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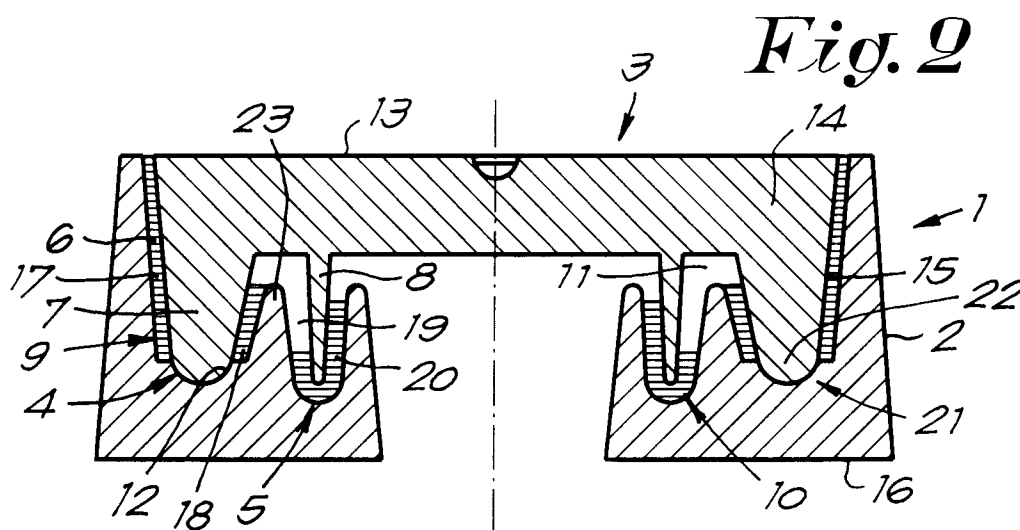
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B-2000 Antwerpen (BE)(54) **Manhole cover with seal.**

(57) Device for sealing pits, consisting of a horizontal frame (2) and cover means (3) fitting in this frame (2), characterized in that the frame (2) has two concentric ducts (4, 5) which can each contain an amount of liquid (6); in that the cover means (3) have two ribs (7, 8) on their bottom sides which extend into the concentric ducts (4, 5) as the cover means (3) are applied, whereby these ducts and ribs are

made such that two liquid seals (9, 10) are created with an inclusion of air (11) in between which can prevent liquid (6) from entering in the pit; in that the outer rib (7) rests in the outer duct (4); and in that the outer rib (7) serves as a support for at least the part of the cover means (3) which serves as bearing surface (13).

**EP 0 633 362 A1**

The present invention concerns a device for sealing pits, in particular a device which consists of a horizontal frame and cover means fitting in the frame, such as a lid.

It is known that devices for sealing pits can be provided with odour seals. These usually consist of grooves in the form of ducts which are provided in the above-mentioned frames and ribs on the bottom side of the lids which extend into the above-mentioned ducts, one and other such that when the ducts are filled with water, a barrier is formed for the odour rising from the pit.

For certain applications it is also desirable that the pit lids can seal in a watertight manner. This is among other the case in control rooms which are situated above the lid of a tank, such as a fuel oil tank. In order to provide for such a watertight seal, various solutions have already been suggested, including the use of elastic sealing rings.

The known devices for sealing pits, whereby an odour seal and/or a seal to prevent the penetration of liquid, such as rain water, is provided, are all disadvantageous in that they no longer meet the above-mentioned requirements after some time, especially when the pit lids used hereby are heavily loaded, for example by vehicles driving over them. Many of the usual defects hereby arise as the pit lids bend and the seatings, where the lids rest in the frames, are damaged. This phenomenon particularly occurs with synthetic lids.

Document GB 2 148 362 discloses a device for sealing pits, having a lid provided with two ribs on its bottom side fitting into concentric ducts of a supporting frame. The construction known herefrom, however, does not exclude the penetration of water.

Documents GB 2 093 509 and EP 0 390 767 disclose devices using sealing rings. These devices have the disadvantage that the sealing rings after some time become untight and penetration of water becomes possible.

Also, the present invention aims a device for sealing pits which does not have the above-mentioned disadvantages, in other words whereby an optimum sealing is provided on the one hand, in order to prevent that odour escapes and/or that liquid seeps in the pit, and whereby damages to the seal arising under an extremely heavy load are optimally excluded on the other hand, even when the frames and lids are made of synthetic material and when the load is more than 12 tons.

To this end, the invention concerns a device for sealing pits, consisting of a horizontal frame and cover means fitting in this frame, characterized in that the frame has two concentric ducts which can each contain an amount of liquid; in that the cover means have two ribs on their bottom sides which extend into the concentric ducts as the cover

means are applied, whereby the ducts and ribs are made such that two liquid seals are created with an inclusion of air in between which can prevent liquid from entering; in that the outer rib rests in the outer duct, preferably on the bottom thereof; and in that the outer rib serves as a support for at least the part of the cover means which serves as bearing surface.

The above-mentioned construction is advantageous in that the load which is exerted on the bearing surface of the cover means is optimally transferred to the frame, without certain ribs being bent in their seatings and breaking off.

The above-mentioned cover means may hereby consist of a single lid which has at least two ribs on its bottom side which work in conjunction with the above-mentioned concentric ducts, or they may consist of two separate lids placed on top of one another, of which the top lid has a rib on its bottom side which works in conjunction with the outer duct and of which the bottom lid has a rib on its bottom side which works in conjunction with the inner duct.

According to a variant of the invention, the device for sealing pits consists of a horizontal frame and cover means fitting in this frame, characterized in that the cover means consist of two lids placed on top of one another; in that the frame has two concentric ducts which can each contain an amount of liquid; and in that the top lid has a rib on its bottom side which extends into the outer duct and in that the bottom lid has a rib on its bottom side which extends into the inner duct, such that an inclusion of air can be created in between the lids which can prevent liquid from entering. By using two lids, the risk of damages is strongly reduced, as only the top lid has to carry the load and the ribs on the bottom lid and the accompanying seating of said lid are not loaded.

In order to better explain the characteristics of the invention, the following preferred embodiments are described without being limitative in any way, with reference to the accompanying drawings, where:

figure 1 shows a device according to the invention;

figure 2 shows a section according to line II-II in figure 1;

figure 3 shows a section of a variant of a device according to the invention.

As shown in figure 1, the invention concerns a device 1 for sealing pits, consisting of a horizontal frame 2 and cover means 3 fitting in this frame.

According to a first embodiment of the invention, the device 1 is characterized in that the frame 2 has two concentric ducts 4 and 5 which can each contain an amount of liquid 6; in that the cover means 3 have two ribs 7 and 8 on their bottom sides which extend into the concentric ducts 4 and

5 as the cover means 3 are applied, whereby these ducts and ribs are made such that two liquid seals 9 and 10 are created with an inclusion of air 11 in between, which can prevent liquid 6 from entering in the pit; in that the outer rib 7 rests on the bottom 12 of the outer duct 4; and in that the outer rib 7 serves as a support for at least the part of the cover means 3 which serves as bearing surface 13.

In the embodiment shown in figure 2 the cover means 3 consist of a single lid 14.

The outer rib 7 is preferably situated on the inner edge 15 of the lid 14, such that this lid 14 cannot topple, not even under a very heavy load, and does not come out of the frame 2, for example when heavy vehicles drive over it.

The base 16 of the frame 2 preferably extends under the outer rib 7, such that pressure forces are vertically transferred downward from the rib 7 to the construction provided under the frame 2, as a result of which the frame 2 is not under any strain of bending.

The lid 14, and more in particular the ribs 7 and 8, fit in the ducts 4 and 5 in such a way that free spaces 17, 18, 19 and 20 are created.

The device 1 is preferably also provided with positioning means to position the lid 14, or at least the rib 7 in the frame 2, such that the lid 14, as the pit is sealed, always fits in the same place in the frame 2, and the above-mentioned spaces 17, 18, 19 and 20 are respected. In the example shown, these positioning means consist of a seating 21 for the bottom edge 22 of the rib 7.

The second rib 8 hangs down entirely freely in the duct 5.

The lid 13 is entirely countersunk in the frame 2.

Preferably, the frame 2 and the cover means 3, in this case the lid 14, are made of synthetic material, which may be reinforced with glass fibres.

The device 1 according to the invention is advantageous in that water cannot seep in the underlying pit. When a liquid, for example rain water, enters the space 17, it will seep through into the space 18. After a certain time, the water from the space 18 will run over the wall 23 between the ducts 4 and 5 into the duct 5. Once a certain amount of water has run into it, an inclusion of air 11 is created. As of that moment, a counterpressure is created which finally results in a situation as represented in figure 2 whereby the water column in the space 20 is higher than in the space 19. The pressure which is thus created in the inclusion of air 11, prevents the liquid from flowing any further from the duct 4 into the duct 5, even when the space 17 is entirely filled with liquid. It is clear that the ducts 4 and 5 should hereby be suitably dimensioned, whereby the minimum dimensions can be either calculated or determined by experi-

ment.

As the lid 14 with the ribs 7 on the bottom rests in the duct 4, large forces are optimally transferred onto the frame 2, as a result of which damages to the ribs 7 and 8 are practically excluded and the above-mentioned working is guaranteed at all times.

Figure 3 shows a variant whereby the cover means 3 consist of two lids 24 and 25 situated on top of one another. The above-mentioned rib 7 is hereby part of the lid 24 and the above-mentioned rib 8 is part of the lid 25. The lid 25 rests on the inner edge 26 of the frame 2, and there is an air slot between the two lids.

As the lid 25 does not make contact with the lid 24, this is not subject to possible deformations of the lid 24, and the good working of the above-mentioned effect, which is brought about thanks to the presence of the inclusion of air 11, is always guaranteed.

The embodiment of figure 3 is also advantageous in that the space of the inclusion of air 11 is bigger than in the embodiment of figure 2 and in that a downward pressure force is exerted on the lid 25, as a result of which it is pressed onto the inner edge 26.

Another advantage of the embodiment of figure 3 consists in that the liquid 6, as an underpressure is created in the pit, is not sucked inside, as in this case the lid 25 is sucked onto the inner edge 26 and the suction of the liquid 6 is prevented.

As explained in the introduction, the invention also concerns a device 1 which is provided, as represented in figure 3, with two lids 24 and 25, whereby the top lid 24 has a rib 7 which fits in the duct 4, and the bottom lid 25 has a rib 8 which fits in the duct 6, regardless of whether the rib 7 serves as a support or not.

With the exception of the fact that the cover means 3 consist of two lids 24 and 25 instead of one single lid 14, all characteristics which are described by means of figure 2 are also valid for the embodiment of figure 3.

The present invention is by no means limited to the embodiments described by way of example and shown in the accompanying drawings; on the contrary, such a device for sealing pits can be made in various forms and dimensions while still remaining within the scope of the invention.

Claims

1. Device for sealing pits, consisting of a horizontal frame (2) and cover means (3) fitting in this frame (2), characterized in that the frame (2) has two concentric ducts (4, 5) which can each contain an amount of liquid (6); in that the cover means (3) have two ribs (7, 8) on their

bottom sides which extend into the concentric ducts (4, 5) as the cover means (3) are applied, whereby these ducts and ribs are made such that two liquid seals (9, 10) are created with an inclusion of air (11) in between which can prevent liquid (6) from entering in the pit; in that the outer rib (7) rests in the outer duct (4); and in that the outer rib (7) serves as a support for at least the part of the cover means (3) which serves as bearing surface (13).

2. Device according to claim 1, characterized in that the outer rib (7) rests on the bottom of the outer duct (4).

3. Device according to claim 1 or 2, characterized in that the outer rib (7) is situated on the outer edge (15) of the cover means (3).

4. Device according to claim 1, 2 or 3, characterized in that there are free spaces (17, 18, 19, 20) around the ribs (7, 8) in the ducts (4, 5).

5. Device according to any of the above claims, characterized in that it is provided with positioning means, which provide at least for the positioning of the outer rib (7) in the outer duct (8), and which consist of a seating (21) for the bottom edge of the above-mentioned outer rib (7).

6. Device according to any of the above claims, characterized in that the base (16) of the frame (2) extends under the outer rib (7) of the cover means (3).

7. Device according to any of the above claims, characterized in that the cover means (3) consist of one single lid (14), onto whose bottom side both above-mentioned ribs (7, 8) are provided.

8. Device according to any of claims 1 to 6, characterized in that the cover means (3) consist of two lids (24, 25) situated on top of one another, whereby the outer rib (7) is situated on the top lid (24) and the inner rib (8) is situated on the bottom lid (25).

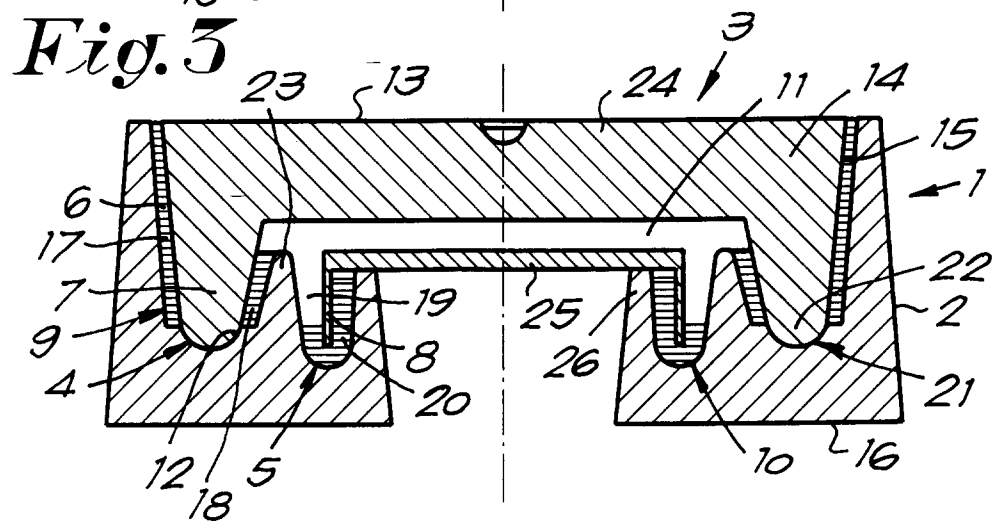
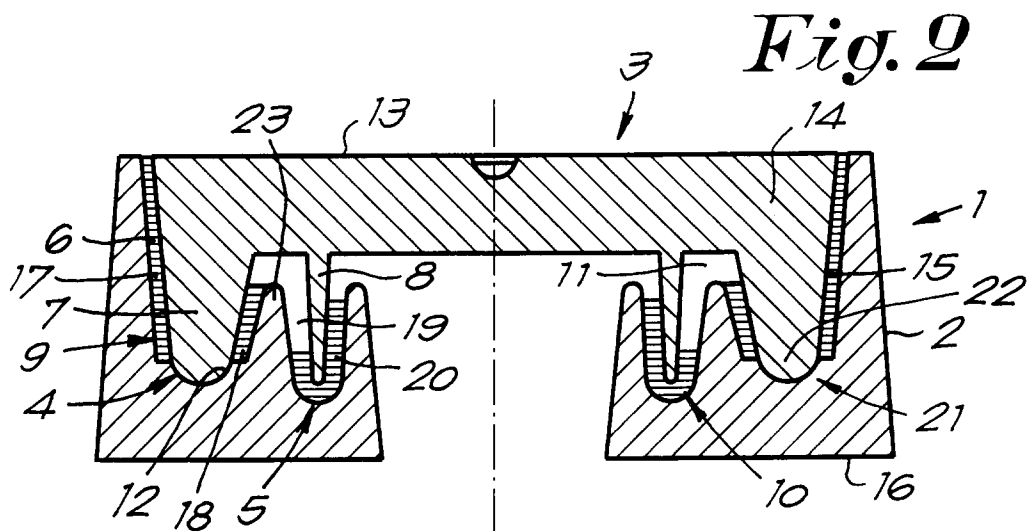
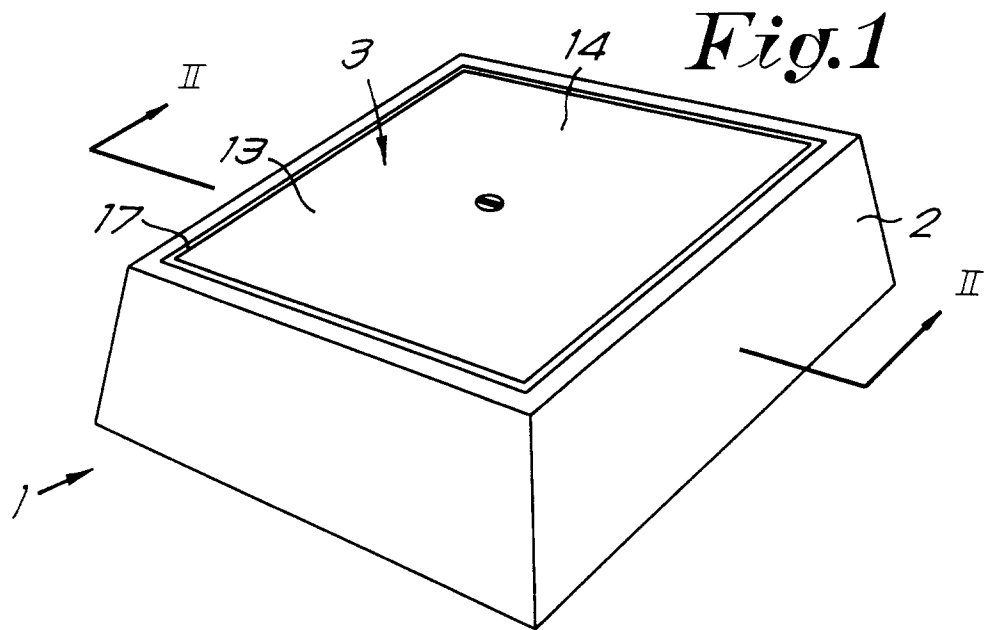
9. Device for sealing pits, consisting of a horizontal frame (2) and cover means (3) fitting in this frame (2), characterized in that the cover means (3) consist of two lids (24, 25) placed on top of one another; in that the frame (2) has two concentric ducts (4, 5) which can each contain an amount of liquid (6); and in that the top lid (24) has a rib (7) on its bottom side which extends into the outer duct (4), and in

that the bottom lid (25) has a rib (8) on its bottom side which extends into the inner duct (5), such that an inclusion of air (11) can be created in between the lids (24, 25) which prevents liquid (6) from entering in the pit.

10. Device according to claim 8 or 9, characterized in that the bottom lid (25) rests on the inner edge (26) of the frame (2), and in that there is a continuous air slot between both lids (24, 25).

11. Device according to any of the above claims, characterized in that both the frame (2) and the cover means (3) are made of synthetic material.

12. Device according to claim 11, characterized in that the synthetic material is reinforced with glass fibres.





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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1666

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 Y	GB-A-2 093 509 (FRANCIS SIDNEY CLARK) * page 1, line 106 - page 2, line 112; figures 1-5 * ---	1-4,6,7 5,8-11	E02D29/14
Y	GB-A-2 148 362 (FRANCIS STANLEY CLARK) * page 1, line 75 - page 2, line 59; figures 1-4 * ---	5	
Y	EP-A-0 390 767 (DEBERGH) * column 6, line 47 - column 7, line 23; figures 2,5 * ---	8-11	
A	PATENT ABSTRACTS OF JAPAN vol. 9, no. 57 (M-363) 13 March 1985 & JP-A-59 192 135 (DAIKIYOU KK) 31 October 1984 * abstract * -----	12	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E02D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 October 1994	Examiner Tellefsen, J
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	