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(19) **United States**(12) **Patent Application Publication****Lin et al.**(10) **Pub. No.: US 2006/0147276 A1**(43) **Pub. Date: Jul. 6, 2006**(54) **TEXTURED GEOCELL****Publication Classification**(76) Inventors: **Chin-Tai Lin**, Taichung (TW); **Ferdie Chen**, Tainan (TW)(51) **Int. Cl.**
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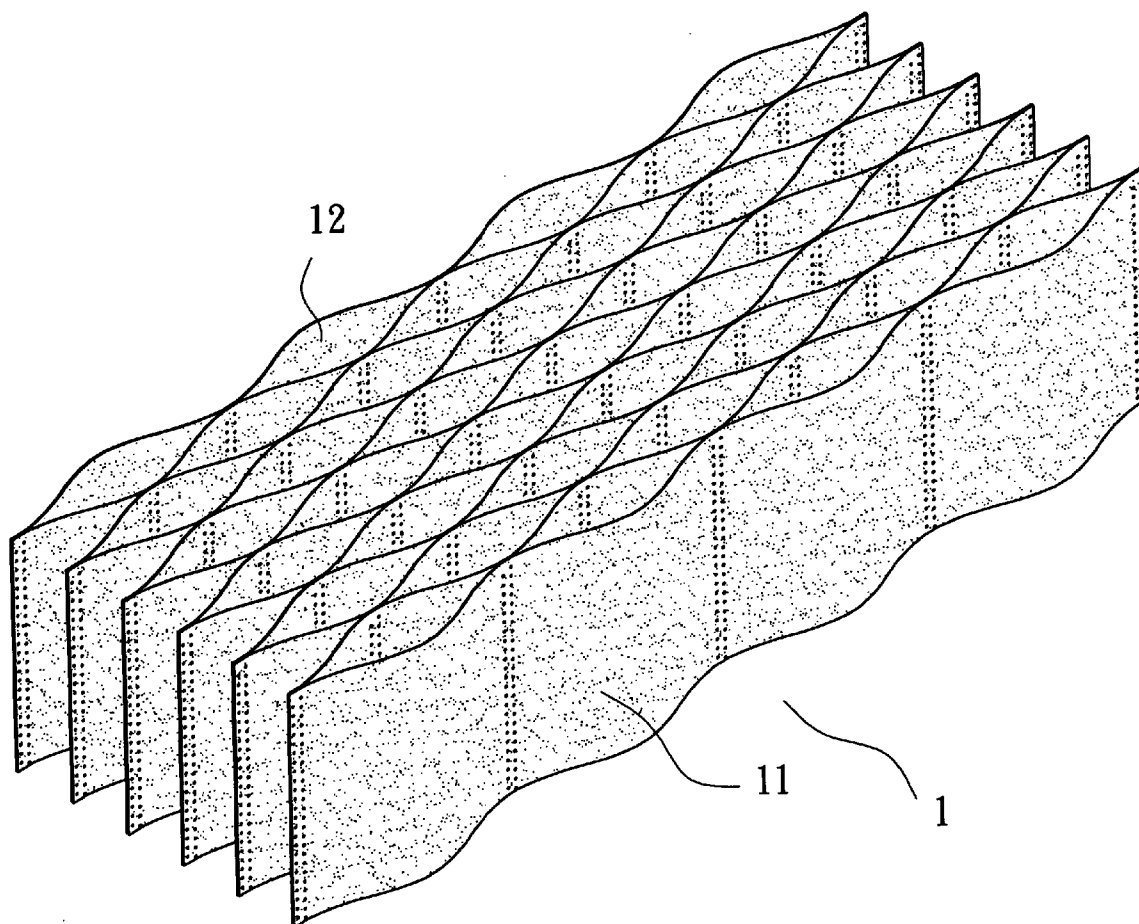
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ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043 (US)(57) **ABSTRACT**

A geocell for retaining infill in geotechnical structure, e.g. a protection construction on an unstable slope in mountainous areas, construction foundation, and green-making with plants, consists of several plastic plates; every two adjacent plastic plates are connected together at several spaced apart elongated joints by means of ultrasonic welding, each of which elongate joints includes several aligned points; thus, the geocell can be expanded into a honeycomb shape, and cells are formed therein for containing backfill therein; the plastic plates are formed with rough finishes so as to increase the backfill retaining capability of the present geocell.

(21) Appl. No.: **11/353,118**(22) Filed: **Feb. 14, 2006****Related U.S. Application Data**

(63) Continuation-in-part of application No. 11/024,694, filed on Dec. 30, 2004.



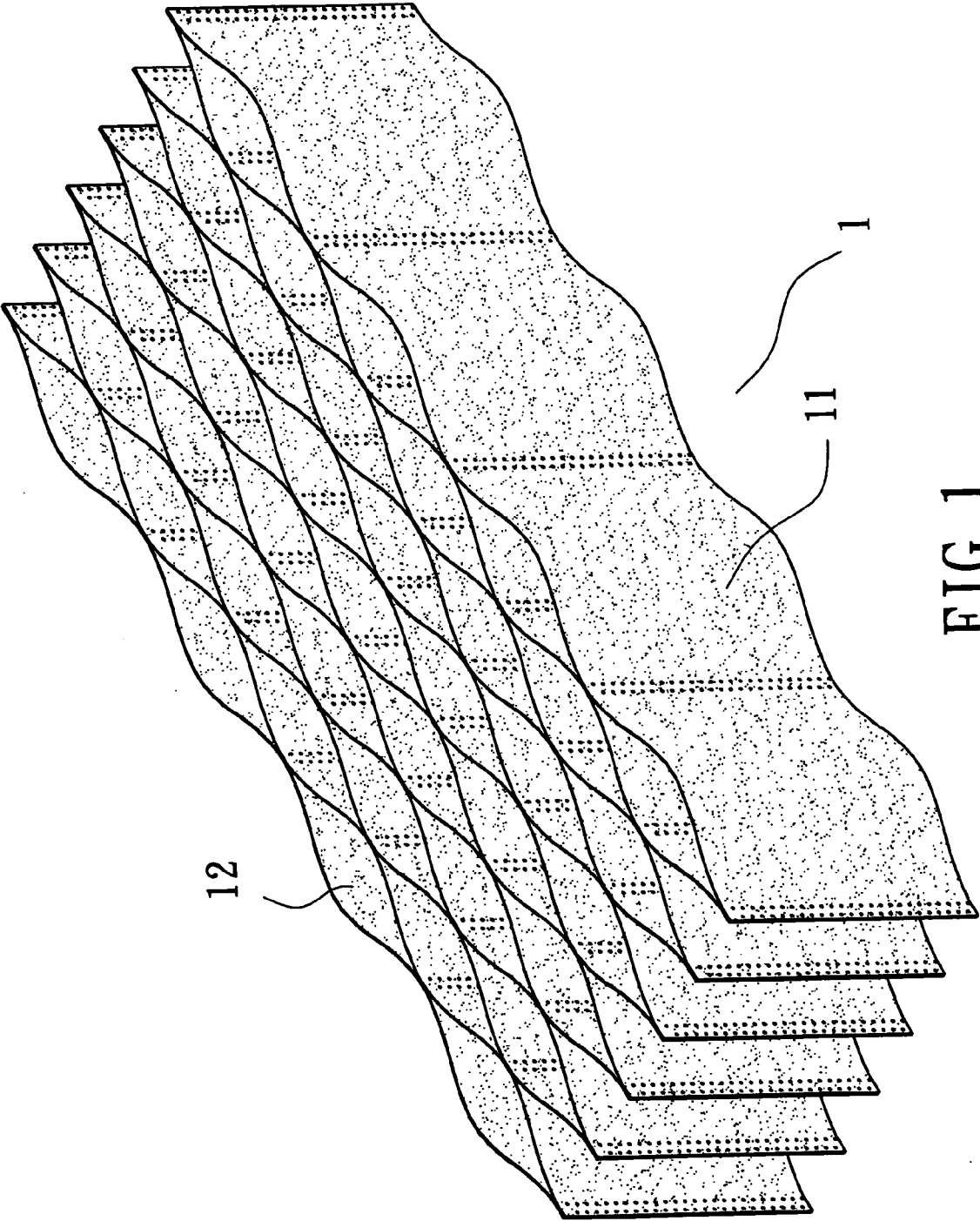


FIG. 1

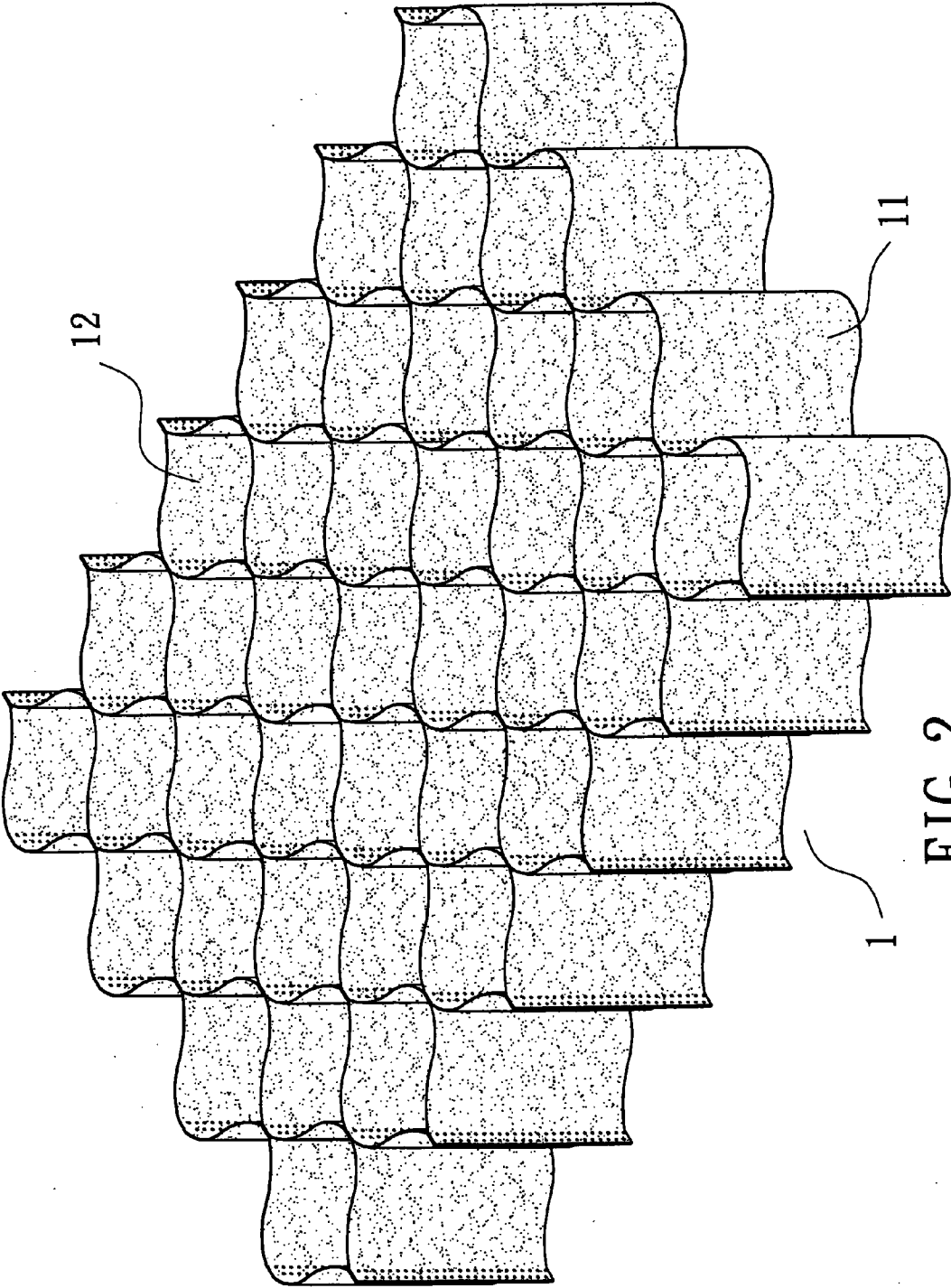


FIG. 2

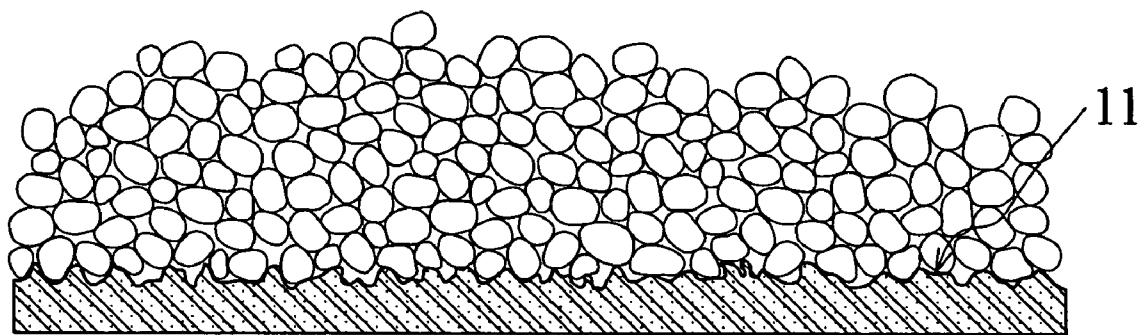


FIG. 3

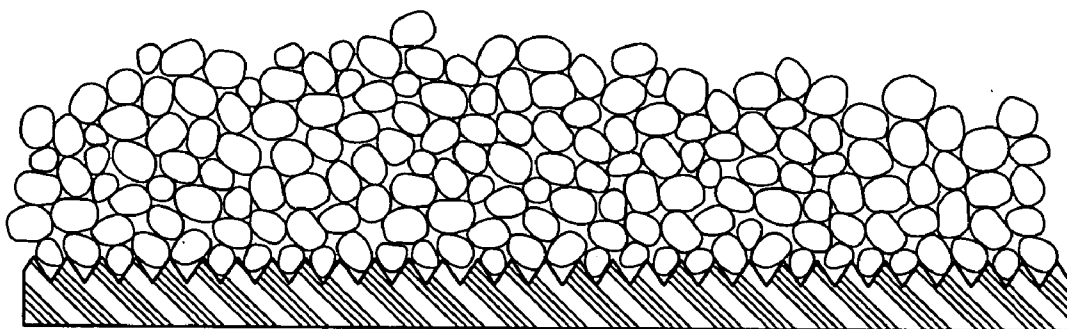
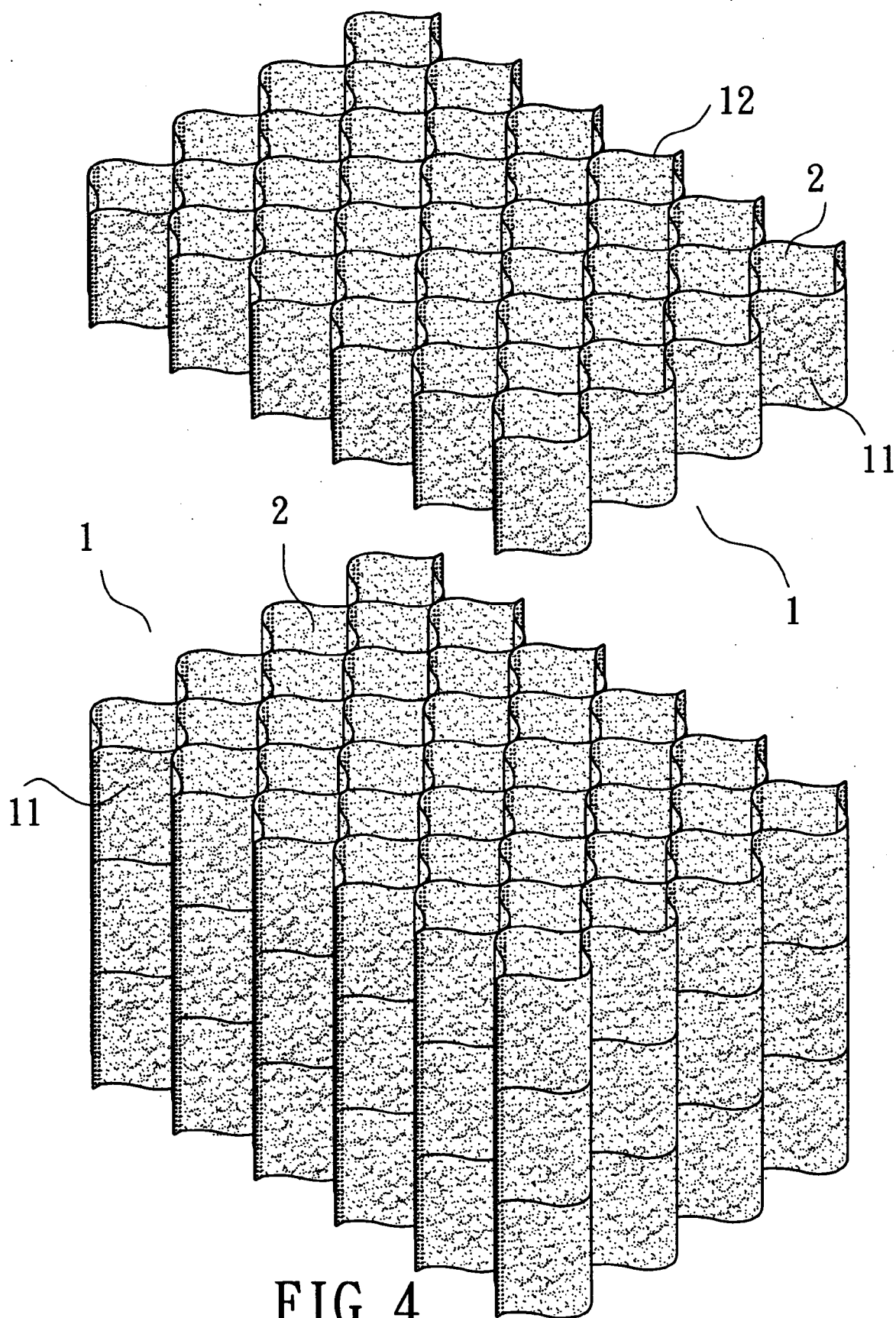


FIG. 10
(PRIOR ART)



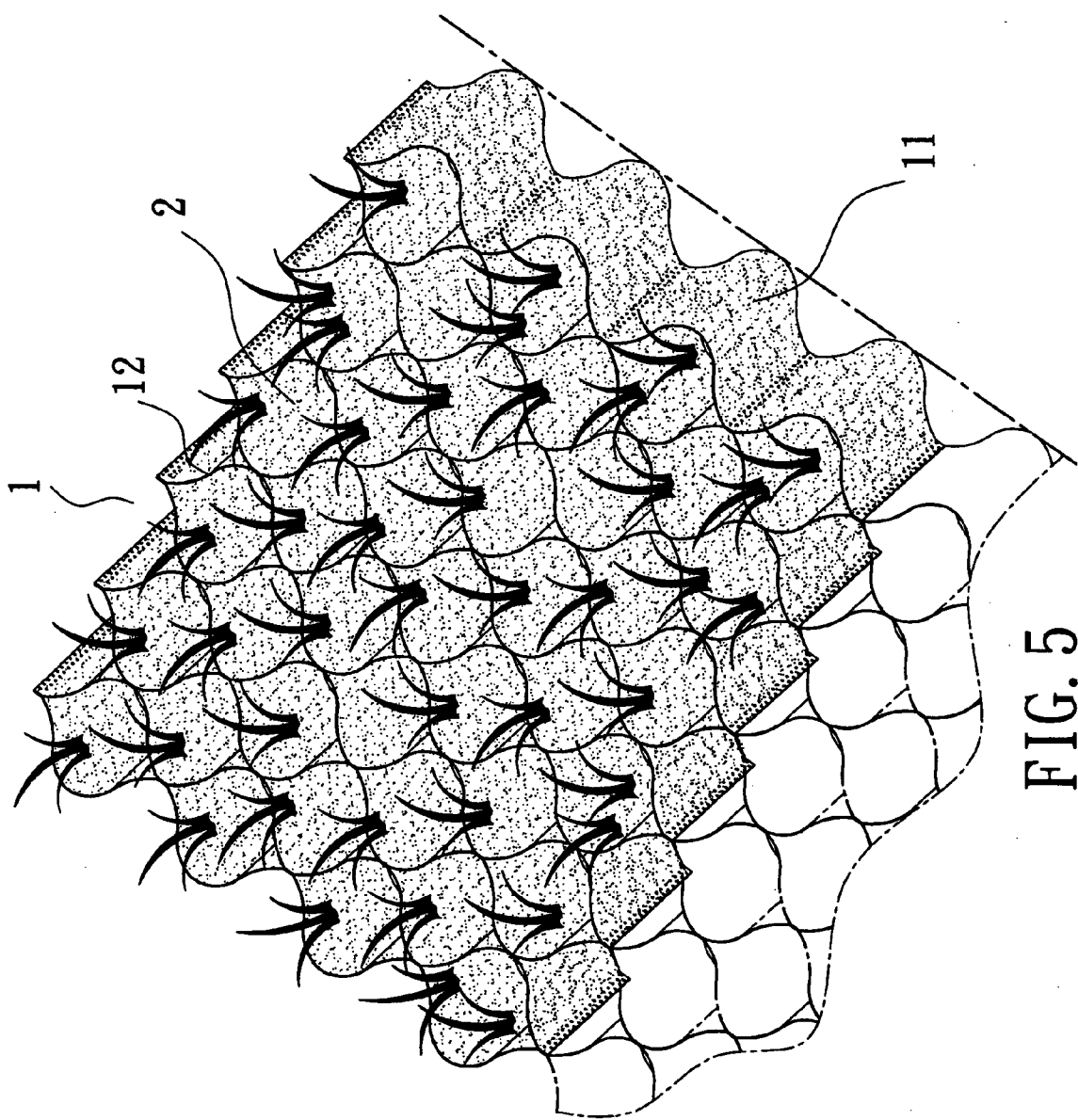


FIG. 5

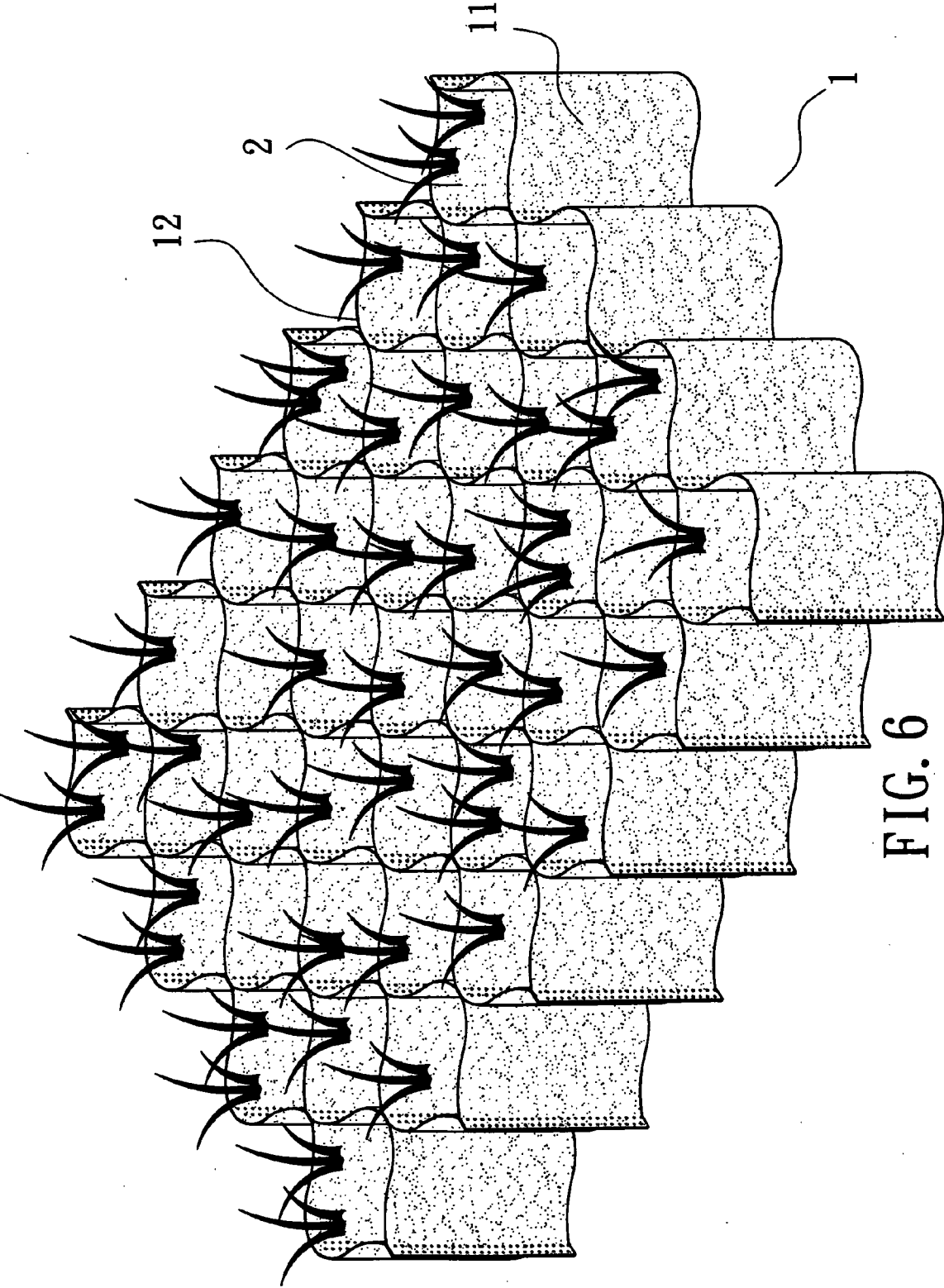


FIG. 6

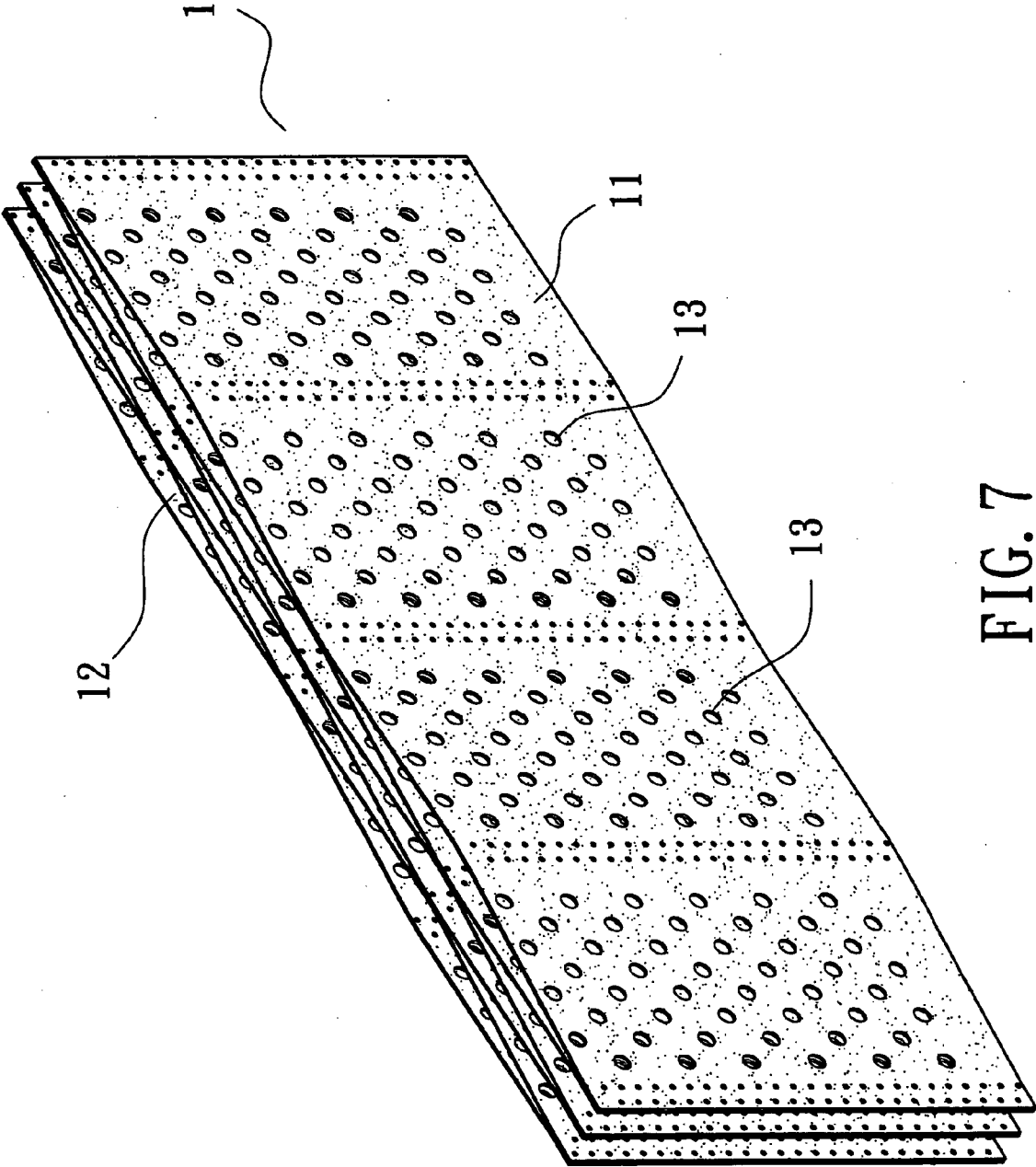


FIG. 7

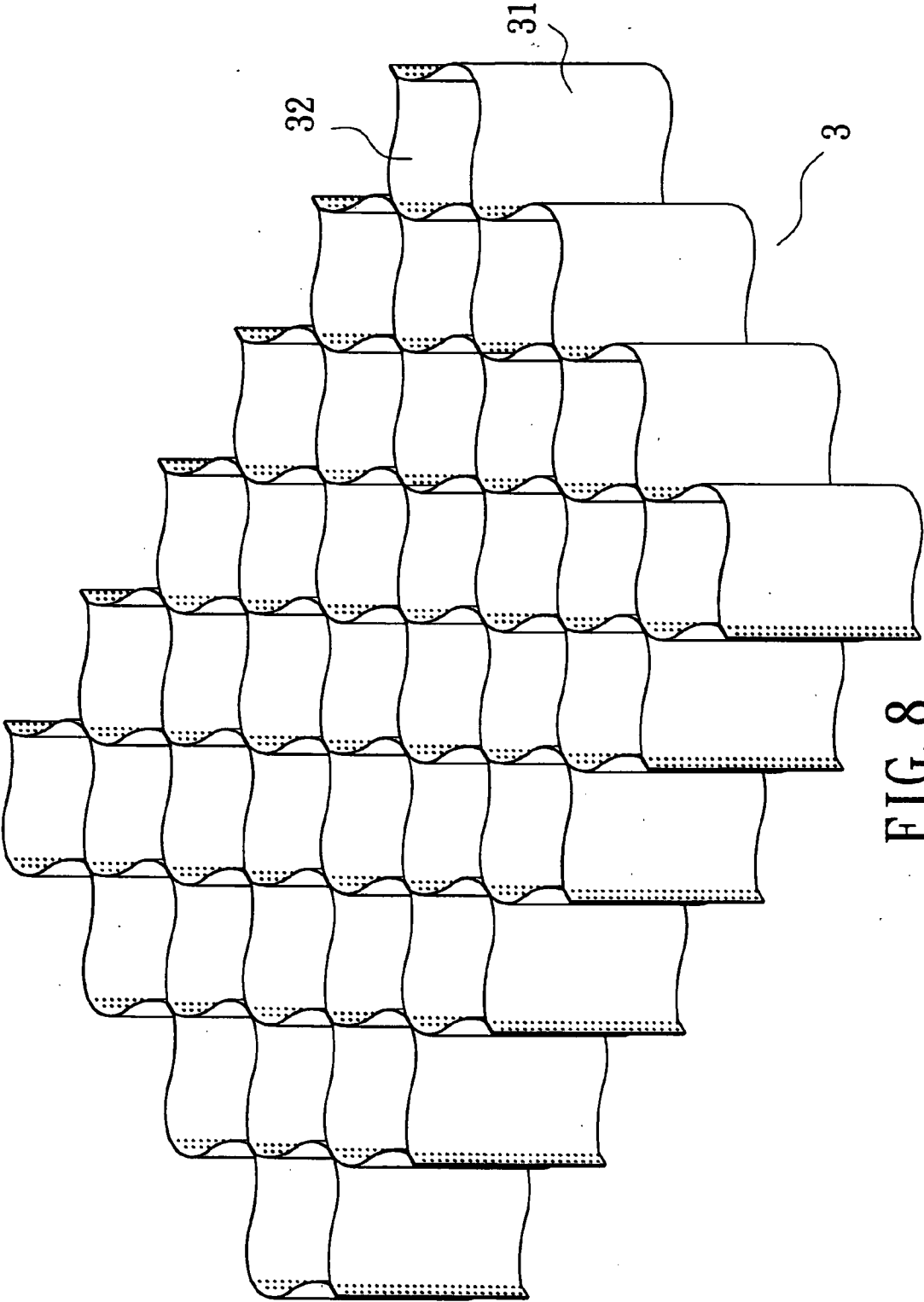


FIG. 8
(PRIOR ART)

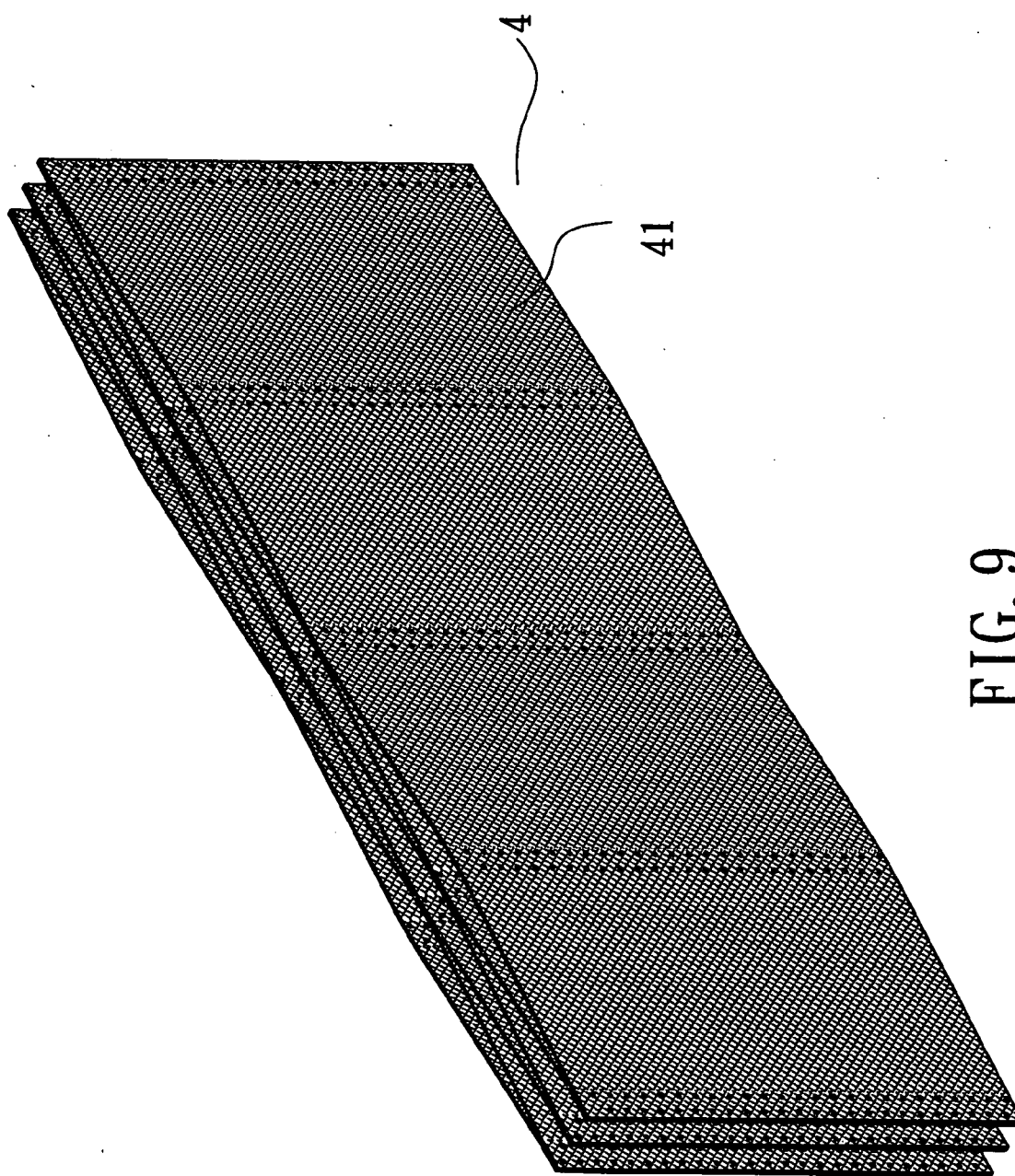


FIG. 9
(PRIOR ART)

TEXTURED GEOCELL

REFERENCE TO RELATED APPLICATIONS

[0001] This Patent Application is a Continuation-in-Part Application based on U.S. patent application Ser. No. 11/024,694, filed on 30 Dec. 2004, currently pending.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the invention

[0003] The present invention relates to a geocell three-dimensional confinement system for retaining infill as a protective construction for slope protection, erosion control, ground stabilization, and retaining wall. More particularly, an infill is contained in geocells in the shape of honeycombs, which are composed of several plastic plates formed with rough surfaces for increasing the infill retaining capability of the geocell.

[0004] 2. Brief Description of the Prior Art

[0005] A common geocell structure for retaining infill in geotechnical structure includes several plastic plates. Every two adjacent ones of the plastic plates are connected by ultrasonic welding or other methods together at several joints with certain ranges such that when the geocell is expanded, it will be in the shape of a honeycomb, which includes many cells for containing the infill, e.g. sand, stones, and earth, therein.

[0006] Referring to **FIG. 8**, a first infill retained geocell **3** of the above structure consists of plastic plates **31**. The plastic plates **31** have smooth surfaces therefore friction between the retained geocell **3** and backfill, which is contained in cells **32** formed between the plastic plates **31**, is too weak to prevent the backfill from being washed away from the retained geocell **3**.

[0007] Referring to **FIG. 9**, a second infill retained geocell **4** of the above structure consists of plastic plates, on which diamond-shaped veins **41** are formed by means of an embossing roller such that the friction between the retained geocell **4** and the backfill increases slightly. However, the asperity height of the embossed pattern is still not enough, usually lower than 0.3 mm. Consequently, the friction between the retained geocell **4** and the backfill still is not large enough to prevent the backfill from being washed away from the retained geocell **4**.

[0008] Referring to **FIG. 10**, U.S. Pat. No. 4,965,097 teaches a kind of texturized cell material, which has a plate shape with texturized surfaces; the plate-shaped main body is made by means of extrusion forming, and rollers with superficial projections are pressed against and moved along the plate-shaped main body to form texturized surfaces before the plate-shaped main body cools and hardens.

[0009] The manufacturing cost of the texturized cell material will increase because rollers have to be pressed against and moved along the plate-shaped main body in addition to the extrusion step. Furthermore, because the texturized surfaces are formed by means of rollers with superficial projections, they have regular projections thereon; the pattern on the rollers will repeat itself every time after the rollers turn one circle, as shown in **FIG. 10**. Consequently, backfill can't closely fit in the space between the regular projections, and the friction between the texturized cell

material and the backfill isn't large enough to prevent the backfill from being washed away from the cell material.

SUMMARY

[0010] It is a main object of the present invention to provide a textured geocell to overcome the above disadvantages. Improved geotechnical structure can be a protection construction for slope protection, erosion control, ground stabilization, and retaining wall with plants.

[0011] The infill retained geocell of the present invention consists of several plastic plates, which have rough surfaces. Every two adjacent plastic plates are connected together at several joints by means of ultrasonic welding or other methods. Each of which elongate joints includes several aligned points; thus, the geocell can be expanded into a honeycomb-shaped three-dimensional confinement structure, and cells are formed for containing backfill therein. Because the plastic plates have rough surfaces, the backfill retaining capability has been significantly increased.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will be better understood by referring to the accompanying drawings, wherein:

[0013] **FIG. 1** is a perspective view of the textured geocell for retaining backfill in geotechnical structure in the present invention,

[0014] **FIG. 2** is a perspective view of the textured geocell for retaining backfill in the present invention, in stretched honeycomb shape,

[0015] **FIG. 3** is a partial side view of the textured geocell of the present invention,

[0016] **FIG. 4** is a view showing the first usage of the textured geocell of the present invention,

[0017] **FIG. 5** is a view showing the second usage of the textured geocell of the present invention,

[0018] **FIG. 6** is a view showing the third usage of the textured geocell of the present invention,

[0019] **FIG. 7** is a perspective view of the second embodiment of a textured geocell in the present invention,

[0020] **FIG. 8** is a perspective view of the first conventional geocell for retaining backfill in geotechnical structure described in Background,

[0021] **FIG. 9** is a perspective view of the second conventional geocell for retaining backfill in geotechnical structure described in Background, and

[0022] **FIG. 10** is a partial side view of the structure taught in U.S. Pat. No. 4,965,097.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] Referring to **FIGS. 1 to 3**, a preferred embodiment **1** of a geocell for retaining infill in geotechnical structure includes several plastic plates with rough finishes **11** with irregular projections on both sides. Every two adjacent plastic plates are connected together at several spaced apart elongate joints, each of which elongate joints includes several aligned points, and in turns, the present geocell will

be in the shape of a honeycomb, which includes many cells **12** for containing backfill therein, when it is expanded, as shown in **FIG. 2**; welding with ultrasonic wave or other methods can be used for connecting the plastic plates together. Because the plastic plates have rough finishes **11** with irregular projections, the backfill **2** can be effectively retained in the textured infill retained geocell **1** of the present invention.

[0024] The rough finishes **11** on the plastic plates are made by means of the following steps:

[0025] 1. mixing materials: plastic materials, stains, and processing aids are mixed and fed into a material barrel of a main extruding machine (A), and plastic materials, stains, processing aids, and foaming agent are mixed and fed into material barrels of second extruding machines (B) and (C);

[0026] 2. extruding: the mixture of plastic materials, stains, and processing aids is melted in a material conduit of the main extruding machine (A), and extruded from the main extruding machine (A) to form a smooth basic material of the plastic plates; also, the mixtures of plastic materials, stains, processing aids, and foaming agent are melted in material conduits of the second extruding machines (B) and (C), with the foaming agent being heated and decomposed to produce gas, and the molten mixtures are extruded from the second extruding machines (B) and (C) respectively to form two pieces of rough covering materials of the plastic plates; the amount of the foaming agent is such that gas produced from the foaming agent is enough for making plastics produce bubbles and the bubbles break;

[0027] 3. shaping: the smooth basic material extruded from the main extruding machine (A), and the rough covering material extruded from the second extruding machines (B) and (C) are conveyed to a mold head, and passed through the mold head together such that the rough covering materials are joined to two sides of the smooth basic parts, and a continuous sheet of plastic material forms with rough finishes;

[0028] 4. cooling, rolling and severing: the continuous sheet of plastic material with rough finishes is cooled, rolled, and severed to form plural plastic plates with a predetermined size.

[0029] Because foaming agent is added to the material mixture, and the amount of the foaming agent is such that when the foaming agent is heated and decomposed, gas produced from it is enough for making plastics produce bubbles and the bubbles break, the plastic plates will form with bubbles on the surfaces thereof, and the bubbles will break randomly. In other words, the plastic plates have rough finishes with irregular projections forming a randomized pattern.

[0030] Referring to **FIG. 4**, several textured geocells of the present invention are expanded into honeycomb shape, filled with backfill **2**, and stacked up for use as a retaining wall or in a construction foundation.

[0031] Referring to **FIG. 5**, several textured geocells of the present invention are positioned side by side on an unstable slope in a mountainous area, expanded into honeycomb shape, and filled with backfill **2**. Furthermore, trailing plants are planted on the fill **2**. Because the plastic plates have rough finishes **11** with irregular projections, the filled **2** will be retained in the cells **12**, and wash-away of the backfill **2** will be prevented when there is rain. And, the trailing plants on the backfill **2** will grow to help hold the backfill **2** in position. Consequently, the unstable slope will be strengthened, and stones are prevented from falling.

[0032] Referring to **FIG. 6**, several textured geocells of the present invention are positioned side by side on the ground, stretched into honeycomb shape, and filled with backfill **2**, and then plants are planted on the backfill **2** to make green. Because the plastic plates have rough finishes **11** with irregular projections, the backfill **2** can be effectively retained in the cells **12**, and strength of the ground increased. Consequently, the ground can remain in good shape even if people run thereon, and wash-away of the backfill **2** will be prevented when there is rain, and the trees and plants will grow well.

[0033] Referring to **FIG. 7**, in a second embodiment, the plastic plates of the textured geocell **1** are further formed with several through holes **13** over them.

[0034] From the above description, it can be easily understood that the textured geocell of the present invention has better retaining capability than the conventional ones as described in Background.

What is claimed is:

1. A textured geocell for retaining infill in geotechnical structure, comprising

a plurality of plastic plates, every two adjacent said plastic plates being connected together at a plurality of spaced apart elongate joints by means of ultrasonic welding, each of said elongate joints includes a plurality of aligned points, such that said plastic plates expand to form a honeycomb shape for containing the backfill therein;

a plurality of rough finishes on said plastic plates, said rough finishes having irregular projections forming a randomized pattern so as to have increased backfill retaining capability.

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