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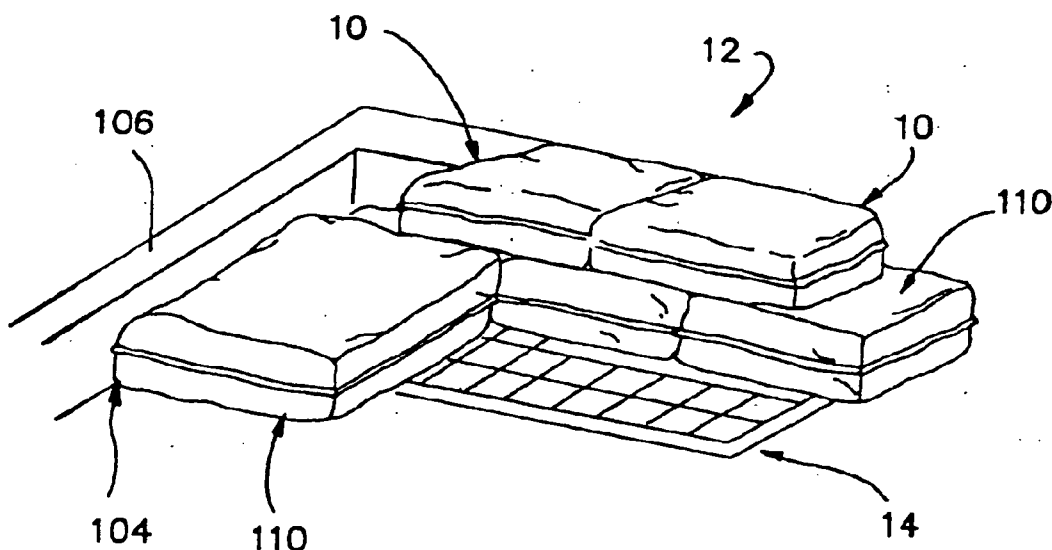
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(54) Title: SEDIMENT CONTROL DEVICE AND SYSTEM



(57) Abstract: Sediment control devices and systems are provided. The devices are in the form of a multi-layered, fillable bag which generally includes an inner bag structured to contain a granular material, for example, gravel or stone, a separate reinforcement layer located outwardly of the inner bag, and a and an outer layer enclosing the reinforcement layer and having a sealable opening providing access to the inner bag. The devices may be provided pre-filled with the granular material. The devices provide an effective, durable system for filtering runoff water, controlling erosion and/or controlling sedimentation at a construction sight.

SEDIMENT CONTROL DEVICE AND SYSTEM

Related Applications

This is a continuation-in-part of U.S. Patent Application Serial No. 11/340,169, filed on January 25, 2006, which is a continuation-in-part of U.S. Patent Application Serial No. 11/088,396, filed on March 23, 2005, now U.S. Patent No. 7,012,869, which is a continuation of U.S. Patent Application Serial No. 10/445,968, filed May 27, 2003, now U.S. Patent No. 6,905,289, the entire disclosure of each of which being incorporated herein by this reference.

Background of the Invention

The present invention generally relates to sediment control devices and systems useful for controlling soil erosion and sedimentation, for example resulting from construction activities.

Silt barriers, sandbags and concrete blocks are some of the many devices currently being used to control soil erosion and sedimentation resulting from industrial activities, such as construction projects and the like. Industrial activities such as highway and housing construction projects and the like, disturb and loosen soil, which is then vulnerable to being washed downstream during rains. The cumulative effect of these activities is a build-up of soil and other matter in waterways. This buildup of soil is generally known as sedimentation. Excessive sedimentation in waterways can destroy fish habitats, suffocate trees, clog streams, obstruct storm drains and culverts, pollute waterways, and cause other serious damage to the environment. Other detriments caused by excessive sedimentation include flooding, cost of repairing flood damage, expense of dredging estuaries and lakes, among others.

In addition to sediment loading, other pollutants are also generated from land disturbance associated with

construction projects. The Clean Water Act defines point source pollutants to include storm water discharge from such industrial activities as construction. As a result, an increased number of state environmental regulations have addressed the mitigation of construction site runoff and a variety of new erosion control methods have been proposed and implemented.

Construction activities related to building roads and highways, flood control projects, and land development for residential and commercial growth contribute sediments, organic matter, nutrients, metals, and other types of pollutants to water bodies. It is believed that sediment is the major pollutant associated with construction related activities, representing approximately 4-5% of the nation's sediment load to adjacent and downstream receiving waters.

Conventionally, sandbags have been used to supplemental other soil control measures, such as the installation of silt fencing, catch basins and the like. Conventional sandbags are inexpensive and convenient to install and are often placed adjacent disturbed areas to block sediment from entering drainage areas. Sandbags can also be used to divert flowing water to a stable drainage outlet. The most commonly used bags are untreated burlap sacks available at feed or hardware stores. Such bags are filled with sand to form a sandbag. Sandbag barriers are typically constructed on site by two people. A typical filled sandbag weighs around 30 to 40 pounds and can be dragged or carried by a single person.

Although they are convenient to install, the use of conventional sandbags in or around construction sites suffers significant drawbacks. For example, the bags regularly burst when run over by machinery or construction vehicles. For obvious reasons, broken sandbags will exacerbate

sedimentation problems if not removed promptly. The useful life of a sandbag is estimated to be about 2 weeks on a typical construction site.

Summary of the Invention

New sediment control devices and systems have been discovered. The present invention provides highly effective, durable and convenient devices and systems for sedimentation and erosion control. For example, the present devices can be used in place of conventional sandbags, without suffering the drawbacks associated therewith. The present devices and systems effectively control sedimentation resulting from soil erosion, for example as a result of construction site activities and the like.

The devices and systems of the invention are useful for controlling erosion and preventing sedimentation of waterways, for example by diverting flowing water, and/or blocking, filtering and/or removing sediment from a water flow, for example from an area under construction.

Advantageously, the present invention is useful in place of, or as an addition to, conventional sandbagging practices, but with substantially better results than sandbagging alone. For example, the present invention is useful for diverting rising floodwater away from homes or building structures, and preventing oversaturation of and erosion of hillside slopes.

The present invention is suitable for meeting various erosion control requirements using practices which are substantially analogous to conventional techniques, for example, conventional sandbagging techniques and practices. Necessary or desirable adaptations of the devices and systems of the present invention for specific purposes will be readily appreciated by those of skill in the art.

Accordingly, devices and systems useful for controlling soil erosion and sedimentation are provided. In accordance with the invention, devices are provided which generally comprise composite bags including multiple layers of different materials and a gravel core enclosed within the layers of materials. More particularly, the present devices preferably generally comprise a core, a compressible layer substantially surrounding the core, and an outer layer enclosing the compressible layer.

Preferably, the core comprises a relatively dense granular material. More preferably, the core comprises a gravel filling. Even more preferably, the core comprises a filling of substantially non-angular gravel particles. For example, the gravel filling comprises smooth edged peat gravel. In one embodiment of the invention, the core comprises an inner enclosure, for example, an inner bag, for example made of a geotextile material, or other suitable porous, high strength material, confining or enclosing the granular material.

Preferably, the compressible layer substantially surrounds the core and comprises for example a fibrous layer made of natural or synthetic fibers. The compressible layer may comprise for example, wood fibers, for example, but not limited to aspen wood fibers. The compressible layer may comprise a fibrous blanket, for example a commercially available excelsior blanket, that is wrapped about the core.

The outer layer preferably comprises a nonwoven or woven geotextile material secured about and substantially enclosing the permeable material. For example, the outer layer preferably comprises a high strength, durable fabric, for example a woven fabric of monofilament or multifilament thread. The outer layer is sewn at edges thereof, forming a

casing for the permeable layer. In one especially advantageous embodiment of the invention, the device includes a substantially squared portion on at least one end thereof in order to effectively seal the device against a structural surface, for example, a curb surface.

Advantageously, the device may be structured to filter and separate sediment contained in water that passes into and through the device. For example, the compressible layer may be a water permeable material that is effective in trapping coarse grained sediment that enters the device. The core is preferably structured to capture sediment, such as fine grained particles such as silt.

Preferably, none of the internal components of the present invention include sharp, jagged edges. The devices of the present invention are highly resistant to breakage, even when used in a high traffic area of a construction site.

For example, the devices of the present invention, when used in place of conventional sandbags, have been found to have a longer useful life than conventional sandbags, for example, having a useful life of up to at least about 1 month up to about 6 months or more, whereas conventional sandbags typically have an expected useful life of only two weeks, when used in a similar setting or in an identical application.

In addition, the present devices are convenient to use. For example, the present devices are preferably sufficiently small in size and/or light in weight such as to enable lifting one of the devices by a single individual. The present devices are easily transportable, and can be used in any desired quantity and in various stacking configurations, for example, in a manner analogous to the use of conventional sandbags, depending on the application involved.

In another embodiment of the invention, the devices are fillable and are provided without the granular material, but are structured to enable an end user or consumer to fill the device with a desired granular material. For example, the sediment control device may comprise an inner member structured to be effective in substantially confining a granular material, the inner member including an openable portion for enabling filling of the inner member with such a granular material, a compressible layer, for example, excelsior, straw or other suitable material, substantially surrounding the inner member, and an outer member substantially surrounding the compressible layer and including a sealable portion positioned to facilitate access to the flexible member openable portion. Preferably, the openable portion of the inner member is sealable. Further, the outer member sealable portion may be substantially aligned with the inner member openable portion to facilitate access to and filling of the inner member.

In another aspect of the invention, erosion control and/or filtering devices are provided which comprise a fillable bag including an openable portion for enabling filling of the bag with a granular material, and a longitudinal seam portion extending along a length of the bag. The bag comprises an inner layer, an outer layer located outwardly of the inner layer, and a reinforcement layer disposed between the inner layer and the outer layer and including opposing longitudinal edges separated from one another by a gap in the reinforcement layer.

In some embodiments, the inner layer and the outer layer are made of the same material, for example, a woven fabric, for example, a woven geotextile fabric. The reinforcement layer provides a puncture resistant, high strength material

that prevents the gravel within the bag from tearing the bag. The gap in the reinforcement layer is effective to facilitate impact absorption by enabling stretching at the seams thereof. The reinforcement layer may comprise a polymer grid material, for example, an extruded polymer grid material.

The gap in the reinforcement layer may extend at least a major portion of the length of the bag, for example, along a full length of the bag. The gap in the reinforcement element may be generally aligned with the seam portion. The gap may have a width in a range of about one inch and about 0.5 inch.

Advantageously, the reinforcement layer provides the device with excellent tear resistance. Further, the gap in the reinforcement element forms a longitudinal region of the bag that is significantly more stretchable, relative to other longitudinal regions of the bag in which the reinforcement element crosses. This stretchable region allows the bag to expand and resist breakage, for example, when the bag is in use at a construction site and is subjected to repeated and/or forceful impacts.

In the embodiments of the invention including the reinforcement layer, the device may include, but does not necessarily include, the compressible layer as described and shown elsewhere herein.

Any and all features described herein and combinations of such features are included within the scope of the present invention provided that the features of any such combination are not mutually inconsistent.

These and other features, aspects and advantages of the present invention will become apparent hereinafter.

particularly when considered in conjunction with the following claims, detailed description and drawings in which like parts bear like reference numerals.

Brief Description of the Drawings

Fig. 1 shows a perspective view of a sediment control device in accordance with the present invention.

Fig. 2 shows a perspective view of a system of the present invention for controlling sedimentation and erosion utilizing a plurality of devices similar to the device shown in Fig. 1.

Fig. 3 shows a perspective view of the device shown in Fig. 1 during assembly thereof including a core and a compressible layer.

Fig. 4 shows a perspective view of the device shown in Fig. 1 having an outer layer partially removed in order to reveal the compressible layer encased therein.

Fig. 5 shows a perspective view an embodiment of the invention having a squared edge feature.

Fig. 6 shows a perspective, partially cross-sectional view of another embodiment of the invention.

Fig. 7 shows a perspective view of yet another embodiment of the invention.

Fig. 8 shows a partially cut-away view of the embodiment shown in Fig. 7.

Fig. 9 shows a cross sectional view of the embodiment of the invention shown in Fig. 7 after filling thereof with a granular material.

Fig. 10 shows a partially cut away, perspective view of an embodiment of the invention comprising a package of erosion control products.

Fig. 11 shows a partially cut-away perspective view of another embodiment of the invention which includes a reinforcement layer.

Fig. 12 shows a partially cut-away perspective view of another embodiment of the invention which includes a reinforcement layer and a compressible layer.

Detailed Description of the Invention

Turning now to Fig. 1, a device for controlling sedimentation and erosion in accordance with the present invention is shown generally at 10.

A system 12 in accordance with the invention generally comprising a plurality of such devices 10 is shown in Fig. 2. Without intending to limit the scope of the present invention, the system 12 is shown being employed for diverting and filtering water flow that is passing into a storm drain 14 located at a bottom of a slope adjacent a construction site.

Turning now to Figs. 3 and 4, the device 10 generally comprises a core 20 (not visible in Fig. 4), a compressible layer 24 substantially surrounding the core 20, and an outer layer 28 (not shown in Fig. 3) enclosing the compressible layer 24.

Preferably, the core 20 comprises a granular material, such as an aggregate of sand, gravel, and/or crushed stone, for example, crushed granite and/or limestone.

More preferably, at least a major portion, that is, about 50% or higher, or substantially all of the granular

material comprises granules 30 having substantially non-angular shapes, for example, substantially smooth or rounded shapes. In other words, at least a major portion of the granular material preferably mostly comprises granules 30 that have relatively low abrasion characteristics. For example, the granular material may comprise a natural rock-based polished gravel material, or a synthetic equivalent thereof. In one very useful embodiment, a major portion of or all of the granular material in the core 20 comprises peat gravel, for example but not limited to peat gravel having an average granule diameter of between about 0.2 inches and about 0.5 inches.

Preferably, the core 20 further comprises an inner enclosure 34 confining the granular material 30. The inner enclosure 34 may comprise a fabric material, for example a high strength, puncture resistant geotextile material. Preferably, the inner enclosure material is a high tensile strength and substantially puncture resistant, porous material. For example, the inner enclosure material may comprise a non-woven polypropylene geotextile having a high tensile strength, such as Mirafi® N-Series Non-Woven Geotextile. For example, the geotextile material is cut and stitched together to form a pocket enclosure which is filled with the granular material 30 and sewn shut.

The compressible layer 24 may comprise any suitable compressible material. In one very useful embodiment, the compressible layer 24 is effective to absorb, or lessen, a shock of impact on the device 10, for example when the device 10 is impacted by a vehicle, machinery, construction equipment and the like. For example, the device 10 is preferably structured such that the compressible layer 24 functions, at least in part, as a buffering element between the core 20 and the outer layer 28 such that upon the device

10, upon being overrun by construction vehicles and/or other heavy equipment, becomes compressed, causing air within the compressible layer 24 to be forced out through the outer layer 28. Upon the compressive load being removed from the device 10, the compressible layer 24 substantially recovers and substantially regains its original volume and shape in the uncompressed state. The device 10 thereby resists tearing, breakage, and/or otherwise being rendered ineffective for use, for example, even when the device 10 is subjected to relatively heavy usage.

In a preferred embodiment of the invention, the compressible layer 24 preferably comprises a fibrous material made of natural or synthetic non-woven fibers 36. The compressible layer may comprise for example, excelsior, straw, wood fibers, for example, but not limited, to aspen wood fibers. For example, a major portion of the fibers 36 making up the compressible layer 24 are curled wood fibers having a minimum length of at least about six inches allowing each of the fibers to interlock with one or more other of the fibers.

Preferably, as shown in Fig. 3, the compressible layer 24 comprises a fibrous blanket 38, for example but not limited to a rolled, stitched excelsior blanket. Preferably, the blanket 38 has a length sufficient to enable the blanket 38 to be wrapped about the core 30 at least once, and more preferably about two or more times. The compressible layer 24 may comprise, for example a continuous, fibrous blanket wrapped about the core (as shown diagrammatically by arrow 40 in Fig. 3).

An example of a blanket suitable for this aspect of the present invention is a Curlex® I Stitched erosion control blanket manufactured by the American Excelsior Company in Arlington, Texas.

Persons of ordinary skill in the art will appreciate that there are many suitable alternative materials that can be used for the compressible layer 24 within the scope of the present invention.

The outer layer 28 of the device 10 (not shown in Fig. 3) encases the compressible layer 24 and preferably comprises a porous material, preferably a water permeable material. The outer layer may comprise a natural material or a synthetic material.

In one particularly advantageous embodiment of the invention, the outer layer 28 comprises a geotextile material, preferably a puncture resistant, high tensile strength geotextile material. Geotextile materials are well known and are generally understood to include permeable fabrics manufactured for use in geotechnical engineering-applications. Geotextiles are generally made of synthetic materials, for example polypropylene, polyester, polyamide and/or polyethylene, that are formed into fabrics and are woven, non-woven, or combinations of woven and non-woven. As a specific example of the present invention, not intended to be limiting the scope of the present invention, the outer layer 28 comprises a Mirafi® -Series Non-Woven Polypropylene Geotextile material.

The inner enclosure 34 and the outer layer 28 may comprise substantially equivalent or the same materials.

Alternatively, the outer layer 28 may comprise sackcloth or a burlap material.

Construction of the present device 10 may be accomplished as follows. The core 20 is constructed by depositing a desired amount of granular material 30 into a casing that forms the inner enclosure. The opening of the inner enclosure is stitched closed in order to prevent the

granular material from spilling therefrom. The core 20 is then placed on an end portion 48 of an unrolled excelsior blanket 38 as shown in Fig. 3. The core 20 and blanket 38 are then rolled, for example in direction shown by arrow 40, thereby causing the core 20 to be enwrapped by several layers of the compressible layer material. The core 20 and compressible layer 24 are then placed into an open end of a casing that forms the outer layer 28 and the open end of the outer layer is sewn shut, thereby forming device 10.

In another aspect of the present invention, a system 12 for controlling sedimentation and erosion is provided, for example as shown in Fig. 2. The system 12 comprises a plurality of the devices 10 as described in detail elsewhere herein. As shown, the devices 10 are designed to be placed side-by-side and/or layered on top of one another in any desired configuration, for example, adjacent a storm drain. Preferably, each individual device 10 is sized to be easily dragged and/or lifted by one adult person.

Advantageously, the devices 10 of the present invention resist breaking, even when subjected to the harsh conditions associated with heavily used construction sites. Surprisingly, the present devices have been found to last up to about six months or more when used in conditions that would require sandbag replacement in only two weeks.

The present devices 10 and systems 12 function as effective filters of sediment contained in water that passes through the devices 10 or systems 12. Fine silt tends to become trapped within the core 20. Larger particulate matter tends to become trapped within the compressible layer 24.

Turning now to Fig. 5, another device for controlling sedimentation and erosion in accordance with the present invention is shown generally at 110. Except as expressly described herein, device 110 is similar to device 10.

Features of device 110 which correspond to features of device 10 are designated by corresponding reference numerals increased by 100.

The most significant difference between device 10 and device 110 is that device 110 includes a substantially squared edge portion 70 that is structured to enhance the fit of the device 100 against a gutter or curb. Preferably, the squared edge portion 70 is provided along at least one of a length and a width of the device 110, and more preferably along at least a width of the device 110 as shown. This may be accomplished by providing, for example by sewing, at least one additional seam 74 into the outer layer 128 of the device 110 in order to form the substantially squared edge portion 70. Other embodiments of the invention may include substantially squared edge portions along more than one of the edges of the device 110, for example along each length and width of the device 110.

Fig. 6 shows yet another device 210 in accordance with the present invention. Except as expressly described herein, device 210 is similar to device 10 and device 110. Features of device 210 which correspond to features of device 10 and device 110 are designated by corresponding reference numerals increased by 200 and 100 respectively.

With reference to Fig. 6, the device 210 is sized and structured to be placed generally around a perimeter, for example a substantially entirely full or complete perimeter of a storm drain (not shown), for example in a curved fashion. Thus, it can be appreciated that device 210 may be made available in a plurality of sizes in order to accommodate various sizes of storm drains or other applications to which the device 210 may be suitable.

Like devices 10 and 110, device 210 is preferably a multilayered structure comprising a core 220 having a

granular material 230 enclosed within an inner enclosure 234, a compressible layer 224, and an outer layer 228. As shown, device 210 is elongated and somewhat cylindrical in form and is structured to be sufficiently flexible in order to allow placement of the device 210 in the form of a desired configuration. For example, the flexibility of device 210 is preferably sufficient to allow placement of the device 210 in at least one of a C-shaped configuration (shown), a substantially straight, linear configuration, a circular configuration, a hook shaped configuration, and the like configurations. Advantageously, the device 210 has a structure, for example a sufficient weight or mass, to prevent the device 210 from rolling or otherwise becoming inadvertently displaced, for example by water flow or construction site vehicle traffic.

When used in place of conventional sandbagging, the present devices 10, 110, 210 have been found to be superior in filtering particulate material from a flow. The devices 10, 110, and 210 and systems 12 are useful as sediment traps, for example, by catching coarse particles being transported by small concentrated flows, for example in gutters and adjacent curbs. As shown in Fig. 2, a plurality of devices 10 and/or 110 may be placed against a curb 106 such that devices 10 and/or 110 are positioned to provide at least a partial seal or obstruction against an unfiltered flow into the drain inlet 14. One or more of elongated devices 210 may be utilized in a similar manner by simply configuring the shape of the device 210 to at least partially, or substantially entirely, block a flow from entering a drain or other area in which filtering of a flow is desirable or necessary.

The devices 10, 110 and 210 and systems 12 can also be used as small check dams, for example to reduce water

velocity in a channel, thereby allowing some sediment particles to settle out of the flow. The devices 10, 110 and 210 and systems 12 also effectively function to control erosion below a slope and can be employed to divert flowing water away from an unstable area to a more favorable drainage area. In large measure, the devices 10, 110 and 210 and systems 12 can be effectively used in many, or all, of the applications in which sandbags can be employed. These are only a few of the possible applications for the present devices 10, 110, and 210 and systems 12, and it will be appreciated by those of ordinary skill in the art that there are many other useful applications therefore.

Figs 7 and 8 show another embodiment of the invention, generally at 310. Device 310 includes essentially the same features of devices 10, 110, and 210, with a primary difference being that device 310 includes no granular material, but is designed to be fillable with a granular material, for example, by an end user.

More specifically, device 310 is designed to facilitate shipment and/or storage of the device and reduce costs associated therewith, by reducing the bulkiness and weight of the device 310 relative to devices 10, 110, and 210.

Generally, sediment control device 310 comprises a fillable inner member 314 structured to be effective in substantially confining a granular material, the inner member 314 including a closed end (not shown) and a openable, sealable portion 316 structured to enable filling of the inner member 314 with a granular material and subsequent containment of the granular material therein. For example, inner member 314 may be substantially bag-like in structure. The sealable portion 316 may include hook and loop fastening strips 314a, or another fastening mechanism that is suitable

for substantially confining the granular material to be loaded into the inner member 314.

The device 310 further includes a compressible layer 322 substantially surrounding the inner member 314. The compressible layer 322 may comprise a woven or nonwoven material. In some embodiments, the compressible layer 322 comprises an erosion control blanket disposed around the inner member 314 as shown in Fig. 8. In a specific embodiment of the invention, the compressible layer 322 comprises a non-woven fibrous blanket 338, for example but not limited to a rolled, stitched fibrous blanket which includes a primary layer 338a of straw, wood, for example aspen wood, coir, excelsior, other natural or synthetic fibers, and combinations thereof, and a monofilament netting layer 338b secured to the primary layer 338a.

The device 310 further includes an outer member 350 substantially surrounding the compressible layer 322, and including a substantially squared end portion 354 (for enhancing fit against a curb as described elsewhere herein with reference to device 210), and a sealable, openable portion 358. As shown in Fig. 7, the sealable portion 358 is preferably positioned adjacent, for example, is substantially aligned with, the inner member sealable portion 316 in order to facilitate filling and closing of the device 310. The outer member sealable portion 358 may comprise a hook and loop strip or other suitable fastening mechanism. In an exemplary embodiment of the invention, the inner member 314 and outer member 350 are both comprised of the same geotextile material.

Preferably, each of the inner member 314, compressible layer 322 and outer member 350 are separable, individually

made components. The inner member 314 is removable, or separable from the outer member 350. For example, the device 310 may be structured such that the inner member 314 can be easily removed from the outer member 350 in an intact condition without losing its bag-like structure. For example, the inner member 314, and compressible layer 322 may be removed from the outer member 350 through the outer member openable portion 358. Further, the compressible layer 322 is also separable and removable from the outer member 350. For example, the compressible layer 322 may enwrap the inner member 314 without being sewn or otherwise bound thereto.

Fig. 9 illustrates a cross-sectional view of device 310 after the device 310 has been filled with a desired granular material 362 and is ready for use.

Turning now to Fig. 10, the present invention further provides a package 412 of sediment control products, the package 412 comprising a plurality of sediment control products, preferably device 310, and a container 415, for example a shipping container, containing the products 310, for example, in a stacked fashion. The package 412 is advantageous in facilitating shipment and/or storage of erosion control products that are intended to be filled and used at a later time or distant place.

Turning now to Fig. 11, another sediment control device in accordance with the invention is shown generally at 510. Device 510 is similar to device 310 shown in Fig. 8, with the primary difference being that device 510 further comprises a reinforcement layer 52. In addition, device 510 does not include compressible layer 322.

In this specific embodiment, device 510 includes an outer layer, or outer bag 54, and an inner layer, or inner bag 56 both made of a porous, weatherable material, for example, a geotextile material. In a specific embodiment, outer layer 54 and inner layer 56 both comprise a high density polyethylene material with an 85% UV rating. A suitable polyethylene material is marketed under the name Sun Screen Fabric and is available from Easy Gardner Products, Ltd and other suppliers. The reinforcement layer 52 is located between the inner layer 56 and the outer layer 56.

The device 510 includes an end 57 with a sealable opening. Gravel, rocks or other granular material is loaded into the opening prior to use of the device for sediment control. The end 57 may be provided with 2" strips of hook and loop fastening strips 57a such as Velcro®. In a specific embodiment, the reinforcement layer 52 comprises an extruded polymer grid. More specifically, the reinforcement layer may comprise a material marketed under the name Vexar® Plastic Sheet Netting - Model L-30, having Mesh size 5/16" x 5/16". Other suitable high strength materials are also contemplated.

The device 510 may be constructed using the following technique. Two identical rectangular pieces of material for forming the inner layer 56 and outer layer 54 are provided and are sewn together at opposing ends along with the hook Velcro® portion at one end and the loop Velcro® portion on an opposing end. The longer opposing sides are left open and the reinforcement layer, for example, a rectangular sheet of Vexar® Plastic Sheet Netting having dimensions slightly smaller than the first and second layers of material is then placed in between the inner layer 56 and the outer layer 54. The two opposite shorter ends having the Velcro in place are

then joined together via the Velcro connection. With the inner layer 54 and the outer layer 56 and Vexar® Plastic Sheet Netting folded once to create the final item shape, inner layer 54 and outer layer are then sewn together to form longitudinal seams at seam portions 58 by running the joined layers through a 4-thread, 2-needle industrial sewing machine, thereby sealing each opposing side with the reinforcement layer 52 in between inner layer 56 and the outer layer 54.

In one aspect of the invention, the reinforcement layer 52 forms a gap 62 at opposing longitudinal edges thereof, the gap being generally aligned with the longitudinal seam portion 58. This is shown most clearly in the cut-away portion of Fig. 11. Like device 310, device 510 is designed to be filled with a gravel material and is used for erosion control and/or filtering of runoff water passing through the device 510. The gap 58 allows for a degree of stretching of the gravel-filled device 510 and may prevent tearing thereof, for example, in instances where the device 510 is in use in an active construction zone and the device 510 is likely to be impacted by heavy machinery and construction equipment. The gap 58 may have a width in a range of about one inch and about 0.5 inch.

Generally, the reinforcement layer 52 provides a puncture resistant, high strength material that prevents the gravel within the device from tearing through the device 510. The gap in the reinforcement layer is effective to facilitate impact absorption by enabling stretching of the filled bag.

Turning now to Fig. 12, another embodiment 610 of the invention is shown. As shown, device 610 includes a compressible layer 622 in addition to reinforcement layer

652. Compressible layer 622 may be identical in structure to the compressible layer 322 described herein with respect to device 310. Reinforcement layer 652 may be made of the same polymer grid material as reinforcement layer 52 described herein with respect to device 510. The reinforcement layer 652 may or may not form a gap as described with respect to device 510. Further, device 610 is similar to device 310 in that device 610 includes an inner bag 614 having sealable/openable portion 616, and outer bag 650 having sealable/openable portion 658. In this particular embodiment, inner bag 614 and outer bag 650 are separable from one another.

While this invention has been described with respect to various specific examples and embodiments, it is to be understood that the invention is not limited thereto and that it can be variously practiced within the scope of the following claims.

What is claimed is:

1. A sediment control device comprising:
a fillable bag including an openable portion for enabling filling of the bag with a granular material, and a longitudinal seam portion extending along a length of the bag, the bag comprising
an inner layer;
an outer layer located outwardly of the inner layer; and
a reinforcement layer disposed between the inner layer and the outer layer and including opposing longitudinal edges separated from one another by a gap in the reinforcement layer, the gap being effective to facilitate stretching of the fillable bag.
2. The device of claim 1 wherein the gap is generally aligned with the seam portion.
3. The device of claim 1 wherein the reinforcement layer is less stretchable than at least one of the inner layer and the outer layer.
4. The device of claim 1 wherein the inner layer and the outer layer are made of the same material.
5. The device of claim 1 further comprising a compressible layer disposed between the inner layer and the outer layer.
6. The device of claim 1 wherein the reinforcement layer comprises a polymer grid material.

7. The device of claim 1 wherein the reinforcement layer comprises an extruded polymer grid material.

8. The device of claim 1 wherein at least one of the first layer and the second layer comprises a woven material.

9. The device of claim 1 further comprising a fastening mechanism for enabling sealing of the openable portion.

10. The device of claim 1 wherein the fastening mechanism comprises a hook and loop fastening mechanism.

11. The device of claim 1 wherein the inner member openable portion comprises a hook and loop fastening mechanism.

12. The device of claim 1 further comprising a compressible layer disposed between the outer layer and the inner layer.

FIG. 1

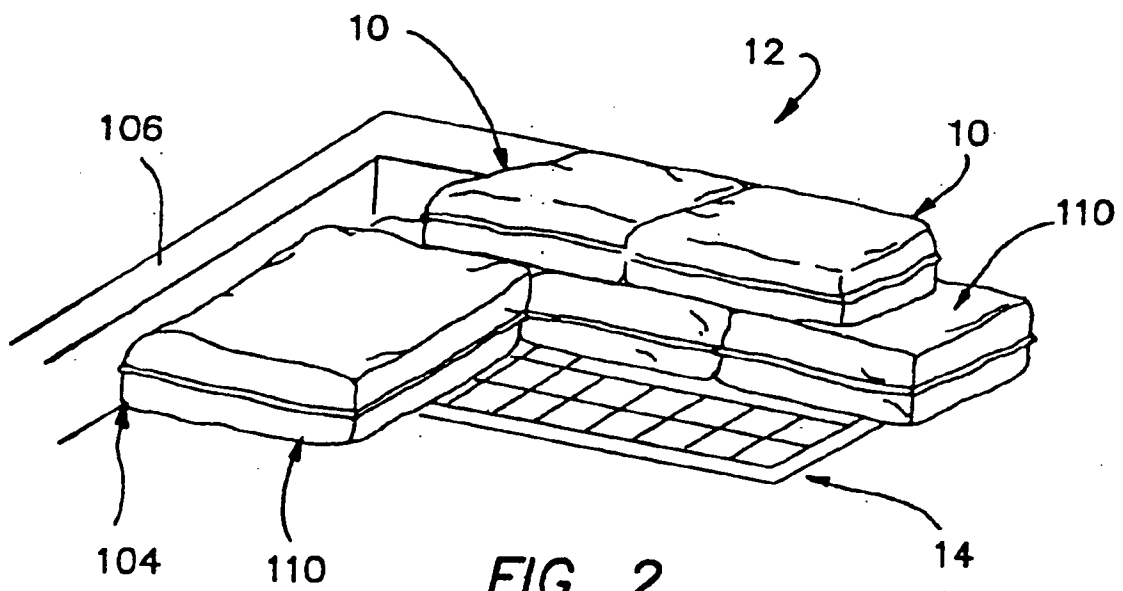
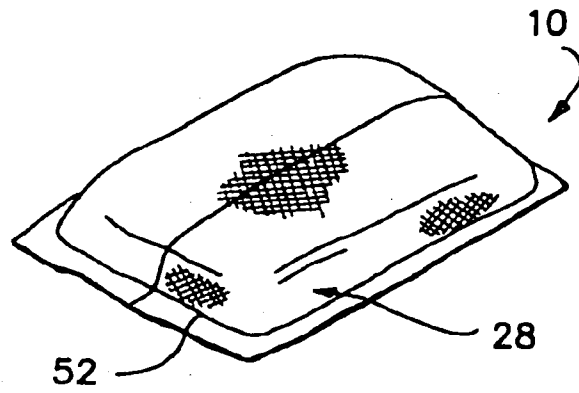


FIG. 2

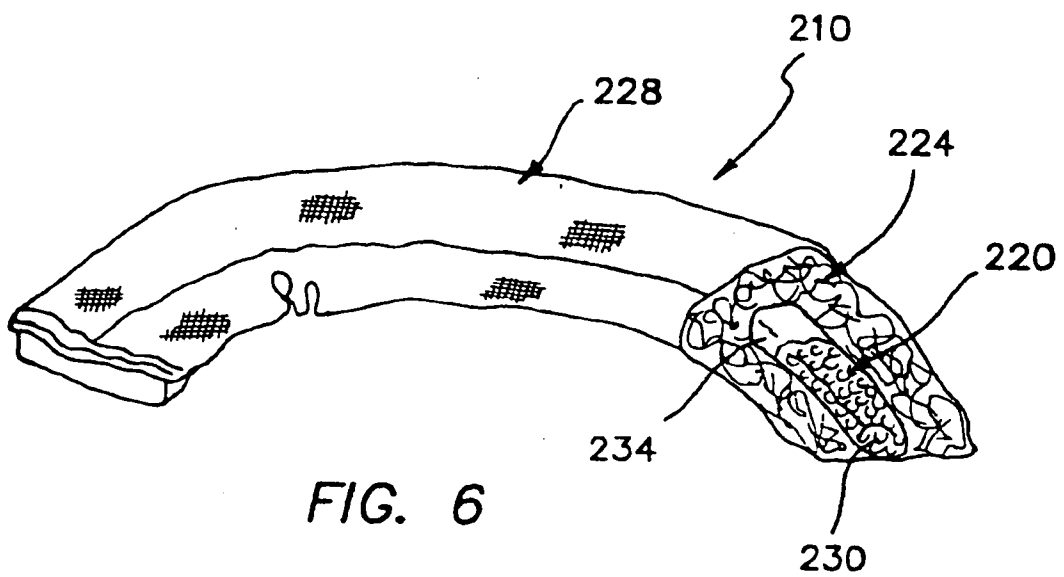
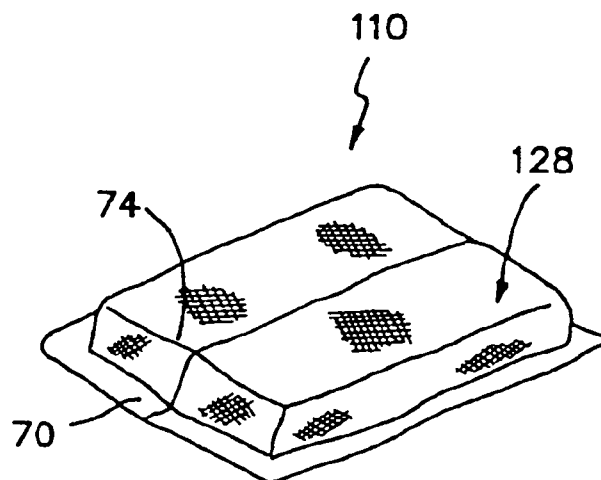
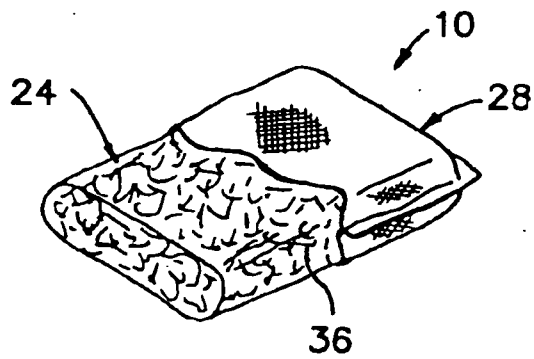
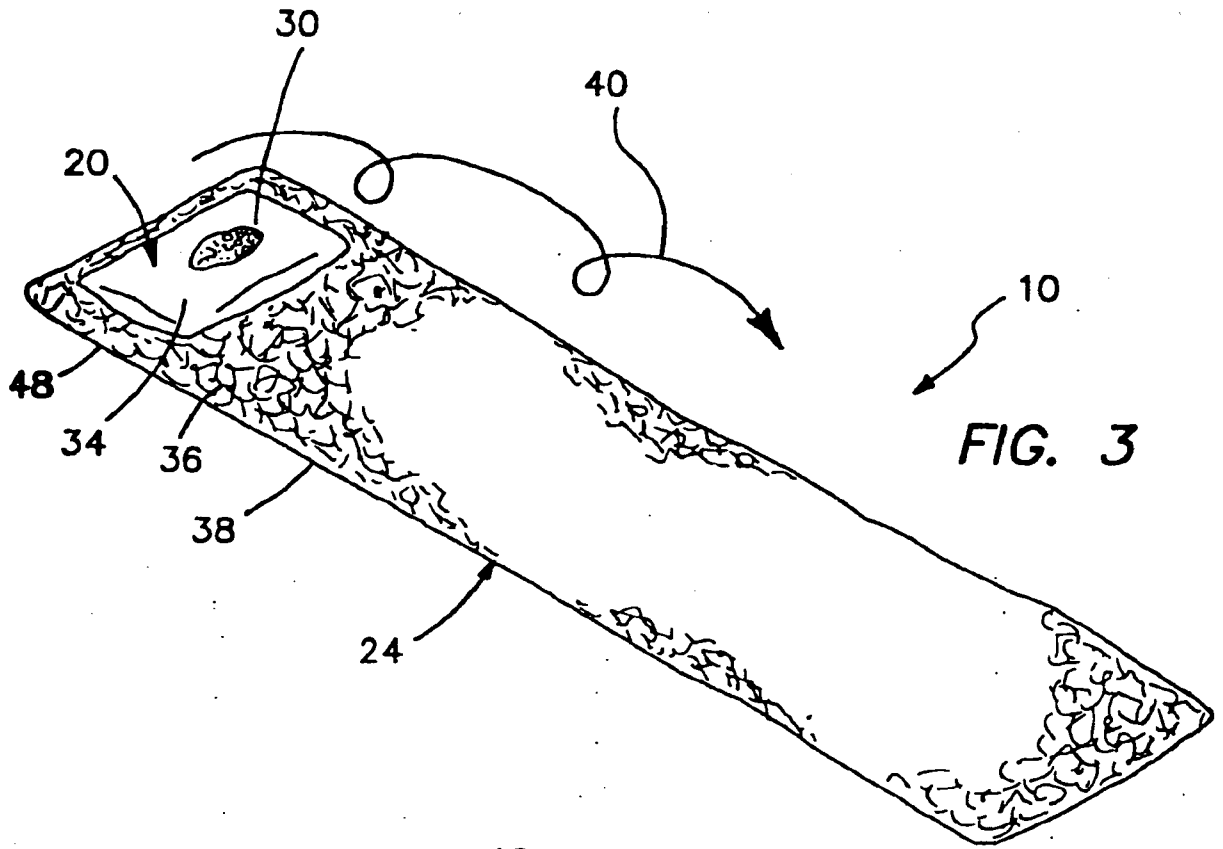


FIG. 6



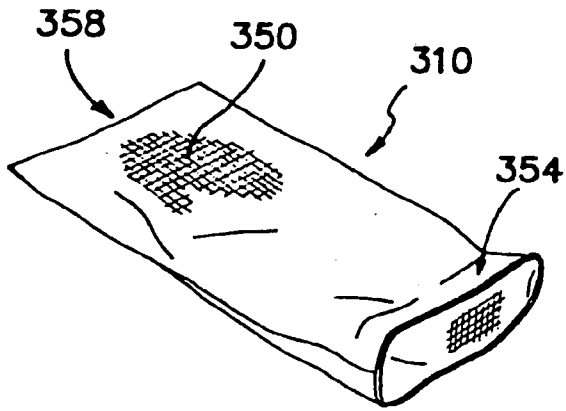


FIG. 7

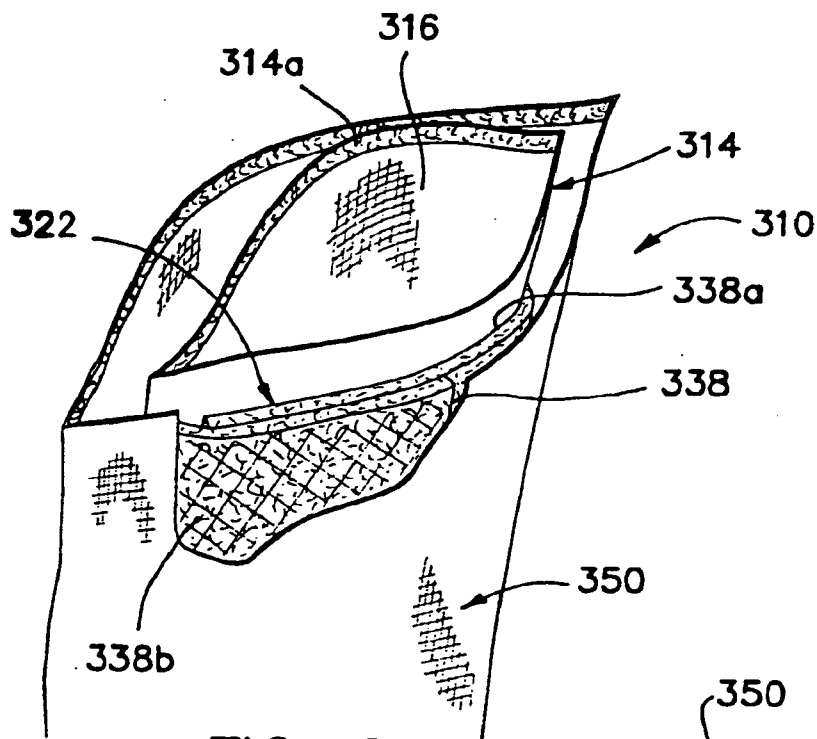
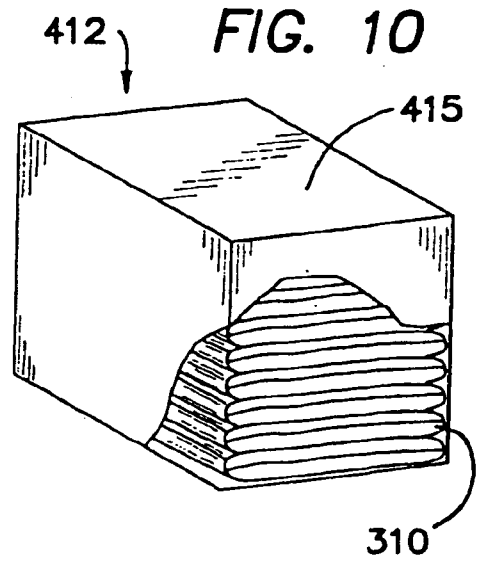


FIG. 8

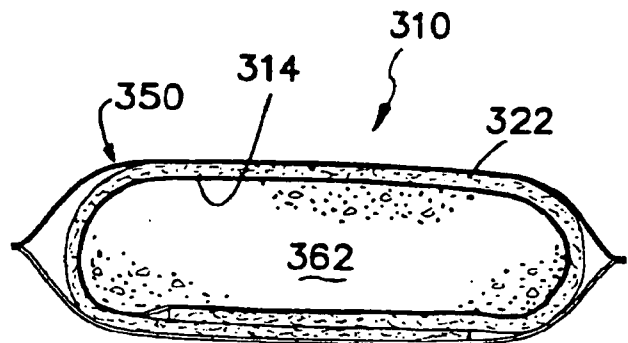


FIG. 9

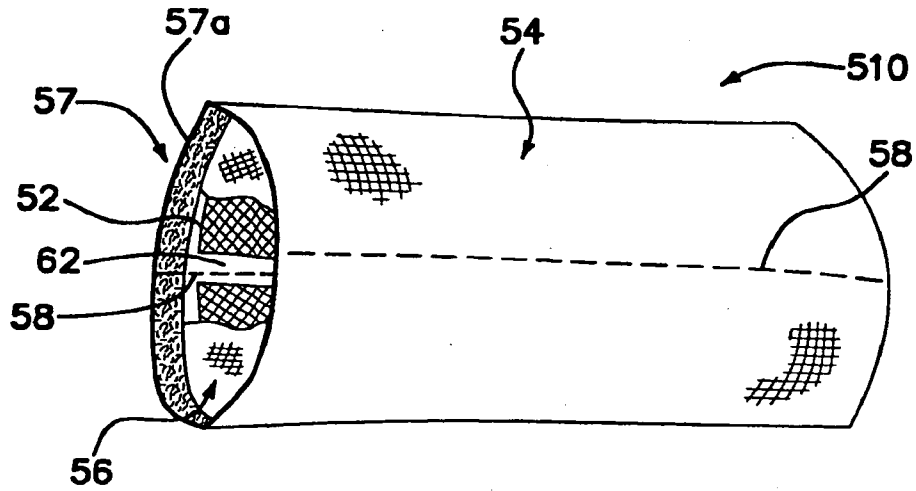


FIG. 11

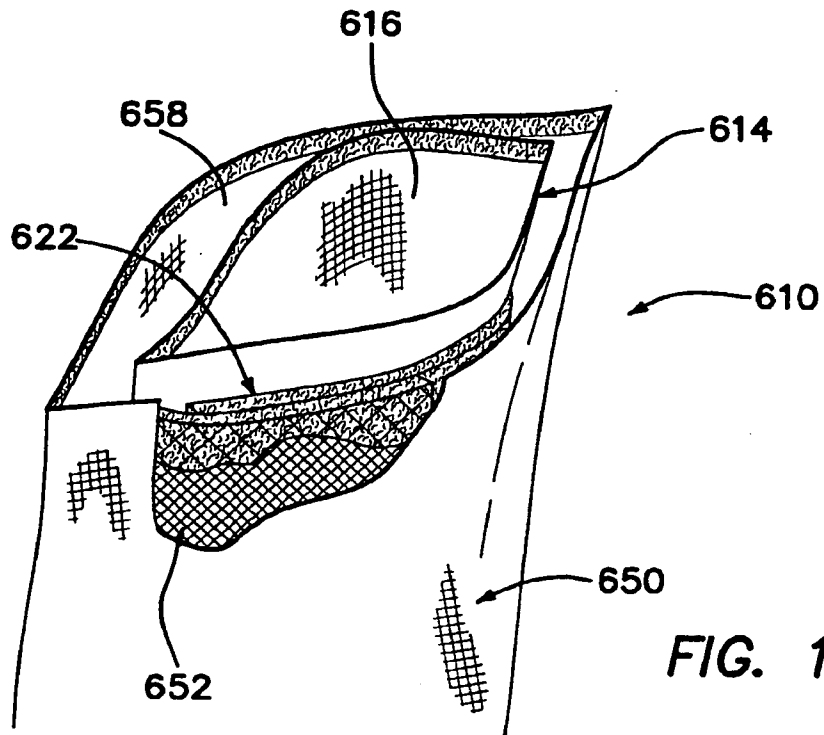


FIG. 12