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(54) **ODOUR TRAP FOR FLOOR DRAIN**

(57) The present invention relates to an odour trap (8) of a floor drain (1), the floor drain having an inlet (5), a mantle (3) formed by a body (2), a bottom (6) closing it, and an inner space (4) surrounded by these. The odour trap separates the liquid flow from the inlet (5) to the inner space from the liquid flow exiting through the outlet (7). Said odour trap (8) is thus formed of a guide plate (9)

arranged between the inlet (5) and bottom (6) and duckbill valve (12) connected to a discharge aperture (10) therein. The duckbill valve comprises substantially parallel lips (13,14), interconnected at their outer edges and settling against each other, which form a mouth (15) at their end oriented towards the outlet (7).

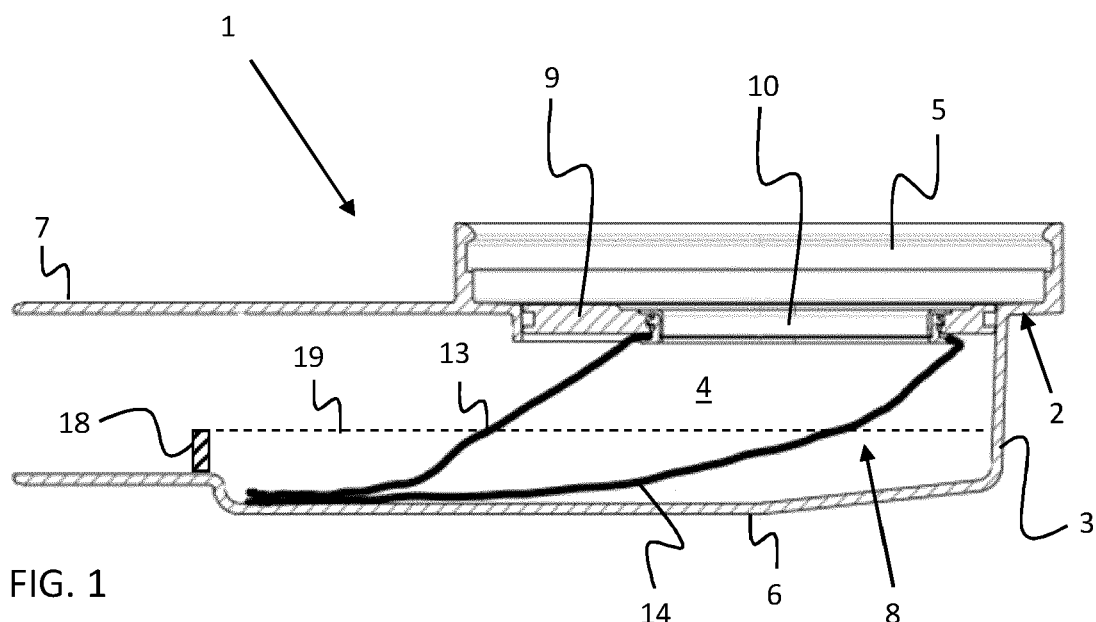


FIG. 1

Description

Background of the invention

[0001] The present invention relates to an odour trap for a floor drain in accordance with the preamble of claim 1, intended to be installed in particular in spaces where an installation space in the depth direction of a floor is limited.

[0002] Conventionally, a floor drain with an odour trap formed in it and to be installed in a floor requires approximately 150 mm or more space in the depth direction. An odour trap in a floor drain is necessary to prevent both odours and other gasses that are disadvantageous to the environment from accessing spaces above the floor drain. Consequently, the use of structurally lower floor drains, known per se, but excluding an odour trap is not necessarily always possible.

Brief description of the invention

[0003] It is an object of the present invention to eliminate drawbacks of the prior art and to accomplish a completely new structure and operation for an odour trap of a floor drain.

[0004] This object is achieved so that the odour trap of a floor drain has the characterising features according to the invention, defined in the claims. More specifically, the arrangement according to the invention is mainly characterised by what is disclosed in the characterising part of claim 1.

[0005] Preferred embodiments of the invention are disclosed in the dependent claims.

[0006] The invention is based on the idea of making use of, instead of a fixed bowl-like odour trap, an adaptive structure of flexible material at the bottom of the floor drain. Instead of maintaining a continuous rigid flow connection from an inlet to an outlet, gravity is allowed to cut the flow connection when there is no liquid flow of any kind acting on the floor drain from the room surrounding it.

[0007] With the scope of the present invention, a "duckbill valve" refers to parallel and partially interconnected flexible flanges that due to their mutual contact prevent a gas and liquid flow from being generated from the mouth of the valve towards an outlet connected thereto.

[0008] The invention provides considerable advantages. Thus, the inventive solution where a duckbill valve is connected by its side to a floor drain allows a clearly lower installation height than previously. Due to this structure, with the same length of the duckbill valve, a larger closure surface area is created than with a duckbill valve connected to a floor drain by the inlet end thereof.

[0009] The floor drain according to the invention is easier to install than before, reliable and easily maintained, because it has very few structural details that would collect impurities and require laborious cleaning. Thus, the floor drain can be cleaned by rinsing it with plenty of water. A guide plate with its duckbill valve forming the odour

trap is also easily removable for the duration of a more extensive maintenance operation. The guide plate with its duckbill valve is also easy to service during the removal, or if need be, to replace with a new one.

[0010] The so-called duckbill valve utilised in the floor drain effectively prevents microbes from accessing the inner space of the floor drain and further the room surrounding the floor drain.

[0011] Due to its structure, the duckbill valve of the floor drain closes fast and efficiently whereby impurities (gasses, liquids, etc.) from a connected sewer cannot access the inner space of the floor drain and further into the room through it.

[0012] The long closure distance forming in the duckbill valve ensures a tight closure of the valve, even if large impurities were to enter it.

[0013] The inventive floor drain may, if necessary, be scaled larger or smaller without its operation suffering.

[0014] To control larger amounts of flow directed to the floor drain, the duckbill valve is implementable as to open at both its ends, whereby a liquid flow may be guided to the floor drain in opposite outlets formed for this purpose.

[0015] Other advantages provided by the invention are disclosed in the following more detailed description of specific embodiments of the invention.

Brief description of the figures

[0016] In the following, some preferred embodiments of the invention will be explained in more detail and with reference to the accompanying drawing, in which

Figure 1 shows a lengthwise section of a first embodiment of the inventive floor drain,

Figure 2 shows a lengthwise section of a second embodiment of the inventive floor drain, and

Figure 3 show a guide plate with its duckbill valve, to be installed in the floor drain.

Detailed description of preferred embodiments

[0017] The present figures do not show the odour trap in scale but the figures are schematic illustrating the principle structure and operation of the preferred embodiments. The structural parts shown by reference numbers in the attached figures then correspond to the structural parts marked by reference numbers in this specification. Even though such an odour trap will in the following be described in detail with reference to the present exemplary embodiments, it should be understood that the odour trap of a floor drain being described is not exclusively restricted to these specific described arrangements but it is obvious that any of the these described features may be utilised also as such or otherwise combined in accordance with the presented idea.

[0018] In the embodiment according to Figure 1, a floor drain 1 comprises a body 2 which forms a mainly vertical mantle 3 for the floor drain and surrounds an inner space

4 located in the floor drain. A liquid flow is directed to the floor drain from the room delimiting it through an inlet 5, and the floor drain is closed for other structures by a bottom 6 substantially opposite this inlet and closing one end of the mantle.

[0019] The liquid flowing to the floor drain is guided to exit towards the sewer through an outlet 7 arranged to the mantle. Usually, a floor drain has one of such outlets, but if the floor drain needs to cope with large amounts of liquid flow, it is possible to arrange at least two opposite outlets in the floor drain for this purpose.

[0020] Access by odours and other gasses disadvantageous to the environment to spaces above the floor drain 1 through the floor drain is prevented by means of an odour trap 8 arranged thereto. At the same time, the odour trap separates the liquid flow at the inlet 5 from the liquid flow exiting through the outlet 7. For this purpose, the odour trap is formed of a guide plate 9 which is arranged between the inlet 5 and bottom 6 settling tightly against the body 2 of the floor drain, and separating the inlet and bottom from each other, and to which guide plate a discharge aperture 10, receiving the liquid flow, is formed. Protruding from this discharge aperture, there is a so-called duckbill valve 12 tightly connected to the edges 11 of the discharge aperture and directed towards the outlet 7. As shown in Figure 3, such a duckbill valve comprises two substantially parallel lips, interconnected at their outer edges and settling against each other, i.e., an upper and lower lip 13 and 14, advantageously made of elastic and reshapable material. The material also has as low as possible a friction coefficient, whereby the sticking of impurities to the duckbill valve surface is avoided. Such material may be, for example, silicone, TPE, PVC, or a teflon-coated fabric.

[0021] To achieve the desired type of a duckbill valve 12, the lips 13 and 14 are connected to each other by mechanical means or chemically, for example. In the tests carried out, the lips are interconnected by sewing, but equally well the joint may be implemented e.g., by welding, gluing, mechanical fasteners, or an installation strip crimping the lips against each other. The duckbill valve may also be manufactured by extrusion whereby the blank resulting from extruding is flattened by pressing, and one end thereof is closed by welding, for example, to create a sock-like duckbill valve. Further, a duckbill valve may also be produced die casting, whereby the blank created by casting may be flattened by pressing, if so required.

[0022] The lips 13 and 14 installed in the floor drain 1 have at least a partially congruent cross sectional orientation with the bottom 6, as may be seen in Figures 1 and 2. In the floor drain, the opposite lips of the duckbill valve 12 form a mouth 15 opening to the end on the side of the outlet 7, the upper lip 13 on the side of the guide plate being adapted to surround the discharge aperture 10 in the guide plate 9 to receive the liquid flow directed to the floor drain. In addition to the drainage aperture 5, liquid may be directed to the inner space 4 of the floor drain

through at least one side connection 16 of the embodiment of Figure 2, adapted on the mantle 3 formed by the body 2.

[0023] The opening needed for the connection with the guide plate 9 is made in one flank of the duckbill valve 12 by punching, for example, after which the duckbill valve is adapted by its opening to the discharge aperture 10 in the installation plate by means of one or more clamping rings 17, for example. Of course, the duckbill valve may be adapted by its opening to the discharge aperture in the installation plate by welding, gluing, or, for example, a crimping installation strip.

[0024] The lips 13 and 14 in a duckbill valve 12 of a dry floor drain 1 squeeze against each other as a result of gravity, forming already as such a barrier that prevents a flow of gas from the sewer to the room through the floor drain. If the gas seal is to be further secured, a gap between the odour trap and outlet may be partly dammed up by means of a separate damming means 18 installed in this gap, which is shown by way of example in Figures 1 and 2. Said damming means is obviously achievable in the bottom structure of the floor drain during its manufacture. This way, a pool of liquid may be formed in the part of the odour trap surrounding the mouth 15 of the duckbill valve to cover resting mouth and simultaneously closing it from a flow of gas. In Figures 1 and 2, the height of the liquid surface 19 caused by the damming means is shown with a dotted line.

[0025] The squeezing against each other of the lips 13 and 14 of the duckbill valve 12 in the floor drain 1 may also be achieved, or boosted, by the effect of an under-pressure or overpressure focused on the floor drain area. At least one of the lips may also be equipped with a spring element 20 arranged to squeeze the lips against each other. By forming one of the lips slightly narrower than the other, and by nevertheless connecting them to each other by their outer edges, a transverse tension is generated in relation to the flow direction of the duckbill valve. This tension bends the duckbill valve to an arc, forcing the lips against each other.

[0026] An odour trap for a floor drain 1, implemented by means of the presented duckbill valve 12, is accomplished as follows: Into the inner space 4 of a floor drain, a guide plate 9 is adapted with a compression joint having a seal, the guide plate dividing the inner space into a liquid-receiving part and a part guiding liquid to the sewer. The guide plate has a discharge aperture 10 guiding the liquid flow towards the outlet 7. In connection with the discharge aperture, there is arranged a duckbill valve 12 installed with a clamping ring 17 against the edges 11 of the discharge aperture, for example. The duckbill valve, in the rest position formed of two lips squeezing against each other, opens by the pressure of the liquid flow guided to the floor drain into a tubular means which takes the liquid flow further towards the outlet. Once the liquid flow has gone dry, the lips return to their original position where they squeeze against each other, which prevents the flow of gas through the floor drain.

[0027] If there are two opposite outlets 7 arranged in the floor drain 1 to deal with large amounts of liquid flow, in such an embodiment the duckbill valve 12 is implementable to be open at both its ends, whereby the liquid flow directed to the duckbill valve is distributed among said opposite outlets 7.

[0028] Those skilled in the art will find it obvious that, as technology advances, the basic idea of the invention may be implemented in many different ways. The invention and its embodiments are thus not restricted to the above-described examples but may vary within the scope of the claims.

Claims

1. An odour trap (8) for a floor drain (1), such a floor drain comprising

an mantle (3) formed by a body (2) and an inner space (4) surrounded by it,
 a bottom (6) closing one end of the mantle,
 an inlet (5), substantially opposite the bottom, which together with at least one outlet (7) adapted to the mantle guides a liquid flow in the floor drain,
 an odour trap (8) for separating the liquid flow coming through the inlet (5) from the liquid flow exiting through the outlet (7),
 the odour trap (8) being formed of a guide plate (9) arranged between the inlet (5) and the bottom (6),
 the guide plate having a discharge aperture (10) from which discharge aperture protrudes a duckbill valve (12) tightly connected to the edges of the discharge aperture and directed towards the outlet,
 the duckbill valve comprising substantially parallel lips, an upper lip (13) and lower lip (14), interconnected by their outer edges and settling against each other,
characterised in that
 the guide plate (9) is connected to an opening in a flank formed in the upper lip (13) of the duckbill valve (12), whereby the upper lip surrounds the discharge aperture (10) in the guide plate,
 the upper and lower lips (13, 14) have at least a partially congruent cross-sectional orientation with the bottom (6),
 a mouth (15) being formed at an end of the duckbill valve (12) oriented towards the outlet (7).

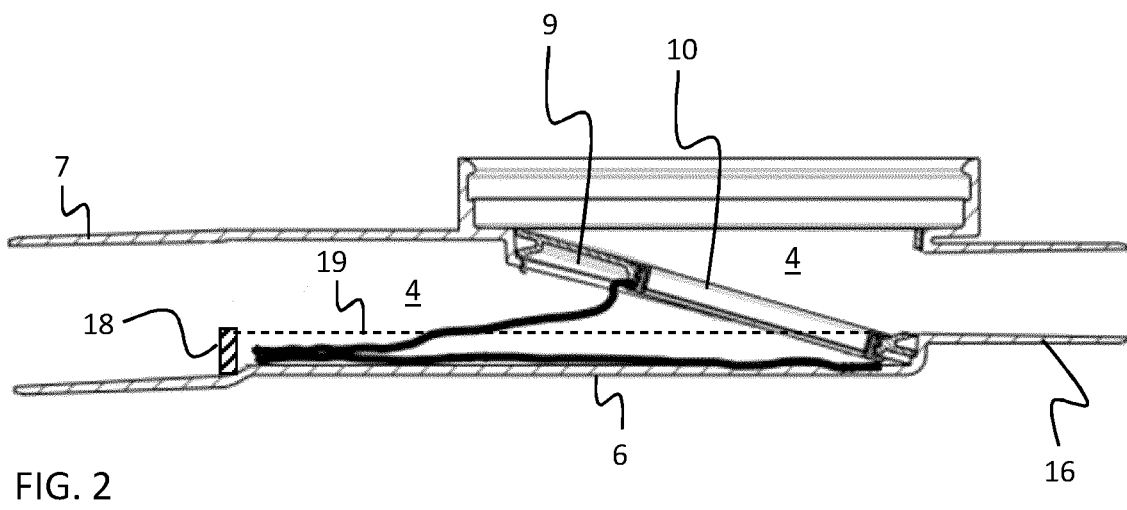
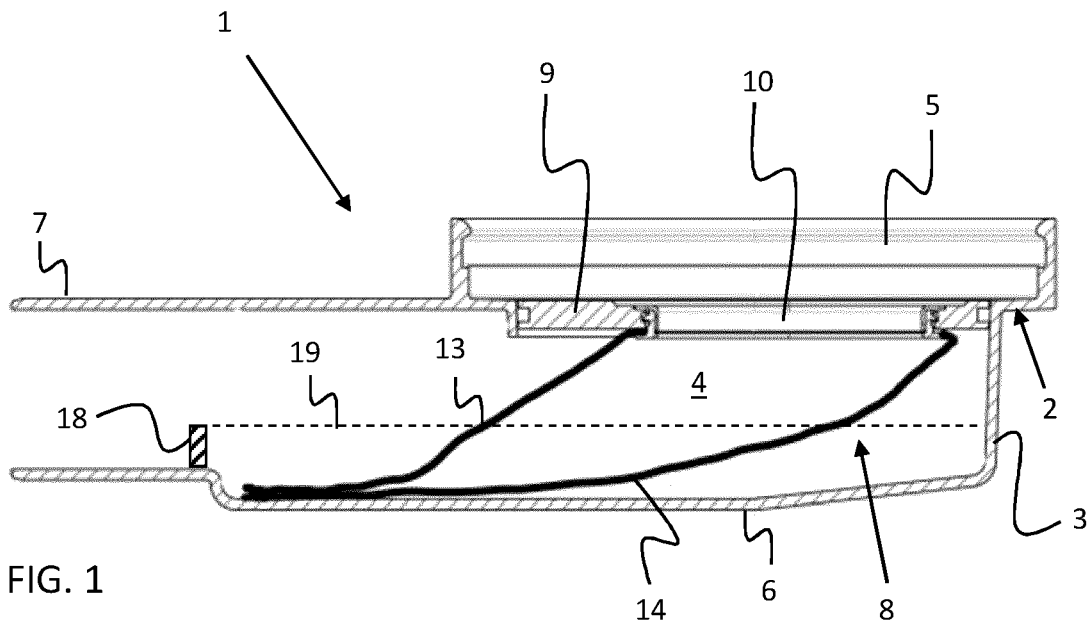
2. An odour trap (8) for a floor drain (1) as claimed in claim 1, **characterised in that**
 at least one side connection (16) is arranged in the mantle formed by the body (2).

3. An odour trap (8) for a floor drain (1) as claimed in

claim 1 or 2, **characterised in that**

the lips (13, 14) comprise means manufactured of elastic reshapable material.

4. An odour trap (8) for a floor drain (1) as claimed in any one of the preceding claims, **characterised in that**
 the lips (13, 14) are interconnected with mechanical means.
5. An odour trap (8) for a floor drain (1) as claimed in any one of the preceding claims 1 to 3, **characterised in that**
 the lips (13, 14) are interconnected chemically.
6. An odour trap (8) for a floor drain (1) as claimed in any one of the preceding claims 1 to 3, **characterised in that**
 the duckbill valve (12) is provided by extrusion whereby the blank resulting from extruding is flattened and one end thereof is closed.
7. An odour trap (8) for a floor drain (1) as claimed in any one of the preceding claims 1 to 3, **characterised in that**
 the duckbill valve (12) is provided by die casting.
8. An odour trap (8) for a floor drain as claimed in any one of the preceding claims, **characterised in that**
 the duckbill valve (12) is adapted to the discharge aperture (10) in the guide plate (9) by a clamping ring (17).
9. An odour trap (8) for a floor drain as claimed in any one of the preceding claims, **characterised in that**
 at least one of the lips (13, 14) of the duckbill valve (12) is equipped with a spring element (20)
10. An odour trap (8) for a floor drain (1) as claimed in any one of the preceding claims, **characterised in that**
 there are damming means (18) arranged between the outlet (7) and the mouth (15) to form a pool of liquid at the bottom (6) of the floor drain to surround the duckbill valve (12) at least partly.



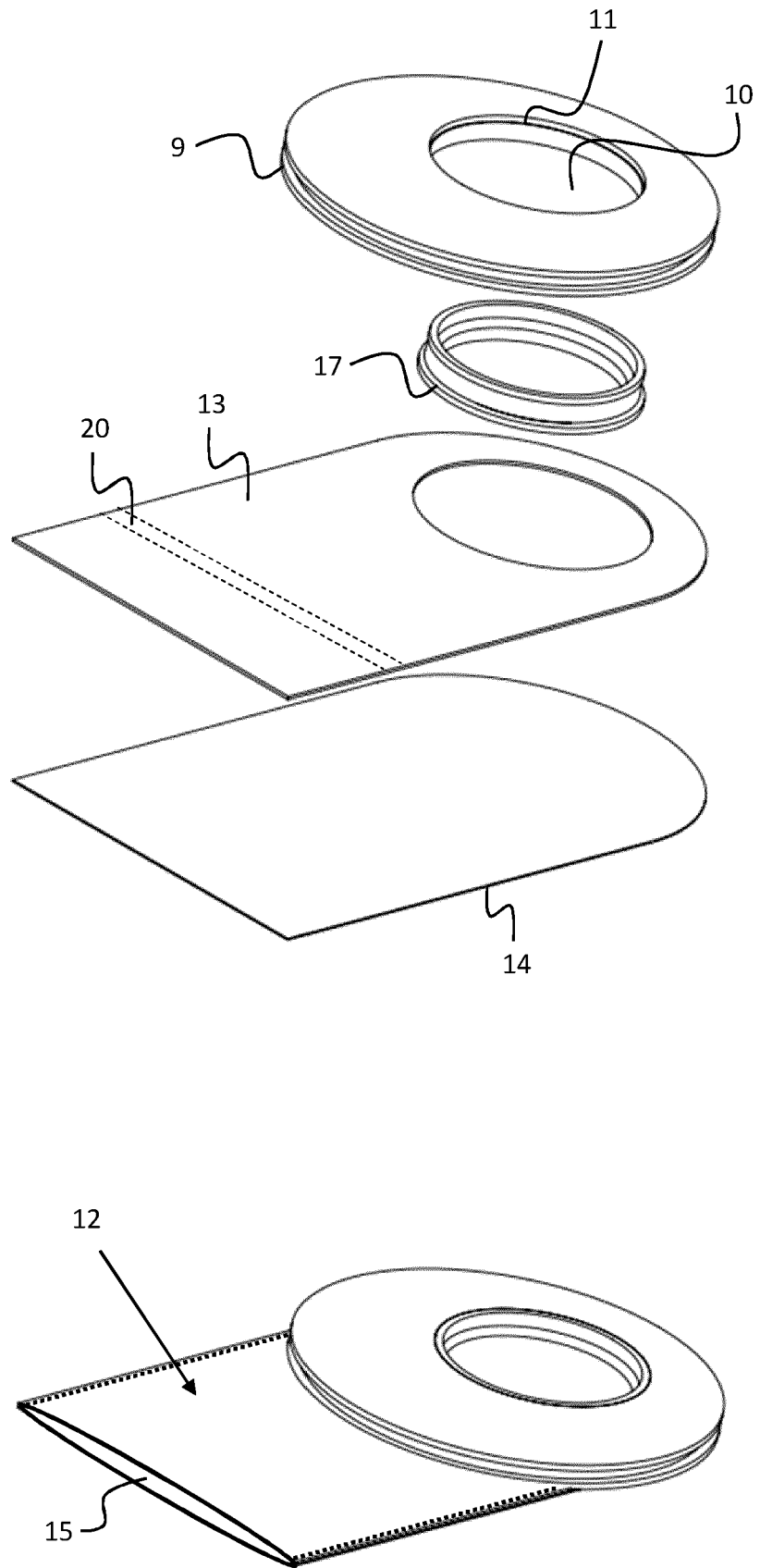


FIG. 3



EUROPEAN SEARCH REPORT

Application Number

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1	The present search report has been drawn up for all claims		
Place of search Munich		Date of completion of the search 17 January 2022	Examiner Flygare, Esa
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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