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(54) LEAD-THROUGH ELEMENT

(57) A lead-through element (1) for leading pipes (70) through a floor structure (180) is disclosed. The lead-through element (1) comprises a first part (10) with first openings (11, 12, 13), a second part (20) with second openings (21, 22, 23) and intermediate casings (31, 32, 33) that extend from the first openings (11, 12, 13) to the second openings (21, 22, 23) to form lead-through channels (310, 320, 330) between the first part (10) and the second part (20). At least one pipe (70) may be led through each lead-through channel (310, 320, 330) from a first space (801) to a second space (802). Also a system and method for leading pipes (70) through floor structures (180) are disclosed.

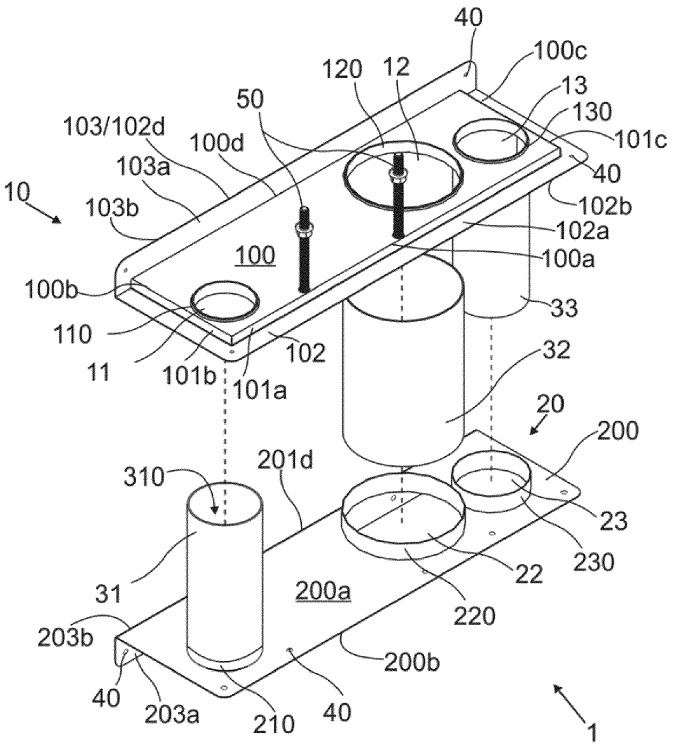

Fig. 1a

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a lead-through element.

BACKGROUND OF THE INVENTION

[0002] Historically, the sanitary rooms, i.e. bathrooms, lavatories or washrooms, of buildings with several floors and several apartments have water and sewage installations arranged into vertical shafts running inside structural walls, and into horizontal lines inside the floor/ceiling structures between the floors. In other words, the pipes and other conducting elements for water and sewage installations are embedded within structures of stone, concrete, tile or other such building material. At the time renovations, when the water and sewage installations need to be replaced, costly and time-consuming cutting-in operations are needed to access the pipes.

[0003] In newer buildings, modern constructions rules and building codes require that all such pipelines should be installed so that they are accessible for maintenance, repair and future renovations without breaking the wall or floor/ceiling structures of the building. For example, water conduits leading fresh water from a mains line to a shower, a toilet or a washbasin must be surface-installed on the walls. Naturally, there are lead-through points for the pipes between floors and walls. In addition, modern building codes have strict requirements for wet sealing and water proofing, as well constructions that allow possible leaks to be detected by leading the leaking water/liquid outside any closed structures where they become visible.

[0004] These kinds of installations are time-consuming and require great precision from the persons conducting the installations, to avoid any mistakes that could lead to water or moisture damages within the sanitary room or building structures.

[0005] To avoid the above-mentioned problems, different pre-constructed sanitary room installation assemblies or plumbing arrangement elements have been introduced to partially replace on-site installation, especially in new buildings but also in renovation projects.

[0006] Such installation assemblies or plumbing arrangement elements are intended to be installed in a vertical line in each vertically successive sanitary room of a building. The installation assemblies may comprise a cassette or cabinet with at least part of the plumbing, piping, insulation and connecting points pre-installed within the cassette casing at a factory by experts, thus eliminating the need of on-site precision work and possible installation mistakes. The installation assembly may need to have correct dimensions and very tight tolerances for the variation in different dimensions to ensure a successful final on-site installation.

[0007] The current solutions, however, require a certain amount of skilled work in aligning the vertical line of pipes and other conducting elements, leading them through the floor/ceiling structures between two adjoining sanitary rooms, and connecting all pipelines. Especially when the on-site personnel is not used to working with such installation assemblies, problems may arise. For example, the securing of wet sealing of the sanitary rooms (floor and ceiling lead-through points, as well as the entire floor/ceiling structure at the area surrounding the lead-through), and vertically aligning the water and sewage lines through all the floors of the building, may be challenging. On the other hand, the installation assemblies may have been constructed so that it is not possible to open the assembly cover or casing after the contents has been pre-installed at the factory. The installation assembly must have correct dimensions and very tight tolerances for the variation in different dimensions, to ensure a successful final on-site installation.

OBJECTIVE OF THE INVENTION

[0008] The objective of the invention is to provide an improved lead-through element for leading pipes and other conducting elements through structures.

[0009] In particular, it is an objective of the present invention to provide a lead-through element that is simple to install on site of sanitary room construction or renovation, that enables the alignment of pipes and other conducting elements, and that provides dependable wet sealing and water proofing of both the sanitary room and the structure in which the lead-through element is arranged.

[0010] The lead-through element is particularly intended to be used in connection with plumbing arrangement elements that are installed in a vertically aligned line in several sanitary rooms or units arranged on top of each other, for example in an apartment building or block of flats with several floors.

SUMMARY OF THE INVENTION

[0011] This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the part "Detailed description". This summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

[0012] According to an aspect of the invention, the present invention provides a lead-through element for leading pipes through a floor structure, the lead-through element comprising a first part mountable to a floor of a first space above the floor structure, the first part comprising first openings; and a second part mountable to a ceiling of a second space located below the floor structure, the second part comprising second openings, the second openings being concentric with the first openings when the lead-through element is mounted in place. The lead-through element further comprises intermediate

casings, each configured to extend from a first opening to a second opening inside a circular hole configured to extend from the first space to the second space through the floor structure, between the first opening and the second opening when the lead-through element is mounted in place; the intermediate casings configured to form lead-through channels between the first part and the second part; through which lead-through channels each, at least one pipe is configured to be led from the first space to the second space.

[0013] In an embodiment of the lead-through element, the first part is configured to be continuously connected to a water barrier membrane of the first space.

[0014] The technical effect of the invention is that, due to the single continuous water barrier membrane connections for each and every individual pipe led through the lead-through element, the space requirement of different pipe and pipeline arrangements may be significantly reduced. Instead of providing every pipe individual water barrier membrane continuations between the joints of each pipe and the floor structure, the lead-through element provides one effective water barrier membrane continuation between the first part and the first space, and the second part and the second space. Therefore the pipes may be installed closer to each other, reducing the space required for plumbing lines. For example, even small sanitary spaces can be renovated in line with current building codes and requirements without sacrificing space to the plumbing lines. The space requirements may be even further reduced by leading more than one pipe through one lead-through channel.

[0015] The pipes may comprise at least one of the following: tap water pipe, grey water pipe, hot water pipe, cold water pipe, waste water pipe, thermal pipe, or other conducting element, including electric wires and telecommunications or data communications cables.

[0016] In another aspect of the invention, a system for leading pipes through floor structures to establish a continuous vertical line of pipes between at least two vertically adjoining spaces is disclosed. The system is characterized in that the pipes are configured to be led through the floor structure with the lead-through element disclosed herein.

[0017] In yet another aspect of the invention, a method for leading pipes through floor structures via the lead-through elements, to establish a continuous vertical line of pipes between at least two vertically adjoining spaces, is disclosed. The method comprises the following steps

- establishing a continuous vertical lines for a required number of pipelines, the vertical line extending from the bottom-most space to the top-most space in a plumbing line of a building;
- arranging a required number of circular holes extending from a first space to a second space, located below the first space, through a floor structure;
- mounting a first part of a lead-through element to the floor of the first space so that openings arranged into the first part are aligned with the circular holes;
- mounting a second part of the lead-through element to the ceiling of the second space so that openings arranged into the second part are aligned with the circular holes and so that first openings and the second openings are concentric;
- arranging intermediate casings to extend from the first openings to the second openings (21, inside the circular holes, and to form lead-through channels between the first part and the second part; and
- leading at least one pipe from the first space to the second space through each of the lead-though channels.

[0018] The lead-through element, the system and the method may be utilized in connection with a plumbing arrangement element. This may bring about specific advantages of the invention. The plumbing arrangement element may be prefabricated so as to improve the quality of different parts and their installation, reduce work required at the installation site, improve installation time and ease, and cause less error in installation. A prefabricated plumbing arrangement element may require significantly smaller installation surface are, as the critical installation operations may be performed in the prefabrication stage.

[0019] At the same time, these plumbing arrangement elements may require skills and precision in the on-site installation operations, for example in aligning the vertical line of pipes and other conducting elements, leading them through the floor structures between two vertically adjoining spaces, and connecting all pipelines. In addition, securing the wet sealing of the spaces (floor and ceiling lead-through points, as well as the entire floor structure at the area surrounding the lead-through), and vertically aligning the water and sewage lines through all the floors of the building, may be challenging.

[0020] The aforementioned problems may be resolved with the lead-through element, the system and the method disclosed in the present invention.

[0021] By lead-through herein is meant generally the connection or joint between two separate spaces one of which is located wholly or partially above the other, the connection extending from the ceiling of the space below to the floor level of the space above, and extending through the floor structure between the two spaces.

[0022] By pipeline and pipe herein is meant any extended conduit or conducting line, comprising several individual pieces of pipe connected to each other to form a conducting line, including but not limited to fresh water pipes, grey water pipes and sewage pipes. The term pipeline may also encompass conduits such as electric wires or data/telecommunications cables. The two terms pipe and pipeline may be used interchangeably throughout this disclosure.

[0023] By water barrier membrane herein is meant a continuous water and moisture proof layer or structure of material that prohibits movement of water, liquid or

moisture from a space towards the surrounding building structures (floors, walls, ceilings). A water barrier membrane may typically be a layer of spreadable waterproofing material or a layer of waterproofing film, sheet or tape.

[0024] It is to be understood that the aspects and embodiments of the invention described above may be used in any combination with each other. Several of the aspects and embodiments may be combined together to form a further embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The accompanying drawings, which are included to provide a further understanding of the invention and constitute a part of this specification, illustrate embodiments of the invention and together with the description help to explain the principles of the invention. In the drawings:

Figure 1a shows an exploded view of a lead-through element according to an embodiment,

figure 1b shows an exploded view of a lead-through element according to another embodiment,

figure 2a shows a first part of the lead-through element installed at a floor plane of a space, and

figure 2b shows a second part of the lead-through element installed at the ceiling of a space.

DETAILED DESCRIPTION OF THE INVENTION

[0026] Figures 1a, 1b, 2a and 2b show a lead-through element 1 for leading pipes, pipelines or other conduits through horizontal building structures such as floor/ceiling structures or floor structures 180 which may be for example concrete floor slabs, disposed between two vertically adjoining spaces (toilets, washrooms, bathrooms, lavatories or other such sanitary rooms, as well as various technical spaces or basement spaces of a building). The lead-through element 1 may be used for leading through pipes in connection with a plumbing arrangement element 8 (see Figures 2a and 2b).

[0027] The plumbing arrangement element 8 is an installation cabinet or cassette comprising a at least side walls 81, 82, and a front panel (not shown), a top part 83, and further comprising at least partially pre-installed pipes 70 for water, waste water and heating, as well as other conduits such as electrical wires or telecommunications wires, as well as different connections for those pipes and conduits, for example connections for a plumbing fixture such as a toilet bowl or a washbasin, for a shower, or for a washing machine water inlet pipes. The lead-through element 1 may be used in connection with all kinds of sanitary piping and/or plumbing pipelines, without the plumbing arrangement element 8.

[0028] The lead-through element 1 comprises a first part 10, intended for installation or mounting onto and into a floor 150 of a first space 801; and a second part 20, intended for installation or mounting onto and into a ceiling 170 of a second space 802, located below the first space and separated from the first space 801 by a floor structure 180. Prior to the installation or mounting of the first part 10 and the second part 20, an appropriate initial circular lead-through holes or openings (not shown) are pierced or otherwise arranged into the floor structure 180 disposed between the first and second spaces by for example drilling or boring.

[0029] Through the circular openings, at least one intermediate casing 31, 32, 33 is extended from the first part 10 to the second part 20 to form a lead-through channel 310, 320, 330 from the first space 801 to the second space 802, the lead-through channel 310, 320, 330 providing a channel through the floor structure 180 for pipes 70. The intermediate casing or casings 31, 32, 33 may have a circular cross-section, as has the lead-through channel or channels 310, 320, 330. The intermediate casings 31, 32, 33 have a length chosen according to the thickness of the floor structure 180 so that the casings 31, 32, 33 have a sufficient length to extend from the first part 10, disposed in the first space 801, to the second part 20, disposed in the second space 802.

[0030] The first part 10 comprises a rectangular face 100 comprising a first edge 100a, a second edge 100b, a third edge 100c, and a fourth edge 100d. From the first edge second, third and fourth edges 100a, 100b, 100c, 100d, corresponding side walls 101a, 101b, 101c, 101d extend downwards at a right angle (i.e. towards the floor 150 when the first part 10 is installed in place).

[0031] In an embodiment (as depicted in Fig. 1a), around the perimeter of the first sidewall 101a, the second sidewall 101b and the third sidewall 101c, a first plate 102 extends outwards from the face 100, again at a right angle so that the plate 102 is aligned with the floor 150 when the first part 10 is installed in place. The first plate 102 forms a collar structure around the first edge 100a, the second edge 100b and the third edge 100c of the face 100. The first plate 102 comprises an upper side 102a and an underside 102b. Further, the plate 102 has a first back edge 102d. The first plate 102 may have rounded corners.

[0032] At the first back edge 102d of the plate 102, the plate 102 extends upwards at a right angle (i.e. away from the floor 150 when the first part 10 is installed in place) to form a first flange 103 comprising a first face side 103a and first backside 103b. In other words the first flange 103 is perpendicular in relation to a plane defined by the face 100 and the plate 102. The first flange 103 may have rounded corners.

[0033] Another embodiment is depicted in Fig. 1b, especially suited in cases where the lead-through element 1 is configured to be disposed in a corner (more specifically, a right-hand corner, as seen from the front or from the direction of the first sidewall 101a) of a space 801, 802. In this embodiment, around the perimeter of the first

sidewall 101a and the second sidewall 101b, the first plate 102 extends outwards from the face 100, again at a right angle so that the first plate 102 is aligned with the floor 150 when the first part 10 is installed in place. The first plate 102 forms a collar structure around the first edge 100a and the second edge 100b of the face 100. The first plate 102 comprises an upper side 102a and an underside 102b. Further, the plate 102 has a second back edge 102c. Also in this embodiment, the first plate 102 may have rounded corners.

[0034] At the first back edge 102d and the second back edge 102c of the plate 102, the plate 102 extends upwards at a right angle (i.e. away from the floor 150 when the first part 10 is installed in place) to form a first flange 103 comprising a first face side 103a and first backside 103b. In other words the first flange 103 is perpendicular in relation to a plane defined by the face 100 and the plate 102. The first flange 103 may have rounded corners.

[0035] The first plate 102 may also be arranged around the perimeter of the first sidewall 101a and the third sidewall 101c to form a collar structure around the first edge 100a and the third edge 100c of the face 100; and the first plate 102 may also be configured to extend upwards at a right angle at the first back edge 102d and a first front edge 102b to form a first flange 103; in order to achieve a mirror image version of the first part 10 of a lead-through element 1, to be mountable in a left-hand corner of a space 801, 802.

[0036] The first plate 102 has mounting holes 40 arranged into a number of locations, for example at the corners, for mounting and installing the first part 10 onto and into the floor 150 of the first space 801. Further, also the first flange 103 may have similar mounting holes arranged into a number of locations, for example at the corners, for mounting and securing the first part further onto a wall 160 of the first space 801.

[0037] The mounting may be executed in any suitable manner, for example by bolts, screws or pins (not shown) arranged through the mounting holes 40 and secured into the floor 150 or into counterparts arranged into the floor 150, and/or wall 160 of the room or counterparts arranged into the wall 160. The mounting holes 40 may be so configured as to accommodate sunk screws, for example by counter-sinking.

[0038] When the first part 10 is mounted in place, the underside of the first plate 102 engages the floor 150, and the first backside of the first flange 103 engages the wall 160 at its backside 103b, as can be seen in Figure 2a. In other words, the first part 10 is mountable onto the floor 150 of the first room 801 by engaging the underside 102b with the floor 150, and onto the wall 160 of the first room 801 by engaging the first backside 103b with the wall 160. The first part may thus be mounted onto the floor 150 only, or onto both the floor 150 and the wall 160 of the first space 801, depending on what is required in a particular installation.

[0039] When the lead-through element 1 is used in connection with a plumbing arrangement element 8, the insides of the sidewalls 81, 82 of the element 8 are brought in contact with the second sidewall 101b and the third sidewall 101c, and the front panel of the assembly 8 brought into contact with the first side wall 101a, to ensure that the plumbing arrangement element 8 ends up secured in a correct position. In an embodiment, the face 100, the edges 100a-d and the side walls 101a-d are may define a stand 105 for securing the plumbing arrangement element 8 in a correct position.

[0040] The dimensions of the first part 10 may depend on the plumbing arrangement element 8 with which the lead-through element 1 is intended to be used. For example, in one embodiment, the length of the first edge 100a (i.e. the distance between the second side wall 101b and the third side wall 101c) may be 650 mm. In other embodiments, the length of the first edge 100a may vary between 400 - 700 mm, being for example 645 mm, 655 mm or 665 mm. For example, in one embodiment, the length of the second edge 100b and the third edge 100c (i.e. the distance between the first side wall 101a and the fourth side wall 101d) may be 220 mm. In other embodiments, the length of the second edge 100b and the third edge 100c may vary between 200 - 250 mm, being for example 215 mm, 230, mm or 235 mm. In one particular embodiment, the length of the first edge 100a is 650 mm and the length of the second and third edges 100b, 100c is 220 mm.

[0041] For example, in one embodiment, the height H_{101} of the sidewalls 101a-101c may be 15 mm. In other embodiments, the height H_{101} of the sidewalls 101a-101c may vary between 10 - 100 mm, being for example 20 mm, 65 mm or 80 mm. The height H_{101} of the sidewalls 101a-c may be chosen to ensure that the plumbing arrangement element 8 may be secured in place onto the first part 10 of the lead-through element 1, as explained earlier.

[0042] Further, the height H_{101} depends on a particular installation solution: when the first part 10 is mounted onto a finished floor 150 (i.e. on the finished surface of the floor 150), the height H_{101} may be 10 - 20 mm. On the other hand, when the first part 10 is mounted to a floor structure 180 prior to the floor 150 has been finished (i.e. before any possible additional concrete layers are poured and surface structures are installed), the height H_{101} may be greater, for example 80 mm to accommodate the additional layers of the floor 150 being poured or otherwise installed on site. Thus, when the actual floor 150 is finished, the face 100 may protrude from the floor structure at a height approximately corresponding to H_{101} in the embodiment where the first part is installed onto the floor 150, that is to say, for example 10 - 20 mm.

[0043] Further, in an embodiment, the width W_{102} of the first plate 102 may be 30 mm. In other embodiments, the width W_{102} of the plate 102 may vary between 20 - 50 mm, being for example 25 mm, 35 mm or 45 mm. Lastly, in an embodiment, the height H_{103} of the first flange 103 may be for example 30 mm. In other embodiments, the height H_{103} of the first flange 103 may vary

between 20 - 50 mm, being for example 25 mm, 35 mm, or 45 mm. The width W_{102} of the first plate 102and the height H_{103} may be equal. The width W_{102} of the first plate 102and the height H_{103} may depend on the particular installation environment on site, for example by the joining strip chosen to join the first part 10 to the water barrier membrane of the space 801.

[0044] The dimensions of each structural detail listed above may vary independently, regardless of the dimensions of the other structural details.

[0045] The first part 10 further comprises one or more circular first opening 11, 12, 13, arranged into the face 100, from which the at least one intermediate casing 31, 32, 33 is arranged to extend downwards through the floor structure 180 towards the room below, all the way to the second part 20 mounted in place to the ceiling of the second room 802. The second part 20 has a corresponding number of circular second openings 21, 22, 23. The first part 10 may have more than one opening 11, 12, 13, for example two openings 21, 22, or three openings 11, 12, 13. Correspondingly, also the second part 20 may have more than one opening. The number of the intermediate casings 31, 32, 33 and the lead-through channels 310, 320, 330 naturally corresponds to the number of the first and second openings. Each of the corresponding openings 11, 12, 13 and 21, 22, 23, and hence also the intermediate casings 31, 32, 33 and the lead-through channels 310, 320, 330 may have the same diameter or they may have different diameters depending on the type and/or number of pipes to be led through each lead-through channel 310, 320, 330 of the lead-through element 1. For example, for a lead-through channel intended for a waste water pipe, the diameter may be 120 - 170 mm. For water pipes or heating pipes, the diameter may be 40 - 170 mm, depending on the number of pipes to be led through.

[0046] When the lead-through element 1 is installed in place, the first opening or openings 11, 12, 13, the second opening or openings 21, 22, 23 and the intermediate casing or casings 31, 32, 33 all have a common vertical axis extending through the center point of each circular element. In other words, the first openings 11, 12, 13 are concentric with the second openings 21, 22, 23, as can be seen in figures 1a and 1b.

[0047] Each first opening 11, 12, 13 comprises a collar 110, 120, 130 arranged at the edge of the opening and surrounding the edge of the openings. The collar 110, 120, 130 protrudes upwards from the face 100. The collar 110, 120, 130 also extends in the opposite direction or downwards from the face 101 (i.e. towards the lower room 802 when the first part is installed in place onto the floor 150, and inside the lead-through channel 310, 320, 330). When the lead-through element 1 is mounted or installed in place, each intermediate casing 31, 32, 33 is arranged to contact the underside 102b of the plate 102 of the first part 10 so that the downwards-extending part of the collar 110, 120, 130 ends up inside the intermediate casing 31, 32, 33 and the lead-through channel 310, 320, 330. This ensures that any leaks from broken or damaged pipes or pipe connections, taking place above the first part 10 and dribbling or flowing downwards, are effectively led outside the lead-through element 1 through the lead-through channel without the dampness, wetness or water making contact with the floor structure 180 through which the pipes 70 are led. The upwards-protruding part of the collar 110, 120, 130 ensures that any leaks puddling on the face 101 of the first part 10 may not enter the lead-through channel 310, 320, 330, but may be led to or towards the floor 150 where the leaks may be effectively noticed before any damage to the building structures or other elements takes place.

[0048] In an embodiment, the total height of the collar 110, 120, 130 may be for example 7,5 mm. In other embodiments, the height of the collar 110, 120, 130 may vary between 5 - 10 mm, being for example 5,5 mm, 7 mm or 8,5 mm. In an embodiment, the height of the upwards-protruding part of the collar 110, 120, 130 may be for example 2,5 mm. In other embodiments, the height of the upwards-protruding part of the collar 110, 120, 130 may be vary between 0 - 5 mm, being for example 2 mm, 3 mm or 3,75 mm. In an embodiment, the height of the downwards-extending part of the collar 110, 120, 130 may be for example 5 mm. In other embodiments, the height of the downwards-extending part of the collar 110, 120, 130 may vary between 3 - 10 mm, being for example 6 mm, 7,5 mm or 8 mm. The height of the collar parts may depend for example on the method of production of the first part 10, the installation room available for installing the lead-through element 1 in a space 801, 802, or on country-specific building codes and regulations concerning installation of structures in wet spaces.

[0049] The first part 10 may further comprise at least one vertical support member 50 integrally arranged or fixed onto the face 100. The vertical support member 50 is intended for providing support and/or load-bearing for a plumbing fixture, for example a body of a toilet bowl or toilet seat. The vertical support member 50 may, for example, comprise a spindle, a threaded rod or screwing rod, and a nut or other such stopping element with which an appropriate height for the plumbing fixture may be chosen by shifting the nut upwards or downward the rod, and which may effectively bear the weight of the plumbing fixture towards the floor 150. The vertical support member 50 may also comprise an angle iron with suitable connecting members.

[0050] This kind of vertical support member 50 offer advantages over previous solutions, where full-wall mount structures or feet structures have been used to provide enough support for a plumbing fixture. Such prior art solutions require post-installation adjustments as a separate installation procedure. Further, as the support members 50 in the first part 10 are a part of the lead-through element 1, a water barrier treatment that forms a continuous water barrier membrane between the floor 150 and the first part 10 may provide a water barrier also for the vertical support member 50 bearing the weight of

the plumbing fixture to the floor 150 without any additional water barrier treatment or structures, which may be needed with conventional support structures.

[0051] Moving on to the second part 20: the second part 20 comprises rectangular second plate 200 with a ceiling-engaging side 200a and an outer side 200b. The second plate 200 comprises a third back edge 201d and a fourth front edge 201c. The corners of the second plate 200 may be rounded. In an embodiment (figure 1a), at the third back edge 201d, the second plate 200 is arranged to extend downward at a right angle (i.e. away from the ceiling 170 when the second part 20 is installed in place) to form a second flange 203 comprising a second face side 203a and second backside 203b.

[0052] In one embodiment (figure 1b), at the third back edge 201d and the fourth back edge 201c, the second plate 200 is arranged to extend downward at a right angle (i.e. away from the ceiling 170 when the second part 20 is installed in place) to also form a second flange 203 comprising a second face side 203a and a second backside 203b. This embodiment is suited in cases where the lead-through element 1 is configured to be disposed in a corner. Similarly to the first part 10, the second part 20 may in this case also be configured as a mirror image, with the flange arranged at the opposite edge from the fourth back edge 201c. The chosen configuration of the second part 20 in regard to the form and position of the second flange 203 is naturally intended to correspond to that of the first part 10 of any particular lead-through element 1.

[0053] The second flange 203 is perpendicular in relation to a plane defined by the plate 200. Also the flange 203 may have rounded corners.

[0054] The second plate 200 has mounting holes 40 arranged into a number of locations, for example at the corners and/or near their edges, for mounting or installing the second part 20 onto and into the ceiling 170 of the second space 802. The mounting may be executed in any suitable manner, for example by bolts, screws or pins (not shown) arranged through the mounting holes 40 and secured into the ceiling 170 of the room 802 or into counterparts (not shown) arranged into the ceiling 170. Also the second flange 203 may have mounting holes 40, so that the second part 20 may also be additionally secured onto a wall 160 of the room 802 or into counterparts arranged into the wall 160, similarly to what has been disclosed earlier in connection with the first part 10.

[0055] The second plate 200 is intended for engaging the ceiling 170 at its ceiling-engaging side 200a, and the second flange 203 is intended for engaging the wall 160 at its backside 202b, as can be seen in Figure 2b. In other words, the second part 20 is mountable onto the ceiling 170 of the second space 802 by engaging the ceiling-engaging side 200a with the ceiling 170, and, additionally, onto the wall 160 of the second space 802 by engaging the second backside 203b with the wall.

[0056] The dimensions of the second part 20 may depend on the plumbing arrangement element 8 with which the lead-through element 1 is intended to be used. For example, in an embodiment, the length of a front edge 201a and the second back edge 201d (i.e. the distance between a first side edge 201b and a second side edge 201c) may be 650 mm. In other embodiments, the length of the first edge 201a and the fourth edge 201d may vary between 400 - 700 mm, being for example 645 mm, 655 mm or 665 mm. For example, in an embodiment, the length of the first side edge 201b and the second side edge 201c (i.e. the distance between the front edge 201a and the second back edge 201d) may be 220 mm. In other embodiments, the length of the second edge 201b and the third edge 201c may vary between 200 - 250 mm, being for example 215 mm, 230, mm or 235 mm. In one particular embodiment, the length of the front edge 201a and the second back edge 201d may be 650 mm and the length of the first side edge 201b and the second side edge 201c may be 220 mm.

[0057] In an embodiment, the height H_{203} of the second flange 203 may be for example 30 mm. In other embodiments, the height H_{203} of the second flange 203 may vary between 20 - 50 mm, being for example 25 mm, 35 mm, or 45 mm. The height H_{203} may depend on the particular installation environment on site, for example by the joining strip chosen to join the first part 10 to the water barrier membrane of the space 802.

[0058] The dimensions of each structural detail listed above may vary independently, regardless of the dimensions of the other structural details. Naturally, the dimensions of the second part 20 correspond to the dimensions of the first part 10 in any particular lead-through element 1, to form a single suitably dimensioned entirety of a lead-through element 1.

[0059] The second part 20 further comprises at least one circular second opening 21, 22, 23, arranged into the plate 200, from which the at least one intermediate casing 31, 32, 33 is arranged to extend upwards through the floor structure 180 towards the first room 801, all the way to the first part 10, which has a corresponding number of circular first openings 11, 12, 13, as explained earlier.

[0060] Each second opening 21, 22, 23 has a collar 210, 220, 230 surrounding the edge of the opening 21, 22, 23. The collars 210, 220, 230 extend upwards from the ceiling-engaging side 200a of the plate 200 (i.e. towards the room above when the second part 20 is installed in place onto the ceiling 170, and either outside or inside the intermediate casing 31, 32, 32 and lead-through channel 310, 320, 330). When the lead-through element 1 is installed in place, each intermediate casing 31, 32, 33 is arranged to contact the ceiling-engaging side 200a of the second part 20 so that the upwards-extending part of the collar 210, 220, 230 ends up either outside or inside the intermediate casing 31, 32, 33 and the lead-through channel 310, 320, 330. When the collar 201, 220, 230 is configured to extend inside the intermediate casing 31, 32, 33, the ceiling-engaging side 200b of the second plate 200 may be used to retain the inter-

mediate parts 30, 31, 32 in place once the second part is mounted in place.

[0061] In an embodiment, the height of the collar 210, 220, 230 may be for example 5 mm. In other embodiments, the height of the collar 110, 120, 130 may vary between 2 - 10 mm, being for example 6 mm, 7,5 mm or 8,5 mm. The height of the collar 210, 220, 230 may depend for example on the method of production of the first part 20, the installation room available for installing the lead-through element 1 in a space, or on country-specific building codes and regulations concerning installation of structures in wet spaces.

[0062] The second part 20 may further comprise at least one connector 60, which is intended for engaging a plumbing arrangement element 8. The connector 60 may be a pin, a bolt, a screw or any other suitable type of connecting element that has a counterpart arranged at the top part 83 of the plumbing arrangement element 8. In an embodiment where the lead-through element 1 is used in connection with a plumbing arrangement element 8, the top part 83 of the assembly 8 is brought in contact with the second part 20, and two connectors 60, arranged at or near the outer corners of the second plate 200, are inserted into their counterpart (not shown) to ensure that the plumbing arrangement element 8 ends up aligned and secured in a correct position. Further, the second part 20 and the connectors 60 enable support for the plumbing arrangement element 8 during its installation, thereby eliminating the need for separate support structures during installation of the assembly 8.

[0063] The first part 10 and the second part 20 may be constructed from sheet metal, stainless steel, or plastic. The two parts may be constructed for example by folding or by welding metal sheets, or by deep drawing plastic. The intermediate casings 31, 32, 33 may be constructed from plastic, such as polyethylene (PE), cross-linked PE (PEX), polypropylene (PP), polycarbonate (PC), polybutylene (PB), polyvinyl chloride (PVC), from or a plastic-metal composite (e.g. a thin layer of aluminum surrounded by any suitable plastic such as PP, PE or PEX, on both sides), or from stainless steel. The intermediate casings 31, 32, 33 may, for example, be suitable lengths of pipe made from one the aforementioned materials. The material may be chosen to accommodate any country-specific building codes and regulations concerning construction of wet spaces and for example fire safety.

[0064] The lead-through element 1 is installed or mounted into place between two vertically adjoining spaces as follows:

[0065] First, a continuous vertical line is established for all the required pipelines and/or conducting elements, the vertical line extending from the bottom-most space to the top-most space in one plumbing line of a building. Between each vertically adjoining space 801, 802, a required number of initial circular lead-through holes or openings are arranged or pierced by drilling or boring through each intervening floor structure 180, the floor structure being for example a voided or a solid concrete floor or slab.

[0066] The diameter of each circular hole may vary 1) according to the type of pipe/pipes or conducting element/elements to be led through that channel, and 2) so that the continuous vertical line, as well as the alignment of plumbing arrangement elements 8, should any be used, may be kept constant despite any possible variations in placement of the different lead-through channels.

[0067] The second part 20 or lower part of the lead-through element 1 is installed or mounted in place onto and into the ceiling 160 of the second space 802, i.e. the space below the floor structure 180. The openings 21, 22, 23 are aligned with the initial lead-through openings arranged into the floor structure 180, and the second plate 200 is brought into contact with the ceiling 170 so that the ceiling-engaging side 200a contacts the ceiling 170. The second flange 203 is similarly brought into contact with the wall 160 so that the backside 202b of the second flange 203 engages the wall 160. The second part 20 is then secured in place with suitable securing elements such as screw or bolts connected to their counterparts in the ceiling 170 and the wall 160 through the mounting holes 40.

[0068] Once the second part 20 has been installed in place, the ceiling 170 may be treated with a suitable water barrier treatment so that a continuous water barrier membrane is formed over the ceiling 170 and the second part 20. Alternatively, the second part 20 may be connected to an existing water barrier membrane of the second space with a joining strip of suitable material. In an embodiment, this may be achieved by applying a layer of water barrier membrane in the form of a waterproofing material or waterproofing mat over the face side 200b of the second part 20 and extending material well into the similar waterproofing material of the surrounding ceiling 170 to ensure the formation of a continuous water barrier membrane. In yet another embodiment, the second part may be pre-treated with a water proofing material prior to the installation, and only the seams or joints between the second part 20 and the ceiling 170 need to be re-treated with a water proofing material.

[0069] In an embodiment, a plumbing arrangement element 8 may be installed in place and connected to the second part 20 via the connectors 60, as explained earlier.

[0070] The first part 10 or upper part of the lead-through element 1 is installed or mounted in place onto and into the floor 150 of the first space 801, i.e. the space above the floor structure 180. The openings 11, 12, 13 are aligned with the initial lead-through holes arranged into the floor structure 180, and the first plate 102 is brought into contact with the floor 150 so that the underside 102b of the first plate 102 engages the floor 150. The first flange 103 is similarly brought into contact with the wall 160 so that the backside 103b of the first flange 103 engages the wall 160. The first part 10 is then secured in place with suitable securing elements such as screw or bolts connected to their counterparts in the floor 150 and the

wall 160 through the mounting holes 40.

[0071] Once the first part 10 has been installed in place, the floor 150 may be treated with a suitable water barrier treatment so that a continuous water barrier membrane is formed over the floor 150 and the first part 10. Alternatively, the second part 10 may be connected to an existing water barrier membrane of the first space. In an embodiment, this may be achieved by applying a layer of water barrier membrane in the form of a waterproofing material or waterproofing mat over the totality of the first part 10 above the floor 150 and extending material well into the similar waterproofing material of the surrounding floor 150 to ensure the formation of a continuous water barrier membrane. In an embodiment the first part may be pretreated with a waterproofing material prior to the installation, similarly to the second part 20 as explained above.

[0072] A plumbing arrangement element 8 may be installed in place and connected to the first part 10, as explained earlier. The second part 20 may be installed before or after the first part 10, or the two parts 10, 20 may be installed simultaneously.

[0073] The intermediate casings 31, 32, 33 are inserted into the initial lead-through channels for example via the second openings 21, 22, 23 of the second part 20 and secured in place to form the lead-through channels 310, 320, 330. This may be done in connection with mounting in place the second part 20 so that the second collars 210, 220, 230 are inserted into the intermediate casings 31, 32, 33 which are then retained by the second plate 200. The intermediated casings may also be inserted later so that the second collars 201, 220, 230 end up outside the intermediate casings 31, 32, 33. In that case, the two parts need to be connected by suitable means.

[0074] In the end, a lead-through structure which is completely and connectively sealed with a water barrier membrane, which is common and continuous with the water barrier of the entire space, is created. Each lead-through channel 310, 320, 330 may house one pipe 70 or conductive element, or several pipes.

[0075] Since the entire lead-through element 1 is encased in a water barrier membrane, there is no need to provide water barrier membrane connectivity to each individual pipe penetration or lead-through, which effectively saves installation space as building code definitions for minimum distances between pipe lead-throughs need not to be taken into account, and pipes may be installed closer to each other, thus reducing the space requirements of the pipelines 70 and/or a plumbing arrangement element 8.

[0076] Further, the installed lead-through element 1 may function as a fire stopping compartment. It is also possible to install additional fire-stopping and/or preventing materials and/or products within the lead-through element 1. The lead-through element 1 may also provide an effective leak water guidance member, shielding the floor/ceiling structure from any water or moisture in case the pipes or pipe connections above the lead-through element 1 are compromised.

[0077] It is obvious to a person skilled in the art that with the advancement of technology, the basic idea of the invention may be implemented in various ways. The invention and its embodiments are thus not limited to the examples described above, instead they may vary within the scope of the claims.

Claims

1. A lead-through element (1) for leading pipes (70) through a floor structure (180), the lead-through element (1) comprising

- a first part (10) mountable to a floor (150) of a first space (801) above the floor structure (108), the first part (10) comprising first openings (11, 12, 13); and
- a second part (20) mountable to a ceiling (170) of a second space (802) located below the floor structure (180), the second part (20) comprising second openings (21, 22, 23), the second openings (21, 22, 23) being concentric with the first openings (11, 12, 13) when the lead-through element (1) is mounted in place,
- **characterized in that** the lead-through element further comprises intermediate casings (31, 32, 33), each configured to extend from a first opening (11, 12, 13) to a second opening (21, 22, 23) inside a circular hole configured to extend from the first space (801) to the second space (802) through the floor structure (180), between the first opening (11, 12, 13) and the second opening (21, 22, 23) when the lead-through element (1) is mounted in place; the intermediate casings (31, 32, 33) configured to form lead-through channels (310, 320, 330) between the first part (10) and the second part (20); through which lead-through channels (310, 320, 330) each, at least one pipe (70) is configured to be led from the first space (801) to the second space (802).

2. The lead-through element (1) according to claim 1, **characterized in that** the first part (10) is configured to be continuously connected to a water barrier membrane of the first space (801).

3. The lead-through element (1) according to claim 1 or 2, **characterized in that** the second part (20) is configured to be continuously connected to a water barrier membrane of the second space (802) so that the lead-through element (1) forms a single continuous water barrier membrane connection for the pipes (70).

4. The lead-through element (1) according to any

one of the claims 1 to 3, **characterized in that** two or more pipes (70) are configured to be led through at least one individual lead-through channel (310, 320, 330).

5. The lead-through element (1) according to any one of the claims 1 to 4, **characterized in that** the first part (10) comprises a first plate (102) comprising a upper side (102a), an underside (102b) and a first back edge (102d), the first back edge (102d) configured to be extended upwards at a right angle to form a first flange (103), the first flange (103) comprising a first face side (103a) and a first backside (103b); and that the first part (10) is mountable onto the floor (150) of the first space (801) by engaging the underside (102b) with the floor (150).

6. The lead-through element (1) according to claim 5, **characterized in that** the first plate (102) further comprises a second back edge (102c) configured to be extended upwards at a right angle to also form the first flange (103), and that the lead-through element (1) is intended to be mounted in a corner of the first space (801).

7. The lead-through element (1) according to any one of the claims 1 to 6, **characterized in that** the first part (10) comprises a face (100) defined by a first edge (100a), a second edge (100b), a third edge (100c), and a fourth edge (100d); and corresponding side walls (101a, 101b, 101c, 101d) configured to extend downwards from respective edges (100a, 100b, 100c, 100d) to the first plate (102); and that the face (100), the edges (100a-d) and the side walls (101a-d) are configured to define a stand (105) for securing a plumbing arrangement element (8) in a correct position.

8. The lead-through element (1) according to any one of the claims 1 to 7, **characterized in that** the first part (10) is configured to be mounted on the surface of a finished floor (170) or straight on the floor structure (180) prior to finishing the floor (170).

9. The lead-through element (1) according to any one of the claims 1 to 8, **characterized in that** second part (20) comprises a second plate (200) comprising a ceiling-engaging side (200a), an outer side (200b) and a third back edge (201d); the third back edge (201d) configured to be extended downwards at a right angle to form a second flange (203), the second flange (203) comprising a second face side (203a) and an second backside (203b); and that second part (20) is mountable onto the ceiling (170) of the second space (802) by engaging the ceiling-engaging side (200a) with the ceiling (170).

10. The lead-through element (1) according to claim 9, **characterized in that** the second plate (200) further comprises a fourth back edge (201c) configured to be extended upwards at a right angle to also form the second flange (203), and that the lead-through element (1) is intended to be mounted in a corner of the first space (801).

11. The lead-through element (1) according to any one of the claims 1 to 10, **characterized in that** the first part (10) and the second part (20) comprise mounting holes (40) through which the first part (10) and the second part (20) are configured to be secured in place by securing elements.

12. The lead-through element (1) according to any one of the claims 1 to 11, **characterized in that** each of the first openings (11, 12, 13) comprise a first collar (110, 120, 130) configured to protrude upwards from the face (100) and configured to extend in the opposite direction downwards from the face (100).

13. The lead-through element (1) according to claim 12, **characterized in that** the downwards-extending parts of the first collars (110, 120, 130) are configured to extend downwards inside the intermediate casings (31, 32, 33) and the lead-through channels (310, 320, 330).

14. The lead-through element (1) according to any one of the claims 1 to 13, **characterized in that** each of the second openings (21, 22, 23) comprise a second collar (210, 220, 230) arranged to extend upwards from the ceiling-engaging side (200a) of the plate (200).

14. The lead-through element (1) according to claim 13, **characterized in that** the second collars (210, 220, 230) are configured to extend upwards inside the intermediate casings (31, 32, 33) and the lead-through channels (310, 320, 330).

15. The lead-through element (1) according to any one of the claims 1 to 14, **characterized in that** the first part (10) comprises at least one vertical support member (50) configured to bear and direct the load from a plumbing fixture arranged onto a plumbing arrangement element (8) towards the first part (10) and the floor (150) of a space (801, 802).

16. The lead-through element (1) according to claim 15, **characterized in that** the vertical support member (50) is configured fixedly into the face (100) of the first part (10).

17. The lead-through element (1) according to any one of the claims 1 to 16, **characterized in that** the second part (20) comprises at least one connector (60) configured to align and secure a plumbing ar-

rangement element (8) in place in connection with the second part (20) by engaging counterparts arranged into a top part (83) of the plumbing arrangement element (8).

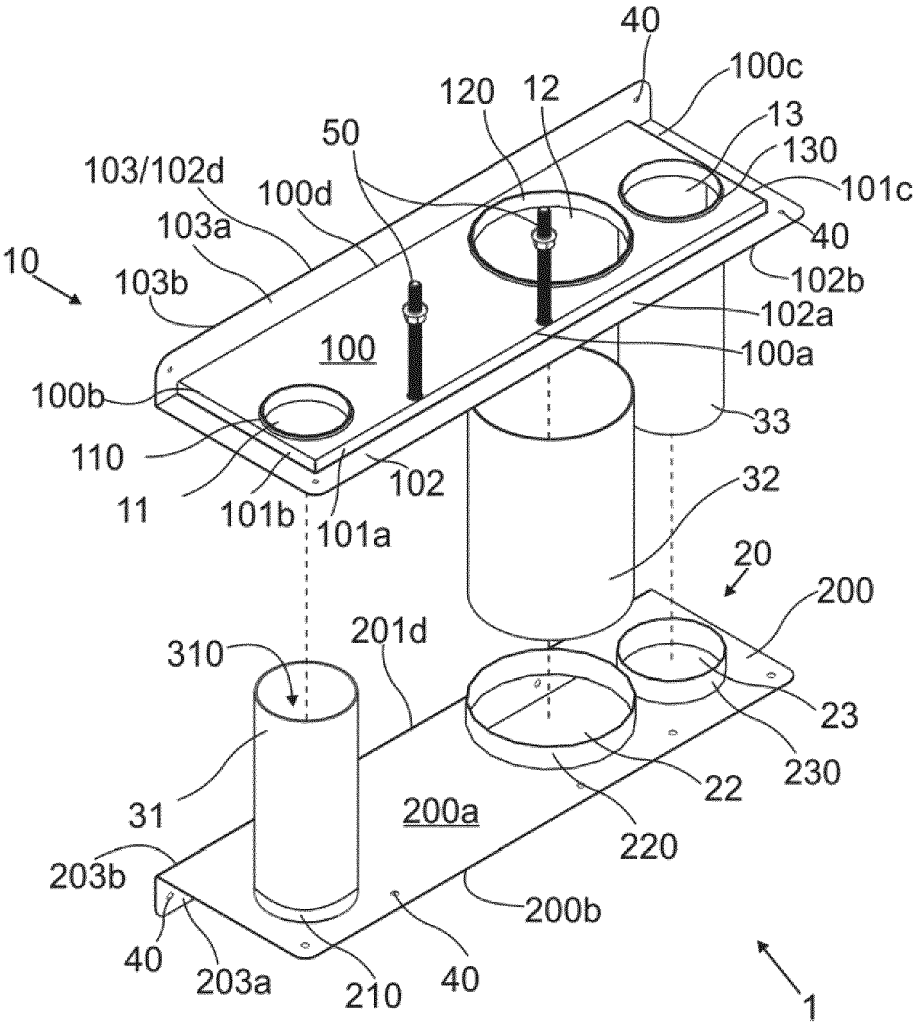
18. A system for leading pipes (70) through floor structures (180) to establish a continuous vertical line of pipes (70) between at least two vertically adjoining spaces (801, 802), **characterized in that** the pipes are configured to be led through the floor structure (180) with a lead-through element (1) according to any one of the claims 1-17.

19. The system according to claim 18, **characterized in that** the pipes (70) are configured to run within a plumbing arrangement element (8) arranged vertically aligned in each space (801, 802).

20. A method for leading pipes (70) through floor structures (180) via lead-through elements (1) according to any of the claims 1-17, to establish a continuous vertical line of pipes (70) between at least two vertically adjoining spaces (801, 802), the method comprising the following steps

- establishing a continuous vertical lines for a required number of pipelines, the vertical line extending from the bottom-most space to the top-most space in a plumbing line of a building;
- arranging a required number of circular holes extending from a first space (801) to a second space (802), located below the first space (801), through a floor structure (180);
- mounting a first part (10) of a lead-through element (1) to the floor (150) of the first space so that openings (11, 12, 13) arranged into the first part (10) are aligned with the circular holes;
- mounting a second part (20) of the lead-through element (1) to the ceiling (170) of the second space so that openings (21, 22, 23) arranged into the second part (20) are aligned with the circular holes and so that first openings (11, 12, 13) and the second openings (21, 22, 23) are concentric;
- arranging intermediate casings (31, 32, 33) to extend from the first openings (11, 12, 13) to the second openings (21, 22, 23) inside the circular holes, and to form lead-through channels (310, 320, 330) between the first part (10) and the second part (20); and
- leading at least one pipe (70) from the first space (801) to the second space (802) through each of the lead-though channels (310, 320, 330).

21. The method according to claim 20, **characterized in that** the pipes (70) are arranged to run within a plumbing arrangement element (8) arranged vertically aligned in each space (801, 802).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50
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100b
33
110
102
32
11
101b
101a
20
200
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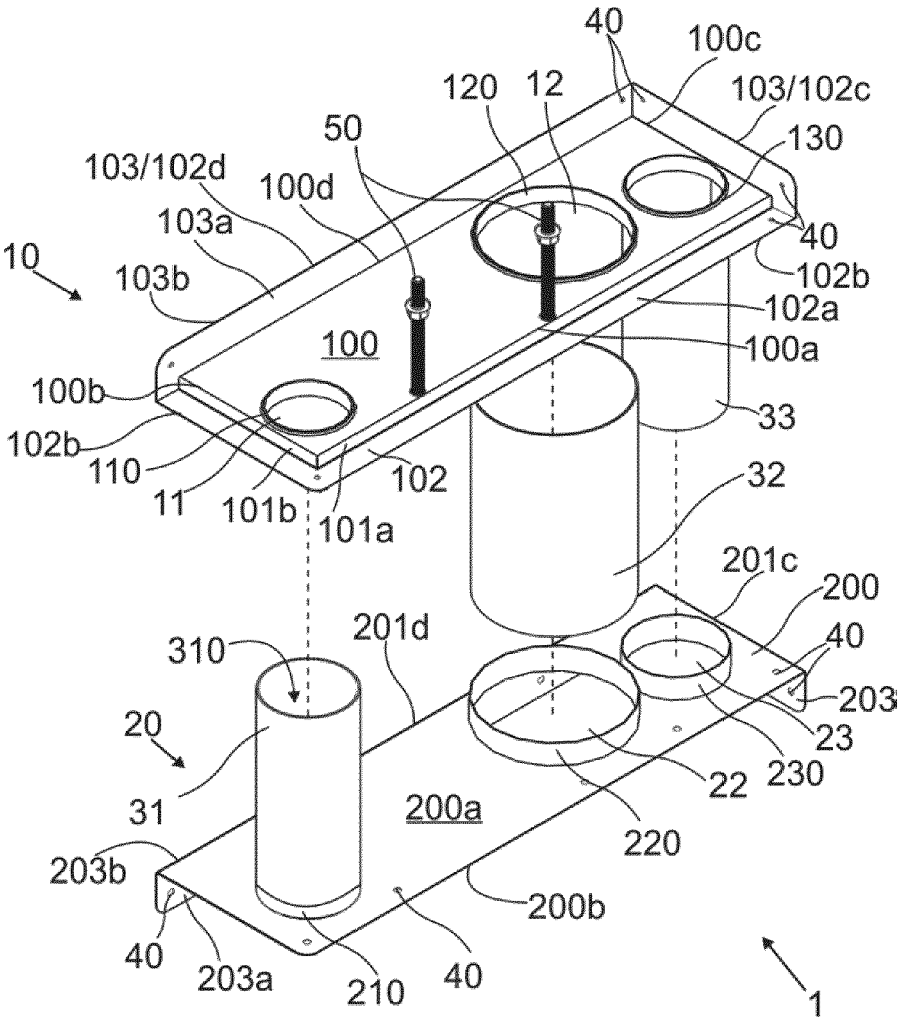
Fig. 1a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100a
100b
33
102b
110
102
32
11
101b
101a
201c
200
201d
310
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23
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203a
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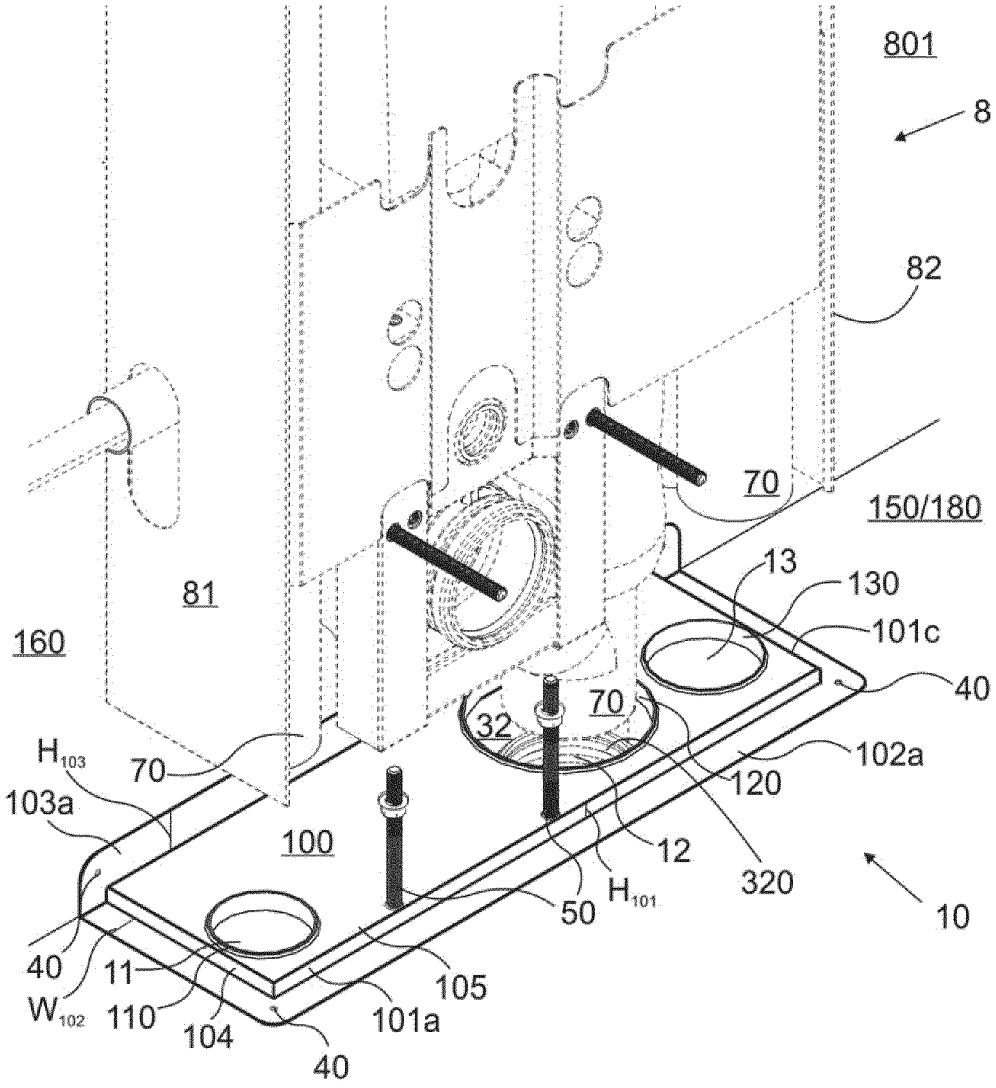
Fig. 1b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70
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13
130
101c
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81
160
32
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H_{103}
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102a
120
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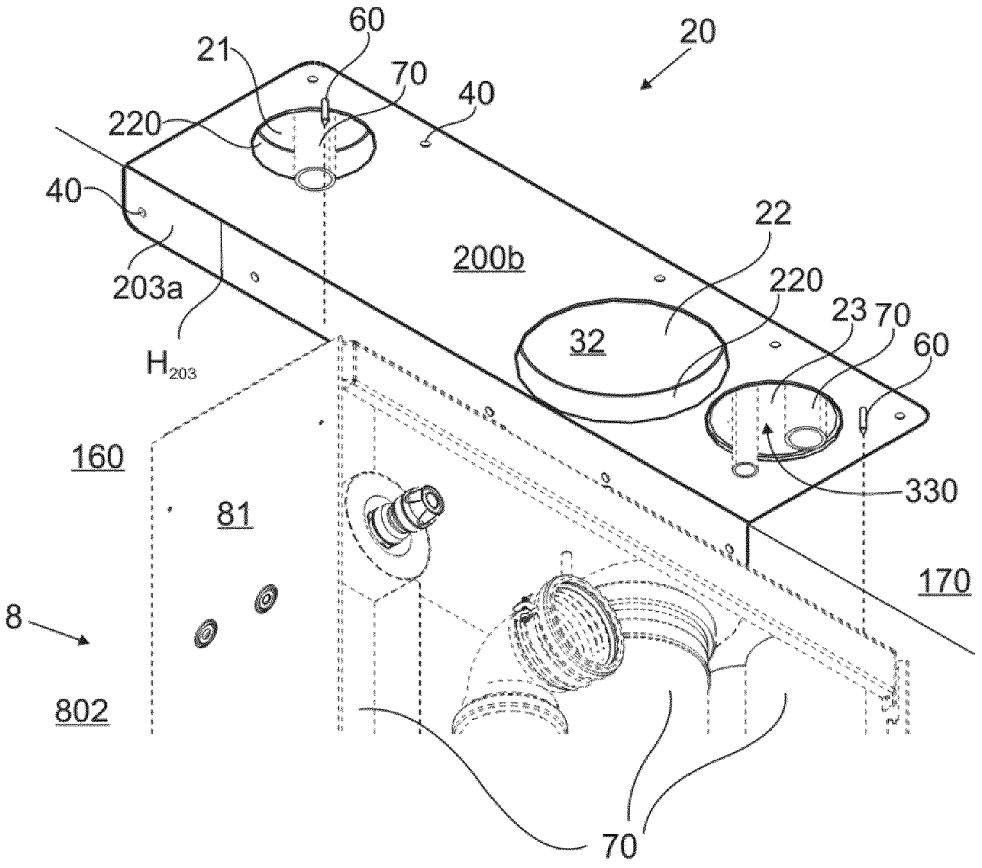
105
W_{102}
110
104
101a
40

Fig. 2a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21
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20
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220
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22
200b
220
23
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203a
32
60
H_{203}
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81
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8
802
70

Fig. 2b

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EUROPEAN SEARCH REPORT

Application Number
EP 16 16 0463

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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	25 July 2016	Isailovski, Marko

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82