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(54) **SIPHON ASSEMBLY**

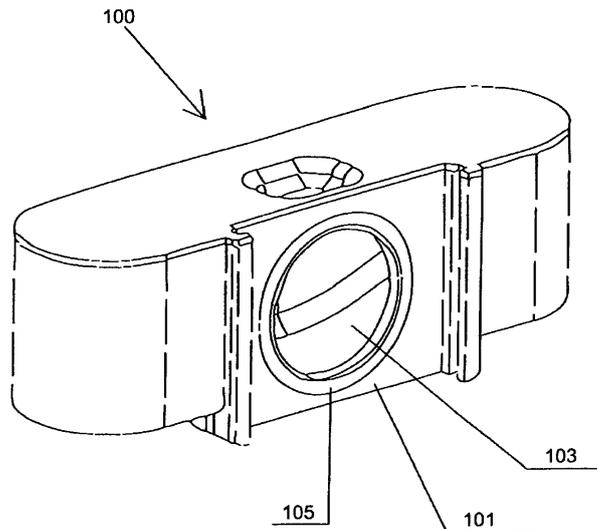
(57) A siphon assembly is described, intended for placing in a discharge gutter (10) and comprising:  
a siphon unit (100) comprising:

- a front face (101), an entrance opening (64) and an exit opening (103) extending through the front face;
- two guiding faces (121) directed towards each other, arranged at opposite sides of the exit opening (103), preferably mutually parallel and preferably perpendicular to the front face (101);
- two mutually parallel guiding grooves (122) arranged in

the respective guiding faces (121) at a distance of the front face (101);

a latching member (500) comprising a pressing latch part (501) and a hand grip part (502), wherein the pressing latch part (501) comprises

- two mutually parallel latch legs (511, 512) lying in a common plane and having outer sides (518, 519) directed away from each other,
- wherein the outer sides (518, 519) of the latch legs (511, 512) fit in the guiding grooves (122).



**Fig.3A**

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**Description****FIELD OF THE INVENTION**

[0001] The invention relates to a siphon assembly.

**BACKGROUND OF THE INVENTION**

[0002] For collecting and discharging water in a sanitary space, particularly in a bathroom or a shower room, it is known to use a collecting trough or collecting gutter with a stench lock. The collecting trough is mounted below floor level, such that the water can flow into the collecting trough from the floor of the room concerned. The collecting trough is provided with an exit for connection to a discharge conduit towards the sewer. A stench lock is an assembly, also indicated as siphon, which is such that there is always remaining a quantity of water that closes the exit opening, in order to prevent odours from the sewer reaching the user space (bathroom or shower room), such as will be clear to a person skilled to the art. It is in principle possible that the stench lock is arranged in the discharge conduit below the floor, but it is desirable that the stench lock can be easily reached for cleaning. It is therefore usual that the siphon is arranged in the collecting trough.

[0003] In an embodiment, the exit of the collecting trough is arranged in a sidewall of this collecting trough. The exit is provided with a horizontal pipe piece of several centimetres length, that is attached to the collecting trough or forms therewith an integral whole. The pipe piece extends into the collecting trough over a short distance, and at its end within the collecting trough it is provided with a vertical flange.

[0004] The siphon is formed by a container with a closed bottom and closed sidewalls, with arranged thereover a cap with closed upper side and closed sidewalls. The cap is larger than the container, and the upper edge of the container is higher than the lower edge of the cap. The cap and the container have side openings in a sidewall aligned with each other. In use, this sidewall of the siphon is clamped against the flange of the exit pipe. Water flows under the lower edge of the cap, flows upwards between the cap and the container, over the upper edge of the container, into the exit pipe. When the supply of water stops, there remains in the collecting trough a quantity of water, of which the level corresponds to the level of the upper edge of the container.

[0005] In order to clean the siphon, it can be removed from the collecting trough by a vertical movement.

**SUMMARY OF THE INVENTION**

[0006] It is a challenge to design a siphon assembly in such a way that on the one hand it can be manufactured relatively easily and on the other hand it functions technically satisfying. The technical functioning on the one hand means that in the operative situation there is a good

and reliable sealing between the siphon and the flange of the exit pipe. On the other hand, the technical functioning means an easy removal and replacement of the siphon.

5 [0007] The sealing is typically provided by an O-ring around the opening, and for a good sealing a relatively high pressing force is required. Persons skilled in the art will understand that too low a pressing force will inevitably result in the assembly no longer functioning as a "good" stench lock. Persons skilled in the art will further understand that the pressing force required depends among others of the size of the O-ring; a common diameter for the exit pipe is 40 mm, and a common diameter for the O-ring is about 50 mm.

10 [0008] A first solution is known in which the siphon, guided by holding guides, is simply pressed in place from above downwards, wherein the distance between the siphon and exit pipe remains constant. This means that the pressing force acts on the O-ring continuously, and that the O-ring slides over the flange, in which case much friction is caused which impedes placing and results in wear and tear of the O-ring. On the other hand, there is a risk that the O-ring, when the passage opening has been passed and the lower edge of the exit pipe is reached, at its lower side gets stuck behind this lower edge and is pulled out of its seat, so that there is no question anymore of a sealing function, which is however not visible to the user from above.

20 [0009] There is also a second solution known, in which the siphon does not scrape along the flange but is first at its lower side coupled to the flange in order to subsequently hinge towards that flange and be fixed at its upper side with a clamp. In this case, placement is a two-stage movement: firstly a movement directed vertically downwards wherein the O-ring passes the flange without being loaded, and subsequently a movement directed horizontally in order to press the O-ring. The problem of pulling the O-ring is solved adequately, indeed, but in the case of such design it is difficult to ensure that the O-ring is correctly pressed over its entire length. Because of the hinging movement, the O-ring will first engage at its lowest point. At that lowest point, the hinge design will take care of a good support for the pressing force required. At the lowest point, the clamp will take care of a good support for the pressing force required. At the intermediate side parts of the O-ring, however, no mechanical coupling is present between the siphon and the flange, so that the pressing force can lead to a deformation of the siphon and/or the flange, causing a risk for reduced sealing. This problem could be mitigated by implementing the parts concerned more sturdy, but in that case those parts would in any case have to become thicker and the whole has to become heavier.

40 [0010] It is an objective of the present invention to provide an alternative design wherein the said problems have been solved or in any case reduced.

45 [0011] To this end, a design proposed by the present invention has, comparable to the said first solution, ver-

tical guides, but on placing the siphon the distance with respect to the flange is so large that the O-ring does not touch the flange. The design proposed by the present invention is further provided with a clamping device having a wedge shaped contour in a vertical direction. When the siphon has reached the correct vertical position, the clamping device is pressed vertically down, causing the siphon, in comparable manner as in the case of the said second solution, to make a horizontal displacement in order to press the O-ring.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0012]** These and other aspects, features and advantages of the present invention will be further clarified by the following description of one or more exemplary embodiments with reference to the drawings, in which same reference numerals indicate same or similar parts, in which indications "below/above", "higher/lower", "left/right" et cetera exclusively relate to the orientation shown in the drawings, and in which:

figures 1A and 1B schematically show longitudinal cross sections of two embodiments of an elongated gutter;

figure 2A is a schematic perspective view of a collecting trough;

figure 2B shows a schematic cross section of the collecting trough of figure 2A;

figure 3A shows a schematic perspective view of a siphon unit;

figure 3B shows a schematic cross section of the siphon unit;

figures 4A and 4B schematically illustrate placing the siphon unit in the collecting trough;

figure 4C on larger scale shows a detail of the siphon unit;

figure 5 shows a schematic perspective view of a latch member;

figure 6 is a view comparable to figure 4B illustrating the coupling between the siphon unit and the collecting trough after placement of the latch member;

figures 7A-7D show details of embodiments of the latch member.

### **DETAILED DESCRIPTION OF THE INVENTION**

**[0013]** Figures 1A and 1B schematically show longitudinal cross sections of two embodiments of an elongated gutter 10, suitable to be used in the floor of for instance a bathroom or a shower room for collecting and discharging water. The gutter 10 has a bottom 11, longitudinal sidewalls 13 and end face sidewalls 14. An upper edge of the gutter 10 is indicated by reference numeral 12. The bottom 11 is slightly inclined to a lowest point, which normally but not necessarily is located in the longitudinal centre of the gutter. The gutter 10 will be mounted in the floor in such manner that water flowing over the floor will

flow over the upper edge 12 into the gutter, and will flow over the bottom 11 towards the lowest point. By way of nonlimiting example, a typical length of such gutter is about 90 cm, but other lengths are well possible.

**[0014]** The gutter 10 is provided with a discharge opening for discharging the collected water. In the embodiment of figure 1A, a discharge opening 15 is located in the lowest part of the bottom 11. In the embodiment of figure 1B, a discharge opening 17 is located in a sidewall 13 close to the lowest part of the bottom 11. In either case, as shown in figure 1B, the lowest part of the bottom 11 may be provided with an additionally recessed part 16. This additionally recessed part 16 may be formed integrally with the remainder of the gutter 10. In a typical embodiment, the gutter 10 is made of stainless steel plate, and formed by deep drawing or by welding; the additionally recessed part 16 may then be formed by deep drawing as well, or attached by welding.

**[0015]** In the following, an embodiment will be discussed of a siphon system intended to be arranged under the gutter 10 of figure 1A.

**[0016]** Figure 2A is a schematic perspective view of a collecting trough 20, and figure 2B is a schematic transverse cross section of the collecting trough 20. The collecting trough 20 has a bottom 21, an standing sidewall 24 following the contour of the bottom 21, and an upper edge 22 with a flange 23. The flange 23 serves to mount the collecting trough 20 from below against the bottom 11 of the gutter 10, for instance by glueing, welding, screwing, or other suitable method of attaching.

**[0017]** The sidewall 24 is provided with an opening 25 through which an exit pipe piece extends. The exit pipe piece 26 may be integrally formed with the collecting trough 20, or can be inserted into the opening and attached liquid-tight, for instance by welding, or for instance by screwed sealing rings (not shown). In any case it is important that the connection between the sidewall 24 and the exit pipe piece 26 is watertight. It is further important that the lower side of the exit pipe piece 26 lies higher than the bottom 21.

**[0018]** A suitable material for the collecting trough 20 and the exit pipe piece 26 is plastic or stainless steel.

**[0019]** The exit pipe piece 26 has a distal end 27 outside the collecting trough 20 and a proximal end 28 inside the collecting trough 20. The distal end 27 serves to connect to a discharge tube towards the sewer. The proximal end 28 is provided with a connection flange 29, extending substantially perpendicular to the central line of the exit pipe piece 26, with some distance between the connection flange 29 and the sidewall 24. In the normal operative condition, the bottom 21 will be directed substantially horizontally, the exit pipe piece 26 will be directed substantially horizontally, and the connection flange 29 will lie in a vertical plane. At its lower end, this connection flange 29 may be separate from the bottom 21 or may be attached thereto. The precise contour of the upper side is not essential, but it preferably is horizontal. The side edges 30 of the connection flange 29 are directed vertically.

**[0020]** Figure 3A shows a schematic perspective view of a siphon unit 100 and figure 3B shows a schematic transverse cross section of the siphon unit 100. The siphon unit 100 comprises a siphon container 40 and a siphon cap 60 arranged thereover. As will be explained later in more detail, the siphon unit 100 is intended to be placed in the collecting trough 20 and, in top view, has a contour comparable to that of the collecting trough 20.

**[0021]** The siphon container 40 has a closed bottom 41 and a sidewall 42 extending upwards from the bottom 41 and following the contour of the bottom 41, and having an upper edge 43. At its upper end, the siphon container 40 is open.

**[0022]** The siphon cap 60 has a closed upper side 61 and a sidewall 62 extending downwards from the upper side 61 and following the contour of the upper side 61, and having a lower edge 63. At its lower end, the siphon cap 60 is open, and it defines here the entrance opening 64 of the siphon unit 100.

**[0023]** The siphon cap 60 extends around the siphon container 40, and more particularly has a length larger than the length of the siphon container 40 in the direction perpendicular to the plane of drawing in figure 3B, and has in the horizontal direction in figure 3B a width larger than the width of the siphon container 40. At one longitudinal side, at the right hand side in figure 3B, the siphon container 40 and the siphon cap 60 have a common wall that will be indicated as front wall 101 of the siphon unit 100. Outside this common front wall 101, a gap-shaped rising space 102 is present between the siphon container 40 and the siphon cap 60, i.e. outside the siphon container 40 and inside the siphon cap 60.

**[0024]** The outer surface of the front wall 101 is substantially a flat plane. Exit opening 103 with a preferably circular-round contour is located in the common front wall 101. For accommodating an O-ring 105 or comparable sealing member, a preferably circular accommodation groove 104 is arranged in the outer surface of the front wall 101 around the exit opening 103. In relaxed and unloaded condition, the O-ring 105 has a thickness larger than the depth of the accommodation groove 104.

**[0025]** It is dimensionally preferred that the diameter of the exit opening 103 substantially corresponds to the diameter of the exit pipe piece 26.

**[0026]** It is dimensionally preferred that the lower edge 63 of the siphon cap 60 lies higher than the bottom 41 of the siphon container 40, that the upper side 61 of the siphon cap 60 lies higher than the upper edge 43 of the siphon container 40, and that the upper edge 43 of the siphon container 40 lies higher than the highest point of the exit opening 103.

**[0027]** It is dimensionally important that the upper edge 43 of the siphon container 40 lies higher than the lower edge 63 of the siphon cap 60. As will be explained later in more detail, the siphon unit 100 is intended to be placed in the collecting trough 20, wherein the bottom 41 of the siphon container 40 rests on the bottom 21 of the collecting trough 20, and wherein the exit opening 103 of the

siphon unit 100 connects to the exit pipe piece 26. Water flowing into the gutter 10 flows into the collecting trough 20. The rising water level in the collecting trough 20 also causes the water level in the rising space 102 to rise, until the level of the upper edge 43 of the siphon container 40 is reached. Further supply of water will cause water to flow over the upper edge 43 of the siphon container 40, to fill the siphon container 40 until the lower edge of the exit opening 103, and will eventually be discharged through the exit pipe piece 26. When the water supply stops the water in siphon container 40 will drop till the level of the lower edge of the exit opening 103, and the water outside the siphon container 40 will stabilize itself to the level of the upper edge 43 of the siphon container 40. Then, the water remaining in the rising space 102 forms the stench lock.

**[0028]** It is noted that instead of a common front wall 101 the cap 60 and the container 40 may also have individual front walls each provided with a corresponding exit opening, which openings then may be aligned with each other, and there may be a sealing provided between the individual front walls.

**[0029]** In order to explain the placement of the siphon unit 100 in the collecting trough 20, figure 4A on a larger scale shows a top view, partially in transverse cross section, of a part of the siphon unit 100 and a part of the collecting trough 20, namely the front wall 101 with the exit opening 103 and the connection flange 29 with the proximal end of the exit pipe piece 26. The accommodation groove 104 is shown at the left hand side in the figure, and the O-ring 105 arranged therein is shown at the right hand side in the figure.

**[0030]** At opposite sides of the exit opening 103, the front wall 101 is divided with two guides 120 projecting forward with respect to the front wall 101 and defining to mutually parallel guiding faces 121 directed towards each other, of which the mutual distance corresponds to the width of the connection flange 29 and preferably slightly larger in order to offer some manoeuvring play. The guiding faces may also be formed by the planar connection parts of the front wall 101 lying recessed with respect to the remainder of the front wall. In horizontal direction, the guiding faces 121 form a confinement for the connection flange 29, and they preferably are perpendicular to the front wall 101.

**[0031]** Depending on the dimensioning of the collecting trough 20 and the siphon unit 100, the guiding faces 121 guide the connection flange 29 when one lowers the siphon unit 100 into the collecting trough 20 (vertical displacement parallel to the connection flange 29), or when one moves the siphon unit 100 with a horizontal movement perpendicular to the connection flange 29 towards the connection flange 29. In any case, the dimensioning is such that in the case of lowering the siphon unit 100 into the collecting trough 20 the O-ring 105 remains free from the connecting flange 29, so that there is no danger of the O-ring 105 being pulled out of its groove 104.

**[0032]** The dimensioning is such that the exit opening

103 of the siphon unit 100 in vertical direction is aligned with the exit pipe piece 26 when the lower part (for instance the bottom 41) of the siphon container 40 rests on the bottom 21 of the collecting trough 20. Now one can move the siphon unit 100 towards the connection flange 29, wherein the O-ring 105 touches the surface of the connection flange 29.

**[0033]** Figure 4B is a view comparable to figure 4A, showing the situation when the siphon unit 100 has been brought into connection with the connection flange 29.

**[0034]** Figure 5 is a schematic perspective view of an embodiment of the latch member 500 for cooperating with a siphon unit 100 and the collecting trough 20 for pressing the siphon unit 100 against the connection flange 29 in the position shown in figure 4B, such that the O-ring 105 establishes a reliable sealing between the front wall 101 of the siphon unit 100 and the connection flange 29 of the collecting trough 20.

**[0035]** The latch member 500 has a generally L-shaped transverse cross section, formed by a plate-shaped pressing latch part 501 and an also plate-shaped handle part 502 which is substantially perpendicular to the pressing latch part 501. The precise shape of the handle part 502 is not essential and will not be discussed in further detail.

**[0036]** The pressing latch part 501 comprises two latch legs 511, 512, mutually parallel and lying in a common plane, with a mutual distance that corresponds to and preferably is slightly larger than the outer diameter of the proximal end of the exit pipe piece 26. The latch legs 511, 512 meet each other at a bridge part 513, to which the handle part 502 is attached or which forms an integral whole with the handle part 502. The inner sides 515, 516 of the latch legs 511, 512, directed towards each other, may make a transition into each other via an arch part 517, of which the radius corresponds to the radius of the proximal end of the exit pipe piece 26, and which forms the lower side of the bridge part 513. Alternatively, the lower side of the bridge part 513 could have a different contour, for instance a straight line perpendicular to the latch legs 511, 512.

**[0037]** The height or length of the latch legs 511, 512 corresponds substantially to the height of the front wall 101 of the siphon unit 100. The outer sides 518, 519 of the latch legs 511, 512, directed away from each other and preferably mutually parallel, have a mutual distance that is indicated as the outer width of the pressing latch part 501. The dimension perpendicular to the height and perpendicular to the width is indicated as the thickness of the latch legs 511, 512.

**[0038]** It is shown in figure 4A and 4B, and detailed in larger scale in figure 4C, that a vertical guide groove 122 is arranged in each guide plane 121, with a depth  $d$  and a width  $b$ . The part of the guide face 121 lying between the front wall 101 and the vertical groove 122 has a width  $a$ .

**[0039]** The thickness of the connection flange 29 substantially corresponds to width  $a$ .

**[0040]** The thickness of the pressing latch part 501 is slightly smaller than the width  $b$  of the groove. The outer width of the pressing latch part 501 is larger than the mutual distance between the guide faces 121, which is indicated here as the "guiding width"  $LB$ . Particularly, the outer width of the pressing latch part 501 is larger than  $LB+d$  and smaller than  $LB+2d$ . Preferably, the outer width of the pressing latch part 501 is between  $LB+1.75xb$  and  $LB+1.95xb$ . Thus, the latch legs 511, 512 fit in the mutually opposite guide grooves 122 with a small play.

**[0041]** After the front wall 101 of the siphon unit 100 has been correctly aligned with and positioned against the connection flange 29, the pressing latch part 501 of the latch member 500 is inserted into the guide grooves 122 from above by the user, and pressed downwards with a shifting movement, directed vertically, towards the latch position. In this case, each latch leg 511, 512 presses against the connection flange 29 and supports against the front side wall 123 of the corresponding guide groove 122, directed away from the front wall 101. Figure 6 is a view/cross section comparable to figure 4B, illustrating the latch position which is then reached. It can be seen that the front wall 101 of the siphon unit 100 is pressed against the connection flange 29, with the O-ring 105 being compressed for providing a good sealing.

**[0042]** It will be understood that the reliable watertight sealing comes into being by a displacement of the latch member 500 which is directed vertically downwards, with the user simply pressing on the handle part 502 till the latch position: the latch position (the end of this downward displacement) is reached when a stop is reached, which can be defined by the bridge part 513 touching the exit pipe piece 26, or by the lower ends of the latch legs 511, 512 touching the bottom of the collection trough 20, or any other way. It will further be understood that the O-ring 105 does not slight along the connection flange 29 in this case; only a pressing force directed perpendicular to the front wall 101 is acting on the O-ring, which presses the O-ring into the groove 104 and compresses the O-ring in the groove 104.

**[0043]** Conversely, the user can release the latching and the watertight sealing in a simple manner by removing the latch member 500 by means of a displacement directed vertically upwards. To this end, the user can place a finger below the handle part 502. The dimensioning of the latch member 500 and the siphon unit 100 is such that in the lowest position of the latch member 500 some space remains between the lower sides of the handle part 502 and the upper side of the siphon cap 60. In an embodiment, a recessed part is accommodated in the upper side of the siphon cap 60, into which fits a finger: in that case the stop can be defined by the handle part 502 meeting the upper side of the siphon cap 60.

**[0044]** In the following, a first main face of the pressing latch part 501 will be indicated as front face 531 and the opposite main face will be indicated as rear face 532. In the embodiment of figure 5, the handle part 502 is located at the side of the rear face 532; referring to figure 6, it is

the rear face 532 that presses against the connection flange 29 and it is the front face 531 that supports against the front side walls 123 of the guide grooves 122.

**[0045]** In principle the pressing latch part 501 may be mirror symmetric. The lower ends of the latch legs 511, 512 may for instance have a rectangular or a round contour. On the initial insertion of the latch legs 511, 512 into the guide grooves 122, the connection flange 29 is however at a relatively large distance from the front wall 101, pressed forward by the O-ring 105 which still is in relaxed condition. The space which then remains between the connection flange 29 and the front side walls 123 of the guide grooves 122 is too small for accommodating the thickness of the latch legs 511, 512. This problem is solved in a preferred embodiment in which the lower end of each latch leg 511, 512 is provided with an inclined run-in face 533, which preferably and as shown extends over the entire thickness from the front face 531 towards the rear face 532, such that the lower end 534 of the front face 531 forms the lowest point of the latch leg. The angle between the run-in face 533 and the front face 531 may for instance be in the range from 45° - 70°. This embodiment has as additional advantage that it is difficult if not impossible to insert the pressing latch part 501 incorrectly.

**[0046]** It is desired to ensure that the pressing latch part 501 cannot be inadvertently pulled out when cleaning the discharge gutter. Therefore, in a preferred embodiment a latching is provided, preferably and as shown a snap latching, to hold the pressing latch part 501 in its latch position. It can be seen in figure 5 that the latch legs 511, 512 at their lower ends are provided with projections 541, 542 on their outer sides 518, 519, having upper borders 543, 544. These projections 541, 542 project in the width direction, and are directed away from each other. Figure 7B is a detail view from the side of the front face 531, showing this in a larger scale for the projection 541 of the latch leg 511. Figure 7B also shows the lower end of the bottom 124 of the corresponding guide groove 122, to illustrate that a recessed part 125 is formed at the lower end of this groove 122, with an upper border 126. The width of the pressing latch part 501 at the level of the projections 541, 542 is larger than  $LB+2d$ . On insertion of the pressing latch part 501 into the guide grooves 122, the latch legs 511, 512 are therefore slightly pinched together in an elastic manner, such that the projections 541, 542 fit in the grooves 122. On downwards displacement of the pressing latch part 501, the projections 541, 542 therefore slide over the respective bottoms 124 of the respective grooves 122; this is the condition illustrated in figure 7B. Once the projections 541, 542 have passed the upper border 126 of the recessed part 125, the latch legs 511, 512 relax and the projections 541, 542 are pressed outwards, into the respective recesses 125.

**[0047]** When the user now tries to lift the latch member 500, the projections 541, 542 will meet the upper border 126 of the recessed part 125, causing the upwards displacement to be blocked. The upwards displacement can

only continue if the user deliberately exerts a larger force, which first must cause the latch legs 511, 512 to be pressed inwards again. The lifting force that is needed to this end can be influenced by implementing the mutually touching interfaces 126, 543 in a slightly inclined manner, as will be clear to be a person skilled in the art.

**[0048]** Figure 7C is a schematic side view of a latch leg 511 and a corresponding section of the connection flange 29, in a larger scale, to illustrate a preferred detail according to the present invention. For the sake of clarity, the pressing latch part 501 and the connection flange 29 are shown at some distance from each other.

**[0049]** In this preferred embodiment, the latch legs 511, 512 are slightly thinner at the lower ends than at their upper ends, while the connecting flange 29 in opposite direction is slightly thicker at its lower end than at its upper end. Further, the front face 531 of the latch legs 511, 512 (at least those parts of the latch legs 511, 512 engaging in the respective guide grooves 122) are planar in vertical direction, in order to lie against the front side wall 123 of the guide grooves 122 over the entire height, and the variation in thickness of the latch legs 511, 512 is achieved at the side of the rear face 532. In respect of the connection flange 29, the variation in thickness is achieved at the engagement plane 560 thereof, directed towards the rear face 532 of the latch legs 511, 512.

**[0050]** The variation in thickness can be achieved as a continuous variation, wherein the latch legs 511, 512 and the connection flange 29 are gib-shaped or wedge shaped, if the rear face 532 of the latch legs 511, 512 is a face making a slight angle with the front face 531, and if the engagement plane 560 makes the same angle. The variation in thickness may also be stepwise, wherein the latch legs 511, 512 and the connection flange 29 are stepwise gib-shaped or wedge-shaped. In the embodiment shown, the variation in thickness is stepwise, and the latch legs 511, 512 in vertical direction have at least two, in the example shown three, but possibly four or more, parts of mutually different thickness, wherein the respective rear face parts 551, 552, 553 are always substantially parallel to the front face 531. The same applies then, mutatis mutandis, for the connection flange 29, which in vertical direction may be subdivided in (this case) three parts with mutually different thickness, wherein the respective engagement face parts 561, 562, 563 are always substantially parallel to the rear face 564 of the flange 29.

**[0051]** An advantage achieved by this is that inserting the latch member 500 is simplified. First, the thinnest part of the latch legs 511, 512 slides over the thinnest part of the connection flange 29, so that the compression force on the O-ring 105 is not yet maximal and the counter force which is experienced, and which is caused by friction, is relatively small. It has to be considered in this respect that this compression force only operates in the upper part of the O-ring, while the remainder of the O-ring is in fact unloaded. In a second phase, the thinnest part of the latch legs 511, 512 slides over the middle part

of the connection flange 29 and the middle part of the latch leg 511, 512 slides over the thinnest of the connection flange 29 with a slightly larger compressing force on the O-ring 105. Only in the third phase, the maximum compression force on the O-ring 105 is achieved, over the maximum height of the O-ring. A further advantage which is achieved is that the connection flange 29 is pressed by the pressing latch part 501 in a better distributed manner, by which deformation of the connection flange 29, which could cause insufficient compression of the O-ring, is reduced or avoided.

**[0052]** The advantages above are also achieved in the case of a continuous wedge shape. It however a problem that it is difficult to give two surfaces the required flatness with a high measure of precision, and that the components involved are of course relatively thin and hence bendable. By giving the surfaces which press on each other a stepped implementation, it is achieved that the components press on each other at the pressure points that are positionally better defined, namely approximately at the upper end, approximately at the lower end and approximately at mid height.

**[0053]** The invention may be applied by providing the siphon unit 100 together with a matching exit pipe piece 26 provided with a connection flange 29, which then in the application is still to be mounted in the side wall of a gutter 10, at an additionally recessed part 16 or not. A siphon assembly comprising the combination of the siphon unit 100 and an exit pipe piece 26 provided with the matching connection flange 29 is therefore an embodiment of the present invention.

**[0054]** The invention may also be implemented by providing the siphon unit 100 together with a matching collecting trough 20 which is provided with a separate, still to be mounted but preferably integrated exit pipe piece 26 with connection flange 29. A siphon assembly comprising the combination of the siphon unit 100, the collecting trough 20 and the exit pipe piece 26 provided with a matching connection flange 29 is therefore an embodiment of the present invention. Further, a siphon assembly comprising the combination of the siphon unit 100 and the collecting trough 20 with integrated exit pipe piece 26 with matching connection flange 29 is an embodiment of the present invention.

**[0055]** The invention may be applied in the case of existing discharge constructions, in which an exit pipe piece 26 with connection flange 29 is already present, to replace the corresponding siphon unit. Therefore, the siphon unit 100 is already an embodiment of the present invention. In such case, the existing connection flange 29 in all probability is a flange with mutually parallel main faces, without taper and without stepped thickness. The embodiment discussed with reference to figure 7C is not possible then. Figure 7D illustrates an embodiment variation which is applicable in combination with a connection flange 29 with mutually parallel main faces, for instance an existing flange.

**[0056]** Figure 7D is a view comparable to figure 7C,

which apart from the exit pipe piece 26 with the flange 29 and the latch member 500 also shows a part of a guide groove 122. More particularly, figure 7D shows a portion of the siphon unit 100 with the front side wall 123 of the guide groove 122 concerned. It can be seen that now the rear face 532 of the pressing latch part 501 is planar, for cooperation with the planar flange 29, and that now the front face 531 of the pressing latch part 501 is stepped, with again the lower part of the pressing latch part 501 being thinner than the upper part. In this embodiment, the front side wall 123 of the guide groove 122 is stepped in reverse direction. An alternative with inclined surface parts is also possible. The operation is comparable to the operation discussed with reference to figure 7C and will not be repeated.

**[0057]** A siphon assembly for application in the gutter of figure 1B may be designed in comparable manner, with the understanding that the additionally recessed part 16 fulfils the function of the collecting trough 20 so that this separate collecting trough 20 may be omitted. The exit pipe piece 26 is then mounted in or to the additionally recessed part 16, and the siphon unit 100 is placed in the additionally recessed part 16.

**[0058]** Summarizing, it is a big advantage of the design proposed by the present invention that the components can be manufactured relatively easily, while a simple operation is offered in combination with a reliable water sealing.

**[0059]** It will be clear to a person skilled in the art that the invention is not limited to the exemplary embodiment discussed in the above, but that several variations and modifications are possible within the protective scope of the invention as defined in the attached claims. For instance, it is not necessary that the handle part 502 is perpendicular to the pressing latch part 501. Further, a variation is possible wherein the O-ring is accommodated in an accommodation groove arranged in the flange 29.

**[0060]** Even if certain features are mentioned in different dependant claims, the present invention also relates to an embodiment having these features in common. Even if certain features are described in combination with each other, the present invention also relates to an embodiment wherein one or more of these features are omitted. Features that have not explicitly been described as being essential may also be omitted. Possible reference numerals used in a claim should not be explained as limiting for the scope of that claim.

## Claims

1. Siphon assembly, intended for placement in a discharge gutter (10) and comprising:

a siphon unit (100) comprising:

- a front face (101), an entrance opening (64) and an exit opening (103) extending

- through the front face;  
 - two guiding faces (121) directed towards each other, arranged at opposite sides of the exit opening (103), preferably mutually parallel and preferably perpendicular to the front face (101);  
 - two mutually parallel guiding grooves (122) arranged in the respective guiding faces (121) at a distance of the front face (101);
- a latching member (500) comprising a pressing latch part (501) and a hand grip part (502), wherein the pressing latch part (501) comprises
- two mutually parallel latch legs (511, 512) lying in a common plane and having outer sides (518, 519) directed away from each other,
- wherein the outer sides (518, 519) of the latch legs (511, 512) fit in the guiding grooves (122).
2. Siphon assembly according to claim 1, further comprising:
- an accommodation groove (104) extending in the front face around the exit opening;  
 - a sealing member (105) arranged in the accommodation groove.
3. Siphon assembly according to any of the previous claims, wherein the latch legs (511, 512) at their lower ends are provided with an oblique run-in face (533).
4. Siphon assembly according to any of the previous claims, wherein the latch legs (511, 512) at their lower ends are provided with projections (541, 542) projecting in the width direction from the respective outer sides (518, 519) and having upper borders (543, 544);  
 wherein the guiding grooves (122) at their lower end are provided with respective recess parts (125) in their respective bottom (124), with an upper border (126); wherein the external width of the pressing latch part (501), measured at the level of the projections (541, 542), is larger than the mutual distance between the non-recess parts of the bottoms (124) of the guiding grooves (122).
5. Siphon assembly according to any of the previous claims, wherein the latch legs (511, 512) have a thickness that at the lower ends of the latch legs (511, 512) is smaller than at the upper ends.
6. Siphon assembly according to claim 5, wherein the pressing latch part (501) has two mutually substantially parallel main faces (531, 532) wherein a first one (531, 532) of these main faces is planar and the other main face (532; 531) is a stepped plane or an oblique plane making a small angle larger than zero with the first main face.
7. Siphon assembly according to any of the previous claims, further comprising an exit pipe piece (26) with a connecting flange (29), wherein the connecting flange has a thickness corresponding to the mutual distance between the guiding faces (121) and having a thickness corresponding to the distance between the front face (101) and the guiding grooves (122).
8. Siphon assembly according to claim 7, wherein the latch legs (511, 512) have a mutual distance corresponding to and preferably slightly larger than the outer diameter or the exit pipe piece (26).
9. Siphon assembly according to claim 7 or 8, wherein the latch legs (511, 512) have a thickness that at the lower ends of the latch legs (511, 512) is smaller than at the upper ends, and wherein the connection flange (29) has a thickness that at the lower end is larger than at the upper ends.
10. Siphon assembly according to claim 9, wherein the pressing latch part (501) has two mutually substantially parallel main faces (531, 532), wherein a first one (531) of these main faces is planar and the other main face (532) is a stepped plane or an oblique plane making an angle larger than zero with the first main face, and wherein the connection flange (29) has an engagement face directed towards the exit pipe piece (26), the engagement face (560) being a stepped plane or an oblique plane making an angle larger than zero with the opposite rear face (564) of the connection flange (29).
11. Siphon assembly according to any of the previous claims, wherein the pressing latch part (501) has two mutually substantially parallel main faces (531, 532), wherein a first one (532) of these main faces is planar and the other main face (531) is a stepped plane or an oblique plane making an angle larger than zero with the first main face, and wherein the sidewalls (123) of the guiding grooves (122) that are most remote with respect to the front face (101) are stepped or oblique in a corresponding manner.
12. Siphon assembly according to any of the previous claims, further comprising a collecting trough (20) with a bottom (21), a standing sidewall (24) and an open upper side, for mounting under a discharge gutter (10), wherein the sidewall (24) is provided with an opening (25) through which the exit pipe piece (26) extends, with a water tide connection between

the sidewall (24) and the exit pipe piece (26).

13. Discharge gutter (10), provided with a siphon assembly according to any of the previous claims.

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14. Method for connecting a siphon assembly according to claim 1, to a discharge line (26), wherein a free end of this discharge line (26) is provided with a connection flange (29), the method comprising the steps of

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a) placing the siphon unit (100) opposite the free end of this discharge line (26), wherein the exit opening (103) is aligned with this discharge line (26);

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b) pressing the front face (101) of the siphon unit (100) towards the connection flange (29), with the connection flange (29) between the guide faces (121);

c) placing the latch legs (511, 512) of the latch member (500) from above into the mutually opposite guiding grooves (122);

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d) pressing the latch member (500) down, such that the latch legs (511, 512) supported in the guiding grooves (122) engage the connection flange (29) and press the front face (101) of the siphon unit (100) against the connection flange (29) causing a sealing member (105) arranged between the front face (101) of the siphon unit (100) and the connection flange (29) and around the exit opening (103) to be compressed;

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wherein step c) is preferably performed prior to step a).

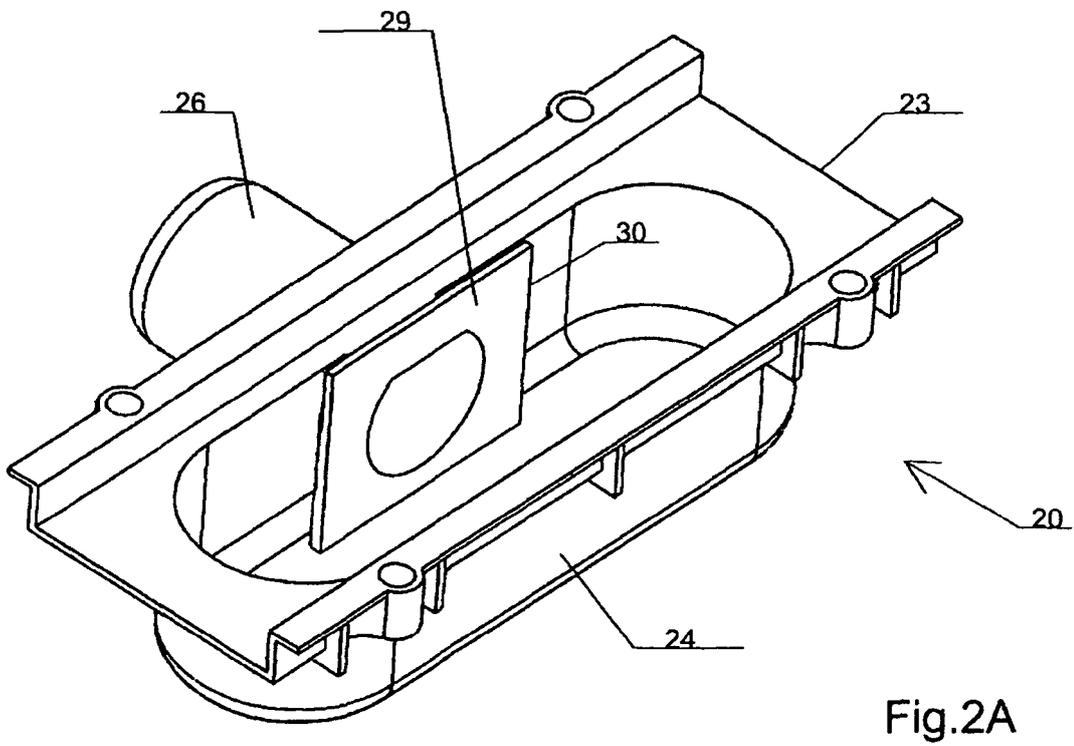
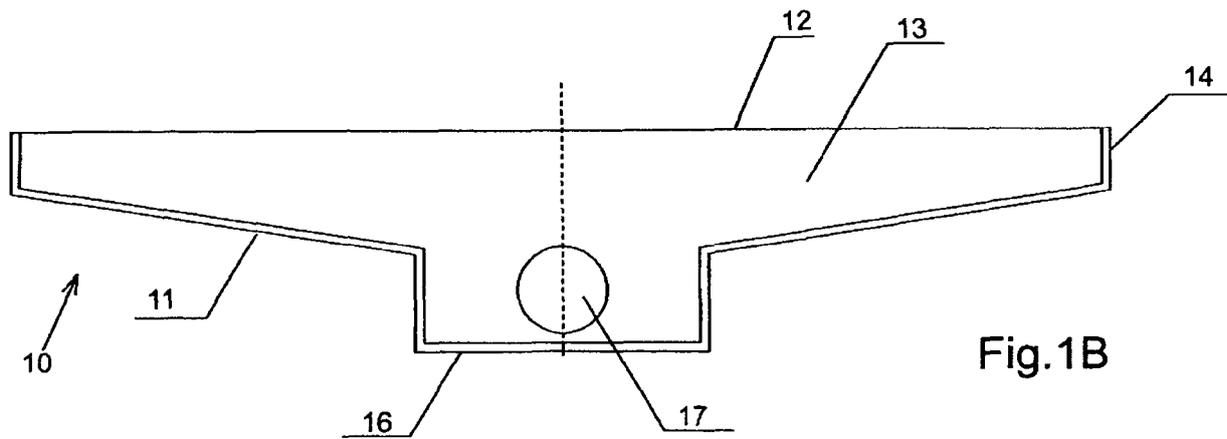
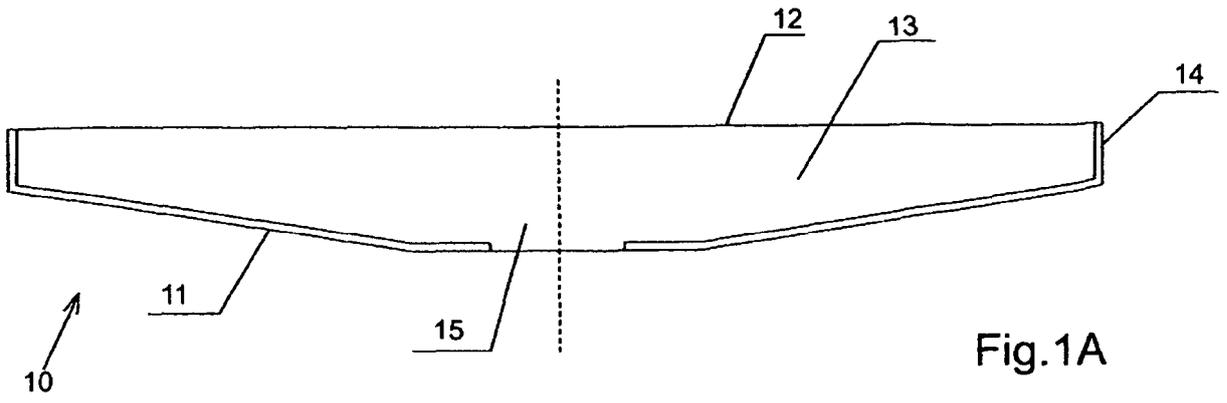
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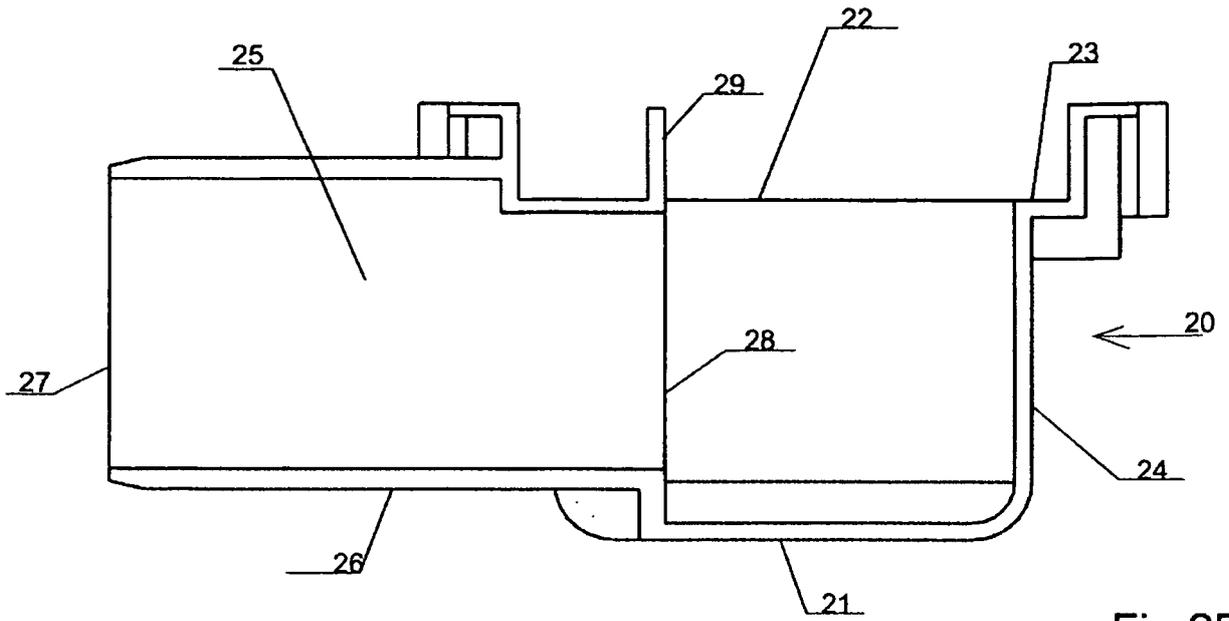


Fig.2B

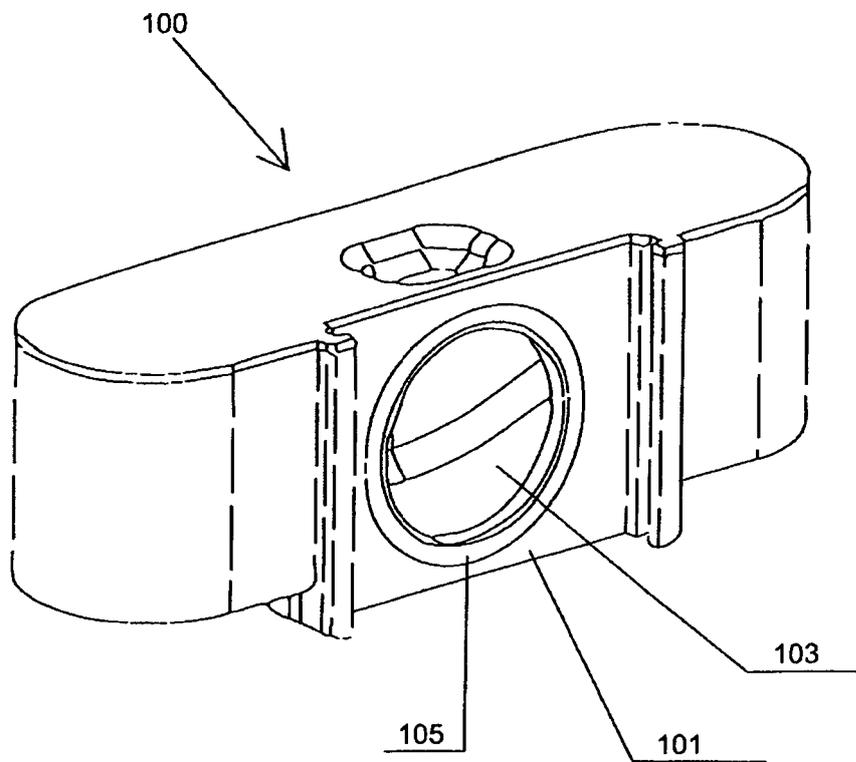


Fig.3A

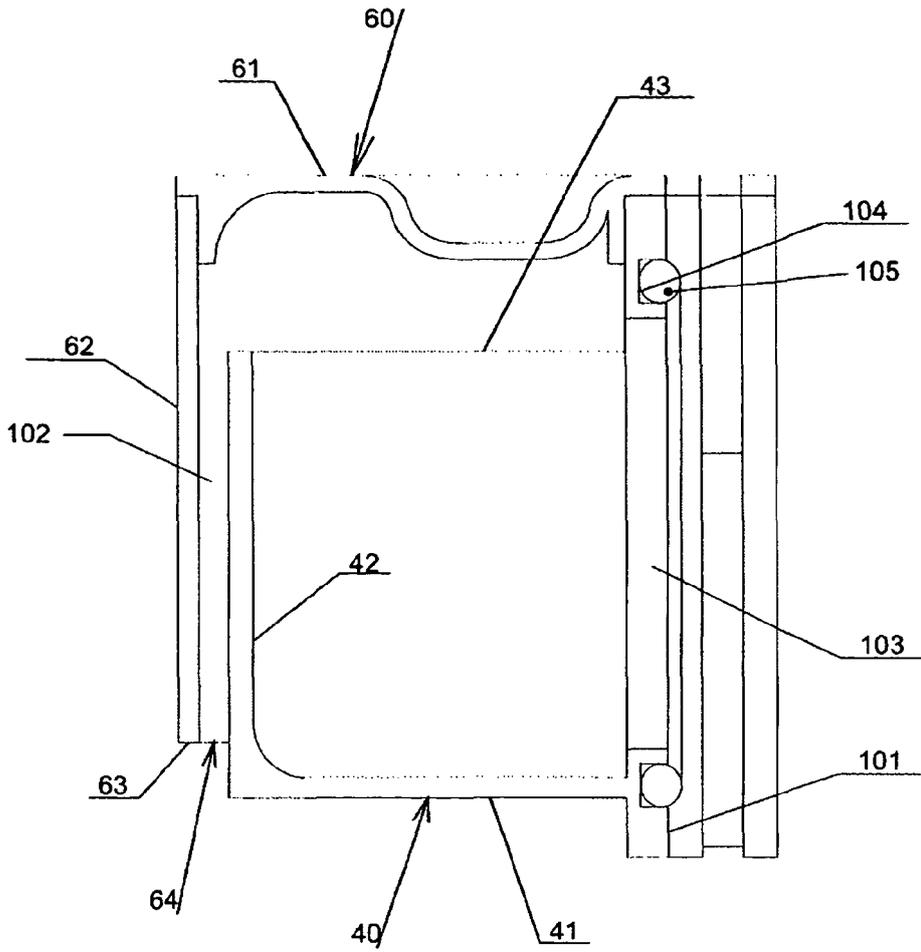


Fig.3B

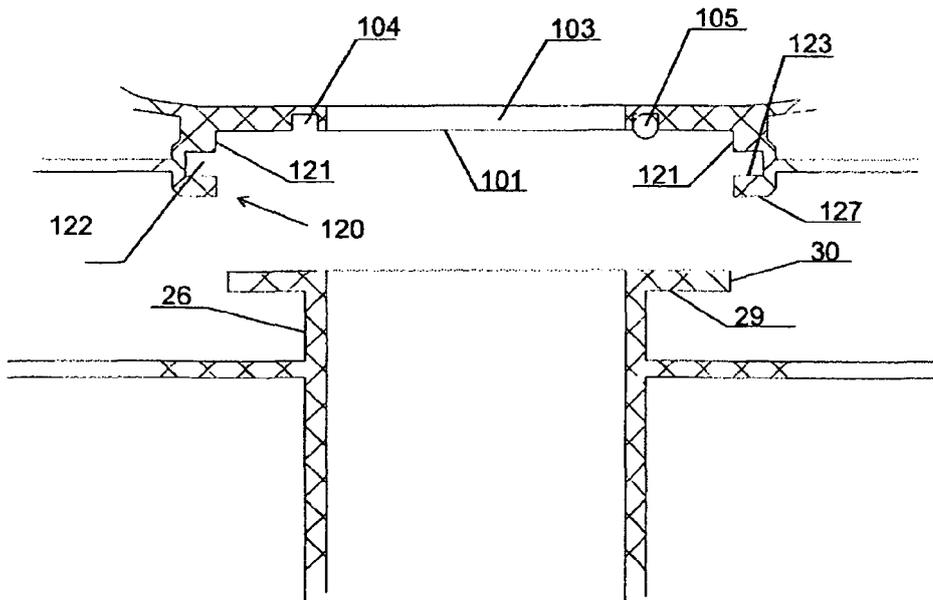


Fig.4A

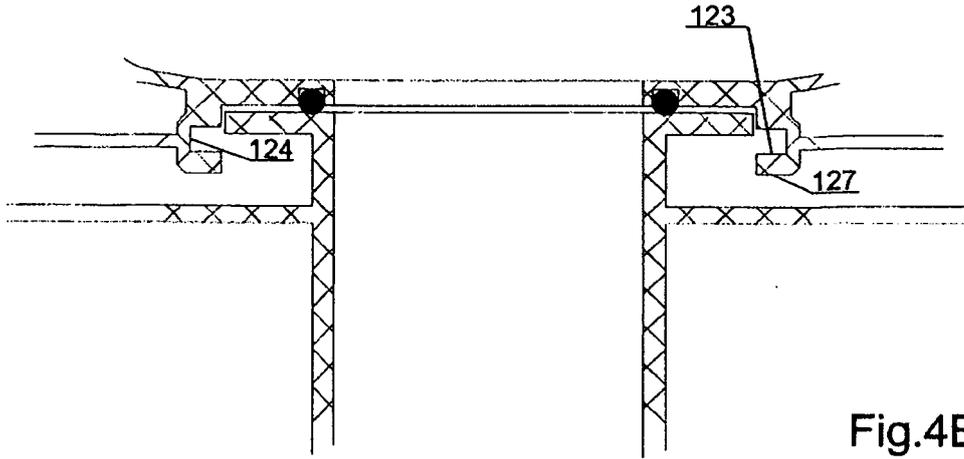


Fig.4B

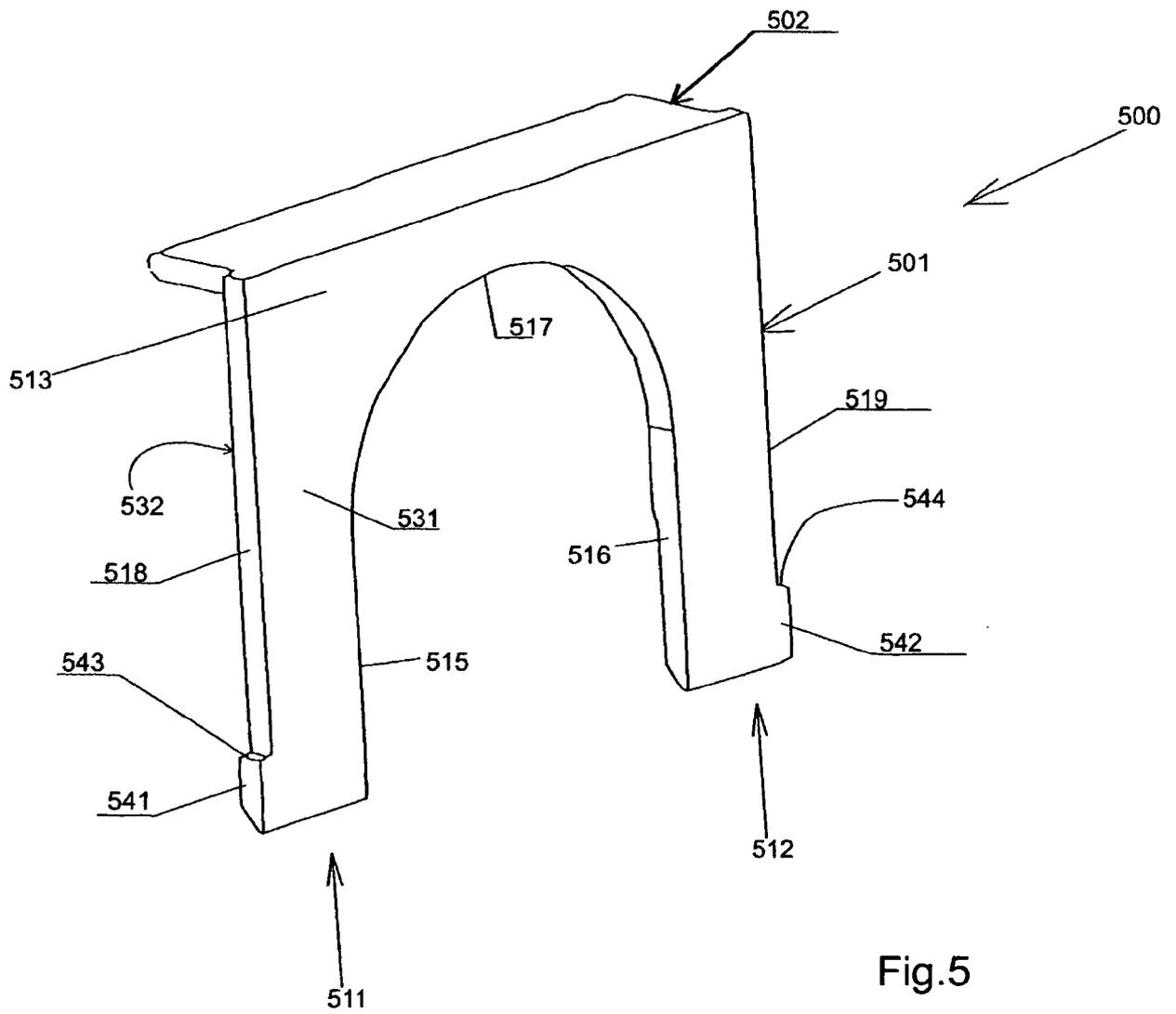
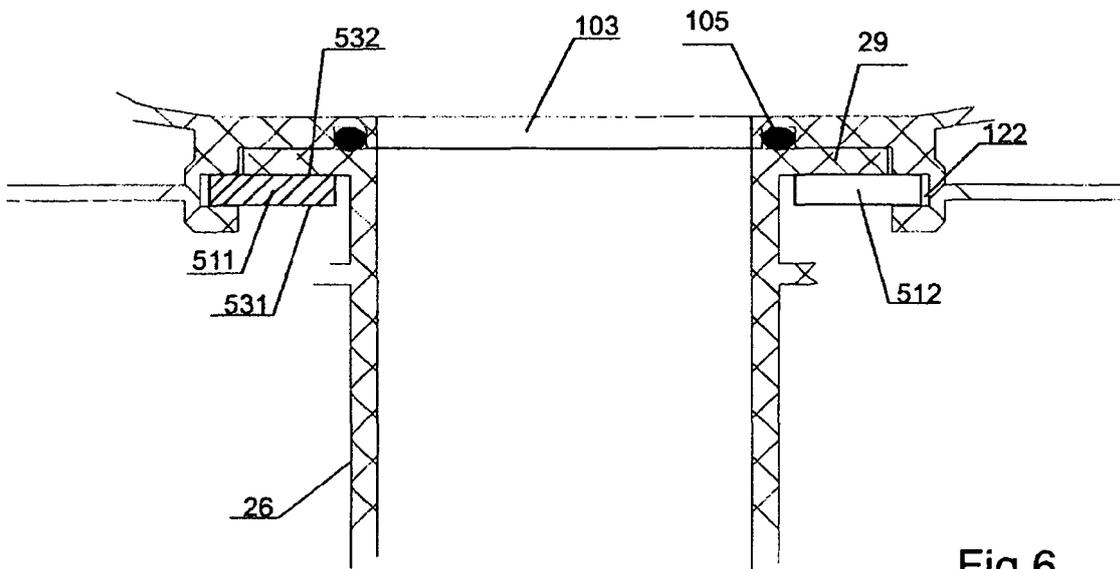
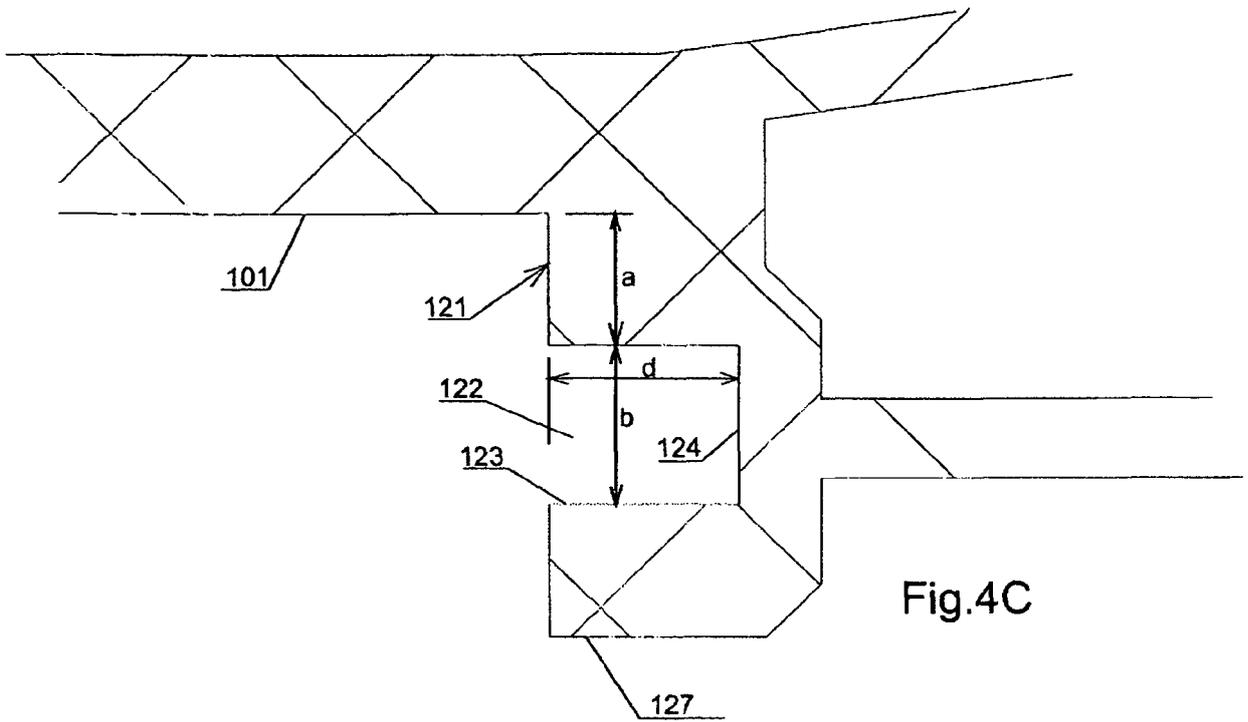


Fig.5



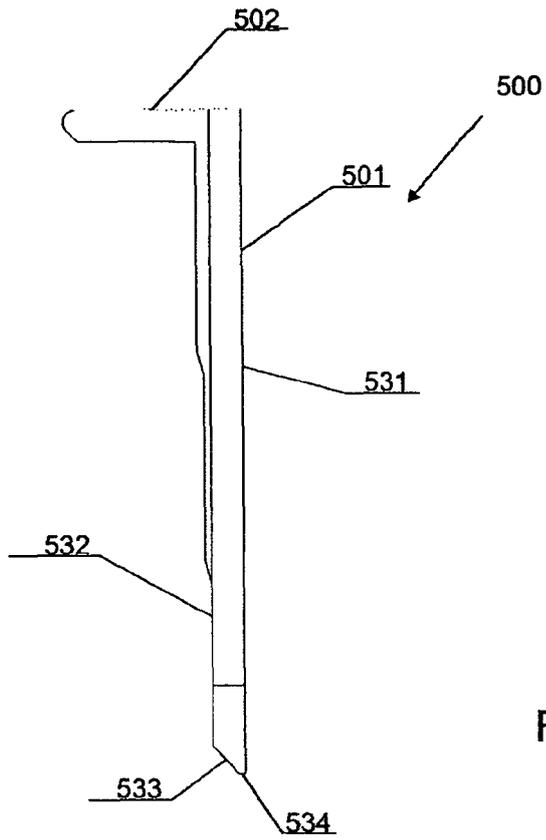


Fig.7A

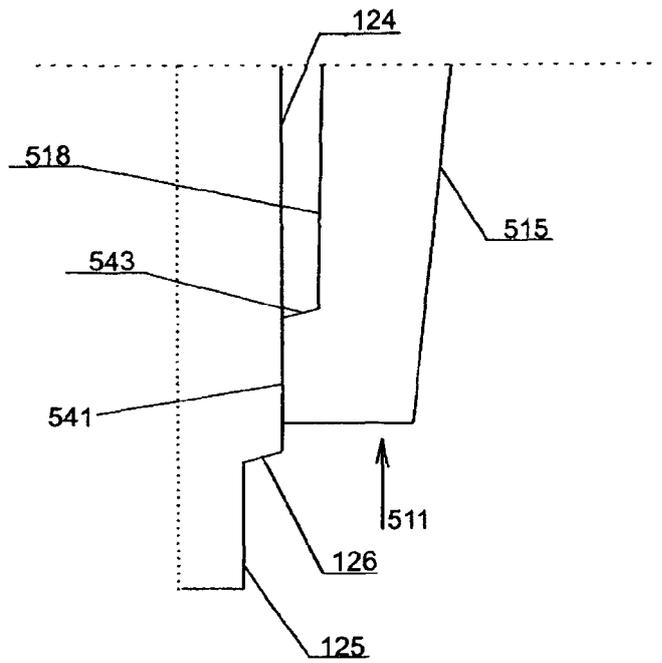


Fig.7B

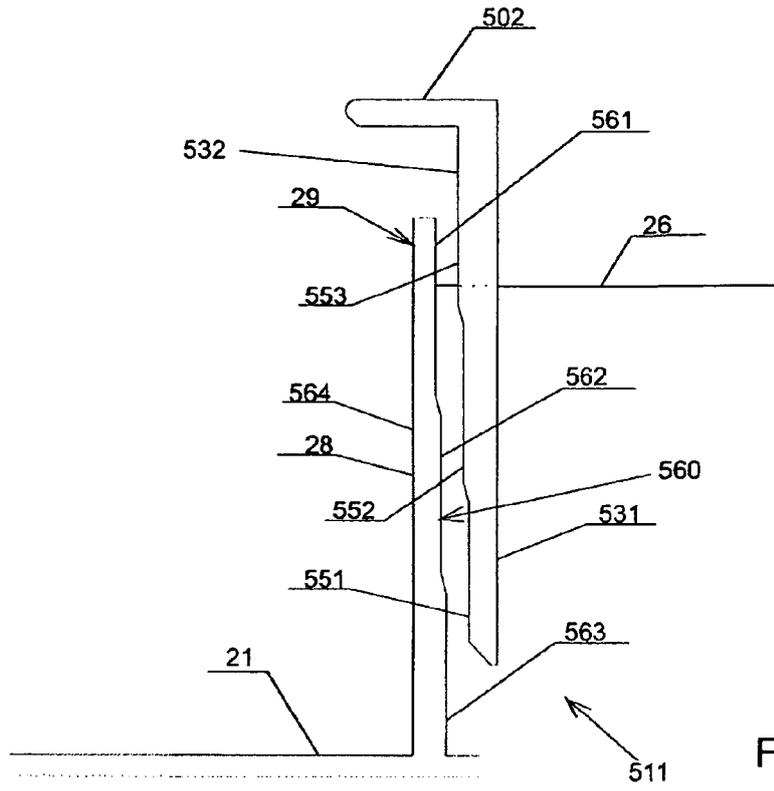


Fig.7C

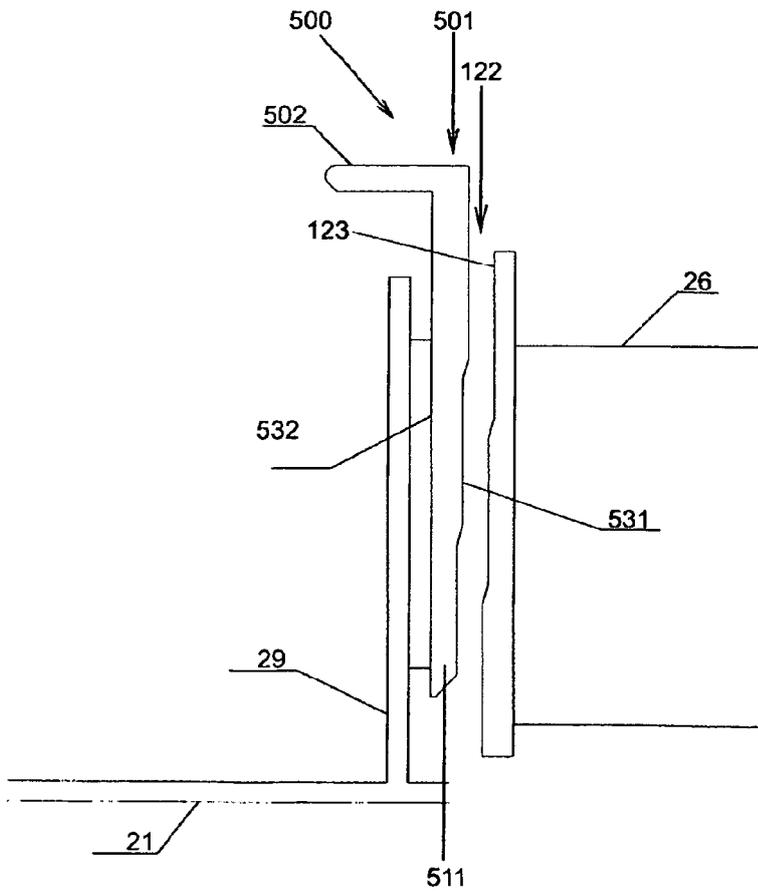


Fig.7D



EUROPEAN SEARCH REPORT

Application Number  
EP 16 00 2654

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	DE 42 28 173 A1 (SIGNUM ABSCHIEDETECHNIK GMBH [DE]) 10 March 1994 (1994-03-10) * figures * -----	1,2, 12-14 7,8	INV. E03F5/04
X	WO 2009/099323 A1 (BIERINGS MARTINUS FRANCISCUS PETRUS JOSEPH [NL]) 13 August 2009 (2009-08-13) * figures 2A,2B *	1,2, 12-14	
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			TECHNICAL FIELDS SEARCHED (IPC)
			E03F E03C E03D
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>9 May 2017</b>	Examiner <b>Isailovski, Marko</b>
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			

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ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 16 00 2654

5 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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09-05-2017

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