



## Description

**[0001]** The invention refers to a floorboard which is connectable with at least another floorboard of the same type, as well as to a method of connecting two floorboards.

**[0002]** Such floorboards are well known in the prior art for laminate flooring, laminate parquet, laminate floor coverings, etc. In recent years floor boards have been developed that have mechanical locking means on opposing sides that lock the joint edges of two neighboring floorboards horizontally, as well as vertically without the application of glue. The respective mechanical locking elements of the floorboards is carried out by angling down a locking tongue into a respective groove. The remaining joint edges of such a floorboard also have mechanical locking elements that, however, only lock the respective joint edges in a horizontal direction. These joint edges are, however, held down by the neighboring rows of installed floorboards. There is, however, the disadvantage that on the first and last row of an installed floor, the floorboards are not held down on their side adjacent to the wall. As a result, the floorboards might jump up when a load or force is placed on them. In order to overcome this problem, one might additionally glue the respective mechanical locking elements that only block the joint edges in a horizontal direction.

**[0003]** Fig. 7 shows such a conventional locking means that has a first locking element at the joint edge 8a of a first floorboard 1 a and a second complementary mechanical locking element extending along a second joint edge 8b of the floorboard 1 b. The first locking element has a projection 13 with a horizontally extending locking element 14 which engages into a locking groove 12 of the second locking element. The locking extension 14 and groove 12, as well as the abutting surfaces 3 of the respective locking elements lock the joint edges 8a, 8b in a horizontal direction only. As a result, as can be seen from Fig. 7 glue is applied between the abutting surfaces 3. As can be seen from Fig. 8, which shows an enlarged portion of the applied glue, after a period of time the glue forms crystals and breaks vertically. As a result, the floorboards are no longer vertically locked and might again jump up when a load or force is placed on them.

**[0004]** It is therefore the object of the present invention to provide a floorboard that is locked in the horizontal direction by mechanical locking elements, and that is also reliably and securely locked in the vertical direction by the application of glue, and moreover to provide a respective method of connecting such floorboards.

**[0005]** This object is met by the features of claims 1 and 13.

**[0006]** According to the present invention, the first mechanical locking element of a first floorboard is adapted to engage with a second complementary locking element of a second floorboard so that the joint edges of two juxtaposed floorboards can be connected. The ex-

pression complementary locking element means that the first mechanical locking element is of a type to cooperate with and to engage the second locking element. Since the recessed portions are formed to face each other, a gap is formed between the abutment surfaces and the glue may be distributed between the opposing walls of the recessed portions of the first and second mechanical locking elements. The filled recessed portions prevent the glue from cracking in a vertical direction when, e.g., shear forces work thereon. Moreover, the glue in the recessed portion also works as a mechanical locking between the respective joint edges of two floorboards when, e.g., a load or force works thereon. As a result, a reliable and permanent strong vertical connection is guaranteed between two floorboards.

**[0007]** According to the present invention, the recessed portion is provided in the abutment surface that extends from the mating line of the two joint edges of the respective floorboards. Such abutment surfaces have a basically vertical extension. It is preferable that the recess portions extend at least partially along the respective mechanical locking element. The longitudinal extension of the recessed portion improves the strength of the connection.

**[0008]** Preferably the recessed portion extends over more than 10% of the height  $h$  of the floorboard 1. The lateral extension of the recessed portion in the abutment surface lies in the range of 5% to 20% of the height of the floorboard 1. Such dimensions provide an improved mechanical strength.

**[0009]** Preferably the recessed portion has an irregular shape, which means that at least two edges extend longitudinally in the direction of the joint edge. Due to this complex shape, the mechanical locking of the glue in the recessed portion is even more improved. The recessed portions of the first and second mechanical locking elements may have a different cross-sectional shape.

**[0010]** According to a preferred embodiment, the first mechanical locking element has a resilient lateral projection projecting from said abutment surface, said projection including a vertical locking extension and said second mechanical locking element having a locking groove which is open to the bottom surface of the floorboard. As a result, the vertical locking extension may engage the locking groove to horizontally lock the two joint edges in a locked state of the first and second mechanical locking elements of different floorboards.

**[0011]** It is preferable if the first and second mechanical locking elements are positioned on opposing joint edges. The inventive floorboard may comprise four joint edges, and third and fourth mechanical locking elements extending at least partially along the third and fourth joint edges. The third and fourth mechanical locking elements may be formed to vertically and horizontally lock the third and fourth joint edges.

**[0012]** According to the preferred embodiment the third locking element has basically the same cross-

tional shape as the first locking element.

**[0013]** According to the inventive method, while applying glue to at least one joint edge of the respective floorboard, the recessed portions will fill themselves with glue due to capillary force. Due to the inventive recessed portions more glue can be applied as compared to prior floorboards. Since the floorboards have a locking element that only locks the joint edges of two floorboards in a horizontal direction, the floorboards may be moved to one another in the same plane without any angling. Since the recessed portions are completely filled with glue, a stronger and more reliable connection in the vertical direction is achieved.

**[0014]** The invention will now be described with reference to the following figures:

Fig. 1 shows a partial cross-section view of two locked floorboards according to the present invention.

Fig. 2 shows the floorboard of Fig. 1, wherein glue is filled within the recessed portion 2.

Fig. 3 shows a further partial cross-sectional view of two inventive locked floorboards.

Fig. 4 shows the floorboards of Fig. 3, wherein glue is filled within the recessed portion.

Fig. 5 shows a top view of several locked floorboards according to the present invention.

Fig. 6a and 6b are partial cross-sections of two locking elements for vertical and horizontal locking.

Fig. 7 shows a partial cross-section of a conventional floorboard.

Fig. 8 is an enlarged view of the circle portion K of Fig. 7.

**[0015]** Figs. 1 and 2 show a partial cross-section of two connected floorboards 1 a, 1 b according to the present invention. As can be seen from Figs. 1 and 2 in combination with Fig. 5, the two floorboards 1 a, 1 b are connected along their respective joint edges 8a,8b with the help of the first mechanical locking element 4 and the second complementary mechanical locking element 5. In this respect, complementary means that the first and second mechanical locking elements are adapted to engage each other to provide horizontal locking. The floorboards are, e.g., formed of HDF or MDF boards. As can be seen from Figs. 1 and 2 the respective mechanical locking elements are integrally formed with the floorboard. The locking element 4 includes a resilient projection 13 with a vertical locking extension 14. As described before in this case, the locking element 4 is integrally formed with the floorboard 1 a, but it is also possible that

the resilient projection 13 is formed from a different material than the core of the board and is premounted, e.g., in the factory to the floorboard. The locking element 4 also includes an abutment surface 3a which longitudinal extends along the joint edge 8a of the floorboard 1 a. As can be seen from Fig. 1, the abutment surface 3a abuts with the respective abutment surface 3b of floorboard 1 b. The second complementary mechanical locking element 5 further includes a locking groove 12 and a projecting tongue 11. The locking groove 12 is opened to the bottom surface of the floorboard. While connecting floorboards 1 a and 1 b, the locking element 5 is, e.g., moved in direction A toward locking element 4 while the two floorboards 1 a and 1 b lie in one plane. The lower part of tongue 11 thereby presses on the bevelled portion of the locking extension 14 and presses the resilient projection 13 in the direction of arrow B. Finally, the lower part of tongue 11 is moved over the locking extension 14, such that the locking extension snaps into the locking groove 12 thereby providing horizontal locking. It is also possible to connect the locking elements 5,4 by a simple drop down motion of the locking element 5 in direction of arrow B into locking element 4. The projection 13 in this case does not need to be resilient.

**[0016]** Since the mechanical locking elements only lock the joint edges 8a,8b of the floorboards 1 a, 1 b in the horizontal direction, there is the necessity of additional glue 16. For this reason, the abutment surfaces 3a,3b each show a laterally recessed portion 2a,2b which at least partially face each other. In this embodiment, the abutment surfaces 3a,3b have a basically vertical extension. The abutment surfaces extend from the mating line 9 of the joint edges 8b of the respective floorboards 1 a, 1 b. The recessed portions have a height K1,K2 of about 2mm to 3mm, when the height h of the floorboard lies in the range between 6mm to 11 mm, which means that the recessed portion extends over more than 10% of the height h of the floorboard 1. The recessed portions 2a,2b have a width D<sub>1</sub>,D<sub>2</sub> of about 1,5mm to 3mm, which means that the lateral extension of the recessed portion in one abutment surface 3a,3b lies in the range between 5% and 20% of the height of the floorboard 1. The recessed portions of the respective abutment surfaces 3a,3b face at least to such an extent that both recessed portions 2a,2b together form a hollow portion 2 which may accommodate the glue 16, as can be seen from Fig. 2. The recessed portions 2a, 2b in this case have a complex irregular shape which means that they are many sided and have at least two edges 15 extending longitudinal in the direction of the respective joint edge 8a,8b. As a result, the direction of the crystallization of the glue 16 is irregular and, as a result, the glue 16 will not break in the vertical direction in a plane including the abutment surfaces 3a,3b, as in the prior art due to vertical shear forces. Moreover, the glue 16, as can be seen from Fig. 2, also serves as a mechanical block in the vertical direction when, for example, a load or a force is placed on them. As a result,

strong and reliable locking is guaranteed in the horizontal and vertical directions of floorboards 1a, 1b.

**[0017]** The floorboards as shown in Figs. 3 and 4 basically correspond to those as discussed in combination with Figs. 1 and 2 with the exception that the recessed portion 2a has a larger lateral extension compared to that as shown in Figs. 1 and 2. In Figs. 3 and 4 the two recessed portions 2a,2b have a completely different cross-sectional shape which even more increases the mechanical strength.

**[0018]** In Figs. 1 to 4, even if not completely shown, the first and second locking elements 4,5 are positioned on opposing joint edges 8a,8b as can also be seen from Fig. 5. In this case, the floorboards may comprise four joint edges 8a,8b,8c,8d as can be seen from Fig. 5, which means that the floorboard also includes third and fourth mechanical locking elements 6,7 which extend at least partially along the third and fourth joint edges 8c, 8d.

**[0019]** The locking elements 4,5 at least partially extend along the joint edges 8a,8b of the floorboards 1a, 1b.

**[0020]** The third and fourth mechanical locking elements are formed to vertically and horizontally lock the third and fourth joint edges 8c,8d as shown in combination with Figs. 6a,6b. Fig. 6b shows the connection of two floorboards 1 a',1 b (also see Fig. 5), wherein a tongue 11 of locking element 6 is moved into a respective groove 10 of locking element 7 by angling the tongue 11 down into groove 10. As can be seen from Fig. 6a, in a connected state of the two floorboards, the tongue 11 lies in the groove 10 and the locking extension 14 of the projection 13 lies in the locking groove 12 such that the two floorboards 1 a, 1 b are locked in the vertical direction by the abutting surfaces of tongue 11 and groove 10 and in the horizontal direction by the locking extension 14 which lie in the locking groove 12.

**[0021]** While comparing Figs. 3 and 4 with Figs. 6a, 6b, the cross-sectional shape of the recessed portion 2a may have basically the same shape as the groove of the female locking element 7 of a locking system that is adapted to vertically and mechanically lock two joint edges of two floorboards 1. In this case, as can be seen from Fig. 3, the abutments surface 3a has a recess portion 2a which cross-sectional shape has a first recess portion 2a<sub>1</sub> followed by a second recess portion 2a<sub>2</sub> which adjoins the first recess portion 2a<sub>1</sub> and which has an upper wall 20 which extends basically parallel to the upper surface of the floorboard 1 a and an adjoining side surface 21 which basically extends perpendicularly to the upper surface 20 and an inclined lower wall 22 that extend to the projection 13. This means that the first locking element 4 of the inventive floorboard may have the same cross-sectional shape as the third female locking element 7 which facilitates the manufacturing of the floorboards and which also enables that, e.g., the joint edges 8c' of the locking mechanism 7 may be connected with joint edges 8b of the locking mechanism 5, which

means that the floorboards may be turned over 90° while being laid.

**[0022]** While, e.g., laying the floor with the inventive floorboards, the joint edges 8c' of floorboard 1 b' and the locking edges 8d of floorboard 1 a, are first connected by angling the locking element 6 into locking element 7 thereby locking the two joint edges 8c' and 8d in the vertical and horizontal directions. Once the longitudinal sides of the respective floorboards are already connected also the joint edges 8a,8b of floorboards 1 a and 1 b will have to be connected. Since the joint edges 8c' and 8d are already connected the floorboard 1 a has to be pushed in direction A to joint edge 8a of the floorboard 1 b, wherein the floorboards 1 a, 1 b are lying in the same plane. Before, however, moving the floorboard 1 a in direction A glue 16 is applied to at least one of the joint edges 8a,8b in such an amount that the recess portions 2a,2b may be completely filled with glue 16. While applying the glue to at least one of the joint edges, the recessed portions will fill themselves with glue. After the glue is applied, the floorboard 1 a is moved as described above such that the first and second mechanical locking elements, e.g., engage as disclosed in combination with Figs. 1 and 2. The glue then dries and forms a stable vertical connection between floorboards 1 a and 1 b. As discussed, joint edge 8a of floorboard 1 b and joint edge 8b of floorboard 1a may also be connected by a simple drop down motion. In this case, the joint edges 8c' of floorboard 1 b' and the locking edges 8d of floorboard 1 a are connected by angling the locking element 6 into locking element 7 in a position where the joint edge 8a of floorboard 1 b and the joint edge 8b of floorboard 1 a face each other such that the locking element 5 can simply be dropped into locking element 4 in direction B (see Fig. 1). The glue is applied to at least one of the joint edges 8a,8b before they are mounted, as discussed above.

## Claims

1. Floorboard which is connectable with at least another floorboard of the same type, including:

a first locking element (4) expanding at least partially along a first joint edge (8a) of said floorboard (1a);

a second complementary mechanical locking element (5), extending at least partially along a second joint edge (8b) of a said floorboard (1 b);

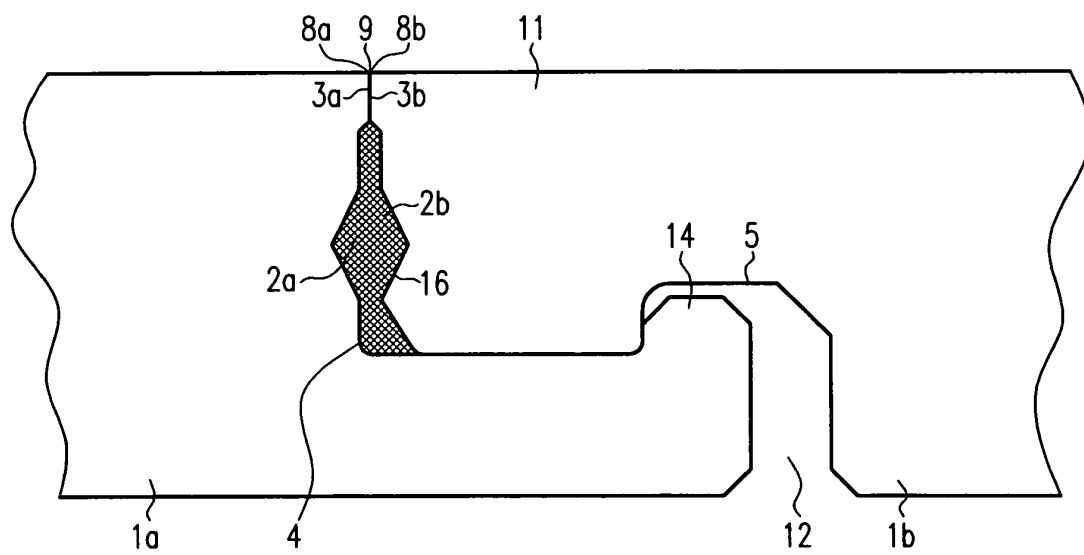
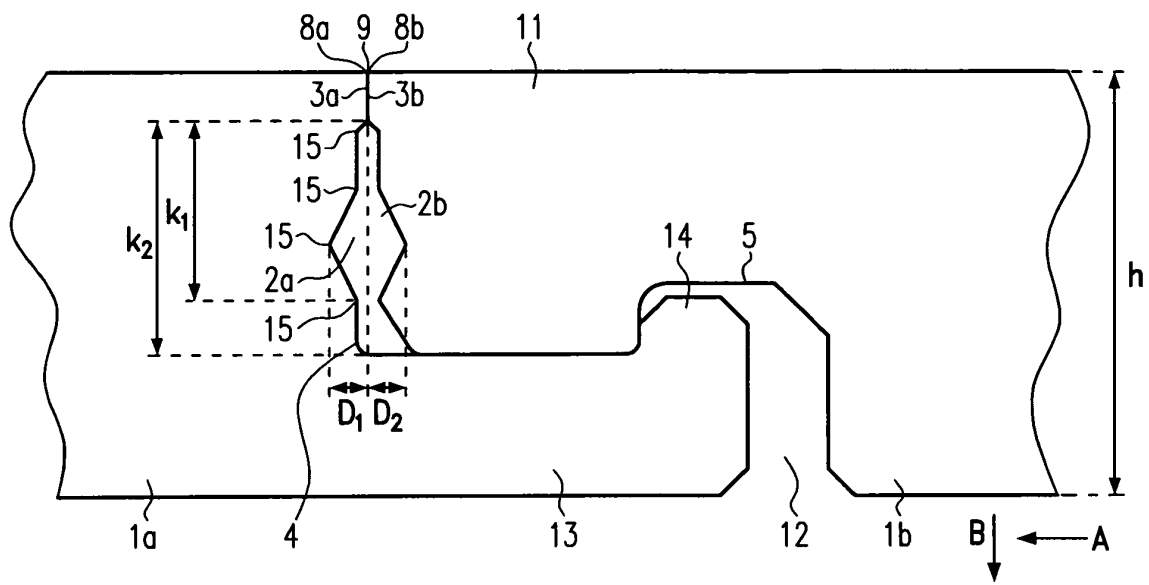
said first and second mechanical locking elements (4,5) are formed to only horizontally lock their respective joint edges (8a,8b) with respective joint edges (8b) of another floorboard (1 b), and include respective abutment surfaces (3a, 3b),

said abutment surfaces (3a,3b) each have a laterally recessed portion (2a,2b) for accommodating glue (16), and are formed to at least partially face a recessed portion (2a,2b) of another floorboard (1 b) when the first and second mechanical locking elements are in a locked state.

2. Floorboard according to claim 1, wherein the abutment surfaces (3a,3b) extend from the mating line (9) of the joint edges (8a,8b) of the respective floorboards (1a,1b).
3. Floor board according to claim 1 or 2, wherein the abutment surfaces (3a,3b) have a basically vertical extension.
4. Floorboard according to at least one of claims 1 to 3, wherein the recessed portion (2a,2b) longitudinally extend at least partially along the respective mechanical locking element (4,5).
5. Floorboard according to at least one of claims 1 to 4, wherein the recessed portion (2a,2b) extends over more than 10% of the height (h) of the floorboard (1)
6. Floorboard according to at least one of claims 1 to 5, wherein the lateral extension of the recessed portion in one abutment surface (3a,3b) lies in the range of 5% and 20% of the height of the floorboard (1).
7. Floorboard according to one of claims 1 to 6, wherein the recessed portion (2a,2b) has an irregular shape having at least two edges (15) extending longitudinally in the direction of the joint edge (8a,8b).
8. Floorboard according to at least one of claims 1 to 7, wherein the recessed portions (2a,2b) of the first and second mechanical locking element have a different cross-sectional shape.
9. Floorboard according to at least one of claims 1 to 8, wherein the first mechanical locking element (4) has a resilient lateral projection (13), projecting from said abutment surface (3a), said projection (13) including a vertical locking extension 14, and said second mechanical locking element (5) having a locking groove (12), which is open to the bottom surface of the floorboard (1b).
10. Floorboard according to at least one of claims 1 to 9, wherein said first and second mechanical locking elements (4,5) are position on opposing joint edges (8a,8b).
11. Floorboard according to at least one of claims 1 or 10, wherein said floorboard (1) comprises four joint

edges (8a,8b,8c,8d), and third and fourth mechanical locking (6,7) elements extending at least partially along the third and fourth joint edges (8c,8d).

- 5 12. Floorboard according to claim 11, wherein said fourth and third mechanical locking elements (6,7) are formed to vertically and horizontally lock the third and fourth joint edges (8c,8d).
- 10 13. Floorboard of claim 15, wherein the third mechanical locking element (7) has basically the same cross-sectional shape as the first locking element (4).
- 15 14. Method of connecting two floorboards (1), comprising the steps of:
  - providing a first and second floorboard (1a, 1b), wherein a first mechanical locking element (4) extends at least partially along a first joint edge (8a) of said first floorboard and a second complementary mechanical locking element (5) extends at least partially along a second joint edge (8b) of said second floorboard, wherein said first and second mechanically locking elements cooperate to only horizontally lock the first and second joint edges (8a,8b) of the respective floor boards (1a,1b), and having respective abutment surfaces (3a,3b), said abutment surfaces each have a recessed portion for accommodating glue, said recessed portions facing each other when said first and second mechanical locking elements are in a locked state,
  - applying glue to at least one of the joint edges (8a,8b) of the first or second floorboard (1 a, 1 b) in an amount that the recessed portions are completely filled with glue (16), and
  - connecting the first and second mechanical locking elements (4,5) by moving at least one of the floorboards to the other while said floorboards are lying in one plane.



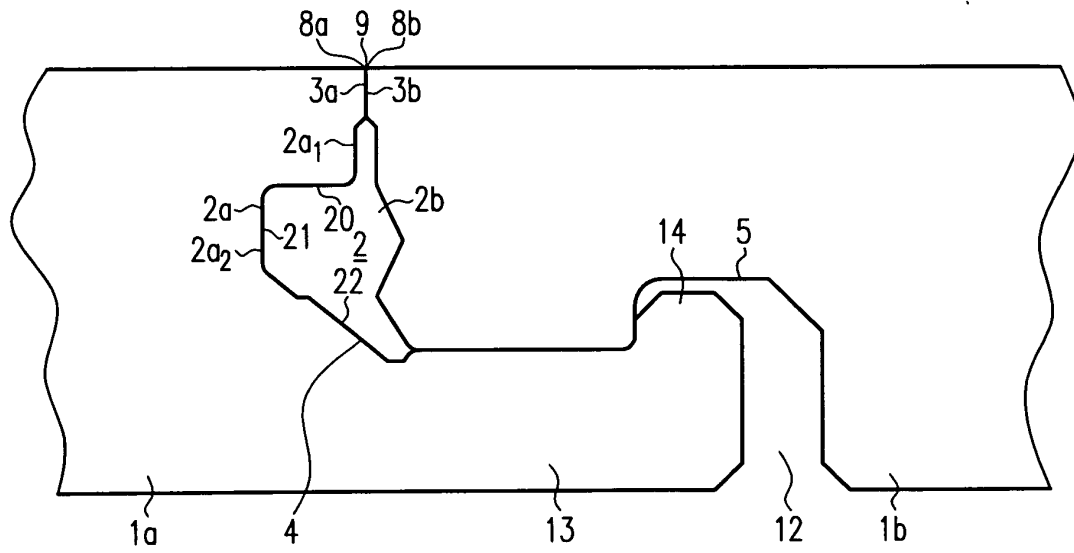


Fig.3

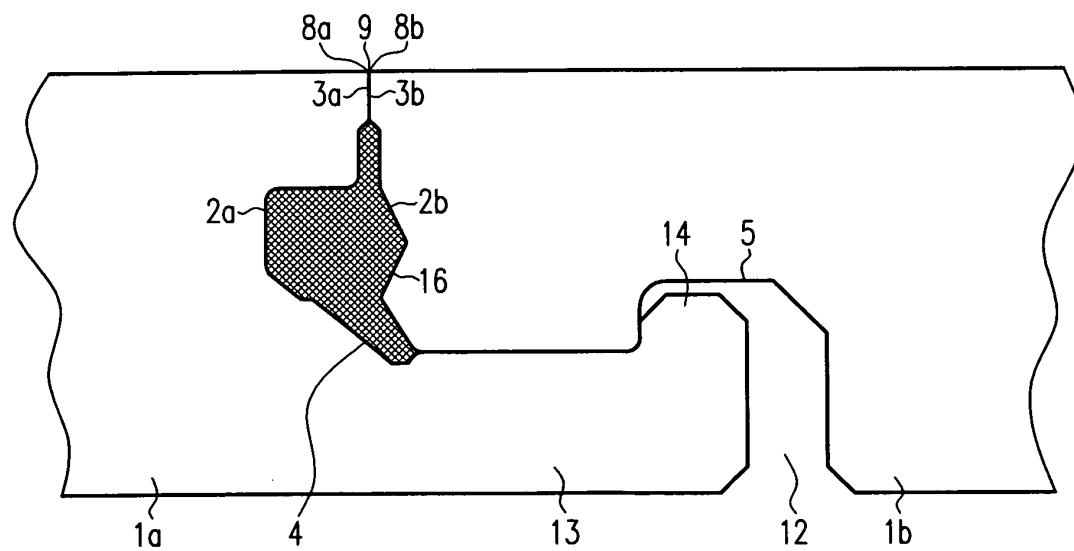


Fig.4

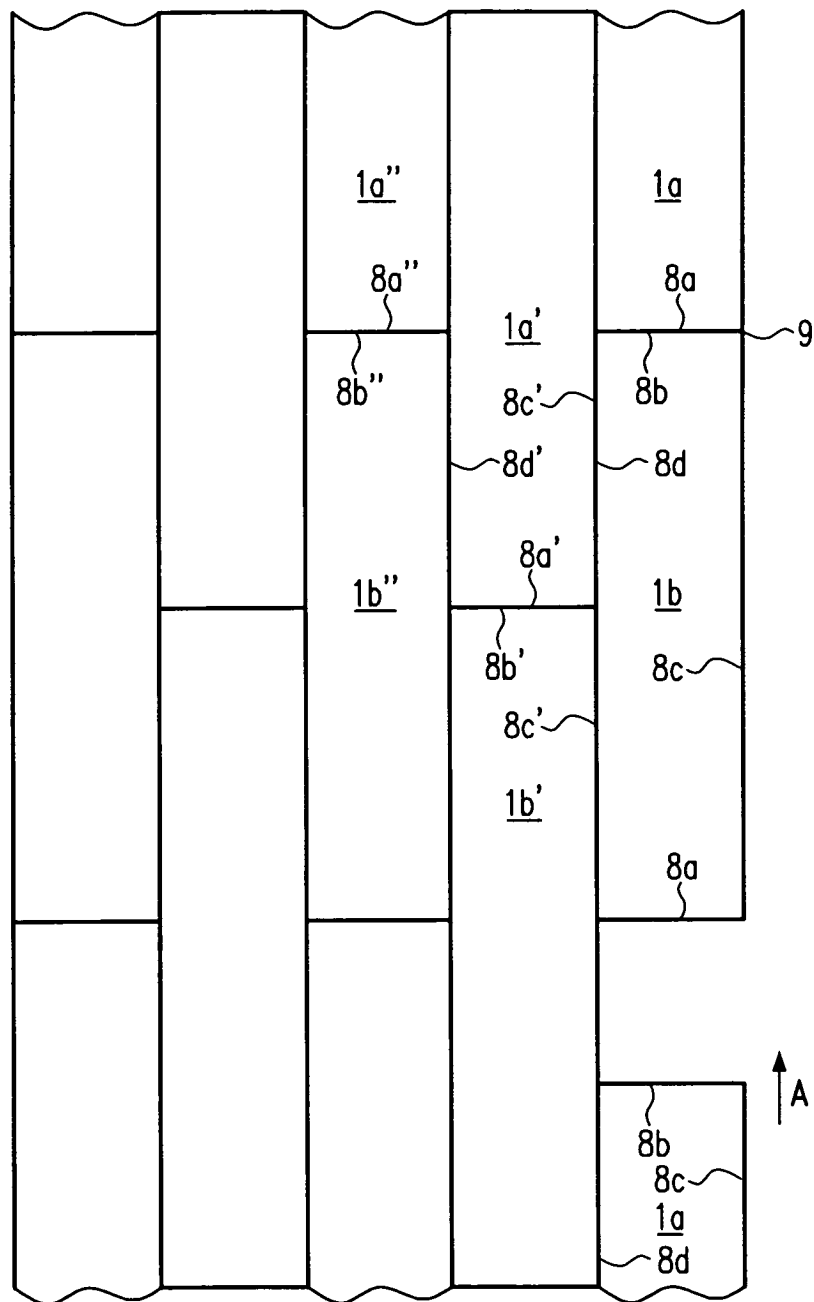


Fig.5



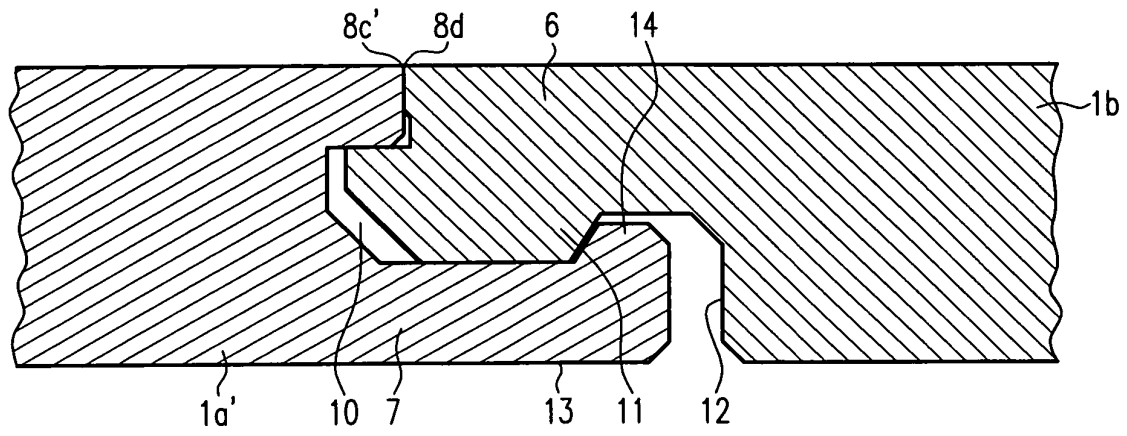


Fig.6a

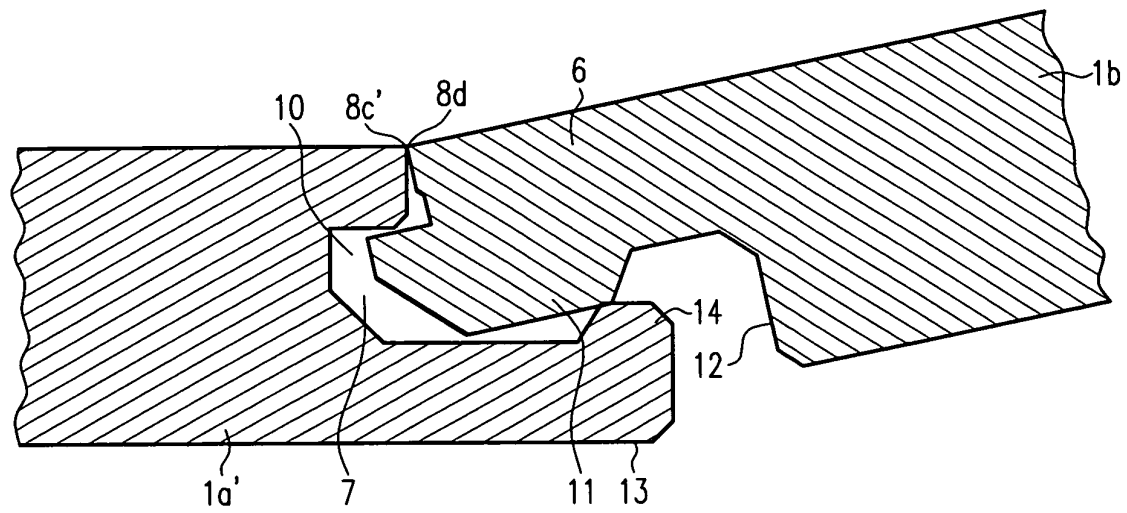


Fig.6b

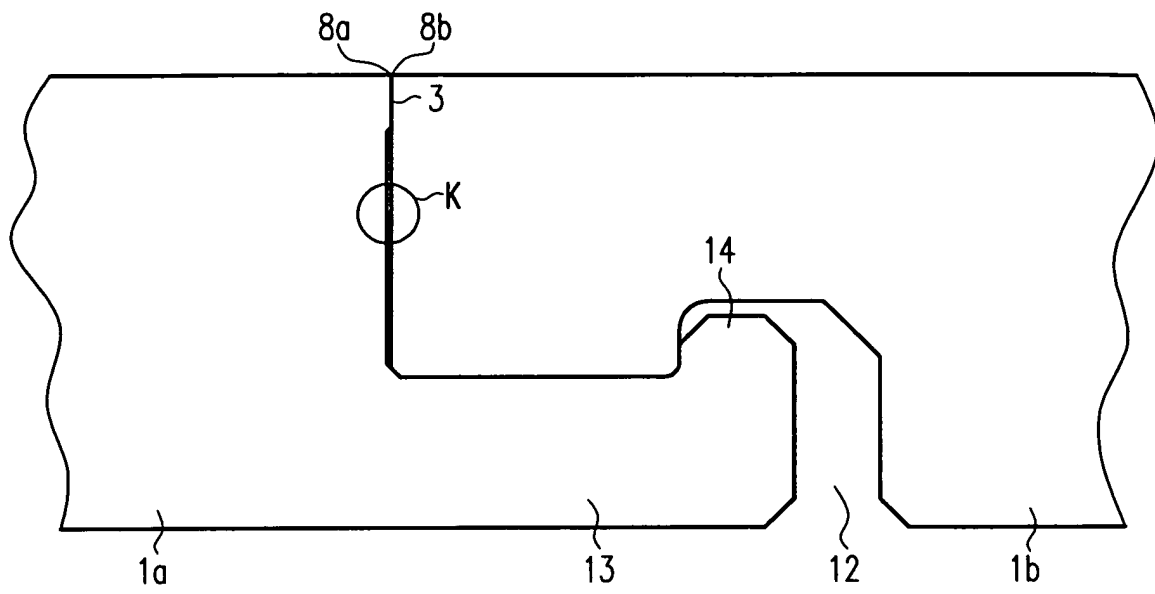


Fig.7

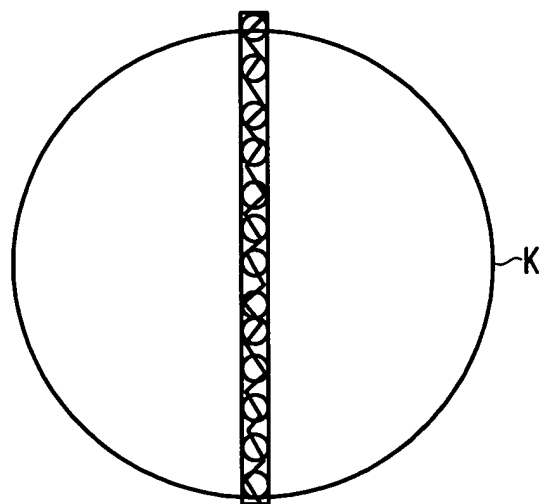


Fig.8



European Patent  
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Application Number  
EP 04 00 0516

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Place of search The Hague		Date of completion of the search 8 July 2004	Examiner Severens, G
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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