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(54) **JOINING SYSTEM**

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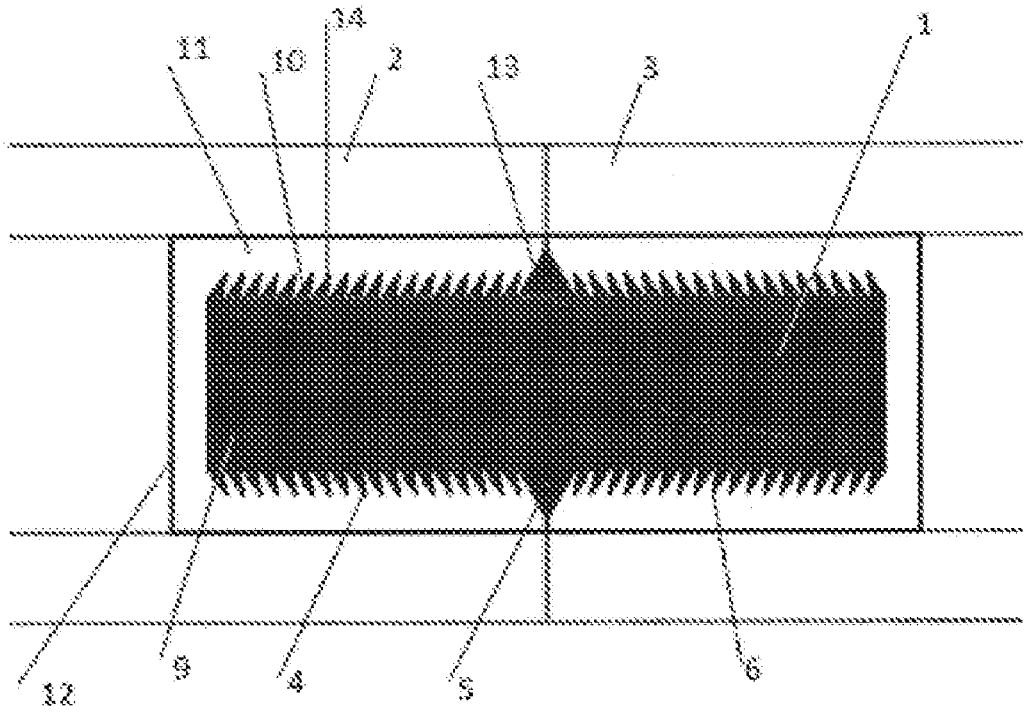
(57) **ABSTRACT**

The present invention relates to a joining system comprising a locking device (**1**) and a first element (**2**) and a second element (**3**) to be joined by the locking device (**1**). The locking device (**1**) comprises a first end section (**4**), a centre section (**5**), and a second end section (**6**). The first and second end sections (**4**, **6**) extend in opposite directions from the centre section (**5**), and at least one surface (**7**) of each of the first and second end sections (**4**, **6**) are provided with at least one barb (**8**). The barb (**8**) is angled in a direction towards the centre section (**5**). The first and second elements (**2**, **3**) are each provided with a groove (**9**). The locking device (**1**) is completely enclosed by the grooves (**9**) when the first and second elements (**2**, **3**) are joined by the locking device (**1**).



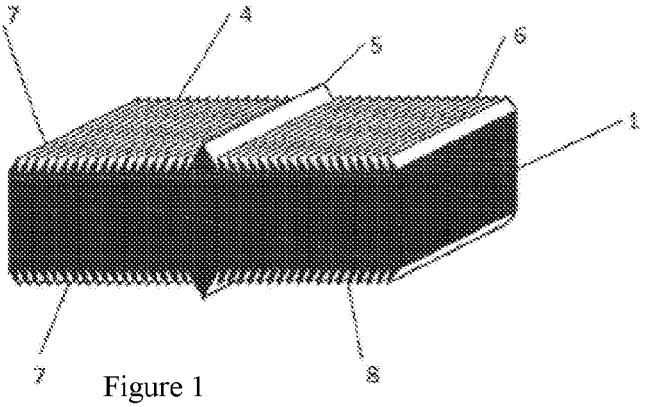


Figure 1

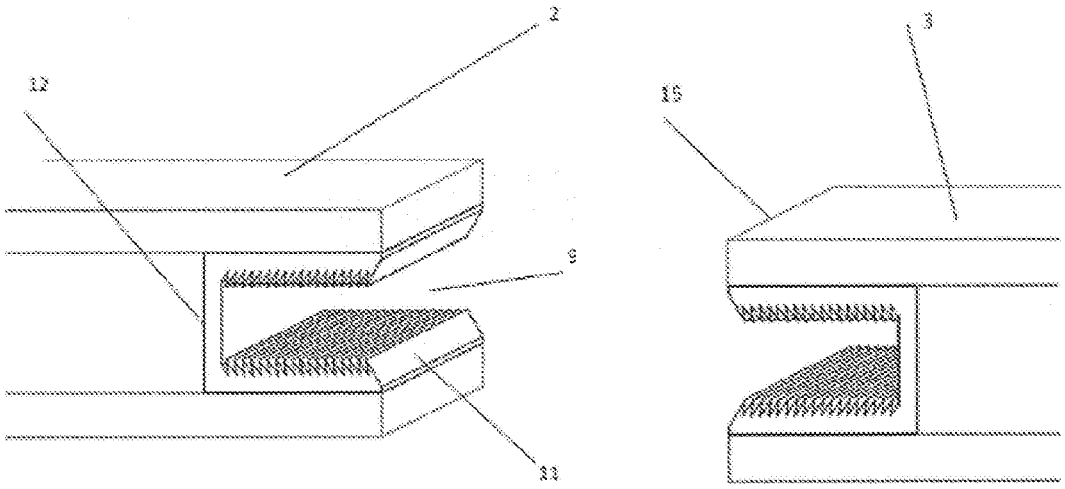


Figure 2

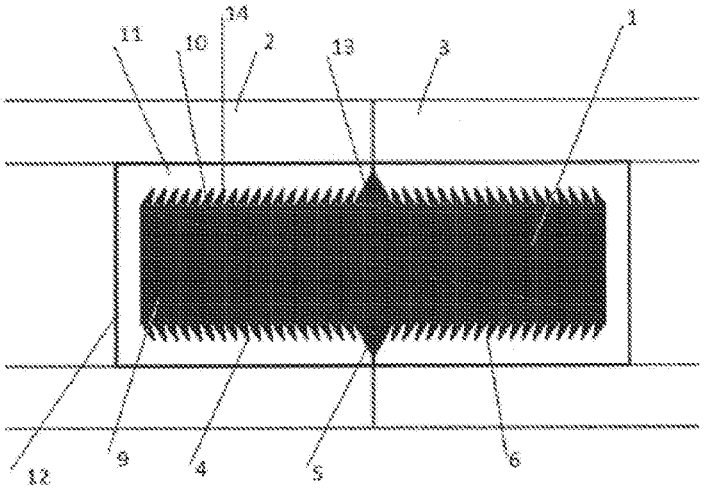


Figure 3

JOINING SYSTEM

FIELD OF THE INVENTION

[0001] The present invention relates to a joining system comprising a locking device and a first element and a second element to be joined by the locking device. The locking device comprises a first end section, a centre section, and a second end section. The first and second end sections extend in opposite directions from the centre section. At least one surface of each of the first and second end sections are provided with at least one barb, angled in a direction towards the centre section.

BACKGROUND OF THE INVENTION

[0002] It is well known in the art to join elements such as floor boards to each other when laying a floor. One common solution is to design the sides of the floor boards such that one short side and one long side of each floor board is provided with a groove and one short side and one long side of each floor board is provided with a corresponding tongue. When mounting the floor, each tongue of a floor board is fitted into a corresponding groove of another floor board.

[0003] The use of such asymmetrically designed floor boards leads to restrictions as regards which floor patterns can be laid, since each tongue needs to fit into a corresponding groove. Further, the groove and tongue configuration does not provide a lock between floor boards. Hence, some kind of additional fastening means such as glue has to be used when laying the floor. The use of additional fastening means is time consuming, and in the case of glue, messy and prevents the floor boards from being easily separated from each other and used again. Also, the groove and tongue configuration makes the actual surface of the floor boards wider than the surface which eventually is intended to walk upon, i.e. the tongues stick out from the sides of the boards. These tongues do not only take up extra space during storage and transport, but also leads to a need for sturdy packaging in order to avoid damaging the fragile tongues during handling of the floor board packages.

[0004] Document WO 2008/148198 discloses a fastener having two end portions each to be fitted into grooves in boards used for decking. The fastener is provided with barbs and the grooves are provided with recesses, such that the fastener can lock two adjacent boards to each other. The centre section of the fastener maintains a predetermined spacing between the boards, as is conventional for decking. Additional fastening means are used for attaching the boards to the foundation, by screwing a screw through a hole in the fastener and into the foundation.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to mitigate the above problems, and to provide a joining system which facilitates not only laying all kinds of floor patterns but also reuse of the floor boards/first and second elements.

[0006] According to a first aspect of the present invention, these objects are achieved by a joining system comprising a locking device and a first element and a second element to be joined by the locking device, the locking device comprising a first end section, a centre section, and a second end section, the first and second end sections extending in opposite directions from the centre section, at least one surface of each of the first and second end sections being provided with at least one barb, the barb being angled in a direction towards the centre section, the first and second elements each being provided with a groove, the locking device being completely enclosed by the grooves when the first and second elements are joined by the locking device.

[0007] The use of such a joining system facilitates easy, reliable, and invisible joining of elements such as floor boards. The floor boards can be laid in abutment to each other, which is normal procedure when laying floors (as opposed to when laying decking). Also, the joining system provides an exact and accurate assembly of the floor boards as seen in a direction perpendicular to the upper surface of the floor boards, i.e. the surface intended for standing on when the floor has been laid. This is essential when laying indoor floors since any difference in height between the individual floor boards is unacceptable. Further, there is no need for providing any of the floor boards with protrusions for engagement, such as e.g. a tongue, which not only makes the floor boards unnecessarily wide but also unnecessarily fragile. The groove may comprise at least one surface provided with at least one angled recess adapted for locking engagement with the barbs. Such angled recesses are necessary when the joining system is used in harder materials where the barbs themselves are not sufficiently strong in order to form a locking engagement with the elements.

[0008] In one embodiment, the locking device substantially has a shape of a right parallelepiped, which is an easy shape to manufacture.

[0009] The groove may be contained within a separate strip provided in a slot in the element. This embodiment facilitates using the joining system also for elements which are made of materials which are not sufficiently strong or durable to engage with the locking device directly.

[0010] In one embodiment, the strip is made of plastic, metal, wood, or wood based material.

[0011] Further, the centre section may comprise a protrusion which extends in a direction perpendicular to the surface. Such a protrusion facilitates the steering of the locking device such that it automatically is placed in the correct position in relation to the surrounding elements.

[0012] The protrusion may be shaped as a ridge, the ridge comprising two straight surface portions extending at an angle away from the surface of the centre section and towards each other such that they have a common peak at the very centre of the locking device. Such a shape is especially well-suited for such steering of the placement of the locking device.

[0013] In one embodiment, a plurality of locking devices is arranged spaced apart from one another along a ribbon. This facilitates simple insertion of the locking devices into the groove of the element at a correct distance from each other.

[0014] The first and second elements may be floor boards.

[0015] In one embodiment, the groove is provided along a peripheral edge of the floor boards.

[0016] In a further embodiment, the slot is provided along a peripheral edge of the floor boards.

[0017] The configuration of the peripheral edges may be substantially the same for the floor boards, which facilitates laying any kind of desired pattern of floor boards since any edge of each floor board may be joined to any other edge of the adjacent floor boards. This is especially an advantage when using laminate floor boards, since the floor boards may be rotated 180° during laying such that the upper surface, i.e. the side having a pre-printed laminate pattern, of the floor

board still is directed upwards but the pre-printed laminate pattern is rotated in relation to the initial position of the floor boards. This makes the laminated surface pattern twice as large as usual, i.e. the pre-printed pattern need be repeated on the same floor only half as many times as usual.

[0018] The groove and/or slot may be provided along all peripheral edges of the floor boards.

[0019] According to a second aspect of the present invention, these objects are achieved by a method of joining a first and a second element using a locking device, comprising the steps of fitting a first end section of the locking device into a groove in the first element, and fitting a second end section of the locking device into a groove in the second element, where after the locking device is in locking engagement with the grooves such that the first and second elements are completely enclosed by the grooves.

[0020] According to a third aspect of the present invention, these objects are achieved by a floor comprising such a joining system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] This and other aspects of the present invention will now be described in more detail, with reference to the appended drawings showing a currently preferred embodiment of the invention.

[0022] FIG. **1** shows a perspective view of a locking device according to the present invention.

[0023] FIG. **2** shows a perspective view of first and second elements according to the present invention.

[0024] FIG. **3** shows a side view of an embodiment of the joining system according to the present invention.

DETAILED DESCRIPTION

[0025] FIG. **1** shows a joining system comprising a locking device **1** and first and second elements **2**, **3** to be joined by the locking device **1**.

[0026] The locking device **1** has a first end section **4**, a centre section **5**, and a second end section **6**, where the first and second end sections **4**, **6** extend in opposite directions from the centre section **5**. In a preferred embodiment, the locking device **1** has substantially the shape of a right parallelepiped. I.e., the locking device **1** is shaped as a right-angled block having six sides. Two first opposing sides have a mutually identical shape while the adjacent two, second opposing sides also have a mutually identical shape. The shape of the second opposing sides could be identical to that of the first opposing sides. However, it could also be different in terms of dimensions. The remaining two third opposing sides of the block can also be described as the short ends of the block. The block preferably has an elongated shape.

[0027] However, the shape of the locking device **1** need not be that of a right parallelepiped. The locking device **1** could e.g. be tapered in the direction towards each short side such that the centre section **5** of the locking device is thicker than its short ends, i.e. the far end of each end section **4**, **6**, in a direction which is perpendicular to the above mentioned first opposing sides.

[0028] Further, the locking device could, as mentioned above, be tapered in the direction towards each short side, but in a direction which is perpendicular to the third opposing sides.

[0029] First, second, and third opposing sides are explained in more detail below, with reference to a floor board.

[0030] The locking device could also be substantially cylindrical, circular, cubical, or have any other shape which is found to be suitable.

[0031] The first and second elements **2**, **3** are preferably floor boards, but could nevertheless be any other kind of objects such as parts for furniture, hanging systems, or any other objects which need to be securely and easily joined to each other. For the sake of simplicity, the first and second elements **2**, **3** are defined as floor boards in the embodiments below.

[0032] In the embodiment where the first and second elements **2**, **3** are floor boards, this means that the first opposing sides of the block are parallel with the upper surface of the floor boards, i.e. the surface intended for standing on when the floor has been laid. Hence, the second and third opposing sides are perpendicular to both each other and the first opposing sides. This assumption is true for the embodiments described below.

[0033] One example of a floor board configuration is a conventional three layered board, but could however also be a two layered board, a solid single layer board, or any other suitably configured type of board. The floor board **2**, **3** is preferably a wooden floor board.

[0034] The floor boards **2**, **3** are substantially identically configured, i.e. not only their general appearance, such as being e.g. rectangular, square, or triangular in shape, but also the peripheral edges are substantially identical for all floor boards. However, the system can be used not only for all edges **15** of a floor board, such that the board has identical peripheral edges **15**, but also for just one edge **15** of a floor board while the remaining edges of the floor board have a different configuration.

[0035] The locking device **1** is provided with at least one barb **8** on at least one side (i.e. surface) **7** of the first and second end sections **4**, **6**. Preferably, both above mentioned first opposing sides of the first end section are each provided with a number of barbs **8**. Preferably, the second end section **6** has the same configuration of barbs **8** as that described for the first end section **4**, only reverse as regards the direction of the barbs **8** as described further below. However, the second end section **6** could also have a configuration completely different from that of the first end section **4**.

[0036] The barbs **8** are preferably angled in a direction towards the centre section **5** of the locking device **1**, i.e. the barbs **8** on the first end section **4** are angled in a direction towards the centre section **5** and the second end section **6**, and the reverse. The barbs **8** together form a saw-toothed shape, when seen from the side of the locking device **1**, i.e. from a direction perpendicular to the above mentioned second opposing sides of the block.

[0037] The first and second elements, i.e. the floor boards **2**, **3**, are each provided with a groove **9**. The groove **9** itself may, when the groove **9** is provided in a softer material such as chipboard, have smooth surfaces. The barbs **8** of the locking device **1** dig into the softer chipboard material, hence causing a locking engagement with the chipboard.

[0038] However, the groove **9** may also, as shown in FIG. **2**, comprise at least one surface **10** provided with at least one angled recess **14** adapted for locking engagement with the barbs **8** on at least one side of the first opposing sides of the locking device **1**. I.e., the surface is in abutment with, and in the same plane as, the first opposing sides of the corresponding end section when the floor boards **2**, **3** are joined by the locking device **1**. In order to achieve the locking engagement,

the barbs **8** on the locking device **1** are angled as mentioned above, i.e. in the direction towards the centre section **5** of the locking device **1** and against the insertion direction for the locking device **1** into the groove **9**. Hence, the recesses **14** in the grooves **9** of the floor boards **2**, **3** are angled in a corresponding way, i.e. in a direction towards the bottom, most inner part of the groove **9** and along the insertion direction for the locking device **1** into the groove **9**.

[0039] Further, when the floor boards **2**, **3** are joined by the locking device **1** the locking device **1** is completely enclosed by the grooves **9**, as shown in FIG. **3**. I.e., the sides of each groove **9** are in abutment with the corresponding sides of the first or second end sections **4**, **6**, respectively, i.e. the two first opposing sides of the block and one of the third opposing sides.

[0040] The groove **9** in the floor boards may be provided with the recesses **14** directly on the surfaces of the groove **9**, i.e. by being incorporated into the components of the floor board **2**, **3**. However, the groove **9** may also be contained within a separate strip **11** provided in a slot **12** in the floor board **2**, **3**. In this case, "slot" refers to a milled out part of the floor board **2**, **3** into which the strip **11** is fitted, while "groove" refers to a milled out part in the strip **11** itself, the groove **9** still comprising the above discussed recesses **14** in the same way as discussed above.

[0041] The groove **9** and/or slot **12** may be provided by milling of e.g. the edge **15** of the floor board **2**, **3**, or by assembling the components of the floor board **2** ,**3** such that the groove/slot **9**, **12** is achieved during the assembly process, i.e. the pressing, of the floor board. The groove **9** and/or slot **12** may be provided along one or more, including all, peripheral edges **15** of the floor boards **2**, **3**.

[0042] The locking device **1** and the strip **11**, comprising the above mentioned groove **9**, is preferably made of plastic, metal, wood, or wood based material such as plywood or fibres.

[0043] The strip **11** has an inner shape which corresponds to that of the locking device **1**. When the locking device **1** is shaped as a right parallelepiped, the inside of the slot is preferably U-shaped. However, if the locking device **1** is tapered, the inside of the strip **11** should have a corresponding V-shape, and if the locking device **1** is cylindrical, the inside of the strip **11** needs to be cylindrical as well.

[0044] The outer shape of the strip **11** corresponds to that of the slot **12**. Usually, the slot **12** is U-shaped, which hence should be the case for the outer shape of the strip **11** as well. The strip **11** is arranged within the slot **12** in the floor board **2**, **3** such that the outer sides of the strip **11** are in abutment with the corresponding U-shaped sides of the slot. **12** The strip **11** may be fitted into the slot **12** during manufacture of the floor board **2**, **3** itself, i.e. when pressing the floor board **2**, **3**. However, the strip **11** could also be inserted into a slot **12** which has been milled into the edge **15** of a finished floor board **2**, **3**, as mentioned above. The strip **11** is preferably glued to the floor board **2**, **3**, regardless of the fitting method.

[0045] As shown in FIG. **3**, the centre section **5** of the locking device may be provided with a protrusion **13** which extends in a direction perpendicular to the surface **7** of the first and second end sections **4**, **6**. More exactly, in a direction perpendicular to the above mentioned first opposing sides of the block. In the embodiment where the first and second elements **2**, **3** are floor boards, this means in a direction perpendicular to the upper surface of the floor boards, i.e. the surface intended for standing on when the floor has been laid.

[0046] The protrusion **13** is preferably shaped as a ridge. The ridge **13** comprises two straight surface portions extending at an angle away from the surface of the centre section **5** and towards each other such that they have a common peak at the very centre of the locking device **1**, the centre being the centre of the locking device **1** in any direction. The protrusion **13** has a triangular shape, when seen from side of the locking device **1**, i.e. from a direction perpendicular to the above mentioned second opposing sides of the block.

[0047] The joining system may comprise a number of locking devices **1** arranged spaced apart from one another along a ribbon, such that a number of locking devices **1** can be easily inserted into the groove **9** of the floor boards at a correct distance from each other.

[0048] The joining system may also be a part of an underfloor heating system. In this case, each locking device **1** is made of a conductive material and is connected to the heating system.

[0049] The joining system is used by fitting a first end section **4** of the locking device **1** into a groove **9** in the first element **2** and fitting a second end section **6** of the locking device **1** into a groove **9** in the second element **3**. Hence, the locking device **1** is in locking engagement with the grooves **9** such that the first and second elements **2**, **3** are completely enclosed by the grooves **9**.

[0050] The person skilled in the art realizes that the present invention by no means is limited to the preferred embodiments described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

1. A joining system comprising a locking device (**1**) and a first element (**2**) and a second element (**3**) to be joined by said locking device (**1**), said locking device (**1**) comprising

a first end section (**4**), a centre section (**5**), and a second end section (**6**)

said first and second end sections (**4**, **6**) extending in opposite directions from said centre section (**5**),

at least one surface (**7**) of each of said first and second end sections (**4**, **6**) being provided with at least one barb (**8**), said barb (**8**) being angled in a direction towards said centre section (**5**),

said first and second elements (**2**, **3**) each being provided with a groove (**9**),

said locking device (**1**) being completely enclosed by said grooves (**9**) when said first and second elements (**2**, **3**) are joined by said locking device (**1**).

2. A joining system according to claim **1**, wherein said groove (**9**) comprises at least one surface (**10**) provided with at least one angled recess (**14**) adapted for locking engagement with said barbs (**8**).

3. A joining system according to claim **1** or **2**, wherein said locking device (**1**) substantially has a shape of a right parallelepiped.

4. A joining system according to any of claims **1**-**3**, wherein said groove (**9**) is contained within a separate strip (**11**) provided in a slot (**12**) in said element (**2**, **3**).

5. A joining system according to claim **4**, wherein said strip (**11**) and/or locking device (**1**) is made of plastic, metal, wood, or wood based material.

6. A joining system according to any of the previous claims, wherein said centre section (**5**) comprises a protrusion (**13**) which extends in a direction perpendicular to said surface (**7**).

7. A joining system according to claim **6**, wherein said protrusion (**13**) is shaped as a ridge, said ridge comprising two straight surface portions extending at an angle away from the surface of said centre section (**5**) and towards each other such that they have a common peak at the very centre of said locking device (**1**).

8. A joining system according to any of the previous claims, wherein a plurality of locking devices (**1**) is arranged spaced apart from one another along a ribbon.

9. A joining system according to any of the previous claims, wherein said first and second elements (**2**, **3**) are floor boards.

10. A joining system according to claim **9**, wherein said groove (**9**) is provided along a peripheral edge (**15**) of said floor boards (**2**, **3**).

11. A joining system according to claim **9**, wherein said slot (**12**) is provided along a peripheral edge (**15**) of said floor boards (**2**, **3**).

12. A joining system according to claim **10** or **11**, wherein the configuration of said peripheral edges (**15**) is substantially the same for said floor boards (**2**, **3**).

13. A joining system according to claim **10** or **11**, wherein said groove (**9**) and/or slot (**12**) is provided along all peripheral edges (**15**) of said floor boards. (**2**, **3**)

14. Method of joining a first and a second element (**2**, **3**) using a locking device (**1**), comprising the steps of:

fitting a first end section (**4**) of said locking device (**1**) into a groove (**9**) in said first element (**2**), and

fitting a second end section (**6**) of said locking device (**1**) into a groove (**9**) in said second element (**3**),

where after said locking device (**1**) is in locking engagement with said grooves (**9**) such that said first and second elements (**2**, **3**) are completely enclosed by said grooves (**9**).

15. A floor comprising a joining system according to any of claims **1**-**13**.

* * * * *