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(54) **EARTH RETAINING AND GEO-GRID WALL SYSTEM**

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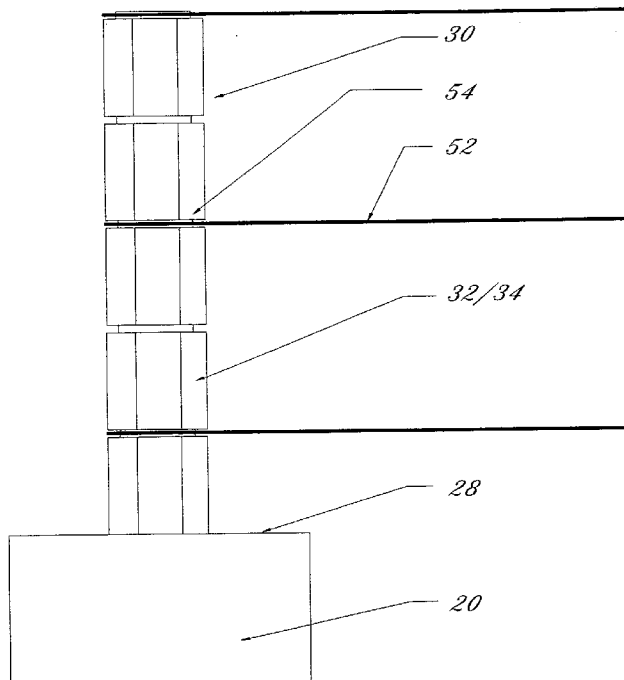
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(57) **ABSTRACT**

The instant invention relates to an earth retaining wall system, definable with reference to an x,y,z Cartesian coordinate system, for stabilizing an earthen wall, the system comprising a y-axis footing having an x-axis width, the

footing embedded within the earth along a y-z plane at a base of an earthen mass to be retained by the system, the footing having a flat xy upper surface thereof; and upon the upper surface of the footing, a retaining wall comprising a multiplicity of courses of constructional blocks, each block thereof defining a generally solid rectangular exterior configuration, an x-axis thereof defining a width axis of the wall, a y-axis thereof defining a segment of a length of the wall, and a z-axis thereof defining a segment of a height of the wall, in which one xz end surface of each block comprises a positive y-axis deep key geometry and each opposing xz end surface thereof comprises a negative y-axis deep key geometry complementally interlockable to a part of a substantially planar xy geo-grid positioned within at least one xy plane between the retaining wall and the earthen mass to be retained, a y-axis edge of the geo-grid rigidly secured between opposing surfaces of y-axis courses of blocks of the retaining wall, in which elements of the grid near to the y-axis edge thereof define x and y axes separations proportioned for complementary interposition between successive z-axis recesses and interlocking blocks of opposing z-axis courses, whereby securing the y-axis edge of the geo-grid is secured between adjacent z-axis courses of blocks of the retaining wall.



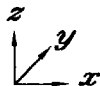
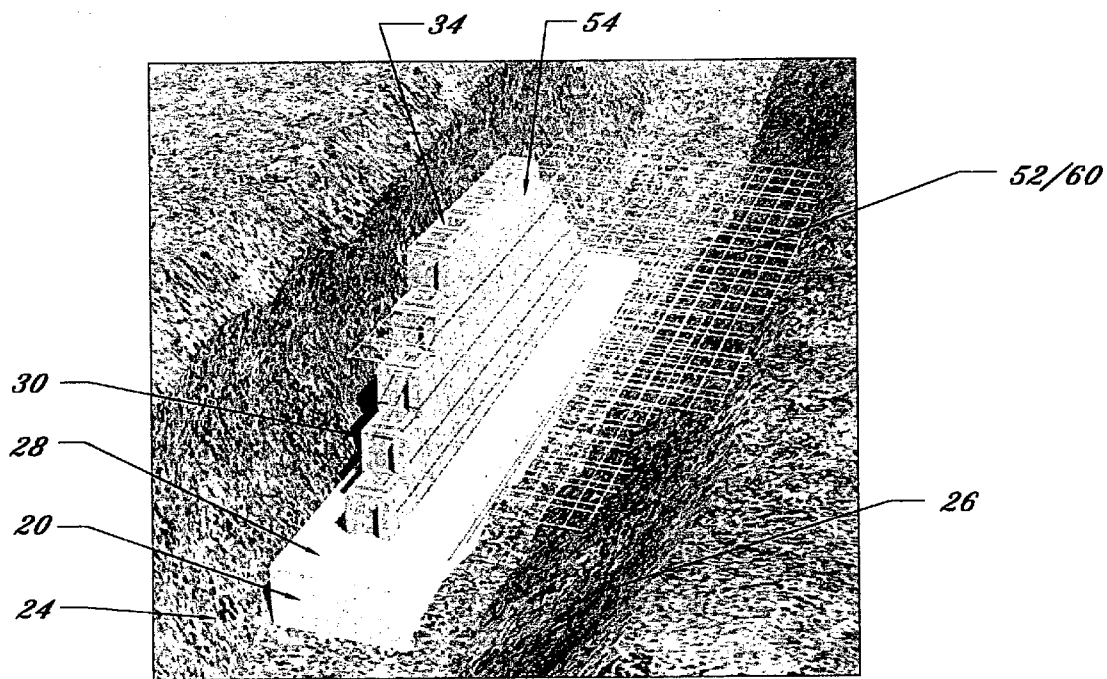


FIG. 1

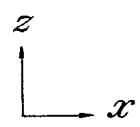
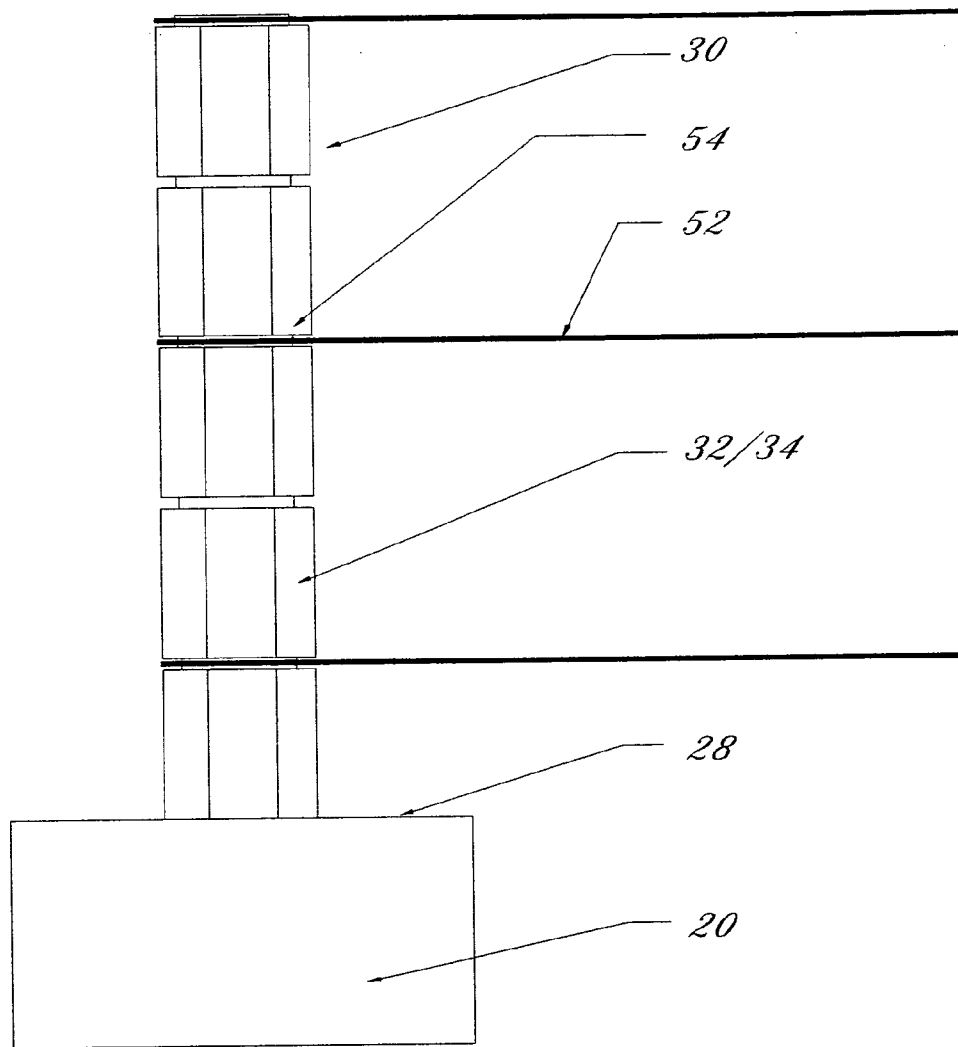


FIG. 2

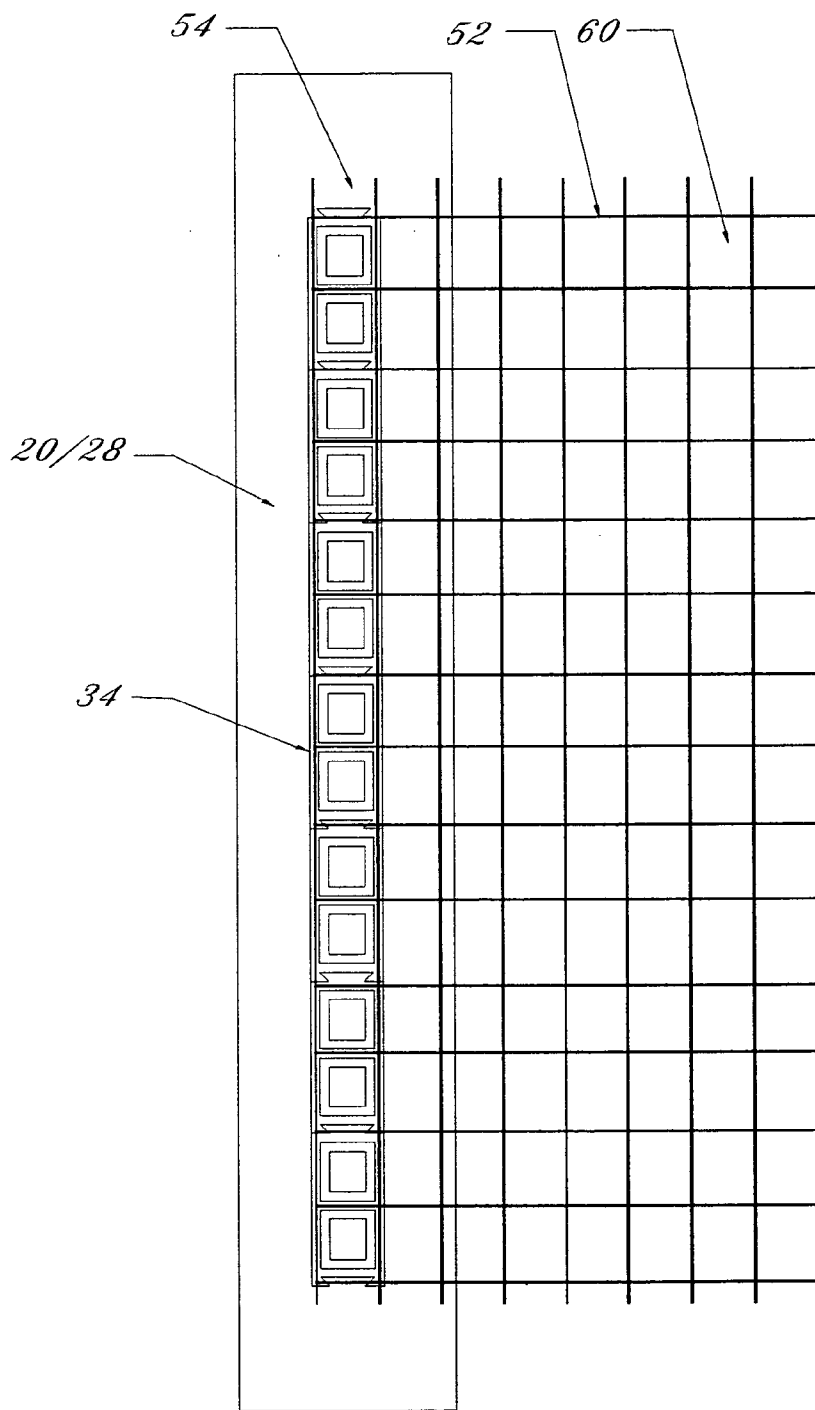


FIG. 3

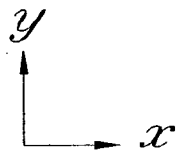
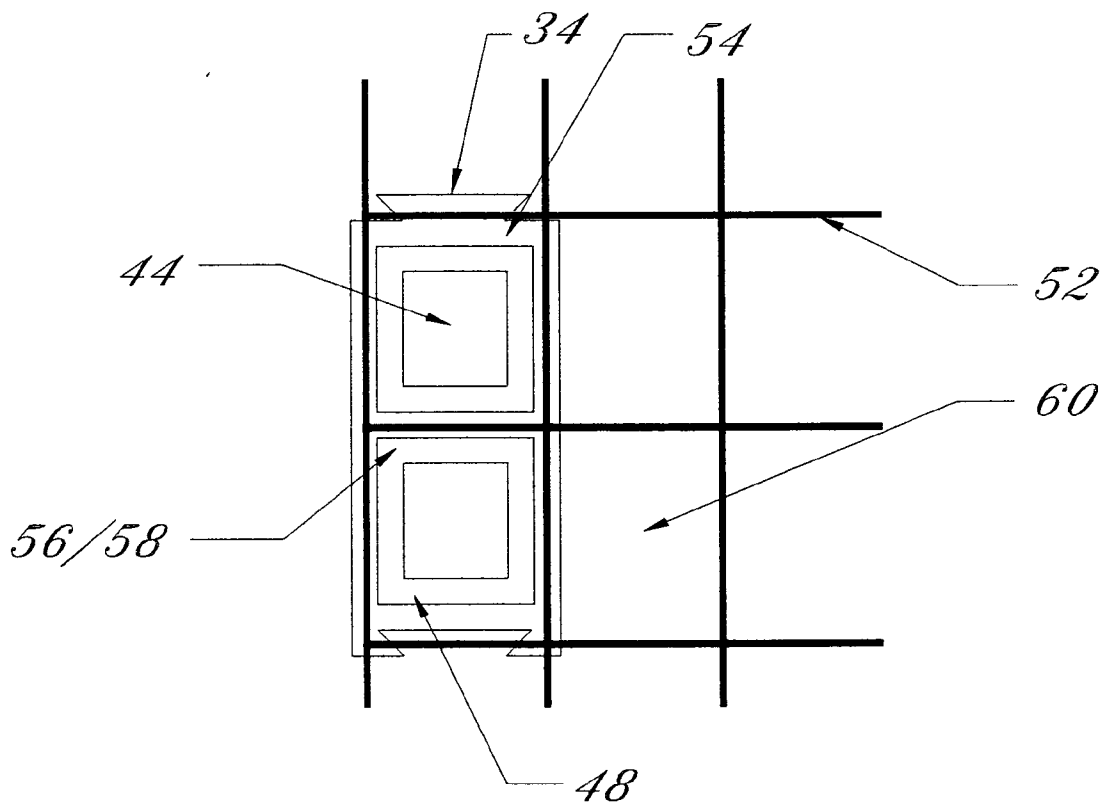


FIG. 4

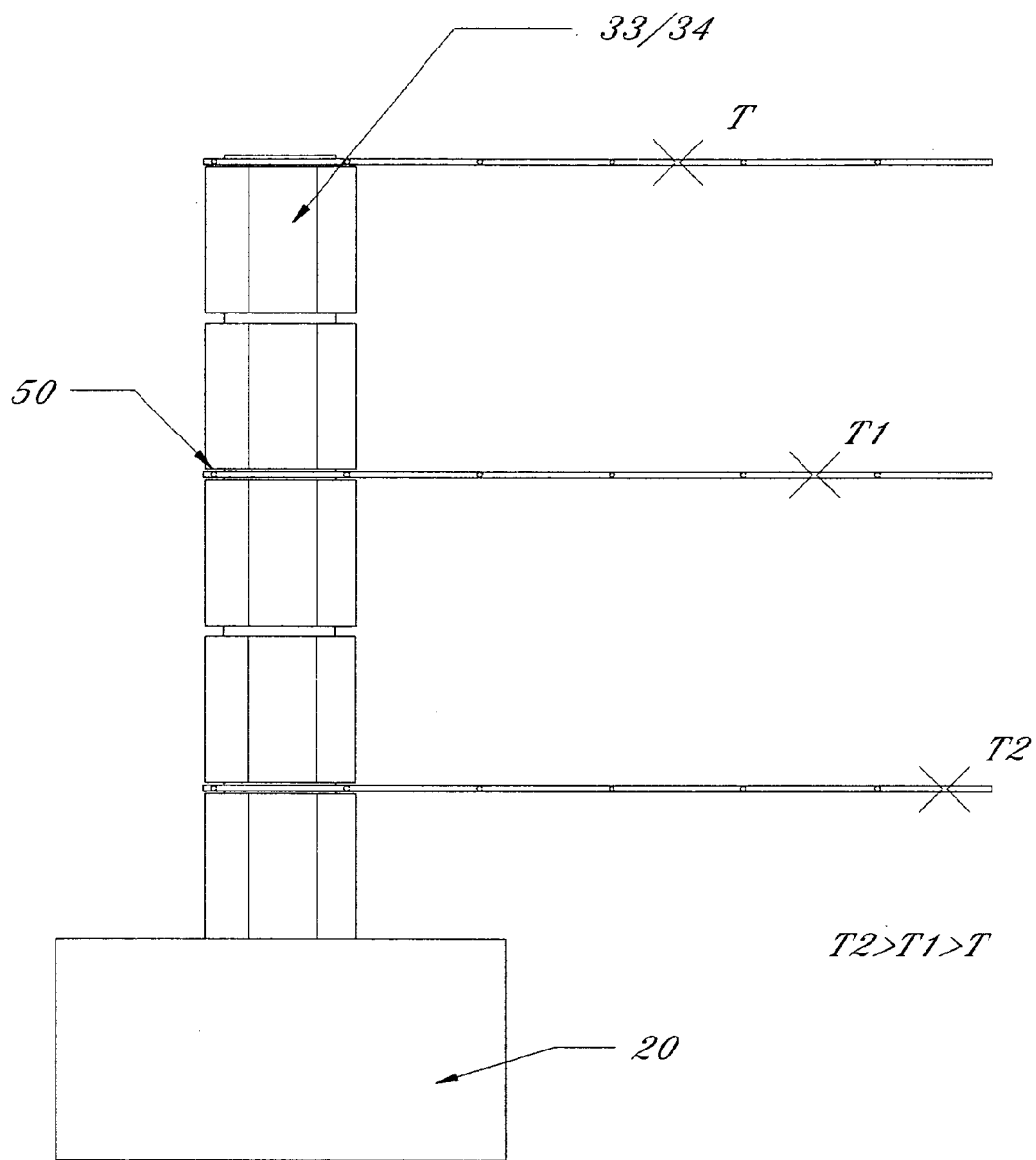


FIG. 5

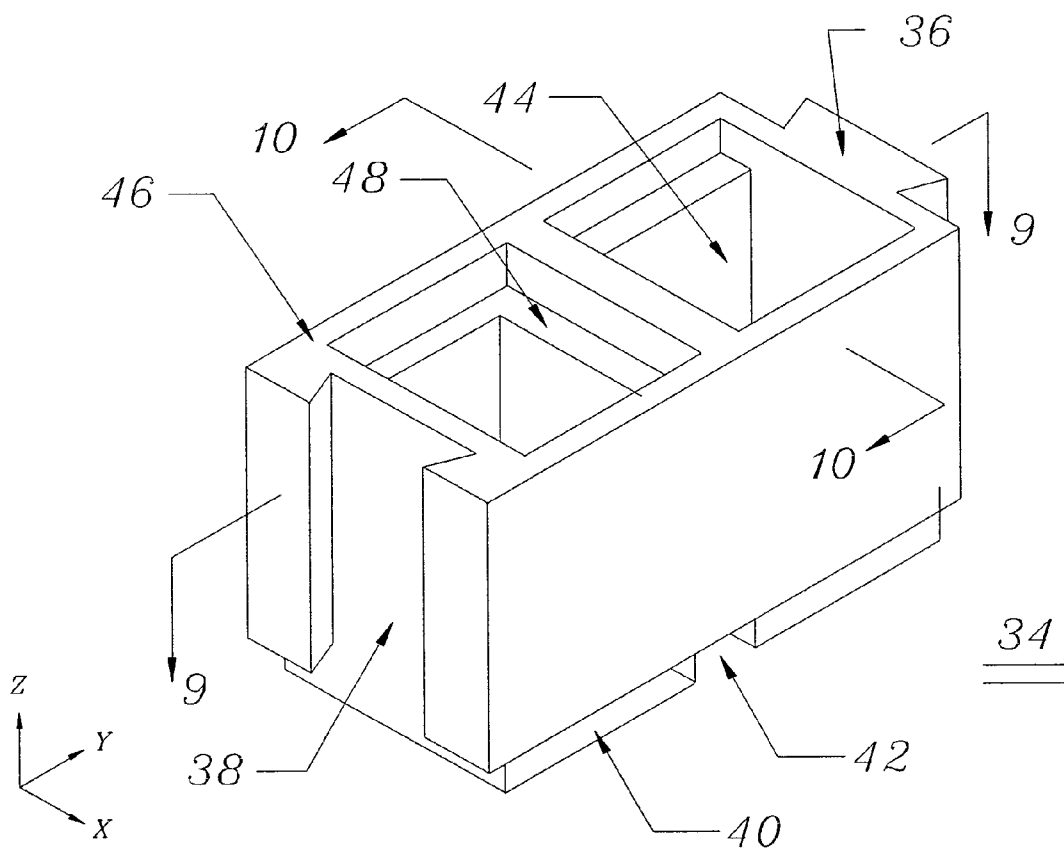
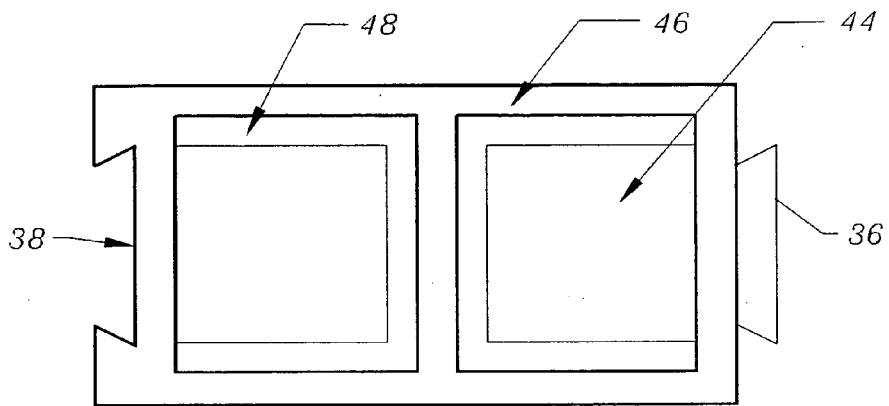


FIG. 6



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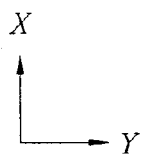
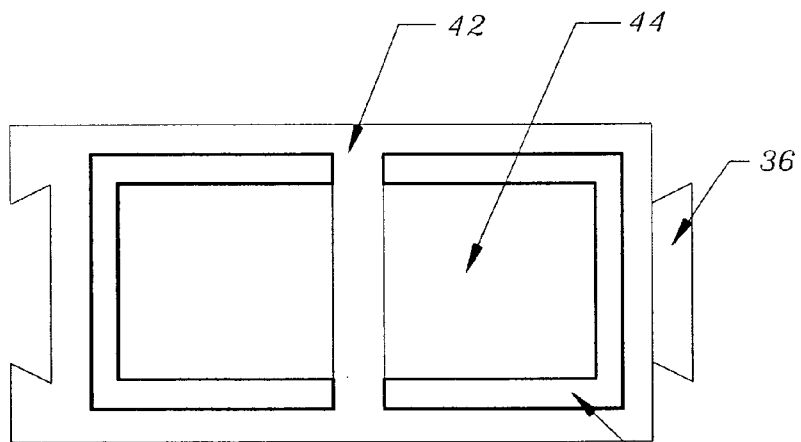


FIG. 7



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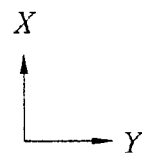
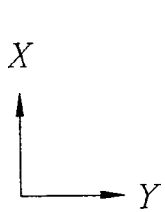
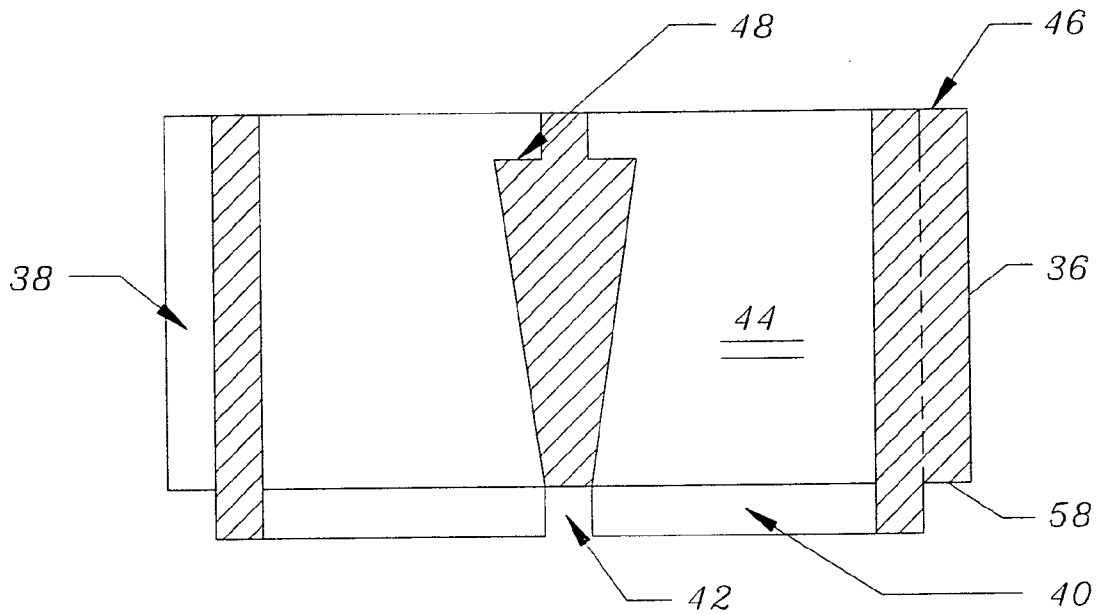
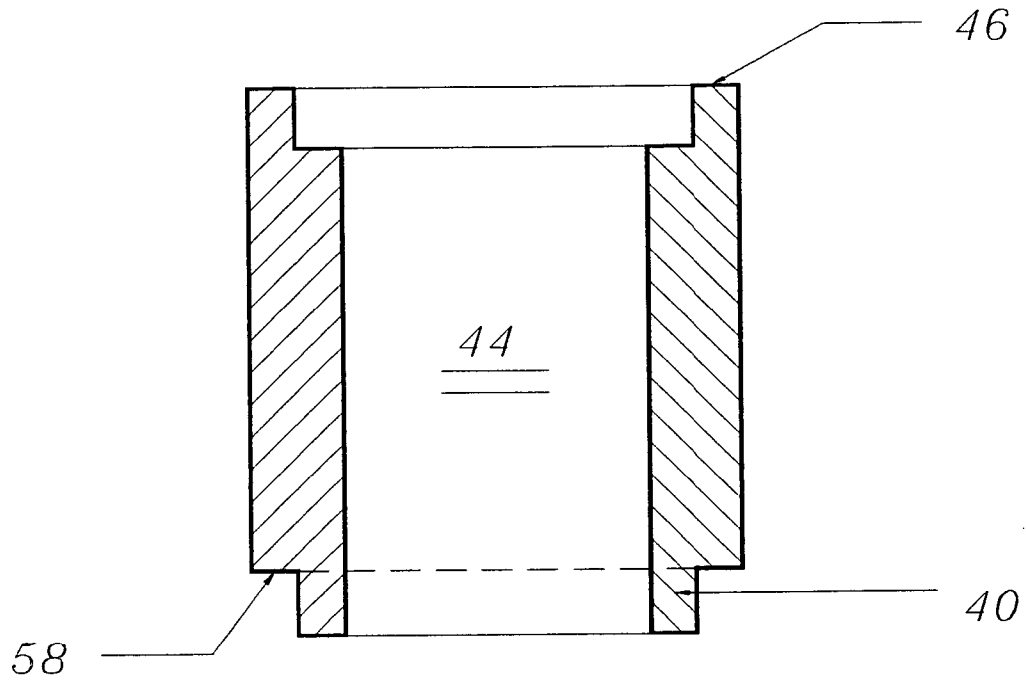


FIG. 8



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FIG. 9



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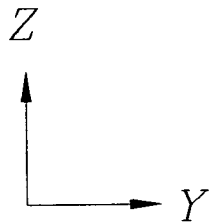


FIG. 10

EARTH RETAINING AND GEO-GRID WALL SYSTEM

BACKGROUND OF THE INVENTION

[0001] The instant application reflects an improvement of my U.S. Pat. Nos. 5,222,836 and 5,372,461, both entitled Passive Resistive Retaining Wall Structure and, as well, is related to my U.S. Pat. No. 6,105,330 (2000) entitled Constructional Components For Use In A Wall System, and above referenced related pending applications. This invention relates to an earth retaining system and, specifically to structures which facilitate the construction of a retaining wall using special-purpose building blocks inclusive of those taught in my said U.S. Pat. No. 6,105,330 (2000).

[0002] It has, in the art, been known to use flexible mechanical soil stabilizing grids or sheets, occasionally termed geo-grids, in combination with a retaining block wall system, as is reflected in U.S. Pat. No. 4,914,876 (1990) to Forsberg; U.S. Pat. No. 5,145,288 (1992) to Borchardt, U.S. Pat. No. 5,800,097 (1998) to Martin; U.S. Pat. No. 6,086,288 (2000) to Ruel et al; and U.S. Pat. No. 6,443,662 (2002) to Scales et al.

[0003] Notwithstanding such art, cost-effective and reliable earth retaining wall block system, in combination with geo-grids, has not emerged. The instant invention is therefore directed to a novel, cost-effective, and simple-to-utilize earth retaining wall block system which uses flexible geo-grids or the like.

SUMMARY OF THE INVENTION

[0004] The instant invention relates to an earth retaining wall system, definable with reference to an x,y,z Cartesian coordinate system, for stabilizing an earthen wall, said system comprising a y-axis footing having an x-axis width, said footing embedded within the earth along a y-z plane at a base of an earthen mass to be retained by said system, said footing having a flat xy upper surface thereof; and upon said upper surface of said footing, a retaining wall comprising a multiplicity of courses of constructional blocks, each block thereof defining a generally solid rectangular exterior configuration, an x-axis thereof defining a width axis of said wall, a y-axis thereof defining a segment of a length of said wall, and a z-axis thereof defining a segment of a height of said wall, in which one xz end surface of each block comprises a positive y-axis deep key geometry and each opposing xz end surface thereof comprises a negative y-axis deep key geometry complementally interlockable to a part of a substantially planar xy geo-grid positioned within at least one xy plane between said retaining wall and said earthen mass to be retained, a y-axis edge of said geo-grid rigidly secured between opposing surfaces of y-axis courses of blocks of said retaining wall, in which elements of said grid near to said y-axis edge thereof define x and y axes separations proportioned for complemental interposition between successive z-axis recesses and interlocking blocks of opposing z-axis courses, whereby securing said y-axis edge of said geo-grid is secured between adjacent z-axis courses of blocks of said retaining wall.

[0005] It is an object of the invention to provide a three-dimensional structure for the stabilization of a mass of earth to be retained to reduce the wall thickness and height necessary to retain a given volume of earth.

[0006] It is another object to provide an earth retaining wall system utilizing geo-grids as well as the mechanical principles of passive resistance.

[0007] It is a further object of the invention to provide a retaining wall system which may be constructed or assembled at the work site from a plurality or modular components.

[0008] It is a yet further object to provide a simple, economical and effective means of constructing an earth retaining wall from concrete building blocks.

[0009] It is a yet further object to provide an invention of the above type which can readily anchor a block wall to backfill and earth volumes of a variety of sizes and geometries.

[0010] It is a further object to provide a mortarless, self-anchoring retaining system using geo-grids.

[0011] The above any yet other objects and advantages of the present invention will become apparent from the hereinafter set forth Brief Description of the Drawings, Detailed Description of the Invention and Claims appended herewith.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] **FIG. 1** is an isometric view of the inventive system.

[0013] **FIG. 2** is a side vertical cross-sectional view of the inventive system in an xz plane thereof.

[0014] **FIG. 3** is a cross-sectional view of the system taken along a xy plane thereof.

[0015] **FIG. 4** is an enlargement of the retaining wall, shown in **FIG. 3**, particularly reflecting the complemental connection between a y-axis edge of a geo-grid and the blocks of the retaining wall.

[0016] **FIG. 5** is a vertical cross-sectional view, similar to that of **FIG. 2**, however showing the use of geo-grids of different x-axis lengths.

[0017] **FIG. 6** is an isometric view of a constructional block used in the retaining wall of the instant invention.

[0018] **FIGS. 7 and 8** are respective top and bottom plan views of the block of **FIG. 6**.

[0019] **FIG. 9** is a vertical cross-sectional view taken along Line 9-9 of **FIG. 6**,

[0020] **FIG. 10** is a vertical cross-sectional view taken through Line 10-10 of **FIG. 6**.

DETAILED DESCRIPTION OF THE INVENTION

[0021] With reference to the isometric view of **FIG. 1**, the instant invention may be described with reference to an x,y,z Cartesian coordinate system. Therein, the system may be seen to include a y-axis footing **20** having an x-axis width and a z-axis height, a part of which is embedded within earth **22**. An earthen mass **26** is indicated to the right of **FIG. 1**. Footing **20** includes a flat xy upper surface **28** thereof.

[0022] Upon said upper surface of footing **20** is a retaining wall **30** (see also **FIG. 2**) which comprises a multiplicity of courses **32** of constructional blocks **34**, each block thereof

defining a generally solid rectangular exterior configuration, an x-axis thereof defining a width axis of said 30, a y-axis thereof defining thereof a segment of a length of said wall, an a z-axis thereof defining a segment of a height of said wall 30.

[0023] As may be noted in FIGS. 6 thru 10, one xz end surface 36 comprises a positive y-axis deep key geometry and each opposing xz end surface 38 of block 34 comprises a negative y-axis deep key geometry, complementally interlockable in said positive y-axis deep key geometry 36.

[0024] Further, in a preferred embodiment, blocks 34 will include male members 40 projecting from lower xy surfaces 42 which are complemental to female recesses 44 within upper xy surface 46 of the block. Thereby, z-axis projections 40 will complementally interlock lower ledge 58 to upper ledge 48, thereby effecting deep key interlocks 36/38 within the y-axis and 40/48 within the z-axis of the system.

[0025] Between one or more xy interfaces 50 (see FIGS. 2 and 5) are a geo-grids 52 having a y-region having a matrix-like structure (see FIGS. 3 and 4) which is complemental to said projecting male elements 40 of the blocks 34 which form said courses 30 of the retaining wall. Accordingly, when region 54 of grid 52 is placed upon xy upper surface 46 of a block 34, z-axis male member 40 of the z-axis abutting block may be placed thereon enabling lower xy surface 42 (see FIGS. 8 to 10) to abut thereagainst, as is shown in FIGS. 3 and 4. Accordingly, it should be understood that constituent matrix elements 60 of geo-grids 52 are, in the instant invention, proportioned for complemental securement between xy surfaces 48 and 58 of blocks 34.

[0026] With reference to FIG. 5, there is shown variable x-axis lengths of geo-grids 52 which may be employed. It should be further understood that grids 52 may include a variety of materials ranging from a flexible polymeric material to a thin gauge steel rebar.

[0027] While there has been shown and described the preferred embodiment of the instant invention it is to be appreciated that the invention may be embodied otherwise than is herein specifically shown and described and that, within said embodiment, certain changes may be made in the form and arrangement of the parts without departing from the underlying ideas or principles of this invention as set forth in the Claims appended herewith.

1. A retaining wall system, definable with reference to an x, y, z Cartesian coordinate system, for stabilizing an earthen wall, said system comprising:

- (a) a y-axis footing having an x-axis width, said footing embedded within the earth along a y-z plane at a base

of an earthen mass to be retained by said system, said footing having a flat xy upper surface thereof; and

- (b) upon said upper surface of said footing, a retaining wall comprising a multiplicity of courses of constructional blocks, each block thereof defining a generally solid rectangular exterior configuration, an x-axis thereof defining a width axis of said wall, a y-axis thereof defining a segment of a length of said wall, and a z-axis thereof defining a segment of a height of said wall, in which one xz end surface of each block comprises a positive y-axis deep key geometry and each opposing xz end surface thereof comprises a negative y-axis deep key geometry complementally interlockable within xy grids a substantially planar xy geo-grid positioned within at least one xy plane between said retaining wall and said earthen mass to be retained, a y-axis portion of said geogrid rigidly secured between opposing surfaces of y-axis courses of blocks of said retaining wall, in which elements of said geo-grid near to said y-axis edge thereof define said xy grids and are proportioned for complemental interposition about successive z-axis and male members of Interlocking blocks of opposing z-axis courses,

whereby securing said y-axis portion of said geo-grid is secured between adjacent z-axis courses of blocks of said retaining wall.

- 2. The system as recited in claim 1, further comprising: mortar placed between opposing xy surfaces of said blocks,

thereby providing a substantially rigid and load resistant interlock of each geo-grid between vertically contiguous courses of said blocks when joined together as components of said retaining wall system.

- 3. The system as recited in claim 2, in which:

a z-axis length of each of said male members of said lower xy surface of each block exceeds a z-axis depth of contiguous xy surface recesses of a vertically contiguous course to thereby provide space for insertion of said mortar between opposing xy surfaces of blocks of said courses of said retaining wall,

- 4. The system as recited in claim 2, in which:

a y-axis length of said positive y-axis deep key geometry exceeds a y-axis depth of said negative deep key geometry, thereby providing space for the insertion of mortar between opposing xz brick surfaces within a given course of said retaining wall.

- 5. The system as recited in claim 4, in which each of said deep key geometries each comprise a trapezoidal structure.

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