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(54) **TOOL FOR MANUAL LAYING OF PAVING STONES AND METHOD OF MANUALLY LAYING PAVING STONES**

(57) Tool for a manual arrangement of the paving stones (4) comprising the main plate (1) which preferably has a rectangular shape, wherein one of its long sides has a series of notches (3a) forming a saw teeth pattern, wherein the length of the notch single edge is longer than the side length of the paving stones applied to the tool edge and wherein the notch edges connect to each other at an angle of not more than 90° relative to each other and the paving stones stabilizers (4) are fixed to the main plate ; and method for the arrangement of the paving stones comprising the steps of positioning the tool on the ground (8), arranging, positioning, wherein in the arranging step first the first pair of the first paving stones is placed in parallel with the outermost edges of the tool,

wherein the first pair of the paving stones is placed parallel with the outermost edges of the tool, wherein the stones are perpendicular to each other and parallel to the edges of the tool and between them an expansion gap is created and in the next step the second paving stones are placed in parallel with one of the first paving stones and are moved in relation thereto, whereupon the third paving stones are placed and with the use of the tool the arranged stones are pressed against each other maintaining the size of the expansion gap and against the pattern already arranged or against the ground contour and then the space between the arranged stones is filled by the fourth paving stones.

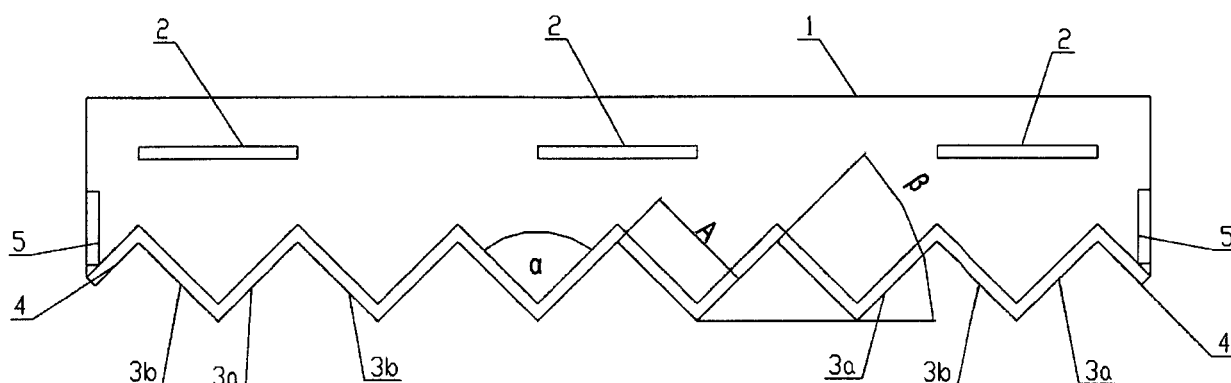


Fig. 1

Description

[0001] The subject of the invention is a tool for a manual arrangement of paving stones and a method for the arrangement of paving stones using this tool. The invention is used in construction works related to the making of pedestrian and road paths, roads, squares, local streets, bicycle paths, passages, pedestrian avenues and playgrounds made of paving stones, especially for paving stones without spacers.

[0002] A tool for arranging paving stones is known from a patent document WO9731157A1. It contains four triangular tables, two sides perpendicular to each other have and edge without notches, and the third side, forming a hypotenuse, includes a number of notches mutually perpendicular and forming a pattern of a saw teeth type. Along the third side there is a series of through holes. The tables also have legs for a height adjustment, located in the corners and a level. During the arrangement of the pattern, the boards are connected through the holes with colorful cords to ensure consistency of the arrangement and to maintain a uniform level of the surface being arranged. For the correct operation of the tool, it is necessary to use all four tables and to connect them with cords additionally.

[0003] From another document, NL8600820A, a tool for a mechanical arranging of paving stones is known. This document discloses a tool for a mechanical arranging of paving stones in a herringbone pattern, where the paving stones are supplied in series with guides and set perpendicular to each other. Then, they are combined into the desired graduated pattern, where B is the width of the brick and v is the desired spacing or width of the seam between the bricks. The paving stones are mounted close to each other using a frame bar and vacuum conveyors and adjusted to a desired pattern, leaving a necessary clearance between them and creating a prefabricated fragment, wherein one of the long sides of the frame has a series of mutually perpendicular notches joining in the pattern of the saw teeth type. After placing the pattern in relation to the first frame, it is additionally blocked by another three frame elements.

[0004] In another document, GB2541650A, a series of templates for laying bricks or paving stones is disclosed. The template elements can be connected to each other using screws or other fasteners, such as a support. The templates have notches to place the ends blocking the paving stones. The templates are provided with openings that allow to attach building string lines in order to mark straight and parallel lines if necessary. Some elements of the template have a central hole that can serve as a pivot point to mark a circular area for laying a surface. The template has the shape of an elongated trapezoid. The side, being the base of the trapezoid, has a number of notches, which are perpendicular to each other and form a pattern of the saw teeth type.

[0005] The technical problem posed before the invention is to provide such a tool construction for a manual

arrangement of paving stones, which will ensure a distance between the elements of the pattern as arranged, simultaneous creation of an expansion gap, repeatability of laying and which will not require additional positioning elements. Another problem is to provide such a manual method for the arrangement of paving stones which will enable its quick arrangement, repeatable while maintaining free spaces between the bricks. Unexpectedly, the above problems were solved by the present invention.

[0006] The first object of the present invention is a tool for a manual arrangement of the paving stones comprising a main plate which preferably has a rectangular shape, wherein one of its long sides has a series of notches forming a saw teeth pattern, characterized in that the length of a single notch edge is longer than a side length of the paving stones applied to the tool edge, wherein the notch edges join together at an angle α not greater than 90° to each other and the paving stones stabilizers are fixed to the main plate. Application of a paving stone with length B with one of the notch edges with length A results in a difference in length C which corresponds to the size of the joint.

[0007] Preferably, the notch edge length is not more than 5mm with respect to the side length of the applied paving stone.

[0008] Preferably, the connection point of the notch edge has an acute, straight-angle or oblique (rounded) shape.

[0009] Preferably, the working handles are attached to the main plate.

[0010] The second object of the present invention is a method for the arrangement of the paving stones comprising the following steps:

- a) positioning the tool on the ground,
- b) arranging the paving stones according to a given pattern,
- a. positioning the tool relative to the preceding row of the paving stones or ground contour,

wherein steps b) and c) are implemented alternately until the entire given ground surface is filled, characterized in that in step b) first, a pair of the first paving stones is placed parallel to the outermost edges of the tool, wherein the first pair of the paving stones is placed parallel with the outermost edges of the tool, wherein the paving stones are perpendicular to each other and parallel to the tool edge and an expansion gap is formed between them and in the next step the second paving stones are placed parallel to one of the first paving stones and moved relative to them, whereupon the third paving stones are placed and with the use of the tool the arranged paving stones are pressed against each other maintaining the size of the expansion gap and against the pattern already applied or to the ground contour, and then the space between the paving stones as arranged is filled by the fourth paving stones. By positioning the tool it is understood its positioning on the ground, align-

ment with the edge, e.g. curb, or alignment of the tool to the arranged pattern fragment, so that it is possible to arrange subsequent paving stones.

[0011] Preferably, in step b) the outer element of the first paving stones is positioned in relation to the pattern already arranged.

[0012] The solution according to the invention has a number of advantages. It enables quick and repeatable arrangement of the paving stones in a given pattern depending on the shape of the paving stones, maintenance of vertical, horizontal and transverse lines (a symmetrical pattern). In the course of arranging the pattern, using the tool and method of the present invention, expansion gaps are formed with a fixed, constant and repeatable width.

[0013] Embodiments of the invention are illustrated in the drawing, in which:

Fig. 1 is a perpendicular view of a tool for the arrangement of paving stones,

Fig. 2 is an isometric view of a tool for the arrangement of paving stones,

Fig. 3a-3b is a view of the tool with a fragment of the herringbone-like pattern from paving stones with straight sides,

Fig. 4a-4b is a view of the tool with a fragment of the wave-like pattern as arranged;

Fig. 5a-5b is a view of the tool with a fragment of the herringbone-like pattern from overlapping paving stones,

Fig. 6a-6b show the arrangement of the paving stones,

Fig. 7 is a perpendicular view of the tool for the arrangement of the paving stones without working handles,

Fig. 8 is an isometric view of the tool for the arrangement of the paving stones without working handles,

Fig. 9 shows an extraction showing the difference (C) of the notch edge length (A) in the tool and the paving stones length (B),

Fig. 10a-10b shows an extraction showing the difference (C) of the notch edge length (A) in the tool and the paving stones length (B) after arranging the stones pairs.

Example 1 A tool for the arrangement of the paving stones

[0014] A tool for the arrangement of paving stones includes a main plate 1, paving stones stabilizers 4 and

main plate working handles 2, 5, as shown in figures 1 and 2. The main plate, in an example embodiment, has a rectangular shape 1 in the contour, but it does not constitute a shape limitation. In one of its sides there are notches made at an angle β not greater than 45° in relation to the side. The notch edges 3a, 3b intersect each other at an angle α not greater than 90° and are connected in series with the notch ends, thereby forming a pattern of the saw teeth type. The "saw teeth" can be terminated sharply or ovally, so that they allow for the arrangement of paving stones of any shape and the angles formed by the edges can also be different from those mentioned above, so as to adapt the pattern of the saw teeth to another shape of the paving stones, e.g. wave-type (Fig. 4a-4b). To the main plate 1 along the edges of the notches 3a, 3b, the parallel elements stabilizing the paving stones 4, with respect to the edges 3a, 3b are fixed which enable easy fitting of the paving stones as arranged to the rest of the pattern. To the main plate 1 also fixed are working handles 2, 5 for carrying the tool and positioning it in the course of the work. In another preferred embodiment, there are no working handles (Fig. 7 and 8).

Example 2 A method for the arrangement of the paving stones

[0015] The arrangement of the paving stones is carried out in a few steps, as shown in figures 6a-6e. In the first step, the tool is positioned on a ground 8 (Fig. 6a). Then, the paving stones are arranged in a given pattern, e.g. herringbone or wave, which is dependent on the stones shape. The paving stones have been appropriately indicated in the figures (Fig. 6a-6e) showing the paving stones arranging sequence, appropriately by the following numbers: the first stones - 1, the second stones - 2, the third stones - 3, the fourth stones - 4. First, the first pair of the first paving stones is placed in parallel with the outermost edges of the tool 3aa i 3bb (Fig 6b), wherein they are perpendicular to each other and parallel to the tool edge. The difference in the notch edge length in the tool for the arrangement of the paving stones and the stones length, which is applied to the tool, creates a gap between the stones, i.e. the so-called joint (an expansion gap), as shown in figures 9 and 10a-10b. In the next step, the second paving stones are placed in parallel with one of the first paving stones and are moved relative to them (Fig. 6c). The third paving stones are placed and with the use of the tool the arranged stones are pressed against each other and against the pattern already arranged or the ground contour (Fig. 6d). And then the space between the arranged stones is filled (Fig. 6e). After this operation, the tool is moved and positioned in order to repeat the above steps. Applying a paving stone with a length A results in a difference in length C which corresponds to the joint size (Fig. 9, Fig 10a-10b).

Claims

1. A tool for a manual arrangement of the paving stones comprising a main plate, which preferably has a rectangular shape, wherein one of its long sides has a series of notches forming a saw teeth pattern, **characterized in that** the length of the notch single edge is longer than the side length of the paving stone applied to the tool edges, wherein the notch edges connect to each other at an angle α not greater than 90° and paving stones stabilizers (4) are fixed to the main plate (1). 5
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2. The tool according to claim 1, **characterized in that** the notch edge length is not more than 5mm in relation to the side length of the paving stone. 15
3. The tool according to claims 1 to 2, **characterized in that** the connection point of the notch edge (3a, 3b) has an acute, straight-angle or oblique (rounded) shape. 20
4. The tool according to claims 1 to 3, **characterized in that** working handles (2, 5) are fixed to the main plate (1) 25
5. A method for the arrangement of the paving stones comprising the following steps:
 - a) positioning the tool defined in claims 1 to 4 on the ground (8), 30
 - b) arranging the paving stones according to a given pattern,
 - c) positioning the tool relative to the preceding row of the paving stones formed in step b) or ground contour, 35

wherein steps b) and c) are implemented alternately until the entire given ground surface (8) is filled, **characterized in that** in step b) the first pair of the first paving stones is placed in parallel with the outermost edges (3aa, 3bb) of the tool, wherein the first pair of the paving stones is placed parallel with the outermost edges of the tool, wherein the stones are perpendicular to each other and parallel to the tool edge and an expansion gap is formed between them and in the next step the second paving stones are placed in parallel with one of the first paving stones and with the use of the tool the arranged stones are pressed against each other maintaining the size of the expansion gap and the pattern already applied or the ground contour and then the space between the arranged stones is filled by the fourth paving stones. 40
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6. The method according to claim 4, **characterized in that** in step b) the outer element of the first paving stone is positioned in relation to the pattern already arranged. 55

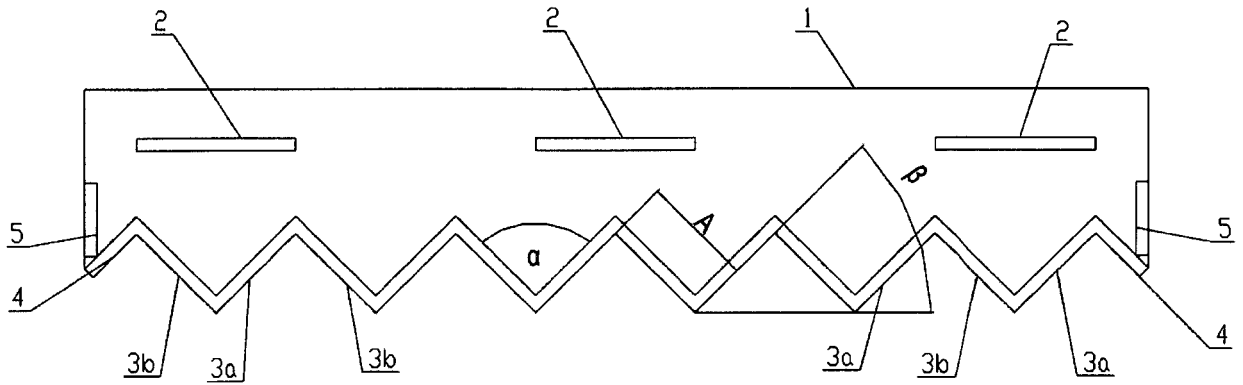


Fig. 1

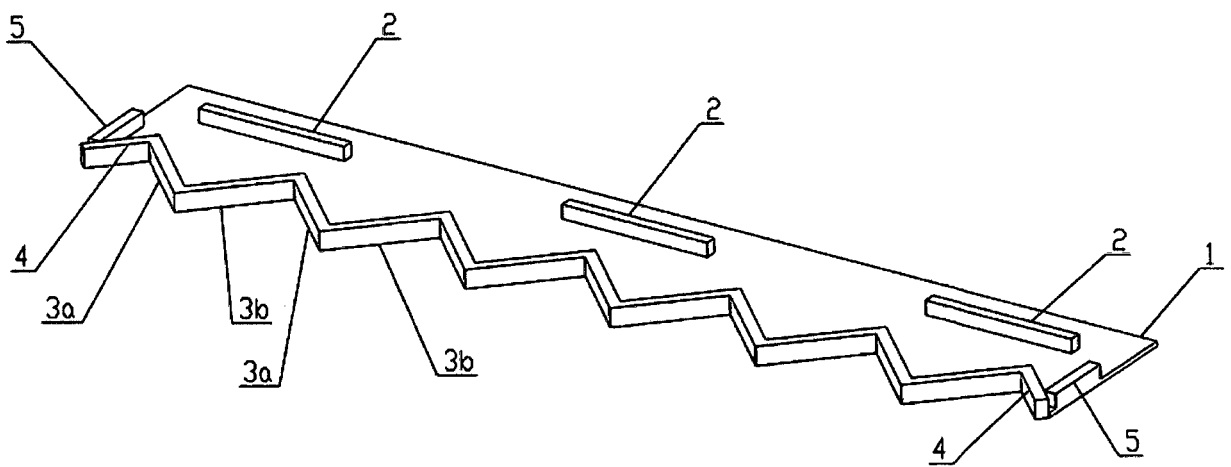


Fig. 2

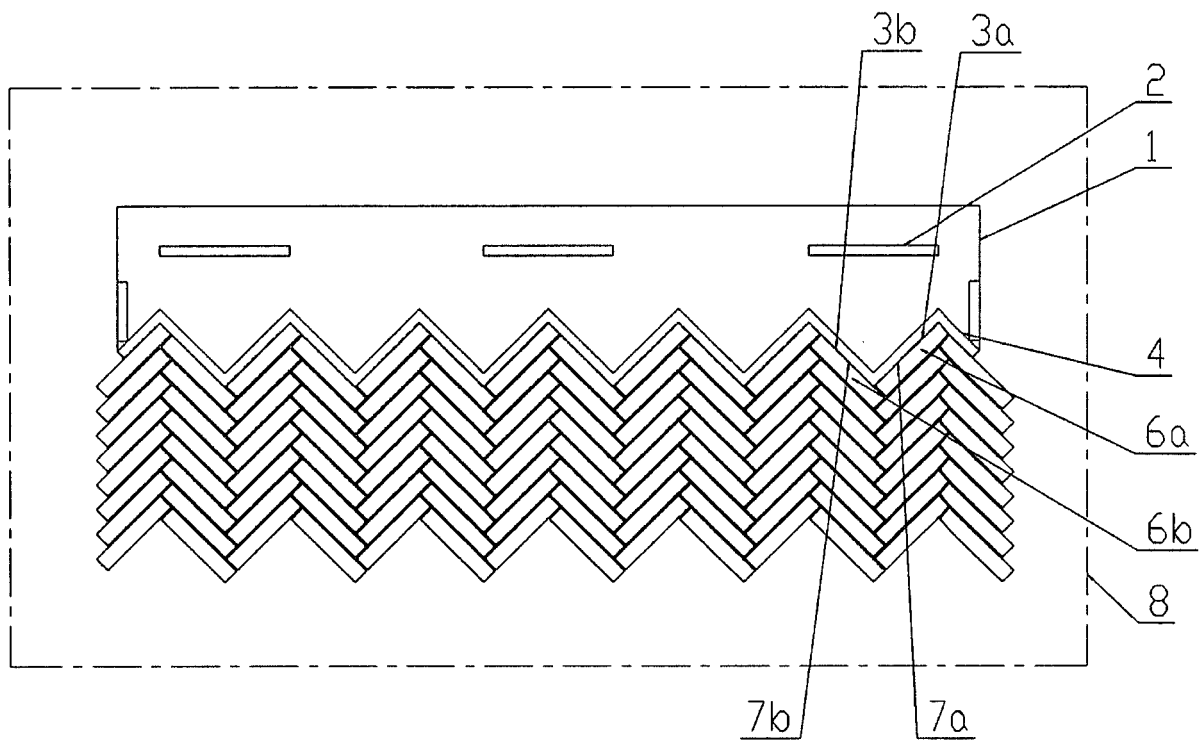


Fig. 3a

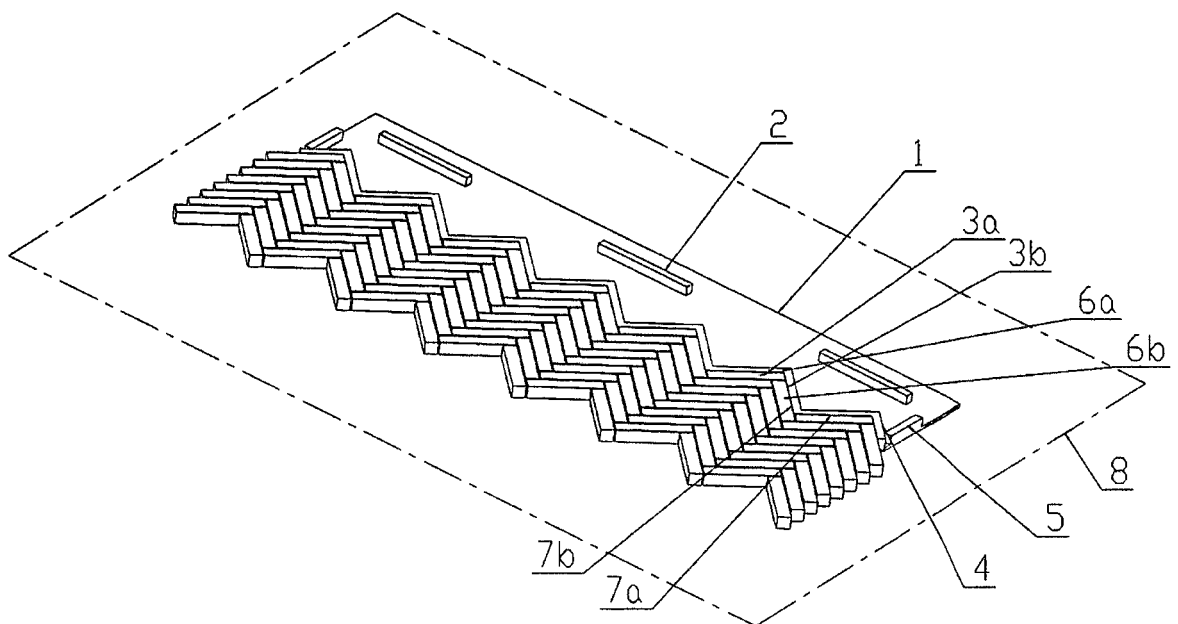


Fig. 3b

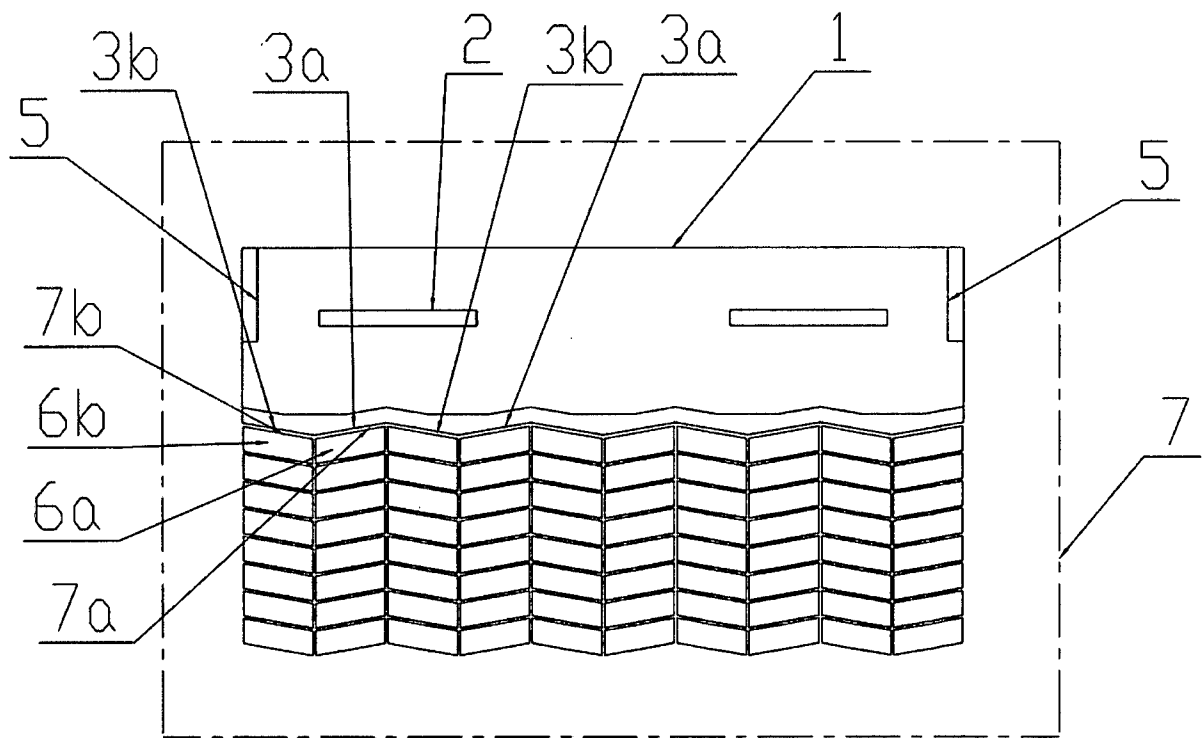


Fig. 4a

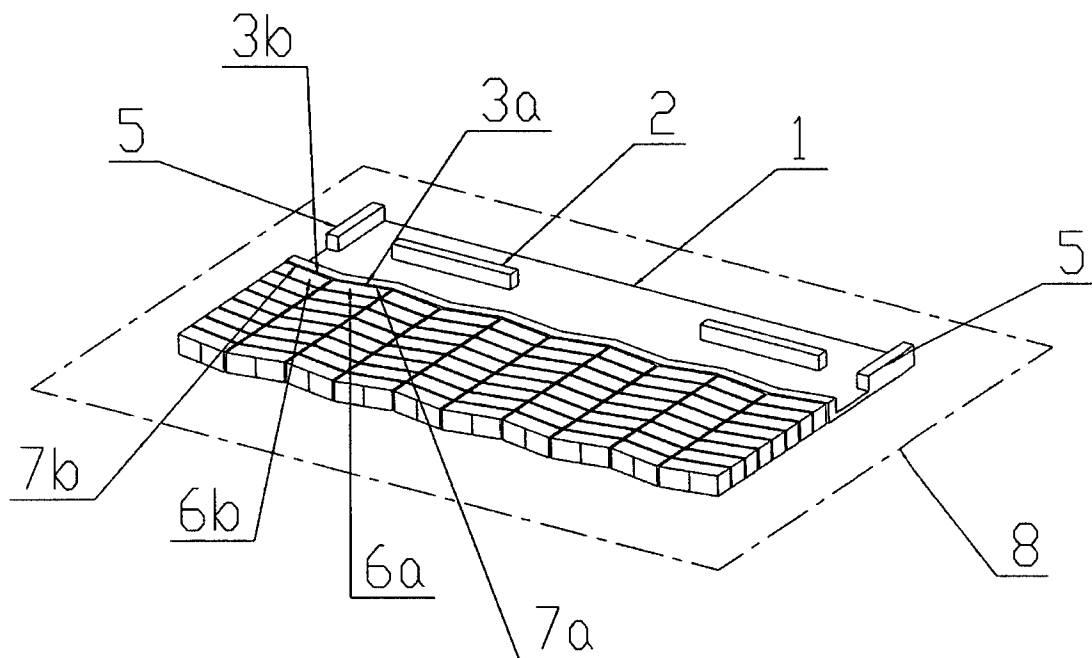


Fig. 4b

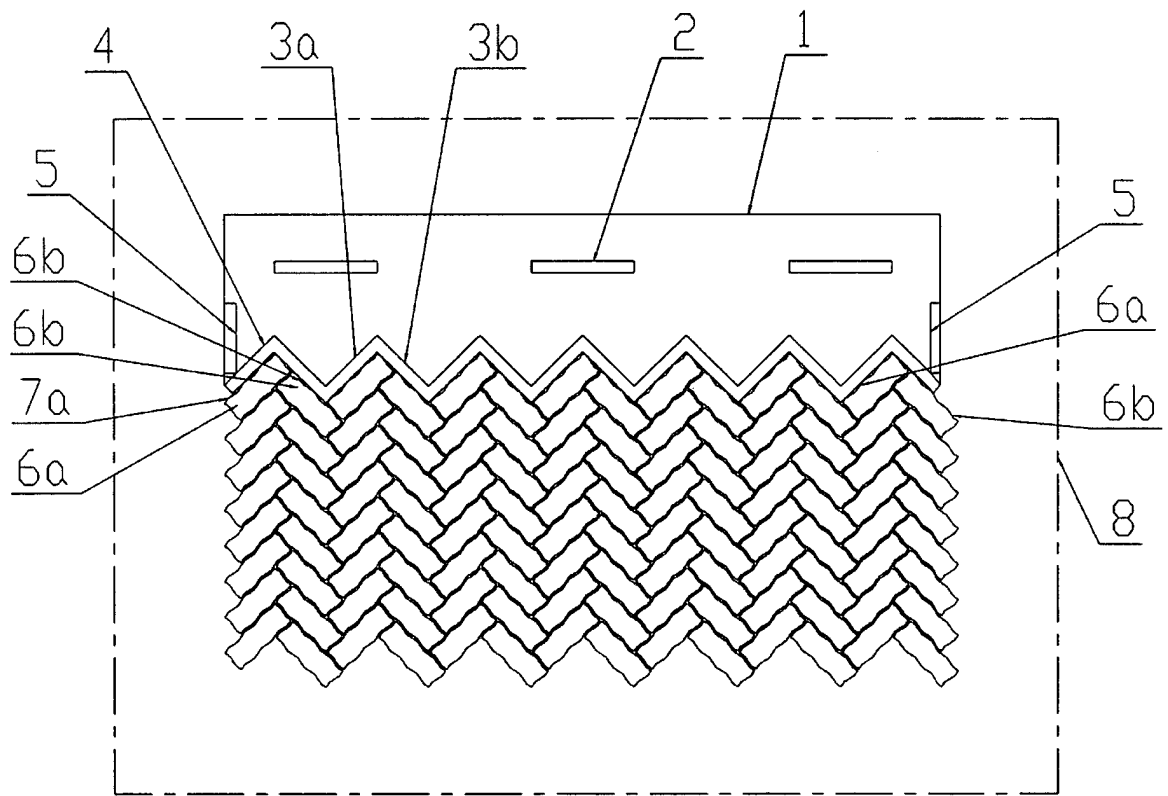


Fig. 5a

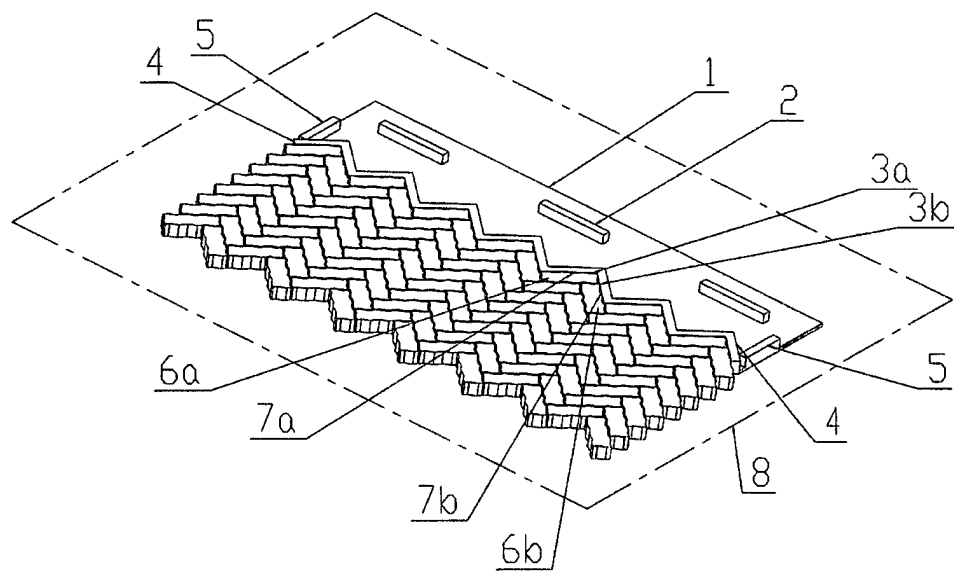


Fig. 5b

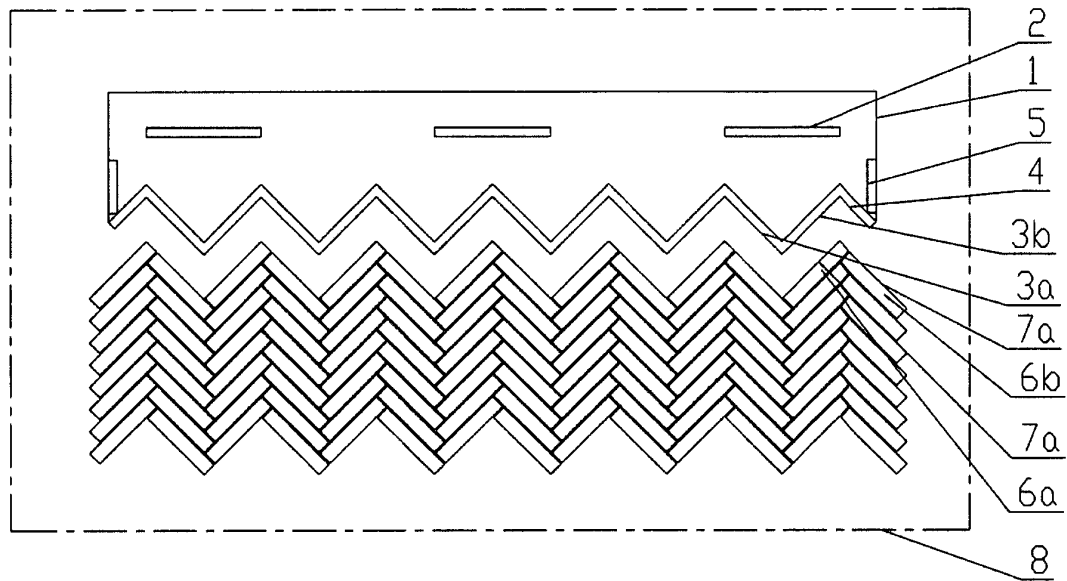


Fig. 6a

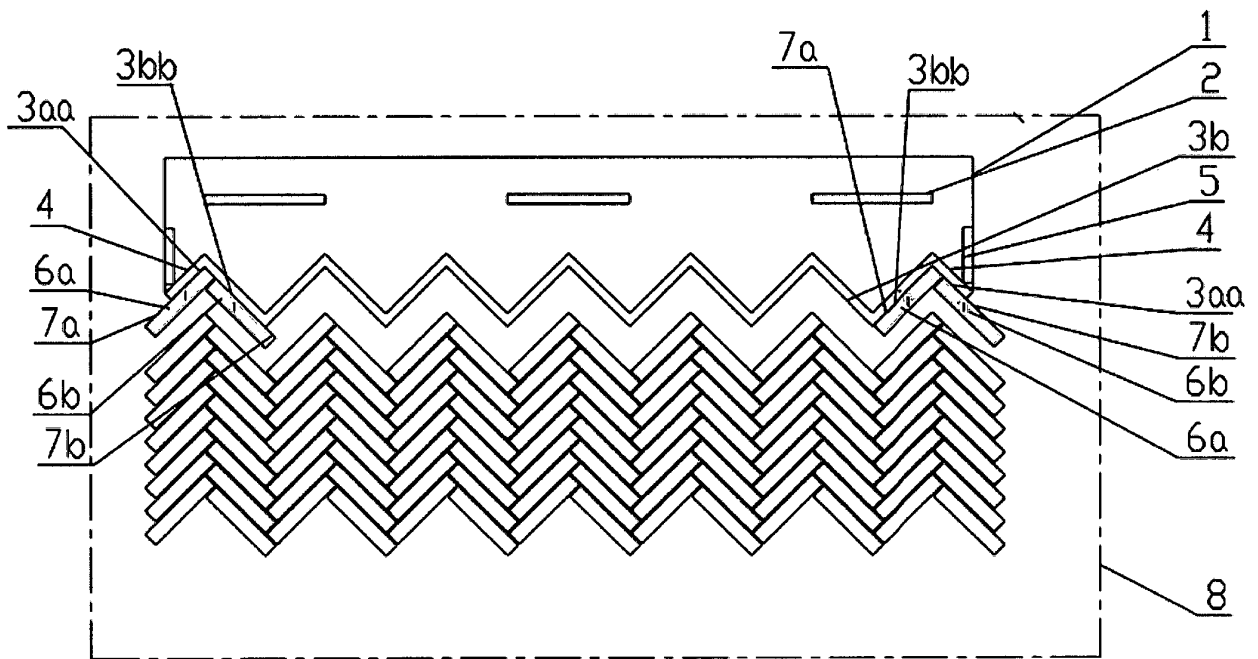


Fig. 6b

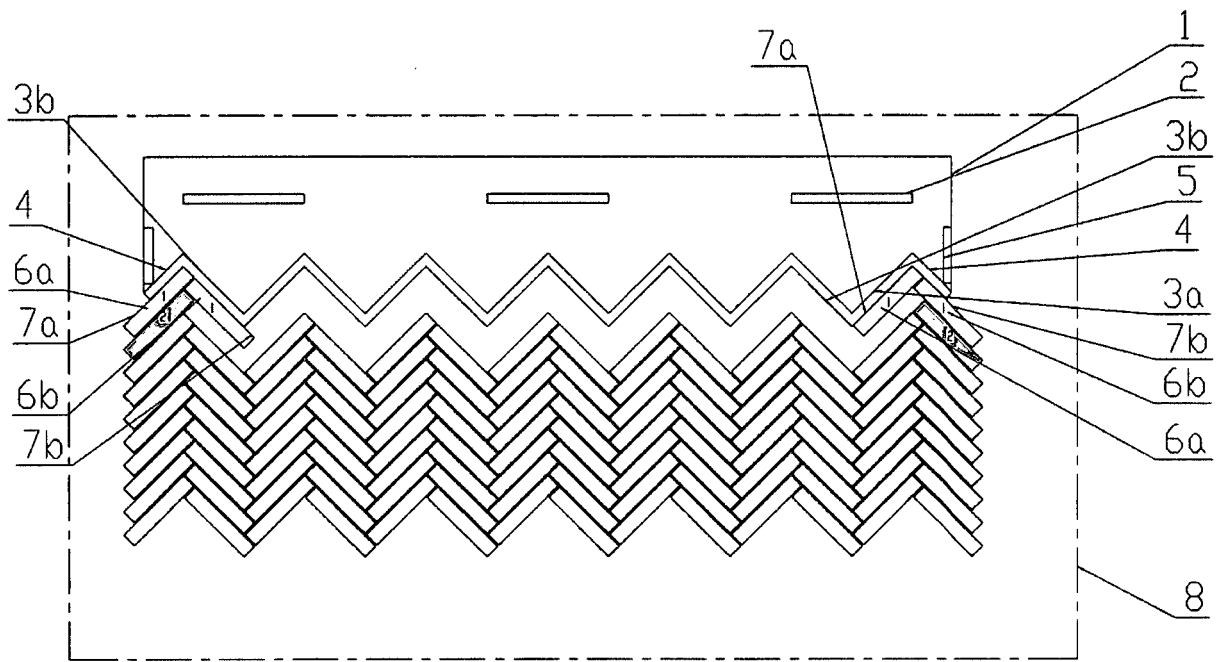


Fig. 6c

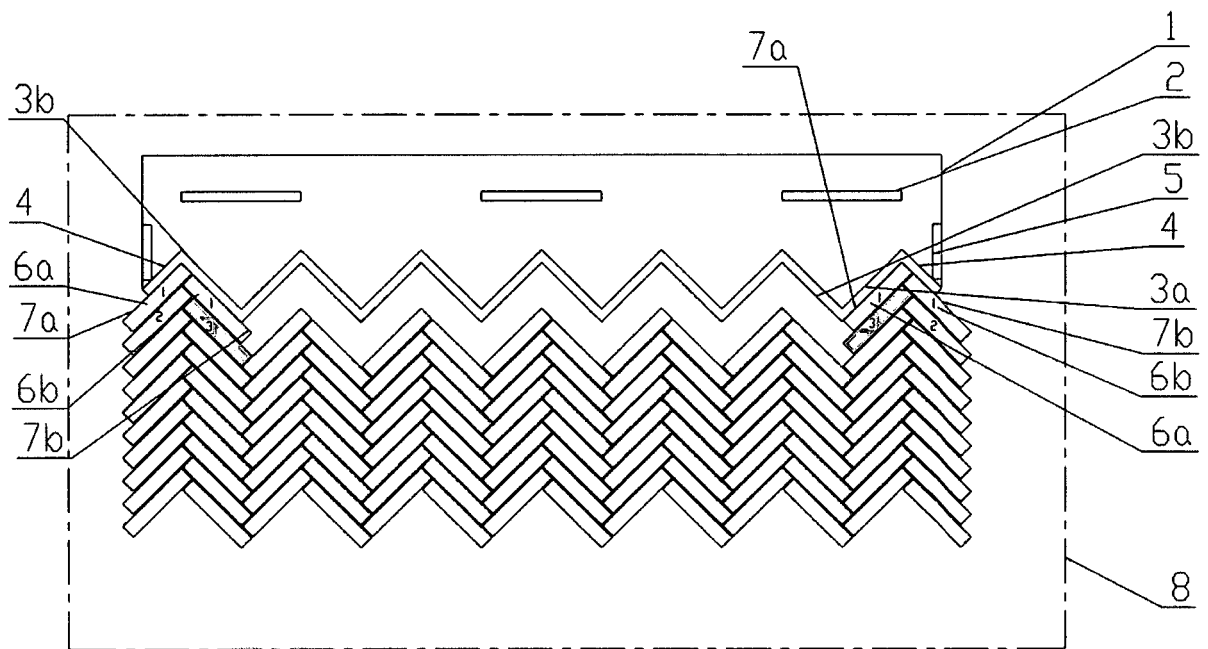


Fig. 6d

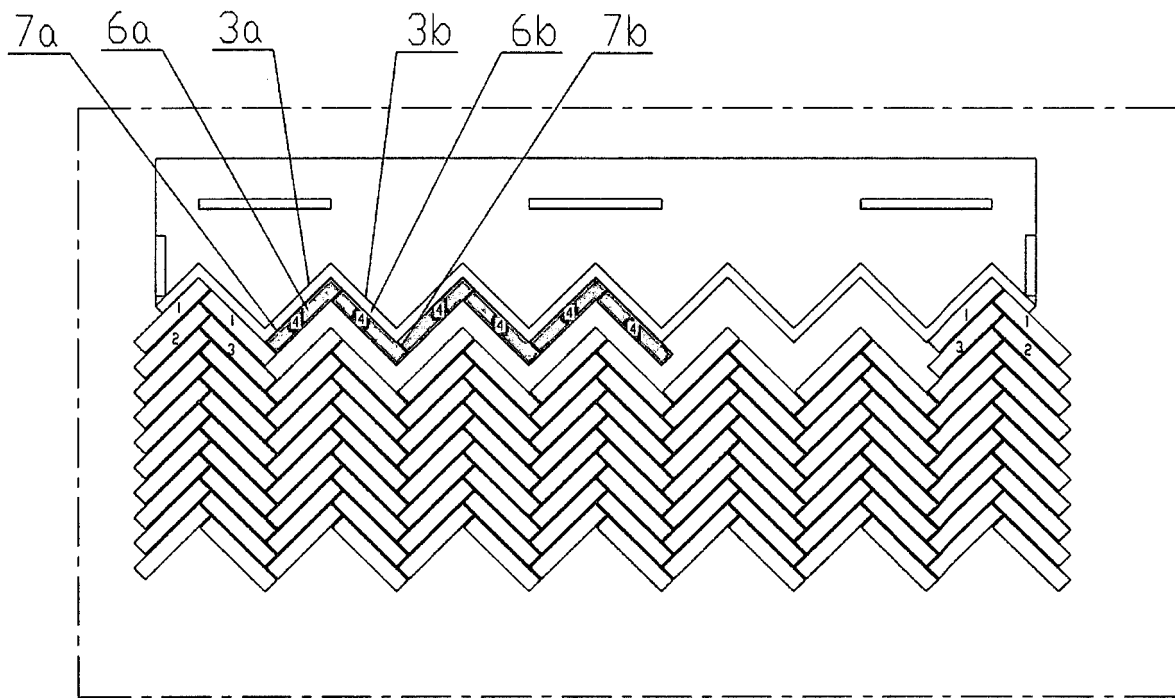


Fig. 6e

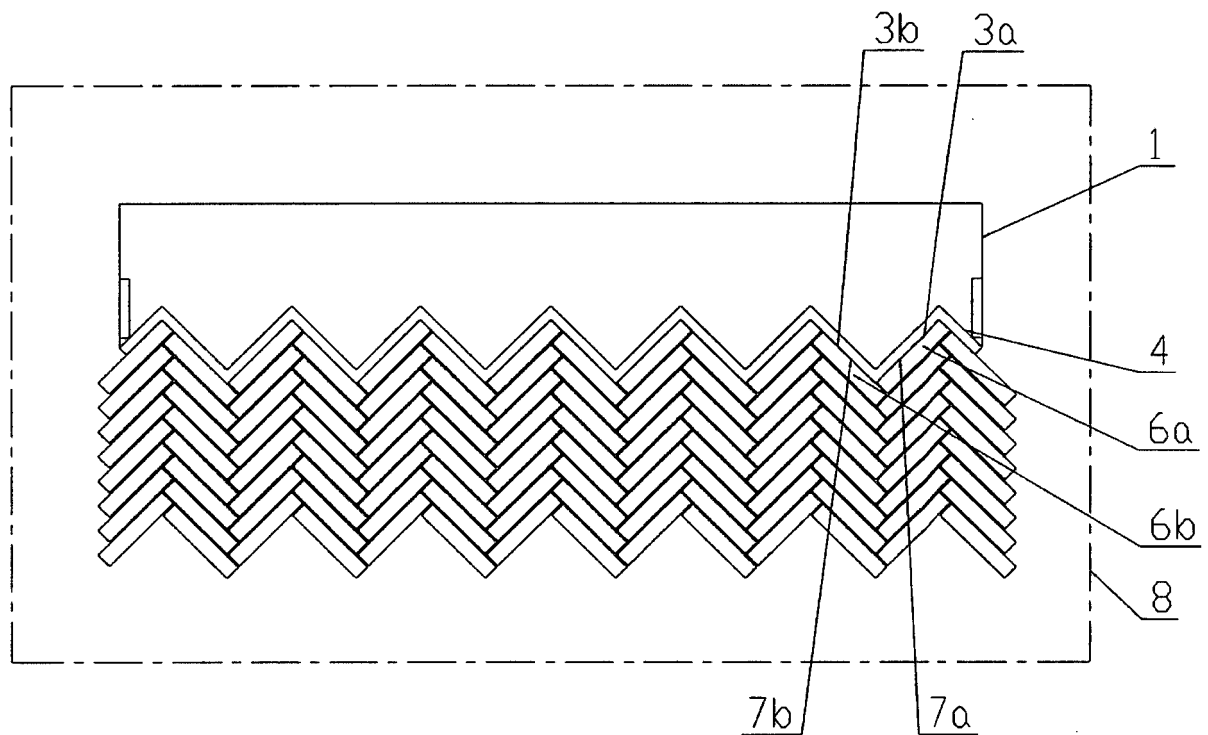


Fig. 7

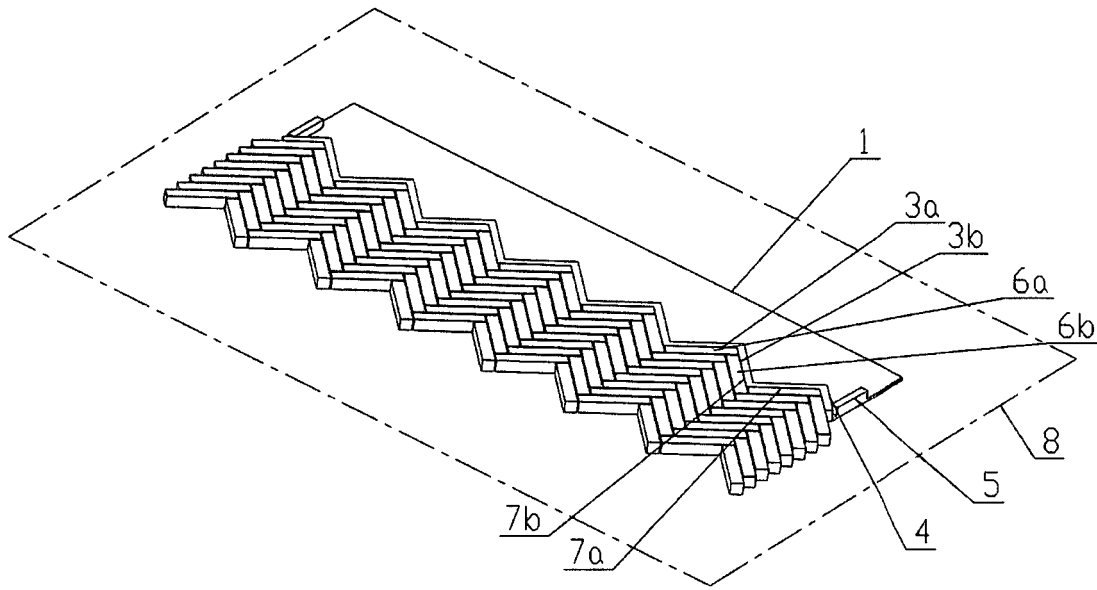


Fig. 8

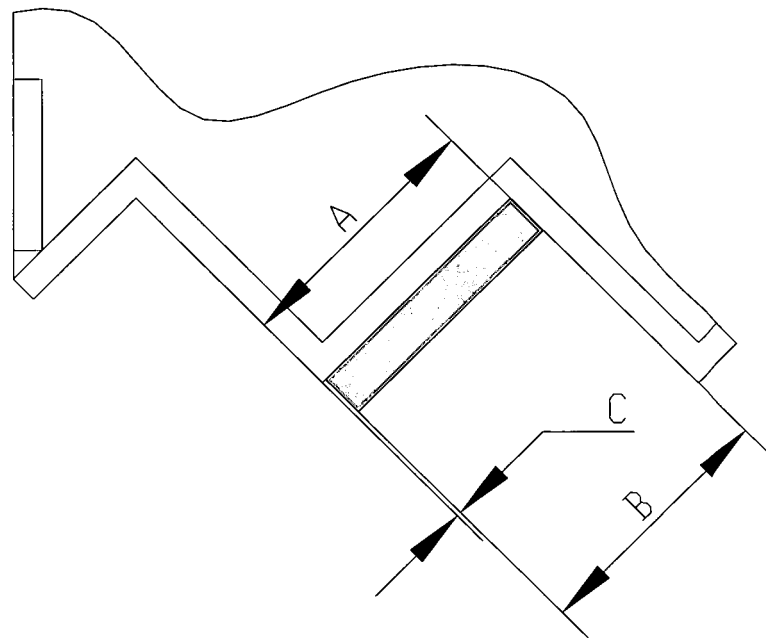


Fig. 9

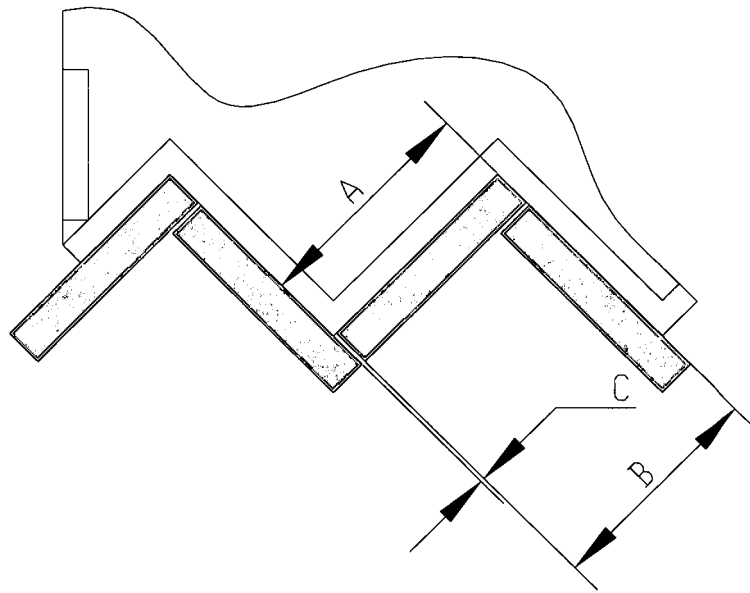


Fig. 10a

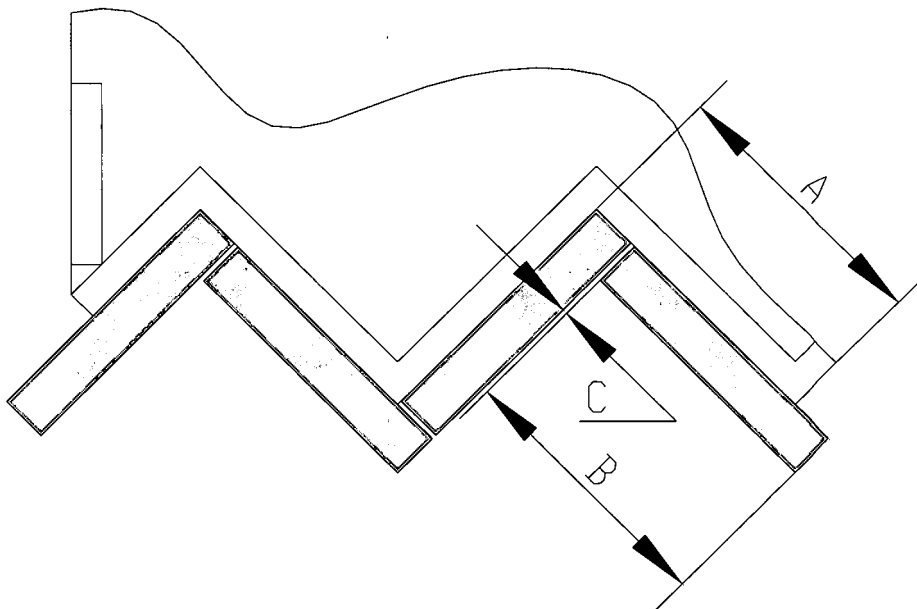


Fig. 10b



EUROPEAN SEARCH REPORT

 Application Number
 EP 18 20 5878

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			TECHNICAL FIELDS SEARCHED (IPC)
			E01C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 March 2019	Examiner Klein, A
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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06-03-2019

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