



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.06.2014 Bulletin 2014/24

(51) Int Cl.:
E02D 29/14 (2006.01)

(21) Application number: **13196546.9**

(22) Date of filing: **10.12.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(30) Priority: **10.12.2012 BE 201200829**

(54) **Ground cover, lifting element, sealing element and method for the lifting thereof**

(57) The present invention relates to an improved device for a manhole cover which comprises a first and a second bowl, wherein the second bowl is suitable to be inserted into the first bowl, wherein the second bowl is provided with at least one or several lifting elements, which lifting elements are provided with a bore, wherein the bore is sealed by a sealing element, wherein the seal-

ing element is made of a magnetically sensitive material and the sealing element is suitable to be linearly displaced and/or removed by means of a magnet. In addition, the present invention relates to a lifting element and a sealing element for and a method for lifting the manhole cover.

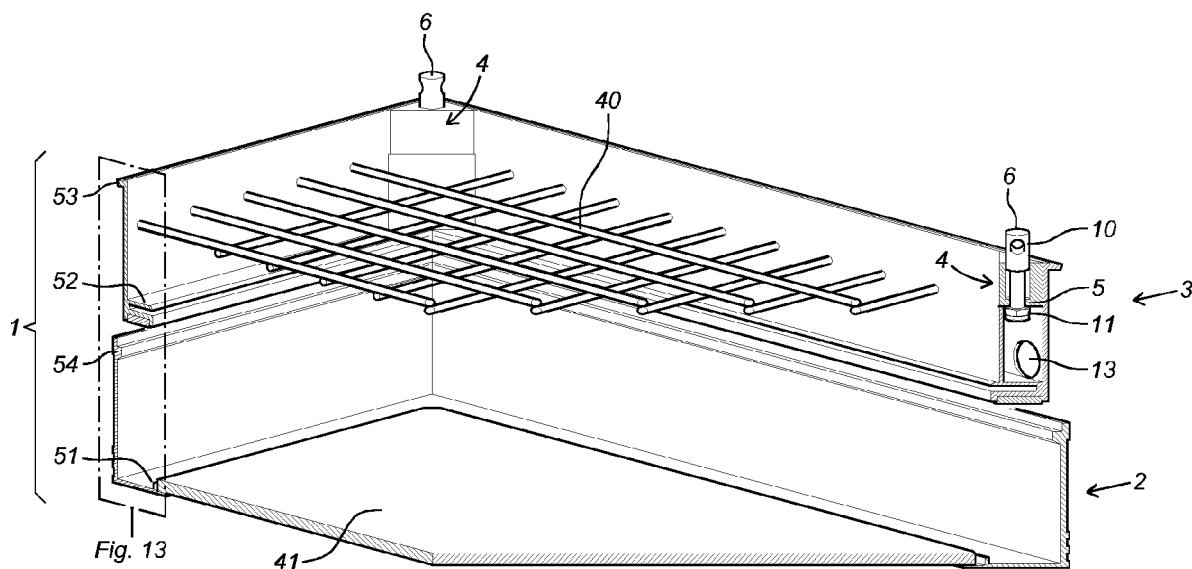


Fig. 12

Description

TECHNICAL FIELD

[0001] The present invention relates to an improved device for a manhole cover which comprises a first and a second bowl, wherein the second bowl is suitable to be inserted into the first bowl, wherein the second bowl is provided with at least one or several lifting elements, which lifting elements are provided with a bore, wherein the bore is sealed by a sealing element, wherein the sealing element is made of a magnetically sensitive material and the sealing element is suitable to be linearly displaced and/or removed by means of a magnet. In addition, the present invention relates to a lifting element and sealing element for and a method for lifting the manhole cover.

BACKGROUND

[0002] The invention relates to a manhole cover containing a first and a second bowl, wherein the second bowl is suitable to be inserted into the first bowl. This second bowl is provided with one or several lifting elements which are fitted to the second bowl. These lifting elements are suitable to be used to lift the second bowl out of the first bowl.

[0003] Such manhole covers are generally known and are used, inter alia, to provide access to sewage systems or utility pipes which are situated in the ground. Paving bricks, other stones or floor elements are placed into the interior of the second bowl, so that the brick cover does not disrupt the structural unity of the road or the floor in which it is arranged. There are numerous options for filling a manhole cover: stones, asphalt, glass, artificial turf, etc. However, this second bowl may also be a solid unit. By lifting the second bowl out of the first bowl, access is gained to the space located underneath, which may be necessary, for example, in case of repairs and checks on the utility pipe. Lifting of the second bowl is typically effected by means of a T-key which is screwed into a bore of a lifting element (or several) and which thus engages with the lifting element and thus with the second bowl.

[0004] The prior art, inter alia, discloses the brick cover as described in patent application WO2010134046A1 (De Vroe D.V.S. Metal). This relates to a brick cover wherein an engagement member is provided in the corner elements, intended for allowing a lifting member (e.g. tube rod, D shackle, snap hook, ...) to engage with said engagement member in order to lift a second bowl out of a first bowl by means of the lifting member.

[0005] Sealing a lifting element and the attendant sealing of the screw thread for screwing in the lifting key is typically effected by means of a screwed-in bolt having the same pitch as said screw thread. Alternatively, a bolt may be used which is suitable to be anchored via an opening of the inner bowl in the outer bowl.

[0006] The problem with manhole covers is that the lifting elements are not sufficiently protected against environmental dirt and other burdensome or external factors (such as for example vandalism).

5 **[0007]** Also, contact corrosion occurs upon contact of e.g. a sealing bolt which is screwed into a bore of a lifting element using the screw thread of this bore.

10 **[0008]** There is a need for a more durable manhole cover, wherein the second bowl is suitable to be lifted from and placed into the first bowl in a more user-friendly, smoother and more efficient way.

[0009] There is also a need for a manhole cover which is more securely protected against loss and vandalism.

15 **[0010]** It is an object of the present invention to provide an improved manhole cover, as described in Claim 1, which offers a solution to at least one of the above-mentioned drawbacks of manhole covers.

SUMMARY OF THE INVENTION

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[0011] The invention relates in particular to a manhole cover which comprises a first and a second bowl, wherein the second bowl is suitable to be inserted into the first bowl, wherein the second bowl is provided with at least one or several lifting elements, which lifting elements are provided with a bore, wherein the bore is sealed by a sealing element, wherein the sealing element is made of a magnetically sensitive material and the sealing element is suitable to be linearly displaced and/or removed by means of a magnet, as described in Claim 1.

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[0012] In a second aspect, the invention relates to a lifting element for a manhole cover, as described in Claim 13.

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[0013] In a third aspect, the invention relates to a sealing element for a manhole cover, as described in Claim 14.

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[0014] In a third aspect, the invention relates to a method for lifting a second bowl out of a first bowl of a manhole cover, as described in Claim 15.

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[0015] Further preferred embodiments are described in the subclaims.

[0016] By using a sealing element made of a magnetically sensitive material, wherein the sealing element is suitable to be linearly lifted or removed by means of a magnet, lifting the second bowl out of and placing the second bowl into the first bowl becomes more user-friendly, smoother and efficient. A sealing element in a lifting element can quickly and efficiently be detached or displaced by means of a magnet (or key provided with a magnet). At the same time, it becomes possible to seal the lifting element more permanently against external factors. It becomes possible to use a lifting element without screw thread. After all, this screw thread technique is very susceptible to contact corrosion and damage. The shape of a sealing element can also be chosen more freely, which also offers an aesthetic advantage. Also, the visible part of the lifting element does not have to be provided with a groove and/or indentation for removal or

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placement of the sealing.

DESCRIPTION OF THE FIGURES

[0017]

Figures 1-3 show a transparent perspective view of different examples of a lifting element for a manhole cover from the prior art.

The following Figures 4-18 show preferred embodiments of the invention.

Figure 4 diagrammatically shows a bird's-eye view of a manhole cover.

Figure 5 shows a bird's-eye view of a manhole cover.

Figures 6-11 show a transparent bird's-eye view of a lifting element of a manhole cover.

Figure 12 shows a perspective cross-sectional bird's-eye view of a manhole cover provided with a plate and a grate.

Figure 13 shows a cross-sectional view of the profiles of the first and second bowl, as indicated in Figure 12.

Figures 14-17 show cross-sectional views of a plate provided with a lifting element.

Figure 18 shows a cross-sectional bird's-eye view of a plate provided with a lifting element.

Figure 19 shows a perspective view of a sealing element.

DETAILED DESCRIPTION

[0018] In this document, "a", "an" and "the" refer both to the singular and the plural, unless clearly indicated otherwise in the context. For example, "a lifting element" means one or more than one lifting element.

[0019] Unless defined otherwise, all terms which are used in the description of the invention, including technical and scientific terms, have the meaning which is generally given to them by someone skilled in the technical field of the invention.

[0020] In a first aspect, the invention relates to a manhole cover which comprises a first and a second bowl, wherein the second bowl is suitable to be inserted into the first bowl, wherein the second bowl is provided with at least one or several lifting elements, which lifting elements are provided with a bore, wherein the bore is sealed by a sealing element, wherein the sealing element is made of a magnetically sensitive material and the seal-

ing element is suitable to be linearly displaced and/or removed by means of a magnet.

[0021] This has the advantage that the lifting element is suitable to be sealed more efficiently against external factors, such as environmental dirt, dust, etc. This has the advantage that lifting the second bowl from or placing the second bowl into the first bowl becomes more user-friendly, smoother and more efficient. A sealing element in a lifting element is suitable to be detached or displaced quickly and efficiently via a linear movement and/or displacement by means of a magnet (or key provided with a magnet).

[0022] By suitably selecting the shape and dimensions of a sealing element, the latter is anchored in the lifting element in such a manner that it cannot be removed from said lifting element by contact or friction with materials other than magnets.

[0023] At the same time, it becomes possible to seal the lifting element more permanently against external factors. It becomes possible to use a lifting element without screw thread. This screw thread technique is very susceptible to contact corrosion and damage. In this case, contact corrosion occurs due to the bolt being permanently or sufficiently long in contact with the screw thread. This makes it very difficult or even impossible to unscrew the bolt.

[0024] This also has the advantage that the shape of a sealing element can also be chosen more freely, which also offers an aesthetic advantage.

[0025] As a result thereof, the surface of a lifting element can also remain perfectly smooth and is not impaired by uneven structures, such as for example a groove and/or indentation, which results from other techniques as described in the prior art.

[0026] In the present invention, the term "second bowl" is understood to mean both a bowl which is suitable to be filled with e.g. stones, asphalt, glass, artificial turf, etc., and a bowl which is a solid unit.

[0027] The expression "wherein the sealing element is made of a magnetically sensitive material" is understood to mean that the sealing element is partly or completely made of a magnetically sensitive material. A combination of a magnetically sensitive material and another material, such as for example plastic, is also possible.

[0028] In a preferred embodiment of the invention, the sealing elements are beared in the bores of the at least one or several lifting elements.

[0029] This has the advantage that the bores are sealed more securely and protected against external factors.

[0030] In a preferred embodiment of the invention, the at least one or several lifting elements are provided with a bore and a deepening.

[0031] This has the advantage that the lifting element is more securely protected against external factors.

[0032] In a preferred embodiment of the invention, the sealing elements are beared in the deepenings of the at least one or several lifting elements.

[0033] This offers the advantage that the sealing elements are scratch-free and that the external impact on the sealing elements is virtually non-existent. Manhole covers are used in environments with mainly pedestrian traffic, light-weight traffic and heavy traffic. Thus, it is likely that a vehicle moving at a certain speed will have an impact on the sealing elements when its tyres come into contact with one or several lifting elements of the manhole cover, as a result of which the sealings could inadvertently be removed from the lifting element.

[0034] By reducing the contact surface with the lifting element, the risk of damage or scratches is likewise reduced.

[0035] In a preferred embodiment of the invention, the lifting elements are without a screw thread.

[0036] This has the advantage that the lifting element is sealed against external factors more permanently. By not using a screw thread technique, the risk of contact corrosion and damage is drastically reduced.

[0037] In a preferred embodiment of the invention, the at least one or several lifting elements are provided with a lifting instrument which is beared in the bore.

[0038] This has the advantage that a user does not require an additional complicated and/or specific lifting instrument in order to lift the second bowl out of the first bowl.

[0039] In a preferred embodiment of the invention, the lifting instrument is the sealing element.

[0040] In a preferred embodiment of the invention, the lifting instrument comprises an eye or bore which is suitable for lifting the second bowl out of the first bowl by means of a snap hook, rod or rope.

[0041] This has the advantage that lifting can be carried out in a more user-friendly, smoother, more economical, simpler, more efficient manner. Lifting is effected by means of simple tools, such as a snap hook, tube rod, rope, screwdriver, etc.

[0042] In a preferred embodiment of the invention, the lifting instrument is provided with a stop at the foot in order to secure the lifting instrument.

[0043] During lifting of the lifting instrument, the stop provides grip on the lifting element and thus on the second bowl.

[0044] In a preferred embodiment of the invention, the second bowl is provided with at least one opening and the first bowl is provided with a bore, wherein an anchoring bolt, which is beared inside the bore of a lifting element, is suitable for anchoring the second bowl in the first bowl.

[0045] This has the advantage that when, for example, relatively heavy traffic causes impacts, the inner bowl will remain in the outer bowl.

[0046] In a preferred embodiment of the invention, the sealing elements comprise magnetically sensitive metal which is preferably resistant to corrosion or which has preferably been treated against corrosion. Corrosion-proofness is advantageous. An example for stainless steel is RVS-430. An example of a treatment against cor-

rosion is heat galvanizing. In addition, it is a preferred embodiment of the present invention that the sealing elements comprise a composition of different types of material, wherein said composition is sufficiently magnetically sensitive.

[0047] In a preferred embodiment of the invention, the shape of the lifting elements is straight prismatic, preferably with a triangular, rectangular or square upper surface, more preferably with a triangular upper surface.

[0048] In a preferred embodiment of the invention, lifting elements are provided at at least two corners, preferably four corners, on the inside of the second bowl.

[0049] In a preferred embodiment of the invention, a lifting element is provided in the centre of the second bowl.

[0050] Obviously, the term "bore" in the present invention also comprises bores or holes having a non-round cross-section. Examples thereof are bores having a triangular, rectangular, square, pentagonal, elliptical, etc. cross-section.

[0051] In a preferred embodiment of the invention, said second bowl comprises a plate. Examples of such a plate may be a metal plate, drain cover, tile, etc.

[0052] In a preferred embodiment of the invention, the lifting element comprises a bore in said plate and a sealing element which is beared in said bore.

[0053] This promotes the safety of the manhole cover, since a sealing element can be made smooth or level and can thus be at the same level as the plate. This prevents this element from possibly protruding above the plate, thus preventing people from stumbling or getting caught. This makes it possible for the lifting element to occupy a surface which is as small as possible compared to the total surface of the plate. This offers an aesthetic advantage. It also makes it possible for the position or location of the lifting element in the plate to be chosen freely.

[0054] In a preferred embodiment of the invention, a lifting element is provided with one or several support elements which extend on the underside of said plate and which can offer support to said plate during lifting thereof.

[0055] This makes it possible to improve the self-supporting capacity of the plate during lifting thereof.

[0056] In a preferred embodiment of the invention, a lifting element is suitable to be provided with a removable sealing element which is suitable to seal the lifting element on the underside of the second bowl.

[0057] As a result thereof, the lifting element is suitable to be sealed against external factors, such as water, gas, etc. The removability of the sealing element can be ensured via a coupling, such as screw thread, click-fit system, magnetic coupling, etc.

[0058] In a second aspect, the invention relates to a lifting element for a manhole cover, which is provided with a bore, wherein the bore is sealed by a sealing element, wherein the sealing element is made of a magnetically sensitive material and the sealing element is suit-

able to be linearly displaced and/or removed by means of a magnet.

[0059] In a third aspect, the invention relates to a sealing element for a manhole cover, wherein the sealing element is made of a magnetically sensitive material and the sealing element is suitable to be linearly displaced and/or removed from said bore by means of a magnet.

[0060] In a fourth aspect, the invention relates to a method for lifting a second bowl out of a first bowl of a manhole cover according to a preferred embodiment of the invention, comprising the following steps:

- linearly displacing and/or removing the sealing elements of the manhole cover by means of a magnet or a key which is provided with a magnet;
- inserting one or several beared lifting instruments in the lifting elements and/or engaging one or several lifting instruments on the lifting elements;
- lifting the second bowl out of the first bowl by means of the one or several of said lifting instrument(s).

In addition to the above-mentioned advantages for the manhole cover, this results in a smooth, simple, user-friendly and efficient method.

The invention is now described below with reference to non-limiting examples which illustrate the invention and which are not intended to limit and may not be interpreted as limiting the scope of the invention.

EXAMPLES

[0061] The invention will now be explained with reference to the following examples, incidentally without being limited thereto.

[0062] Figures 1-3 show a transparent perspective view of different examples of a lifting element (4) for a manhole cover (1) from the prior art.

[0063] Example 1 :

[0064] Figure 4 diagrammatically shows a bird's-eye view of a manhole cover (1) according to a preferred embodiment of the invention. This manhole cover (1) comprises a first (2) and a second bowl (3), wherein the second bowl (3) is suitable to be inserted into the first bowl (2). The second bowl (3) has lifting elements (4) at the four corners on the inside of the second bowl (3). They have a straight-prismatic shape with a triangular upper surface. They are provided with a bore (5) which is sealed by a magnetically sensitive sealing element (6). These lifting elements (4) do not extend across the entire height of the second or inner bowl (3). On the upper side of each lifting element (4), a magnetically sensitive plate is beared in a deepening (7).

[0065] The profile approach where the inner bowl (3) rests on the outer bowl (2) ensures that the space between the inner and outer bowl remains free from environmental dirt and thus prevents them from becoming stuck, as mentioned before in EP1705295A2 and WO2010134046A1.

Example 2:

[0066] Figure 5 shows a bird's-eye view of a manhole cover (1) according to a preferred embodiment of the invention. This manhole cover (1) again comprises a first (2) and a second bowl (3) which is suitable to be inserted into the first bowl (2). The lifting elements (4) in the four corners of the second bowl (3) again have a straight-prismatic shape with a triangular upper surface. They are provided with a deepening (7) comprising a bore (5) which is sealed by a magnetically sensitive sealing element (6). In this case, these lifting elements (4) do extend across the entire height of the inner bowl (3).

[0067] Figure 6 shows a transparent bird's-eye view of a lifting element (4) of the manhole cover (1) from Figure 5. The lifting element (4) comprises a bore (5) having a deepening (17) on the upper side, which can accommodate the head of the magnetically sensitive sealing element (6). This head is provided with an eye (10) which is suitable to be used to enable a lifting means to engage with the sealing element (6). The sealing element (6) is also a lifting instrument (9) as the bottom end thereof is provided with a safeguard or stop (11) which provides grip on the lifting element (4) when lifting this lifting instrument (9) and thus makes it possible to lift the second or inner bowl (3) out of the first or outer bowl (2).

Example 3:

[0068] In the prior art, a bore (5) with screw thread (8) in a lifting element (4) in a manhole cover (1) is typically sealed by a screwed-in bolt (see Figure 1). If the inner bowl (3) is to be lifted from the outer bowl (2), this bolt (15) is first unscrewed and removed, so that a T-shaped key with screw thread (8) can then be screwed into the bore (5). Figure 2 shows such a screwed-in T-key (14) in a lifting element (4) in a manhole cover (1) from the prior art. By means of this key, the inner bowl (3) can be lifted out of the outer bowl (2).

[0069] Figure 7 shows a transparent bird's-eye view of a lifting element (4) for a manhole cover (1) according to a preferred embodiment of the invention. The lifting element (4) is provided in the corner of the inner bowl (3) which rests on the outer bowl (2). The lifting element (4) comprises a bore (5) with screw thread (8), without a sealing bolt (15). This prevents contact with the screw thread and thus also contact corrosion. The screw thread (8) may be used to screw in a lifting instrument. The lifting element (4) does not extend across the full height of the inner bowl.

[0070] The difference to the prior art is that a magnetically sensitive triangular plate (6) is beared on the upper side, in a deepening (7) of the lifting element (4). The plate (6) seals the upper side of the lifting element (4) and thus also the screw thread (8) in the bore (5).

[0071] The sealing plate (6) comprises a blind bore (32) on the underside of the plate which leaves space for incorporating an information-bearing colour code.

Example 4:

[0072] Figure 8 shows a transparent bird's-eye view of a lifting element (4) for a manhole cover (1) according to a preferred embodiment of the invention. The lifting element (4) comprises a bore (5) with screw thread (8) without a screwed-in bolt (15). On the upper side, in a deepening (7) of the lifting element (4), a magnetically sensitive triangular plate (6) is beared. Omitting a screwed-in bolt (15) reduces the risk of contact corrosion between bolt (15) and screw thread (8). The lifting element (4) does not extend across the entire height of the inner bowl.

[0073] The lifting element (4) is provided with a sealing cap (31) provided in the opening of the bore (5) of the lifting element (4). The colour of this sealing cap (31) corresponds to an information-bearing code.

Example 5:

[0074] Figure 9 shows a transparent bird's-eye view of a lifting element (4) for a manhole cover (1) according to a preferred embodiment of the invention. The lifting element (4) comprises a bore (5) with screw thread (8). The lifting element (4) does not extend across the full height of the inner bowl. The bore (5) contains a magnetically sensitive bolt (15) without screw thread (8). The bore (5) is sealed by the cylindrical head of this bolt (15). The diameter of the foot of this sealing element is smaller than the diameter of the screw thread opening for the lifting instrument. Thus, the metal of the sealing does not come into contact with the screw thread. This reduces the risk of contact corrosion. The lifting element (4) is provided with a ring (30) underneath the head of the bolt (15). The colour of this ring (30) corresponds to an information-bearing code.

Example 6:

[0075] In the prior art, the inner bowl (3) is typically anchored in the outer bowl (2) by means of an anchoring bolt (12) (see Figure 3). At its end, this anchoring bolt (12) is provided with a screw thread (8). Due to the fact that an opening (13) is provided in the inner bowl (3) and a screw thread anchoring (16) is provided in the outer bowl (2), the anchoring bolt (12) can be screwed into the screw thread anchoring or rivet (16) in order thus to anchor the inner bowl (3) in the outer bowl (2). In addition, such an opening (13) may be used to provide access to the interior of the lifting element (4). With a brick cover as described in patent application WO2010134046A1 (prior art) an engagement member is provided in corner elements which is intended to allow engagement of a lifting member in order to lift a second bowl out of a first bowl by means of the lifting member. The engagement member comprises a screw thread which can accommodate the engagement member in the corner element.

[0076] Figure 10 shows a transparent bird's-eye view of a lifting element (4) for a manhole cover (1) according

to a preferred embodiment of the invention. The lifting element (4) comprises a bore (5) without screw thread (8). The lifting element (4) extends across the full height of the inner bowl (3).

[0077] A magnetically sensitive sealing element (6) is beared in the bore (5) and has an eye (10) in its head. The sealing element (6) is also a lifting instrument (9) due to the fact that the bottom end thereof is provided with a safeguard or stop (11) which provides grip on the lifting element (4) when lifting this lifting instrument (9) and thus makes it possible to lift the inner bowl (3) out of the outer bowl (2). The diameter of this safeguard (11) is larger than that of the opening of the lifting element (4). As this sealing element and lifting element (4) do not comprise any screw thread and there is consequently no contact between a bolt and a screw thread, the risk of contact corrosion is drastically reduced compared to the prior art. Also, the diameter of the cylindrical central part of the lifting instrument (9) is smaller than the diameter of the bore (5), thus preventing possible contact between the two here as well.

[0078] The inner bowl (3) is provided with an opening (13) at the bottom of the lifting element (4), as is the case in Figure 3. The presence of an opening in the inner bowl provides access to the lifting element via the underside. In the figure, the opening (13) in the inner bowl (3) is sealed by a removable cap (18). The diameter of this opening (13) may be smaller than the foot of the integrated lifting instrument (9), as a result of which the end user can perform cleaning or maintenance operations on the lifting element (4) via this opening at the bottom.

[0079] The diameter of this opening may also be larger than the foot of the integrated lifting element (9), as a result of which the end user can remove the integrated lifting instrument in order to clean and/or replace the latter. After all, the foot of the integrated lifting instrument (9) can rest on a removable plastic cap (18) or simply on the outer bowl (2).

Example 7:

[0080] Figure 11 shows a transparent bird's-eye view of a lifting element (4) for a manhole cover (1) according to a preferred embodiment of the invention. The lifting element (4) comprises a bore (5) without screw thread (8). The lifting element (4) extends across the entire height of the inner bowl (3). The bore (5) contains a magnetically sensitive sealing element (6), the head of which is provided with an eye (10). The sealing element (6) is also a lifting instrument (9) due to the fact that the bottom end thereof is provided with a safeguard or stop (11) which provides grip on the lifting element (4) when lifting this lifting instrument (9) in order thus to lift the inner bowl (3) out of the outer bowl (2). An opening (13) is provided in the side wall of the inner bowl (3). This makes it possible to provide access to the interior of the lifting element (4).

[0081] The lifting element (4) is provided with a ring (30) underneath the head of the lifting instrument (9). The

colour of the ring (30) corresponds to an information-bearing code.

Example 8:

[0082] Figure 12 shows a cross-sectional bird's-eye view in perspective of a manhole cover (1) provided with lifting elements (4), a plate (41) and a grate (40).

[0083] The lifting elements (4) comprise a bore (5) without screw thread (8). The bore (5) contains a magnetically sensitive sealing element (6), the head of which is provided with an eye (10) and the bottom end of which is provided with a safeguard (11). An opening (13) is provided in the side wall of the inner bowl (3). This makes it possible to provide access to the interior of the lifting element (4).

[0084] Figure 13 shows a cross-sectional view of the profiles of the first (2) and second bowl (3), as illustrated in Figure 12. The upper side of the profile of the second bowl (3) is provided with a widened section (53) which can rest on a widened section (54) of the first bowl (2). As a result thereof, the second bowl (3) rests on the profile of the first bowl (2). At the top of the profile of the second bowl (3), the widened section (53), which also seals the space between the first (2) and second bowl (3), comprises a deepening (50). The latter acts as a 'trompe l'oeil'. The combination of the upper layer of both profiles therefore seems less wide. This combination is less susceptible to scratches.

[0085] The profile of the first bowl (2) is provided with an upright elevation (51). This upright elevation (51) makes it possible to place or position the carrier plate (41) in such a manner that the carrier plate (41) does not prevent the subsequent placement of the second bowl (3). The thickness of the carrier plate (41) is determined in such a way that it supports the base plate of the inner bowl. This base plate (not shown in the figure) is provided in the groove underneath the projection (52). The carrier plate (41) is made from a corrosion-proof material, preferably stainless steel, and increases the load capacity of the cover (1). A grip is provided in this carrier plate (41) for the user. Furthermore, a grate or reinforcement net (40) may be provided in the second bowl (3).

[0086] A cover which is composed of a first (2) and second bowl (3) and carrier plate (41) is lifted in 2 stages. First, the second bowl (3) is lifted out of the first bowl (2), followed by the carrier plate (41). Conversely therefore, for example when closing the manhole, the carrier plate (41) is replaced first, followed by the second bowl (3). The upright elevation in the profile facilitates positioning of the carrier plate.

Example 9:

[0087] Figure 14A shows a cross-sectional view of a plate (60) provided with a lifting element (4). The lifting element (4) comprises a bore (5) in said plate (60) and a sealing element (6), which is beared in said bore (5),

which comprises a widened section on the upper side of the plate (60). This widened section makes it possible for the sealing element (6) to be anchored in this bore (5) at the head by means of a widened section. The lifting element (4) is provided in the centre of the plate (60). The head of the sealing element (6) is provided with an eye (10) and is also a lifting instrument (9) due to the fact that the bottom end is provided with a safeguard (11). When lifting the sealing element (6), this safeguard (11) comes into contact with the underside of the plate (60), which bore has a smaller diameter and as a result of which the sealing element (6) can be used to lift the plate (60).

[0088] Figure 14A shows a cross-sectional view of the plate (60) wherein the sealing element (6) has been displaced linearly by means of a magnet, resulting in the eye becoming accessible for, for example, a snap hook which lifts the plate upwards by means of the lifting element (4).

Example 10:

[0089] Figure 15 shows a cross-sectional view of a plate (60) provided with a lifting element (4). The lifting element (4) comprises a cylindrical jacket on the upper side, which bears against a bore in said plate (60), in which a sealing element (6) is beared. The head of the sealing element (6) is provided with an eye (10) and also serves as a lifting instrument (9) due to the fact that the bottom end is provided with a safeguard (11). When lifting the sealing element (6), this safeguard (11) comes into contact with the constriction in the lifting element (4) which has a smaller diameter and as a result of which the sealing element (6) can lift the plate (60).

[0090] The lifting element (4) is provided with a support plate (64) which extends on the underside of said plate (60). This support plate (64) is preferably attached to the plate (60) by means of glue and/or screws. As a result thereof, said plate (60) is more efficiently supported during lifting.

[0091] The lifting element (4) is provided with a screw-on sealing element (63) which can be used to hermetically seal the lifting element (4) on the underside of the second bowl (3). Like the sealing element (63), the lifting element (4) is also provided with a screw thread (62) to this end.

[0092] In case the thickness of the plate cannot be determined, the lifting element (4) may be provided with a taller jacket (61) which can then, for example, be sawn off to the desired height, depending on the plate thickness.

Example 11:

[0093] Figure 16 shows a cross-sectional view of a plate (60) provided with a lifting element (4). The lifting element (4) is similar to the lifting element (4) from Example 10, except for a narrowing of the cylindrical jacket

(61) on the upper side. In case the thickness of the plate is known, the desired height can be set at the beginning. This narrowing in the jacket (61) makes it possible for the sealing element (6) to be anchored therein by means of a widened section at the head. During removal of the sealing element (6), this safeguard (11) comes into contact with the constriction in the lifting element (4) which has a smaller diameter, as a result of which the sealing element (6) can lift the plate (60).

Example 12:

[0094] Figure 17 shows a cross-sectional view of a plate (60) provided with a lifting element (4).

[0095] The lifting element (4) comprises a cylindrical jacket (61) on the upper side which bears against a bore in said plate (60) in which a sealing element (6) is beared.

[0096] The bore in the plate (60) comprises a widened section on the upper side of the plate (60). This widened section makes it possible for the lifting element (4) to be anchored in the bore of the plate by means of a widened section (67) on the cylindrical jacket (61). The lifting element (4) is provided in the centre of the plate (60).

[0097] The sealing element (6) is provided with an eye (10) in its head and also serves as a lifting instrument (9) due to the fact that the bottom end is provided with a safeguard (11).

[0098] The lifting element (4) is provided with screw thread (62) via which a sealing element (63), which is likewise provided with screw thread (62), can be screwed on, which sealing element (63) can hermetically seal the lifting element (4) on the underside of the second bowl (3). The sealing element (63) itself is provided with a support plate (64) which extends on the underside of said plate (60). As a result of the widened section (67) and therefore the anchoring of the lifting element (4) on the upper side, the support plate (64) is suitable to be clamped against the plate (60) by screwing on the lifting element (4) via the screw thread (62).

Example 13:

[0099] Figure 18 shows a cross-sectional bird's-eye view of a plate provided with a lifting element.

[0100] The lifting element (4) in the centre of the plate (60) comprises a cylindrical jacket (61) which bears against a bore in the plate (60) in which a sealing element (6) is beared, the head of which is provided with an eye (10) and the bottom end of which is provided with a safeguard (11).

[0101] In case the thickness of the plate cannot be determined, this lifting element (4) makes it possible to set the desired height of the cylindrical jacket (61) by means of screwing on or unscrewing this jacket (61) via the inner screw thread (66) of the supporting element (64).

[0102] On the outer side, the cylindrical jacket (61) comprises a screw thread (66) via which it is coupled to the supporting element (64) which comprises a corre-

sponding screw thread (66) on the inner side. The supporting element (64) comprises a support plate which extends on the underside of said plate (60). This also comprises a cylindrical jacket and is also provided with a screw thread (62) on the outer side and is attached to the underside of the plate (60) by means of glue and/or screws.

[0103] By means of this outer screw thread (62), a sealing element (63) with a corresponding screw thread (62) on the inner side can be screwed onto the lifting element (4), which sealing element (63) is suitable to be used to hermetically seal the lifting element (4) on the underside of the second bowl (3).

[0104] Placement of the lifting element (4) is preferably carried out as follows. First, the supporting element (64) is attached to the underside of the plate (60). Subsequently, the element with the cylindrical jacket (61) is screwed into the supporting element (64) until the height of this element (61) approximately reaches the upper surface of the plate (60). Then, the sealing element (6) is placed in element (61) from above and the nut or safeguard (11) is then screwed onto the sealing element (6) on the underside. Finally, the sealing element (63) is screwed onto the lifting element (4) via the outer screw thread (62) of element (64) in order to hermetically seal the underside thereof.

Example 14:

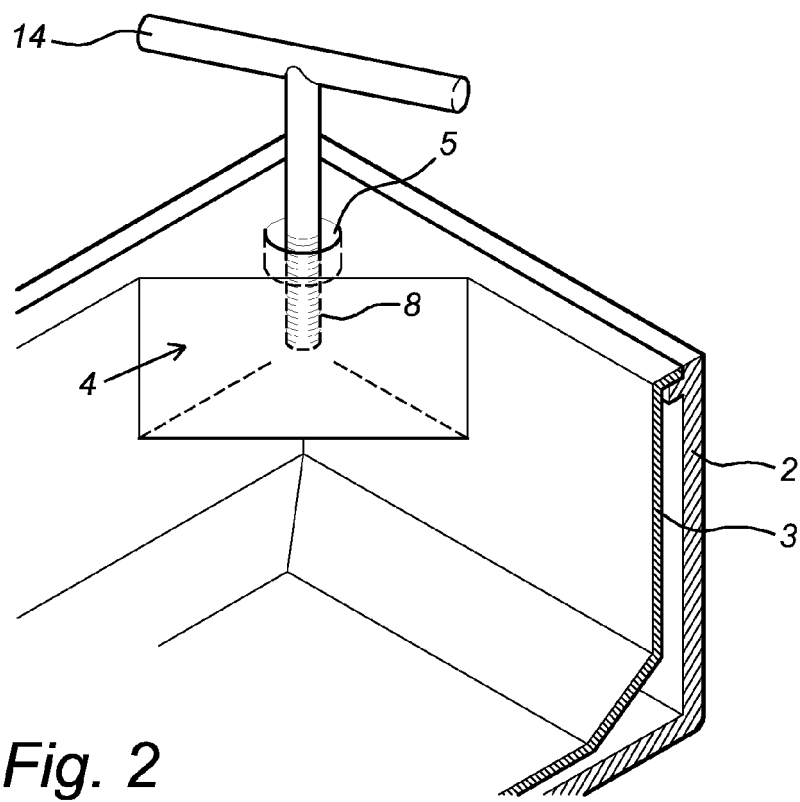
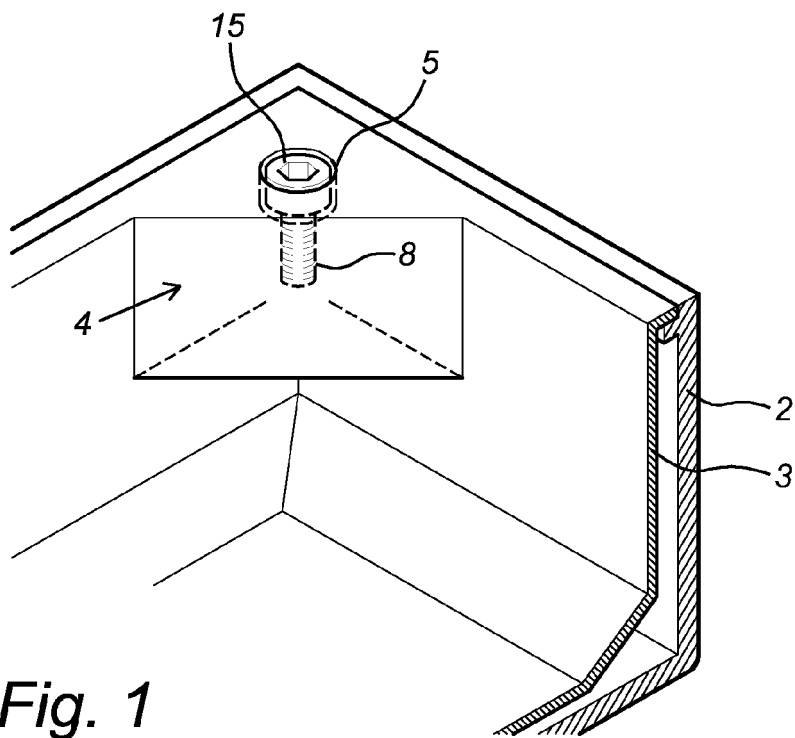
[0105] Figure 19 shows a perspective view of a sealing element (6). In terms of shape, it corresponds to a bolt without screw thread. It is suitable to be fitted in the bore (5) of the manhole cover from the prior art, as is illustrated in Figures 1 and 2. The sealing element (6) thus seals the bore (5) and the screw thread (8) of the manhole cover.

[0106] It is assumed that the present invention is not limited to the embodiments which have been described above and that some modifications or changes can be added to the described examples without reassessment of the attached claims.

Claims

1. Manhole cover (1) which comprises a first (2) and a second bowl (3), wherein the second bowl (3) is suitable to be inserted into the first bowl (2), wherein the second bowl (3) is provided with at least one or several lifting elements (4), which lifting elements (4) are provided with a bore (5), wherein the bore (5) is sealed by a sealing element (6), **characterized in that** the sealing element (6) is made of a magnetically sensitive material and **in that** the sealing element (6) is suitable to be linearly displaced and/or removed by means of a magnet.
2. Manhole cover (1) according to the preceding Claim

- 1, **characterized in that** the sealing elements (6) are beared in the bores (5) of the at least one or several lifting elements (4).
3. Manhole cover (1) according to one of the preceding Claims 1 or 2, **characterized in that** the at least one or several lifting elements (4) are provided with a bore (5) and a deepening (7).
4. Manhole cover (1) according to the preceding Claim 3, **characterized in that** the sealing elements (6) are beared in the deepening (7) of the at least one or several lifting elements (4).
5. Manhole cover (1) according to one of the preceding Claims 1-4, **characterized in that** the lifting elements (4) are free from a screw thread (8).
6. Manhole cover (1) according to one of the preceding Claims 1-5, **characterized in that** the at least one or several lifting elements (4) are provided with a lifting instrument (9) which is beared in the bore (5).
7. Manhole cover (1) according to the preceding Claim 6, **characterized in that** the lifting instrument (9) is the sealing element (6).
8. Manhole cover (1) according to one of the preceding Claims 6 or 7, **characterized in that** the lifting instrument (9) comprises an eye or bore (10) which is suitable for lifting the second bowl (3) out of the first bowl (2) by means of a snap hook, rod or rope.
9. Manhole cover (1) according to one of the preceding Claims 6-8, **characterized in that** the lifting instrument (9) is provided with a stop (11) at the foot in order to secure the lifting instrument (9).
10. Manhole cover (1) according to one of the preceding Claims 1-9, **characterized in that** said second bowl (3) comprises a plate (60).
11. Manhole cover (1) according to the preceding Claim 10, **characterized in that** the lifting element (4) comprises a bore (5) in said plate (60) and a sealing element (6) which is beared in said bore (5).
12. Manhole cover (1) according to one of the preceding Claims 1-11, **characterized in that** a lifting element (4) is suitable to be provided with a removable sealing element (63) which is suitable to seal the lifting element (4) on the underside of the second bowl (3).
13. Lifting element (4) for a manhole cover according to one of the preceding Claims 1-12, which is provided with a bore (5), wherein the bore (5) is sealed by a sealing element (6), **characterized in that** the sealing element (6) is made of a magnetically sensitive material and **in that** the sealing element (6) is suitable to be linearly displaced and/or removed by means of a magnet.
14. Sealing element (6) for a manhole cover according to one of the preceding Claims 1-12, **characterized in that** the sealing element (6) is made of a magnetically sensitive material and **in that** the sealing element (6) is suitable to be linearly displaced and/or removed from said bore (5) by means of a magnet.
15. Method for lifting a second bowl (3) out of a first bowl (2) of a manhole cover (1) according to one of the preceding Claims 1-12, comprising the following steps:
- linearly displacing and/or removing the sealing elements (6) of the manhole cover (1) by means of a magnet;
 - inserting one or several recess-bearers lifting instruments (9) in the lifting elements (4) and/or engaging one or several lifting instruments (9) on the lifting elements (4);
 - lifting the second bowl out of the first bowl by means of the one or several of said lifting instruments (9).



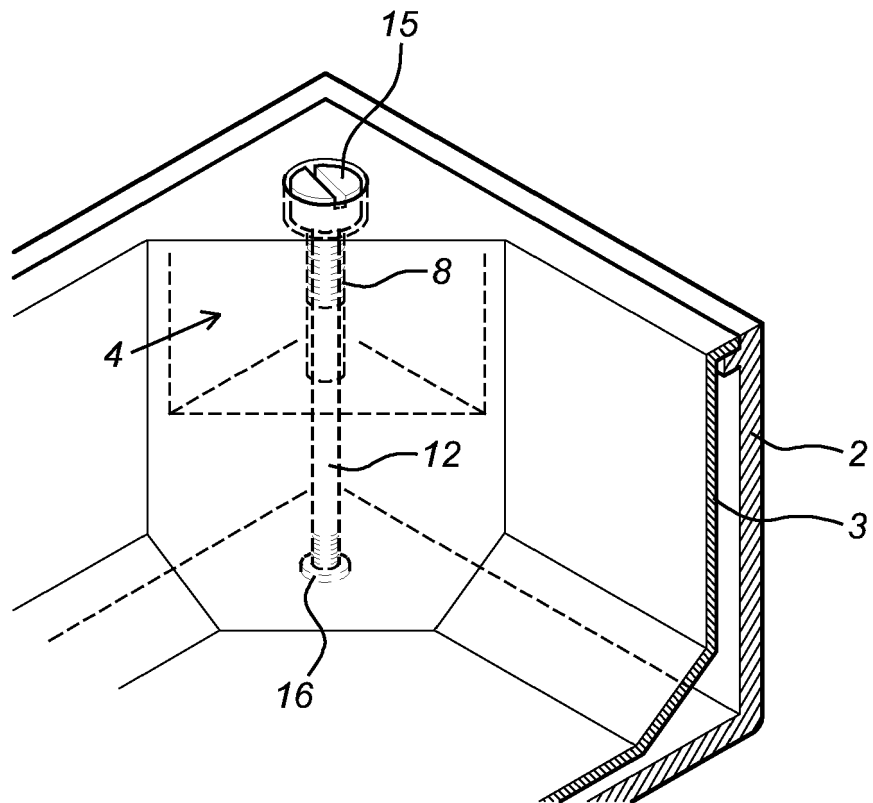


Fig. 3

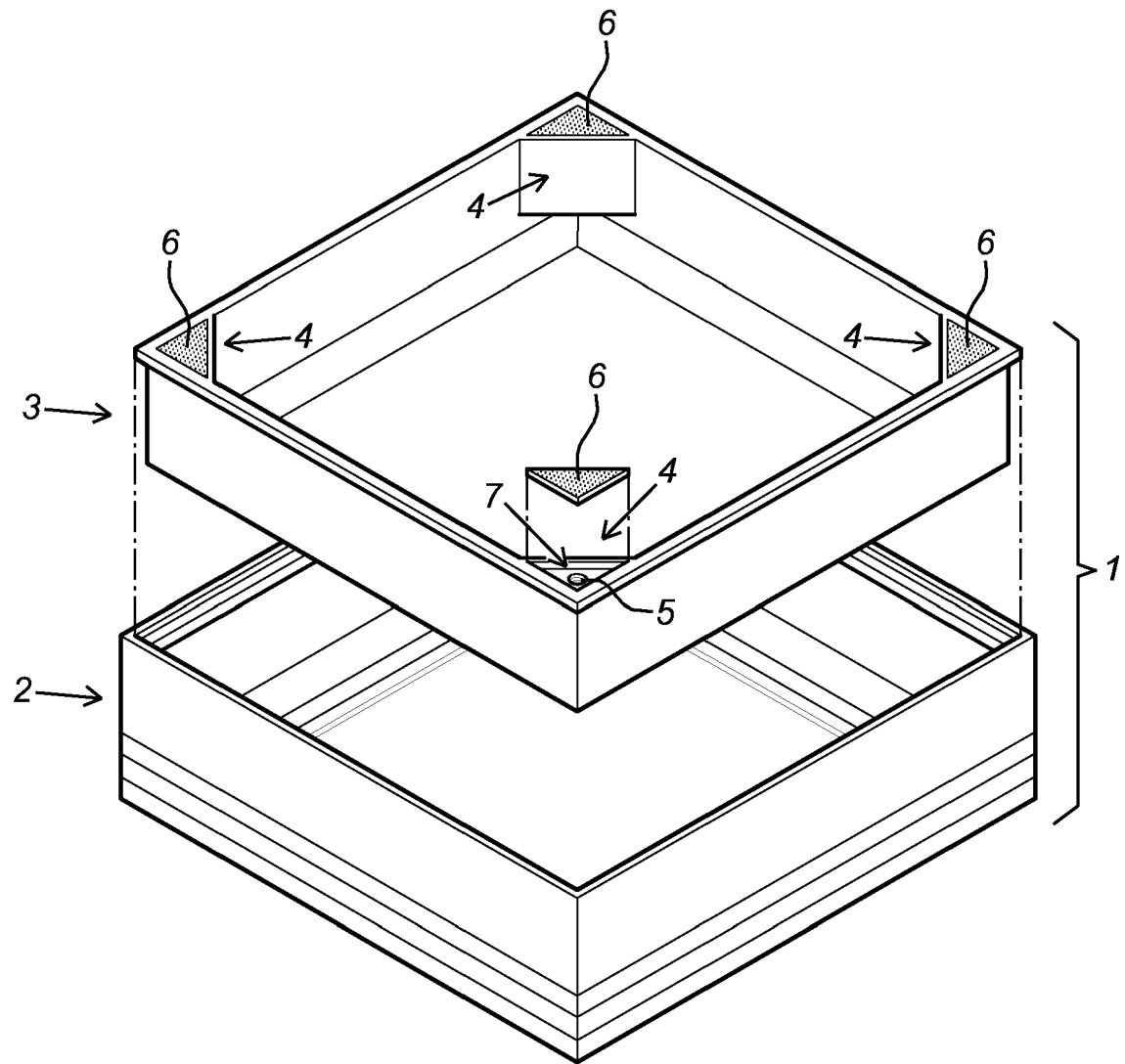


Fig. 4

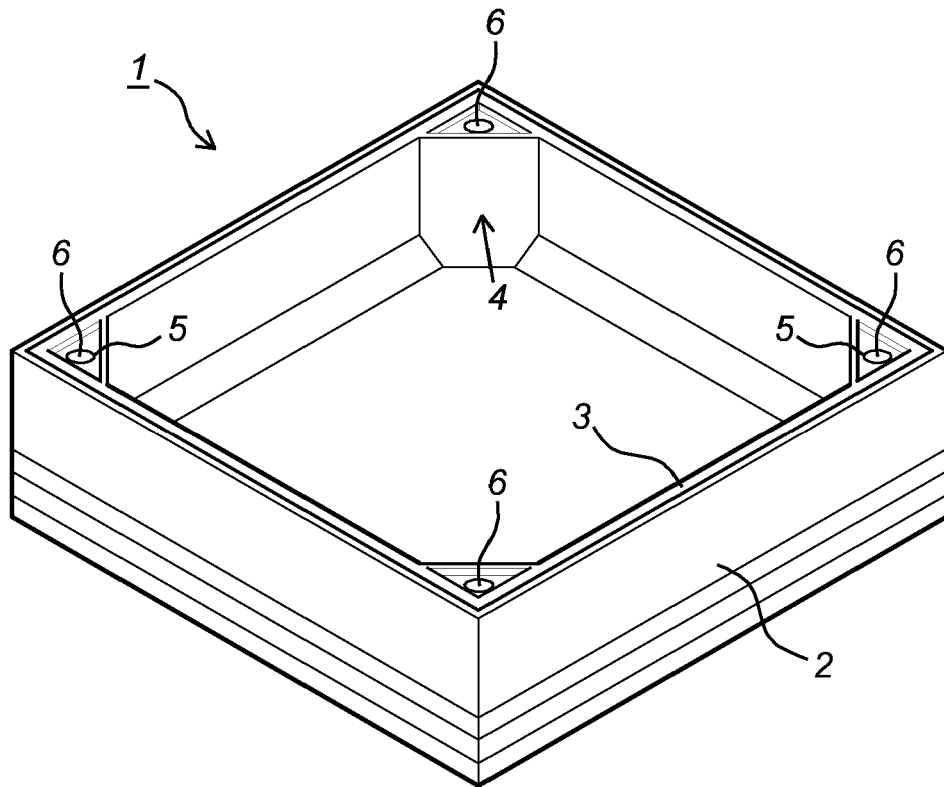


Fig. 5

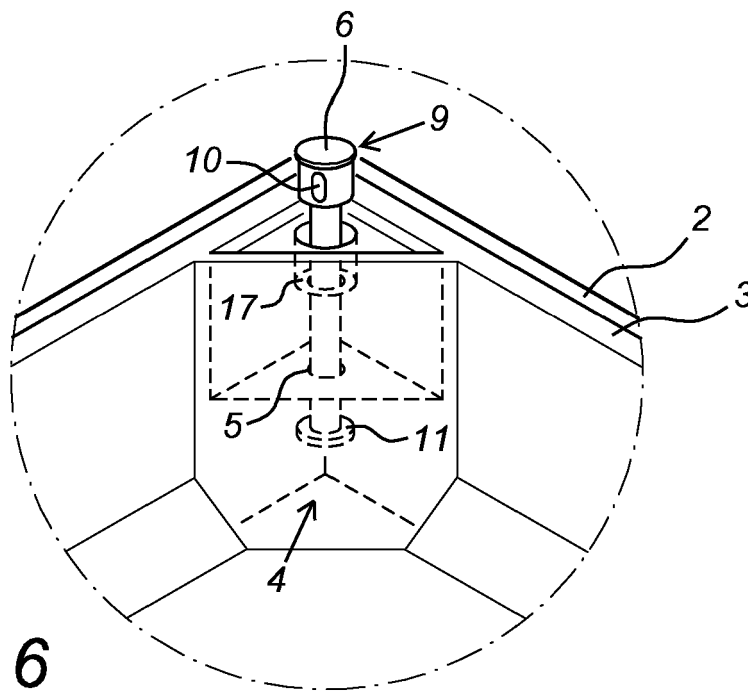


Fig. 6

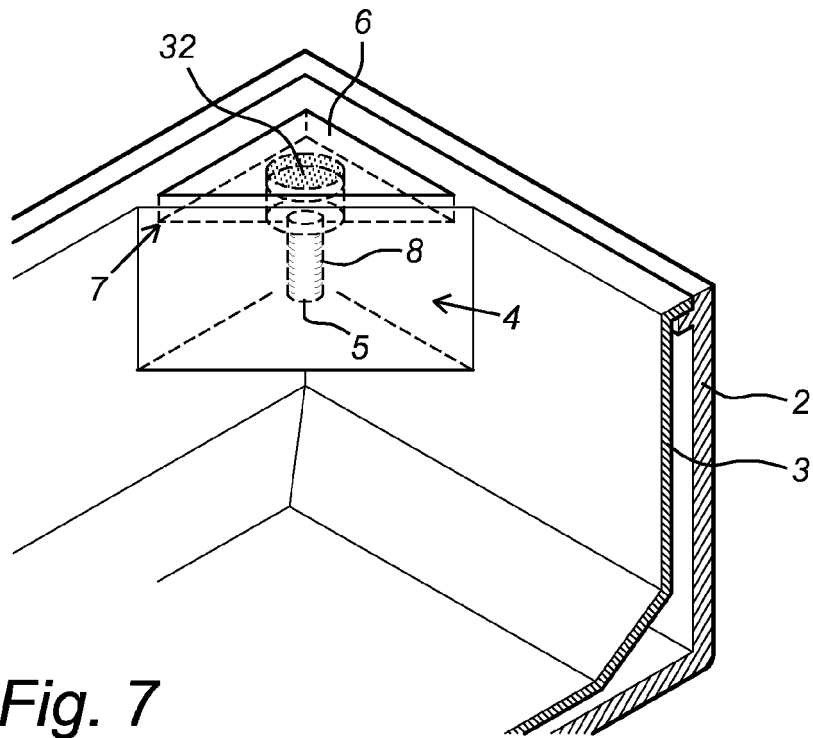


Fig. 7

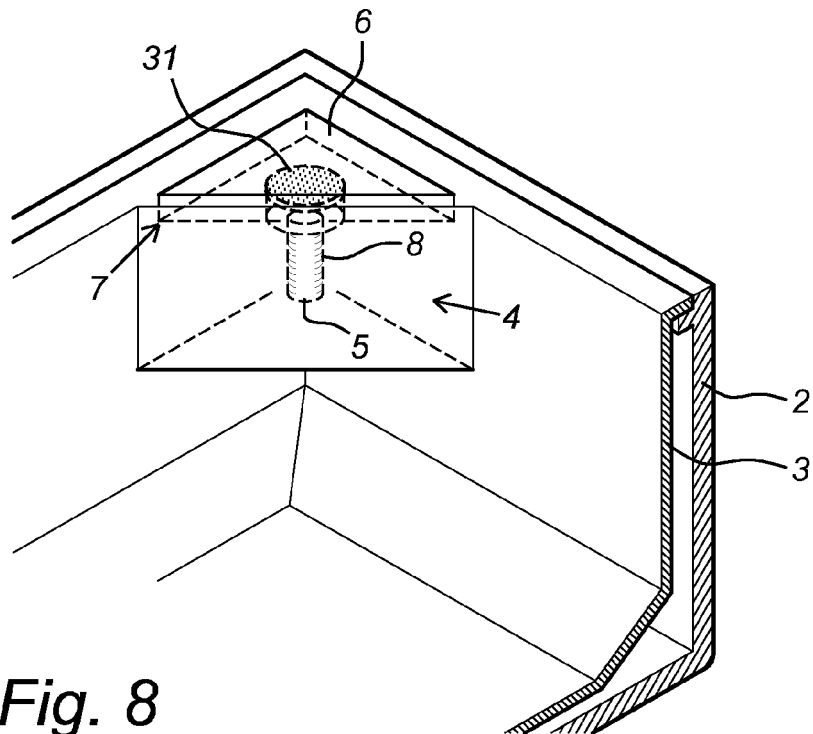


Fig. 8

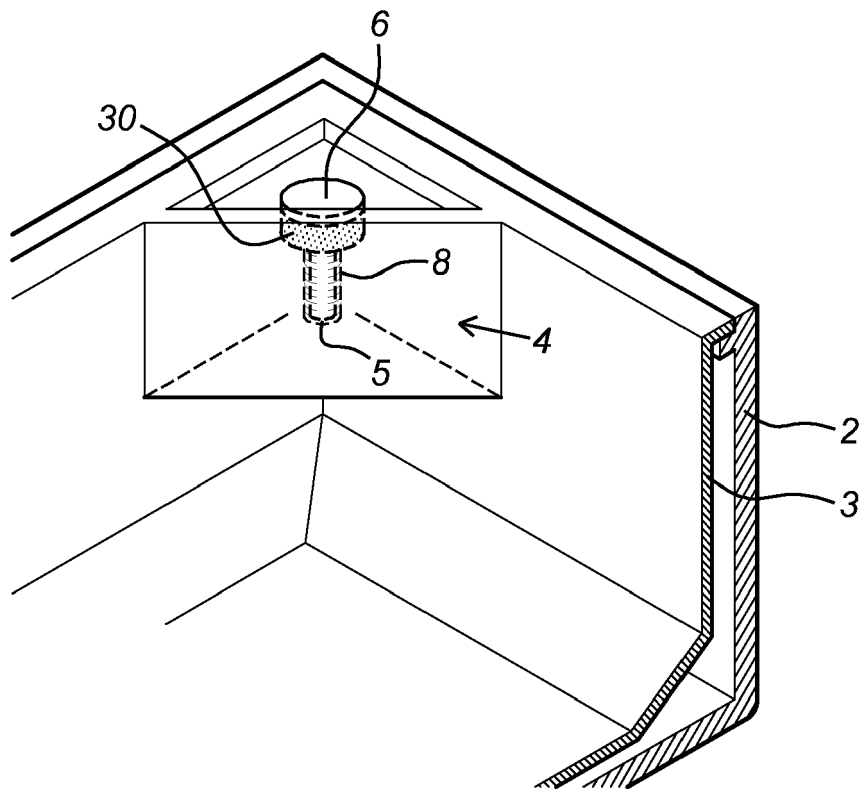
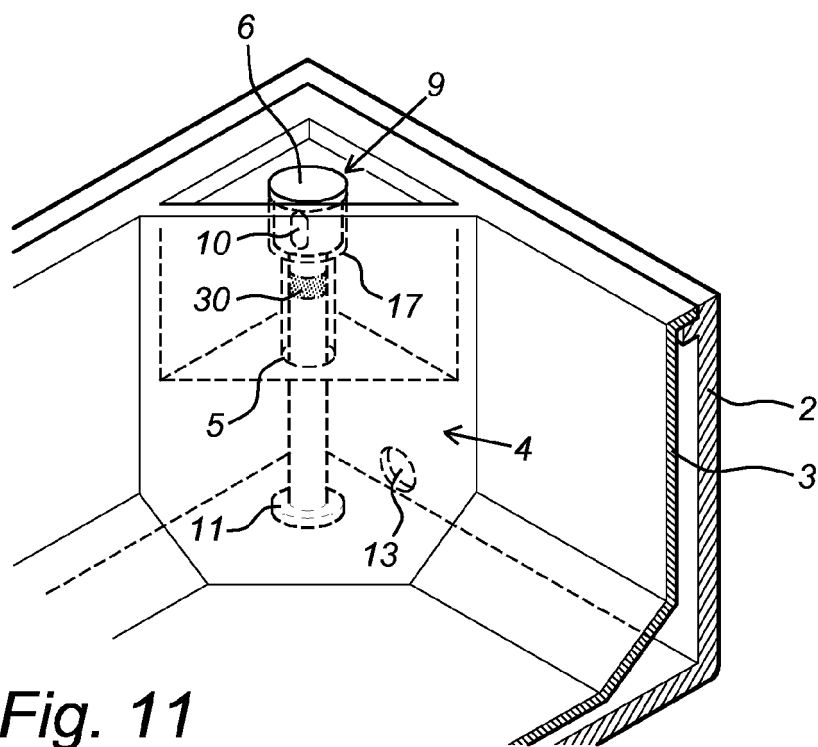
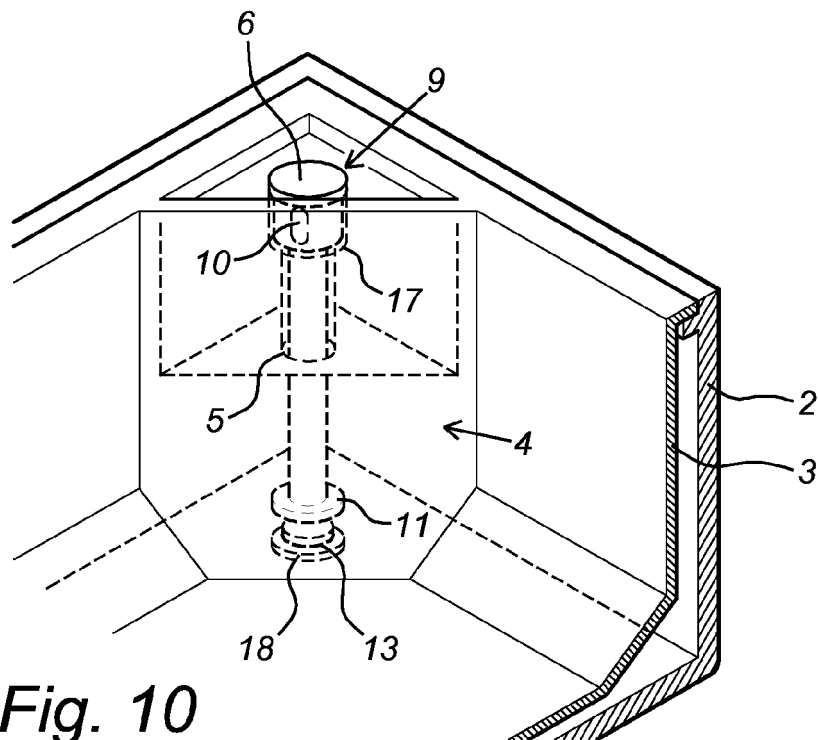


Fig. 9



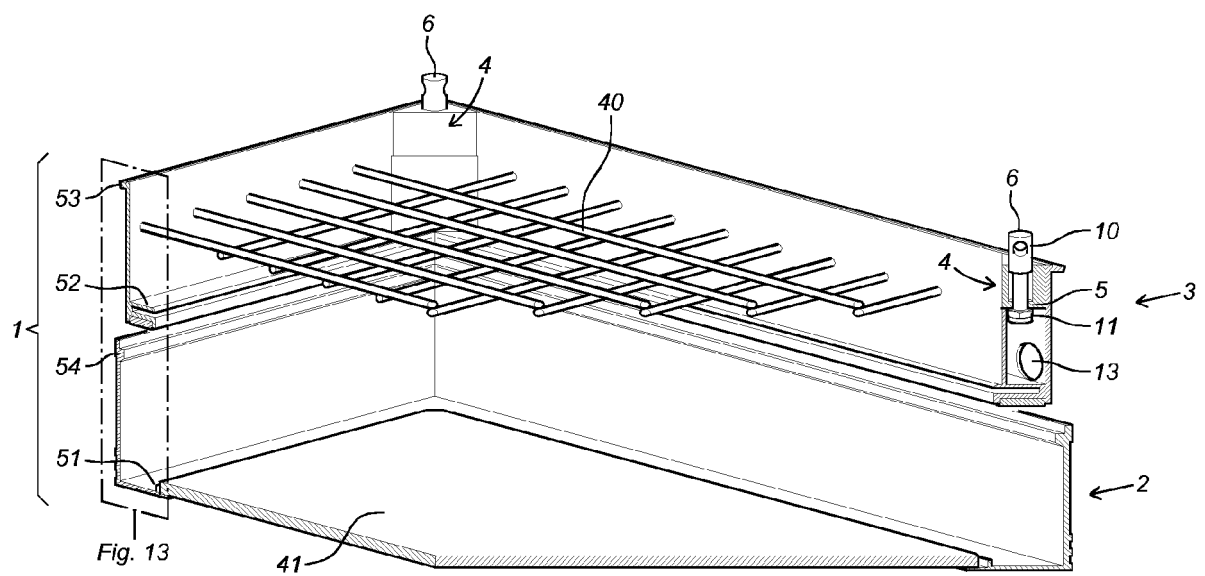


Fig. 12

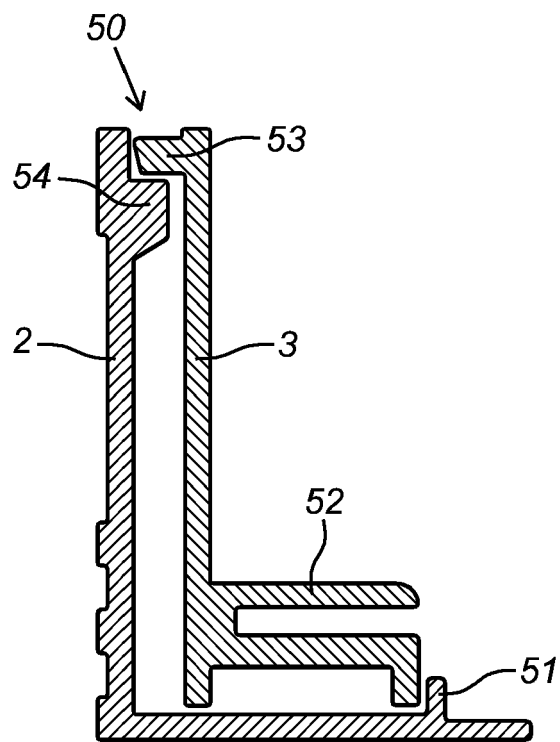


Fig. 13

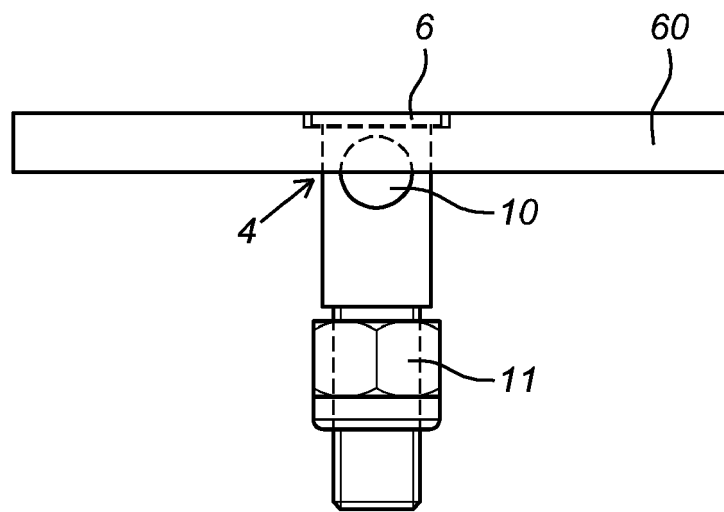


Fig. 14A

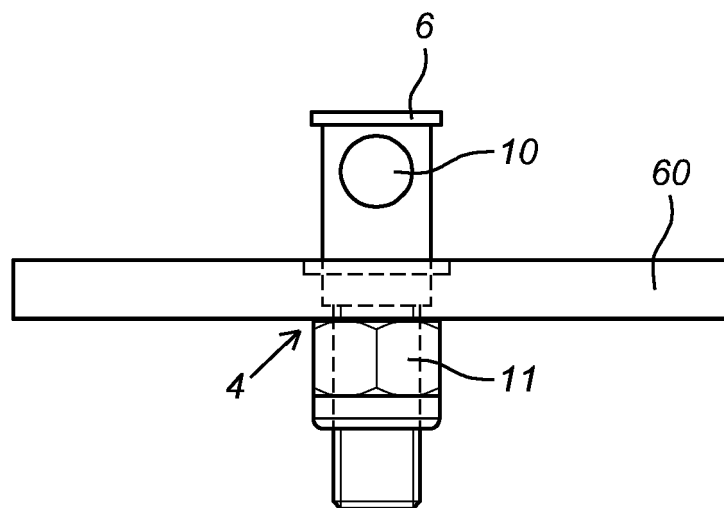


Fig. 14B

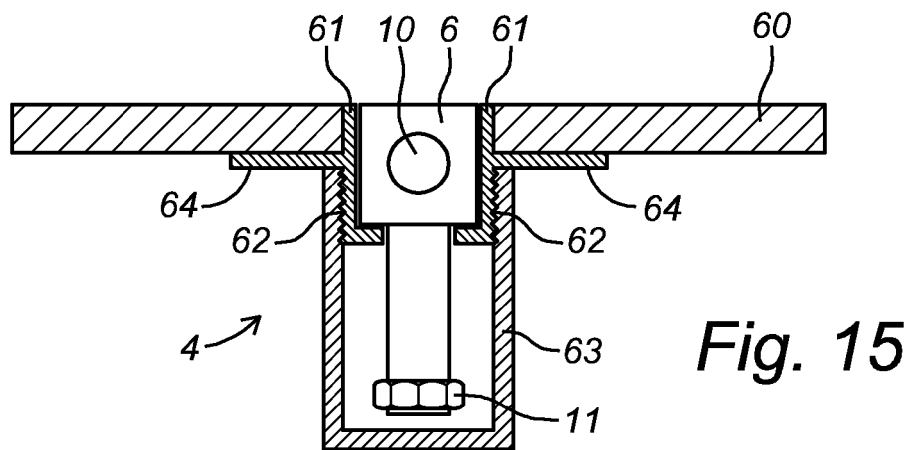


Fig. 15

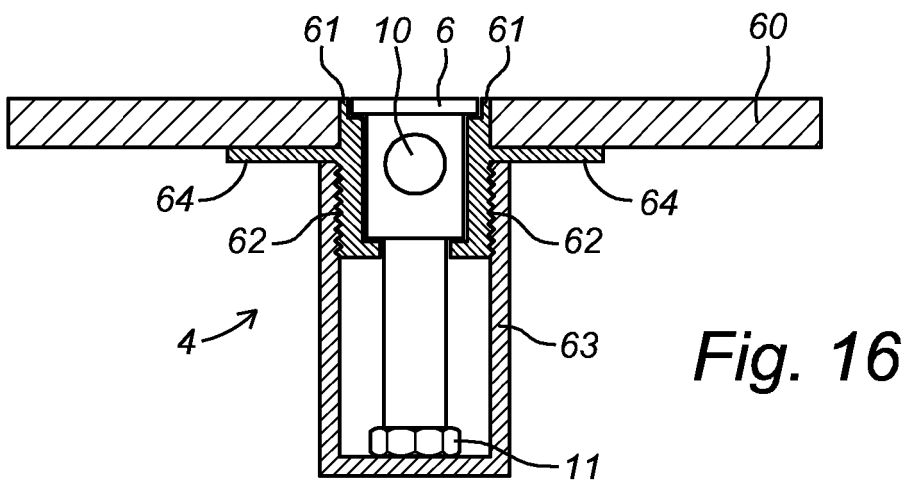


Fig. 16

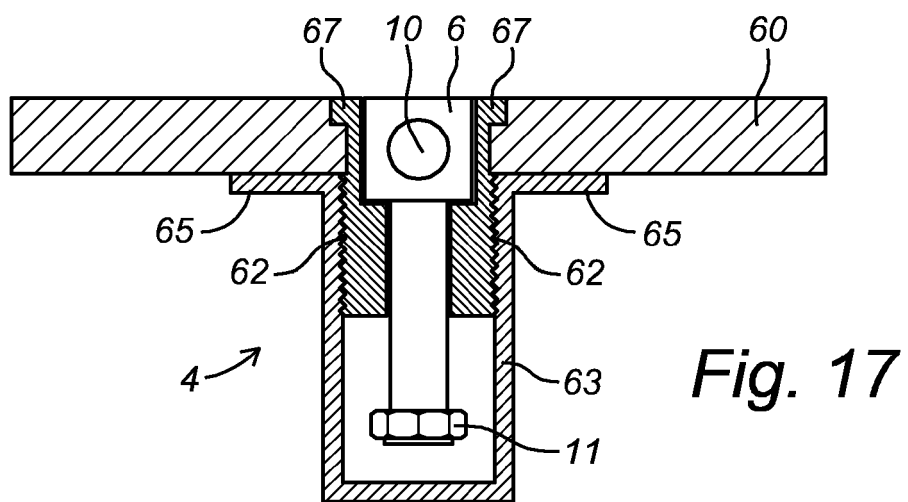
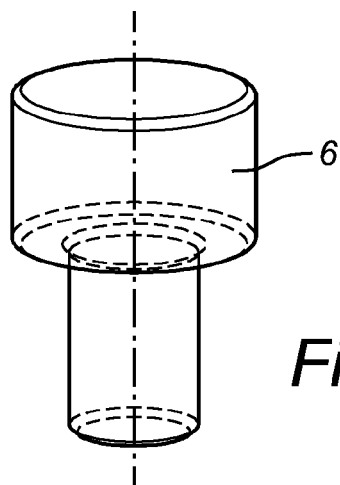
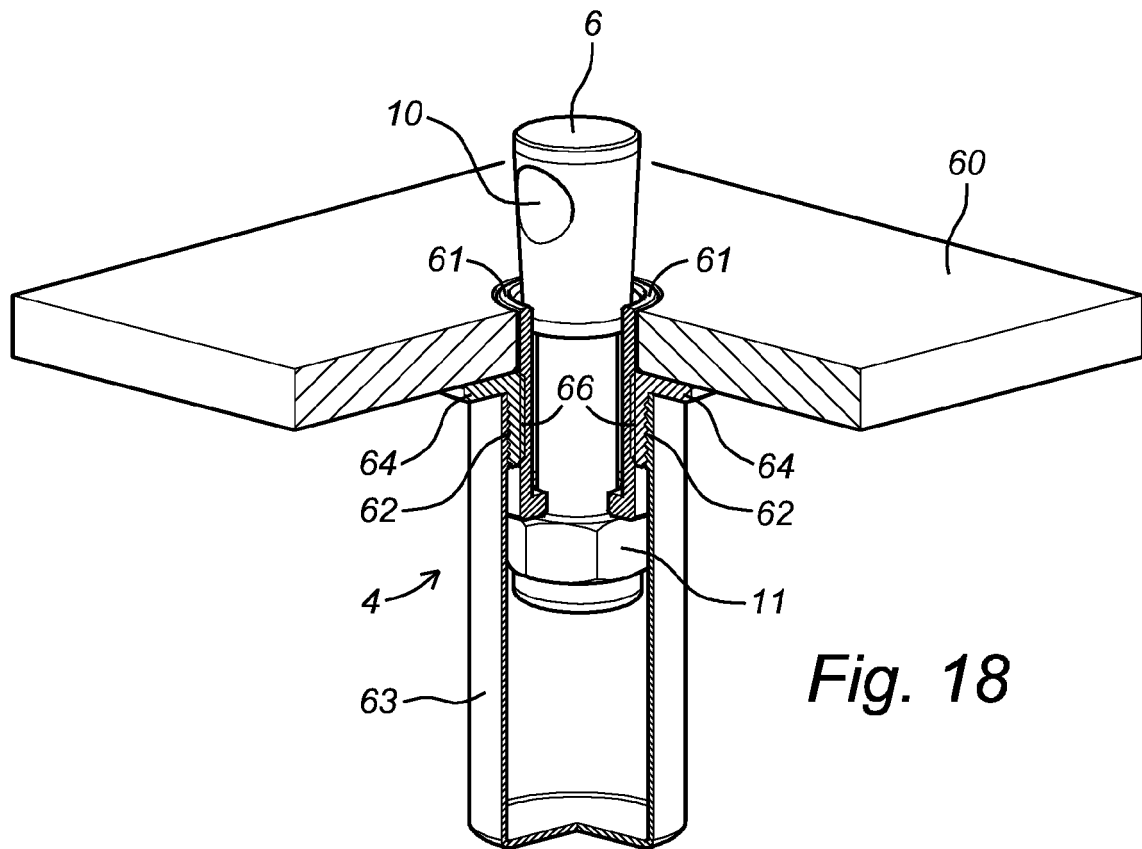


Fig. 17



REFERENCES CITED IN THE DESCRIPTION

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- EP 1705295 A2 [0065]