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(54) **MODULE FOR RETAINING EARTH**

(57) The invention relates to a wall composed of hollow, interlocking male-female plastic pieces intended to prevent both horizontal and vertical movement, and able to receive concrete and metal frameworks to give said wall the necessary mechanical strength. The plastic pieces line up with triangle-shaped plates (2) having hollow, cylindrical parts (3) and a narrower oval part (4), placed on the corresponding foundation (1), and intended to accept superimposed modules (5) with cylindrical projec-

tions (6) that can be inserted into the cylindrical bodies (3) of the plates (2), so that on said modules (5), other similar modules (5') having connecting oval, lower projections (6') of lesser diameter on the oval parts (4) of the plates (2) can be placed, the upper assembly of modules of the type (7) having a lower extension in an inverted "T" (9) being such that in combination with the rear projections (12 and 12') of the modules (5 and 5'), said upper assembly establishes a male-female connection among the various modules.

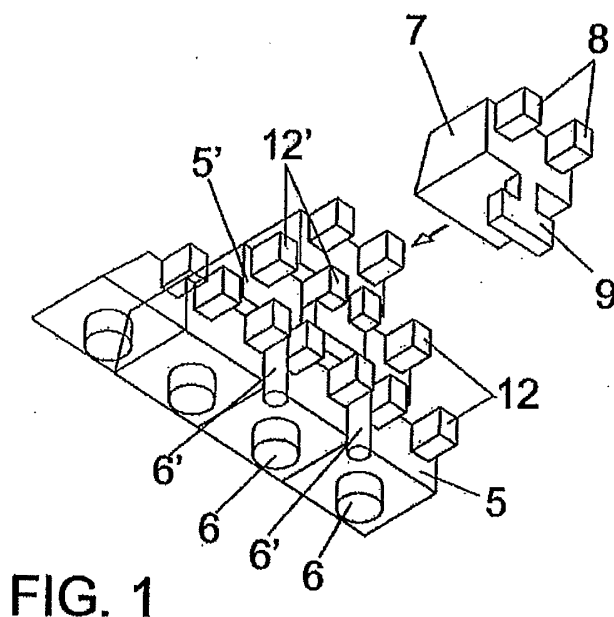


FIG. 1

Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a module for retaining earth, envisaged preferably and mainly to build the classic breakwaters, walls for retaining earth placed in staggered terrains and terraces, also being applicable at the coast to prevent the erosion of the water on the earth, the river banks, etc.

[0002] The object of the invention is to obtain an easy-to-make retaining wall having optimal stability, preventing the movement of the parts making it up, and therefore withstanding the force that could be exerted by the earth when it shifts.

[0003] Although it has been previously said that the retaining wall is envisaged for breakwaters, river banks, terrace-type staggering for example, it can be applicable in any circumstance where the retaining of earth is desired to be carried out, whether stable or not, as well as for public works and other buildings works.

BACKGROUND OF THE INVENTION

[0004] Normally, the retaining walls are made based on large stone blocks placed forming an inclined wall in correspondence with the inclination of the terrain, so these stones are placed in the attempt they 'marry' each other in the best way possible, being affixed to one another by means of mutual friction.

[0005] Among the problems and inconveniences presented by this type of construction of retaining walls, we have the following:

- the stone blocks work by friction, as indicated above.
- There is a notable actual weight of the retaining wall.
- In principle, the technician cannot know with certainty if the operative on site will be able to choose the appropriate stone blocks and arrange them in the most suitable position for their unification.
- The reliability in the obtaining of the survey according to the execution project is not always appropriate.
- The resources necessary for carrying out these works are very expensive and burdensome.
- The need to look for natural stone blocks generates an additional difficulty, added to the well-known deterioration of the environment.
- It should be noted that highly qualified technicians must permanently control the execution of the work.

[0006] Well, part of the problems and inconveniences indicated above are solved by using pre-manufactured stones made from concrete instead of the classic natural stone blocks, although the inconvenience that the blocks are linked to one another by means of friction, that is to say, that they work by friction, still remains, as well as the elevated costs to execute the work, and, of course, the control of the execution thereof.

DESCRIPTION OF THE INVENTION

[0007] The wall for retaining earth proposed has been conceived to solve the problems indicated above, based on the use of hollow interlocking male-female plastic pieces which, once mounted in a simple manner due to their low weight, can be filled with concrete, even allowing the introduction of steel frameworks through said pieces, thus reinforcing the mechanical strength of the wall, instead of the classic natural stones or pre-manufactured concrete blocks.

[0008] More specifically, the wall is constituted from a foundation, which can be straight, winding, curved, straight-angled, cornered, buttresses and pilasters, etc. according to the characteristics of the terrain, so, on said initial foundation, different rows of modules with a male-female interlocking among them are placed, making it impossible for the same to move horizontally due to the pressure of the earth.

[0009] On the original foundation, a first row based on foundation plates, constituted by triangle-shaped structures wherein they are established is placed, in correspondence with two of the vortexes, two hollow, cylindrical bodies, while on the other vortex there is a slightly smaller oval part, these foundation plates being conveniently joined with one another on the original foundation in such a way that on top of this row of foundation plates, a first row of base modules is mounted, which are likewise hollow and have a cylindrical foot connectable to one of the cylindrical housings of the foundation plate, so these foundation plates that would constitute the first row present an inclined plane in their front side that is variable according to the slope necessary to constitute the facing side of the retaining wall, which can vary in shape and colour according to the project planner, while incorporating a pair of horizontal protrusions in its rear side, whose function will be exposed below.

[0010] Once this first row of foundation modules is mounted, a second row of other modules is placed, with the same characteristics as the previous ones but, instead of having a cylindrical foot for its overlapping in one of the cylindrical bodies of the foundation plate, it presents a longer yet narrower cylindrical foot for its coupling to the hollow and oval body established in the foundation plate and in the triangle-shaped structure located on the original foundation, so this elongated yet narrower cylindrical body passes behind the foundation module of the first row.

[0011] After the mounting of the second row of foundation modules, another row of modules of the type is mounted, with similar characteristics to the two referred above, but instead of the cylindrical body, they include a lower extension in the form of an inverted "T", positioned in a fitted manner between the projections constituting the horizontal and rear protrusions of the foundation modules of the first row, thus establishing a male-female coupling preventing the relative displacement between modules, both in the horizontal and vertical directions.

[0012] The modules forming the wall constituted in this manner may have flat lateral sides when the retaining wall is straight, but said sides can have an angular or other configuration in order to make curves in the trajectory of the wall, which may be concave or convex.

[0013] The constructive system based on which the wall is obtained, according to the invention, allows the dismounting of the different modules by only using supporting pads between modules in order to free them during dismounting.

DESCRIPTION OF THE DRAWINGS

[0014] In order to supplement the description to be made below, and with the purpose of aiding a better comprehension of the characteristics of the invention, according to a preferred example of a practical embodiment thereof, a set of drawings is attached as an integral part of said description, wherein the following has been represented in an illustrative rather than limitative manner.

Figure 1. Shows a representation according to a perspective of the mounting method of the modules participating in the wall of the invention, showing the so-called foundation modules and the first row, and in explosion of the module of the type.

Figure 2. Shows a sectional representation of a module of the type, showing the hollow configuration thereof.

Figure 3. Shows a lateral view and a rear, elevational view, of the mounting of a wall object of the invention, with a supporting pad to free the modules themselves during dismounting.

Figure 4. Shows a perspective view of the foundation plate participating in the retaining wall object of the invention.

Figure 5. Shows a lateral elevational view and a plant view of the foundation module participating in the retaining wall object of the invention.

Figure 6. Shows a lateral elevational view and a plant view of the module forming the first row in the foundation of the retaining wall object of the invention.

Figure 7. Shows a plant view, an elevational view and a back elevational view of the module of the type participating in the retaining wall object of the invention.

Figure 8. Shows an elevational view corresponding to the explosion in the mounting form of the foundation module of the row on the corresponding foundation plate.

Figure 9. Finally shows a view as the one shown in the previous figure, with the foundation module of the second row in the position to be mounted.

PREFERRED EMBODIMENT OF THE INVENTION

[0015] As seen in the referred figures, the retaining module object of the invention is obtained by means of

the male-female mounting or assembly of a series of modules and elements among each other, which will be exposed throughout the present description, all of which from a foundation (1) on the terrain, wherein, in the first place, there is a base constituted by means of the integration of foundation plates (2) among each other, defining a triangle-shaped structure wherein two of its vortexes are determined by hollow, cylindrical bodies (3), and the other vortex is formed by an oval, narrower body (4), also hollow, so said foundation plates (2) are arranged on the foundation (1) carried out for said purpose, in such a way that the foundation plate (2) and the remaining modules participating in the wall are made from plastic, are hollow and are able to receive concrete and metal frameworks to give said set the necessary mechanical strength after being mounted.

[0016] Well, on this base formed by the foundation plates (2), a series of foundation modules (5) are mounted, which will constitute a first row, also formed by hollow bodies, with a cylindrical lower extension or projection (6) intended to be housed in one of the cylindrical parts of bodies (3) of the foundation plate (2), allowing the rotation of the module (5) to be placed conveniently.

[0017] After the first row formed by the modules (5) referred to above, the arrangement of a second row based on modules (5') with similar characteristics than the modules (5) takes place, presenting longer, narrower projections (6') instead of the cylindrical projections (6), intended to be arranged after the modules (5) and to be coupled, by their lower extremity, to the oval bodies (4) of the foundation plate (2), as seen in the explosion view of figure 9.

[0018] After the arrangement of these modules (5') of the second row, it could be said that the foundation is made, next arranging another row of modules of the type (7), which are also hollow and are provided with a pair of rear protrusions (8) and a lower extension in an inverted "T" (9), presenting its inclined front plane (10), as clearly shown in figure 2, wherein the cavities (11) presented by the body constituted the aforementioned module (7) can be observed.

[0019] Regarding the base modules (5), in addition to the lower cylindrical projection (6) and its corresponding inclined plane (13) in its frontal side, they include a pair of rear projections or protrusions (12), characteristics that are repeated in the module (5'), with its frontal and inclined side (13'), its rear projections or protrusions (12'), and its elongated and oval projection (6').

[0020] Therefore, the embodiment of the retaining wall is carried out by firstly arranging the foundation plates (2) on the foundation (1), and on said plates, the modules (5) that are to form the first row, connecting the lower cylindrical projections (6) thereof to the cylindrical bodies (3) of the plates (2), in order to then form the second row with the modules (5'), connecting the oval and elongated projections (6') to the oval bodies (4) of the plates (2); with the arrangement of these oval and elongated projections (6') of the modules (5'), behind the modules (5),

to finally have the modules of the type (7), whose rear projections or protrusions (8) are arranged in an interlocking manner, as in a male-female coupling, between the rear projections (12 and 12') of the modules (5 and 5'), all of which without the existence of the possibility of inter-module movement, both horizontally and vertically.

[0021] Finally, it should be said that in order to enable dismounting, supporting pads (14) between modules have been provided, as clearly shown in figure 3, in such a way that, based on these pads (14), the dismounting of the different modules and therefore the retaining wall can be carried out easily, in the case that said dismounting must take place due to need or due to any other circumstance.

Claims

1. Module for retaining earth, which, being envisaged for constituting a means for retaining earth, whether stable or not, and obtaining a maximum stabilization of the construction of the wall itself, is **characterized in that** it is constituted by means of the mounting of a series of hollow plastic modules, susceptible of being filled with concrete and even with metal frame-works to give said wall the necessary mechanical strength or with other materials in the case of a temporary retaining wall; with the provision that from the foundation (1) on the terrain, a plurality of foundation plates (2) collaterally interrelated with each other are first mounted, each one of them constituted by a triangle-shape structure, in two of whose vortexes there are two separate cylindrical and hollow bodies (3), and in the other vortex another oval, narrower body (4), in such a way that a first line of modules (5) with a lower cylindrical projection (6) is mounted on these foundation plates (2), said projection being connectable to one of the cylindrical housings (3) of the foundation plate (2). The modules (5) include a pair of projections (12) and an inclined frontal side (13), a second line of modules (5') being arranged on this first line of modules (5) and having the same configuration and an elongated, narrower projection (6'), connectable from behind the modules (5) to the oval body (4) provided in the foundation plates (2), another row of modules of type (7) being completed above this row of modules (5') with rear projections (8), an inclined frontal plane (9) and a lower extension in the form of an inverted "T" (9) for the connection between the projections (12 and 12') of the modules (5 and 5'), establishing a male-female interlocking of the different modules preventing movement horizontally and vertically.
2. Module for retaining earth according to claim 1, **characterized in that** both the foundation plates (2) and the modules (5, 5' and 7) are made from plastic and are hollow in order to make said modules lighter and

to facilitate their mounting for the formation of the wall.

3. Module for retaining earth according to the previous claims, **characterized in that** both the foundation plates (2) and the modules (5, 5') and 7) are susceptible of being arranged to form straight or curved walls or walls with angular sections among each other.
4. Module for retaining earth according to the previous claims, **characterized in that** there are supporting pads (14) between the modules (5, 5' and 7) enabling the dismounting of the different modules and therefore, of the retaining wall.

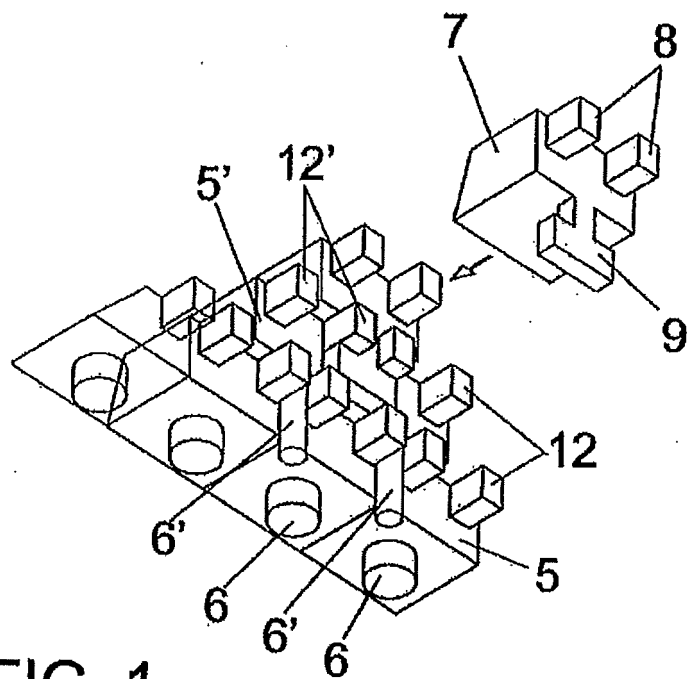


FIG. 1

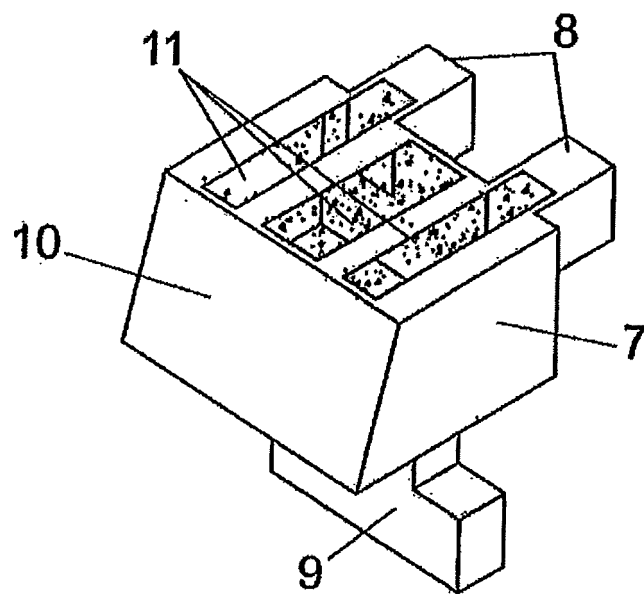


FIG. 2

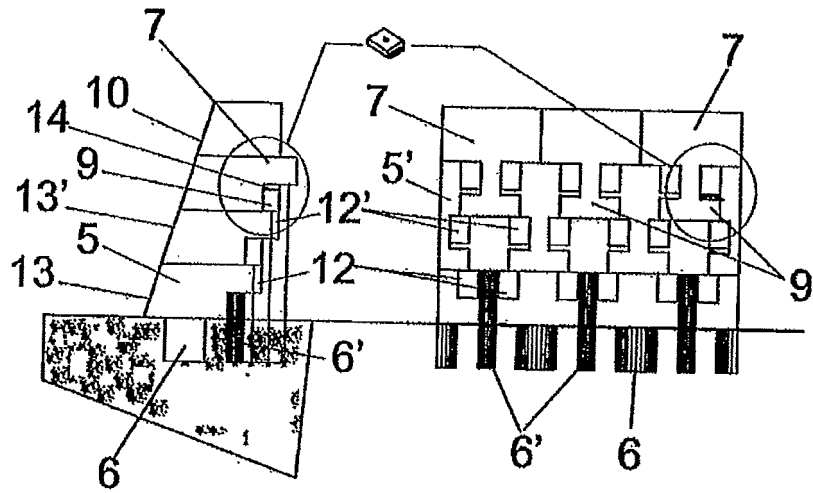


FIG. 3

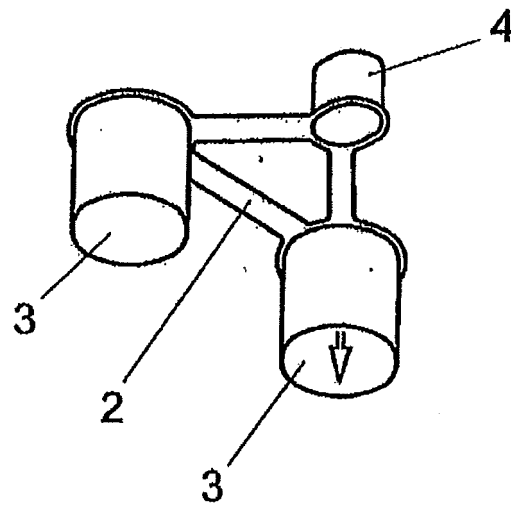


FIG. 4

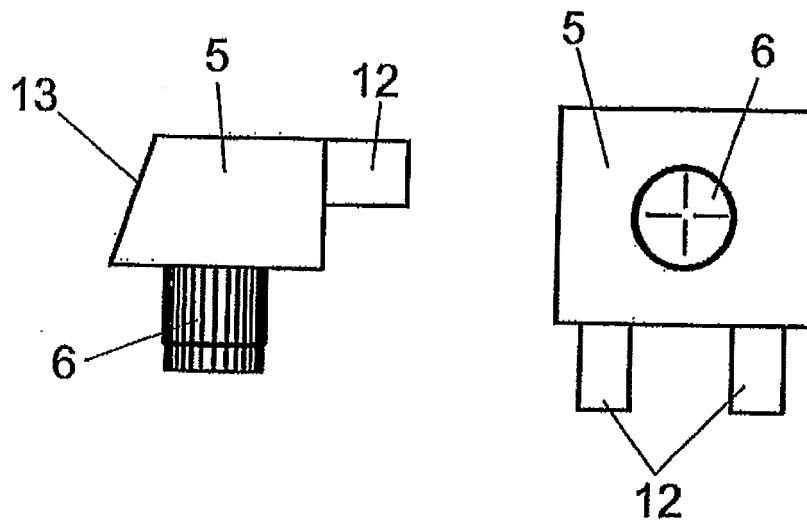


FIG. 5

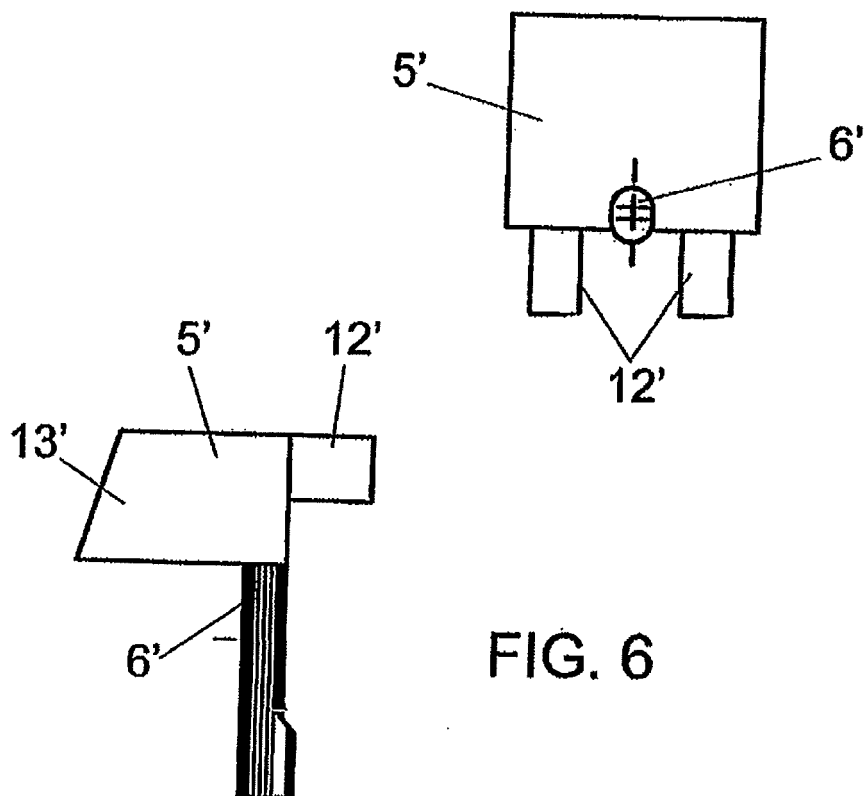


FIG. 6

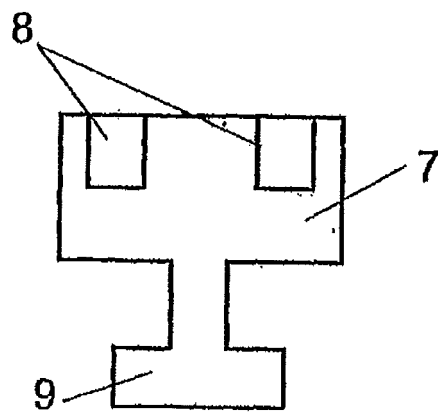
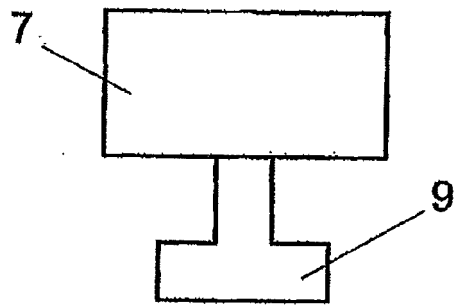
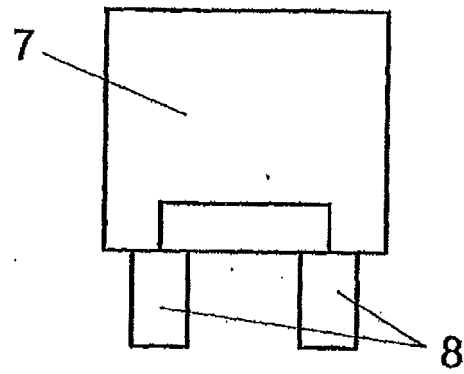


FIG. 7

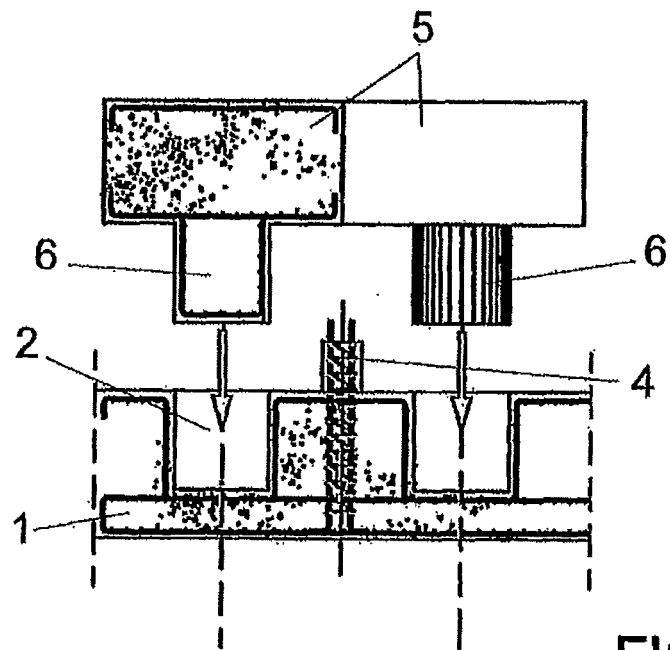


FIG. 8

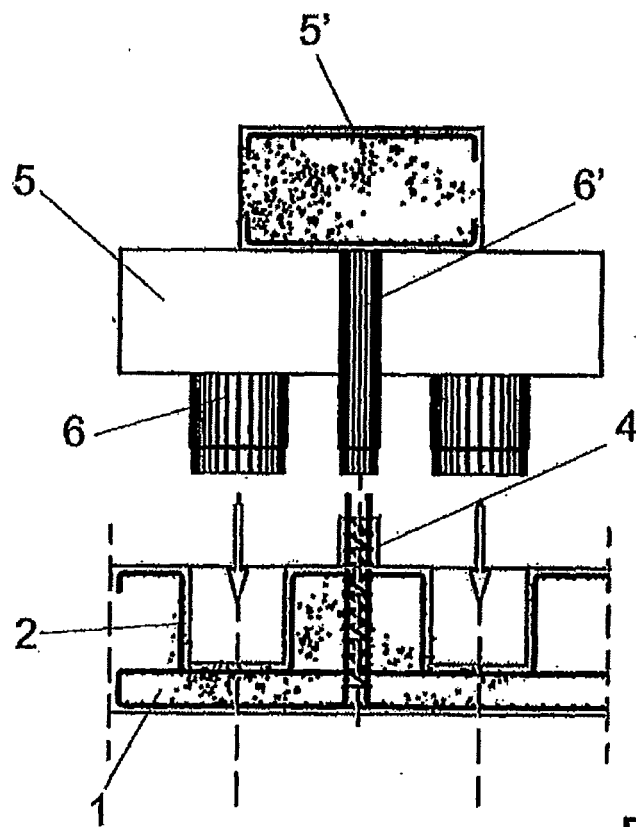


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2011/070071

A. CLASSIFICATION OF SUBJECT MATTER

E02D17/20 (2006.01)*E02D29/02* (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E02D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2002069595 A1 (KNUDSON EDWARD ALAN ET AL.) 13/06/2002, figures & Abstract from base of datos WPI. Retrieved from EPOQUE; AN 2002-607172.	1-4

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

07/06/2011

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

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