

A DEVICE AND A METHOD FOR FILTERING STORMWATER

TECHNICAL FIELD

5 The invention relates to a device and a method for filtering stormwater. More specifically the present invention relates to a device and a method for filtering stormwater inside a storm drain to remove pollutants from it.

 Stormwater, which also is called urban runoff, is surface runoff of rainwater, melted snow or ice, wash water or similar from different types of
10 surfaces. Such surfaces can be parking lots, sidewalks, roofs, and similar surfaces, sometimes referred to as impervious surfaces. Water running off from such surfaces tends to become polluted by e.g. gasoline, oil, heavy metals, trash, fertilizers, pesticides and other pollutants. During rain these surfaces carry polluted stormwater to storm drains. Storm drains can be
15 connected to a drainage system for discharge into receiving surface waters, such as a canal, river, lake, reservoir, sea, ocean, or other surface water, with or without treatment of the stormwater before discharge.

 Storm drains generally comprise a vertical pipe having an inlet, such as a horizontal grated inlet or a side inlet, being connected to a drainage system.
20 Such storm drains can comprise a catchbasin, also called sump or gully-pot, for catching small objects, such as sediment, sand, gravel, pebbles, twigs, trash and similar. Then, the catchbasin serves as a water-filled trap for trapping objects and prevent such objects from entering the subsequent drainage system. Such catchbasins also prevent gases from the drainage
25 system from escaping. Storm water from the top of the catchbasin drains into the subsequent drainage system. The catchbasins can be emptied by means of vacuum trucks at suitable time intervals.

PRIOR ART

There are different types of devices for filtering stormwater in the prior art. Such prior art devices, such as those disclosed in US 2005/230317A and US 5 364 535 A, comprise a filter for positioning in a storm drain. However,
5 there is a need for an improved device for filtering stormwater inside a storm drain to remove pollutants from it.

One problem with such prior art devices for filtering stormwater is that they may be inefficient and do not remove pollutants satisfactorily.

Another problem with such prior art devices for filtering stormwater is
10 that it may be difficult to install them inside a storm drain and also to remove them from the storm drain, e.g. to be replaced.

One drawback with such prior art devices for filtering stormwater is that they may impede the function of the storm drain.

15 SUMMARY OF THE INVENTION

An object of the present invention is to avoid the drawbacks and problems of the prior art devices. The device and method according to the present invention result in a reliable and efficient filtering of stormwater as well as easy installation and replacement. In some embodiments, the present
20 invention results in a possibility to monitor the device in an efficient manner.

The present invention relates to a device for filtering stormwater inside a storm drain, wherein the device comprises a filter unit and a floating carrier for carrying the filter unit, wherein the filter unit comprises a bottom portion and a top portion, and wherein the carrier comprises a recess for receiving
25 the bottom portion of the filter unit, which recess extends axially through the carrier so that the filter unit can be arranged on top of the carrier while the bottom portion of the filter unit is arranged in the recess, whereby at least a part of the bottom portion of the filter unit is adapted to be arranged below a surface of the stormwater inside the storm drain when the device is arranged
30 in a floating condition inside the storm drain, and through apertures extending

radially from an outer surface of the carrier to the recess, so that stormwater can pass through the apertures and reach the recess when the device is arranged in a floating condition inside the storm drain.

A major portion of the pollutants in stormwater is present at the surface of the stormwater inside the storm drain, also sometimes called the surface film. A part of the bottom portion of the filter unit, when the device is arranged in a floating condition in a storm drain, is arranged at the surface by means of the floating carrier. Further, the apertures in the floating carrier result in that stormwater at said surface may engage the bottom portion of the filter unit to remove pollutants accumulated at the surface of the stormwater. Further, the structure of the device results in easy installation of the device and easy replacement of the filter unit. For example, the filter unit is detachable from the carrier, wherein the filter unit may be replaced and the carrier may be reused.

The top portion of the filter unit may be formed with an inclined surface, e.g. by the filter unit being tapered or cone shaped, for guiding non-filterable objects to the surface of the stormwater inside the storm drain. When non-filterable objects, such as twigs, trash, sand and similar, fall through the storm drain it will then hit the inclined surface and continue along therewith to the surface of stormwater and then continue further to a catchbasin in the storm drain. Hence, non-filterable objects are prevented from accumulating on top of the filter unit to impede its function.

The filter unit may comprise a plurality of different filter layers. For example, the filter unit may comprise one or more of an absorbing material, a heavy metal filtering peat and activated carbon. The filter unit may comprise a first filter layer including a first absorbing material, a second filter layer including heavy metal filtering peat, a third filter layer including activated carbon and a fourth filter layer including a second absorbing material, which layers may be arranged in sequence or contiguous sequence. The first filter unit may be arranged at the top and the fourth filter unit may be arranged at the bottom. The fourth filter layer may be least partially arranged in the bottom

portion of the filter unit. Hence, the filter unit is arranged for efficient and reliable filtering of pollutants from stormwater.

The floating carrier may be made of a light-weight material for good floating capabilities. For example, the carrier may be made of expanded plastic, such as expanded polystyrene.

The device may be narrower than the storm drain in which it is intended to be arranged, thereby allowing formation of a gap between the device and an interior wall of the storm drain.

The device may comprise a sensor for monitoring the status of the device and the pollutants in the storm drain. For this purpose, the device may comprise an RFID transponder having an ID-number and a pressure sensor for monitoring the depth of the device in the stormwater and thus the weight of the device, from which the amount of collected pollutants may be calculated. Also unexpected events resulting in sudden heavy pollution of a storm drain may be detected.

According to another aspect, the invention also relates to a method of filtering stormwater in a storm drain, including the steps of

- a) providing a filter unit having a bottom portion and a top portion,
- b) providing a floating carrier having a recess extending axially through the carrier so that the filter unit may be arranged on top of the carrier while the bottom portion of the filter unit is arranged in the recess and through apertures extending radially from an outer surface of the carrier to the recess,
- c), arranging the bottom portion of the filter unit in the recess of the carrier,
- d) arranging the carrier and the filter unit in the storm drain, so that at least a part of the bottom portion of the filter unit is arranged below a surface of the storm water inside the storm drain and at least a part of the top portion is arranged above said surface,
- e) providing stormwater to the bottom portion of the filter unit through the apertures of the carrier, and

f) by means of the top portion of the filter unit, receiving at least a major part of any stormwater entering the storm drain.

Further characteristics and advantages of the present invention will become apparent from the description of the embodiments below, the
5 appended drawings and the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described more in detail with the aid of embodiments and with reference to the appended drawings, in which:

- 10 Fig. 1 is a schematic view of a device for filtering stormwater in accordance with one embodiment of the invention, wherein the device is installed in a storm drain,
- Fig. 2 is a schematic section view the device in Fig. 1, wherein a filter unit and a floating carrier of the device have been separated from each
15 other, and
- Fig. 3 is a schematic section view of the device according to one embodiment, wherein the device is partially immersed in stormwater.

DETAILED DESCRIPTION

- 20 In Fig. 1 a device 10 for filtering stormwater according to one embodiment of the present invention is illustrated schematically. In Fig. 1 the device 10 is arranged in a storm drain 11 having an inlet 12 for incoming storm water, an outlet 13 for discharging storm water, and a catch basin 14 for trapping objects, such as sediment, sand, gravel, pebbles, twigs, trash and
25 similar. Hence, the device 10 is arranged for filtering stormwater inside the storm drain 11 to remove pollutants from the storm water before discharge from the storm drain 11. The storm drain 11 according to Fig. 1 comprises an outlet pipe 15 forming a water trap in a conventional manner. The storm drain 11 is arranged in a vertical direction and extends axially, wherein the outlet
30 pipe 15 extends radially. A portion of the outlet pipe 15 extends upwards,

wherein the water seals the inlet 12 of the storm drain 11 from the outlet 13. In Fig. 1, the surface of the water inside the storm drain 11 is indicated by the dashed line A. Alternatively, the storm drain 11 is arranged without a water trap. The outlet 13 is connected to a subsequent drain system 16, such as a sewer or similar.

The device 10 comprises a filter unit 17 and a floating carrier 18 for carrying the filter unit 17. The filter unit 17 is arranged for filtering the stormwater to remove pollutants therefrom. The filter unit 17 is arranged on top of the carrier 18, so that the filter unit 17 is arranged between the inlet 12 of the storm drain 11 and the carrier 18. The carrier 18 is arranged between the filter unit 17 and the catchbasin 14 or the bottom of the storm drain 11.

The device 10 is arranged to form a gap 19 between the device 10 and an interior wall 20 of the storm drain 11. The gap 19 is arranged so that non-filterable objects, such as sediment, sand, gravel, pebbles, twigs, trash and similar can pass by the device 10 to the catchbasin 14. Hence, the device 10 is arranged to cover less than 100% of the cross section area of the storm drain. For example, the device 10 is arranged to cover 50-90% or 70-80% of the cross section area of the storm drain to form a suitable gap 19. For example, the filter unit 17 is arranged is arranged to cover 50-90% or 70-80% of the cross section area of the storm drain.

With reference also to Figs. 2 and 3 the filter unit 17 comprises a bottom portion 21 and a top portion 22. The bottom portion 21 is arranged to engage the surface A of the stormwater inside the storm drain 11 to remove pollutants at the surface or in a surface film. For example, the bottom portion 21 is arranged to be at least partially submerged in the stormwater inside the storm drain 11, i.e. at least a portion of the bottom portion 21 is arranged to be below the surface A of the stormwater inside the storm drain 11. The top portion 22 is arranged to be above the surface A. For example, the bottom portion 21 is bevelled and more narrow in its lowermost part.

The filter unit 17 comprises an inclined surface 23 for guiding non-filterable objects to the gap 19. For example, the top portion 22 of the filter

unit 17 comprises the inclined surface 23 for guiding non-filterable objects to the surface of the stormwater inside the storm drain. According to the embodiment of the drawings the top portion 22 of the filter unit 17 is tapered, wherein an apex is arranged upwards in a direction towards the inlet 12 of the storm drain 11 and away from the carrier 18, so that the inclined surface 23 extends between the apex and the widest portion of the device to guide objects along the inclined surface 23 to the gap 19. For example, the filter unit 17 is arranged as a cone. The bottom portion 21 of the filter unit 17 is arranged narrower than the widest portion of the top portion 22 thereof.

10 The filter unit 17 is arranged for filtering different types of pollutants from the stormwater. According to one embodiment the filter unit comprises a plurality of filter layers, such as a first filter layer 24 including a first absorbing material, a second filter layer 25 including heavy metal filtering peat, a third filter layer 26 including activated carbon and a fourth filter layer 27 including a second absorbing material. Optionally, the filter unit comprises additional filtering layers. For example, said filter layers 24-27 are arranged in sequence, such as contiguous sequence, from the top to the bottom, so that the first filter layer 24 is arranged in the top portion 22 of the filter unit 17 in a direction towards the inlet 12 of the storm drain 11 and so that the fourth filter layer 27 at least partially is arranged in the bottom portion 21 of the filter unit 17 in a direction towards the carrier 18. For example, the first absorbing material of the first filter layer 24 comprises a material having capillaries, wherein the stormwater enters said capillaries by capillary force. For example, the absorbing material of the first filter layer 24 is arranged to absorb 10-20 or 18 times of its own weight. According to one embodiment, the absorbing material of the first filter layer 24 is arranged so that the capillaries are closed when they are full. For example, the absorbing material of the first filter layer 24 is a synthetic fibre, such as a granular synthetic fibre. For example, the absorbing material of the first filter layer 24 complies with the requirements set out in table 1 below.

Table 1

Product	Rating	
	20 °C	60 °C
Acids		
Boric acid	2	3
Boric acid	2	3
Hydrobromic acid 15 %	2	3
Chloric acid	2	3
Cyanocyanic acid	2	3
Hydrofluoric acid	2	2
Phosphoric acid 25 %	2	2
Phosphoric acid 85 %	2	2
Phthalic acid	2	3
Tannic acid	2	3
Chromic acid	2	3
Maleic acid	2	3
Oxalic acid	2	3
Oxalic acid	2	3
Nitric acid 5 %	3	3
Nitric acid 65 %	3	3
Chlorosulfonic acid 10 %	2	3
Chlorosulfonic acid 37 %	2	3
Butyric acid	2	3
Sulphuric acid 10 %	2	3
Sulphuric acid 78 %	2	3
Sulphuric acid 93 %	2	3
Tartaric acid	2	3
Acetic acid 10 %	2	3
Acetic acid 50 %	2	3
Acetic acid 75 %	2	3
Acetic acid 100 %	2	3
Perechloric acid	2	3
Doses		
Aqua ammonia	2	3
Calcium hydroxide	2	3
Potassium hydroxide	2	3
Caustic soda	2	3
Acid salt	2	3
Basic salt	2	3
Neutral salt	2	3
Various salt		
Potassium bicarbonate	2	3
Potassium permanganate	2	3
Sodium cyanide	2	3
Sodium ferricyanide	2	3
Sodium hypochlorite	2	3
Organic Substances, Solvents		
Acetone	2	3
Aniline	2	3
Benzol	2	3
Petrol	2	3
Butyl alcohol	2	3
Ethyl acetate	2	3
Ethyl alcohol	2	3
Ethyl dichloride	2	3
Ethyl ether	2	3
Phenol	2	3
Formalin 37%	2	3
Heptanes	2	3
Chlorobenzene	2	3
Chloroform	2	3
Carbon disulphide	2	3
Carbon tetrachloride	2	3
Methyl alcohol	2	3
Methylene (dichloride)	2	3
Methyl ethyle ketone	2	3
Xtirobenzene	2	3
Toluene	2	3
Trichloroethylene	2	3
Gases		
Chlorine (damp)	2	3
Chlorine (dry)	2	3
Chlorine dioxide	2	3
Carbon monoxide	2	3
Sulphur dioxide (damp)	2	3
Sulphur dioxide (dry)	2	3
Hydrogen sulphide	2	3

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5 The second filtering layer 25 comprises, for example, a heavy metal filtering peat in the form of granules. For example, the second filtering layer 25 is arranged for removing heavy metals, such as lead, mercury, cadmium, etc., from the stormwater.

The third filter layer 26 is arranged to remove pollutants remaining in the stormwater after having passed the first and second filter 24, 25. According to one embodiment, the activated carbon of the third layer 26 is formed as granules. For example, the activated carbon of the third layer 26 is formed as granules having a particle size of 1-10 mm, 2-7 mm or 3-5 mm. For example, the active carbon is a conventional active carbon for water treatment.

The fourth filter layer 27 is arranged for removing pollutants at the surface A of the stormwater inside the storm drain. Hence, the fourth filter layer 27 is arranged to be at the surface A, wherein a portion of the fourth

Page 8a, Table 1

Product			Product			Product		
		Rating			Rating			Rating
		20°C			20°C			20°C
		60°C			60°C			60°C
Acids			Bases			Organic Substances, Solvents		
Benzoic acid	1	2	Aqua ammonia	1	1	Acetone	3	4
Boric acid	1	1	Calciumhydroxide	1	1	Aniline	1	1
Hydrobromic acid 25%	2	3	Potassiumhydroxide	1	1	Benzol	3	4
Citric acid	1	1	Caustic soda	1	1	Petrol	4	4
Hydrocyanic acid	2	2	Acid salt	1	1	Butyl alcohol	1	1
Hydrofluoric acid	2	2	Basic salt	1	1	Ethyl acetate	2	4
Phosphoric acid 25%	1	1	Neutral salt	1	1	Ethyl alcohol	1	1
Phosphoric acid 85%	1	1	Various salt			Ethyl dichloride	3	4
Phthalic acid	1	1	Potassium bicarbonate	1	2	Ethyl ether	4	4
Tannic acid	1	1	Potassium permanganate	1	2	Phenol	2	2
Chromic acid	1	2	Sodium cyanide	1	1	Formalin 37%	1	2
Maleic acid	1	1	Natriumferricyanid	1	2	Heptanes	3	4
Oleic acid	2	3	Sodium hypochlorite	2	3	Chlorobenzene	3	4
Oxalic acid	1	1				Chloroform	4	4
Nitric acid 5%	2	3				Carbon disulphide	4	4
Nitric acid 65%	4	4				Carbon tetrachloride	4	4
Chlorhydric acid 10%	1	1				Methyl alcohol	1	1
Chlorhydric acid 37%	2	3				Methylene (di)chloride	4	4
Butyric acid	1	1				Methyl ethyle ketone	3	4
Sulphuric acid 10%	1	1				Nitrobenzene	3	4
Sulphuric acid 78%	2	4				Toluene	3	4
Sulphuric acid 93%	3	4				Trichlorethylene	4	4
Tartaric acid	1	1				Gases		
Acetic acid 10%	1	1				Chlorine (damp)	2	4
Acetic acid 50%	1	1				Chlorine (dry)	2	4
Acetic acid 75%	1	1				Carbon dioxide	1	1
Acetic acid 100%	2	3				Carbon monoxide	1	1
Perchloric acid	1	2				Sulphur dioxide (damp)	2	3
			Excellent (no attack)		1	Sulphur dioxide (dry)	2	3
			Good (no significant attack)		2	Hydrogen sulphide	1	1
			Acceptable (light attack, limited use)		3			
			Unacceptable (significant attack)		4			
			Inferior (possible cracking or dissolving)		5			

filter layer 27 is submerged in the stormwater. According to one embodiment, the fourth filter layer 27 comprises an absorbing material of a similar type as the first filter layer 24, e.g. complying with the requirements set out in table 1 above. For example the absorbing material of the fourth filter layer is a
5 synthetic fibre felt or fleece.

The filter unit 17 comprises, for example, a cover forming a stormwater permeable housing. For example, the cover is a perforated plastic cover, wherein the perforations have a diameter of 0.1-5 mm, 0.5-2 mm or about 1 mm. The cover is not disclosed in the drawings.

10 The carrier 18 is arranged for carrying the filter unit 17, so that the top portion 22 of the filter unit 17 is arranged above the surface A of the stormwater inside the storm drain 11 and at least a part of the bottom portion 21 of the filter unit 17 is arranged below said surface A. For example, the carrier 18 is arranged in a floating material, i.e. a material having less density
15 than water, such as an expanded plastic material. For example, the carrier 18 is formed in expanded polystyrene.

The carrier 18 comprises a recess 28 for receiving the bottom portion 21 of the filter unit 17. The recess 28 extends axially through the carrier 18, so that the filter unit 17 can be arranged on top of the carrier 18 while the
20 bottom portion 21 is arranged in the recess 28. When arranged in a storm drain 11 the device 19 is floating, wherein the filter unit 17 is arranged to engage incoming stormwater, which is illustrated by means of the arrows B in Fig. 3. For example, the top portion 22 of the filter unit 17 is primarily arranged to engage incoming stormwater B falling substantially in a vertical
25 direction. When incoming stormwater come into contact with the filter unit 17 non-filterable objects are guided by the shape of the filter unit 17 to the gap 19 and the surface A of the stormwater in the gap 19. The filterable part of the stormwater is filtered by the filter unit 17. For example, a main part of incoming stormwater B initially engages the first filter layer 24, wherein
30 stormwater passing the first filter layer 24 then engages the second filter layer 25 and subsequently the third and fourth filter layers 26, 27.

According to the illustrated embodiment the recess 28 is optionally bevelled and wider in its top to guide the bottom portion 21 into the recess 28 and facilitate assembly of the device 10. For example, the carrier 18 is provided with an optional flange 29 forming a wider top of the carrier 18 to support the filter unit 17.

The carrier 18 comprises through apertures 30 for conducting stormwater into the recess 28 and into contact with the bottom portion 21 of the filter unit 17 for removal of pollutants in the stormwater at the surface A. The apertures 30 extend radially from an outer surface of the carrier 18 to the recess 28. Hence, when the device 10 is arranged in a storm drain 11 the carrier 18 is partially submerged in the stormwater and thus positioned below the surface A, wherein at least a part of the recess 28 and at least some of the apertures 30 are located below the surface A of the stormwater inside the storm drain 11. Then, at least a part of the bottom portion 21 of the filter unit 17, i.e. at least a part of the fourth filter layer 27, is arranged in the recess 28 and below the surface A. Consequently, stormwater at the surface A is conducted radially through the apertures 30, which is illustrated by the arrows C. The radially conducted stormwater C is conducted into the recess 28 and into contact with the filter unit 17 for removing pollutants in the stormwater. For example, the stormwater C is conducted to the fourth filter layer 27 in the bottom portion 21 of the filter unit 17, so that pollutants on the surface A or close to the surface A engages the filter unit 17 and are removed by it.

According to one embodiment of the invention the device 10 comprises a sensor 31 for detecting the filter capacity of the filter unit 17. For example, the sensor 31 is a pressure sensitive sensor for detecting the surrounding pressure. The sensor 31 is arranged below the surface A of the stormwater inside the storm drain 11. Said pressure is readily calculated to obtain the depth of the device 10 in the stormwater, wherein a change in the depth of the device 10 can be calculated. Said depth corresponds to the weight of the device 10, wherein the added weight, i.e. the weight of filtered material in the filter unit 17, is calculated. Said weight is compared to the total weight

capacity of the filter unit 17, wherein the remaining filter capacity is calculated.

The sensor 31 is, for example, connected to a central monitoring unit for monitoring a plurality of devices 10 arranged in different storm drains 11.

According to one embodiment, the sensor 31 is included in an RFID

- 5 transponder having an ID-number and the pressure sensor to detect the weight of the device and send a signal to the central monitoring unit when a predetermined weight has been exceeded or a sudden weight change has been detected. When a predetermined weight of the device 10 has been exceeded it can indicate that the filter unit 17 is full and needs to be replaced.
- 10 The detection of a sudden weight change can indicate a substantial and local discharge of pollutants, which can be related to an event, such as a traffic accident or any other event.

CLAIMS

1. A device (10) for filtering stormwater inside a storm drain (11), wherein the device (10) comprises a filter unit (17) and a floating carrier (18) having an
5 axis for carrying the filter unit (17),
wherein the filter unit (17) comprises a bottom portion (21) and a top portion (22), **characterized** in that the carrier (18) comprises
a recess (28) for receiving the bottom portion (21) of the filter unit (17), which recess (28) extends axially through the carrier (18) so that the
10 filter unit (17) can be arranged on top of the carrier (18) while the bottom portion (21) of the filter unit (17) is be arranged in the recess (28), whereby, in use, at least a part of the bottom portion (21) of the filter unit (17) is arranged below a surface (A) of the stormwater inside the storm drain (11) when the device (10) is arranged and floating therein; and
15 through apertures (30) extending radially from an outer surface of the carrier (18) to the recess (28), so that stormwater at the surface (A) can pass through the apertures (30) and reach the bottom portion (21) of the filter unit (17) .
- 20 2. A device according to claim 1, wherein the top portion (22) of the filter unit (17) comprises an inclined surface (23) for guiding non-filterable objects to the surface (A) of the stormwater inside the storm drain (11).
3. A device according to claim 2, wherein the top portion (22) of the filter unit
25 (17) is tapered.
4. A device according to any of the preceding claims, wherein the filter unit (17) comprises an absorbing material, a heavy metal filtering peat and activated carbon.
- 30 5. A device according to claim 4, wherein the filter unit (17) comprises a first filter layer (24) including a first absorbing material, a second filter layer (25)

including heavy metal filtering peat, a third filter layer (26) including activated carbon and a fourth filter layer (27) including a second absorbing material.

6. A device according to claim 5, wherein the filter layers (24-27) are
5 arranged in sequence and wherein the fourth filter layer (27) at least partially is arranged in the bottom portion (21) of the filter unit (17).
7. A device according to claim 5 or 6, wherein the first absorbing material of the first filter layer (24) comprises a granular synthetic fibre, the heavy metal
10 filtering peat of the second filter layer (25) is formed as granules, the activated carbon of the third filter layer (26) is formed as granules, and the absorbing material of the fourth filter layer (27) is a synthetic fibre felt or fleece.
8. A device according to any of the preceding claims, wherein the floating
15 carrier (18) is made of expanded plastic, such as expanded polystyrene.
9. A device according to any of the preceding claims, wherein the filter unit (17) comprises a perforated plastic cover.
- 20 10. A device according to any of the preceding claims, wherein the device (10) is narrower than the storm drain (11) in which it is intended to be arranged to form a gap (19) between the device (10) and an interior wall (20) of the storm drain (11).
- 25 11. A device according to any of the preceding claims, wherein the device comprises an RFID transponder having an ID-number and a pressure sensor (31) for monitoring the weight of the device.
12. A method of filtering stormwater in a storm drain (11), including the steps
30 of
- a) providing a filter unit (17) having a bottom portion (21) and a top portion (22),

- b) providing a floating carrier (18) having an axis and a recess (28) extending axially through the carrier (18) so that the filter unit (17) can be arranged on top of the carrier (18) while the bottom portion (21) of the filter unit (17) is arranged in the recess (28); and through apertures (30) extending
- 5 radially from an outer surface of the carrier (18) to the recess (28),
- c) arranging the bottom portion (21) of the filter unit (17) in the recess (28) of the carrier (18),
- d) arranging the carrier (18) and the filter unit (17) in the storm drain (11), so that at least a part of the bottom portion (21) of the filter unit (17) is
- 10 arranged below a surface (A) of the storm water inside the storm drain (11) and at least a part of the top portion (22) is arranged above said surface (A),
- e) providing stormwater to the bottom portion (21) of the filter unit (17) through the apertures (30) of the carrier (18), and
- f) by means of the top portion (22) of the filter unit (17), receiving at
- 15 least a major part of any stormwater entering the storm drain (11).

13. A method according to claim 12, including the step of arranging the carrier (18) and the filter unit (17) in the storm drain (11), so that a gap (19) is formed between them and an interior wall of the storm drain (11).

20

14. A method according to claim 13, including the step of guiding non-filterable material to the gap (19) by means of an inclined surface (23) of the top portion (22) of the filter unit (17).

25 15. A method according to any of claims 12-14, including the steps of detecting the weight of the device by means of an RFID transponder having a pressure sensor (31), and sending a signal to a central monitoring unit when a predetermined weight has been exceeded or a predetermined weight change during a specific time period has been exceeded.