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(54) **Syphon operating sump pit structure for manholes and the like**

(57) Syphon operating sump pit structure (4), for effectively preventing outflows of foul odours and exhalations generated in a sewer underlying a manhole, having: a surface grid (3) inserted in a road manhole frame (2); a first vessel (5), supported by said road manhole frame (2) or located therebelow, having a top inlet (6) juxtaposed to the port of the surface grid (3), an open bottom (7) and solid walls (8) which occlude, with the

exception of the open bottom (7), the entire manhole section; and a second vessel (9) located below the open bottom (7) of the first vessel (5), having a closed bottom (10) and a top edge (11) located at a level above the open bottom (7), so that the filling up of the second vessel (9) with water or other liquid does not obstruct the flow path of further liquid, concomitantly stemming any exhalation underlying the sump pit structure (4).

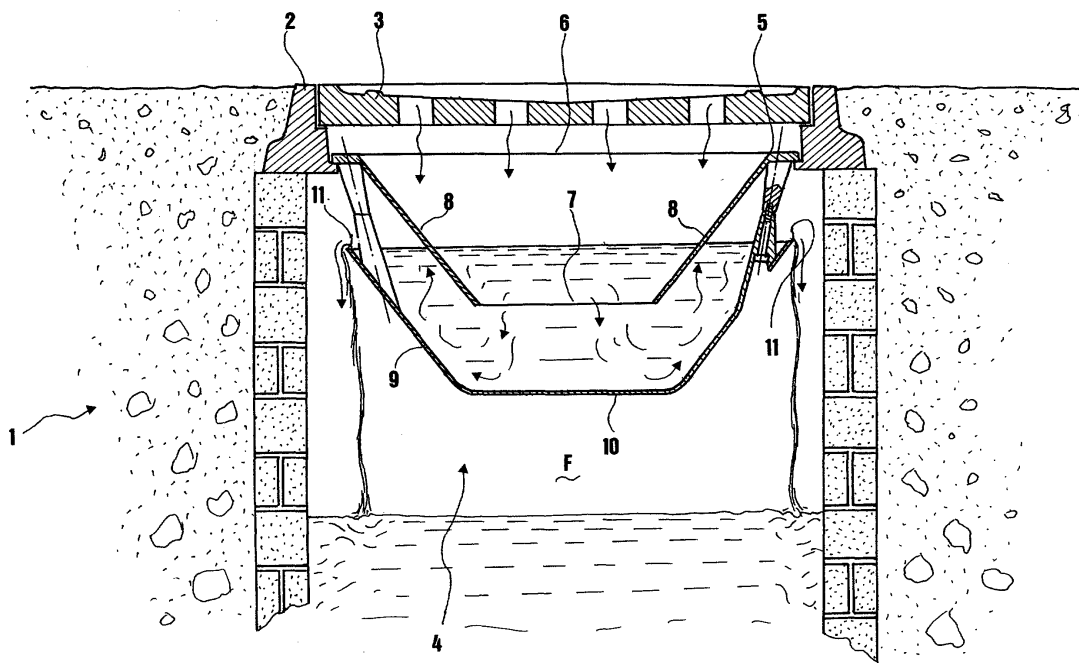


fig.3

## Description

**[0001]** The present invention refers to a syphon operating sump pit structure for manholes, for preventing outflows of foul odours and exhalations generated in a sewer underlying a manhole.

**[0002]** Known-art sump pits lack the functionality required by the context, and their use proved less than satisfactory.

**[0003]** The object of the present design is that of providing a more functional and practical sump pit, apt to fulfil its task with the utmost effectiveness.

**[0004]** This object is attained by a sump pit structure having:

- \* a surface grid inserted in a road manhole frame;
- \* a first vessel, supported by said road manhole frame or located therebelow, having a top inlet juxtaposed to the port of the surface grid, an open bottom and solid walls which occlude, with the exception of the open bottom, the entire manhole section; and
- \* a second vessel located below the open bottom of the first vessel, having a closed bottom and a top edge located at a level above the open bottom,

so that the filling up of the second vessel with water or other liquid does not obstruct the flow path of further liquid, concomitantly stemming any exhalation underlying the structure.

**[0005]** It is understood that usually such exhalations are found at a substantially atmospheric pressure, hence unable to cross the syphon determined by the combination of the two vessels by virtue of the pressure gradient, however minimal, determined by the level difference between the open bottom of the first vessel and the top edge of the second vessel.

**[0006]** Advantageously, in the structure of the present invention, the second vessel is supported by the first vessel by virtue of fixed or removable connecting members.

**[0007]** Moreover, the two vessels could have the shape of a frustum of cone or of a frustum of pyramid, with the smaller base facing downward, and inserted the one into the other, so that the larger base of the first vessel be engaged at the road manhole frame or located therebelow; the smaller base of the first vessel correspond to the open bottom thereof; the larger base of the second vessel be delimited by said top edge; and the smaller base of the second vessel make a closed bottom.

**[0008]** The main advantage of the sump pit structure according to the present invention lies in serving as syphon in an extremely effective and practical way, without negatively affecting the discharge functionality of the manhole.

**[0009]** Moreover, the structure is remarkably compact and installable on-site as a whole.

**[0010]** The present invention will hereinafter be described according to a preferred embodiment thereof, given by way of a non-limiting example and with reference to the annexed drawings, wherein:

\* Figures 1 and 2 are perspective views illustrating a detail of the sump pit structure according to the present invention, in a disassembled and assembled configuration, respectively; and

\* Figure 3 is a cross sectional view of a manhole comprising a sump pit structure according to the present invention.

**[0011]** With reference to the figures, a manhole, generally indicated by 1, has a manhole frame 2 and a surface grid 3, of a type apt to leave unobstructed the flow path of liquids, e.g. rainwater, flowing into the underlying space F.

**[0012]** Inside the manhole a sump pit structure is housed, generally indicated by 4, the grid 3 and the frame 2 being integral thereto.

**[0013]** Such sump pit structure 4 comprises a first vessel 5, supported by said road manhole frame 2, which has a top inlet 6 juxtaposed to the port of the surface grid 3, an open bottom 7 and downward-converging solid walls 8 which occlude, with the exception of the open bottom 7, the entire section of the manhole 1.

**[0014]** In particular, in the present embodiment the first vessel 5 has a square frustum of pyramid shape, with the smaller base thereof facing downward, so that the larger base thereof be engaged at the road manhole frame 2 or located therebelow, and the smaller base thereof correspond to the open bottom 7 thereof.

**[0015]** Such sump pit structure 4 comprises a second vessel 9 located below the open bottom 7 of the first vessel 5, which has a closed bottom 10 and a top edge 11 located at a level above the open bottom 7 of the first vessel 5 and delimiting another open inlet.

**[0016]** In the present embodiment, the second vessel 9 has a square frustum of pyramid shape, with the smaller base thereof facing downward. Moreover, the larger base thereof is delimited by said top edge 11 and the smaller base thereof makes the closed bottom 10.

**[0017]** With reference to the reciprocal location of the two vessels 5, 9, the open bottom 7 of the first vessel 5 lies below the level of the top edge 11 of the second vessel, so that the filling up of the second vessel 9 with water or other liquid does not obstruct the flow path of further liquid, concomitantly stemming any exhalation underlying the structure 4.

**[0018]** I.e., the two frustum-of-pyramid-shaped vessels are both located with their smaller base facing downward and are inserted the one into the other.

**[0019]** Such exhalations are usually found at substantially atmospheric pressure, hence unable to cross the syphon determined by the combination of the two vessels 5, 9, by virtue of the pressure gradient, however

minimal, determined by the level difference between the open bottom 7 of the first vessel 5 and the top edge 11 of the second vessel 9.

**[0020]** The second vessel 9 is supported by the first vessel 5 by virtue of removable connecting members comprising blind threaded insertion holes 12 formed in the first vessel 5, and screws 13 engaging in openings 14 located in the second vessel 9 at the holes 12 of the first vessel 5 (Figures 1 and 2). Said holes 12 may also be of a non-threaded type, having a different fastening system.

**[0021]** Remarkably, the liquid contained in the second vessel 9 not only stems, by syphon effect, the underlying exhalations, but also prevents inletting of waste, like paper, packagings, leaves and the like, below the structure. Such waste will remain floating on the free surface of the liquid contained in the second vessel 9.

**[0022]** Both vessels will be made of a suitable corrosion protection material, resistant to water and to atmospheric agents, as well as to other chemical aggressions.

**[0023]** The connecting screws 13 could be made of an analogous material, e.g. stainless steel. The openings 14 could comprise sleeves 15 receiving the respective screws 13 and fitting the holes 12.

**[0024]** It is understood that the vessel shape could differ, optionally depending on the manhole shape. Moreover, other than removable the connections between the vessels could also be fixed.

**[0025]** To the abovedescribed sump pit structure a person skilled in the art, in order to satisfy further and contingent needs, may effect several further modifications and variants, all however encompassed by the protective scope of the present invention, as defined by the appended claims.

## Claims

1. A syphon operating sump pit structure (4), for preventing outflows of foul odours and exhalations generated in a sewer underlying a manhole, having:

\* a surface grid (3) inserted in a road manhole frame (2);

\* a first vessel (5), supported by said road manhole frame (2) or located therebelow, having a top inlet (6) juxtaposed to the port of the surface grid (3), an open bottom (7) and solid walls (8) which occlude, with the exception of the open bottom (7), the entire manhole section; and

\* a second vessel (9) located below the open bottom (7) of the first vessel (5), having a closed bottom (10) and a top edge (11) located at a level above the open bottom (7),

so that the filling up of the second vessel (9) with

water or other liquid does not obstruct the flow path of further liquid, concomitantly stemming any exhalation underlying the sump pit structure (4).

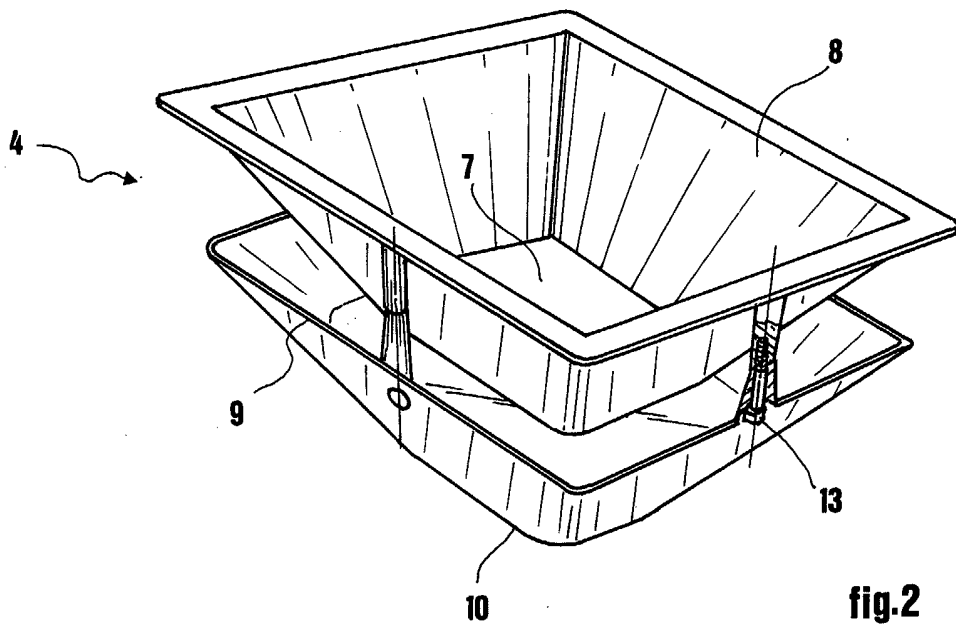
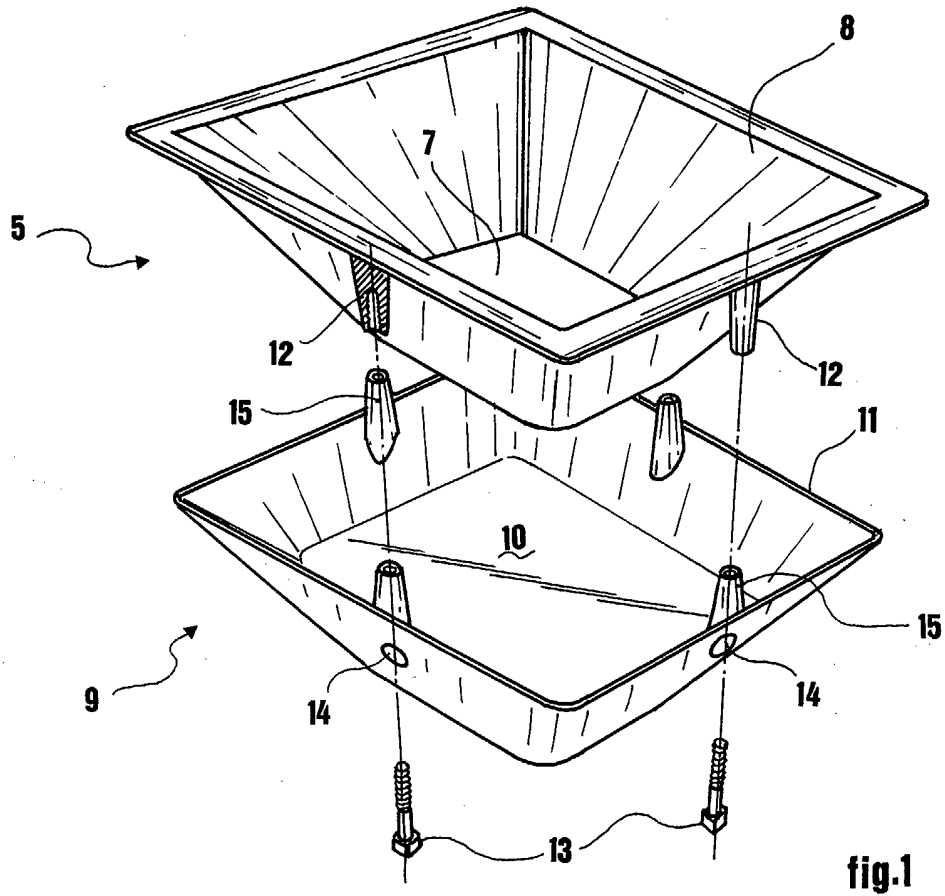
2. The sump pit structure (4) according to claim 1, wherein the second vessel (9) is supported by the first vessel (5) by virtue of fixed or removable connecting members.

3. The sump pit structure (4) according to claim 1, wherein the two vessels (5, 9) have the shape of a frustum of cone or of frustum of pyramid, with the smaller base facing downward and inserted the one into the other, so that the larger base of the first vessel (5) be engaged at the road manhole frame (2) or located therebelow; the smaller base of the first vessel (5) correspond to the open bottom (7) thereof; the larger base of the second vessel (9) be delimited by said top edge (11); and the smaller base of the second vessel (9) make a closed bottom (10).

4. The sump pit structure (4) according to claim 2, wherein the second vessel (9) is supported by the first vessel (5) by virtue of removable connecting members comprising blind threaded or non-threaded insertion holes (12), formed in the first vessel (5), and screws (13) engaging in openings (14) located in the second vessel (9) at the holes (12) of the first vessel (5).

5. The sump pit structure (4) according to claim 1, wherein both vessels are made of a suitable corrosion protection material, resistant to water and to atmospheric agents, as well as to other chemical aggressions.

6. The sump pit structure (4) according to claim 4, wherein the connecting screws (13) are made of stainless steel and the openings (14) comprise sleeves (15) receiving the respective screws (13) and fitting the holes (12).



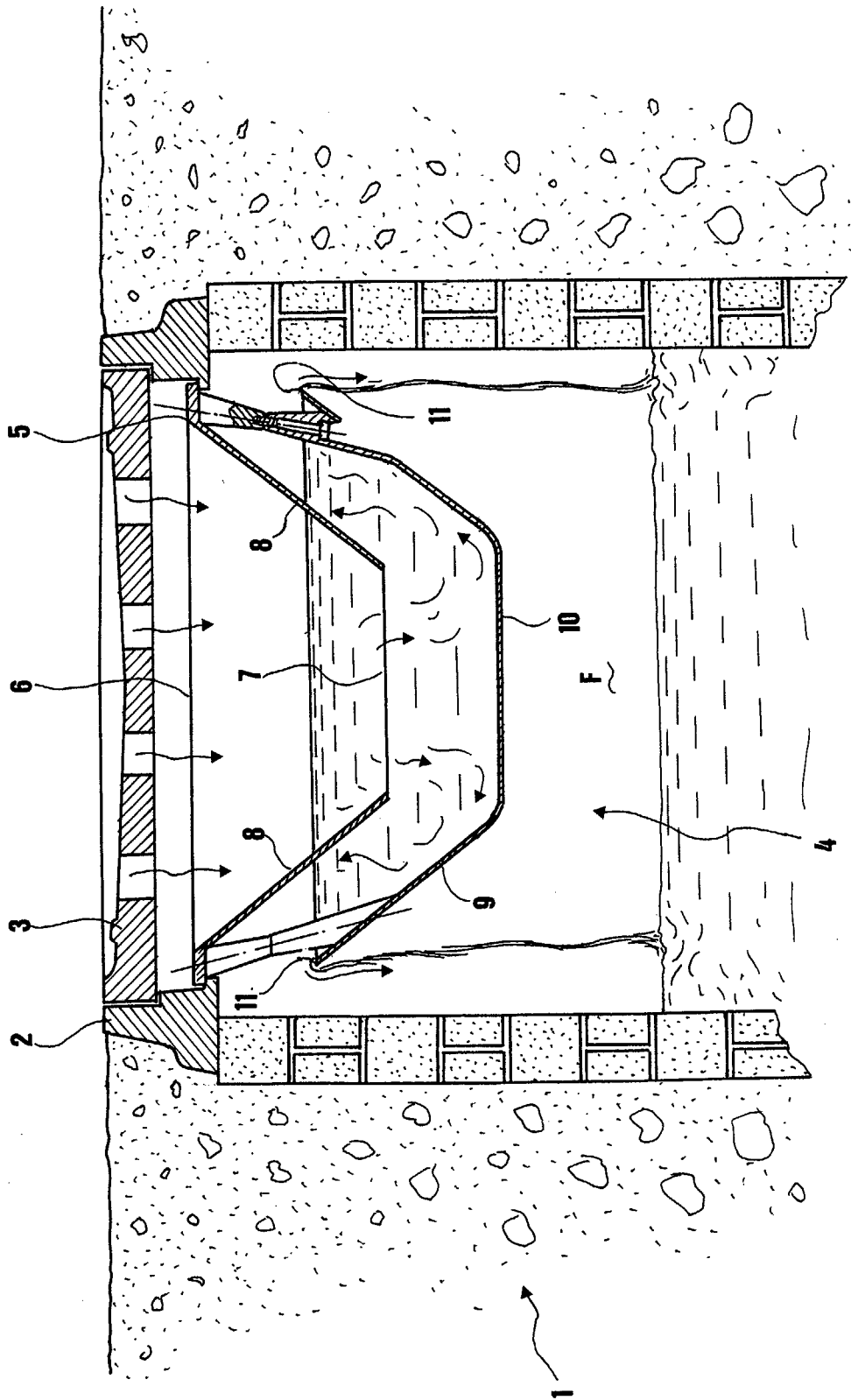


fig.3