Title: EARTHWORK BASKET WITH SYNTHETIC TURF FACING

Abstract: An earthwork basket including a wire or mesh cage or basket and a synthetic turf liner. The basket has at least two sides and the synthetic turf liner is affixed to at least one side thereof.
Published:

— without international search report and to be republished upon receipt of that report (Rule 48.2(g))
EARTHWORK BASKET WITH SYNTHETIC TURF FACING

TECHNICAL FIELD

[0001] The present invention relates generally to building, shoring, drainage and flood control structures and, in particular, to these structures having at least one side covered with synthetic turf.

BACKGROUND

[0002] As described in U.S. Patent No. 5,472,297, certain structures are known by the name "gabions" and comprise essentially wire mesh cages having a block shape, which are filled with rock, stone, rubble and the like. Although such gabions are made up of wire mesh cages filled with stone and other rubble, in effect they often function like solid blocks which can be used for building, for shorings for hillsides, for sea walls and the like, for walls and for other purposes.

[0003] U.S. Patent No. 5,472,297 also describes that such gabions can be filled with a much looser particulate as compared to being filled with rock. That patent describes that the filling material can be sand, concrete, ash, soil colliery waste and small particular aggregate. The patent also describes that to use the loose particulate material, the interior of at least some of the gabion is lined with flexible sheet material, and the cage is filled with a particulate of a nature which, but for the lining, would pass through the meshes of the cage.

[0004] Such prior art arrangements generally suffer from being unsightly due to the exposed flexible sheet material (geotextile or sheet film). They also suffer from having a limited life, as UV radiation tends to break down the flexible sheet material (geotextile or sheet film), leading to premature failure.
SUMMARY

[0005] Generally described, the present invention relates to earthwork basket-like structures utilizing synthetic turf to improve weatherability (longevity in spite of being exposed to wind, rain, and sun) and to improve the visual aesthetics. These earthwork baskets are typically made of wire or mesh cage or a basket and have common industry names of gabion, gabion mattress, gabion basket, reno mattress, or concentrainer. These earthwork baskets are typically used for applications involving flood control, flood barriers, retaining walls, walls and barriers, drainage channels, grade control, erosion control, shoreline and coastal protection, and slope reinforcement.

[0006] In a first example embodiment, the present invention comprises an earthwork basket including a multi-sided wire or mesh cage or basket which optionally can be erected from a flat, folded configuration to an erect, tillable configuration. The earthwork basket also includes a liner for lining at least part of the multi-sided cage. Preferably, the liner is made from a synthetic turf comprising a backing and a plurality of synthetic grass blades tufted into and extending from the backing. In example forms, the backing is comprised of one or more geotextile(s), which optionally may be coated to increase tuft bind. Preferably, the synthetic turf is placed along at least one side of the multi-sided cage. In example embodiments, the synthetic turf is placed along one side or face of the cage, while in other embodiments the synthetic turf is placed along multiple sides or faces of the cage.

[0007] The earthwork basket can take various shapes, such as cylindrical, cubic, brick, block, triangular, oval, L-shaped, V-shaped, etc. In one form, the multi-sided cage has 2 sides. In a preferred form, the multi-sided cage has 6 sides.

[0008] Preferably, the synthetic turf faces outwardly from the multi-sided cage and optionally the synthetic turf is positioned along multiple sides of the multi-sided cage. Preferably, the synthetic turf is installed on the inside face(s) of the multi-sided cage and optionally the synthetic turf is installed on the outside face(s) of the multi-sided cage.
Optionally, one or more sides of the multi-sided cage can be lined with a geotextile and/or sheet film liner. Thus, the synthetic turf need not be used on every face or side of the cage, although it can be so used if desired.

In another example embodiment, the present invention relates to a bundle of earthwork basket-like blocks including a plurality of earthwork basket-like blocks mechanically fastened to one another to form a bundle. Each earthwork basket-like block has a wire or mesh cage or basket structure optionally erectable from a folded configuration to an erect tillable configuration and a liner for containing loose fill material within the earthwork basket-like block. The liner includes a synthetic turf positioned along at least one portion of the earthwork basket-like block, with the synthetic turf including a synthetic backing and a plurality of synthetic blades tufted to and extending from the synthetic backing. Preferably, the synthetic turf is oriented in the earthwork basket-like block so that the synthetic blades extend and face outwardly from the earthwork basket-like block.

The specific techniques and structures employed to improve over the drawbacks of the prior devices and accomplish the advantages described herein will become apparent from the following detailed description of example embodiments and the appended drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an earthwork basket according to a first example embodiment of the present invention, showing synthetic turf along one face portion thereof.

Figure 2 is a plan view of the earthwork basket of Figure 1, showing an optional geotextile liner or film sheet liner along another face portion of the earthwork basket.
Figure 3 is a plan view of another earthwork basket according to another example embodiment of the present invention, showing a synthetic turf liner along four face portions of the earthwork basket.

Figure 4 is a plan view of another earthwork basket according to another example embodiment of the present invention, showing a pair of earthwork baskets according to Figure 1 mechanically fastened to one another to form a larger building structure.

Figure 5 is a perspective view of another earthwork basket according to yet another example embodiment of the present invention, showing three earthwork baskets fastened together and a synthetic turf liner along front face portions of the earthwork baskets.

Figure 6 is a perspective view of another earthwork basket according to another example embodiment of the present invention, showing an angular V-shaped earthwork basket and a synthetic turf liner along a front face portion thereof.

Figure 7 is a perspective view of another earthwork basket according to another example embodiment of the present invention, showing an angular L-shaped earthwork basket and a synthetic turf liner along a front face portion thereof.

Figure 8 is a perspective view of another earthwork basket according to another example embodiment of the present invention, showing a block-like triangular prism-shaped earthwork basket and a synthetic turf liner along a front face portion thereof.

Figure 9 is a perspective view of another earthwork basket according to another example embodiment of the present invention, showing an earthwork basket having multiple sections and having a synthetic turf liner along a front face portion thereof.

Figure 10 is a perspective view of another earthwork basket according to another example embodiment of the present invention, showing an earthwork basket
having multiple sections and having a synthetic turf liner along a front face portion thereof.

[0022] Figure 11 is a perspective view of another earthwork basket according to another example embodiment of the present invention, showing an earthwork basket having multiple sections and having a synthetic turf liner along a front face portion thereof.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

[0023] Generally described, the present invention relates to earthwork basket constructions for preventing erosion on flood control structures, channels, and slopes; for providing reinforcement to walls and slopes; and for creating a barrier. Figures 1-2 show an earthwork basket 10 according to a first example embodiment of the present invention. The earthwork basket 10 generally includes a multi-sided wire or mesh cage or basket 20 and a liner 30 for lining at least a part of the basket 20. As depicted in Figure 1, the liner 30 is placed on one face of the basket 20. In one form, the liner 30 is made from a synthetic turf comprising a backing and a plurality of synthetic grass blades tufted into and extending from the backing. U.S. Patent Application No. 2012/0063854, U.S. Patent Application No. 2012/0064262, and U.S. Patent Application No. 2012/0064263 show examples of synthetic turf and are incorporated by reference herein in their entirety. In example forms, the backing of the liner 30 comprises one or more geotextile(s), which may be coated to increase tuft bind.

[0024] In example embodiments, the earthwork basket 10 is filled with rock, gravel, soil materials, sand, shredded tires, ash, soil colliery waste, small particular aggregate, other loose material, or cementitious material. In one preferred form, the earthwork basket is filled with soil. Preferably, when the earthwork basket 10 is filled with soil, the liner 30 is utilized to contain the soil within the basket 20. Optionally, an additional secondary liner 40 can be provided along one or more faces of the basket 20 as desired. For example, as depicted in Figure 2, the earthwork basket 10 has a first face comprising the liner 30 (e.g., synthetic turf) and a second face (generally opposite
the first face) comprising the secondary liner 40. In example forms, the secondary liner 40 can be in the form of a geotextile and/or sheet film liner that is preferably UV resistant and substantially durable. Optionally, the secondary liner 40 can be provided in addition to the liner 30 or can be omitted.

[0025] In example forms, the basket 20 can be constructed from steel, galvanized steel, zinc-coated steel, stainless steel, PVC-coated steel, aluminum, fiberglass, or polymeric material. Generally, the basket 20 has junctions that are welded, fused, single twisted, double twisted, or woven together. In typical forms, the basket is double twisted or welded together. Preferably, the earthwork basket 10 can take various shapes, such as cylindrical, cubic, brick, block, triangular, oval, L-shaped, V-shaped, and various other shapes as desired. Preferably, the basket 20 can be erected from a flat, folded configuration to an erect, tillable configuration. Preferably, the synthetic turf is affixed to the one or more faces of the basket 20 by heat bonding, adhesive bonding, stitching or sewing, mechanical fasteners, or combinations thereof.

[0026] Preferably, the earthwork basket 10 is modular and is capable of being stacked on top of another earthwork basket 10. Optionally, the earthwork basket 10 can be placed side-by-side or butted end-to-end with one or more additional earthwork baskets 10.

[0027] Figure 3 shows an earthwork basket 100 according to another example embodiment of the present invention. As depicted, the earthwork basket 100 comprises a mesh basket 120 and a liner 130 (i.e., synthetic turf) affixed to four faces of the basket 120. Optionally, all six faces can carry the liner 130.

[0028] Figure 4 shows a bundle of earthwork baskets 200 according to another example embodiment of the present invention. As depicted, the bundle 200 comprises two earthwork baskets. Preferably, each earthwork basket comprises a mesh basket 220, at least one face thereof comprising a liner 230 (i.e., synthetic turf) and at least one face comprising a secondary liner 240. Preferably, the baskets 220 are affixed to one
another with fasteners 250. The fasteners 250 can be in the form of rings, wire, ties, spiral binders, or other available fasteners.

[0029] Figure 5 shows a bundle of earthwork baskets 300 according to another example embodiment of the present invention. As depicted, the bundle 300 is substantially similar to the bundle 200 and comprises three mesh baskets 320. At least one face of each basket 320 has a liner 330 (i.e., synthetic turf) affixed thereon. Similarly, the baskets 320 are affixed to a basket 600 other than a basket 320 and affixed to another basket 600 with fasteners. Optionally, one or more additional earthwork baskets can be affixed to the bundle 300 as desired.

[0030] Figure 6 shows an earthwork basket 400 according to another example embodiment of the present invention. As depicted, the earthwork basket 400 is in the form of an angular basket that is generally V-shaped. Generally, the earthwork basket 400 comprises a mesh basket 420 (comprising two sides) and a liner 430 (i.e., synthetic turf) affixed to at least one side thereof. As similarly described above, fasteners can be used to affix one or more earthwork baskets 400 together as desired.

[0031] Figure 7 shows an earthwork basket 500 according to another example embodiment of the present invention. As depicted, the earthwork basket 500 is in the form of an angular basket that is generally L-shaped. Generally, the earthwork basket 500 comprises a mesh basket 520 (comprising two sides) and a liner 530 (i.e., synthetic turf) affixed to at least one side thereof. As similarly described above, fasteners can be used to affix one or more earthwork baskets 500 together as desired.

[0032] Figure 8 shows an earthwork basket 600 according to another example embodiment of the present invention. As depicted, the earthwork basket 600 is in the form of a block-like basket that is shaped similarly to a triangular prism. Generally, the earthwork basket 600 comprises a mesh basket 620 (comprising three sides) and a liner 630 (i.e., synthetic turf) affixed to at least one side thereof. As similarly described above, fasteners can be used to affix one or more earthwork baskets 600 together as desired.
[0033] **Figures 9-11** show earthwork baskets 700, 800, 900 according to additional example embodiments of the present invention. As depicted, each earthwork basket 700, 800, 900 generally comprises a mesh basket 720, 820, 920 that is divided into multiple sections and a liner 730, 830, 930 (i.e., synthetic turf) affixed to at least one side thereof. As similarly described above, fasteners can be used to affix one or more earthwork baskets 700, 800, 900 together as desired. As depicted in **Figure 9**, the earthwork basket 700 is divided into five sections. As depicted in **Figure 10**, the earthwork basket is divided into four sections. As depicted in **Figure 11**, the earthwork basket is divided into three sections. Optionally, the earthwork baskets 700, 800, 900 can have fewer than three sections or more than five sections, as desired.

[0034] Optionally, the synthetic turf comprises synthetic blade-like elements tufted into a synthetic backing. Preferably, the synthetic turf is used as a principal component of the system. It can be constructed using a knitting machine or tufting machine that may use, for example, over 1,000 needles to produce a turf width of about 15 feet. Preferably, the synthetic turf includes synthetic grass blades which comprise polyethylene monofilament and/or slit-film fibrillated and non-fibrillated fibers tufted to have a blade length of between about 0.5 inches and 4 inches. Other polymers can be used for the synthetic grass blades, as desired. Preferably, the synthetic grass blades are tufted to have a blade length of between about 1.5 inches and 3 inches. Most preferably, the synthetic grass blades are tufted to have a blade length of about 1.5 inches. Optionally, the synthetic grass blades are tufted to have a density of between about 20 ounces/square yard and about 120-ounces/square yard. Preferably, the synthetic grass blades have a thickness of at least about 100 microns.

[0035] The synthetic grass blades are tufted into the substrate or backing comprising a synthetic woven or non-woven fabric. Moreover, this backing can be a single-ply backing or can be a multi-ply backing, as desired. Optionally, the backing fabric may be coated to increase the tuft bind resistance.
The chemical composition of the synthetic turf components should be selected to resist degradation by exposure to sunlight, which generates heat and contains ultraviolet radiation. The polymer yarns should not become brittle when subjected to low temperatures. The selection of the synthetic grass color and texture should be aesthetically pleasing.

The grass-like components preferably consist of green or tan polyethylene fibers of about 1.5 to about 2.5 inches in length tufted into a woven or non-woven fabric. For added strength, an additional fabric component backing can be tufted for improving dimensional stability. The polyethylene grass filaments preferably have an extended operational life of at least 15 years.

Advantageously, the earthwork basket construction according to the present invention provides a good barrier from flooding and other threats, good protection against erosion in flood control and drainage structures, and good reinforcement of walls and slopes. The present earthwork basket construction has good durability, low-cost, excellent erosion control and water control, and a rather natural, pleasant appearance.

It is to be understood that this invention is not limited to the specific devices, methods, conditions, or parameters of the example embodiments described and/or shown herein, and that the terminology used herein is for the purpose of describing particular embodiments by way of example only. Thus, the terminology is intended to be broadly construed and is not intended to be unnecessarily limiting of the claimed invention. For example, as used in the specification including the appended claims, the singular forms "a," "an," and "the" include the plural, the term "or" means "and/or," and reference to a particular numerical value includes at least that particular value, unless the context clearly dictates otherwise. In addition, any methods described herein are not intended to be limited to the sequence of steps described but can be carried out in other sequences, unless expressly stated otherwise herein.
While the claimed invention has been shown and described in example forms, it will be apparent to those skilled in the art that many modifications, additions, and deletions can be made therein without departing from the spirit and scope of the invention as defined by the following claims.
What is claimed is:

1. An earthwork basket comprising:
   a multi-sided cage; and
   a liner for lining at least part of the multi-sided cage, the liner comprising a synthetic turf comprising a backing and a plurality of synthetic grass blades tufted into and extending from the backing, the synthetic turf being placed along at least one side of the multi-sided cage.

2. The earthwork basket of Claim 1, wherein the multi-sided cage can be erected from a flat, folded configuration to an erect, tillable configuration.

3. The earthwork basket of Claim 1, wherein the multi-sided cage has at least 2 sides.

4. The earthwork basket of Claim 1, wherein the synthetic turf faces outwardly from the multi-sided cage.

5. The earthwork basket of Claim 1, wherein the synthetic turf is positioned along multiple sides of the multi-sided cage.

6. The earthwork basket of Claim 1, wherein one or more sides of the multi-sided cage are lined with a geotextile liner or film sheet liner.

7. The earthwork basket of Claim 1, wherein the earthwork basket is generally polyhedric.

8. The earthwork basket of Claim 7, wherein the block-like earthwork basket is generally cubic.

9. The earthwork basket of Claim 7, wherein the block-like earthwork basket is generally brick-shaped.
10. The earthwork basket of Claim 7, wherein the block-like earthwork basket is generally a triangular prism.

11. The earthwork basket of Claim 7, wherein the angular earthwork basket is generally L-shaped.

12. The earthwork basket of Claim 7, wherein the angular earthwork basket is generally V-shaped.

13. The earthwork basket of Claim 1, wherein the backing comprises one or more geotextile(s).

14. The earthwork basket of Claim 1, wherein the geotextile(s) comprise a coating to increase tuft bind.

15. The earthwork basket of Claim 1, wherein the multi-sided cage comprises multiple sections.

16. A bundle of earthwork basket-like blocks or angles comprising:

   a plurality of earthwork basket-like blocks mechanically fastened to one another to form a bundle; and

   each earthwork basket-like block comprising a wire cage structure and a liner for containing loose fill material within the earthwork basket-like block, the liner comprising a synthetic turf positioned along at least one portion of the earthwork basket-like block, the synthetic turf comprising a synthetic backing and a plurality of synthetic blades tufted to and extending from the synthetic backing, the synthetic turf being oriented in the earthwork basket-like block so that the synthetic blades extend and face outwardly from the earthwork basket-like block.

17. The bundle of earthwork basket-like blocks of Claim 16, wherein the wire cage structure is erectable from a folded configuration to an erect tillable configuration.

18. The bundle of earthwork basket-like blocks of Claim 16, wherein the synthetic backing comprises one or more geotextile(s).
19. The bundle of earthwork basket-like blocks of Claim 18, wherein the geotextile(s) comprise a coating to increase tuft bind.