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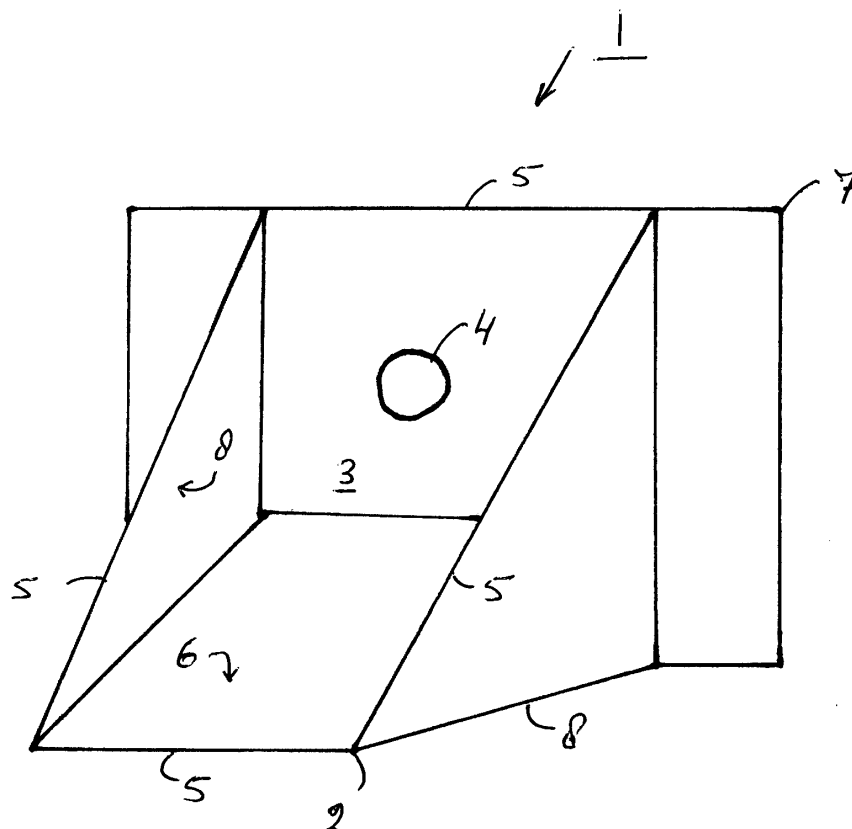
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(54) **Discharge trough for a water drain opening onto an embankment**

(57) There is disclosed a facility for water drainage on an embankment of an earthen structure. The facility comprises a discharge trough to be installed in the embankment, into which one or more outflow openings of the water drain open, which discharge trough is bounded by an upper edge extending below the surface level of

the embankment. As a result, neither the water drain nor the discharge trough disposed under the upper edge can be damaged by machines or means of transport driving over the embankment, or by rotating blades mowing the embankment. Furthermore, the trough is easily discernible in the field in connection with possible maintenance work on a water drainage system.



Description

[0001] The present invention relates to a facility for the drainage of water on an embankment.

[0002] The present invention further relates to a discharge trough suitable for use in said facility for water drainage.

[0003] Such a facility in the form of a water drain, such as a drain for drainage water, which opens onto the embankment, is known.

[0004] A drawback of the known facility is that when the "greenery", such as grass, reed or the like, on the embankment is mown with a certain regularity, the facility is frequently damaged during said mowing. Repairs are then needed in order to prevent the drain from clogging up.

[0005] The object of the present invention is to provide an improved facility for the drainage of water drainage on the embankment which is less vulnerable to being damaged during maintenance of plants and grasses that grow on the embankment.

[0006] In order to accomplish that object, the facility according to the invention is **characterised in that** it comprises a discharge trough to be installed in the embankment, into which one or more outflow openings of the water drain open, which discharge trough is bounded by an upper edge extending below the surface level of the embankment.

[0007] The advantage of the facility according to the invention is that the upper edge of the discharge trough into which the water from the water drain can flow is disposed below the surface level. As a result, neither the water drain nor the discharge trough disposed below the upper edge can be damaged by machines or means of transport driving over the embankment, or by rotating blades mowing the embankment.

[0008] The advantage of the facility according to the invention, apart from the improved discernibleness in the field, is that regularly recurring repairs are no longer needed, because the facility will remain functional and fully intact. As a result, the community no longer needs to bear the cost of repairs on the facility.

[0009] Another advantage is the fact that the outflow opening of the water drain, which now opens into the outflow space of the discharge trough, will no longer clog up, so that it will function better and longer.

[0010] One embodiment of the facility according to the invention is **characterised in that** the discharge trough comprises a bottom over which water from said at least one water drain can flow out.

[0011] Advantageously, water that flows out over the bottom will not wear away said bottom, whilst furthermore the water drain will remain free from mowed-off greenery material and not clog up.

[0012] Preferably, the bottom of the discharge trough slopes down in the same direction as the embankment, so that the discharged water, such as drainage water, can drain away along the embankment without impedi-

ment.

[0013] Another embodiment of the facility according to the invention is **characterised in that** the slope of the upper edge of the discharge trough corresponds to the slope of the embankment.

[0014] In this way the facility can be readily adapted for use in all kinds of embankments exhibiting a certain slope, in which the discharge trough is entirely concealed and can be installed in a simple manner, for example by digging it into the ground of the embankment.

[0015] The facility for water drainage and the discharge trough according to the present invention will now be explained in more detail with reference to the figure below, which shows a currently preferred embodiment of a removable discharge trough of the water drainage facility.

[0016] The figure shows a facility 1 for water drainage to be installed in an embankment (not shown), i.e. the sloping side of a dyke, elevation, bank of earth, railroad or, for example, an earthen structure or a rampart. The facility in particular comprises a removable discharge trough 2 to be dug into the embankment, which can thus be installed in a simple manner without using machines. If desired, such a trough 2 might also be entirely or partially built in bricks and subsequently be concealed in the earth of the embankment, in which case it is not removable. The trough 2 encloses a space 3, into which one or more outflow openings 4 of a water drain open. The water drain may for example form part of a drainage system for water that normally drains away over the embankment. The discharge trough 2 is bounded by an upper edge 5, which is inclined in the figure, and is installed in the embankment in such a manner that the upper edge 5 of the trough 2 extends just below the surface level of the embankment. The discharge trough 2 protects in particular the outflow openings 4 of the water drain and contributes to the discernibleness thereof in the field, so that finding it for possible maintenance on the drainage system will take less time than previously. Furthermore, the embankments are mowed regularly within the framework of the maintenance of earthen structures, and because in practice not a single part of the trough 2 projects above the surface level, mowing can simply take place across the facility 1 that is installed flush with the surface in the field, without the facility being damaged.

[0017] The discharge trough 2 has a bottom 6, which generally comprises a bottom plate, over which water from the drain can drain away over the embankment. If the bottom 6 of the discharge trough 2 slopes down in the same direction as the embankment, no water will remain behind in the trough 2, and grass and plant remnants will automatically be washed out, so that the space 3 is self-cleaning.

[0018] In the illustrated embodiment, the discharge trough 2 is provided with a bulkhead 7, through which said at least one drain passes, and in which the outflow opening 4 of the drain can be fixed, if desired. Side walls 8 mounted between the bulkhead 7 and the bottom 6 of the discharge trough 2 contribute towards obtaining a

solid, box-shaped construction of the possibly removable trough 2.

[0019] In practice, the slope of the upper edge 5 of the discharge trough 2 will correspond to the slope of the embankment, so that the bulkhead 7, which protects the portion of the earth of the embankment thereabove from sliding down, can be dug into the ground in a vertical orientation.

[0020] The upper edge 5 of the discharge trough 2 may be open or be provided with a cover (not shown) which closes the space 3.

[0021] Preferably, the discharge trough 2 is made of a long-life, lightweight, solid and simple plastic, possibly to be made in one piece, such as HDPE.

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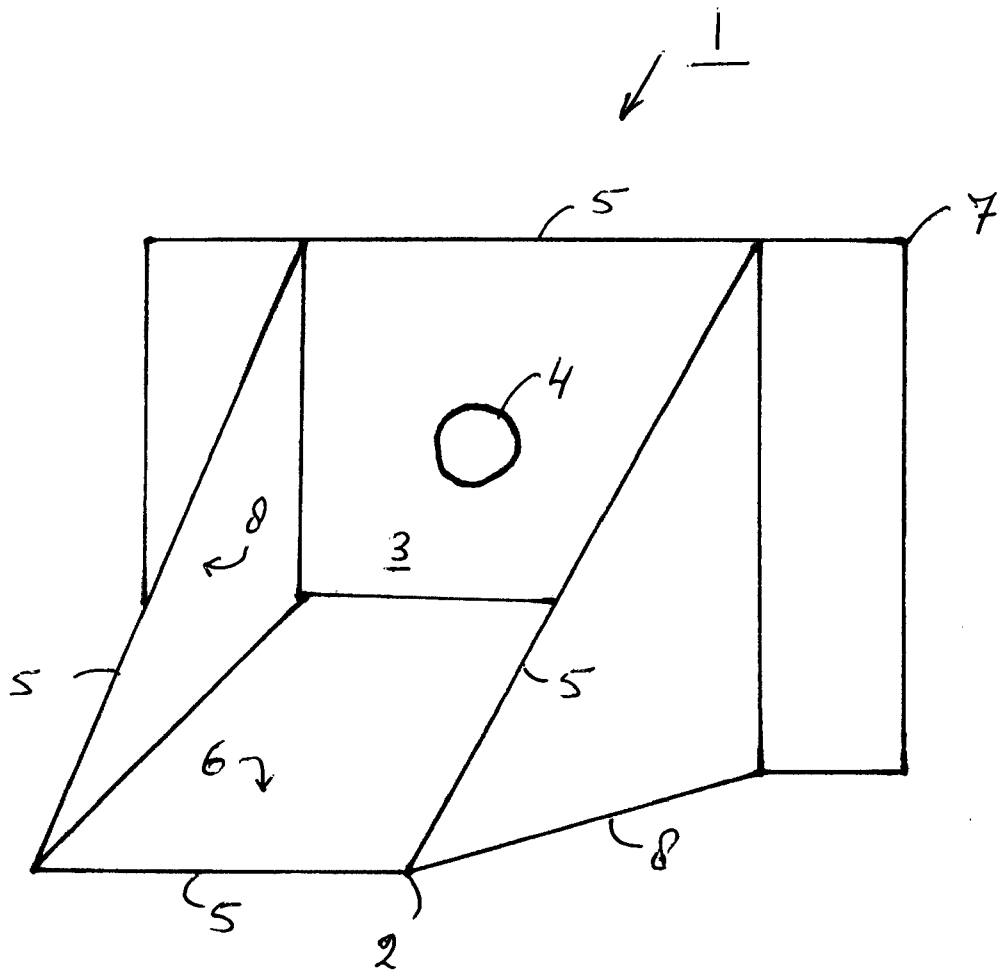
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9. A discharge trough according to claim 7 or 8, **characterised in that** the discharge trough is made of a plastic material, such as HDPE.

Claims

1. A facility for water drainage on an embankment, **characterised in that** said facility comprises a discharge trough to be installed in the embankment, into which one or more outflow openings of the water drain open, which discharge trough is bounded by an upper edge extending below the surface level of the embankment. 20
2. A facility according to claim 1, **characterised in that** the discharge trough comprises a bottom over which water from said at least one water drain can flow out. 30
3. A facility according to either one of claims 1 or 2, **characterised in that** the bottom of the discharge trough slopes down in the same direction as the embankment 35
4. A facility according to any one of claims 1 - 3, **characterised in that** the discharge trough comprises a bulkhead, through which said at least one water drain passes. 40
5. A facility according to claim 4, **characterised in that** at least one side wall is provided between said bulkhead and the bottom of the discharge trough.
6. A facility according to any one of claims 1 - 5, **characterised in that** the slope of the upper edge of the discharge trough corresponds to the slope of the embankment. 45
7. A discharge trough for use in the facility according to any one of claims 1 - 6, comprising an upper edge whose slope corresponds to the slope of the embankment into which the discharge trough is to be dug. 50
8. A discharge trough according to claim 7, **characterised in that** the upper edge of the discharge trough is open and/or provided with a cover. 55





EUROPEAN SEARCH REPORT

Application Number
EP 09 16 5900

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2008/138156 A1 (JANESKY LAWRENCE M [US]) 12 June 2008 (2008-06-12) * paragraph [0025]; figures *	1-9	INV. E03F1/00 E04D13/08
X	DE 195 22 982 A1 (SF KOOP GMBH BETON KONZEPTE [DE]) 2 January 1997 (1997-01-02) * column 2, line 50 - column 3, line 35; figures *	1-3,6-9	
X	US 1 696 237 A (HOUGH OTTO V) 25 December 1928 (1928-12-25) * the whole document *	1-4,6-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			E03F E04D E01C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		28 December 2009	De Coene, Petrus
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			

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

EP 09 16 5900

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
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28-12-2009

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