



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.07.2020 Bulletin 2020/27

(51) Int Cl.:
E03F 5/04 (2006.01)

(21) Application number: **19219711.9**

(22) Date of filing: **24.12.2019**

(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
Designated Validation States:
KH MA MD TN

• **Van Nuland, Franciscus Hendricus**
1764 NW Breezand (NL)

(72) Inventors:
• **SCHOTANUS, Jacobus Gerhard Nicolaas**
2121 XC BENNEBROEK (NL)
• **VAN NULAND, Franciscus Hendricus**
1764 NW BREEZAND (NL)
• **WILLEMSSEN, Johannes Cornelis**
3921 EB ELST (NL)

(30) Priority: **24.12.2018 NL 2022311**

(71) Applicants:
• **Willemsen Infra B.V.**
3565 AV Utrecht (NL)
• **Schotanus, Jacobus Gerhard Nicolaas**
2121 XC Bennebroek (NL)

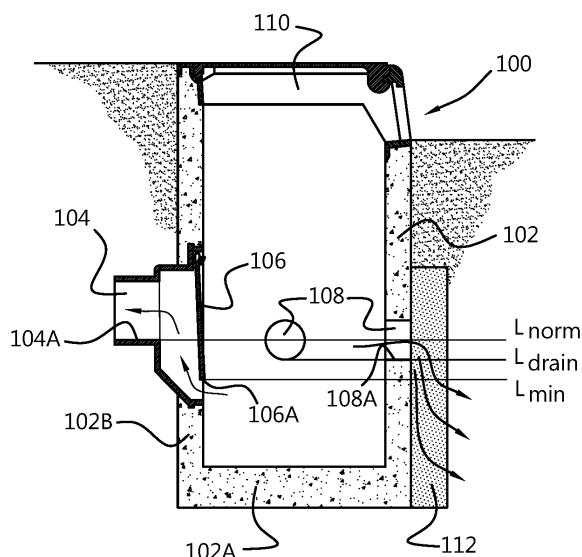
(74) Representative: **de Hoog, Johannes Hendrik**
Octrooibureau de Hoog
Gouverneurslaan 18 A
3905 HE Veenendaal (NL)

(54) **GULLEY**

(57) Gulley (100) comprising a gulley pot (102), an outlet (104) in a side wall of the gulley pot and a baffle (106) configured as an odour trap, wherein the outlet is configured to couple the gulley to a sewer system and has an underside (104A) defining a normal water outflow level L_{norm} , and wherein the baffle has an underside (106A) defining a minimum liquid level L_{min} to allow the baffle to act as an odour trap; the pot further comprises an infiltration outlet (108) through the side wall, to transfer

liquid to the ground around the gulley when the liquid level in the pot exceeds a level L_{drain} , wherein $L_{min} < L_{drain} < L_{norm}$. The gulley comprises a removable insert part (204) configured to be inserted into the outlet and further configured to increase the liquid outflow level L_{norm} to a new outflow level L_{new} , wherein $L_{norm} < L_{new}$. The outlet has a height H , wherein $H/3 < (L_{new} - L_{norm}) < H/2$. The gulley comprises a filter element positioned in each of the at least one drainage outlet.

Fig. 1



Description

TECHNICAL FIELD

[0001] The subject disclosure relates to gullies for receiving storm water, usually collected from street surfaces, and discharging the storm water through an outlet in a rainwater sewer system.

BACKGROUND ART

[0002] Gully's as described above are well known for collecting rain water or storm water in streets, sidewalks, gutters etc. and generally comprise a gully pot, e.g. a plastic, cast-iron or concrete receptacle buried in the ground and comprising a bottom wall and a number of side walls. In a side wall of the gully pot an outlet is positioned which is coupled to a sewer system. Water received in the gully pot exits via the outlet to the sewer system. The drain is generally offset from the bottom wall. In the volume between the bottom wall of the gully pot and the underside of the outlet, water and pollution (refuse, debris, leaves, sand, oil, etc....) can accumulate. A baffle extending to below the underside of the outlet serves as an odour trap and it may prevent pollution floating on the water from entering the sewer system.

[0003] NL1005621 discloses a drain sump for road gutters, comprising a concrete body and a cast iron connection into the concrete drain pipe. The cast iron connection is anchored by a flange into the sump body during moulding of the concrete of the sump body. The cast iron connection comprises a front chamber. In the cast iron connection a cast iron baffle for an odour trap may be installed such that it is rotatable.

[0004] EP2796628A1 discloses a gully comprising a gully pot, an outlet and a baffle. The baffle is attached to the gully pot such that the baffle is movable between a first stable position with respect to the gully pot in which position the baffle overlaps and covers the outlet and extends below an underside of the outlet and a second stable position with respect to the gully pot in which position the outlet is substantially uncovered by the baffle.

[0005] CN207062678U discloses a road drainage structure. The structure includes a roadbed, a vegetation layer, a soil layer, a water filtering sand layer, a water filtering gravel layer, a water filtering channel, a drainage body, an overflow pipe, an overflow well, and a liquid level sensor. The water flows from the roadbed, through the layers and water filtering channel into the drainage body. When the liquid level in the drainage body exceeds a top edge of the overflow pipe in the drainage body, the water flows through the overflow pipe into the overflow well.

[0006] CN206205290U discloses a roof rainwater collecting and processing system. The system comprises a rainwater seepage well with an inlet pipe, infiltration pipe and an outlet pipe. The infiltration pipe extends radially

outward. A gravel layer surrounds the infiltration pipe. The bottom of the seepage well is covered with gravel and another gravel layer below the gravel forming the bottom of the seepage well. After two layer filtering the water enters the ground to replenish groundwater.

SUMMARY OF INVENTION

[0007] It is an object of the present technology to provide a gully which supplies storm water only to the sewer system if more than a specific amount of water has entered the gully pot in a particular short period of time and which reduces the need to expand the discharge capacity of the sewer system to prevent water problems during heavy rain shower due to climate changes.

[0008] According to an aspect of the subject technology, this object is achieved by a gully having the features of claim 1. Advantageous embodiments and further ways of carrying out the present technology may be attained by the measures mentioned in the dependent claims.

[0009] A gully according to the subject technology comprises a gully pot, a sewer outlet in a side wall of the gully pot and a baffle configured to act as odour trap. The sewer outlet is configured to couple the gully to a sewer system and has an underside defining a normal outflow level L_{norm} . The baffle has an underside defining a minimal liquid level L_{min} to enable the baffle to act as odour trap. The gully pot further comprises at least one infiltration outlet being configured to transfer liquid in the gully pot to the ground around the gully when the liquid level in the gully pot exceeds a drainage outflow level L_{drain} , wherein $L_{min} < L_{drain} \leq L_{norm}$.

[0010] The concept of the present technology is to have a gully pot which is coupled to an additional reservoir that is filled with an amount of storm water before substantially all further storm water is supplied to the sewer system. The additional reservoir facilitates infiltration of the collected water as a reverse drainage system into the soil around the gully. Thus before it's going to rain, the additional reservoir will normally be empty. Then the first storm water will be collected in the gully pot. Due to evaporation of water in the gully pot during the dry period, the water level will be below the level L_{drain} . As soon as the liquid level will become higher than L_{drain} liquid will flow through the at least one infiltration outlet into the additional reservoir that is in fluid flow connection with the infiltration outlet. The additional reservoir will almost immediately start infiltration of the liquid in the soil. The liquid level in the gully pot will start rising as soon as the liquid level in the additional reservoir becomes at the same level in the gully pot. From that moment, substantially all storm water will flow away via the sewer outlet into the sewer system. When it stops raining, the water in the additional reservoir infiltrates the soil around the gully pot till the additional reservoir is empty and the procedure above can be started again. In this way, it might be possible that during a small rain shower most storm water is released to the soil around the gully pot

and that only during heavy rain shower a considerable part of storm water is discharged through the sewer outlet into the sewer system. When L_{drain} is smaller than L_{norm} the inflowing storm water has to fill the additional reservoir first before some storm water will flow into the sewer system. Another advantage of the present technology is that the gulley pot retains its function to accumulate dirt at its bottom. As a result, only parts that float in or float on the water can reach the infiltration outlet and probably after accumulation in the infiltration outlet obstruct the flow of water to infiltrate the soil around the gulley pot.

[0011] In an embodiment, the gulley further comprises an insert part configured to be inserted in the sewer outlet and further configured to increase the liquid outflow level L_{norm} for liquid in the gulley pot to the sewer system to a new outflow level L_{new} , wherein $L_{\text{norm}} < L_{\text{new}}$. This feature allows one to reuse existing gullies without changing the specification of the baffle acting as strainer or odour trap, while providing the gulley the characteristic to discharge only liquid to the sewer system after the liquid level in the additional reservoir and gulley pot exceeds the new outflow level.

[0012] In a further embodiment, the sewer outlet has a height H , and $H/3 < (L_{\text{new}} - L_{\text{norm}}) < H/2$. It has been found that an insert part which increases the outflow level of the gulley pot in the range $H/3 - H/2$ still provides the outlet enough outflow capacity to discharge enough storm water to the sewer system during heavy rain showers.

[0013] In an embodiment, the insert part is a removable part. This feature enables one to provide full access to duct coupled to the outlet for inspection and or cleaning.

[0014] In an embodiment, the gulley comprises a filter element positioned in each of the at least one infiltration outlet. In a further embodiment, the filter element comprises a material that makes the filter element impermeable for oil and permeable for water. The filter element counteracts accumulation of dirt in the reservoir. The impermeability to oil reduces the risk of contamination of the soil around the gulley.

[0015] In an embodiment, the filter element comprises a layer of pervious concrete arranged in an opening through the side wall of the gulley pot for the infiltration outlet. This feature provides a robust filter that could easily be cleaned by for example a high pressure washer.

[0016] In an embodiment, the filter element further comprises a check valve arrangement configured to block liquid to flow through an infiltration outlet into to gulley pot. These features prevent groundwater from flowing into the sewer via the gulley pot. In an embodiment, the gulley further comprises a porous layer attached to at least a portion of the outer surface of the side wall of the gulley pot, wherein the porous layer extends over the openings of the at least one infiltration outlet. The cavities in the porous layer from the reservoir and surfaces of water-filled porous layer that are contact with the soil drain liquid to the soil. In this way, the infiltration surface to the soil is enlarged. In a further embod-

iment, the porous layer extends along a bottom wall of the gulley pot. This feature enlarges to surface being in contact with the soil and consequently the flow capacity to drain storm water to the soil.

[0017] In an embodiment, the porous layer is a layer of pervious concrete. This feature provides a gulley with reservoir that can be applied in a similar way as existing gullies with a concrete gulley pot.

[0018] In an embodiment, the filter element comprises pervious concrete, made of finer gravel than gravel of the porous layer attached to the outer surface of the side wall. This feature has the advantage that when dirt is accumulated in the filter, the filter can be cleaned with a pressure washer. As the openings in the filter to pass water are smaller than the openings in the porous layer, when cleaning the filter the dirt particles accumulated in the filter will flow to the bottom of the porous layer and not accumulate at the level of the infiltration outlet.

[0019] In an embodiment, the porous layer has a thickness of at least 4 cm, more particular 6 cm.

[0020] In an embodiment, sewer outlet has a first radius and each of the at least one infiltration outlet has a second radius, wherein the second radius is smaller than the first radius. In an alternative embodiment, the gulley pot comprises four or more plane sidewalls. Side walls other than the side wall comprising the sewer outlet comprise one or more infiltration outlets. This feature enlarges the drainage flow capacity to drain water to the soil.

[0021] In an embodiment, the gulley comprises drainage means coupled to the at least one infiltration outlet, wherein the drainage means are configured to transfer liquid from the gulley pot to the ground around the gulley. In a further embodiment, the drainage means comprises at least one of: infiltration pipes, perforated ducts and infiltration box. These features allow enlarging the volume of the additional reservoir and/or the area to which the storm water is discharged.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and other aspects, properties and advantages will be explained hereinafter based on the following description with reference to the drawings, wherein like reference numerals denote like or comparable parts, and in which:

Fig. 1 shows schematically a sectional view of a first embodiment of a gulley;

Fig. 2 shows schematically a sectional view of a second embodiment of a gulley;

Fig. 3 shows schematically a sectional view of a third embodiment of a gulley;

Fig. 4 shows schematically a perspective view of a gulley pot according to the subject disclosure;

Fig. 5 shows schematically a perspective view of a gulley pot provided with porous layer;

Fig. 6 shows schematically a sectional view along VI-VI in Fig. 5;

Fig. 7 shows schematically a sectional view along VII-VII in Fig. 6; and,
Figs 8A and 8B show schematically a section view of two states of an embodiment of a filter element.

DESCRIPTION OF EMBODIMENTS

[0023] It is noted that the drawings are schematic, not necessarily to scale and that details that are not required for understanding the present invention may have been omitted. The terms "upward", "downward", "below", "above", and the like relate to the embodiments as oriented in the drawings, unless otherwise specified or functionally required. Further, elements that are at least substantially identical or that perform an at least substantially identical function are denoted by the same numeral.

[0024] Figs. 1 and 2 show a gulley 100 comprising a lid or cover grate 110 for collecting rain water or street cleaning water in streets, sidewalks, gutters etc. and a gulley pot 102 having an interior volume for receiving the water and associated pollution passing the cover grate 110. The gulley pot 102 comprises a bottom 102A and side walls 102B, a sewer outlet 104, at least one infiltration outlet 108 and a drainage means 112. The drainage means 112 enables the water flowing through an infiltration outlet 108 to be absorbed by the soil around the gulley. In Fig 1, the drainage means 112 is a porous layer which is attached to the outside of one or more side walls 102B of the gulley pot 102 and preferably extends along the sidewall from the bottom of the side wall to at least a level above the hole through the sidewall for the infiltration outlet 108.

[0025] The sewer outlet 104 is configured to be coupled to a drain piping of e.g. a storm water drainage system (not shown) and comprises a baffle assembly 106. The sewer outlet has an opening with a height H. Examples of baffle assemblies are known from NL100561C2 and NL2004578C. The baffle assembly 106 is configured to act as odour trap. In principle any arrangement configured to act as odour trap in a gulley could be used.

[0026] The infiltration outlet 108 of the gulley forms a passage for water in the gulley pot 102 to drainage means. In Fig. 1, the sewer outlet 104 has a water outflow level L_{norm} that is defined by the underside 104A of opening of the sewer outlet 104. The infiltration outlets 108 are holes through the side wall of the gulley pot 102 and arranged at substantially the same height in the side walls 102B. The undersides 108A of the infiltration outlets 108 define an additional outflow level L_{drain} . The additional outflow level L_{drain} is at a lower level than the normal level L_{norm} . Furthermore, the baffle assembly 106 defines a level L_{min} by the lower side 106A of the baffle. As long as the water level is above level L_{min} , the baffle means 106 prevent escaping sewer odour from the storm water drainage system. It should be noted that the height difference between L_{drain} and L_{min} depends on the climate wherein the gulley is used. The height difference should be sufficient such that during dry periods, less water

evaporates than is present in the pot between said two levels.

[0027] The drainage means 112 is a porous layer. In an embodiment, the porous layer has a thickness of at least 4 cm, and more particular 6 cm. In an embodiment the porous layer is a layer of pervious concrete. The porous layer may be obtained by a mixture of two or three component epoxy bonding mortar and gravel with a grainsize of 4-16mm. In another embodiment gravel with a grainsize of 4-12mm is used. Other mortars and gravel sizes might be used for obtaining the porous layer as long as the layer comprises sufficient cavities and passages between the gravel to pass the water from the infiltration outlet to the soil and to buffer an amount of water. The gulley according to the present technology functions as follows. Rainwater enters the gulley pot 102 through openings of the lid or cover grate 110 on top of the gulley pot 102. As soon as the water level is above the additional outflow level L_{drain} rainwater leaves the gulley pot 102 through the one or more infiltration outlets 108 and passes the porous material of the drainage means 112 to the soil and the soil will absorb said rainwater by infiltration. When the soil absorbs less water than is supplied via the one or more infiltration outlets 108, cavities in the porous material of the drainage means will be filled with water. As soon as the cavities below the additional outflow level L_{drain} are filled with water, the water level in the gulley pot will rise. When the water level rises above the water outflow level L_{norm} in Fig. 1 liquid will flow along the lower side of the baffle through the sewer outlet 104 into a sewer system or storm water drainage system. As long as the soil is not saturated, water will be extracted from the drainage means. In normal circumstances before it is going to rain, the cavities in the drainage means will be empty and form a buffer that could be filled relatively fast via the one or more infiltration outlets when it is going to rain. Furthermore, the volume in the gulley pot defined by the height difference L_{norm} and L_{drain} functions as additional buffer that has to be filled before water will be discharged from the gulley pot through the sewer outlet into the storm water drainage system. Only during heavy rain showers, the absorbency of the soil, the buffer capacity of the drainage means and buffer capacity of the gulley pot defined by the height difference $L_{norm} - L_{drain}$ will not be sufficient to store and drain the water into the soil. In that case, water will leave the gulley via outlet 104 into the storm water drainage system. When it stops raining, the soil will absorb the water supplied by the drainage means and consequently the water level in the gulley pot will be lowered to the level L_{drain} . So, the volume of water in the gulley pot present between the levels L_{norm} and L_{drain} will be absorbed by the soil and the emptied corresponding volume is available as buffer for the next rain shower. The present technology enables the gulley to drain most of the rain water to the soil around the gulley and significantly reduces the amount of water that is drained via the storm water drainage system.

[0028] Fig. 2 shows schematically a sectional view of a second embodiment of a gulley according to the present technology. In this embodiment an existing gulley pot 102 used as part of a gulley according to the present technology. The one or more infiltration outlets 108 are drilled in the side walls such that the lower side of the one or more infiltration outlets 108 is at substantially the same level as the lower side of the sewer outlet 104. This ensures that there is enough water in the gulley to prevent escaping of sewer odours from the storm water drain system over dry periods. Furthermore, porous material is arranged against sidewalls of the gulley pot 102 from the bottom up to a level above the infiltrations outlets 108 to form the drainage means 112. An insert part 214 is positioned in the opening of the sewer outlet 104 to increase the outflow level from the gulley to the storm water drain system to level L_{new} . In this way, the discharge capacity of the drainage means 112 and soil around the gulley has to be used before rain water leaves the gulley via the sewer outlet 104. It should be noted that in this embodiment $L_{\text{drain}} = L_{\text{norm}}$. To ensure that the sewer outlet 104 has enough outflow capacity the height of the insert is preferably smaller than $H/2$, wherein H is the diameter/height of the opening of the sewer outlet 104. In an embodiment to ensure that the outflow capacity via six drain openings is sufficient, the height of the insert ($= L_{\text{new}} - L_{\text{drain}}$) is larger than $H/3$ wherein H is the diameter/height of the opening of the sewer outlet. In an embodiment, the diameter of the sewer outlet 104 is 125 mm and the diameter of the infiltration outlets 108 is 80 mm. It is noted that other diameters might be used, however preferably the diameter of the infiltration outlets is smaller than the diameter of the sewer outlet.

[0029] Fig. 3 shows schematically a sectional view of a third embodiment of a gulley according to the present technology using an existing gulley pot 102 with another type of baffle assembly 306. The one or more infiltration outlets 108 are drilled in the side walls such that the lower side of the one or more infiltration outlets 108 is at substantially the same level as the lower side of the sewer outlet 104. Furthermore, porous material is affixed against sidewalls of the gulley pot 102 from the bottom up to a level above the infiltration outlets 108 to form the drainage means 112. An insert part 314 is positioned directly in the discharge pipe coupling the gulley to the storm water drain system to increase the outflow level of the existing gulley pot 102 to the new level L_{new} .

[0030] Fig. 4 shows schematically a perspective view of a gulley pot 102 according to the subject disclosure. The gulley pot is obtained by drilling 6 infiltration outlets 108 in an existing block shaped gulley pot 102 with four flat rectangular sidewalls. Therefore, the underside of the sewer outlet 104 is at the same level as the underside of the infiltration outlets. By placing an insert in the sewer outlet as described above, the outflow level into the storm water system could be increased while the existing baffle (not shown) could be used to provide the same odour trap as in the original gulley pot. Fig. 5 shows schemat-

ically a perspective view of the gulley pot in Fig. 4 provided with a porous layer forming the drainage means 112. It shows the sewer outlet 104 at one side wall of the gulley pot and six infiltration outlets 108 at the three other side walls. Each other sidewall of the gulley pot 102 comprises two infiltration outlets. The diameter of the infiltration outlets 108 is preferably smaller than the diameter of the sewer outlet 104. The number and size of the infiltration outlets define the drain capacity water from the volume in the gulley pot 102 to the drainage means 112. The porous layer forming the drainage means 112 is applied against three side walls. Furthermore, the porous layer extends below the bottom of the gulley pot 102. Fig. 6 shows schematically a sectional view along VI-VI in Fig. 5 and Fig. 7 shows schematically a sectional view along VII-VII in Fig. 6.

[0031] In the embodiments described above, the sewer outlet 104 has a first radius and each of the infiltration outlets have a second radius, wherein the second radius is smaller than the first radius.

[0032] In the embodiments described above, the openings in the gulley pot 102 forming the infiltration outlets 108 might be used to position a filter element. The filter element is configured to prevent that the porous layer attached to the outer surface of the gulley pot gets blocked by dirt that flows into the gulley. The filter element could be a replaceable filter element. In an embodiment, the filter element is made from pervious concrete obtained by a mixture of epoxy mortar and sand with a grain-size of 0,6 - 1,2mm. The openings through the gulley pot for the infiltration outlets are filled with said mixture. The filter element is thus made of finer gravel than the gravel of the porous layer. With such a filter only small particles could pass the filter element which would subsequently not form an obstruction in the cavities of the porous layer outside the gulley pot but will flow downwards in the porous layer. The outside of the filter element might be cleaned by using a pressure washer and/or a vacuum cleaner.

[0033] Figs 8A and 8B show schematically a section view of two states of an embodiment of another embodiment of a filter element 800. Preferably, the filter element is a replaceable filter element. The filter element 800 comprises a material 802 that is impermeable for oil and permeable for water. Furthermore, the filter element 800 comprises a check valve arrangement which opens when water pressure in the gulley pot acting on the shutters is higher than the water pressure acting on the other side of the shutters and which closes when the water pressure acting on the other side of the shutters is higher than the water pressure acting on the side facing the inside of the gulley pot 102. The shutters prevent groundwater to flow into the gulley pot. In this way, ground water is blocked to flow through the gulley into the storm water drainage system or sewer system that when the ground water level is higher than the level L_{drain} .

[0034] In the embodiments described above, the drainage means 112 are a porous layer 112 attached to at

least one side wall of the gulley pot and wherein the porous layer extends fully across the hole in the sidewall of the gulley pot for the at least one infiltration outlet. Furthermore, it is shown that the porous layer might extend along a bottom wall of the gulley pot. In an embodiment the porous layer is a layer of pervious concrete. It might be clear that other materials can be used that have the characteristics of permeable for water and capacity to store temporarily an amount of water to be absorbed by the soil abutting the porous layer. Furthermore, the material of the layer should be strong enough to withstand the pressure of the soil acting on the outer surface of the layer. In an embodiment, the drainage means is a plastic tray with reinforcement ribs in which the gulley is placed and where the outer wall is perforated. The reinforcement ribs function as spacers between the outer wall and gulley pot. The space between the outer wall and the gulley pot forms the cavity to buffer rain water before it is absorbed by the soil surrounding the gulley pot.

[0035] In an alternative embodiment, the drainage means configured to transfer water from the gulley pot to the ground around the gulley. For example at least one of: infiltration pipes, perforated ducts and infiltration boxes could be coupled to the infiltration outlets. The pipes or tubes might be twisted around the gully pot. In another embodiment, the pipes or tubes extend horizontally or slope downward away from the gulley pot to enlarge the ground surface that could absorb directly water coming from the gully pot. In these embodiments, the space in the tubes will function as buffer to store temporarily rain water before it infiltrates the soil around the tubes or pipes.

[0036] The buffer to temporarily store rain water before it infiltrates the soil around the gulley pot can be extended by channels in the ground, which adjoin the porous layer affixed to the outside of the gulley pot. The channels should preferably be filled with broken stone with a grain-size of 7-32mm, wherein the channel of broken stones is encapsulated by PE filter fabric.

[0037] It might be clear for the skilled person, that the present subject technology is not limited to gulley pots with a block shape but could also be applied to gulley pots with a cylindrical sidewall.

[0038] It is contemplated that alternatives, modifications, permutations and equivalents thereof will become apparent to those skilled in the art upon reading the specification and upon study of the drawings. The invention is not limited to the illustrated embodiments. Changes can be made without departing from the scope of the appended claims.

Claims

1. Gulley (100) comprising a gulley pot (102), a sewer outlet (104) in a side wall of the gulley pot and a baffle (106) configured to act as odour trap, wherein the sewer outlet is configured to couple the gulley to a

sewer system and has an underside (104A) defining a normal outflow level L_{norm} , and wherein the baffle has an underside (106A) defining a minimal liquid level L_{min} to enable the baffle to act as odour trap;

characterized in that,

the gulley pot further comprises at least one infiltration outlet (108) through the side wall, the at least one infiltration outlet (108) being configured to transfer liquid in the gulley pot to the ground around the gulley when the liquid level in the gulley pot exceeds an additional outflow level L_{drain} , wherein $L_{\text{min}} < L_{\text{drain}} \leq L_{\text{norm}}$.

2. Gulley according to claim 1, wherein the gulley further comprises an insert part (214) configured to be inserted in the sewer outlet and further configured to increase the liquid outflow level L_{norm} for liquid in the gulley to the sewer system to a new outflow level L_{new} , wherein $L_{\text{norm}} < L_{\text{new}}$.
3. Gulley according to claim 2, wherein the sewer outlet has a height H , and $H/3 < (L_{\text{new}} - L_{\text{norm}}) < H/2$.
4. Gulley according to any of the claims 2 - 3, wherein the insert part is a removable part.
5. Gulley according to any of the claims 1 - 4, wherein the gulley comprises a filter element positioned in each of the at least one infiltration outlets.
6. Gulley according to claim 5, wherein the filter element comprises a layer of pervious concrete arranged in an opening through the side wall of the gulley pot for the infiltration outlet (108).
7. Gulley according to any of the claims 5 - 6, wherein the filter element comprises a material that is impermeable for oil and permeable for water.
8. Gulley according to any of the claims 5 - 7, wherein the filter element further comprises a check valve arrangement configured to block liquid to flow through an infiltration outlet into the gulley pot.
9. Gulley according to any of the claims 1 - 8, wherein the gulley further comprises a porous layer (112) attached to at least a portion of the outer surface of the side wall of the gulley pot, and wherein the porous layer (112) extends over openings of the at least one infiltration outlet and optionally along a bottom wall of the gulley pot.
10. Gulley according to claim 9, wherein the porous layer is a layer of pervious concrete.
11. Gulley according to claim 10 in conjunction with claim 6, wherein the layer of pervious concrete of the filter element is made of finer gravel than gravel of the

porous layer attached to the outer surface of the side wall.

12. Gulley according to any of the claims 9 - 11, wherein the porous layer has a thickness of at least 4 cm, more particular 6 cm. 5
13. Gulley according to any of the claims 1 - 12, wherein outlet (104) has a first radius and each of the at least one infiltration outlet (108) has a second radius, wherein the second radius is smaller than the first radius. 10
14. Gulley according to any of the claims 1 - 13, wherein the gulley comprises drainage means coupled to the at least one infiltration outlet (108), wherein the drainage means are configured to transfer liquid from the gulley pot to infiltrate the ground around the gulley. 15
15. Gulley according to claim 14, wherein the drainage means comprises at least one of: infiltration pipes, perforated ducts and infiltration box. 20

25

30

35

40

45

50

55

Fig. 1

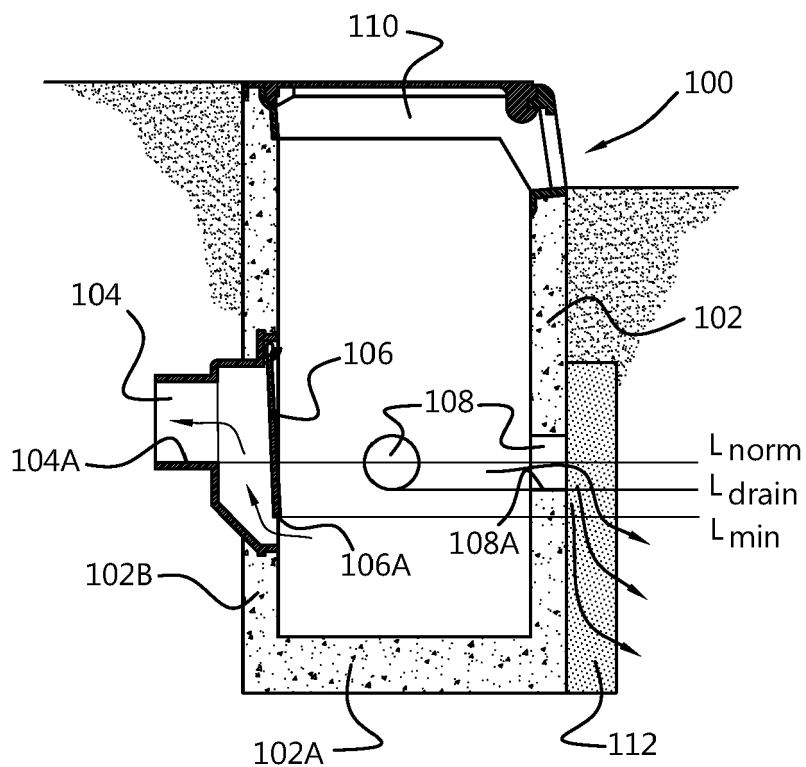


Fig. 2

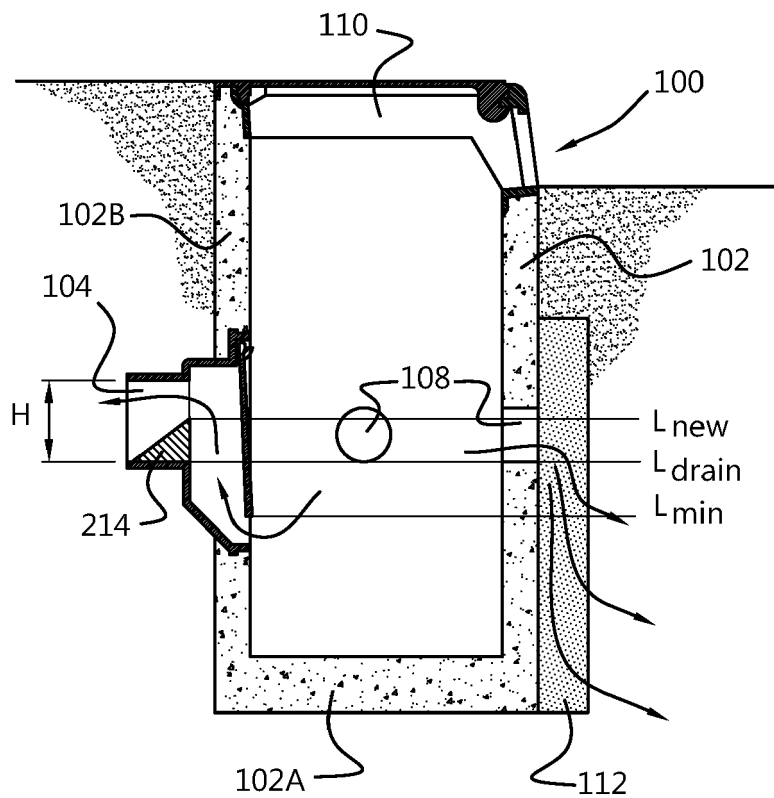


Fig. 3

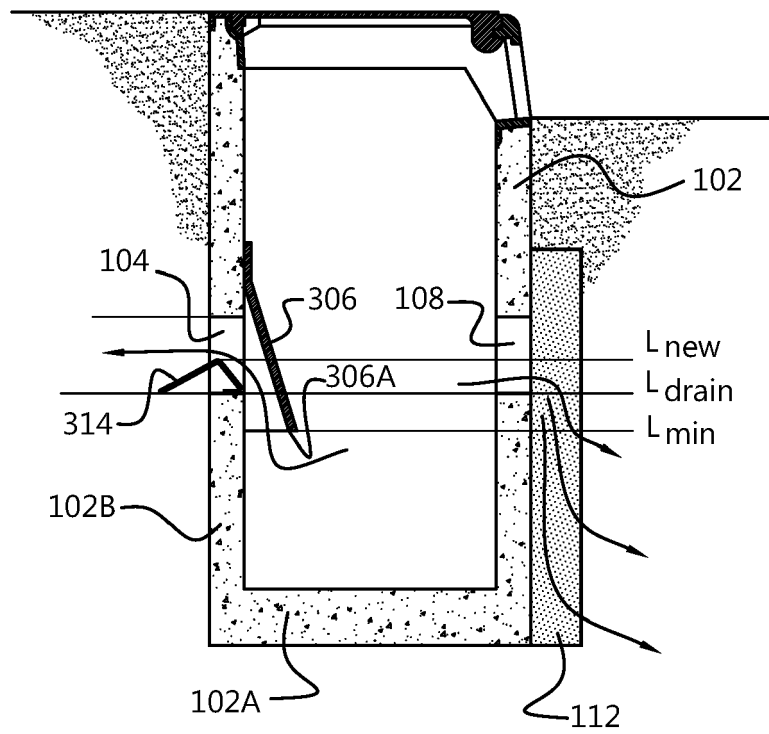


Fig. 4

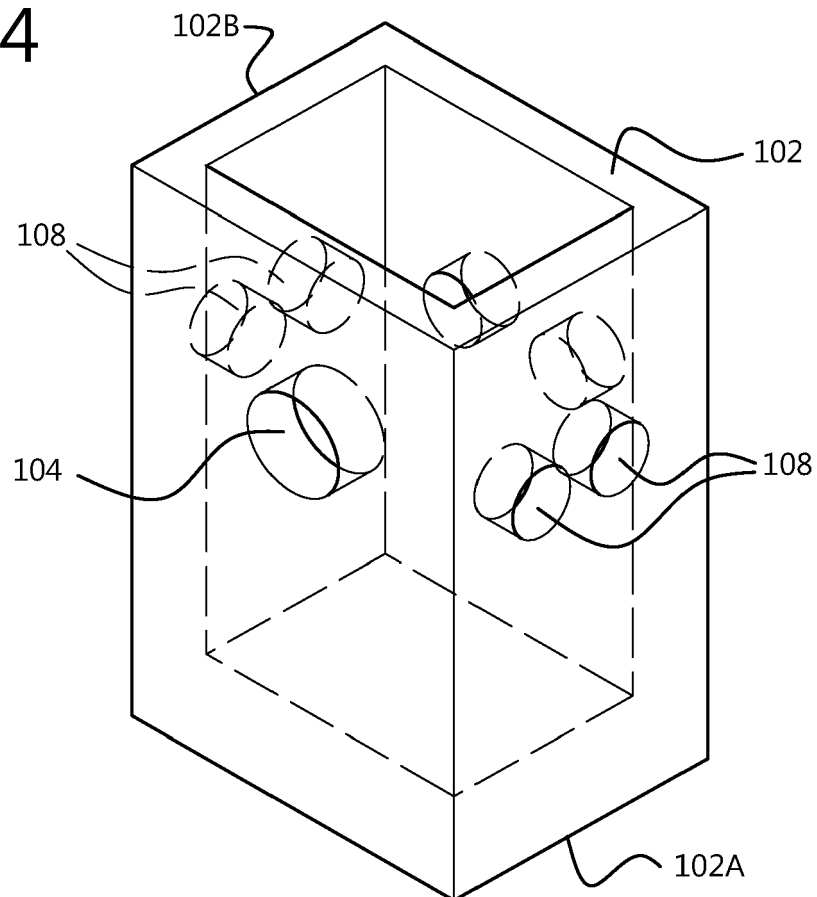


Fig. 5

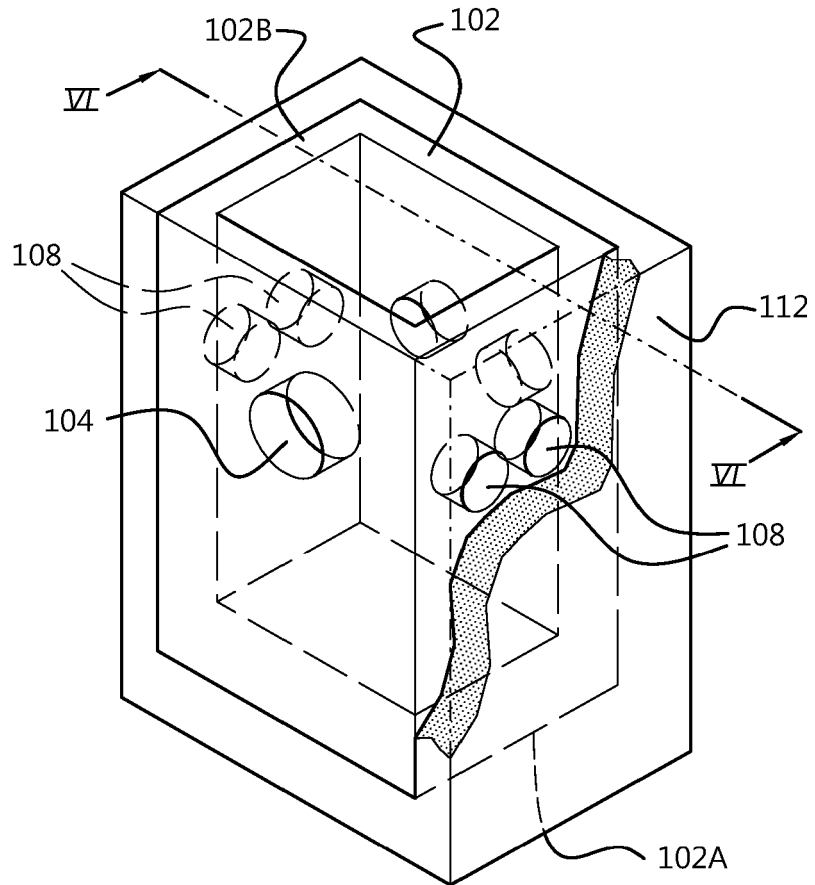


Fig. 6

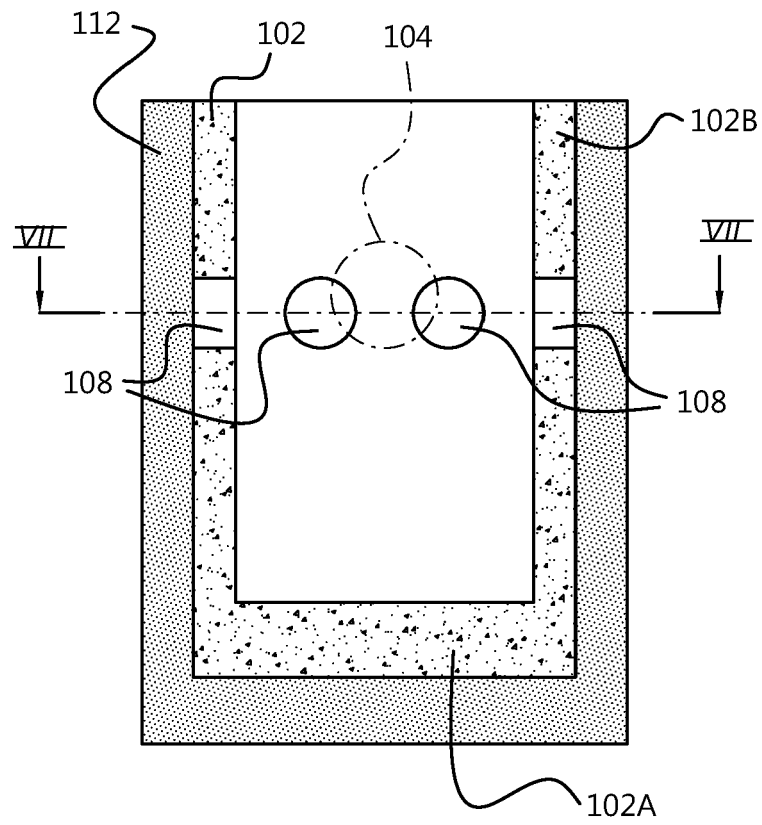


Fig. 7

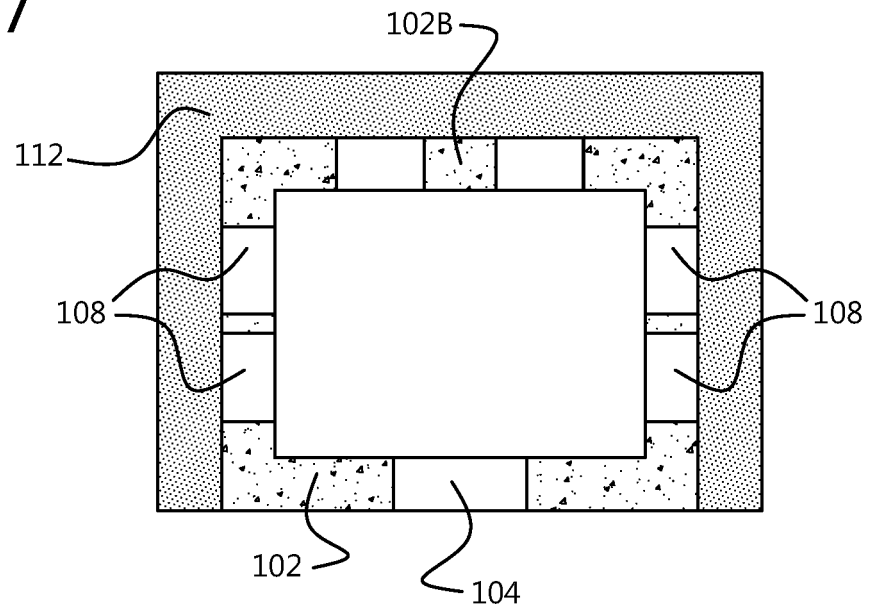


Fig. 8A

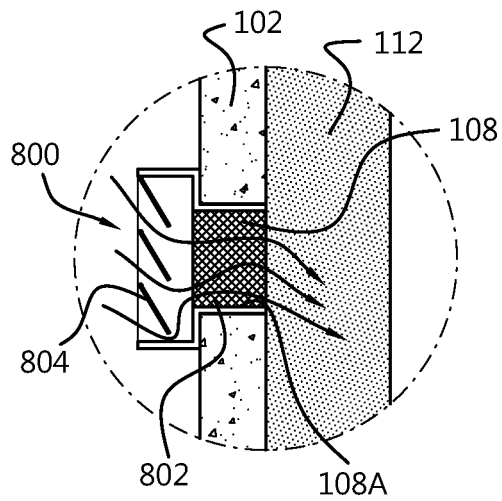
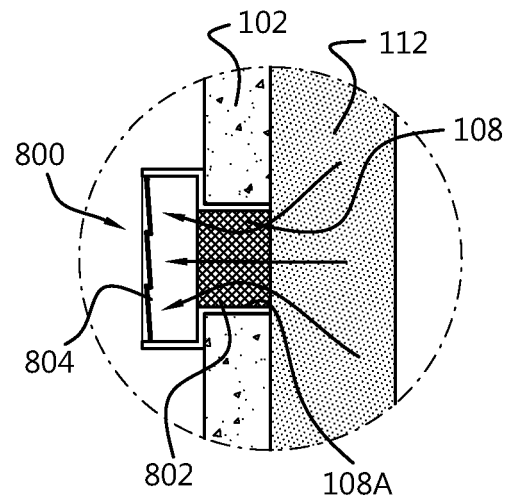


Fig. 8B





EUROPEAN SEARCH REPORT

Application Number
EP 19 21 9711

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 207 062 678 U (LIU HONGBIN) 2 March 2018 (2018-03-02) * figure 1 *	1,5-15	INV. E03F5/04
A	DE 103 48 520 A1 (FUNKE KUNSTSTOFFE GMBH [DE]) 19 May 2005 (2005-05-19) * figures 1-4 *	1	
A	KR 2014 0126467 A (PERFECT CO LTD [KR]) 31 October 2014 (2014-10-31) * figures 1,2,5 *	1	
A	DE 26 18 199 A1 (SPANBERG B) 9 December 1976 (1976-12-09) * figures *	2	
A	FR 2 903 433 A1 (REY JEAN PAUL [FR]) 11 January 2008 (2008-01-11) * figures *	1,5,9	
A	CN 206 205 290 U (HU SHIQIN) 31 May 2017 (2017-05-31) * figure 1 *	5,9,11	TECHNICAL FIELDS SEARCHED (IPC) E03F
A	WO 2011/049253 A1 (KGC CO LTD [KR]; YU HEUNG SIK [KR]; JIN SEONG KYUN [KR]) 28 April 2011 (2011-04-28) * figure 7 *	1,5-9, 12,14,15	
A	CN 106 219 758 A (YELLOW RIVER ENGINEERING CONSULTING CO LTD) 14 December 2016 (2016-12-14) * figures *	10,11	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 May 2020	Examiner Isailovski, Marko
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			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 21 9711

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-05-2020

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 207062678 U	02-03-2018	NONE	
DE 10348520 A1	19-05-2005	NONE	
KR 20140126467 A	31-10-2014	NONE	
DE 2618199 A1	09-12-1976	DE 2618199 A1	09-12-1976
		DK 225176 A	24-11-1976
		FI 761062 A	24-11-1976
		JP S51141456 A	06-12-1976
		NO 148603 B	01-08-1983
		SE 384703 B	17-05-1976
FR 2903433 A1	11-01-2008	NONE	
CN 206205290 U	31-05-2017	NONE	
WO 2011049253 A1	28-04-2011	KR 100939173 B1	28-01-2010
		WO 2011049253 A1	28-04-2011
CN 106219758 A	14-12-2016	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- NL 1005621 [0003]
- EP 2796628 A1 [0004]
- CN 207062678 U [0005]
- CN 206205290 U [0006]
- NL 100561 C2 [0025]
- NL 2004578 C [0025]