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## (54) Improvements in and relating to access chambers

(57) Apparatus and method for joining together in sealing engagement the lower edge of a corbel unit (14) to the upper edge of an access chamber wall (12) comprises a flexible sealing strip (30) having an upper edge for securing to the corbel unit, a lower edge for securing to the access chamber and a shaped middle section whereby any movement between the access chamber and the corbel unit can be accommodated by means of said shaped middle section without breaking the sealing engagement. Also disclosed is water collection (20) and duct means (22) for collection and drainage of water, eg from condensation.

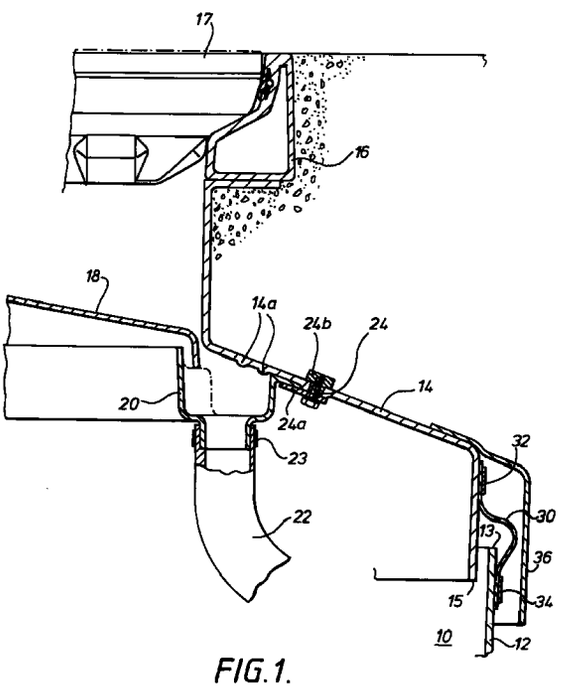


FIG.1.

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## Description

The present invention relates to a method and apparatus for preventing collection of water in the interior of an access chamber above an underground storage tank, and to a method and apparatus for joining together in sealing engagement the upper edge of the access chamber and the lower edge of a corbel unit, the latter extending from the access hole frame down to the upper edge of the access chamber.

Various attempts have been made in the past to prevent water ingress from the exterior to the interior of an access chamber - such attempts have been concentrated on improving the manner in which the access hole cover seals within the frame, or providing an overhang on the cover itself, which lies over the outer edge of the frame and serves to drain water away from the cover. However, it is inevitable that some water is going to enter as the covers have to be removed from time to time, and also moisture in the atmosphere tends to condense due to temperature differentials and condensation water will collect on the interior walls of the chamber. The present invention stems from an appreciation of the fact that water beneath the cover is inevitable and seeks to prevent the water from entering the chamber.

According to a first aspect of the present invention there is provided, in or associated with an access chamber for use with an underground storage tank, water collection means and duct means for removing the collected water therefrom .

Preferably, the duct means extends into a suitable container, which may even be inside the chamber, which would then be emptied from time to time as needed. Alternatively, the duct means may extend from the water collection means to the exterior of the chamber, where it may be safely pumped away if such facilities exist.

The water collection means preferably comprises a generally U shaped channel into which water is directed from a generally dome shaped lid, the latter covering the entry to the access chamber. This lid has a downturned perimeter edge which is received within the U shaped channel, so that no water can escape beyond the channel. The channel includes one or more openings in its base, to which the duct means is attached.

Usually, a corbel unit is used to join the upper edge of the access chamber to the access hole frame, and the channel may conveniently run around the interior of the corbel unit and be bolted and sealed thereto at intervals, or alternatively bonded using a suitable bonding agent, e.g acrylic adhesive. This arrangement prevents water from entering the interior of the access chamber by collecting it and draining it away before it can enter.

Where the duct means extends beyond the confines of the access chamber, it may conveniently pass through the same sealed hole in the access chamber side wall as is already provided for the utility pipes.

According to the first aspect of the present invention there is further provided a method of preventing water from entering the interior of an access chamber, the method comprising collecting the water into water collection means and draining same away via duct means.

A common problem associated with the installation of access chambers for underground storage tanks is that associated with ground movements which can occur. If the corbel unit is rigidly attached to the access chamber wall, ground movements can cause enormous pressures to build up which can eventually cause the whole structure to be pushed upwards and/or buckle.

It is therefore the aim of the second aspect of the present invention to provide apparatus and method for joining the corbel unit to the access chamber wall in such a manner as to eliminate the aforementioned difficulties.

According to a second aspect of the present invention there is provided apparatus for joining together in sealing engagement the lower edge of a corbel unit to the upper edge of an access chamber wall, the apparatus comprising a flexible sealing strip having an upper edge for securing to the corbel unit, a lower edge for securing to the access chamber and a shaped middle section whereby any movement between the access chamber and the corbel unit can be accommodated by means of said shaped middle section without breaking the sealing engagement.

In effect, the shaped middle section provides a kind of "bellows" effect, absorbing the relative movements of the two structures.

Preferably, the apparatus includes a protective housing, one end of which is joined to the corbel unit, and the other end of which overhangs the seal.

During the installation, the access chamber is first fitted to the top of the storage tank, and then the corbel unit, which is of a fixed length, is fitted to the top of the access chamber at such a level that, when the access hole frame is seated on top of the corbel unit, the frame is flush with ground level.

According to the second aspect of the present invention, there is provided a method of joining and sealing a corbel unit to an access chamber during underground installation thereof, the method comprising temporarily fixing the relative positions of the lower edge of the corbel unit and the upper edge of the access chamber wall at the desired level, securing the first edge of a flexible sealing strip to the corbel unit and securing the second edge of the strip to the access chamber wall, said sealing strip having a shaped middle section whereby any movement between the access chamber and the corbel unit can be accommodated by means of said shaped middle section without breaking the sealing engagement.

The temporary fixing may be achieved by simple fabric straps having cam lock fasteners, or alternatively the Applicants have designed a special temporary fixing tool.

According to a third aspect of the present invention there is provided temporary fixing tool for temporarily securing a corbel unit to an associated access chamber, the tool comprising a support mounted for longitudinal movement along a rod, one end of said rod being adapted to be supported by the upper edge of the access chamber, and the tool including clamp means which can be loosened to allow the support to slide along the rod and tightened to clamp the support rigidly onto the rod.

Preferably, the tool comprises a small block having a bore running vertically therethrough, and a cylindrical rod which passes through the bore and is hooked over at the top. The block also has a threaded bore extending laterally, for receiving a tightening bolt.

To use this device, the hooked end of the rod is slipped over the edge of the access chamber wall, and the lower edge of the corbel unit is seated on top of the block. The block, and the corbel unit seated thereon, is then slid up or down the rod, until the desired level is achieved, i.e when the level of the uppermost edge of the corbel unit is such that when the frame is seated thereon, the upper surface of the frame is flush with the ground, whereupon the bolts are tightened, clamping the block to the rod.

A further advantage of the Applicants' device is that it may be used to assist in removing any unnecessary height from the access chamber. If necessary, a line can be marked around the interior of the corbel unit while the temporary fixing means is in place, and the excess height of the access chamber would be sawn off to approximately 25mm above this line, having first removed the temporary fixing means and the corbel unit. Then, the corbel unit would again be temporarily fixed within the access chamber, as described previously, adjusting the temporary fixing means as appropriate.

The edges of the sealing strip are then clamped as described, and the temporary fixing tools, of which several may be used, are removed only after back-filling to ground level with concrete, leaving the corbel unit attached and sealed to the access chamber wall in a flexible manner which is capable of absorbing changes in relative position of the two structures, by means of the specially shaped middle region of the seal.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which;

Figure 1 illustrates in cross section the access hole cover, frame, corbel unit and access chamber, including water collection means and sealing strip according to the present invention, and

Figures 2, 3 and 4 illustrate the use of a specially designed temporary fixing tool to enable the sealing strip illustrated in Figure 1 to be attached in the desired manner.

Referring to the drawings, an underground storage tank (not shown) has an access chamber 10, only the upper wall 12 of which is shown, and a corbel unit 14 which spans the gap between the top of the access chamber 10 and the access hole frame 16.

Water may enter through the access hole when the cover 17 is removed, and condensation water can also form due to lower night-time temperatures, particularly on the underneath of the cover. Any such water drips onto domed lid 18, which covers the entry to the access hole, to run down the lid and into a U shaped channel 20 which is bolted at intervals to the corbel unit 14, by means of bolt 24, swan neck type clamp 24a and threaded insert 24b. In addition, mastic may be used to enhance the seal.

An alternative is to bond the channel 20 to the interior of the corbel unit 14, using, for example, an acrylic adhesive.

Small ridges 14a in the interior surface of the corbel unit cause any condensation droplets running down the surface to drip into the channel below.

The base of the channel is open at one or more points, to allow connection via strap 23 to duct 22 which removes the water to either a separate collection bottle (not shown) or to the exterior of the access chamber.

Also illustrated in Figure 1 is a flexible sealing strip 30, which runs around the entire perimeter of the corbel unit, the upper edge being strapped to the corbel unit via strap 32 and the lower edge being strapped to the access chamber wall via strap 34. The middle region of the seal is shaped as illustrated, which provides a "bellows" effect to absorb relative movements of the corbel unit and the access chamber.

A device for allowing accurate placement of this sealing strip during installation is shown in Figures 2, 3 and 4, although other alternatives could be used to equal effect, for example fabric straps with cam lock fasteners.

Before the sealing strip 30 can be secured in place, the correct level of the corbel unit lower edge 15 relative to the access chamber upper edge 13 must be achieved, such as to allow the seal to be fitted, as well as having the frame 16, when seated on the corbel unit, flush with ground level.

The device 41 of Figures 2, 3 and 4 achieves this and comprises a block 42 with a central bore running vertically therethrough, through which is received a cylindrical rod 40. The rod 40 is hooked at its uppermost end 40a, and this end is hooked over the upper edge of the access chamber wall 13. The block 42 also includes an internally threaded bore 42a running laterally, which receives a tightening bolt 43, the arrangement being such that tightening the bolt within the lateral bore clamps the block 42 onto the rod 40 in any desired position along the rod.

After hooking the rod 40 over the chamber wall 13, the edge 15 of the corbel unit is allowed to rest on the block, and with the bolt 43 loosened, the block 42 is slid up or down along the rod 40 until the frame 16 is

brought flush with ground level. The bolt 43 is then tightened to hold the corbel unit in place, whilst the sealing strip 30 is strapped into place as described above. If necessary, any excess height of the access chamber can be removed, using the temporary fixing as a guide as described previously. Figure 2 shows the arrangement before the excess height on the access chamber is sawn off, and Figure 4 illustrates the arrangement afterwards, the position of the block 42 on the rod 40 having been re-adjusted.

Once fitted, the strip is protected by fitting a housing 36 to the corbel unit, as illustrated in the drawings.

The excavation is then back-filled with concrete up to ground level, the bolt 43 is loosened slightly, the rod 40 is rotated through 90 degrees, and the device 41 can then be slipped downwards and removed from the access chamber.

Typically, several of the devices 41 would be used (for example five or six), spaced around the perimeter of the access chamber, to collectively form what is essentially an adjustable height ledge for "hanging" the corbel unit within the access chamber at the desired height.

## Claims

1. Apparatus for joining together in sealing engagement the lower edge of a corbel unit (14) to the upper edge of an access chamber wall (12), the apparatus comprising a flexible sealing strip (30) having an upper edge for securing to the corbel unit, a lower edge for securing to the access chamber and a shaped middle section whereby any movement between the access chamber and the corbel unit can be accommodated by means of said shaped middle section without breaking the sealing engagement.

2. Apparatus according to Claim 1 wherein there is included a protective housing (36), one end of which is joined to the corbel unit, and the other end of which overhangs the seal.

3. A method of joining and sealing a corbel unit (14) to an access chamber (10) during underground installation thereof, the method comprising temporarily fixing the relative positions of the lower edge of the corbel unit and the upper edge of the access chamber wall (12) at the desired level, securing the first edge of a flexible sealing strip (30) to the corbel unit and securing the second edge of the strip to the access chamber wall, said sealing strip having a shaped middle section whereby any movement between the access chamber and the corbel unit can be accommodated by means of said shaped middle section without breaking the sealing engagement.

4. A method according to Claim 3 wherein the temporary fixing comprises fabric straps having cam lock fasteners.

5. A temporary fixing tool (41) for temporarily securing a corbel unit to an associated access chamber, the tool comprising a support (42) mounted for longitudinal movement along a rod (40), one end of said rod being adapted to be supported by the upper edge (13) of the access chamber, and the tool including clamp means (42a, 43) which can be loosened to allow the support to slide along the rod and tightened to clamp the support rigidly onto the rod.

6. A tool according to Claim 5 and comprising a small block (42) having a bore running vertically therethrough, and a cylindrical rod (40) which passes through the bore and is hooked over at the top.

7. A tool according to Claim 5 or Claim 6 and including a threaded bore (42a) extending laterally, for receiving a tightening bolt (43).

8. In or associated with an access chamber for use with an underground storage tank, water collection means (18,20) and duct means (22) for removing the collected water therefrom .

9. Water collection and duct means according to Claim 8 wherein the duct means extends into a suitable container.

10. Water collection and duct means according to Claim 8 wherein the duct means extends from the water collection means to the exterior of the chamber.

11. Water collection and duct means according to any of Claims 8 to 10 wherein the water collection means comprises a generally U shaped channel (20) into which water is directed from a generally dome shaped lid (18), the latter covering the entry to the access chamber.

12. Water collection and duct means according to Claim 11 wherein the U shaped channel includes one or more openings in its base, to which the duct means is attached.

13. A method of preventing water from entering the interior of an access chamber, the method comprising collecting the water into water collection means (18,20) and draining same away via duct means (22).

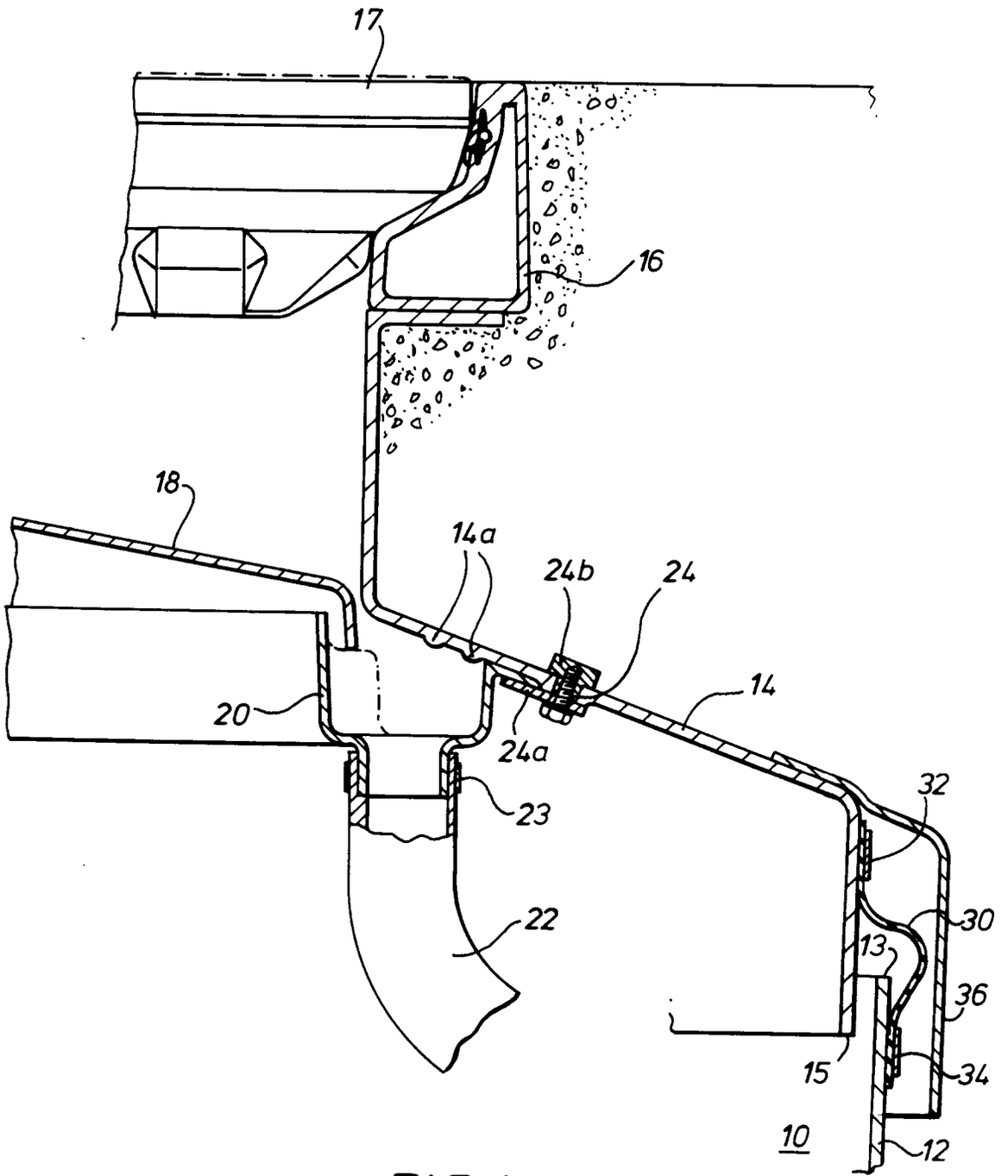


FIG. 1.

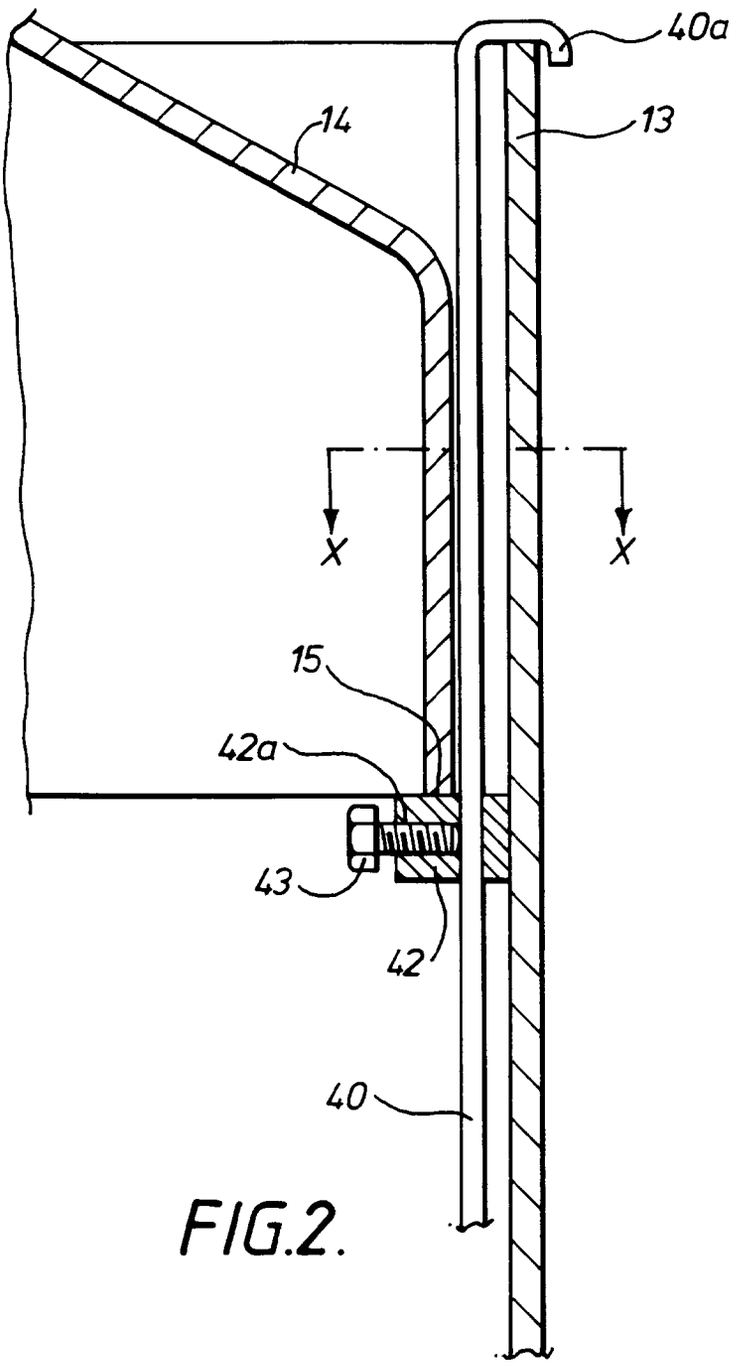


FIG.2.

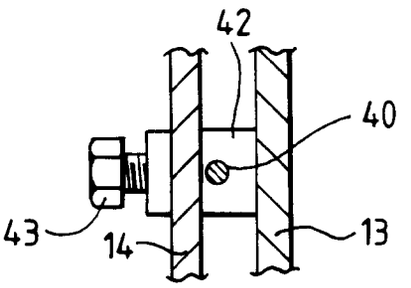


FIG.3.

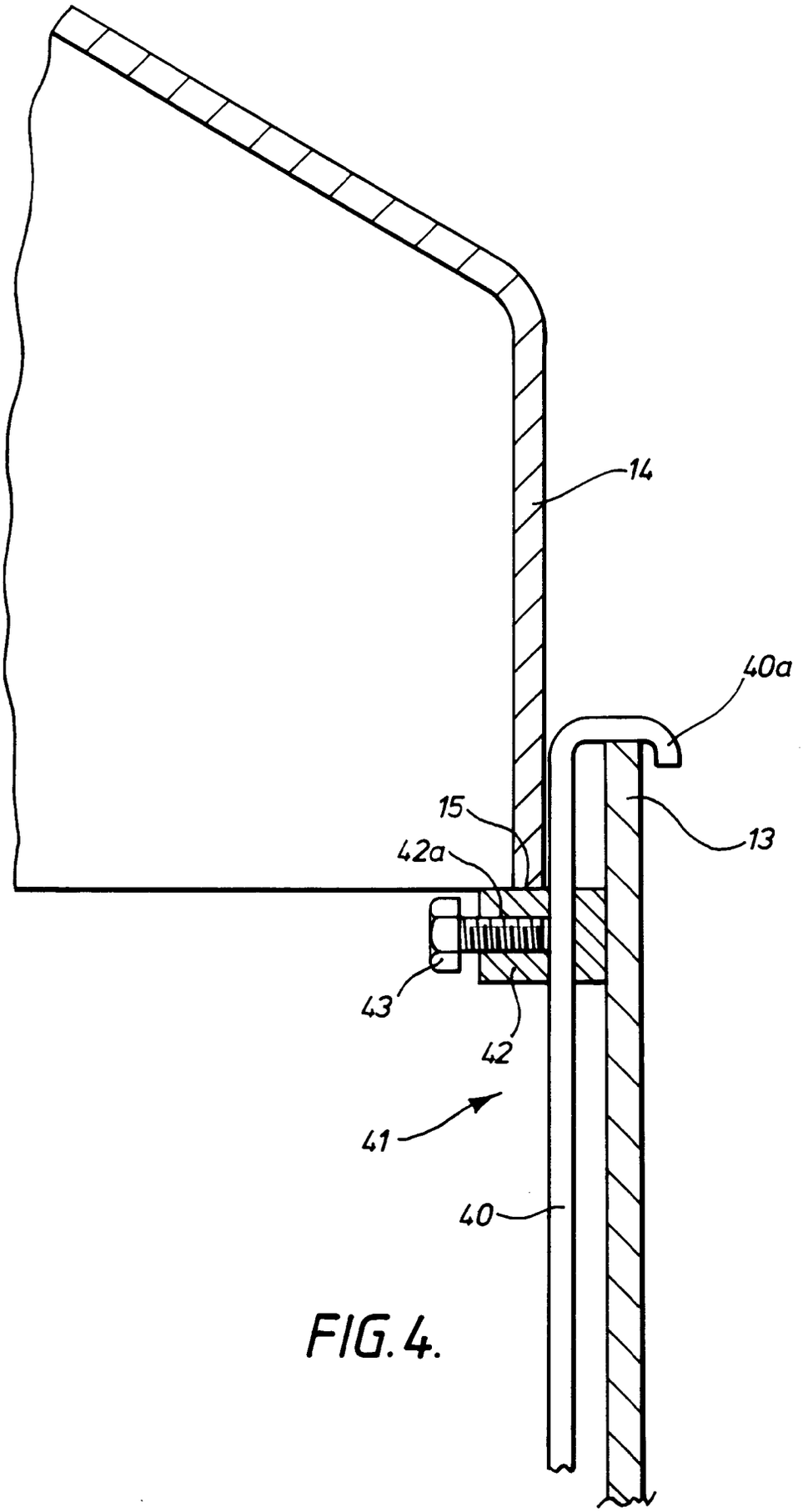


FIG. 4.

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# EUROPEAN SEARCH REPORT

Application Number
EP 96 20 1367

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
|---|---|---|---|
| X<br>A | US-A-4 763 806 (PODGERS ALEXANDER R ET AL) 16 August 1988<br>* column 6, line 26 - line 57 *<br>* column 7, line 12 - line 29 *<br>* figure 3 * | 1,2,8,9<br>3,5 | B65D90/10 |
| X | US-A-4 793 387 (LEBLANC LEO J ET AL) 27 December 1988<br>* column 2, line 61 - column 3, line 44; figure 2 * | 1,2 | |
| A | US-A-5 114 271 (SUNDERHAUS CHARLES A ET AL) 19 May 1992<br>* column 6, line 43 - column 8, line 29; figure 3 * | 1,3,5,8 | |
| A | US-A-4 278 115 (BRILES WALLACE E ET AL) 14 July 1981<br>* column 2, line 26 - line 62; figures * | 1,8 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65D
E02D

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| BERLIN | 29 August 1996 | Olsson, B |

CATEGORY OF CITED DOCUMENTS

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