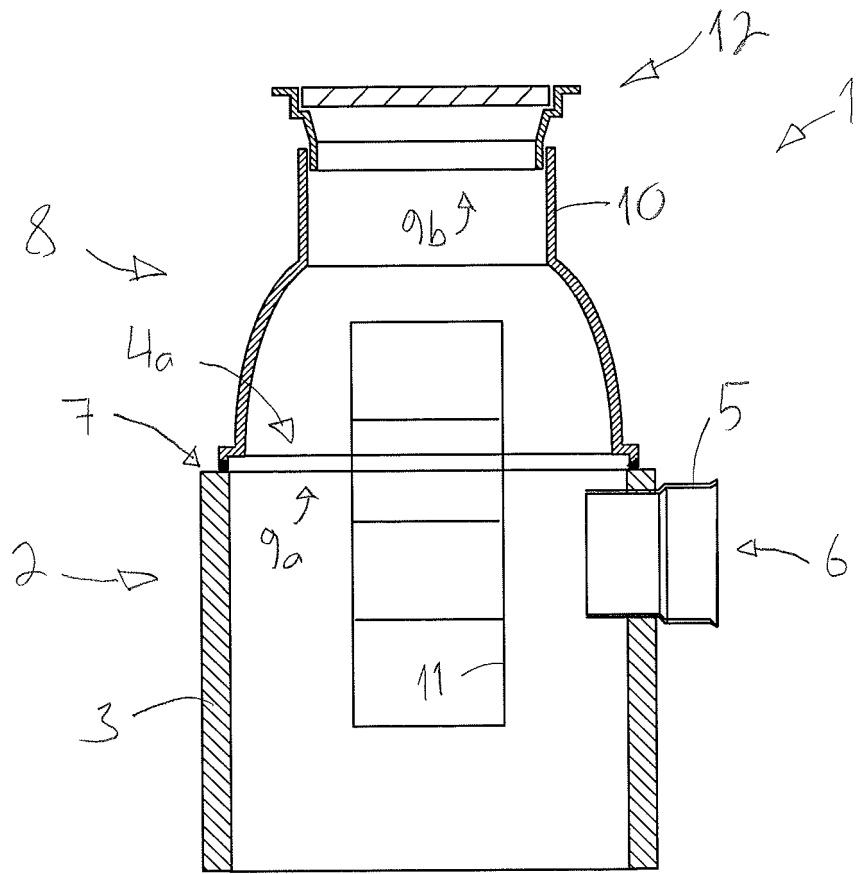
12 chamber cover
13 blower
14 suction duct
15 connecting duct
16 excavation
17 radon permeable material
18 perforation
19 discharge duct
20 ground level
21 pipe section
22 socket
23 socket bend
24 film
25 filling material
26 silencer element
27 inner tube
28 muffler material
29 outer cover
30 kit
31 pallet
32a, b amount of pipe elements

Claims

1. An arrangement for inhibiting ingress of radon into a building, the arrangement (1) comprising an inspection chamber (2) arrangeable to ground, the inspection chamber (2) having a periphery wall (3) and open ends (4a, 4b), the periphery wall (3) made of material comprising thermoplastic material, and a connector element (5) arranged in the periphery wall (3), the connector element (5) establishing an opening through the periphery wall (3).
2. An arrangement as claimed in claim 1, wherein the connector element (5) is a pipe socket comprising

thermoplastic material.

3. An arrangement as claimed in any of the preceding claims, wherein the thermoplastic material comprises polyolefin. 5
4. An arrangement as claimed in any of the preceding claims, further comprising
a blower (13) arranged inside the inspection chamber (2), wherein the discharge channel of blower (13) is connected to the inner end of the connector element (5), 10
a suction duct (14) connected to the intake channel of the blower (13), the suction duct (14) extending from the inspection chamber (2) through second open end (4b) of the inspection chamber. 15
5. An arrangement as claimed in claim 4, comprising a connecting duct (15) having a bendable structure. 20
6. An arrangement as claimed in claim 4 or 5, comprising a silencer element (26) arranged between blower (13) and the connector element (5).
7. An arrangement as claimed in claim 6, wherein the silencer element (26) comprises a perforated inner tube (27), a porous muffler material (28) arranged around the perforated inner tube (27), and an outer film (29) arranged around the muffler material (28). 25
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8. An arrangement as claimed in any of the preceding claims, comprising a discharge duct (19) connected to the outer end of the connector element (5).
9. An arrangement as claimed in any of the preceding claims, comprising an extension element (8) of inspection chamber made of material comprising thermoplastic material and having
a first aperture (9a) fastenable to the first open end (4a) of the inspection chamber (2), and 35
a second aperture (9b) having area smaller than one of the first aperture (9a). 40
10. An arrangement as claimed in claim 9, wherein the second aperture (9b) of the extension element comprises a section (10) having a constant diameter. 45
11. An arrangement as claimed in claim 9 or 10, wherein the extension element 8 is a rotationally asymmetrical piece. 50
12. A kit comprising an arrangement of claim 1, comprising
a first amount (32a) of pipe elements for constituting a suction duct (14), 55
a second amount (32b) of pipe elements for constituting a discharge duct (19),
at least one socket (22) for joining one of said pipe elements to another of said pipe elements,
the first amount of pipe elements (32a), the second amount of pipe elements (32b) and the at least one socket (22) satisfying the need of a radon well of a typical building, wherein
the kit (30) is arranged to a packing deliverable to a customer.
13. A kit as claimed in claim 12, wherein the first and the second amount of pipe elements (32a, 32b) comprises pipe elements having an identical diameter.
14. A method for inhibiting ingress of radon into a building, the method comprising:
excavating an excavation (16) to ground next to the building,
arranging an arrangement of any of claims 1 to 11 into the excavation (16), and
filling the excavation (16).
15. A method as claimed in claim 14, further comprising:
bringing a kit (27) of claim 12 or 13 next to the site of the excavation (16).



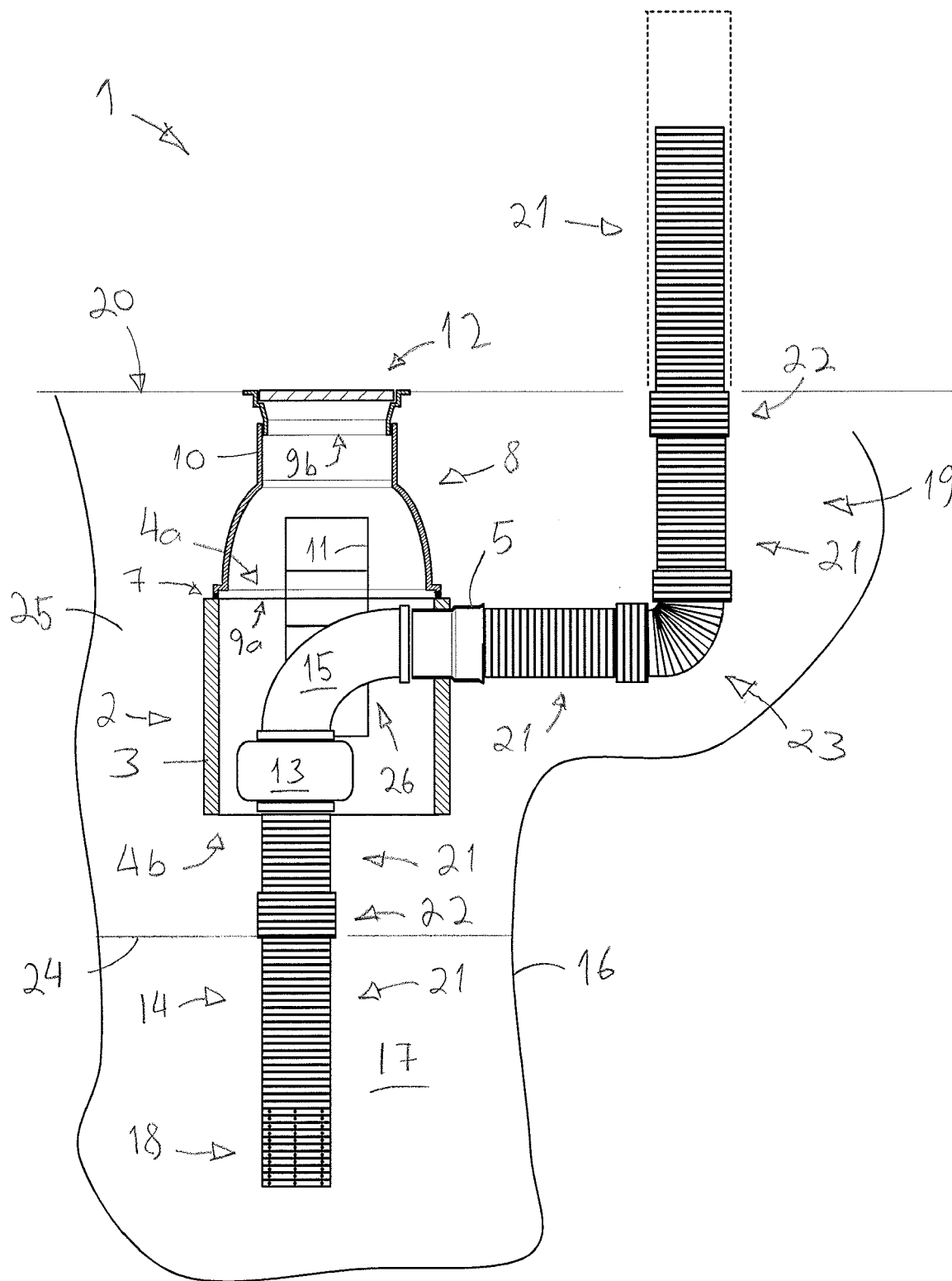
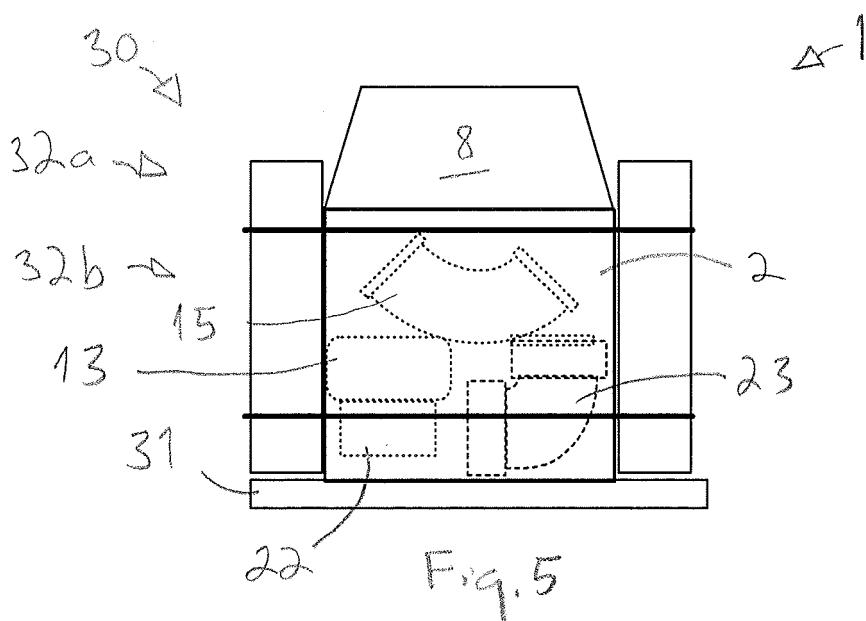
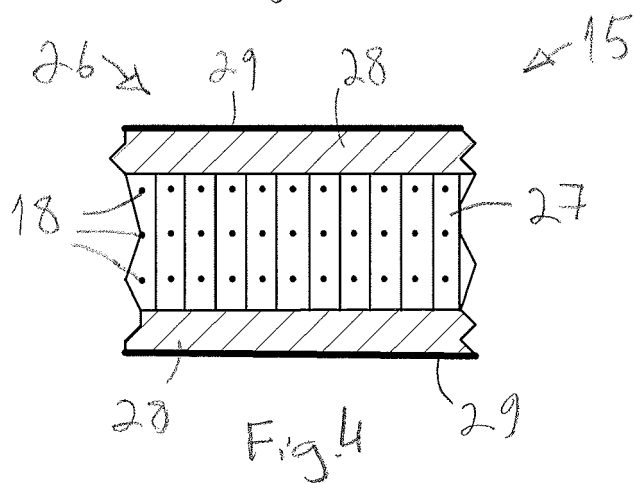
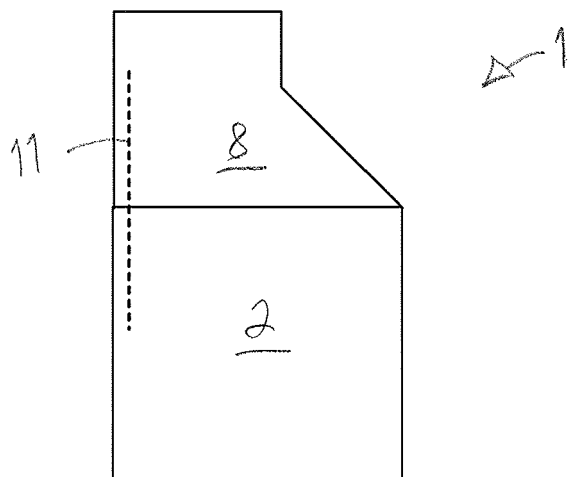


Fig. 2





EUROPEAN SEARCH REPORT

Application Number
EP 12 15 8755

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	SE 528 611 C2 (UPONOR INNOVATION AB [SE]) 27 December 2006 (2006-12-27) * the whole document *	1-15	INV. E02D31/00
A	US 2005/191956 A1 (DOYLE MICHAEL J [US]) 1 September 2005 (2005-09-01) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E02D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 November 2012	Examiner Friedrich, Albert
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 15 8755

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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22-11-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE 528611	C2	27-12-2006	NONE

US 2005191956	A1	01-09-2005	NONE

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