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RAISED CERAMIC TILE AND JOINING METHOD THEREOF

(57)

The present invention discloses a suspended ceramic tile and a splicing method thereof, the suspended ceramic tile comprises: a substrate layer, wherein every two adjacent parts of the substrate layer are detachably connected to each other; a ceramic tile surface layer fixedly arranged on a top surface of the substrate layer; a suspension structure arranged at a bottom of the substrate layer, wherein the suspension structure is configured to make the substrate layer and the ceramic tile surface layer in a suspended state, so as to avoid soaking of the substrate layer by water. The present invention

discards a series of environmental factor restrictions brought by the traditional laying method, increases the simplicity of ceramic tile splicing and disassembling, reduces the labor cost, enables the disassembled ceramic tiles to be reused, and enhances the service life of ceramic tiles. As there is a spacing between the ground and the substrate layer with the ceramic tile surface layer in the invention, soaking of the substrate layer and the ceramic tile surface layer by water is avoided, corrosion of the substrate layer by water is avoided, and the service life of the suspended ceramic tile body is prolonged.

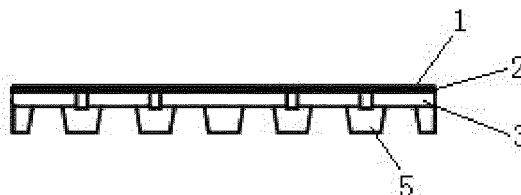


Fig. 2

Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of decorative building materials, in particular relates to a suspended ceramic tile and a splicing method thereof.

BACKGROUND

[0002] Ceramic tile is an acid-resistant and alkali-resistant porcelain or stone building or decorative material formed by a process of grinding, mixing, pressing, glazing and sintering of fire-resistant metal oxides and semi-metal oxides. Its raw materials are mostly formed by mixing clay and quartz sands that have been compressed after going through high temperature, so it has high hardness.

[0003] In the past, when laying ceramic tiles, cement was needed, but the proportion of cement used has strict requirement, otherwise it would cause unstable bonding. Meanwhile, although the cement used had a good curing effect, it was easy to be affected by the environment, and it was not easy to be removed and replaced after a long time of use. Hexavalent chromium contained in cement has carcinogenic hazard and pollutes the environment. The ceramic tile adhesive that has appeared in recent years also has time limit when used, and its adhesion becomes reduced after exceeding the time limit.

[0004] The existing spliced ceramic tiles are limited to bonding of ceramic tiles and floor panels, that is, the floor panels need to be fixed to the ground by means of cement and so on, which not only has a large weight, but also increases the cost, and is not convenient for the disassembly and replacement of ceramic tiles. Meanwhile, the floor panels are in direct contact with the ground, when scattered water penetrates into the lower part of the ceramic tiles through gaps between the ceramic tiles, the floor panels will be soaked in a micro water environment, causing the floor panels to be easily corroded, and affecting its service life.

SUMMARY

[0005] Therefore, the technical problem to be solved by the present invention is to overcome the disadvantages of inconvenient disassembling and assembling, high cost of the existing spliced ceramic tiles and easy corrosion of the floor panels when soaked in a micro water environment, so as to provide a suspended ceramic tile and splicing method thereof, to discard a series of environmental factor restrictions brought by the traditional laying method, to increase the simplicity of splicing and disassembling the ceramic tiles, to reduce the labor cost, to enable the disassembled ceramic tiles to be reused, and to enhance the service life of ceramic tiles.

[0006] In order to achieve the above-mentioned objectives, the technical solutions adopted by the present in-

vention are:

[0007] A suspended ceramic tile, comprising:

[0008] A substrate layer, wherein every two adjacent parts of the substrate layer are detachably connected to each other;

[0009] A ceramic tile surface layer fixedly arranged on a top surface of the substrate layer;

[0010] A suspension structure arranged at a bottom of the substrate layer, wherein the suspension structure is configured to make the substrate layer and the ceramic tile surface layer in a suspended state, so as to avoid soaking of the substrate layer by water.

[0011] In a further optimized technical solution, the suspension structure comprises a plurality of support protrusions arranged spaced at the bottom of the substrate layer.

[0012] In a further optimized technical solution, the bottom end of each of the support protrusions is provided with a flexible material which is used for sound insulation and increasing the friction between the support protrusions and the ground.

[0013] In a further optimized technical solution, every two adjacent parts of the substrate layer are connected to each other by plugging or snap-fitting.

[0014] In a further optimized technical solution, a plurality of hasps and/or buckles are arranged in a spaced-apart manner on at least two side edges of each part of the substrate layer; every two adjacent parts of the substrate layer are connected to each other by means of snap-fitting between the hasps and the buckles.

[0015] In a further optimized technical solution, the hasps are arranged as T-shaped protrusions, and the buckles are provided with T-shaped holes matched with the T-shaped protrusions;

[0016] Or, the hasps are arranged as rectangular protrusions, and the buckles are provided with rectangular holes matched with the rectangular protrusions.

[0017] In a further optimized technical solution, the substrate layer is arranged in a shape of a grid, comprising a frame and a plurality of grid bars arranged in the frame, with a grid through hole or a grid blind hole formed between every two adjacent grid bars.

[0018] In a further optimized technical solution, the substrate layer is made of a material of one of PP, PE or PVC.

[0019] A splicing method of suspended ceramic tiles, the splicing is performed on the aforementioned suspended ceramic tiles, the splicing method comprises the following steps:

[0020] step S1: applying glue onto a top of a part of the substrate layer, and bonding a part of the ceramic tile surface layer to the top of the part of the substrate layer to form a splicing unit;

[0021] step S2, placing the splicing unit along an edge of a wall, so that the suspension structure at the bottom of the splicing unit contacts a ground, and directly plugging or snap-fitting the next splicing unit onto the previous splicing unit, so that the parts of substrate layer in the

two splicing units are connected to each other by plugging or snap-fitting; and ensuring that there is a gap between the parts of tile surface layer in every two adjacent splicing units;

[0022] step S3, splicing each splicing unit in sequence according to the step S2 to form a suspended ceramic tile panel as a whole.

[0023] In a further optimized technical solution, in the step S2, the splicing units are arranged on a ground with geothermal pipes provided thereon.

[0024] The technical solutions of the present invention have the following advantages:

1. The suspended ceramic tile provided by the present invention is configured to make the substrate layer and the ceramic tile surface layer in a suspended state by arranging a suspension structure at a bottom of the substrate layer. The advantages of suspending the substrate layer and the ceramic tile surface layer are as follows: on the one hand, when compared to the existing ceramic tile using cement, it would not cause carcinogenic hazard and pollution to the environment. Meanwhile, when compared to the existing ceramic tile, it would reduce the weight, save a lot of labor, production and installation costs, and by making the parts of the substrate layer to be detachably connected to each other, it is more convenient for assembling, disassembling and replacement, which saves assembling and disassembling time, and the disassembled tiles can also be reused. On the other hand, if external water is scattered on the ceramic tile surface layer and the external water penetrates through the ceramic tile surface layer onto the ground below the ceramic tile surface layer, as there is a spacing between the ground and the substrate layer with the ceramic tile surface layer in the present invention, soaking of the substrate layer and the ceramic tile surface layer by water is avoided, corrosion of the substrate layer by water is avoided, and the service life of the suspended ceramic tile body is prolonged.

2. The suspended ceramic tile provided by the present invention discards a series of environmental factor restrictions brought by the traditional laying method, increases the simplicity of ceramic tile splicing and disassembling, reduces the labor cost, enables the disassembled ceramic tile to be reused, and enhances the service life of the ceramic tile.

3. In the suspended ceramic tile provided by the present invention, the bottom end of each of the support protrusions is provided with a flexible material, and the flexible material has the performance of sound insulation, increasing friction, and facilitating the leveling of the ceramic tile surface layer.

4. In the suspended ceramic tiles provided by the present invention, the whole floor substrate is changed into a shape of a grid by changing the substrate structure, that is, the substrate layer is ar-

ranged in a shape of a grid, and a grid through hole or a grid blind hole is formed between every two adjacent grid bars, which can be arranged according to needs, the arranged grid through holes or grid blind holes can reduce the weight of the substrate and reduce the cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] In order to more clearly explain the technical solutions in the specific embodiments of the present invention or in the prior art, the drawings needed for describing the specific embodiments or the prior art will be briefly introduced hereinafter. Apparently, the drawings described below are some embodiments of the present invention, and for a person with ordinary skill in the art, other drawings can also be obtained based on these drawings without expenditure of any creative labor.

Figure 1 is a top view of a suspended ceramic tile of the present invention;

Figure 2 is a side view of a suspended ceramic tile of the present invention;

Figure 3 is a top view of a ceramic tile surface layer in a suspended ceramic tile of the present invention;

Figure 4 is a top view of a substrate layer in a suspended ceramic tile of the present invention;

Figure 5 is a side view of the structure of Figure 4 in a suspended ceramic tile of the present invention;

Figure 6 is a top view of two parts of substrate layer connected to each other in a suspended ceramic tile of the present invention;

Figure 7 is a top view of another substrate layer in a suspended ceramic tile of the present invention;

Figure 8 is a top view of hasps in a suspended ceramic tile of the present invention;

Figure 9 is a top view of another type of hasps in a suspended ceramic tile of the present invention;

Figure 10 is a top view of buckles in a suspended ceramic tile of the invention;

Figure 11 is a top view of the hasps and the buckles snap-fitted in a suspended ceramic tile of the present invention;

Figure 12 is a top view of a suspended ceramic tile of the present invention after being laid.

[0026] Reference numerals:

[0027] 1. Ceramic tile surface layer, 2. Adhesive layer, 3. Substrate layer, 31. Grid bars, 4. Hasps, 5. Support protrusions, 6. Buckles.

DETAILED DESCRIPTION

[0028] The technical solution of the present invention will be described clearly and completely hereinafter in combination with the drawings. Apparently, the described embodiments are part of the embodiments of the present invention, not all of them. Based on the embod-

iments described in the present invention, all other embodiments, obtained by a person with ordinary skill in the art without expenditure of any creative work, belong to the protection scope of the present invention.

[0029] In the description of the present invention, it should be noted that the orientations or positional relationships indicated by the terms "center", "top", "bottom", "left", "right", "vertical", "horizontal", "inside", "outside", etc. are based on the orientation or positional relationship shown in the drawings, which are only used for the convenience of describing the present invention and simplifying the description, rather than indicating or implying that the device or element referred to must have a specific orientation or be constructed and operated in a specific orientation, and therefore should not be understood as a limitation of the present invention. In addition, the terms "first", "second" and "third" are only used for descriptive purposes and should not be understood as indicating or implying relative importance.

[0030] In the description of the present invention, it should be noted that, unless otherwise clearly specified and defined, the terms "installation", "connection" and "communication" should be understood in a broad sense, for example, they can be fixed connection, detachable connection or integral connection; they can be mechanical connection or electrical connection; they can be direct connection, or indirect connection through an intermediate medium, they can be the internal communication between two elements. For a person with ordinary skill in the art, the specific meanings of the above-mentioned terms in the present invention can be understood according to specific circumstances.

[0031] In addition, the technical features involved in different embodiments of the present invention described below can be combined with each other as long as they do not conflict with each other.

Embodiment 1

[0032] A specific embodiment of a suspended ceramic tile, as shown in Figures 1 to 12, comprises a substrate layer 3, a ceramic tile surface layer 1 and a suspension structure arranged from top to bottom.

[0033] Wherein, every two adjacent parts of the substrate layer 3 are detachably connected to each other. A ceramic tile surface layer 1 is fixedly arranged on a top surface of the substrate layer 3. A suspension structure is arranged at a bottom of the substrate layer 3.

[0034] The above-mentioned suspended ceramic tile is configured to make the substrate layer 3 and the ceramic tile surface layer 1 in a suspended state by arranging the suspension structure at a bottom of the substrate layer 3. The advantages of suspending the substrate layer 3 and the ceramic tile surface layer 1 are as follows: on the one hand, when compared to the existing ceramic tiles using cement, it would not cause carcinogenic hazard and pollution to the environment. Meanwhile, when compared to the existing ceramic tiles, it would reduce

the weight, save a lot of labor, production and installation costs, and is more convenient for assembling, disassembling and replacement, saves assembling and disassembling time, and the disassembled tiles can also be reused.

On the other hand, if external water is scattered on the ceramic tile surface layer 1 and the external water penetrates through the ceramic tile surface layer onto the ground below the ceramic tile surface layer, as there is a spacing between the ground and the substrate layer 3 with the ceramic tile surface layer 1 in the present invention, soaking of the substrate layer 3 and the ceramic tile surface layer 1 by water is avoided, corrosion of the substrate layer 3 by water is avoided, and the service life of the suspended ceramic tile body is prolonged.

[0035] More specifically, the ceramic tile surface layer 1 is bonded onto the substrate layer by an adhesive layer 2, that is, the ceramic tile surface layer 1 and the adhesive layer 2 are fixed to each other by means of adhesive, or by other fixing methods, and there is no restriction herein. Increasing the amount of glue can effectively enhance the adhesion between the ceramic tile surface layer 1 and the adhesive layer 2.

[0036] The suspension structure comprises a plurality of support protrusions 5 arranged spaced at the bottom of the substrate layer 3, the substrate layer 3 and the ceramic tile surface layer 1 are suspended by the respective support projections 5. In addition, the setting number of support protrusions 5 shall ensure the support strength for the ceramic tile surface layer 1. Taking a square substrate with a side length of 50 cm as an example, for a 5 mm thick ceramic tile, the distance between the protrusions at the bottom of the substrate is 1-10 cm; for a 3 mm thick ceramic tile, the distance between the protrusions at the bottom of the substrate is 1-6 cm.

[0037] As an improved embodiment, the bottom end of each of the support protrusions 5 is provided with a flexible material, and the flexible material has the performance of sound insulation, increasing friction, and facilitating the leveling of the ceramic tile surface layer 1. The flexible material has a certain sound absorption capacity to reduce the sound transmitted from the ground to the ceramic tile surface layer. The flexible material has a certain elasticity, which can increase the friction between the support protrusions 5 and the ground, after a person has stepped on the ceramic tile surface layer 1, the flexible material is squeezed, which further increases the friction between the support protrusions 5 and the ground and prevents the problem of shifting of the ceramic tile surface layer 1. In addition, the flexible material has the performance of facilitating the leveling of the ceramic tile surface layer 1. When the ceramic tile surface layer is being installed, if the height of a part of the ceramic tile surface layer to be spliced is higher than that of another part of the ceramic tile surface layer that has already been spliced, the flatness of the two adjacent parts of ceramic tile surface layer can be ensured by pressing down the part of ceramic tile surface layer to be spliced.

[0038] In this embodiment, every two adjacent parts of

the substrate layer 3 are connected to each other by plugging or snap-fitting. In addition, every two adjacent parts of the substrate layer 3 can also be connected to each other by other detachable methods, and there is no restriction herein.

[0039] More specifically, as shown in Figures 6 to 11, a plurality of hasps 4 and/or buckles 6 are arranged in a spaced-apart manner on at least two side edges of each part of the substrate layer 3. That is, a plurality of hasps 4 are arranged in a spaced-apart manner on one side edge of a part of the substrate layer 3, or a plurality of buckles 6 are arranged in a spaced-apart manner on one side edge of a part of the substrate layer 3, or a plurality of hasps 4 and buckles 6 are arranged in a spaced-apart manner on one side edge of a part of the substrate layer 3.

[0040] Correspondingly, adjacent side edges of every two adjacent parts of substrate layer 3 are connected to each other by means of snap-fitting between the hasps 4 and the buckles 6, that is, when hasps 4 are arranged on the side edge of one part of substrate layer, buckles 6 are arranged on the side edge of the other adjacent part of substrate layer. The buckles in this embodiment have diversity and are used for splicing two adjacent parts of substrate layer 3 together.

[0041] The hasps 4 are arranged as T-shaped protrusions, and the buckles 6 are provided with T-shaped holes matched with the T-shaped protrusions. Or, the hasps 4 are arranged as rectangular protrusions, and the buckles 6 are provided with rectangular holes matched with the rectangular protrusions. This embodiment does not limit the setting shape of the buckles 4 and the shape of the holes arranged in the buckles 6.

[0042] As the thicker the substrate layer is, the deeper the snap-fitting between the hasps 4 and the buckles 6 is, and since a plurality of support protrusions 5 are arranged at the bottom of the substrate layer 3, the hasps 4 and the buckles 6 can directly extend to a lateral side of the support protrusions 5, that is, the setting thickness of the hasps 4 and the buckles 6 can be increased by means of the support protrusions 5.

[0043] As an improved embodiment, the whole floor substrate is changed into a grid shape by changing the substrate structure in this embodiment, that is, the substrate layer 3 is arranged in a shape of a grid, comprising a frame and a plurality of grid bars 31 arranged in the frame, with a grid through hole or a grid blind hole formed between every two adjacent grid bars, which can be arranged according to needs, the arranged grid through holes or grid blind holes can reduce the weight of the substrate and reduce the cost. The frame in this embodiment is arranged in a square shape to match the shape of the ceramic tile surface layer, but different inner shapes can be generated inside the frame by different arrangements of grid bars. In this embodiment, the size of the holes can be controlled according to the thickness and distribution of the grid bars, so as to form different shapes and holes, and the shape of the hole and the overall grid can also be changed by changing the shape of the grid

bars, such as changing linear grid bars into curved ones.

[0044] The substrate layer in this embodiment can be made into various styles of grids. As shown in Figure 4, the center of the substrate layer is set as a "cross line", and the substrate layer is set to have diamond shapes from the inside to the outside. If the ceramic tile is relatively large, the substrate layer will also increase proportionally, and the cross line can increase the firmness of the entire plane. As shown in Figure 7, if the ceramic tile is relatively small, the center points of the side edges of the substrate layer can be interconnected into a rhombic shape by changing the arrangement and layout of the grid bars, the part inside the rhombic shape of the substrate layer is set to have a shape of horizontal lines, and the part outside the rhombic shape of the substrate layer is set to have a shape of inclined lines.

[0045] In terms of the strength of the substrate, although the use of grids can effectively save raw materials, the specified strength can be achieved by the grid bar arrangement density and grid bar thickness on the basis of ensuring the strength of the substrate. Taking the square substrate with a side length of 50 cm as an example, the thickness range of the grid bars is set at 1-3 cm, and the spacing range of the grid bars is 3-5 cm; taking the square substrate with a side length of 30 cm as an example, the thickness range of the grid bars is set at 0.2-1 cm, and the spacing range of the grid bars is 0.5-1.5 cm.

[0046] The material of substrate layer 3 is one of PP, PE or PVC. PP has the advantages of light weight, good toughness and corrosion resistance, PE has the advantage of being able to be recycled, and PVC has the advantage of good machining quality.

Embodiment 2

[0047] This embodiment discloses a specific embodiment of a splicing method of suspended ceramic tiles, the splicing method comprises the following steps:

Step S1, applying glue onto a top of a part of the substrate layer 3, and bonding a part of ceramic tile surface layer 1 onto the top of the part of substrate layer 3 to form a splicing unit.

Step S2, placing the splicing unit along an edge of a wall, so that the suspension structure at the bottom of the splicing unit contacts a ground, and directly plugging or snap-fitting the next splicing unit onto the previous splicing unit, so that the parts of substrate layer 3 in the two splicing units are connected to each other by plugging or snap-fitting, i.e. the hasps of the first substrate layer can be connected to the buckles of the second ceramic tile. Meanwhile, ensuring that there is a 3-5 mm gap between the parts of ceramic tile surface layer 1 in every two adjacent splicing units. Ceramic tiles are easily affected by thermal expansion and cold contraction, and different types of ceramic tiles have different amounts of expansion

and contraction under different temperature environments. If no gap is preset, ceramic tiles are easy to bulge or crack, therefore, a gap should be reserved between every two adjacent parts of ceramic tile surface layer.

S3, splicing each splicing unit in sequence according to the step S2 to form a suspended ceramic tile panel as a whole.

S4, filling the gaps between the individual parts of ceramic tile surface layer 1 with a filler material which can be white cement, a gap filler, a seam beautifying agent, etc.

S5, setting a skirting line along the edge of the wall, and fixing the ceramic tile surface layer 1 arranged along the edge of the wall by means of the skirting line.

[0048] As an improved embodiment, in step S2, the splicing units are arranged on a ground with geothermal pipes provided thereon, and the friction between the splicing units and the ground is increased by the flexible material arranged at the bottoms of the protrusions, thus there is no need to lay cement onto the geothermal pipes, so that the laying cost of the geothermal pipes and ceramic tiles is reduced. Meanwhile, as the ceramic tile surface layer is suspended directly above the geothermal pipes, the heat released by the geothermal pipes will be directly transferred upward into the room, so that the heat transfer performance is better.

[0049] If one of the assembled ceramic tiles is damaged in use and it needs to replace the part of ceramic tile surface layer, the part of ceramic tile surface layer can be directly broken and removed, and then a new part of ceramic tile surface layer can be glued to the previous part of substrate layer with glue; or the part of ceramic tile surface layer is smashed and removed, then the snap-fitting is directly released, the whole part of substrate layer is removed, and a new overall ceramic tile is installed and assembled by snap-fitting.

[0050] When the ceramic tile surface layer is being disassembled, it can be disassembled from the ceramic tile at the outermost edge, the part of ceramic tile surface layer at the outermost edge can be directly broken and disassembled by releasing the snap-fitting.

[0051] Apparently, the above-mentioned embodiments are only examples for clear illustration, not for limitation of embodiments. For a person with ordinary skill in the art, other changes or modifications in different forms can be made on the basis of the above-mentioned description. It is unnecessary and impossible to enumerate all embodiments herein. Any obvious changes or modifications derived therefrom are still within the protection scope of the present invention.

Claims

1. A suspended ceramic tile, **characterized by** com-

prising:

a substrate layer (3), wherein every two adjacent parts of the substrate layer (3) are detachably connected to each other;

a ceramic tile surface layer (1) fixedly arranged on a top surface of the substrate layer (3);

a suspension structure arranged at a bottom of the substrate layer (3), wherein the suspension structure is configured to make the substrate layer (3) and the ceramic tile surface layer (1) in a suspended state, so as to avoid soaking of the substrate layer (3) by water.

2. The suspended ceramic tile according to claim 1, **characterized in that**, the suspension structure comprises a plurality of support protrusions (5) arranged spaced at the bottom of the substrate layer (3).

3. The suspended ceramic tile according to claim 2, **characterized in that**, the bottom end of each of the support protrusions (5) is provided with a flexible material which is used for sound insulation and increasing the friction between the support protrusions (5) and the ground.

4. The suspended ceramic tile according to claim 1, **characterized in that**, every two adjacent parts of the substrate layer (3) are connected to each other by plugging or snap-fitting.

5. The suspended ceramic tile according to claim 4, **characterized in that**, a plurality of hasps (4) and/or buckles (6) are arranged in a spaced-apart manner on at least two side edges of each part of the substrate layer (3); every two adjacent parts of the substrate layer (3) are connected to each other by means of snap-fitting between the hasps (4) and the buckles (6).

6. The suspended ceramic tile according to claim 5, **characterized in that**,

the hasps (4) are arranged as T-shaped protrusions, and the buckles (6) are provided with T-shaped holes matched with the T-shaped protrusions;

or the hasps (4) are arranged as rectangular protrusions, and the buckles (6) are provided with rectangular holes matched with the rectangular protrusions;

7. The suspended ceramic tile according to claim 1, **characterized in that**, the substrate layer (3) is arranged in a shape of a grid, comprising a frame and a plurality of grid bars arranged in the frame, with a grid through hole or a grid blind hole formed between

every two adjacent grid bars.

8. The suspended ceramic tile according to claim 1, **characterized in that**, the substrate layer (3) is made of a material of one of PP, PE or PVC. 5
9. A splicing method of suspended ceramic tiles, **characterized in that**, splicing is performed on the suspended ceramic tiles according to any one of claims 1 to 8, the splicing method comprises the following steps: 10
 - step S1, fixing a part of ceramic tile surface layer (1) onto a top of a part of substrate layer (3) to form a splicing unit; 15
 - step S2, placing the splicing unit along an edge of a wall, so that the suspension structure at the bottom of the splicing unit contacts a ground, and directly plugging or snap-fitting the next splicing unit onto the previous splicing unit, so that the parts of substrate layer (3) in the two splicing units are connected to each other by plugging or snap-fitting; and ensuring that there is a gap between the parts of tile surface layer (1) in every two adjacent splicing units; 20 25
 - step S3, splicing each splicing unit in sequence according to the step S2 to form a suspended ceramic tile panel as a whole.
10. The splicing method of suspended ceramic tiles according to claim 9, **characterized in that**, in the step S2, the splicing units are arranged on a ground with geothermal pipes provided thereon. 30

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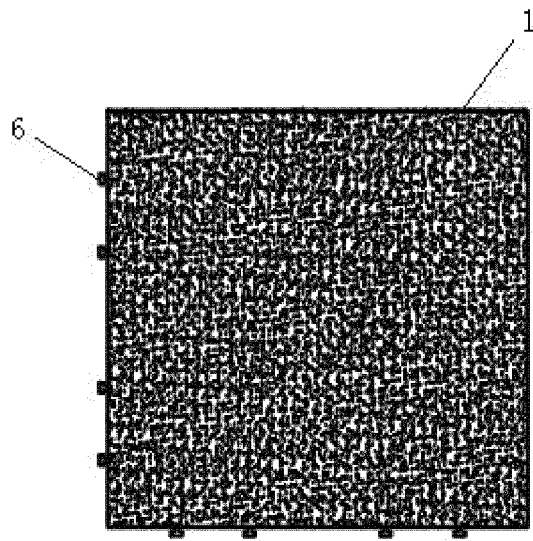


Fig. 1

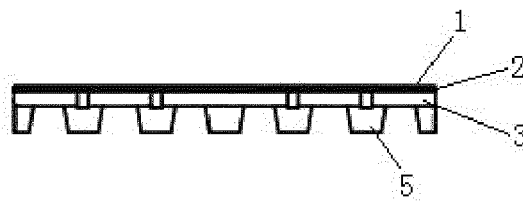


Fig. 2

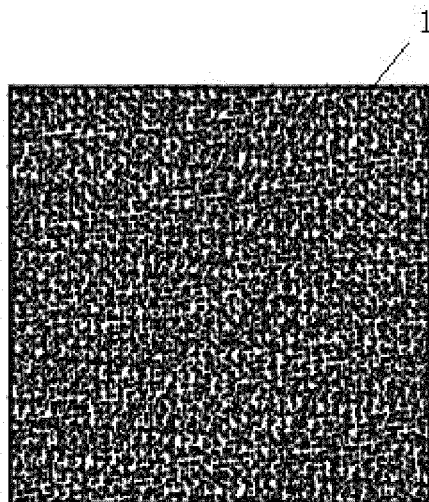


Fig. 3

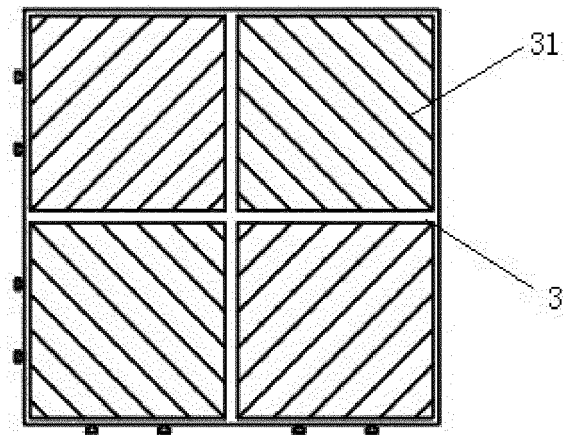


Fig. 4

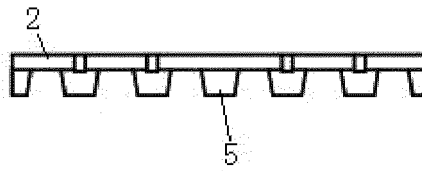


Fig. 5

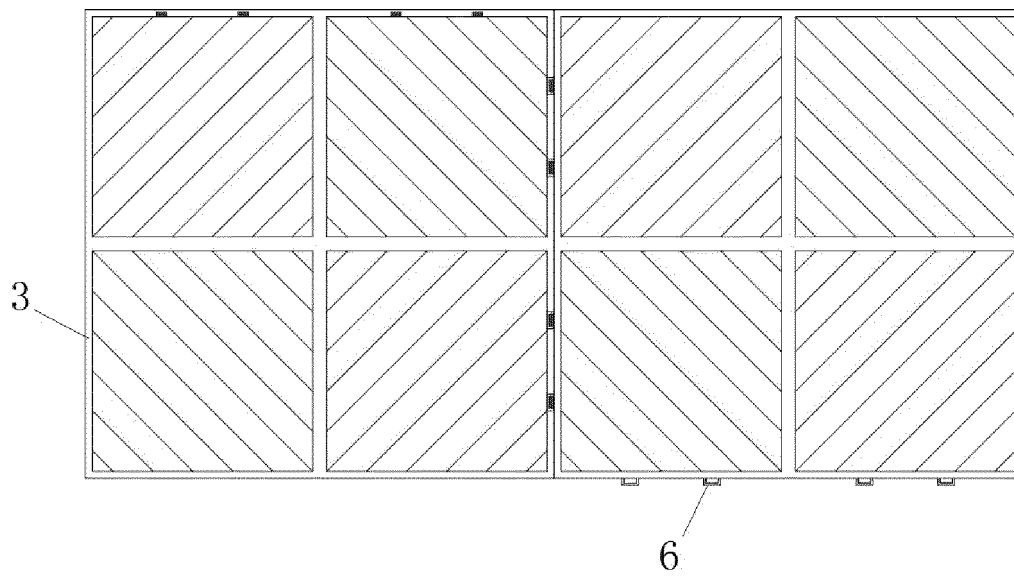


Fig. 6

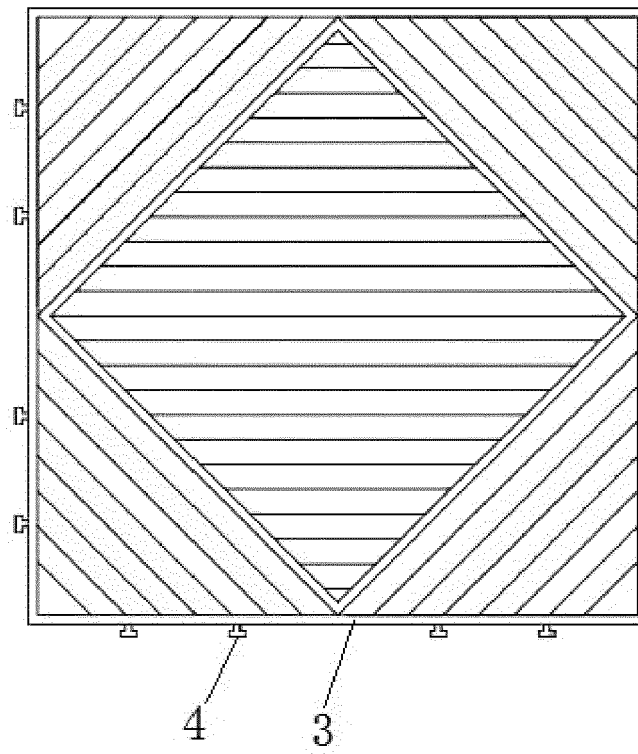


Fig. 7

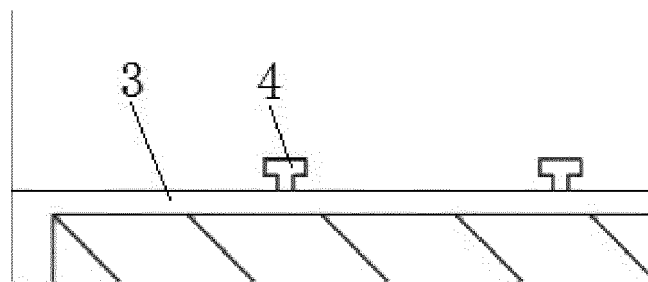


Fig. 8

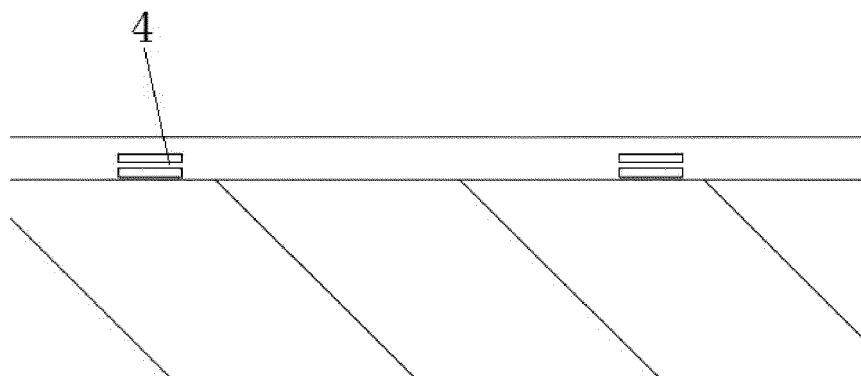


Fig. 9

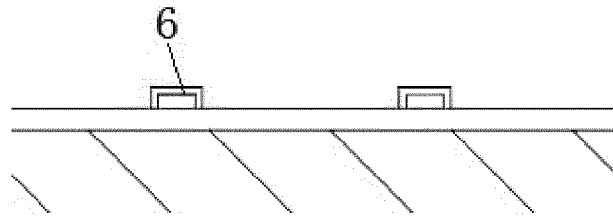


Fig. 10

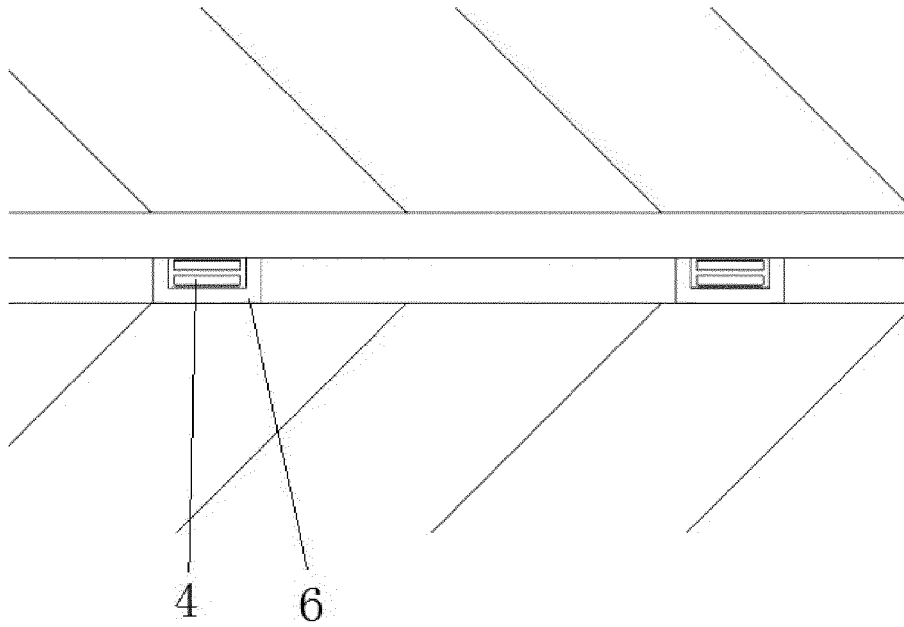


Fig. 11

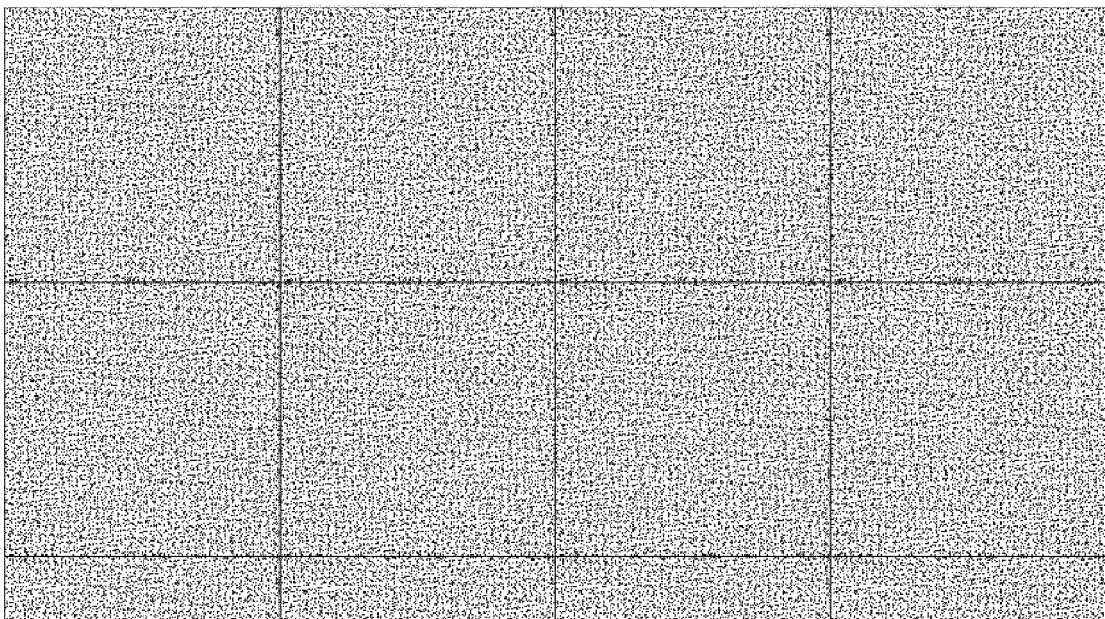


Fig. 12



EUROPEAN SEARCH REPORT

Application Number

EP 23 16 2292

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2010/170176 A1 (SANSANO MARTI VICENTE FRANCISCO [ES]) 8 July 2010 (2010-07-08)	1, 2, 4, 5, 7, 9, 10	INV. E04F15/02
Y	* paragraph [0039]; figures 7, 8 *	3, 6, 8	E04F15/08 E04F15/20
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