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(54) **Geo textile material**

(57) Adjacent strips 2, 4 of geo textile material are joined with a surface fastener 8, 12.

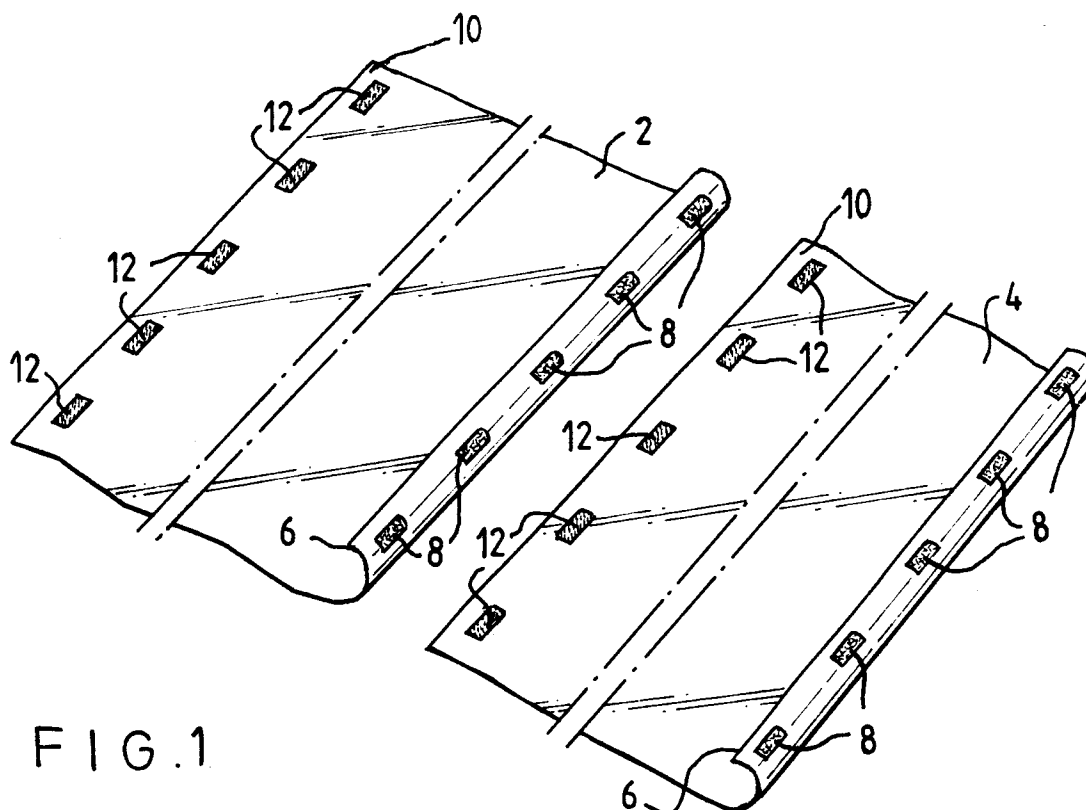


FIG. 1

EP 0 896 102 A1

Description

[0001] The present invention relates to a geo textile material.

[0002] Geo textiles are used in civil engineering projects to strengthen or reinforce sub-soil for separation and for filtration. Usually the material is laid in strips which are typically 4.4 metres wide. A variety of materials is available, typically have a breaking strain in the warp direction of from 100kN/m to 1000 kN/m and 100 to 400 kN/m in the weft direction. For some applications, a simple overlap of adjacent strips is adequate, but for other applications the strips must be secured together. This is very difficult and time consuming because the length and weight of the strips makes them difficult to handle. Typically, the strips are folded at the overlap and sewn, all this taking place on-site, after the strips are laid. It may take 10 people one day to sew the strips covering a 5000 square metres area. Sewing can offer a join equal in strength to about 50 kN/m in the weft direction. Not all applications require such a strong join between strips. For example, in some applications all that may be needed is to hold the strips in place relative to each other during laying and covering operations.

[0003] A first aspect of the present invention provides a method of laying geo textile materials comprising laying a plurality of strips of material side by side and joining the strips by means of a surface fastener.

[0004] Preferably the surface fastener comprises a hook type fastener, such as typically used with a hook and loop fastener.

[0005] The adjacent edges of geo textile strips may be joined by a strip of hook-type surface fastener which engages the geo textile material itself. The geo textile strip may have a complementary loop part attached to it for cooperating with the hook fastener, but one side at least of many geo textile materials can be engaged directly by a hook type surface fastener.

[0006] The hook part may be secured to a strip adjacent its edge, for example by sewing or welding, and engage directly with the material of the adjacent strip.

[0007] In a particularly preferred method, a hook type fastener, such as typically used in hook and loop fasteners, bridges two adjacent geo textile strips to hold them in place. The strips may be butted edge to edge and the hook type fastener pressed onto the material, across the join. This provides a substantial saving in material costs, because no overlap of the geo textile strips is needed and also a saving of time because sewing is not needed.

[0008] Preferably moulded hooks are used, however other hook types such as mushroom hooks and also cut filament hooks may be used. The hook type and size chosen will depend on the strength of the join required, and lifetime (some materials deteriorate or weaken on exposure to water), and the complementary engaging surface - for example whether a strip of woven loop material is to be provided or the hooks are to engage with the material or the threads of the geo textile. Preferably a moulded hook having a height up to about 4mm is used.

[0009] When the fastener or fastener part is to be attached to the geo textile strip, e.g. by sewing or gluing, it may be attached to a strip on site, but preferably it is attached to the strip, or incorporated in it, during manufacture.

[0010] The fastener may extend continuously along the join between strips of geo textile or it may be provided at spaced intervals.

[0011] Where a two part fastener is used, a continuous length of one part may be provided along one edge of a strip, and the complementary part provided at intervals along one edge of the adjacent strip. Preferably a strip has one fastener part on one face adjacent one edge, and a complementary part on the other face adjacent the other edge so that strips can be easily matched when laid. In another form, like fastener parts may be attached to the strip edges, and the complementary part bridges the abutting strips.

[0012] A second aspect of the invention provides a length of geo textile material having a surface fastener provided at an edge of the material.

[0013] The invention provides a system which greatly simplifies the procedure for joining strips of geo textile while maintaining sufficient strength in the joint. Also, it can reduce the amount of material which must be overlapped to form the join.

[0014] The invention will be further described by way of example, with reference to the accompanying drawings, in which:-

Figure 1 illustrates a first embodiment of the invention;
 Figure 2 illustrates a second embodiment of the invention;
 Figure 3 illustrates a third embodiment of the invention;
 Figure 4 illustrates a fourth embodiment of the invention, and
 Figure 5 illustrates a test example.

[0015] Figure 1 shows two strips 2, 4 of geo textile material, typically four meters wide. On the underside of the right hand edge 6 (as shown in the drawing) of each strip short lengths 8 of loop material of a hook and loop fastener are attached to the strip by sewing, welding or gluing. On the upper side of the left hand edge 10 of each strip, short lengths

12 of complementary hook material are attached at the same spacing and in a similar manner as the lengths 8.

[0016] The material and design of the hook and loop fastener 8, 12, and its method of attachment is chosen to suit the required physical properties of the join between the strips. Hook and loop fasteners having very high strengths - resistance to shear or peel and resistance to environmental degradation, are available. Fasteners with moulded hooks, in particular, can provide high strength fastenings.

[0017] In place of the hook/loop fastener 10, 12, hook parts which mate with like hook parts, or mixed hook and loop material may be used.

[0018] The fastener parts 8, 12 may be attached to the geo textile strip 2, 4 as part of the manufacturing process, or they may be attached on site when the strips are unrolled or after they have been laid. The fastener parts may, for example, be sewn or fixed in place with touch sensitive adhesive. The strips 2, 4 are laid so that the edge 6 will overlap the edge 10 of an adjacent strip. The strips can then be joined by simply pressing the fastener parts 8, 12 together.

[0019] The size and spacing of the fastener parts 8, 12 is also selected to suit the required strength of the join between the strips 24. Typically the parts 8, 12 may be 100mm long by 20mm wide and spaced at 1 metre intervals and about 20mm in from the extreme edge of the strip 2, 4.

[0020] Surface fasteners typically have a greater strength in shear than in peel. Hence for many applications they will be quite suited to joining the geo textile lengths which are more likely to be subjected to shear forces trying to separate them.

[0021] In the embodiments of figures 2 to 4, like parts to the embodiment of figure 1 are given the same reference numeral. In the embodiment of Figure 1, if the fastener parts 8, 12 are attached before the strips are laid, they must be aligned during laying of the strips. In the embodiment of Figure 2 the surface fastener is in the form of two continuous strips 8', 12', thus avoiding the need to align the fastener parts in the length direction. This will also provide a greater strength join.

[0022] In the embodiment of Figure 3, a continuous strip 12' of fastener material is used on one edge 10, while spaced apart short lengths 8 of complementary material are used on the other edge. It will be appreciated that the lengths 8 need not be at precisely regular spacing. Also, if complementary surface fastener parts such as hooks on one part and loops on the other are used, the cheaper part may be used for the continuous strip 12'.

[0023] In the foregoing embodiments, when a hook and loop type material is used, the geo textile material itself may take the place of the loop part of the fastener. For example, geo textile materials will often have a loop pile surface or spun bonded material which provides for good fixation of surface fastener hooks. A loop pile material may be purposely provided as part of the geo textile 'weave' or incorporated along an edge during manufacture. An example of a material to which a hook type surface fastener can adhere with sufficient strength is Hi-Ten (trade mark) product range of the Welbeck company of Nottinghamshire, England. Moulded hooks of height up to 4mm, particularly the 'D7' (trade mark) design of YKK Corporation, are particularly suitable for adhering direct to this geo textile material. Another example of a geo textile with a 'natural' loop surface is PROFELT (trade mark) of the Proctor Group, Perthshire, Scotland.

[0024] In the embodiment of figure 4, two adjacent strips of geo textile 2, 4 are laid with their edges abutting, and overlap a strip 14 of hook type surface fastener material which serves to join the strips. The hook material strip extends along the length of the geo textile material strips. However, short strips of the hook type fastener material could be provided, spaced at intervals along the length of the geo textile strips, and extending across the adjacent edges of the strips. In this particularly preferred embodiment, the hook material has a hook design suitable for engaging the geo textile material directly. Thus there is a significant saving in the cost of materials as only one fastener part is provided, there is no overlap of the geo textile, and the fastener 14 is simply pressed onto the strip. The hook strip 14 is about 200mm wide. Preferably the moulded hook fastener has a fabric backing for increased strength of the fastener material.

[0025] The strip 14 need not extend continuously along the length of the geo textile but may be in short lengths, preferably about 100mm long.

TEST EXAMPLE

[0026] As shown in Figure 5, two lengths of Hi-Ten (trade mark) geo textile material were laid side by side with their elongate, warp, directions parallel and their edges abutting. A panel of YKK laminated moulded fastener with a knitted backing, having the product code 1QCD7 and length 100mm was laid across the join, engaging the fabric backing of the geo textile. Widths of 200mm and 400mm were laid symmetrically and the shear strength across the join and along the join were measured, giving the following results.

DIRECTION/WIDTH	200mm	400mm
D1	3.2kN/m	3.5kN/m
D2	3.3kN/m	3.3kN/m

When greater strength is required, the geo textile strips which have been laid may be additionally secured together, for example by stitching to each other or to the surface fastener, the surface fastener serving to locate the geo textile strips as they are laid.

[0027] Various modifications will occur to those skilled in the art and it is desired to include all such modifications as fall within the scope of the accompanying claims.

Claims

1. A method of laying geo textile material, comprising laying a plurality of strips of material (2, 4) side by side and joining the adjacent strips (2, 4) by means of a surface fastener (8, 12).
2. A method as claimed in claim 1, wherein at least a portion of the surface fastener (8, 12) is attached to the geo textile (2, 4) at the site where the material (2, 4) is laid.
3. A method as claimed in claim 1 or 2, wherein the adjacent strips of geo textile material (2, 4) are connected by a hook type surface fastener which overlaps adjacent edges of the strips of material (8, 12).
4. A method as claimed in claim 3 wherein the geo textile material strips (2, 4) are connected by a strip of hook type surface fastener (14) which engages directly with the geo textile material.
5. A method as claimed in any one of claims 1 to 5, wherein the strips of geo textile material (2, 4) are joined intermittently along their length by shorter strips of surface fastener material.
6. A strip of geo textile material including a surface fastener (8, 12) adjacent an edge of the strip.
7. A strip of geo textile material as claimed in claim 6, wherein the surface fastener (8, 12) is adapted to engage directly with the material of an adjacent geo textile strip.
8. A strip of geo textile material as claimed in claim 6 or 7, wherein the strip of geo textile material (2, 4) has a first surface fastener part (8) on one side adjacent one edge (6) of the strip, and a complementary surface fastener part (12) on the other side and adjacent the other edge (10).
9. A strip of geo textile material as claimed in claim 6, 7 or 8, wherein the or a part of the surface fastener (8, 12) is provided in a substantially continuous length along one edge (6, 10).
10. A strip of geo textile material as claimed in any one of claims 6 to 9, wherein the or a part of the surface fastener (8, 12) is provided at intervals along an edge of the strip (6, 10).
11. A length of geo textile material as claimed in any one of claims 6 to 10, wherein the surface fastener (8, 12) comprises at least the hook part of a hook and loop fastener.

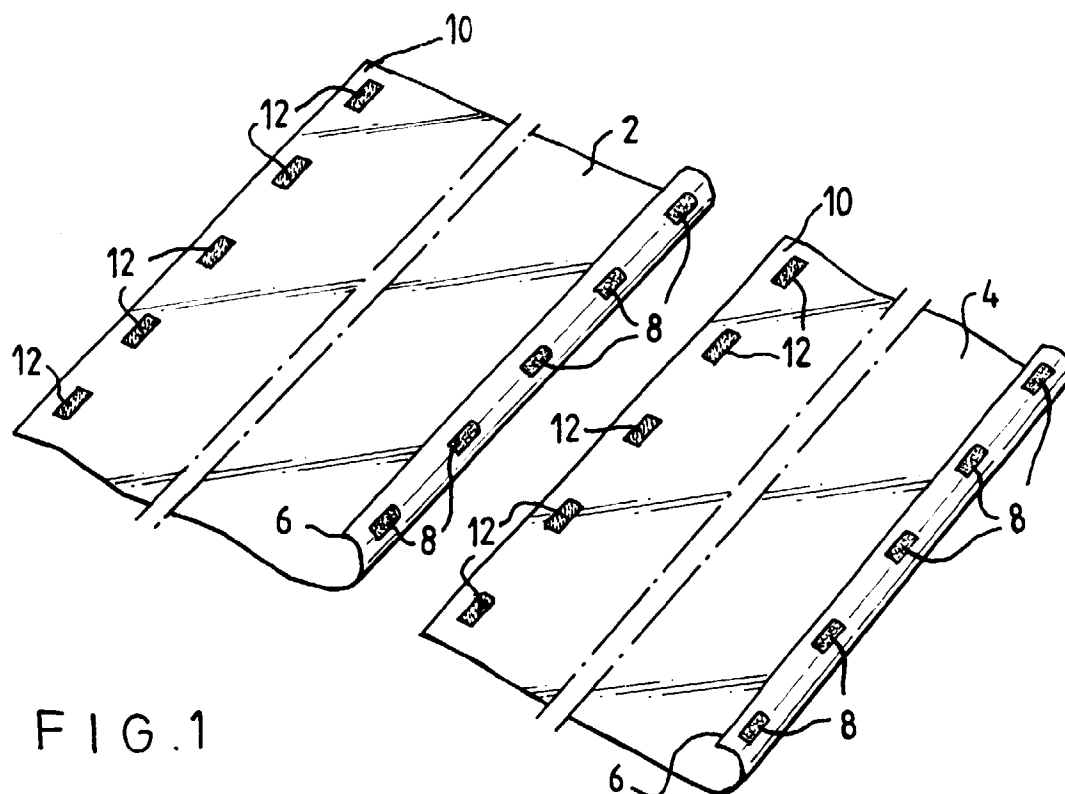


FIG. 1

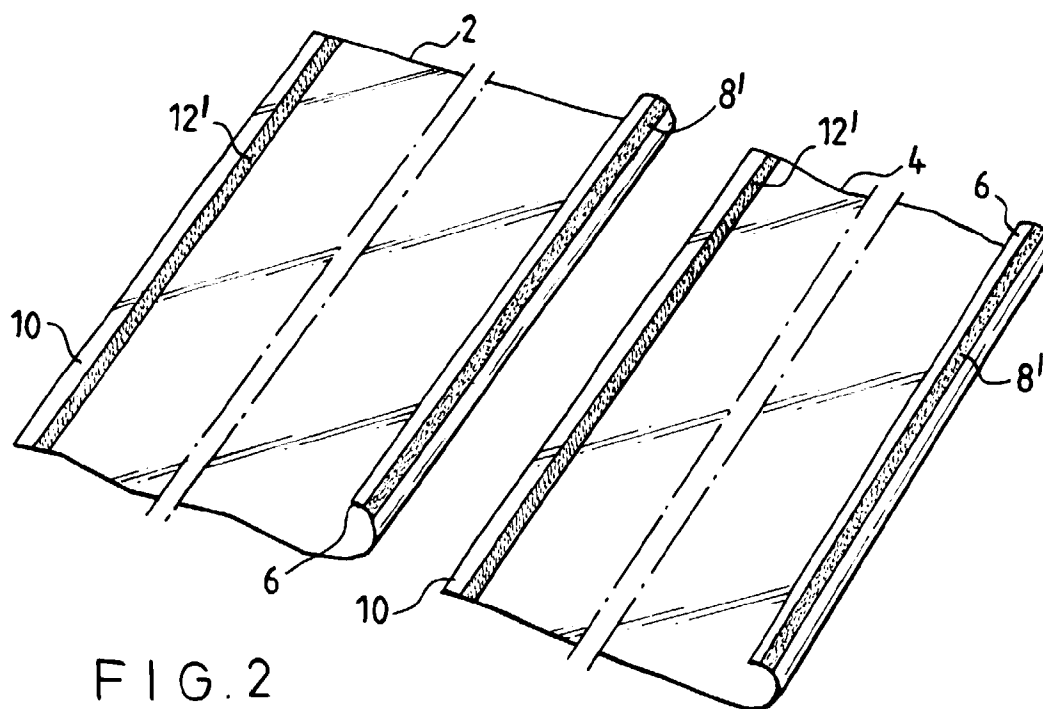


FIG. 2

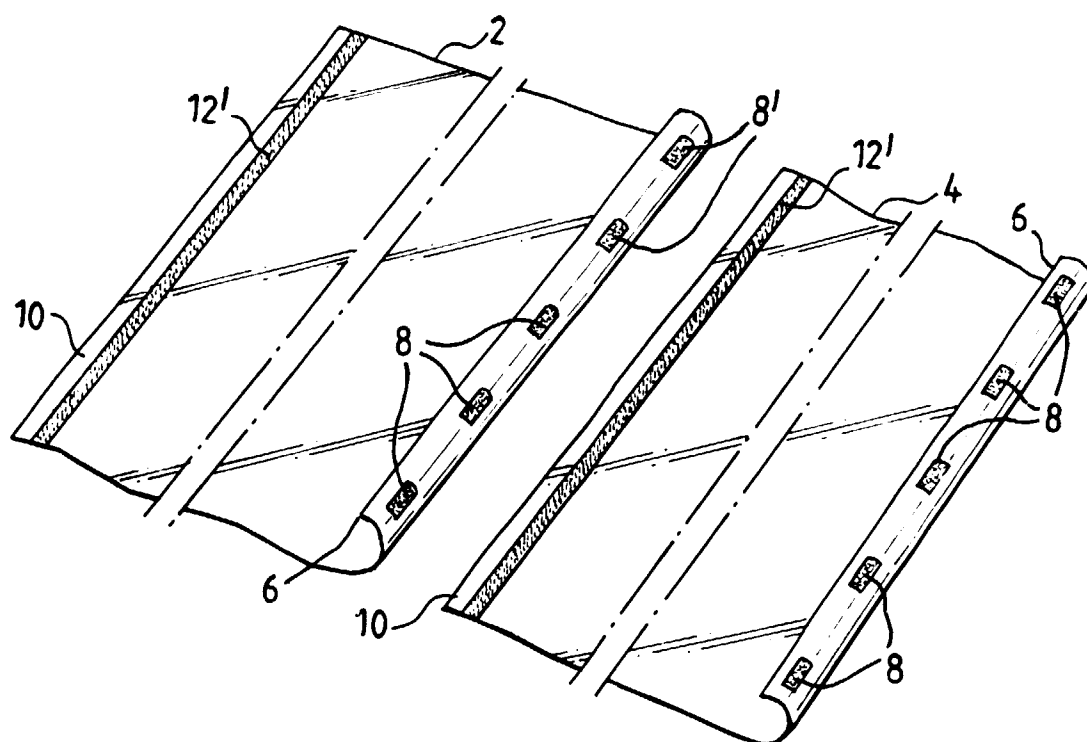


FIG. 3

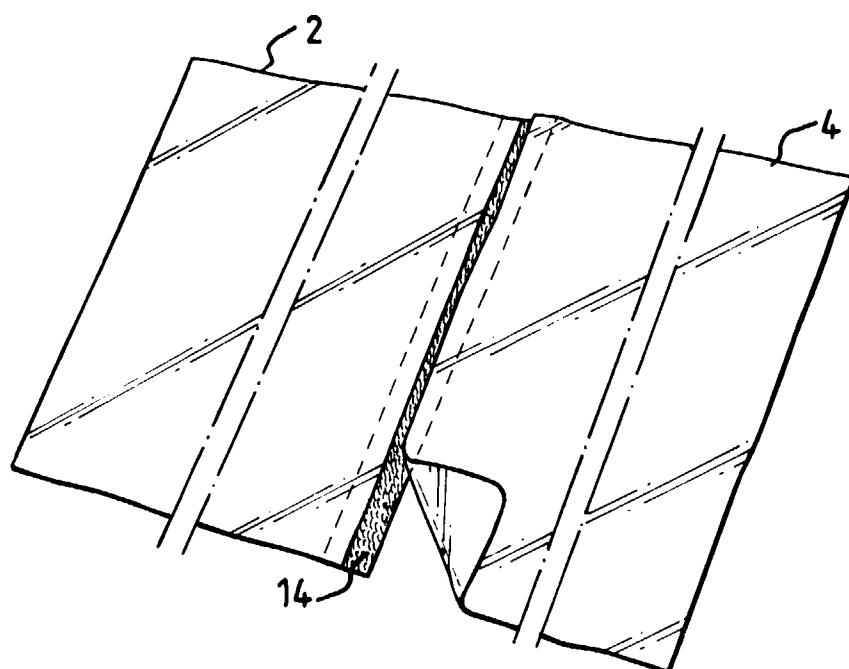


FIG. 4

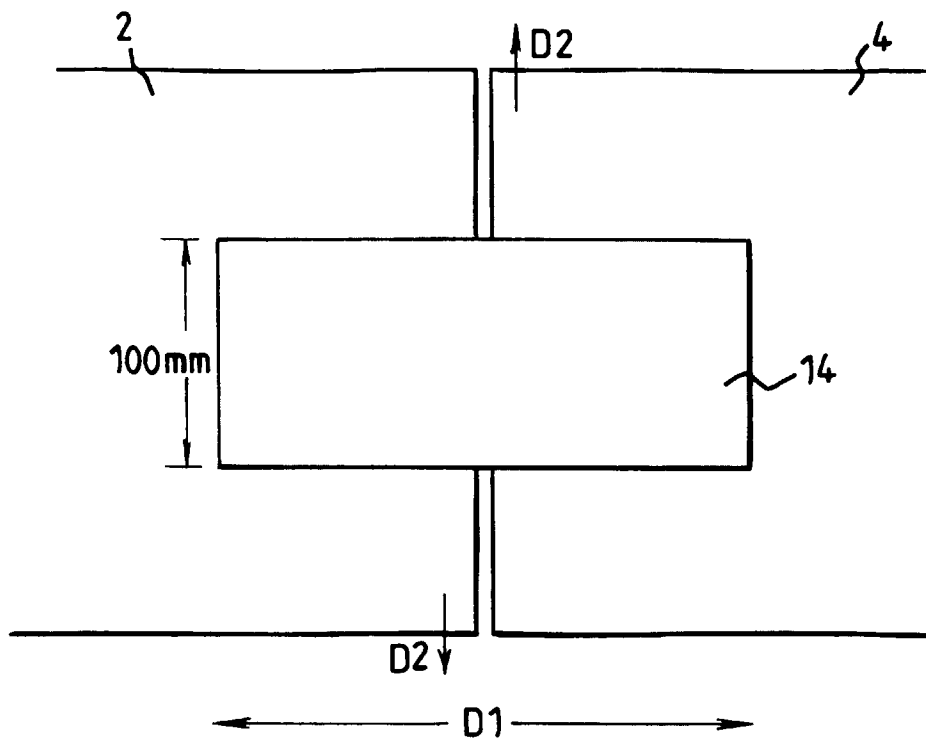


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 98 30 6226

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)
X	PATENT ABSTRACTS OF JAPAN vol. 096, no. 003, 29 March 1996 & JP 07 310323 A (OHYAYASHI CORP), 28 November 1995	1-3,6,8, 9,11	E02D31/00
A	* abstract; figures 1-3 *	4,5,7,10	
X	US 4 565 468 A (CRAWFORD LESLIE A) 21 January 1986 * abstract *	1,3,6,8, 9,11	
A	* column 4, line 43 - line 54; figures 6,7 *	2,4,5,7, 10	
X	US 5 360 294 A (CARRIKER RICHARD ET AL) 1 November 1994	1,3,6,8, 11	
A	* claim 1; figures *	2,4,5,7, 9,10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E02D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 4 November 1998	Examiner Blommaert, S
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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