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SYSTEM AND METHOD FOR PREVENTING EROSION

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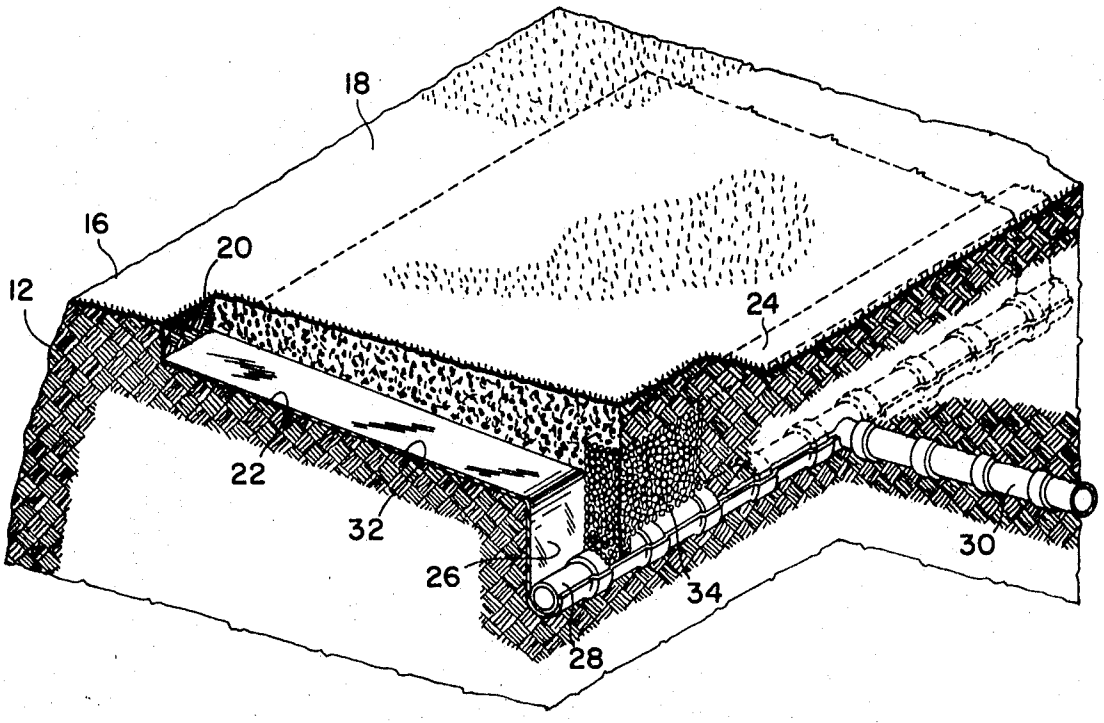


Fig. 1

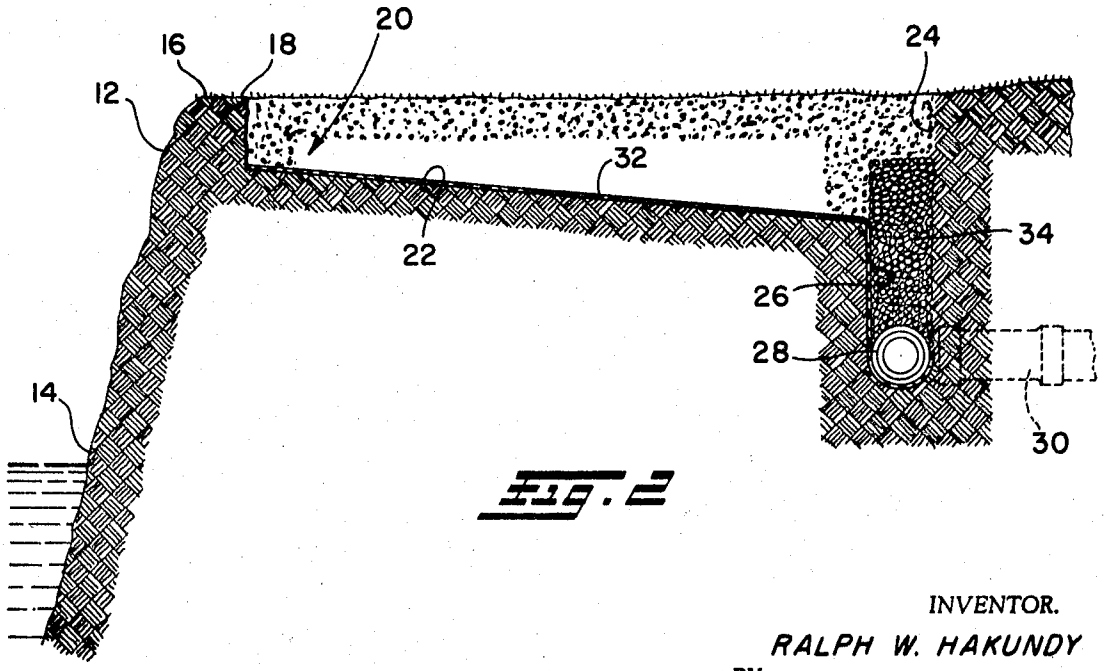


Fig. 2

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SYSTEM AND METHOD FOR PREVENTING EROSION

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ABSTRACT OF THE DISCLOSURE

A system and method for preventing erosion of an embankment in which a shallow excavation about nine feet in width is dug in the ground along the top of the embankment, spaced slightly back from the embankment edge. A trench deeper than the excavation is dug along the rearmost side of the excavation remote from the edge of the embankment. The bottom of the excavation is sloped gently in the direction of the trench and a water impervious plastic sheet is laid covering the bottom. Drain tile is placed in the bottom of the trench and covered with granular material such as crushed stone. The excavation and trench are then covered with topsoil. Water soaking into the soil close to the embankment is caused by the plastic sheet to drain away from the embankment edge and is collected by the tile.

DESCRIPTION

The present invention relates to a system and method for erosion prevention, and in particular to prevention of erosion of an embankment.

The present invention is particularly directed to the prevention of erosion of embankments along a lake or river frontage, where the erosion can be particularly severe, and will be described with reference thereto, although it will be apparent that the invention has other applications.

Erosion is becoming an increasingly severe problem in the United States where more and more natural covering for the soil is being removed. In the case of an embankment, the main problem is not surface erosion of the face of the embankment, but rather slides in the form of settling of the embankment or breaking-away of sections. Excessive surface water seeps into the soil and subsoil of the embankment lubricating the soil particles, and also establishing a pressure head similar to that of a reservoir behind a dam. The particular characteristics of the slide which results, whether in the form of settling of the embankment, or more in the form of breaking-away of sections of the embankment, depends in part upon the type of soil.

This erosion is particularly severe along lake and river frontage where waves hitting against the base of the embankment are apt to erode a part of the base removing support from the embankment. Removal of the support alone is not a principal cause of slides, but can accelerate or aggravate the problem caused by surface water.

Elaborate schemes have been proposed, and also undertaken, to avoid erosion of embankments. The costs are usually staggering. For instance, in the case of embankments extending upwardly from a lake or river surface, it is not uncommon to attempt to cover the entire face of the embankment with a layer of rubble or other material. Aside from being less than completely effective and costly, this has the disadvantage of detracting from or adversely affecting the esthetic appearance of the frontage.

Sub-drainage of the embankment, to relieve water pressure in the embankment is effective, but can be excessively expensive and not warranted in all cases.

Accordingly, it is an object of the present invention to provide an effective, and yet relatively inexpensive system for preventing erosion.

It is also an object of the persent invention to provide such a system which does not adversely affect the esthetic appearance of the embankment.

To the accomplishment of the foregoing and related ends, the invention, then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail a certain illustrative embodiment of the invention, this being indicative, however, of but one of the various ways in which the principles of the invention may be employed.

In such annexed drawing:

FIG. 1 is a perspective partially broken away view of an embankment illustrating the concepts of the present invention; and

FIG. 2 is an elevation section view taken illustrating the concepts of the present invention.

Referring to the drawing, the figures illustrate an embankment **12** which may lead from a lake or river surface at or near the base **14** of the embankment to an upper edge **16**. The ground area **18** above the embankment may or may not be level.

In accordance with the present invention, the ground area **18** above the embankment is excavated to a fairly shallow depth coextensive with the top of the embankment to provide excavation **20**. This excavation is commenced about a foot back from the edge of the embankment and is extended about eight or nine feet farther back from the edge, although these dimensions may vary depending upon the type of soil involved and nature of the embankment and ground area **18**. The bottom **22** of the excavation is provided with a reverse slope so that the excavation gradually increases in depth with distance from the edge of the embankment. In a particular example the bottom of the excavation may have a reverse slope of about ¼ inch per foot, the depth increasing from about seven inches close to the edge of the embankment to about nine inches furthermost removed from the embankment.

Along the rear side **24** of the excavation furthermost removed from the edge of the embankment, a trench **26** is dug which is coextensive with the excavation, but deeper than the excavation, perhaps two feet in depth plus or minus. Drain tile or perforated plastic pipe **28** is laid along the bottom of the trench. A drain conduit **30** is connected with the drain tile intermediate the ends of the tile to carry away water which is collected by the tile to a storm sewer, drainage ditch or the like.

A water impervious sheet **32** preferably of plastic material is laid in the bottom of the excavation covering the bottom. Preferably, the plastic sheet is continued down into the trench underneath the drain tile or perforated pipe, extending around the bottom half of the pipe.

The trench is filled with granular material **34** such as plastic scrap or crushed stone above the drain tile, the level of the crushed stone preferably extending two or three inches above the level of the bottom of the excavation. The entire excavation can be filled with soil and seeded for a lawn or otherwise planted. Preferably the level of the topsoil is graded with a reverse slope extending rearwardly and slightly downwardly from the edge of the embankment.

Surface water collected in the topsoil along the top of the embankment drains onto the plastic sheet **32** and is caused to run into the trench **26** for collection by the drain tile or pipe **28**.

Advantages of the invention should be apparent, a principal advantage being that the system prevents flow of sur-

face water into the subsoil and thereby prevents slides which would be caused by the water. Such surface water instead is conveyed by the system to a storm sewer or drain ditch. The invention also prevents build up of a water head or pressure in the soil which is also responsible for slides.

If desired, the system of the invention can be combined with sub-drainage means effective to relieve underground water pressure, for instance, from an underground spring. In addition, in the case of embankments above a lake or river frontage, the system of the present invention can be combined with a conventional sea wall or other means to prevent erosion of the base of the embankment and removal of support for the embankment.

I, therefore, particularly point out and distinctly claim as my invention:

1. A system for preventing erosion of an embankment, the embankment having an elevated surface, a forward edge, and a front slope extending downwardly from the edge; comprising a shallow excavation dug along the elevated surface of the embankment substantially coextensive with the embankment forward edge, the bottom of the excavation having a slope away from the forward edge in which the depth of the excavation relative the elevation of the forward edge increases with increased distance from the edge, a trench deeper than the excavation along the rearward side of the excavation removed from the edge of the embankment, drain collection and conduit means in the bottom of said trench, and plastic sheet means along the bottom of the excavation covering the bottom and extending into the trench into engagement with the drain collection and conduit means to convey surface water collected thereon to said drain collection and conduit means.

2. The system of claim 1 in which said trench is filled with granular material above the drain collection and conduit means, such as crushed stone and scrap plastic.

3. The system of claim 2 in which said plastic sheet is extended down into the trench and around the bottom of the drain collection and conduit means.

4. The system of claim 2 in which the excavation bottom slope is approximately ¼ inch per foot.

5. The system of claim 2 in which said excavation is filled with topsoil.

6. The system of claim 5 in which said granular material extends above the level of the bottom of the excavation, the filled excavation also having a slope away from the edge of the embankment by which the rear of the filled excavation is lower in elevation than said forward edge.

7. A method for preventing erosion of an embankment having an elevated surface, a forward edge, and a front slope extending downwardly from the edge; comprising the steps of digging a shallow excavation substantially coextensive with the embankment edge along the elevated surface but spaced slightly back from the edge, bottom of the excavation having a slope away from the forward edge in which the depth of the excavation relative the forward edge increases with increased distance from the edge, digging a trench along the rearward side of the excavation removed from the edge of the embankment, the trench being deeper than the excavation, laying drain collection and conduit means in said trench, laying a water impervious sheet in the bottom of the excavation covering the bottom, the sheet extending into the trench and beneath the drain collection and conduit means, filling said trench with granular material above the level of the bottom of the excavation, and filling said excavation with topsoil.

8. A system for preventing erosion of an embankment having an elevated surface, a forward edge, and a front slope extending downwardly from the edge; comprising a shallow excavation dug along the elevated surface of the embankment substantially coextensive with the embankment, the bottom of the excavation having a slope away from the forward edge in which the depth of the excavation relative the elevation of the forward edge increases with increased distance from the edge, a trench deeper than the excavation along the rearward side of the excavation removed from the edge of the embankment, drain collection and conduit means in the bottom of said trench, plastic sheet means along the bottom of the excavation to convey surface water collected thereon to said drain collection and conduit means, granular material such as crushed stone and scrap plastic in said trench above the drain collection and conduit means, said plastic sheet extending into the trench around the bottom of the drain collection and conduit means, said granular material extending to a level above the level of the bottom of the excavation, and topsoil filling the remainder of the excavation.

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