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(54) Device for maintaining manhole closures coplanar with the road surface

(57) A device is disclosed for maintaining manholes or trapdoors closure coplanar with the road surface, the manholes or trapdoors including one or more inner vertical walls (2,211), which form the body of the manhole or trapdoor (1), a cover (3), and a seat (41,51,411) having angular section, for receiving and supporting the cover (3). The device comprises an adapter element that inserts into, and matches with, the seat (41,51,411) for elevation and containment of said cover. The cover is firstly mounted temporarily at a zero elevation position, for laying a first layer of a binder. Then, the cover is mounted at a definitive elevation position, by inserting or changing the adapter element, when the first asphalt layer is applied. The adapter element is added or changed also when the asphalt layer is re-applied for road reparation.

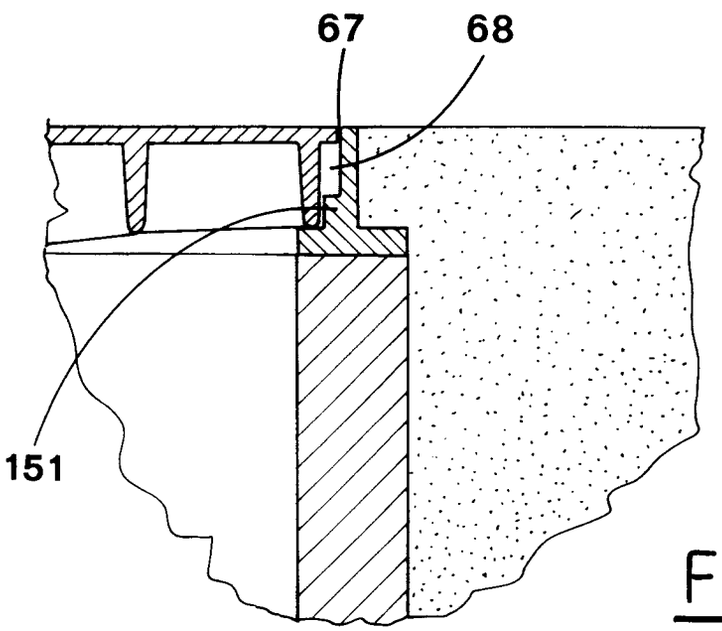

FIG. 6a

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Description

[0001] The present invention relates to devices for maintaining the closure of manholes coplanar with the road surface, with particular reference to inspection traps (sewer systems, gas pipelines, water systems, electrical mains), to gratings for road drains, to covers of underground filling reservoir trapdoors, etc.

[0002] It is known that below the surface of the ground, which is aimed at being road stretches, laybyes, etc., there are ducts adapted to carry and deliver water, gas, electricity, communications, etc..

[0003] There are special manholes situated at the branch points of the main duct, opening on the ground surface, to allow periodical inspections therethrough.

[0004] It is also known that below the ground surfaces aimed at the construction of service and filling stations there are different reservoirs adapted to contain the various types of fuel, which - as known - are provided with trapdoors opening on the ground surface.

[0005] According to known and consolidated techniques, a binder layer - that is to say, a base material with binding effect - is applied on the ground, and it is thus covered with a first asphalt layer so as to leave manholes and trapdoors accessible from outside.

[0006] The disadvantage of the above mentioned asphalt-covering procedure results from the fact that the first binder layer, suitably compressed, cannot exceed the height of the manhole or trapdoor aperture, and moreover, the level difference between the created asphalt surface and the closing element of said manholes must be minimized.

[0007] Basically, the manhole aperture must be coplanar with the level of the asphalt layer created, so as to avoid possible obstacles and hindrances, and it must be closed by a suitable removable element, whose shape is complementary to the upper aperture of the same manhole, and coplanar with the surrounding asphalt surface.

[0008] In case of the initial execution of the asphalt laying, manholes or trapdoors are situated with their opening at a level suitably higher than the ground level.

[0009] After the binder layer has been applied, it must be compressed with particular attention and with all difficulties arising from the need of operating between and around the projecting edges of the manhole or trapdoor.

[0010] This makes operations with operating machines extremely difficult, often impossible, and requires considerable manual interventions or using lower-efficiency small tools.

[0011] In case of a possible reparation of the road surface on which a new asphalt layer is applied, the same problems arise since the new layer increases the level difference between the already installed manhole closing element and the new road surface.

[0012] Generally, according to the currently used methods, the manhole or trapdoor is removed, and it is settled to a higher level, or at the elevation of the manhole or trapdoor opening, through intervention carried out when already installed.

[0013] In some cases, the manhole must be closed tightly.

[0014] These cases can be, for example, the installations of data transmission or electric systems, or of the inspection trapdoors of reservoirs for fuel supply systems, where water infiltrations are particularly harmful since infiltrated water mixes with the hydrocarbons present therein, and then must be disposed of as special waste, which is a particularly onerous operation.

[0015] Typically, a sealing 0-ring is applied, made of a synthetic material and commonly called OR, around the trapdoor edge.

[0016] The disadvantage of this method lies in the fact that the weight of the trapdoor rests on the O-ring, thus compressing it against the underlying base of the manhole.

[0017] Therefore, after having opened and closed the manhole a few times, the O-ring is damaged and cannot carry out its function in an acceptable way anymore.

[0018] The object of the present invention is to propose a device which allows to maintain the closure of a manhole always coplanar with the road surface, or generally with the surrounding ground.

[0019] Another object of the present invention is to propose a closing device which meets different possible needs in a simple and versatile way.

[0020] A further object of the present invention is to propose a closing device which is simple and quick to apply without the necessity to remove or adjust the already existing manhole or trapdoor.

[0021] A still further object of the present invention is to propose a closing device, which allows, when the asphalt is applied for the first time, to use, on the binder layer as well as on the final asphalt layer, those working means generally used on flat extended surfaces without obstacles.

[0022] A yet another object of the present invention is to propose a particular configuration of the device, which allows to introduce a sealing ring, which is not subjected to any compressing action between the trapdoor and the manhole base, so as to open and close the trapdoor without any limit.

[0023] The above mentioned objects are obtained in accordance with the content of the claims.

[0024] The characteristic features of the present invention will be pointed out in the following description of some preferred, but not only embodiments, with reference to the enclosed tables of drawings, in which:

- Figure 1 is a schematic and vertical section view of an already installed closed manhole, with a cover 3 contained in a containment frame 4 having an overturned T section;

- Figure 2 is a schematic and a partial vertical section view of a closed manhole, which is to be installed,

in an initial temporary position elevated position, while

- Figure 3 is a schematic view of the same section of the above manhole equipped with the proposed device and in the definite elevated position, after the asphalt layer has been applied;

- Figures 4 and 5 are schematic and fragmentary vertical section views of other two embodiments of the proposed device for already mounted manholes, showing two different rise positions defined by the thickness of the reparation asphalt layer;

- Figures 6a and 6b are schematic and fragmentary vertical section views of another embodiment of the proposed device with respectively, a no elevation position (binder applying) and with an elevation element mounted (firstly applied asphalt);

- Figure 7 is a schematic, vertical section view of an already mounted closed manhole, with the trapdoor 31 contained inside a bearing seat 411 made of concrete;

- Figure 8 is a schematic, vertical section view of another embodiment of the proposed device for already mounted manholes with the related trapdoor contained in a bearing seat 411 made of concrete;

- Figure 9 is a schematic and fragmentary vertical view of a mounted manhole, with a trapdoor and with a sealing ring put therebetween.

[0025] With reference to figure 1, reference numeral 1 indicates an already installed manhole, reference numeral 2 refers to the relative inner vertical walls, reference numeral 4 refers to a containment frame of a manhole of a cover 3 of the same manhole, coplanar with level 11 of the road surface.

[0026] In the following description reference will always be made to more walls in plural.

[0027] However, it is understood that in case of circular horizontal section manholes or trapdoors, reference may be made to a single circular wall.

[0028] According to the first embodiment, a containment frame 4 having an overturned T-section, for example made of metal.

[0029] The inner vertical walls 2 are provided with two upper ends 21 situated at a lower level with respect to the road surface level 11, and with such conformation as to support the frame 4.

[0030] The frame 4 supporting cover 3, whose dimensions allow it to perfectly rest on the upper ends 21 of the inner vertical walls 2 of manhole 1 of whatever shape - round, square or rectangular, has, as it has been already said, an overturned-T section, thus defining, on the inner side, an angular-section support seat 41 for cover 3, so as to make it coplanar with road surface level 11.

[0031] The outer side of the containment frame 4 forms an anchoring and positioning seating 43 where the road surface is introduced.

[0032] The vertical extension of the overturned-T section is designed to the side containment of the cover 3, and its dimension is such as to match road surface level 11.

[0033] The device for maintaining the closure of manholes coplanar with the road surface substantially includes - with reference to figures 2 and 3, where a manhole 1 to be installed is considered - of an adapter element 5, which is to be inserted into the above frame 4.

[0034] The adapter element 5, together with the frame 4, define a housing 51 aimed at receiving a cover 3 and having suitably reduced size, in a first temporary position at zero elevation, and more precisely a seating 53 adapted for the side containment of the cover 3.

[0035] Zero elevation means that the level difference between the cover 3 and the surrounding area after the binder layer has been applied, is zero.

[0036] Thus, the cover 3 is coplanar with the first level 13 of the binder application, which is the base for the next asphalt laying.

[0037] Figure 3 shows the cover 3 in its final position of variable elevation, which is perfectly coplanar with the level 14 of the firstly applied asphalt layer, which defines the road surface, where the adapter element 5 is replaced by an elevation and containment element 6.

[0038] The vertical section of the elevation and containment element 6 is such as to perfectly rest - with its lower region - onto the seat 41, which is created on the inner side of the overturned T section of the above frame 4.

[0039] The inner side of the frame 4 is so shaped, as to define an elevation 61, a support housing 63 and a side containment seating 64 for the cover 3 as to make it coplanar with the level 14 of the firstly applied asphalt layer.

[0040] Finally, the outer side of the frame 4 is so shaped as to adhere to frame 4 along its entire extension, thus defining such an elevation 65 for the frame 4 as to match the level 14 of the firstly applied asphalt layer characterizing the variable elevation of the manhole 1.

[0041] In practice, the height of the outside elevation 65 is equal to the height of the inside elevation 61, and it can take different values depending on unified measures according to the usual thickness of the asphalt layer.

[0042] The proposed device is easy and quick to use.

[0043] If ground surfaces with manholes for inspection traps or drains, covers of filling reservoir trapdoors are to be asphalted, it is sufficient for an operator to lay the frame 4 on the inner vertical walls 2, to insert the adapter element 5, so as to create a seating suitable for the subsequent introduction of the cover 3, which thus

will be in the first temporary position of zero elevation.

[0044] Then, it is possible to apply the first binder layer, whose thickness is equal to the distance of the previously applied trapdoor from the ground, compressing the first binder layer by working machines without necessarily avoiding the opening of the manhole 1, which has been already covered with the cover 3.

[0045] Afterwards, the cover 3 is lifted, the adapter element 5 is removed and replaced with the elevation and containment element 6, and the cover 3 is inserted again, so as to obtain the final position of variable elevation. It is now possible to lay the firstly applied asphalt layer.

[0046] Also in this case it is possible to intervene with operating machines without necessarily avoiding the opening of the manhole 1, which has been already covered with the cover 3.

[0047] Thus, it is possible, by these simple and few actions, to install a manhole 1 and guarantee that its closure is coplanar with the level 14 of the first asphalt layer, and moreover the asphalt laying operation is easier, quick and effective.

[0048] If subsequent asphalt layers are to be applied, it will be sufficient to replace each time the elevation and containment element 6 with a new element, of a suitably modified height taking into account the bigger height of the overall road surface.

[0049] Figures 4 and 5 show further embodiments of the invention characterising the device for maintaining the closure of manholes coplanar with the road surface, related to the problem of the elevation of already installed manholes in case of repairing of an already existing road surface.

[0050] Figures 4 and 5 show the same embodiment principle applied respectively to two cases of variable height elevation of the cover 3, so as to make the level of the same coplanar with two new levels of the road surface, respectively 16 and 17.

[0051] If a first road surface level 15 is to be repaired and brought to a new level 16, and the overall elevation is e.g. smaller than the height of frame 4, it is necessary to prepare previously the device for maintaining the closure of the already installed manhole 1 coplanar with the new road surface.

[0052] With reference to figure 4, the elevation of the cover 3 is obtained by placing an elevation element 7 of a suitable thickness and made of cast iron or other material, into the frame 4.

[0053] The shape of the elevation element 7 allows it to match perfectly the frame 4, independently from the fact that it is round, square or rectangular, and to be perfectly contained by the relative seat 41.

[0054] The elevation element 7, whose thickness is equal to the new asphalt layer thickness, is inserted directly into the frame 4, in the special seat 41, and it can be formed by a single piece or by two or more separate pieces, connected through couplers of the known type.

[0055] Figures 6a and 6b show an embodiment, which is extremely interesting for its structural as well as installing features.

[0056] In this case, the trapdoor is as shown in the figure, i.e. with one edge projecting along its entire outside perimeter. This allows to maintain the trapdoor centred and motionless in its best position, when it is situated inside the seat 41, defined by the frame inner side, indicated in this case with reference numeral 44.

[0057] According to this embodiment, the adapter element 5 is not necessary and the area 68 occupied thereby according to the previous embodiment now remains empty and covered by the projecting edge 67.

[0058] As in the previous embodiment, after laying the first binder layer and carrying out the necessary operations, the trapdoor elevation element 165 is inserted, and the laying of the road surface is completed.

[0059] The elevation element 165 includes three adjacent parts or parts A, B, C having a width that increases progressively upwards in the horizontal plane. The upper part C of the elevation element 165 defines the trapdoor housing.

[0060] The profile of the lower part A is such as to perfectly match, at its lower region, with the seating 151 formed by the inner side of the frame 44, which can feature a step 166.

[0061] The lower part A features different heights in relation to the necessary elevation, so as to align perfectly the trapdoor with the plane defined by the asphalt, either new or repaired.

[0062] Finally, the central part B of the elevation element 165 is aimed at connecting the lower part A with the upper part C.

[0063] Once situated into the seating that now is formed by the elevation element 65, the trapdoor is coplanar with the level of the first asphalt layer, and in case of subsequent asphalting of the road, or generally, of the surface where the trapdoor is placed, it is necessary to replace the elevation element 65 with another one equipped with the lower part A having suitable height. This configuration is evident in figure 6a.

[0064] In practice, a series of elevation elements 165 is given, whose height increases each time by about three centimetres, that is to say, by the thickness equal to the new asphalt layer thickness.

[0065] According to an interesting feature of the invention, shown in figure 9, the heights of the portions B and C of the elevation element 165 are such as to leave an empty area 60 underneath the projecting edge 70 of the cover 66, which rests on the lower edge 69 on the lower part A.

[0066] The empty area 60 can be delimited in its lower part by the top of the central part B, or by the lower part A in those cases in which there is no central part B.

[0067] An O-ring 62 can be placed into the empty area 60. The size of the empty area 60 is such as to touch the o-ring 62 with a light pressure in different points. This allows to seal without subjecting the ring 62 to compressions that could deform it, thus causing its damages

when the trapdoor is opened and the ring 62 is positioned again.

[0068] After having been placed into the seating consisting of the elevation element 165, the cover 66 is coplanar with the level 14 of the first asphalt layer.

[0069] The advantages obtained with this configuration lie in the fact that the O-ring 62 is protected. Its life is thus significantly prolonged, but above all, its protection of the systems leading to the manhole or trapdoor provided with the O-ring, against the introduction of water or humidity is always assured.

[0070] This feature is extremely important in the case of installations of data transmission or electric systems, or in the inspection trapdoors of reservoirs for fuel supply systems, where water infiltrations are particularly harmful.

[0071] Also the advantages obtained with the previously described embodiments are evident.

[0072] The side containment of the cover 3, in its new elevation position, is obtained by inserting a containment element 8, made of cast iron or other material, outside the containment frame 4, suitably shaped so as to adhere perfectly to the upper portion of said frame 4, independently from the fact that it is round, square or rectangular, and at least partly, to the external side portion thereof.

[0073] The containment element 8, whose upper portion extends for a length corresponding to the new level 16 to be obtained, is housed, adhering externally to the above frame 4, by a simple and quick cut of the already existing paving.

[0074] If a first road surface of level 15 is to be repaired and brought to a new level 17, different from the previously mentioned level 16, the elevation of the cover 3 is obtained, with reference to figure 5, by placing an elevation element 71 of a suitable thickness different from the elevation element 7 mentioned above, into frame 4.

[0075] The elevation element 71 is made of cast iron or other material.

[0076] Also in this case, the side containment of the cover 3 is assured by a containment element 81, made of cast iron or other material, outside the frame 4, suitably shaped so as to adhere perfectly thereto, independently from the fact that it is round, square or rectangular, e.g. along its entire vertical development.

[0077] The containment element 81, whose upper part extends for a length corresponding to the new level 17 to be obtained, is housed in the above frame 4, adhering externally thereto, by a simple and quick cut of the already existing paving.

[0078] In practice, in both cases, the upper part of the containment element 8, 81 will be equal to the height selected each time for the elevation element 7, 71, and it can take different values depending on unified measures according to the usual thickness of the asphalt layer.

[0079] Also in these cases, the containment element 8, 81 can include two parts connected by known locking members.

[0080] The containment element is adjusted and locked in the correct position by acting on the locking members.

[0081] By carrying out the simple operations described above, the cover 3 is situated at the same level as the new road surface, without causing depressions to the road surface and independently of the elevation thickness of the same.

[0082] With reference to figure 7, reference numeral 211 indicates the inner vertical walls, made of concrete, of an already installed manhole 111, and reference numeral 31 indicates a cover of the same manhole 111.

[0083] The upper ends 211a of the inner vertical walls 211 are coplanar with a road surface 12 and feature recesses forming a bearing seat 411 for the cover 31.

[0084] The bearing seat 411 is made in such a way as to make the cover 31 coplanar with the ends 211a of the inner vertical walls 211, and consequently, to the road surface 12.

[0085] Figure 8 shows a further embodiment of the invention characterising the proposed device, related to the problem of the already installed manholes 111 that are structured as pointed out in figure 7.

[0086] The device for maintaining the closure of manholes coplanar with a new asphalt layer 121 resulting from repairing of the road surface 12, includes substantially, in the particular embodiment being examined, a spacer element 511.

[0087] The embodiment described now is particularly applicable in case the elevation is certainly bigger than the height of the cover 31 and the distance between the lower surface of the same trapdoor and the original bearing seat 411, resulting from the presence of the spacer element 511, is also to be added thereto..

[0088] The spacer element 511 is placed between the upper ends 211a of the inner vertical walls 211 and the lower base 31b of the cover 31.

[0089] The shape of the spacer element 511 is such that its lower part 511a is complementary with the above bearing seat 411 and that its upper part 511b is coplanar with the new asphalt layer 121.

[0090] The upper part 511b of the spacer element 511 features recesses, turned toward the inside of the manhole 111 and aimed at defining a suitable support housing 511s for the cover 31, so that the latter is coplanar with the above new asphalt layer 121, when in closed configuration.

[0091] When the spacer element 511 is manufactured, the thickness of the outermost ring is equal to that of an asphalt layer usually realized during the repairing of a road surface 12, and according to the most common sizes of the manholes 111 aperture.

[0092] The spacer element 511 is easy to use, and the cover 31 is situated at the same level as the new asphalt layer 121, without causing depressions.

[0093] The proposed device according to all the pre-

viously described embodiments will be realized in different dimensions according to the most common sizes of the manholes and trapdoors aperture.

[0094] It is to be noted that the last two described embodiments of the proposed device structured as shown in figure 7, can be applied without any problems, by applying suitable case changes, to manholes and trapdoors structured as shown in figure 1 and having a containment frame 4 instead of a bearing seat 411.

[0095] The above described device, according to described different embodiments, is particularly advantageous, since it allows to maintain the manhole closure coplanar with the road surface, or generally with the surrounding ground.

[0096] Moreover, the proposed device is advantageous because it can be applied to a vast range of manholes, to be installed or already installed, due to its versatility and immediate adaptability to different manholes forms and sizes.

[0097] Further, the proposed closing device allows, during the application of the first asphalt layer, to use working means usually used on flat vast surfaces without obstacles, on the binder layer as well as on the final asphalt layer.

[0098] It is also to be pointed out that the proposed closing device is simple and rapid to use, and does not require any removal or adjustment of the already installed manhole.

[0099] The above described advantages are obtained by a simple technical solution, which is extremely reliable and functional.

Claims

1. Device for maintaining manholes or trapdoors closure coplanar with the road surface, said manholes or trapdoors including one or more inner vertical walls (2,211), whose upper ends (21,211a) constitute the body of the manhole or trapdoor (1,111), a cover (3,31,66), and a seat (41,51,411) of rectangular section, which receives and supports said cover (3,31), said device being characterized in that it includes means for elevation and containment of said cover (3,31) situated between said seat (41,51,411) and said cover (3,31).

2. Device, according to claim 1, characterized in that said means for elevation and containment of said cover (3) include an adapter element (5), which defines a first temporary position at zero elevation of said cover (3), and an elevation and containment element (6), which is aimed at substituting said adaptor element (5), so as to define a definite elevation position of the cover (3).

3. Device, according to claim 2, characterized in that said adapter element (5) is insertable into, and matches with, said support seat (41), so as to define a housing (51), whose dimensions are suitably reduced with respect to the support seat (41), and aimed at receiving said cover (3).

4. Device, according to claim 2, characterized in that the outer shape of said elevation and containment element (6) is complementary to said seat (41) and defines an elevation (61) featuring a support housing (63) for said cover (3).

5. Device, according to claim 1, characterized in that said cover (3) containment and elevating means include an elevation element (7,71), whose thickness defines the elevation for said cover (3), and a containment element (8,81).

6. Device, according to claim 5, characterized in that said elevation element (7,71) can be round, square or rectangular, and is complementary with said support seat (41), the thickness of said elevation element (7,71) being equal to the elevation of the cover (3), so as to maintain said cover (3) coplanar with a new asphalt level (16,17).

7. Device, according to claim 1, characterized in that said containment and elevation means for the cover (3) include an elevation element (165) formed by three parts (A,B,C), whose width increases gradually upwards in the horizontal plane, said lower part (A) having the height corresponding to the elevation necessary to rise said cover and having profile such that its lower portion matches with the seating (151) formed by the inner side of the frame (44), said upper part (C) defining the seat receiving the cover (66), and said central part (B) being aimed at connecting said lower part (A) with said upper part (C).

8. Device, according to claim 7, characterized in that said frame (44) features a step (166) made in the seating (151) of said elevation element, the profile of the lower portion of said lower part (A) corresponding to the profile of said step (166).

9. Device, according to claim 5, characterized in that said containment element (8,81), independently from the fact that it is round, square or rectangular, on one side contains the cover (3) being in its elevation position, and on the other side it adheres to the already existing paving outside the manhole (1), with the upper part of said containment element (8,81) extending for a length corresponding the height of said elevation element (7,71).

10. Device, according to claim 1, characterized in that said elevation and containment means for the cover (31) include a spacer element (511), which is situated between said bearing seat (411) and the lower

base (31b) of the cover (31) and is aimed at supporting said cover (31), said spacer element (511) having the width which allows it to be, in its new elevation position, coplanar with a repaired asphalt layer (121).

11. Device, according to claim 10, characterized in that said spacer element (511) features a lower part (511a), whose shape allows it to insert in a complementary way in said bearing seat (411), and an upper part (511b), which defines a support housing (511s) for the cover (31).

12. Device, according to claim 1, characterized in that said elevation and containment means for the cover (31) include a spacer element (9), situated between said bearing seat (411) and the lower base (31b) of the cover (31) and is aimed at supporting said cover (31), said spacer element (9) having the width which allows it to be, in its new elevation position, coplanar with a repaired asphalt layer (123).

13. Device, according to claim 1, characterized in that said containment and elevation means for the cover (3) include an elevation element formed by two parts (A,C), namely a lower part (A) and an upper part (C) whose width increases gradually upwards in the horizontal plane, said upper part (C) defining a seat receiving the cover (66), with said lower part (A) and said upper part (C) of the elevation element (165) are sized with such heights as to leave an empty area (60) underneath the projecting edge (70) of trapdoor (66), which rests on the lower edge /69) on the lower part (A), and an O-ring (62) is located inside said empty area (60).

14. Device according to claim 13, characterised in that said empty area is delimited at the lower side by the lower part (A).

15. Device according to claim 7, characterised in that said central part (B) and said upper part (C) of the elevation element (165) are sized with such heights as to leave an empty area (60) underneath the projecting edge (70) of trapdoor (66), which rests on the lower edge (69) on the lower part (A), and an O-ring (62) is located inside said empty area (60).

16. Device according to claim 15, characterised in that said empty area is delimited at the lower side by the central part (B).

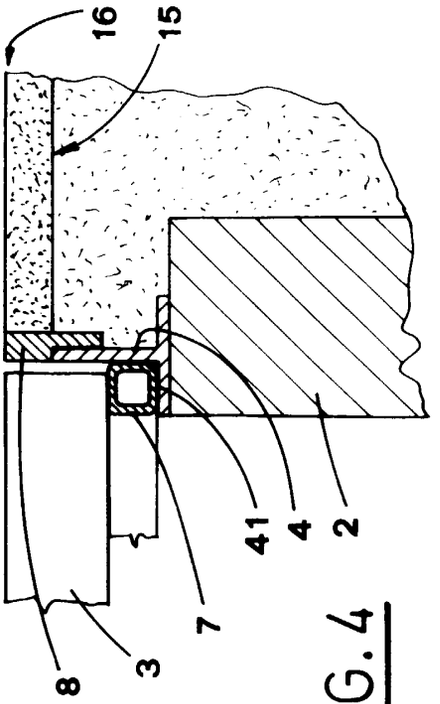

FIG.4

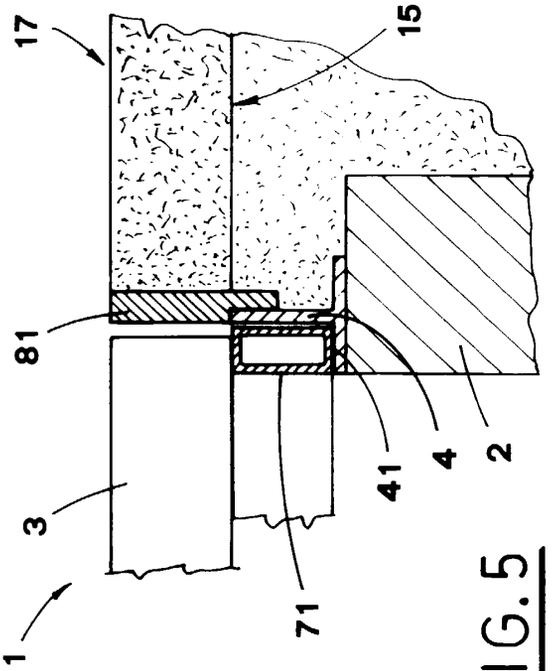

FIG.5

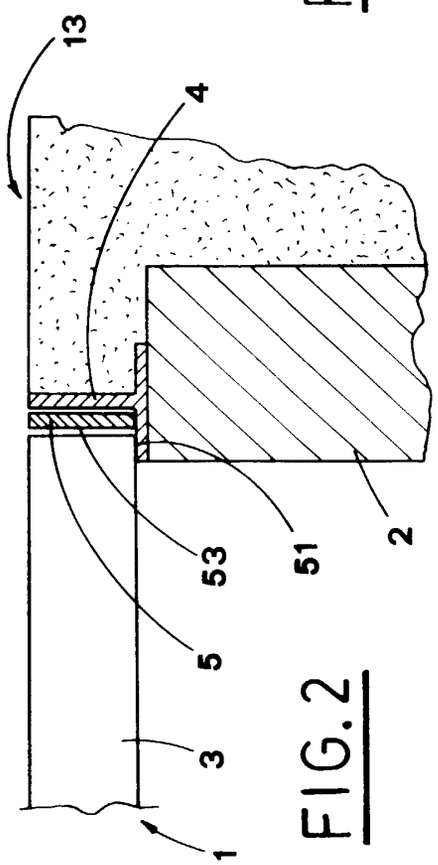

FIG.2

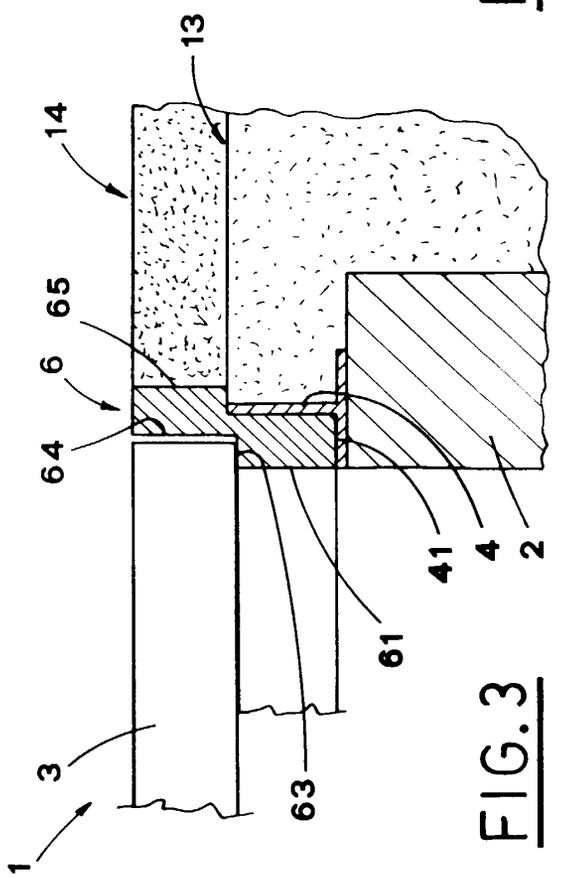

FIG.3

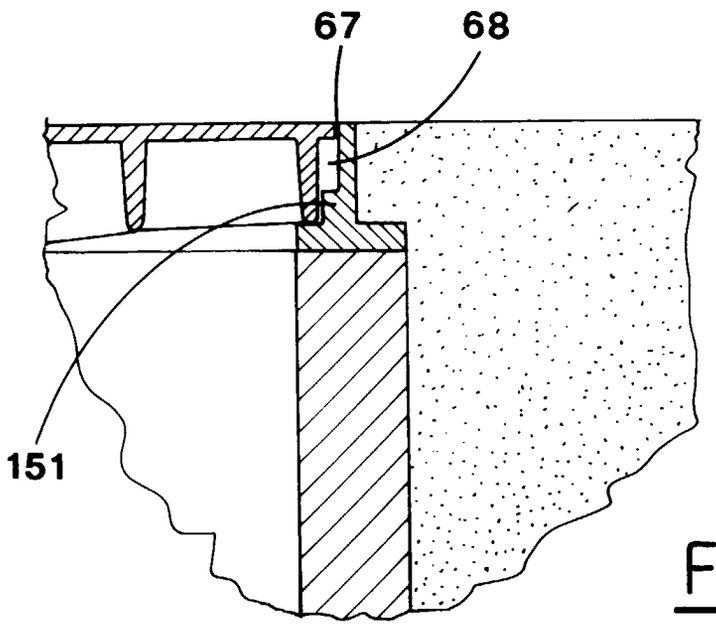

FIG. 6a

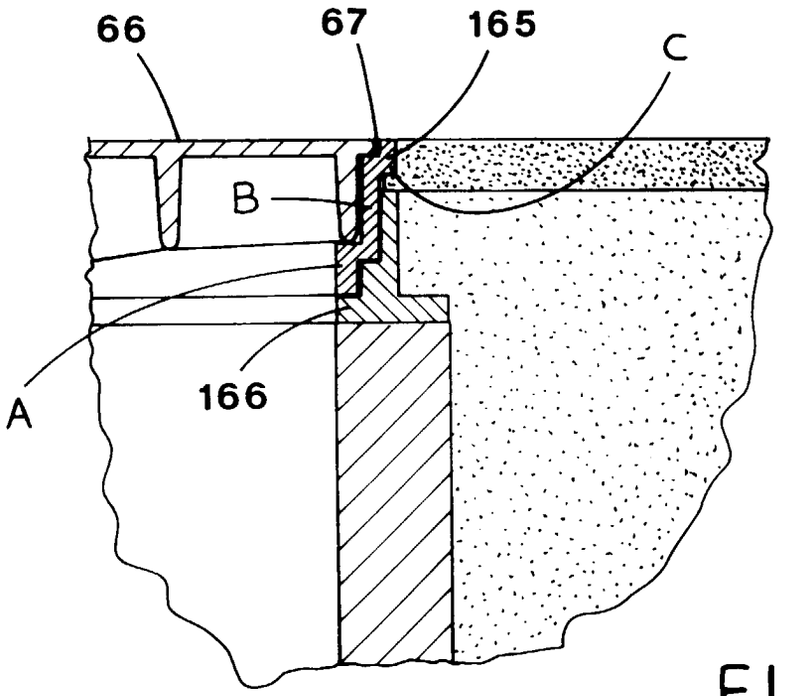

FIG. 6b

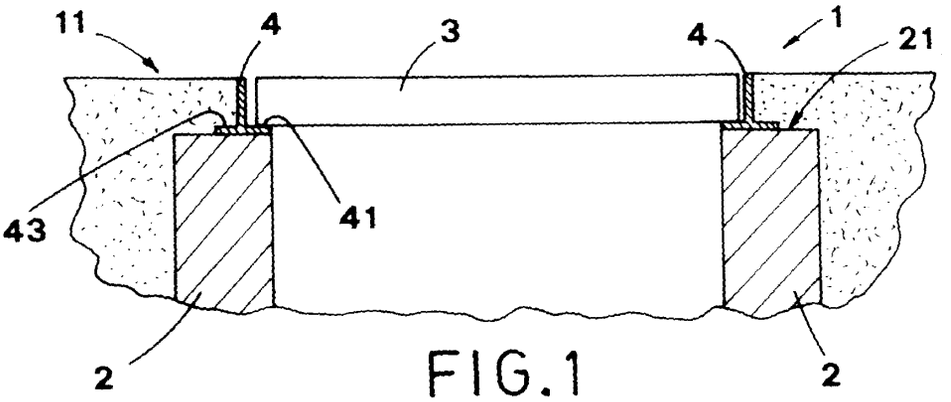

FIG.1

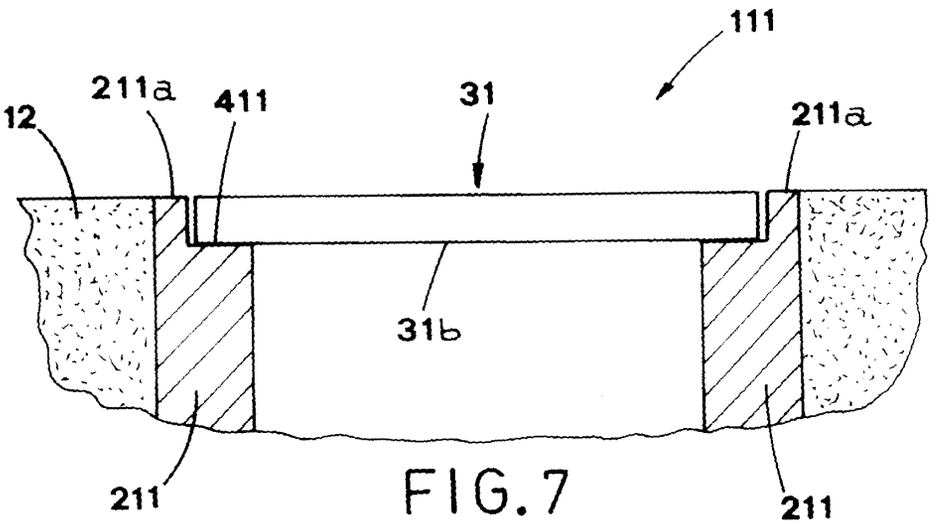

FIG.7

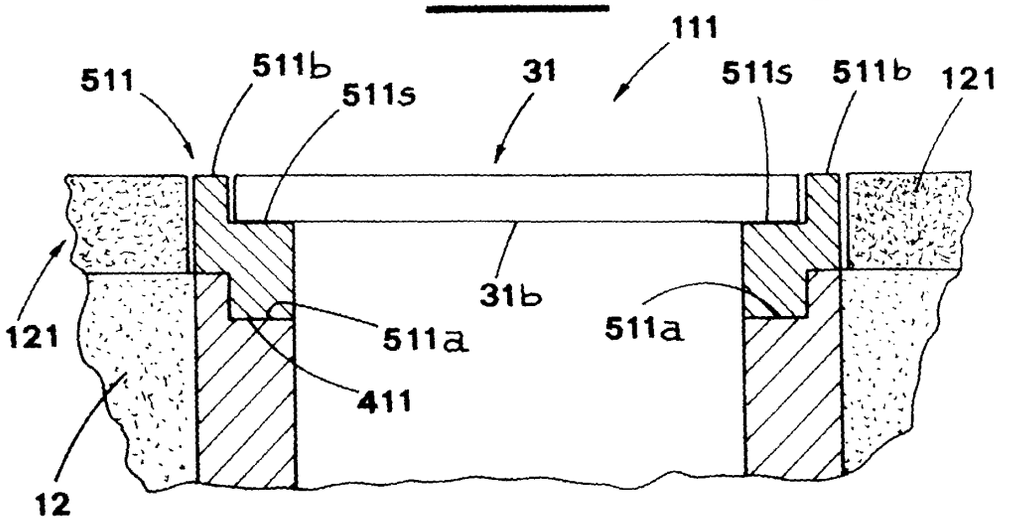

FIG.8

FIG. 9