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(54) **FLOOR TILE**

(57) The subject of the invention is a floor tile (1) including a substrate piece (2) and a flooring layer (3), wherein the flooring layer (3) is connected to the substrate piece (2) and the substrate piece (2) includes shape locks (4) along its circumference for connection with the adjoining floor tiles (1'). The substrate piece (2)

further includes a frame (5) which projects from the substrate piece (2) above the plane of the substrate piece (2) in a direction perpendicular to the plane of the substrate piece (2) directly on its two adjacent edge sides and flanks the flooring layer (3) on its two adjacent edge sides.

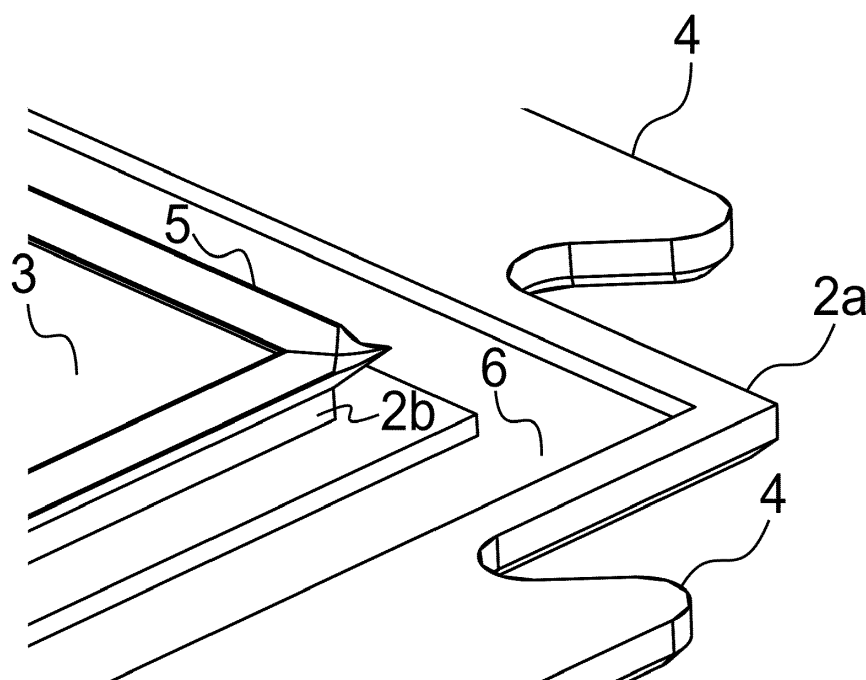


Fig. 5

Description

Technical Field

[0001] The invention relates to a floor tile provided with shape locks for interconnection and a frame for reliably securing the flooring in a substrate piece of the tile.

Background of the Invention

[0002] In the current state of the art, there are solutions for an interlocking pavement which is characterised by sufficient resistance and simultaneously by simple assembly. The individual tiles, most often made from PVC, include shape locks in the form of projections or pawls along the circumference for connection with another tile. These locks are shaped so that two adjoining locks form a gap of substantially the same, only inverted shape between each other. The shape lock of the second tile is inserted into this gap, which is thus simply and without use of special tools connected to the first tile.

[0003] Furthermore, tile solutions are known which consist of two basic portions - a substrate moulding which includes shape locks and the flooring itself which is placed and adhered to the substrate moulding. In this way it is possible to produce, for example, decorative tiles with different colours, patterns, or flooring finish, which can be chosen, for example, according to the environment in which they will be used.

[0004] An example of such solution with flooring adhered to the substrate moulding is described in the patent document EP2812509 B1. This document also describes that the substrate moulding is provided with a frame along its entire circumference for a more reliable fixation of the flooring. Inserting a piece of the flooring into the frame prevents undesirable displacement or kicking out of the flooring during walking or operation on the pavement. However, the design of the frame along the circumference of the substrate moulding is significantly disadvantageous, since in the connection three interstices total are formed near the point of connection of two adjoining tiles. The first interstice is situated on the first tile between its flooring and the frame. The second interstice is analogically situated on the second tile between its flooring and the frame. The third interstice is formed between the frames of the adjoining tiles.

[0005] Since each interstice represents a space into which debris can fall or be carried into, it would be desirable to come up with a solution which would minimize number of such interstices while still providing sufficient fixation of the flooring on the substrate moulding.

Summary of the Invention

[0006] The above mentioned drawbacks are to some extent eliminated by a floor tile including a substrate piece and a flooring layer, wherein the flooring layer is connected to the substrate piece and the substrate piece includes

shape locks along its circumference for connection with the adjoining floor tiles, the essence of which lies in the fact that the substrate piece further includes a frame, which projects from the substrate piece above the plane of the substrate piece in a direction perpendicular to the plane of the substrate piece on its two adjacent edge sides only and flanks the flooring layer on its two adjacent edge sides.

[0007] Because the substrate piece is provided with the frame on two of its adjacent sides only, it is possible to eliminate one of the interstices when the tiles are connected to each other. The frame of the particular tile also fulfils the function of the frame for two adjoining tiles on those sides which are not provided with their own frame. Conversely, the remaining two adjacent sides of the particular tile, which are not provided with the frame are abutted by frames of the other two adjoining tiles, thus also fulfilling the function of the frame for this particular tile. Therefore, the connection of two tiles is characterized by only two interstices. The first interstice is formed between the flooring layer of the first tile and the frame which is therefore common for both tiles and the second interstice is formed between the flooring layer of the second tile and this common frame. The third interstice which would be otherwise located between frame external side walls of the individual tiles is therefore eliminated, thus contributing to the better appearance of the laid interlocking pavement. By decreasing the number of the interstices, a better watertightness of connection is achieved and above all, the amount of dust or other debris which can fall or be carried into these interstices is limited. This makes the maintenance easier or less expensive and helps maintain a better visual appearance of the laid interlocking pavement.

[0008] The substrate piece preferably includes a lower portion of the substrate piece and an upper portion of the substrate piece, wherein the shape locks are arranged on the lower portion of the substrate piece and the frame is arranged on the upper portion of the substrate piece. Due to this design, the shape locks do not interfere with the upper portion of the substrate piece, and do not spatially limit the flooring layer inserted to the frame on the upper portion in any way. The lower portion is also not visible when looking at the laid pavement from above, which contributes to the good appearance.

[0009] A frame external side wall is preferably bevelled relative to the tile plane to form an extension beyond the upper portion of the substrate piece, wherein the frame ends are bevelled relative to the tile plane to match the upper portion of the substrate piece and the flooring layer abuts to the frame on two of its adjacent edge sides and it is bevelled relative to the tile plane on its two remaining adjacent edge sides to match the upper portion of the substrate piece, wherein the bevel angle of the flooring layer is the same as the bevel angle of the frame ends and frame external side wall. The bevel angle of the frame external side wall relative to the tile plane is preferably 20°.

[0010] By bevelling the frame external side wall, the frame ends and also the respective edge sides of the flooring layer, the individual tiles better abut to each other, and their connection is better sealed. The interstice formed between both bevelled areas is also bevelled so that the dust does not fall so deep into the interstice. The frame ends abut to the bevelled frame external side wall at the tile corner, thus ensuring a tighter connection of the tiles and integral appearance of the frame within the laid interlocking pavement.

[0011] The substrate piece preferably includes a groove along its two adjacent edge sides which are provided with the frame and includes a protrusion along its two remaining edge sides which has a shape complementary to the shape of the groove. The protrusion/groove system provides a reliable fixation of the adjoining tiles and tighter contact thereof.

[0012] The flooring layer is preferably adhered to the substrate piece. It is a simple and cheap way of attaching the flooring layer to the substrate piece. Adhesion of the flooring layer provides a sufficient fixation which together with the frame prevents undesirable displacement or kicking out the flooring during walking or operation on the pavement.

[0013] The substrate piece and the flooring layer are preferably made from PVC. As a result, the produced tiles are sufficiently light, resistant, and easy to maintain. In addition, the PVC material can be used in the standard injection moulding process. The PVC flooring layer also allows variability in terms of chosen properties, for example colour, pattern, or finish to correspond to the environment and the purpose of use thereof.

Description of Drawings

[0014] The summary of the invention is further described in exemplary embodiments which are described with reference to the accompanying drawings, in which:

Fig. 1 shows the floor tile of the present invention in the top view of the flooring layer,

Fig. 2 shows the floor tile of the present invention in the bottom view of the flooring layer,

Fig. 3a shows the substrate piece without the inserted flooring layer of the present invention in the side view of the edge side provided with the frame,

Fig. 3b shows the substrate piece with the inserted flooring layer of the present invention in the side view of the edge side provided with the frame,

Fig. 4a shows the substrate piece without the inserted flooring layer of the present invention in the side view of the edge side provided without the frame,

Fig. 4b shows the substrate piece with the inserted

flooring layer of the present invention in the side view of the edge side provided without the frame,

Fig. 5 shows a close-up view of the floor tile corner provided with the frame of the present invention in the perspective view, and

Fig. 6 shows the connection of the floor tile with the adjoining floor tile of the present invention.

Exemplary Embodiments of the Invention

[0015] The invention will be further described by way of exemplary embodiments with reference to respective drawings.

[0016] In the first exemplary embodiment of Fig. 1 to Fig. 6, a floor tile 1 of the present invention includes a substrate piece 2 and a flooring layer 3. The substrate piece 2 is preferably made by PVC injection moulding and is moulded as an integral piece which is shaped to include a lower portion 2a of the substrate piece 2 including shape locks 4 for connection with an adjoining floor tile 1' and an upper portion 2b of the substrate piece 2 for adhesion of the flooring layer 3.

[0017] In the first exemplary embodiment, the lower portion 2a of the substrate piece 2, shown in Fig. 2, has a flat shape with much smaller thickness than the two remaining dimensions thereof. These dimensions are preferably of the same length, i.e., the lower portion 2a of the substrate piece 2 has essentially a square shape, with the difference that it includes the shape locks 4 along its entire circumference, i.e., on all four edge sides. These shape locks 4 project from the lower portion 2a of the substrate piece 2 in the same plane and have a flat shape as well with the same thickness as the entire lower portion 2a of the substrate piece 2. The individual shape locks 4 have such shape and are placed in such distance that a gap is defined by two adjoining shape locks 4 on the same side of the lower portion 2a of the substrate piece 2, with shape complementary to the shape of the shape lock 4.

[0018] Both elements of the pair of shape lock 4 and gap are always located opposite to each other on the opposite edge sides of the lower portion 2a of the substrate piece 2. The shape locks 4' of the adjoining floor tile 1' can be precisely inserted into these gaps, thus connecting the particular floor tile 1 with the adjoining floor tile 1' as shown in Fig. 6. Thus, the adjoining floor tile 1' can be attached to all edge sides of the floor tile 1 by a simple manipulation and gradually create the floor covering for entire room or exterior area. In the first exemplary embodiment, each edge side of the lower portion 2a of the substrate piece 2 is provided with eight shape locks 4. Alternatively, each side is provided with different number of the shape locks 4, or the lower portion 2a of the substrate piece 2 has a different suitable shape, for example, rectangular, with the difference that the shape locks 4 are included along its entire circumference.

[0019] The upper portion 2b of the substrate piece 2 is located on the lower portion 2a of the substrate portion 2. In the first exemplary embodiment, the upper portion 2b of the substrate piece 2 has a flat shape with much smaller thickness than its two remaining dimensions. In addition, the shape and dimensions of the upper portion 2b of the substrate piece 2 are preferably the same as of the lower portion 2a of the substrate piece 2, with the difference that the upper portion 2b of the substrate piece 2 does not include the shape locks 4 and has square shape, or corresponding rectangular shape in the alternative embodiment. The upper portion 2b of the substrate piece 2 and the lower portion 2a of the substrate piece 2 are not placed directly on top of each other, but the upper portion 2b of the substrate piece 2 is shifted in the tile 1 plane, i.e., in the horizontal plane when laying down the tile 1 onto the horizontal area, diagonally compared to the lower portion 2a of the substrate piece 2. Due to this diagonal shift, the two adjacent edge sides of the lower portion 2a of the substrate piece 2 with the shape locks 4 are visible when looking at the substrate piece 2, shown in Fig. 1, from above, while the two remaining adjacent edge sides of the lower portion 2a of the substrate piece 2 with the shape locks 4 are not visible because they are entirely covered by the upper portion 2b of the substrate piece 2.

[0020] The frame 5 projects from the upper portion 2b of the substrate piece 2, particularly from the two of its adjacent edge sides only, in the perpendicular direction. More particularly, the frame 5 projects from these two adjacent edge sides which do not cover the two adjacent edge sides of the lower portion 2a of the substrate piece 2 with the shape locks 4 due to the mentioned diagonal shift in the top view of Fig. 1. The remaining two adjacent edge sides of the upper portion 2b of the substrate piece 2 are not provided with the frame 5, however the frame 5 ends which end at these remaining two adjacent edge sides are bevelled at an angle so as not to extend beyond the upper part 2b of the substrate piece 2, shown in Fig. 4a, or Fig. 4b. In the first exemplary embodiment, the frame 5 includes internal side wall which projects in the perpendicular direction from the upper portion 2b of the substrate piece 2. This perpendicular side wall thus represents a support or stop for the inserted flooring layer 3. The frame 5 further includes external side wall bevelled at an angle to extend beyond the upper portion 2b of the substrate piece 2, shown in Fig. 3a, Fig. 3b or Fig. 5. Both frame 5 side walls are connected on the top by the frame 5 upper wall which can be straight or bent.

[0021] The flooring layer 3 is adhered to the upper straight area of the upper portion 2b of the substrate piece 2 into the space for insertion of the flooring layer 3 defined by the frame 5 internal side walls and the remaining two adjacent edge sides of the upper portion 2b of the substrate piece 2. In the first exemplary embodiment, the flooring layer 3 has square shape, or corresponding rectangular shape in an alternative embodiment, and its dimensions correspond to those of said space for insertion

of the flooring layer 3. In the first exemplary embodiment, the flooring layer 3 thickness is chosen to be almost at the frame 5 height upon insertion thereof into the space for insertion of the flooring layer 3, see, for example, Fig. 3. In the preferred embodiment, the flooring layer 3 is made from PVC. Alternatively, the flooring layer 3 is made from different material, or have different colour or finish, according to the intended purpose or environment where it will be applied.

[0022] The lower portion 2a of the substrate piece 2 is provided with the shape locks 4 as well as a groove 6, shown in Fig. 1, Fig. 5, and Fig. 6, for the purpose of connection with the adjoining floor tile 1'. The groove 6 is made on the upper side of the lower portion 2a of the substrate piece 2, wherein it runs along the two adjacent edge sides of the lower portion 2a of the substrate piece 2 which are visible when looking at the floor tile 1 from above, shown in Fig. 1. A protrusion 7 which fits by its shape into the groove 6 is made along the two edge sides of the upper portion 2b of the substrate piece 2 which in turn are visible when looking at the floor tile 1 from below, shown in Fig. 2. In alternative embodiment, the arrangement of the groove 6 and the protrusion 7 is reversed, i.e., the protrusion 7 is made on the lower portion 2a of the substrate piece 2 and the groove 6 is made on the upper portion 2b of the substrate piece 2.

[0023] The flooring layer 3 is bevelled at an angle so as not to extend beyond the upper portion 2b of the substrate piece 2 on the two adjacent edge sides of the upper portion 2b of the substrate piece 2 which are not provided with the frame. The flooring layer 3 is bevelled at the same angle as the respective frame 5 ends, shown in the side view of Fig. 4b.

[0024] The connection of the floor tile 1 with the adjoining floor tile 1', shown in Fig. 6, is such that the shape locks 4' of the adjoining floor tile 1' are inserted into the gaps between the shape locks 4 of the given floor tile 1 so that the individual upper portions 2b of the substrate piece 2 also abut to each other by their side walls. In this connection, the protrusion 7' of the adjoining floor tile 1' is in the groove 6 and the bevelled side of the flooring layer 3' of the adjoining floor tile 1' abuts to the bevelled frame 5 external side wall. There is an interstice between the bevelled frame 5 external side wall and the bevelled side of the flooring layer 3' of the adjoining floor tile 1', at the point of connection of the floor tile 1 with the adjoining floor tile 1'. The bevel of the interstice is given by a bevel angle of the flooring layer 3' of the adjoining floor tile 1' and frame 5 external side wall. In the preferred embodiment, the bevel angle of the flooring layer 3' of the adjoining floor tile 1' and frame 5 external side wall relative to the tile 1 plane is 20°. Alternatively, the bevel angle of the flooring layer 3' of the adjoining floor tile 1' and frame 5 external side wall relative to the tile 1 plane is 45°, shown in Fig. 3a to Fig. 4b, however, the angle of 20° provides more bevelled, i.e., less open, interstice. Alternatively, the bevel angle of the flooring layer 3' of the adjoining floor tile 1' and the frame 5 external side wall

relative to the tile 1 plane is chosen differently if the angle is smaller than 90°, i.e., the interstice is not vertical when laying down the tile 1 on the horizontal plane, and if the production of the floor tile 1 of the present invention is not prevented or significantly impeded by this embodiment.

[0025] The interstice then runs in the direction perpendicular to the plane of the substrate piece 2, i.e., when laying down the tile 1 on the horizontal area it runs vertically, between respective side walls of the individual upper portions 2b of the substrate piece 2. The penetration of the debris deeper into the interstice is limited because the portion of the interstice is bevelled, as described above. In addition, because the frame 5 external side wall abuts to the flooring layer 3' of the adjoining floor tile 1' directly, and not its frame 5, the frame 5 of the floor tile 1 also fulfils the role of the frame 5 for the adjoining floor tile 1' on its side which is not provided with the frame 5' of the adjoining floor tile 1'. Similarly, the frame 5' of the adjoining floor tile 1' also fulfils the role of the frame 5 for the given floor tile 1 on its side which is not provided with its own frame 5. This minimizes the number of interstices into which the debris can fall or be carried into. Essentially, only one other interstice is formed between the flooring layer 3 and the frame 5 of the given floor tile 1 to which it abuts, in addition to the interstice between the bevelled frame 5 external side wall and the bevelled side of the flooring layer 3' of the adjoining floor tile 1'. This second interstice runs in the direction perpendicular to the substrate piece 2, shown, e.g., in Fig. 3b.

[0026] In the following section, the method of producing the floor tile 1 of the present invention is described for the sake of completeness.

[0027] The substrate piece 2 is made by plastic injection moulding, preferably PVC, wherein this technique is well known to the person skilled in the art. An injection moulding machine which includes a plasticizing unit and an injection mould is used for injection moulding. First, a plastic granulate is fed to the plasticizing unit by a hopper which is then heated in the plasticizing unit to the required injection temperature, usually in the range of 150-400 °C. The injection mould is connected to the plasticizing unit by a nozzle which includes two basic pieces which upon their connection form a cavity with shape corresponding to the shape of the substrate piece 2.

[0028] In addition to the two basic pieces used to mould the lower portion 2a of the substrate piece 2 and the upper portion 2b of the substrate piece 2, the injection mould for producing the substrate piece 2 of present invention also includes a third piece. Its shape resembles the letter L and is located between the two basic pieces of the injection mould, near the two adjacent edge sides of the substrate piece 2 on which the frame 5 will be formed. This third piece is essential to mould the groove 6 on the lower portion 2a of the substrate piece 2.

[0029] A molten plastic is injected into the injection mould by a screw piston under high pressure after heat-

ing, wherein this step is typically in the order of a few seconds. Subsequently, the moulding is cooled, typically in the order up to tens of seconds.

[0030] The mould is gradually disassembled after cooling time has elapsed, wherein firstly the first basic piece of the injection mould is removed, which is used to mould the upper portion 2b of the substrate piece 2 with the frame 5 which defines the space for insertion of the flooring layer 3. Then the third piece in the shape of the letter L is also removed, thus allowing the formed substrate piece 2 to be removed from the first basic piece of the injection mould, which is used to mould the lower portion 2a of the substrate piece 2. The disassembly of the injection mould is automatized and is implemented by moving the individual pieces of the injection mould away from the first basis piece of the injection mould. Also, the removal of the substrate piece 2 is preferably done automatically using a suitable machine.

[0031] An adhesive is applied on such formed substrate piece 2 in the space for insertion of the flooring layer 3 and subsequently, the flooring layer 3 is adhered so that it abuts to the frame 5. The two adjacent edge sides of the flooring layer 3 are milled at an angle which corresponds to the bevel angle of the frame 5 external side wall before adhesion of the flooring layer 3, or after adhesion. The adhered flooring layer 3 thus abuts to the frame 5 with its two unbevelled adjacent edge sides and does not extend beyond the upper portion 2b of the substrate piece 2 with its two adjacent edge sides.

Industrial Applicability

[0032] The floor tile solution described above can be used to form the floor coverings suitable for use in a variety of environments.

List of Reference Signs

[0033]

1	floor tile
1'	adjoining floor tile
2	substrate piece
2a	lower portion of the substrate piece
2b	upper portion of the substrate piece
3	flooring layer
3'	flooring layer of the adjoining floor tile
4	shape lock
4'	shape lock of the adjoining floor tile
5	frame
5'	frame of the adjoining floor tile
6	groove
6'	groove of the adjoining floor tile
7	protrusion
7'	protrusion of the adjoining floor tile

Claims

1. A floor tile (1) including a substrate piece (2) and a flooring layer (3), wherein the flooring layer (3) is connected to the substrate piece (2) and the substrate piece (2) includes shape locks (4) along its circumference for connection with the adjoining floor tiles (1') **characterized in that** the substrate piece (2) further includes a frame (5) which projects from the substrate piece (2) above a plane of the substrate piece (2) in a direction perpendicular to the plane of the substrate piece (2) on its two adjacent edge sides only and flanks the flooring layer (3) on its two adjacent edge sides.

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2. The floor tile (1) according to claim 1 **characterized in that** the substrate piece (2) includes a lower portion (2a) of the substrate piece (2) and an upper portion (2b) of the substrate piece (2), wherein the shape locks (4) are arranged on the lower portion (2a) of the substrate piece (2) and the frame (5) is arranged on the upper portion (2b) of the substrate piece (2).

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3. The floor tile (1) according to claim 2 **characterized in that** a frame (5) external side wall is bevelled relative to a tile (1) plane to form an extension beyond the upper portion (2b) of the substrate piece (2), wherein the frame (5) ends are bevelled relative to the tile (1) plane to match the upper portion (2b) of the substrate piece (2) and the flooring layer (3) abuts to the frame (5) on two of its adjacent edge sides and is bevelled relative to the tile (1) plane on two remaining adjacent edge sides to match the upper portion (2b) of the substrate piece (2), wherein the bevel angle of the flooring layer (3) is the same as the bevel angle of the frame (5) ends and the frame (5) external side wall.

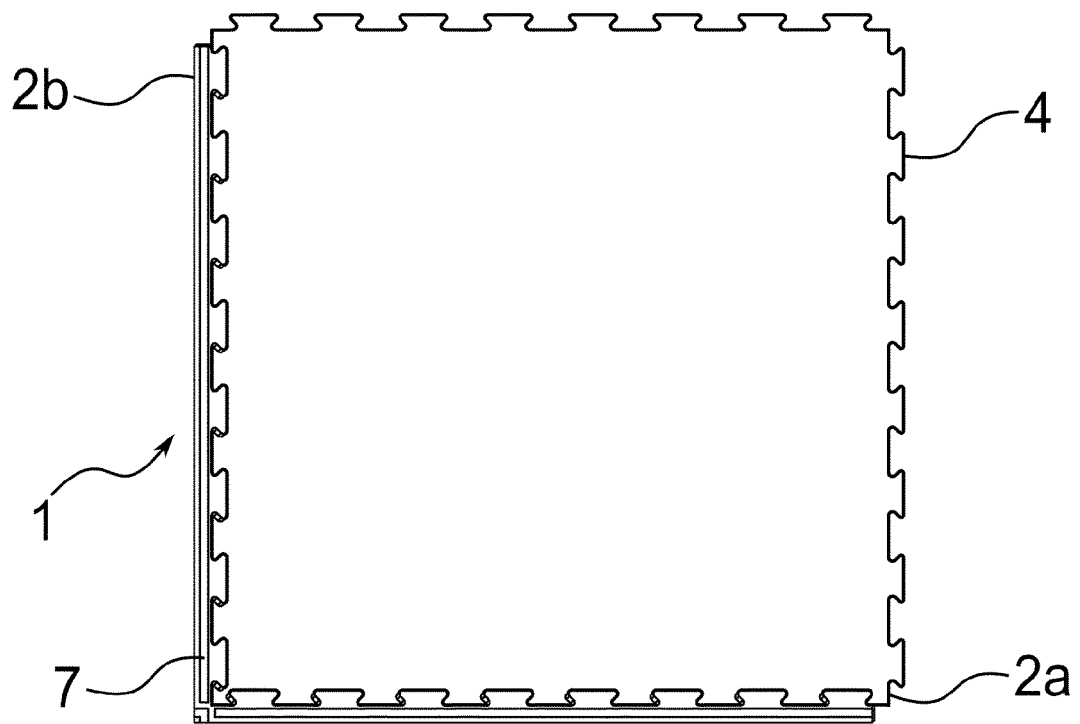
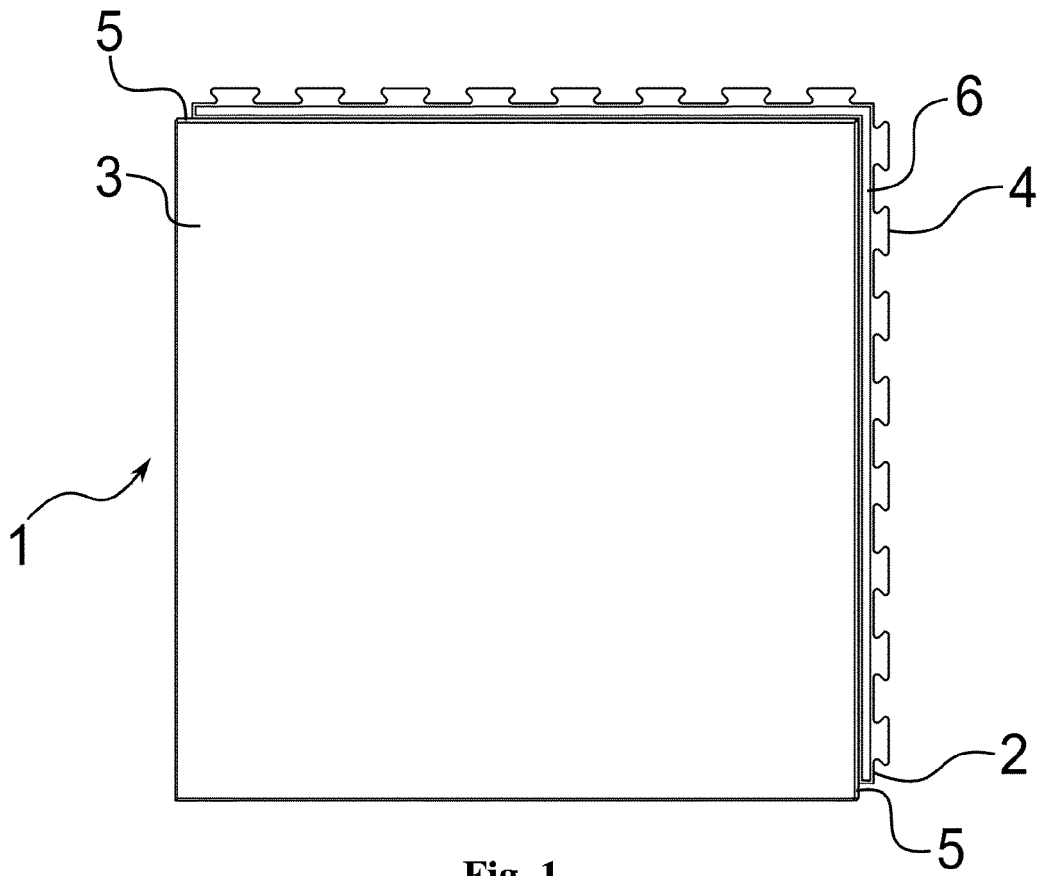
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4. The floor tile (1) according to claim 3 **characterized in that** the bevel angle of the frame (5) external side wall relative to the tile (1) plane is 20°.

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5. The floor tile (1) according to any preceding claim 1 to 4 **characterized in that** the substrate piece (2) includes a groove (6) along its two adjacent edge sides which are provided with the frame (5) and includes a protrusion (7) which shape is complementary to the shape of the groove (6) along its two remaining edge sides.

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6. The floor tile (1) according to any preceding claim 1 to 5 **characterized in that** the flooring layer (3) is adhered to the substrate piece (2).

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7. The floor tile (1) according to any preceding claim 1 to 6 **characterized in that** the substrate piece (2) and the flooring layer (3) are made from PVC.

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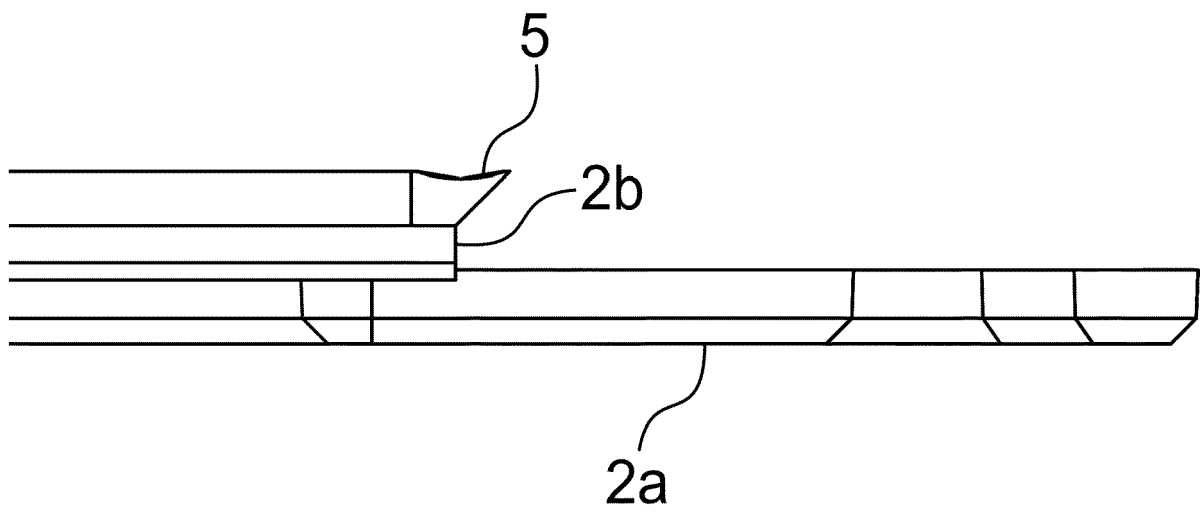


Fig. 3a

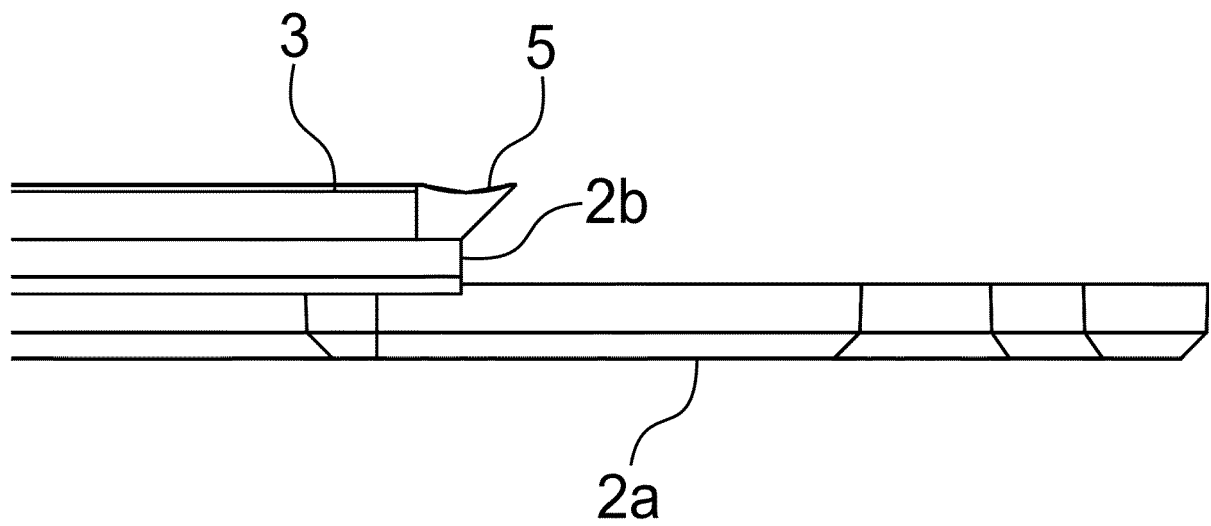


Fig. 3b

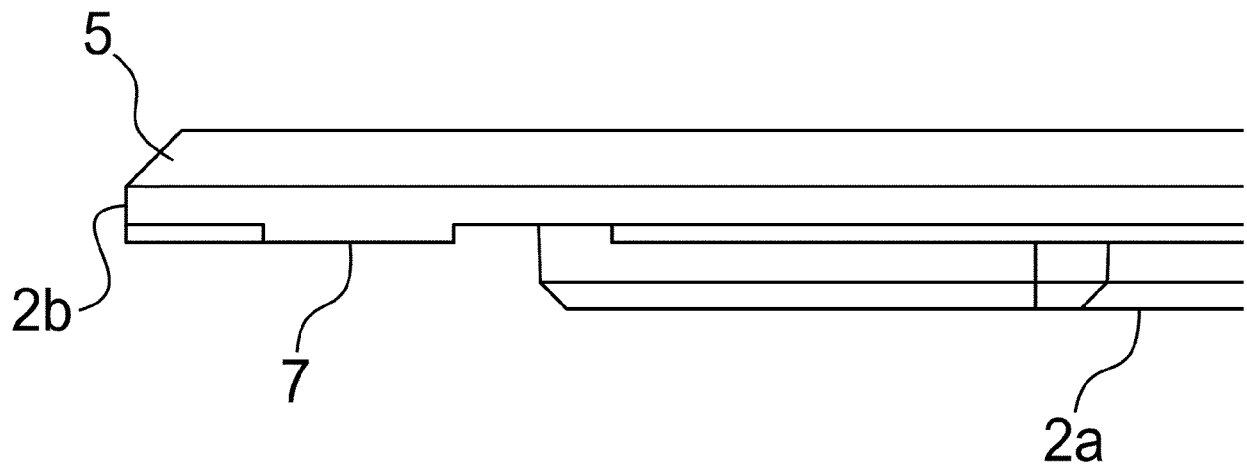


Fig. 4a

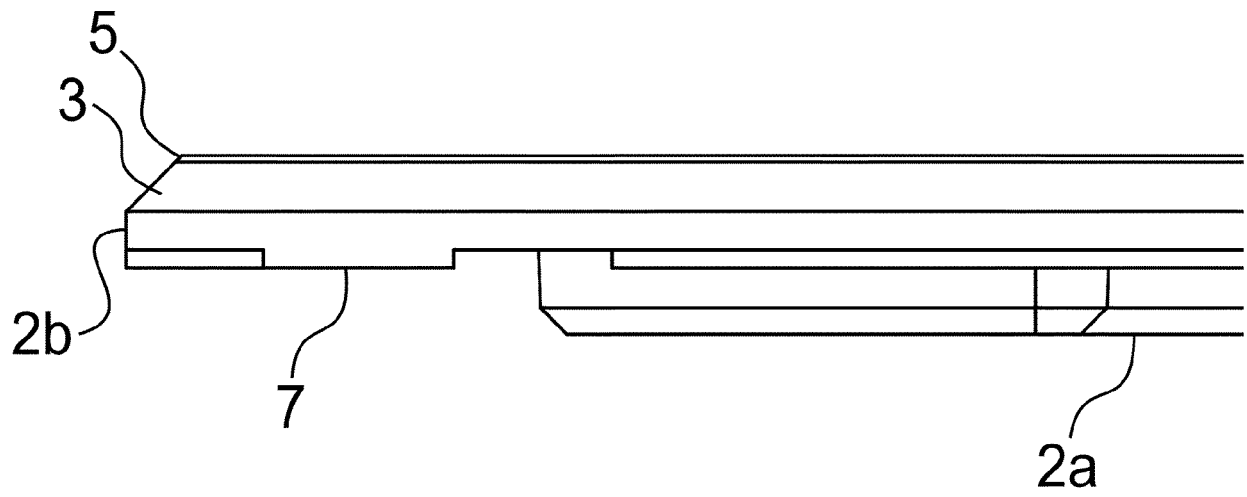


Fig. 4b

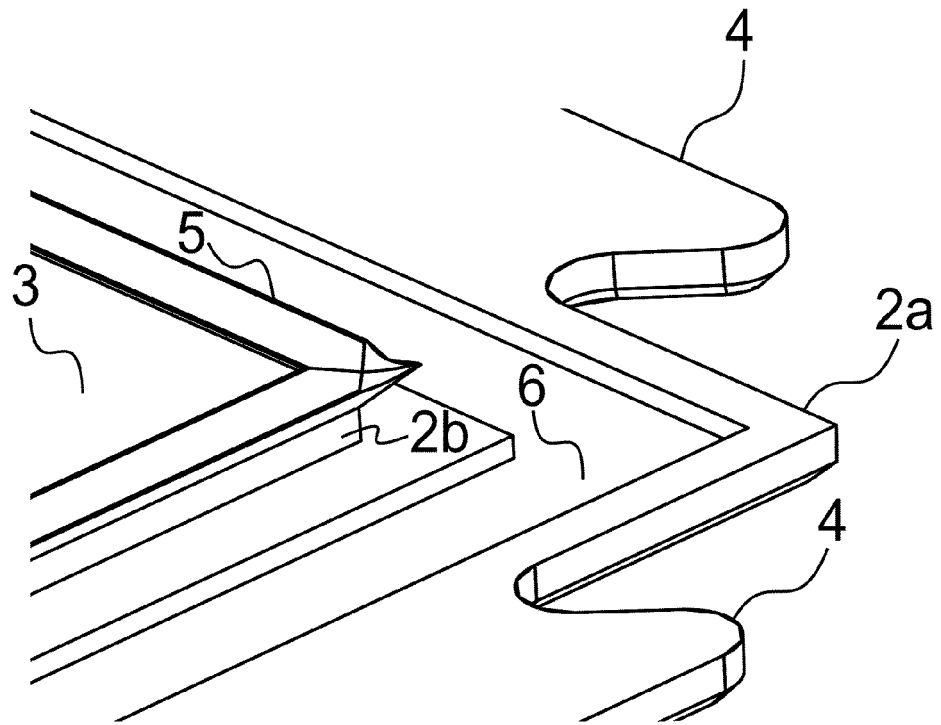


Fig. 5

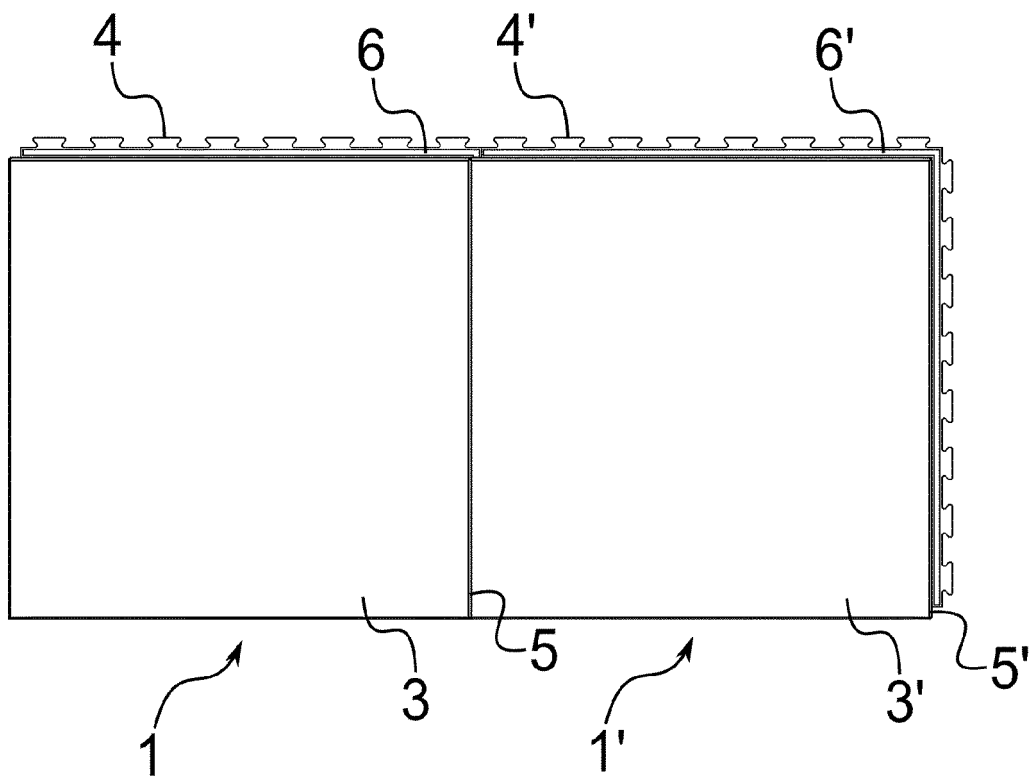


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 22 15 7884

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	WO 03/040491 A1 (MEYER HANS [DE]; DELLA PEPA TOMAS [DE]) 15 May 2003 (2003-05-15)	1-6	INV.
Y	* figure 11 *	7	E04F15/02
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Y	WO 2020/254192 A1 (NIAL HURSON [GB]) 24 December 2020 (2020-12-24)	7	
	* page 5, lines 1-3, 8-10 *		

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E04F
Place of search	Date of completion of the search	Examiner	
Munich	5 August 2022	Fournier, Thomas	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention	
X : particularly relevant if taken alone		E : earlier patent document, but published on, or	
Y : particularly relevant if combined with another document of the same category		after the filing date	
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P : intermediate document			
		& : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 15 7884

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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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REFERENCES CITED IN THE DESCRIPTION

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