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(71) Applicant: **Yang, Jesse**
Taiwan (TW)

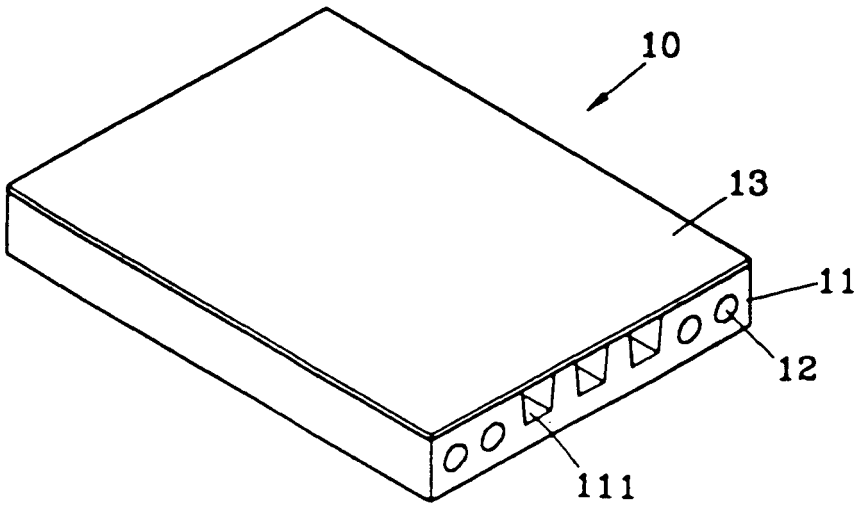
(72) Inventor: **Yang, Jesse**
Taiwan (TW)

(74) Representative:
King, James Bertram
KINGS PATENT AGENCY LIMITED
73 Farringdon Road
London EC1M 3JB (GB)

(54) Ground water drainage system

(57) A ground water drainage network is formed from interlocked strips (10) reinforced with high tensile fibre bundles (12) embedded in the strip. The centre of the strip has a plurality of channels (111) and a drainage filter sheet (13) is connected and covers the top of the strip. The arrangement provides an efficient means for rain water and underground water to be drained from a construction site to increase ground stability and prevent earth movements.

FIG.2



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Description

[0001] This invention relates to a ground water drainage system particularly a drainage network for construction sites. The drainage network of this invention includes multiple drainage strips that have channels covered by filter means which can divert water from the ground rapidly and efficiently. By draining rain water and accumulated underground water the hydraulic pressure exerted on the ground is released effectively. This invention thus increases ground stability and prevents earth movement from occurring at a construction site.

[0002] When conventional drainage networks are used, the resulting drainage configuration formed between the drainage network and the ground very often causes serious adverse effects on the ground system in terms of ground pressure, ground stability and earth movement in the construction site.

[0003] In order to efficiently drain rain water and accumulated underground water our patent applications EP 0688906 and US 5,567,077 disclose a drainage network 5 comprising a plurality of drainage strips 50 in a network configuration. Each drainage strip 50 possesses a channeled strip 511, two pairs of high tensile strength polyester fibre bundles 512 and 513, and a drainage belt 514. A channel containing strip 501 including two sets of high tensile strength polyester fibre bundles 512 and 513 is embedded in the channel strip 511. The strip 501 is formed by moulding using a moulding apparatus in which two sets of high tensile-strength polyester fibre bundles 512 and 513 separated by an appropriate distance are embedded in a polyethylene material. The centre of said strip 501 is equipped with the channel 502. A drainage belt 514 is inserted into said channel 502 by a machine, thereby forming said drainage strip 50. A polyethylene material is used to form the strip 511. The two sets of high tensile-strength polyester fibre bundles 512 and 513 are embedded in the strip 511 and are spaced to form the two slot-defining strips 501. The drainage belt 514 inside slot 502 at the centre of said slot-containing strip 501 provides means for rain water and underground water to be drained from a site equipped with said drainage network.

[0004] Since the space and drainage means inside the drainage belt 514 is limited, it is sometimes hard to drain the water completely and fully, especially when the drainage belt 514 is blocked.

[0005] The principal object of this invention is to provide a drainage network having hollow channels by which an effective drainage network system can be established in ground structures.

[0006] Another object of this invention is to provide a drainage network provided with filters to increase ground stability and prevent earth movements.

[0007] According to this invention there is provided a ground water drainage network comprising a number of interlocked strips for embedding in the ground and forming a water permeable network or mesh structure characterised in that each drainage strip comprises one or more high tensile-strength fibre bundles embedded in a polymeric material by a moulding process thereby forming said strip, the said strip having at least one recessed or channeled portion said portion being covered by a water permeable sheet inserted therein.

[0008] In this invention the drainage network has filtered channels which comprise a plurality of drainage strips and connection strips connected with each other. The drainage strip has a channel strip, sets of high tensile strength polyester fibre bundles, and a drainage filter. The high tensile strength polyester fibre bundles are embedded in the channel strip. The centre of said strip is equipped with a plurality of channels and a drainage filter is connected and covered on the top of said strip. The hollow channels at the centre of said strip provide the most efficient means for accumulated rain water and underground water to be drained from a construction site equipped with said drainage. Therefore ground stability is increased and earth movements prevented on the site.

[0009] This invention is further described and illustrated with reference to the drawings showing embodiments by way of examples only

[0010] In the drawings:-

- Figure 1 shows in three-dimensional view the drainage network having filtered channels of this invention,
- Figure 2 shows in three-dimensional view a drainage strip of the drainage network of this invention,
- Figure 3 shows an exploded view of the drainage strip of Figure 2,
- Figure 4 shows a cross-sectional view of the drainage strip of Figure 3, and
- Figure 5 shows the application of a drainage network according to this present invention to a construction site.

[0011] Referring to the drawings and as shown in Figure 1, the drainage network 1 has filtered channels and comprises a plurality of drainage strips 10 interconnected by cross-strips 20 and being interlocked with each other. As shown in Figures 2, 3 and 4, said drainage strip 10 has a channeled strip 11, multiple sets of high tensile strength polyester fibre bundles 12 and a drainage filter sheet layer 13. The said sheet 13 may be bonded to the top surface of the strip 11 by adhesive or mechanical means. The strip 11 is formed by moulding using a moulding apparatus in which the high tensile-strength polyester fibre bundles 12 separated by an appropriate distance are embedded in a polyethylene material. The centre region of said strip 11 has a plurality of smooth channels 111. The drainage filter 13 forms a cover and is attached on the top of said strip 11 allowing water to pass through and flow into the channels

111. The unimpeded channels 111 provide a fast, large and most effective drain for underground water. As shown in figure 5, the networks 1 can be laid in tiers upon each other in the ground during installation to increase ground stability and prevent earth movement.

[0012] A polyethylene material is used to form the strip 11. The high tensile-strength polyester fibre bundles 12 inside said channels 11 have many properties, such as durability, UV resistance, chemical resistance bio-resistance and tensile strength. The fibre material forming the bundles 12 possesses a tensile strength comparable to that of soft steel when elongated less than approximately 20%.

[0013] The unimpeded channels 111 of this invention can provide a fast, high capacity and most effective drain for underground water.

Claims

1. A ground water drainage network comprising a number of interlocked strips for embedding in the ground and forming a water permeable network or mesh structure characterised in that each drainage strip (50) comprises one or more high tensile-strength fibre bundles (512,513) embedded in a polymeric material (511) by a moulding process thereby forming said strip, the said strip (50) having at least one recessed or channeled portion (502) said portion being covered by a water permeable sheet (13) inserted therein.

2. A drainage network as claimed in Claim 1, characterised in that the drainage strip (50) includes a plurality of channels in a top surface with one more fibre bundles provided each side of the channels.

3. A drainage network as claimed in Claim 1 or 2, characterised in that high tensile strength polyester fibre bundles are embedded in the strip each side of the centre, the centre region of the strip having a plurality of channels, in a top surface, said top surface being covered by a water permeable layer comprising a sheet connected with the strip.

4. A drainage network according to any preceding claim, characterised in that the water permeable sheet is bonded to the top surface of the strip.

FIG.1

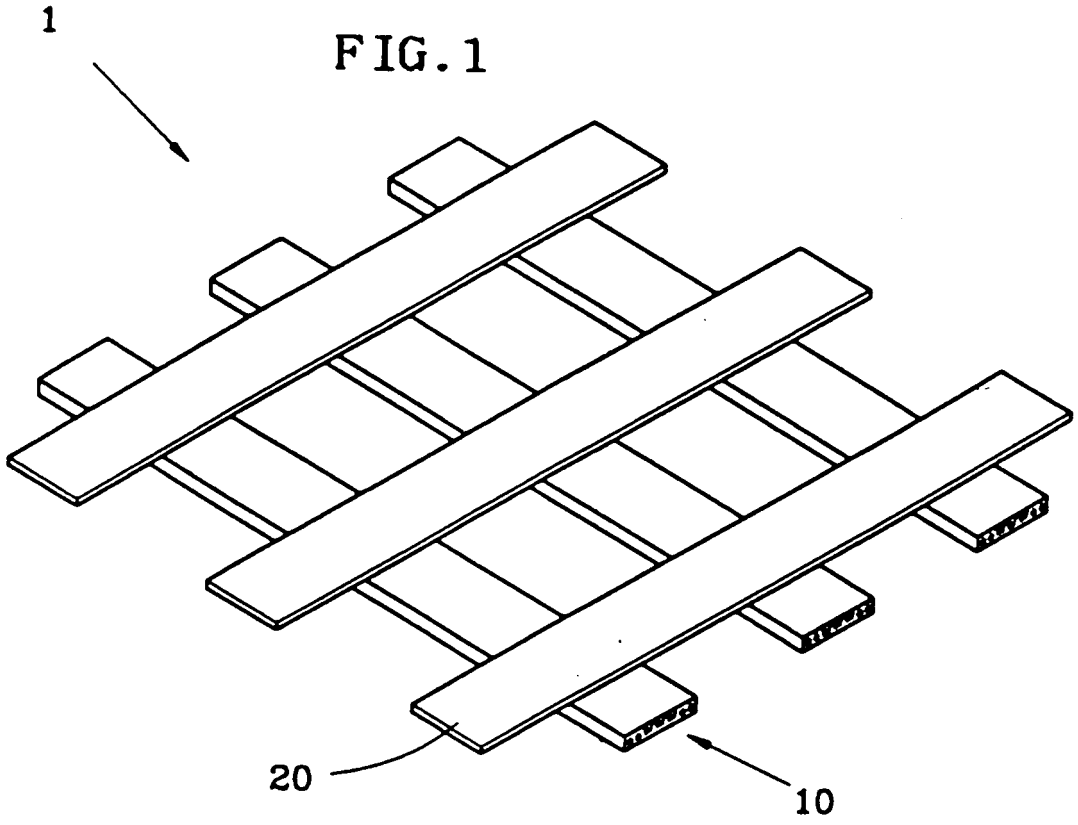


FIG.2

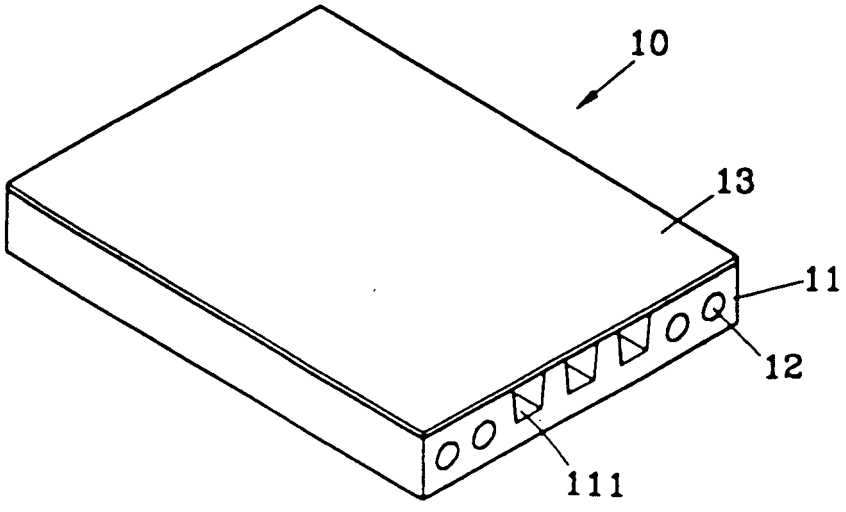


FIG.3

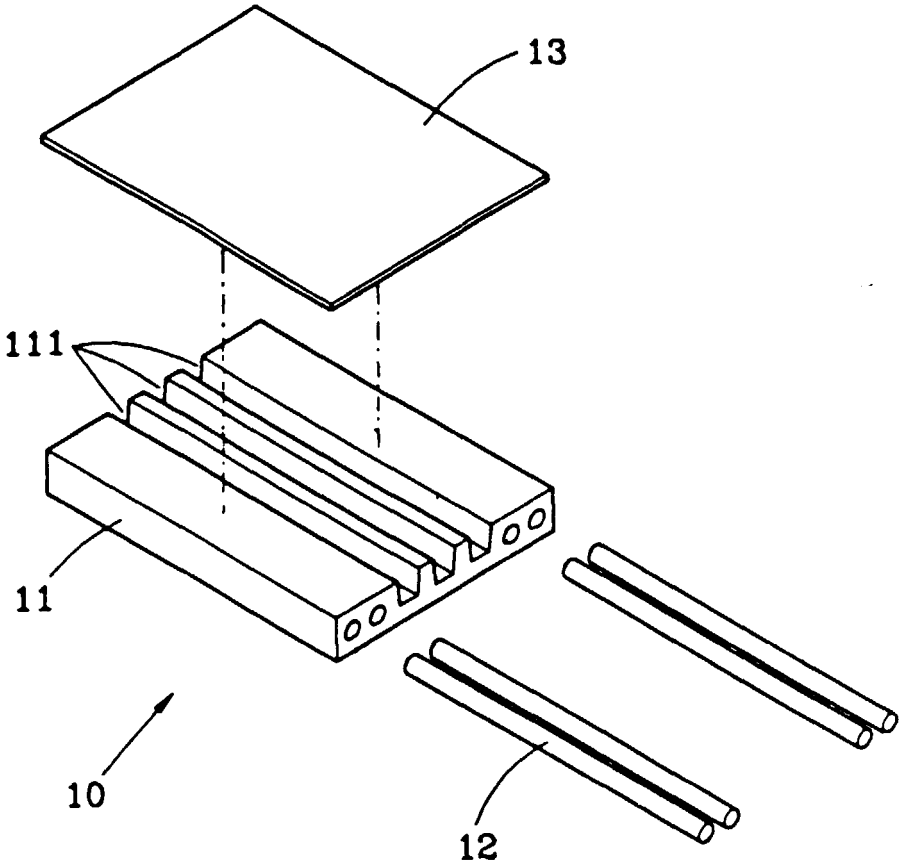
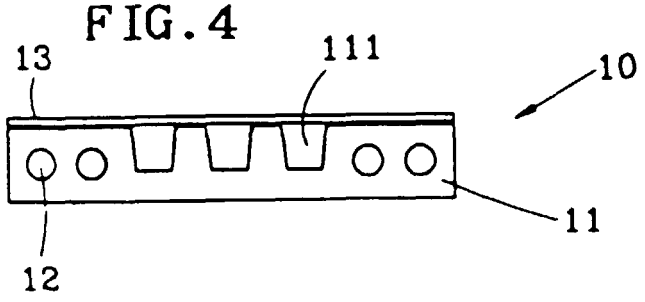


FIG.4



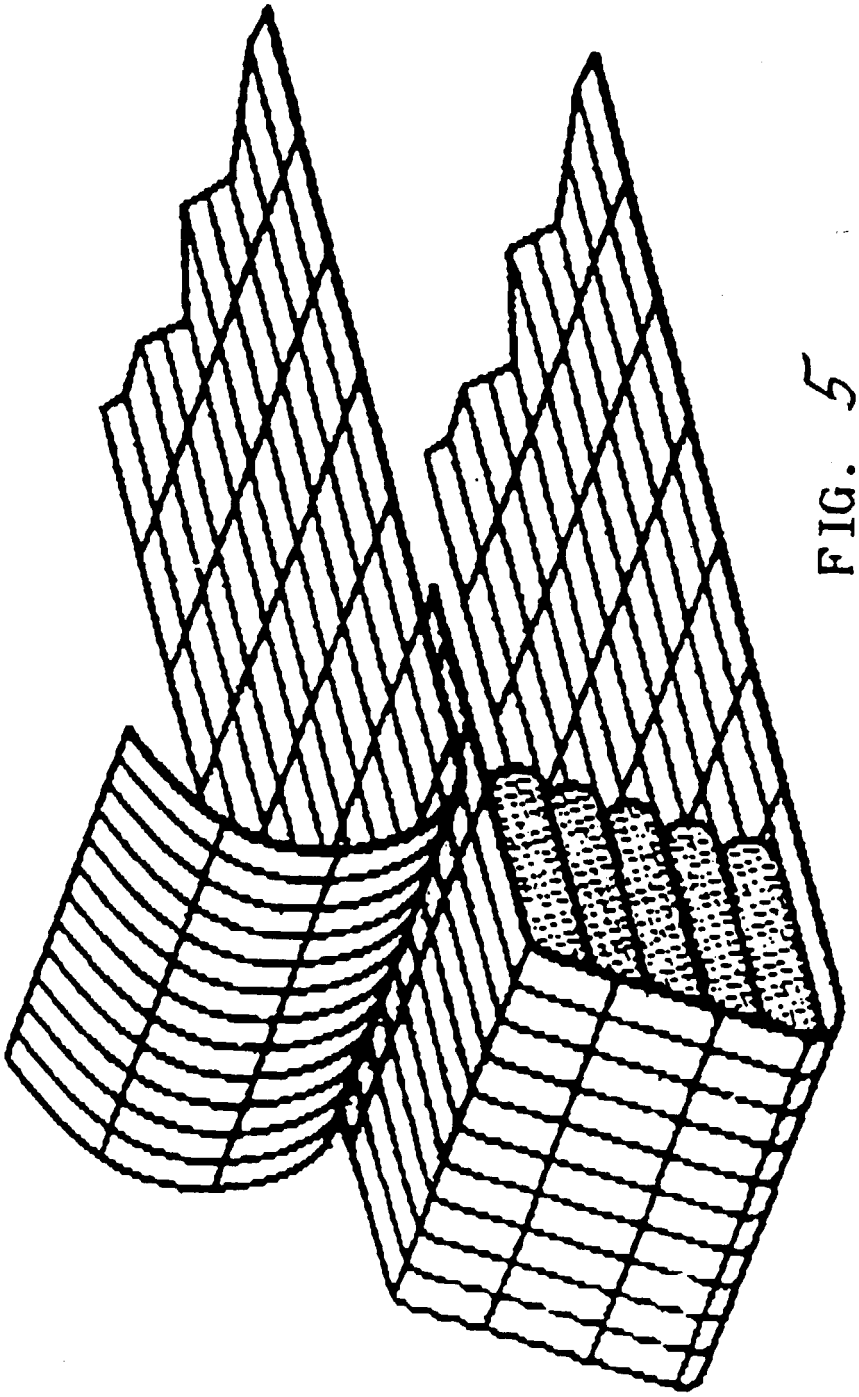


FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 98 31 0374

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y,D	EP 0 688 906 A (YANG JESSE) 27 December 1995 * column 1, line 51 - column 2, line 4 * * column 3, line 29 - column 4, line 16 * * figures 5,6 *	1-4	E02B11/00
Y	DE 89 02 963 U (NIEDERBERG-CHEMIE GMBH) 12 July 1990 * page 2, line 5 - line 23 * * page 3, line 31 - page 4, line 26 * * figure 1 *	1-4	
A	US 5 263 792 A (DAVIS EVERETT R ET AL) 23 November 1993 * column 2, line 63 - column 3, line 46 * * figures 1,2 *	1,4	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
E02B
E02D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 May 1999	Urbahn, S

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 31 0374

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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18-05-1999

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82