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(54) **Arrangement for supporting a ladder**

(57) The present invention relates to an arrangement (1) for easy installing and stably supporting a ladder (2) in a passageway or manhole (7), such that damage to the wall (4) of the passageway due to for example penetration of fastening means is minimized. The invention provides an arrangement for supporting a ladder (2) comprising positioning brackets (5, 105) for positioning the lower part of the ladder at a distance from the inside wall (4), which positioning brackets are secured against the surface of the inner wall by a resilient elongated member (6). By bending this elongated member (6) in a ring shape and positioning this member inside the passageway (7), it exerts a radially directed force and thus clamps itself in position against the wall (4). Because the elongated member (6) clamps itself in a fixed position, the elongated member does not need to be secured to the wall (4) by for example bolts. Thus the wall (4) maintains its structural integrity.

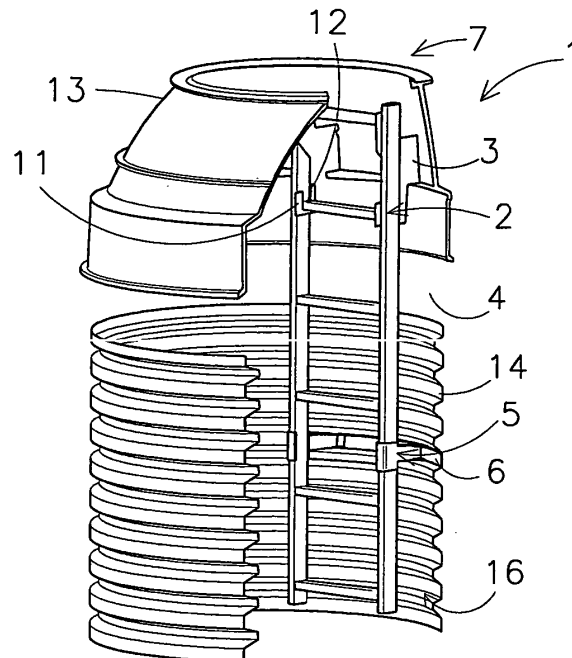


Fig 1

Description

[0001] The present invention relates to an arrangement for easy installing and stably supporting a ladder in a generally vertically disposed passageway, for example a manhole and to a method for installing a resilient elongated member for use in such an arrangement. The invention is especially concerned with an arrangement for easy installing a ladder and for stably supporting a ladder such that damage to the inner wall of the passageway or manhole due to for example penetration of fastening means is minimized.

[0002] An arrangement for supporting a ladder in a generally vertically disposed passageway is known in practice. Ladders are installed in vertically disposed passageways to provide access to for example sewer systems, water reservoirs, gas transport pipes etc.

[0003] Arrangements for supporting a ladder typically comprise multiple brackets, which brackets are mounted to the wall for example by screws fixed in holes drilled in the inner wall or via hooks provided in prefabricated elements for constructing a manhole. The disadvantage of the known arrangements is that they damage the structural integrity of the wall, and can result in damage to the wall and leakage through the wall. Furthermore, the mounting of brackets against the wall is a laborious process which takes a lot of time, while the position of prefabricated brackets can not be adjusted once the prefabricated elements have been put in place.

[0004] To overcome this problem, arrangements are provided for hanging a ladder down the passageway, only securing the upper end of the ladder with a bracket fixed to the wall. The lower part of the ladder is not fixed to the wall, but is only held at bay from the wall by spacers abutting the surface of the wall. However, although they maintain the structural integrity of the lower section of the passageway, these solutions do not provide a stably installed ladder. Since the lower part of the ladder is not secured to the wall, it may act as a pendulum with the upper mounted part forming a hinge.

[0005] Under the weight of a person climbing the ladder, the ladder may move to and from the wall or swing like a pendulum along the wall. Thus the bracket supporting the ladder in a vertical direction may be subjected to excessive forces, damaging the bracket and/or the wall to which the bracket is fixed.

[0006] Furthermore, a person climbing the ladder may feel insecure or may even lose his balance and fall down due to the lower part of the ladder moving relative to the wall.

[0007] The object of the invention is to provide an arrangement for supporting a ladder in a generally vertically disposed passageway whereby the above-mentioned drawbacks are eliminated altogether or occur to a greatly reduced extent.

[0008] According to a first object of the present invention, this is achieved by providing an arrangement for supporting a ladder according to claim 1.

[0009] Unlike prior practices and constructions, the present invention provides an arrangement for stably supporting a ladder while minimising damage to the wall of a passageway, such as for example a manhole. The present invention furthermore provides a method for quickly and easily installing a resilient elongated member for an arrangement according to the invention.

[0010] An arrangement according to the invention comprises at least one support bracket for securing a ladder near its upper end to a passageway, at least one positioning bracket for positioning the ladder at a distance from an inner wall of the passageway, and at least one resilient elongated member for securing the at least one positioning bracket against the inner wall of the passageway.

[0011] The ladder is supported in a vertical direction by the at least one supporting bracket, which is mounted near an upper end of the passageway, for instance to an upper edge thereof or an inner wall. The lower part of the ladder is secured by the one or more positioning brackets.

[0012] The at least one positioning brackets keeps the ladder at a distance from the inside wall, and prevents the ladder from moving away from the inner wall towards the centre of the passageway, and/or from swinging like a pendulum along the wall.

[0013] The positioning brackets are secured against the surface of the inner wall by the resilient elongated member, such as for instance a strip or string, which is designed to be positioned along the inner circumference of the passageway so as to form a ring, or at least a part of a ring, which due to its resilient properties exerts a force in a radial direction against the inner wall for keeping the resilient strip in place. Thus, the positioning brackets stably position the ladder and prevent it from towards the centre of the passageway, or from acting as a pendulum.

[0014] When the elongated member is not mounted, that is in an unloaded condition, it may have a radius of curvature relatively large compared to the radius of curvature of the surface of the inner wall of the passageway. Furthermore, when unloaded the elongated member may also be straight.

[0015] By bending this elongated member in a ring or spiral shape having a radius smaller than the radius of the passageway, the elongated member can be positioned inside the passageway. The ring shaped elongated member is subsequently allowed to expand until it extends along the circumference of the inner wall of the passageway. The elongated member exerts a radially directed force upon the wall surface and thus clamps itself in position against the wall. The friction between the elongated member and the surface of the wall prevents the ring from moving out of its position and falling down.

[0016] Since the elongated member clamps itself in a fixed position, the member need not be secured by for example bolts or hooks mounted in the wall. Thus the wall maintains its structural integrity.

[0017] Also, the elongated member and the positioning brackets can be installed without the need of heavy ma-

chinery such as drills, which is particularly beneficial because passageway such as manholes typically do not provide much room for a person to manoeuvre, let alone for handling heavy machinery and installing a ladder.

[0018] Furthermore, since the elongated member and positioning brackets do not need to be secured into the wall, installation is relatively easy and can be done in a limited amount of time. Also, an arrangement according to the invention can easily be removed without leaving holes or hooks in or mounted to the lower sections of the passageway.

[0019] According to a further embodiment, the invention provides a passageway, for instance a manhole, having an inner wall comprising at least one recess extending in a circumferential direction for cooperating with the elongated member. When the elongated member is positioned in the recess, the side walls of the recess provide extra support for the elongated member against movement in a vertical direction. Preferably, the width of the elongated member and the width of the recess are substantially equal, such that the recess locks the ring against movement in a vertical direction.

[0020] The invention further provides a method for installing a resilient elongated member for use in an arrangement according to the invention.

[0021] Further objects, embodiments and elaborations of the arrangement according to the invention will be apparent from the following description, in which the invention is further illustrated and elucidated on the basis of an exemplary embodiment, with reference to the drawings, in which:

Fig. 1 is a schematic view, partially in section, of a manhole structure which is provided with an arrangement for supporting a ladder according to the invention;

Fig. 2 is a schematic, enlarged view of a support bracket from Fig. 1;

Fig. 3 is a schematic, enlarged view of a positioning bracket from Fig. 1;

Fig. 4 shows a first step of a method for positioning a resilient elongated member according to the invention inside a manhole;

Fig. 5 shows a second step of a method for positioning a resilient elongated member according to the invention inside a manhole;

Fig. 6 shows a third step of a method for positioning a resilient elongated member according to the invention inside a manhole; and

Fig. 7 is a schematic, enlarged view of an alternative positioning bracket comprising flanges.

[0022] Fig. 1 shows a view, partially in section, of a manhole structure 7 which is provided with an arrangement 1 for supporting a ladder 2 according to the invention. The arrangement shown comprises two support brackets 3 for supporting the ladder 2 in a vertical direction, two positioning brackets 5 for positioning the ladder

2 at a distance from the inner wall 4 of the passageway 7, and one resilient elongated member 6, in particular a strip, for securing at least one positioning bracket 5 against the surface of the inner wall 4 of the passageway 7.

[0023] The support brackets 3 each have a first end for supporting the ladder 2 near its upper end in a vertical direction, and a second end for securing the support bracket to the inner wall 4 of the passageway. They are mounted to the inner wall near the top end of the passageway, which in the embodiment shown is a conical shaped part 13.

[0024] In the embodiment shown the supports brackets 3 are formed integrally with the conical shaped part 13 of the passageway. Such a conical part 13 may be formed from a thermoplastics material by injection moulding or is formed out of metal components welded together. In an alternative embodiment the brackets 3 may be formed as separate parts or as integral parts of the ladder 2. The part of the passageway for mounting the support brackets may provide a ridge along the upper circumference of the inner wall of the manhole. Such a ridge may provide a support surface to which the support brackets 3 can easily be mounted, for example by providing the support brackets 3 with hooks to be hooked to the ridge. Alternatively, it is for example also possible to attach the support bracket 3 to the wall of the passageway using fastening means such as screws, by providing the support bracket with hooks that fit into openings provided in the wall of the passageway, or, when support brackets and passageway are at least partially made out of a metal such as steel, by welding.

[0025] It is noted that prefab elements making up a passageway are of a simple and sober design to keep production costs low. However, the end piece of a passageway is normally a special structure provided with means for receiving a closure for closing off the passageway, etc. Its more complicated design can therefore easily be adapted for providing for example a ridge or openings for mounting the support brackets, without raising the overall production costs of the element. Furthermore, because fluids normally do not reach the top end of a passageway, the risk of leakage due to perforations in this part of the passageway is limited.

[0026] Each positioning bracket 5, for positioning the ladder 2 at a distance from the inner wall 4, has a first end 26 for engaging the ladder 2 below its upper end, and a second end 28 that is designed to engage the elongated member 6 and to be positioned against the surface of the inner wall 4 of the passageway 7.

[0027] The first end 26 is preferably designed to slideably engages a stile of the ladder 2, allowing at least limited vertical movement of the supported ladder 2 relative to the bracket 5. Thus, the positioning of the resilient strip 6 and the at least one positioning bracket 5 relative to the ladder 2 is less critical. To that end, the first end 26 may for instance comprise a resilient, substantially C-shaped hook 27, that can be snapped around a stile of

the ladder 2. Alternatively, the bracket 5 may for example be hingeably attached or fixed to a stile to form an integral part of the ladder 2.

[0028] The second end 28 may for instance be provided with a hook or a slid 29, as illustrated in Figure 3, to engage the elongated member 6. Furthermore, the second end 28 may comprise a support flange 30 for abutment against the inner wall 4 of the passageway. Said support flange 30 preferably has a shape that corresponds to that of the inner wall, so that the positioning bracket 5 can be stably placed against the wall 4. In the illustrated embodiment, the support flange 30 thereto features a curved shape that conforms to the curved circumferential surface of the inner wall 4.

[0029] Furthermore, the support flange 30, or at least the portion of the bracket 5 that in mounted condition is clamped between the resilient elongated member 6 and the inner wall of the passageway, may have extended dimensions in circumferential direction (with respect to the passageway) so as to increase the contact area with the elongated member 6 and consequently the clamping force exerted thereon. This may help to immobilize the bracket 5 even better against the inner wall of the passageway and may furthermore prevent the bracket 5 from tipping over in lateral direction, that is to rotate around an axis S extending substantially parallel to the stiles shown in Figure 3.

[0030] Figure 7 shows an alternative embodiment of a positioning bracket 105 according to the invention, wherein like components have been denoted with like reference numerals, increased by 100. The alternative positioning bracket 105 is especially advantageous for use with a passageway wall having one or more circumferentially extending recesses or corrugations. The bracket 105 comprises a first end 126 provided with means for engaging the ladder 2, e.g. a resilient hook 127 which can be snapped around a stile of the ladder, and a second end 128 provided with means for engaging the elongated member 6, for instance a slid 118. The second end 128 furthermore comprises a support flange 130 which is shaped to fit in a recess or corrugation of the inner wall. Preferably, the width h of the support flange 130 substantially equals the width of such recess or corrugation, so that in mounted condition the flange 130 is blocked against movement in vertical direction and rotation (around centre line M). Furthermore, the support flange 130 may feature the same advantages as the support flange 30 described here above.

[0031] The positioning bracket 105 furthermore comprises at least one auxiliary support flange 132A, 132B, which extends substantially parallel to the support flange 130 at a distance thereof, so as to abut, in mounted condition, the inner wall extending above, respectively below the recess. Thanks to such auxiliary support flange(s) 132A, 132B the positioning bracket 105 will be prevented from rotation around an axis extending substantially parallel to the inner wall, substantially perpendicular to the centre line M. Accordingly, the bracket 105 can be sup-

ported against the inner wall in a very stable manner, despite of (or thanks to) the recessed surface.

[0032] A central portion 25, 125 of the positioning brackets 5, 105 connecting the first and second ends may be web-shaped (as shown in Figure 3) or have an H-shaped cross section (as shown in Figure 7). The latter configuration may contribute to the bracket's torsion and bending stiffness and as such may help to even better withstand forces and moments acting on the bracket, during use. Of course, other cross sections are possible, such as tubular, C, I, T- or L-shaped.

[0033] The central portion 25, 125 and the second end 28, respectively 128 are preferably aligned such that in mounted condition, the centre line M of said central portion 25, 125 extends at a substantially straight angle with the inner wall 4 of the passageway. This may result in advantageous loading conditions for the brackets 5, 105.

[0034] Furthermore, the configuration and dimensioning of the afore-described brackets 5, 105 is preferably such that the ladder 2, in mounted condition, extends substantially vertical and/or parallel to the passageway wall.

[0035] The positioning brackets 5, 105 do not only function as a spacer for keeping the ladder 2 at bay of the wall 4 of the manhole 7 but also, together with the strip 6, supports the ladder 2 in the opposite direction, preventing it from moving away from the wall 4, and from swinging alongside the wall. Thus a ladder is positioned in a stable manner. Movement of the ladder relative to the inner wall due to a person climbing the ladder is minimized.

[0036] In the illustrated embodiment, the resilient elongated member 6 is shaped as a strip, with a length which allows it to be positioned along the inner circumference of the passageway 7 so as to form at least part of a ring.

[0037] According to one embodiment the strip 6 can have a length substantially equal to the circumference of the passageway, for forming a ring along the full circumference of the passageway such that the first and second end of the strip 6 abut each other head to head.

[0038] The strip 6, when not mounted in a manhole but in its unloaded condition, may have a radius of curvature which is larger than the radius of curvature of the wall 4 of the manhole 7 in which it is to be positioned. In an alternative embodiment, the strip in unloaded condition may have a radius of curvature which is infinite, e.g. the strip is straight.

[0039] When the strip 6 is positioned in the manhole 7 along the inner circumference of the manhole, the first end 8 and second end 9 of the strip 6 abut each other head to head and the strip 6 forms a ring. When in use, the ring thus has a radius of curvature almost equal to the radius of curvature of the inner wall. Due to the resilient properties of the strip 6, the ring exerts a force in a radial direction against the inner wall 4. This radially directed force clamps the strip 6 in place, enabling securing the at least one positioning bracket 5 against the surface of the inner wall 4 of the passageway 7.

[0040] In a further embodiment, the length of the strip in unloaded condition may be slightly larger than the circumferential contour of the manhole. When the strip is forced into a ring, and mounted in the manhole, the first end and the second end abut each other. Thus the strip is also compressed in its longitudinal direction. This compression forces provides a radially directed force, in addition to the radial force already caused by bending the strip into a ring, for extra securing the ring in its position.

[0041] Figures 4-6 show subsequent steps of a method for installing a strip 6 according to the invention in a passageway, in particular a manhole 7.

[0042] First, the elongated member, in particular the resilient strip 6, is connected with at least one positioning bracket 5, 105. The strip 6 is bent in a ring shape by positioning a first end 8 of the strip over an opposite, second end 9 of the strip, as is shown in Fig. 4. The diameter of the ring formed by the strip 6 can easily be adapted by moving one end 8, 9 along the strip. Thus, the radius of the ring is adjusted until its substantially smaller than the diameter of the manhole 7 such that the bent strip 6 can easily be positioned inside the manhole.

[0043] When the strip is positioned correctly in the manhole 7, the ring is allowed to expand by way of its resilient property, to clamp itself, e.g. the resilient elongated member, in position against the inner wall of the manhole.

[0044] In the embodiment shown in figs. 4-6, the length of the strip 6 in unloaded condition is slightly larger than the circumferential contour of the manhole 7. Thus, after expansion of the ring, the ends 8, 9 slightly overlap. One end (8, 9), e.g. the end overlapping at the centre side of the ring, is bent inwards and positioned against the opposite end (8, 9), creating a section 15 of the strip 6 that bulges inward towards the centre of the ring, as is shown in Fig. 5. By exerting a pressure in radial direction on the bulging section 15 of the resilient strip 6, this section of the strip will snap into position against the inner wall 4 of the manhole 7 to form a ring.

[0045] The entire resilient strip 6 now lies against the surface of the inner wall 4 of the manhole 7, as is shown in Fig. 6. Furthermore, the strip 6 is also under compression in its longitudinal direction, enlarging the overall force with which the strip clamps itself inside the manhole 7.

[0046] Because both ends 8, 9 of the resilient strip 6 are positioned head to head, the ends are prevented from sliding along the inside of the wall towards and away from each other in a circumferential direction.

[0047] The positioning bracket 5, 105 may be positioned prior to and/or after expanding the ring by sliding along the longitudinal direction of the elongated member. In an alternative embodiment, the positioning bracket 5, 105 may be designed, for example with hooks, for connecting to the elongated member 6 after the member has been positioned along the wall of the passageway.

[0048] The arrangement according to the invention may further comprise a connector, for example in the

form of a sleeve 10 as shown in fig. 4-6, slideable along at least part of the resilient strip for positioning the first end 8 of the resilient strip 6 relative to the second end 9 of the resilient strip. The sleeve thus fixes the two ends relative to each other. In an alternative embodiment, the connector may also be part of the at least one positioning bracket 5.

[0049] In a further embodiment, a manhole 7, notably the vertically aligned shaft, comprises at least one recessed inner wall 14, extending in a circumferential direction, for cooperating with the resilient strip 6 and one or more positioning brackets 105 as described with reference to Figure 7. When the resilient strip 6 is placed in the recess 14, the side walls of the recess provide extra support for the strip against movement in a vertical direction. The same is true for the support flange 130 of the positioning bracket 105. Preferably, the recess 14 has a width substantially equal to the width of the resilient strip 6 such that the recess locks the resilient strip against movement in the vertical direction. By providing such a recess 14, the strip 6 can easily be positioned in the passageway 7. In the embodiment shown, the manhole 7 comprises multiple recesses 14, forming a corrugated surface 16. Thus, one or more resilient strips 6 can be easily positioned. Furthermore, strips can be positioned at different heights.

[0050] The support bracket 3 may comprise a hook 11 for supporting the ladder 2 and a resilient finger 12 which is arranged to restrict the movement of the ladder 2 when the ladder is placed in the hook 11.

[0051] The resilient finger is positioned at the open end of the hook 11. By exerting a force on the resilient finger 12, it is moveable from a closing position into an open position. When the force is removed, the resilient finger moves back into the closing position. The latter is shown in Fig. 3. By pressing the ladder against the finger, to position the ladder in the hook, the finger is moved into the open position. In this position the finger allows access to the hook for placing a ladder. In the closing position the resilient finger prevents the ladder from being moved out of the hook. Once a ladder is placed in the hook it can only be removed by first moving the finger into the open position, thus the ladder becoming unhooked by accident is prevented. Furthermore, by providing the support bracket 3 with such a resilient finger, a ladder can be placed quick and easy in the mounted bracket, while minimizing the risk of the ladder coming loose by accident.

[0052] The hook and finger may be formed out of one piece, for example out of plastic such as PVC, PE or PP. In an alternative embodiment, the finger may for example be formed out of a relatively stiff material connected via a hinge with the hook and provided with a spring for forcing the finger into the blocking position.

[0053] It is observed that an arrangement according to the invention may also be used for supporting pipes or hoses in a manhole. Furthermore, the arrangement may also be used in combination with a passageway hav-

ing for example an oval cross section.

[0054] A resilient strip according to the invention may be made out of plastic, for example PVC or PP. However, other materials having a resilient property may also be used.

[0055] In the embodiment shown the resilient elongated member has a rectangular cross section. In a mounted position it lays with a flat side against the surface of the inner wall. The relatively large contact surface provided by a rectangular cross section causes a large friction between the resilient strip and the surface of the manhole, preventing the strip from easily sliding out of position.

[0056] To increase the friction between the resilient strip 6 and the surface of the wall, the surface of the strip may be provided with a rough surface. Also, for example intermediates such as sheets of rough material may be positioned between strip and wall for providing extra friction.

[0057] The elongated member may have another cross section than rectangular, such as an elliptical, T-shaped, hollow or circular cross section, may also be used. Furthermore, the cross section of the resilient elongated member may be designed for cooperating with a recess in the inner wall. For example both the recess and the elongated member may have a triangular cross section such that the elongated member when mounted in the recess fits tightly therein. A skilled person may select a cross section of particular dimension in relation to the size of the manhole and the forces needed to securely position a ladder.

[0058] In a further embodiment, the posts of a ladder do not touch the ground. The support brackets 3 are designed to carry the full weight of the ladder and at least one person climbing it. Thus there is no risk of the posts damaging the bottom of the manhole.

[0059] Within the scope of the present invention, many embodiments other than those described above to illustrate the present invention are conceivable. For instance, two or more resilient strips can be positioned on top of each other, forming concentric rings, to provide an extra clamping force securing the ring in position.

[0060] Also, components can be incorporated, for example, the support and/or positioning brackets can be incorporated with the ladder.

[0061] In yet another embodiment the length of the strip may exceed the inner circumference of the passageway and the strip may be provided at both ends with a number of small holes. The overlapping ends may then be connected by pushing a short dowel or similar into 2 overlapping holes.

It is also possible to provide the strip at one end with a fixed connector and on the other end with small holes. Alternatively, one end surface of the elongated member may be provided with one or more protrusions such as pins, while the other end surface may be provided with one or more complementary recesses, so as to provide for a male-female connection.

Claims

1. Arrangement for supporting a ladder in a generally vertically disposed passageway (7), such as for example a manhole, the arrangement comprising:
 - at least one support bracket (3) for securing the ladder (2) near its upper end to the passageway (7),
 - at least one positioning bracket (5, 105) for positioning the ladder (2) at a distance from an inner wall (4) of the passageway (7), and
 - at least one resilient, elongated member such as for instance a strip or string (6) which is designed to be positioned along the inner circumference of the passageway (7) so as to form a ring, or at least a part of a ring, which due to its resilient properties exerts a force in a radial direction against the inner wall (4) for keeping the resilient strip (6) in place, and for securing the at least one positioning bracket (5, 105) against the inner wall (4) of the passageway (7).
2. Arrangement according to claim 1, wherein the elongated member (6) has a length such that, when the resilient member (6) is positioned along the inner circumference of the passageway (7), a first end (8) and a second end (9) of the resilient member (6) abut each other head to head and the member (6) is under compression in its longitudinal direction..
3. Arrangement according to claim 1 or 2, further comprising a connector (10) for positioning a first end (8) of the resilient member (6) relative to a second end (9) of the resilient member (6).
4. Arrangement according to claim 3, wherein the connector (10) is a sleeve (10), which sleeve (10) is slideable along at least part of the resilient member (6).
5. Arrangement according to any one of the preceding claims, wherein the at least one support bracket (3) comprises a hook (11) which is arranged to support the ladder (2), at least in a vertical direction.
6. Arrangement according to claim 5, wherein the at least one support bracket (3) comprises a resilient finger (12) which is arranged to restrict movement of the ladder (2) when said ladder (2) is placed in the hook (11).
7. Arrangement according to any one of the preceding claims, wherein the at least one positioning bracket (5, 105) comprises means for engaging the elongated member, such as a slid or a hook.
8. Arrangement according to any one of the preceding claims, wherein the at least one positioning bracket

(5, 105) comprises means for engaging a stile of the ladder in a slideable way.

9. Arrangement according to any one of the preceding claims, wherein an end of the at least one positioning bracket (5, 105) conforms to the shape of the inner wall of the passage way against which said end is positioned in mounted condition. 5
10. Arrangement according to claim 9, wherein the at least one positioning bracket (5, 105) has an end portion which is shaped for use with a recessed inner wall, wherein in mounted condition part of said end portion sits in the recessed wall portion and part of the end portion sits against an adjoining wall portion, preferably at opposite sides of the recessed portion... 10
11. Arrangement according to any one of the preceding claims, wherein the at least one positioning bracket (5, 105) engages a lower part of the ladder (2). 20
12. Passageway (7) comprising an arrangement (1) according to any one of the preceding claims.
13. Passageway (7) according to claim 12, wherein the support bracket (3) is fixed against a wall of an upper, preferably conical shaped part (13) of the passageway (7). 25
14. Passageway (7) according to claim 12 or 13, wherein the support bracket (3) is formed integrally with an upper, preferably conically shaped part (13) of the passageway (7). 30
15. Passageway (7) according to any one of claim 12, 13 or 14, wherein the inner wall (4) comprises at least one recess (14), said recess extending along the circumference of the passageway and having a width substantially equal to the width of the resilient member (6), for cooperating with said resilient member (6). 35 40
16. Passageway (7) according to claim 11, wherein the inner wall (4) comprises multiple recesses (14) forming a corrugated surface. 45
17. Method for mounting a resilient elongated member (6) for use in an arrangement according to the invention, inside a passageway (7), the method comprising: 50

bending the resilient elongated member (6) in a ring shape by positioning a first end (8) of the resilient elongated member (6) over an opposite, second end 9 of the resilient elongated member (6); 55

adapting the diameter of the ring by moving one end (8, 9) along the resilient elongated member

(6) until the diameter of the ring is smaller than the diameter of the passageway (7) such that the bent resilient elongated member (6) can easily be positioned inside the passageway (7); positioning the resilient elongated member (6) inside the passageway (7); and expand the ring by way of its resilient property to clamp the resilient elongated member (6) in position against the inner wall of the passageway (7).

18. Method according to claim 17, for mounting an elongated member (6) the length of which in unloaded condition is slightly larger than the circumferential contour of the passageway 7, comprising;

bending one end (8, 9) of the resilient elongated member (6) inwards to position it against the opposite end (8, 9), creating a section (15) of the resilient elongated member (6) that bulges towards the centre of the ring; and exerting a pressure in radial direction on the bulging section (15) to snap the section against the inner wall (4) of the manhole (7) to form a ring.

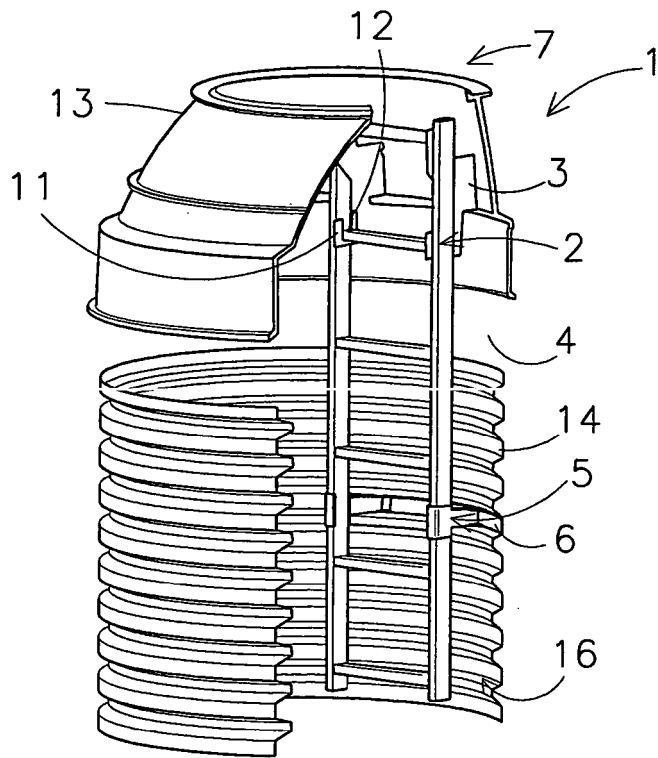


Fig 1

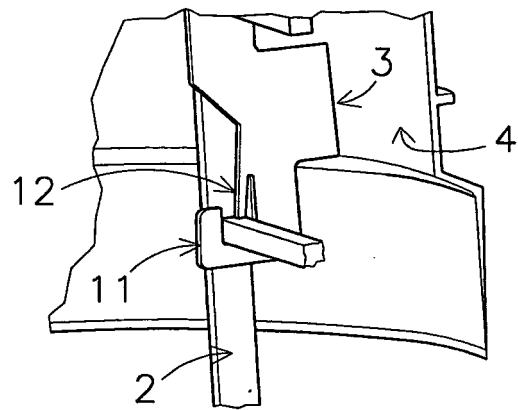


Fig 2

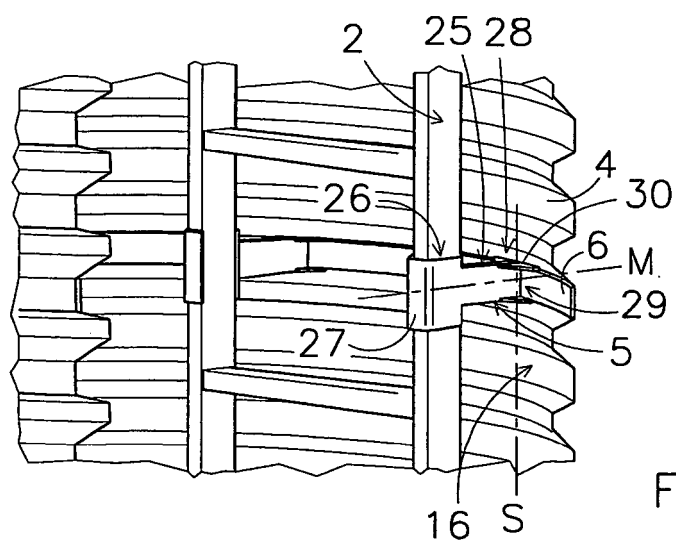


Fig 3

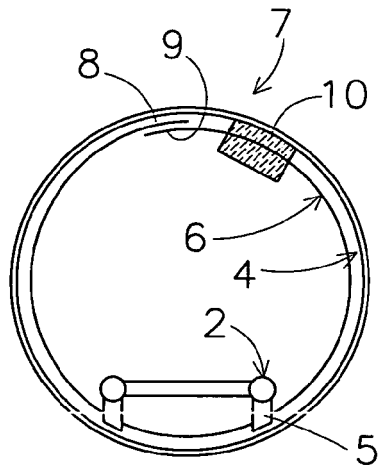


Fig 4

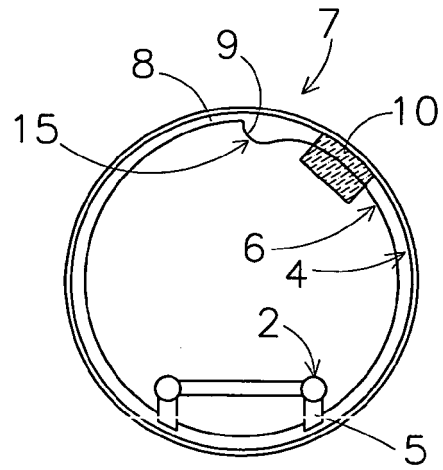


Fig 5

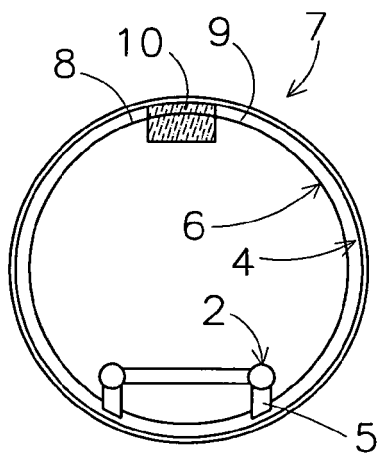


Fig 6

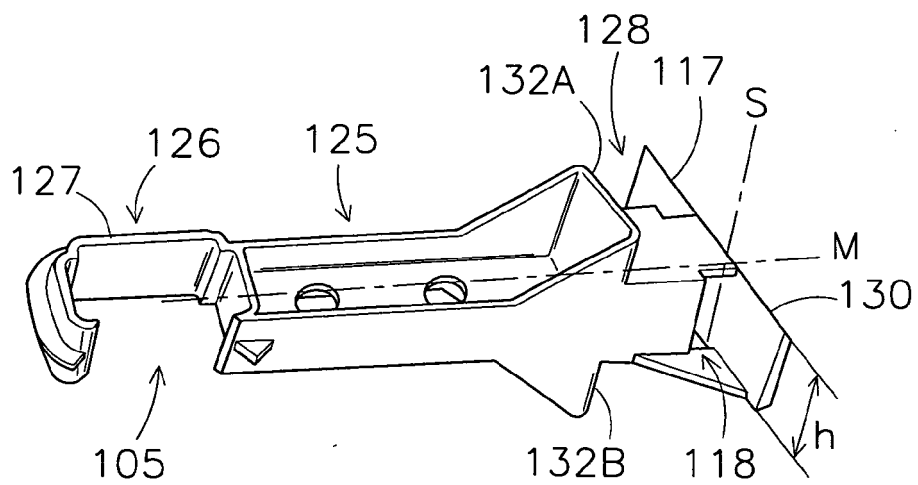


Fig 7



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 07 5149

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	DE 298 11 997 U1 (RITTMANN HANS JUERGEN [DE]) 26 November 1998 (1998-11-26) * figures 1,3-5 *	1-7,11,12	INV. E06C1/36 E06C9/02 E02D29/12
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 August 2008	Examiner Demeester, Jan
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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EPO FORM 1503 03.82 (P04C01)

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

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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07-08-2008

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