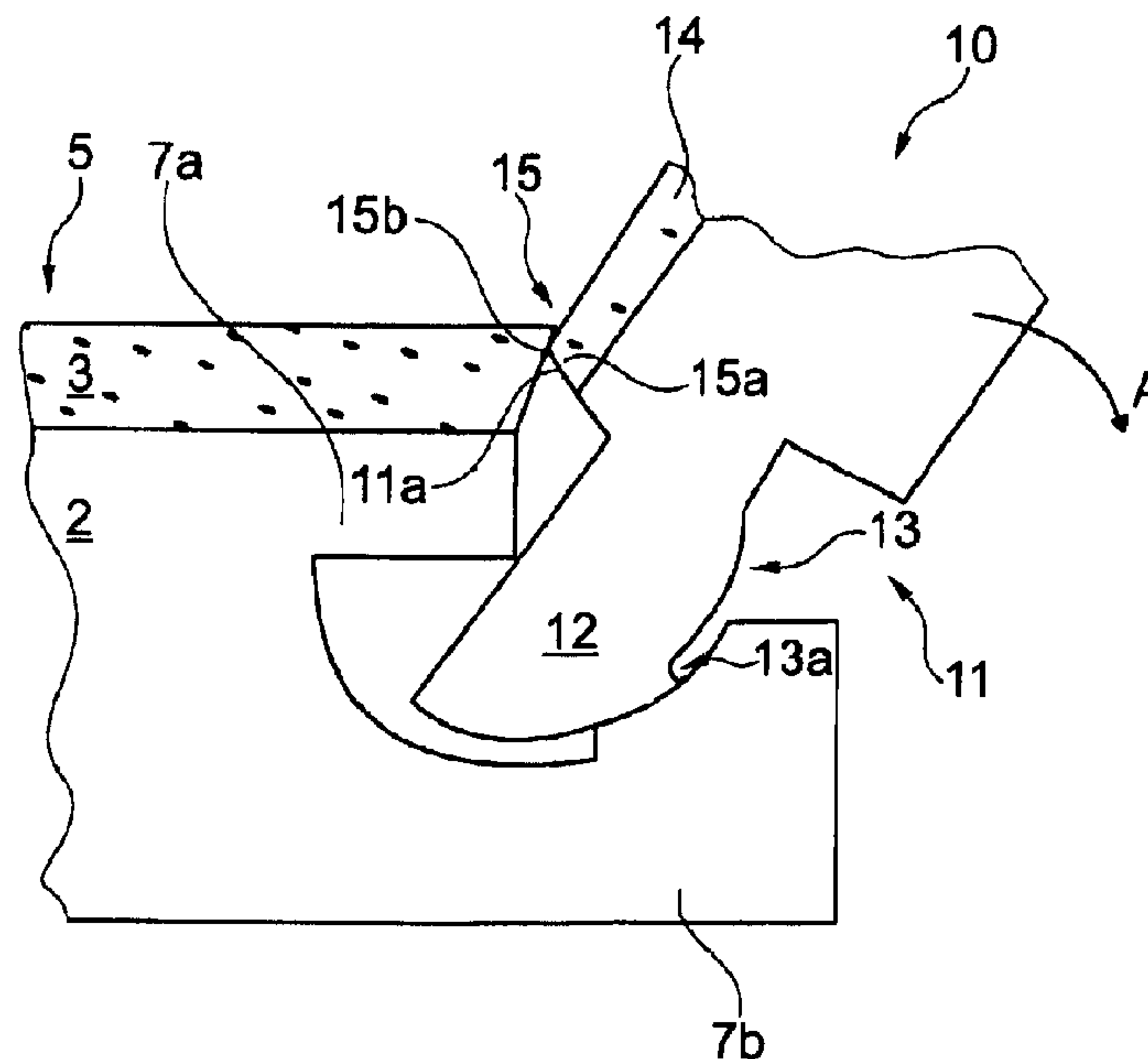




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(54) **Titre : PANNEAU DE PLANCHER COMPORTANT UNE COUCHE UTILE SOUPLE ELASTIQUE**
(54) **Title: FLOOR PANEL WITH SOFT/RESILIENT WEAR LAYER**



(57) **Abrégé/Abstract:**

The invention relates to a floor panel (5, 10, 16, 22, 35) comprising a carrier layer (2, 17, 23), a wear layer (3, 14, 18, 24), formed from a soft/resilient material, and at least two mutually opposite pairs (36, 37) of locking edges, wherein at least the locking edges



(57) Abrégé(suite)/Abstract(continued):

of one pair are designed as form-fitting edges (6, 11, 20, 25) and are configured such that two of the floor panels (5, 10, 16, 22, 35) can be connected by means of these form-fitting edges (6, 11, 20, 25), and wherein the form-fitting edges (6, 11, 20, 25) each have a horizontal locking surface (8a, 13a, 27, 28) which, in the connected state, together counteract the action of the floor panels (5, 10, 16, 22, 35) moving apart from one another in a direction which is located in the floor plane and perpendicularly to the form-fitting edges (6, 11, 20, 25), wherein each form-fitting edge (6, 11, 20, 25) has a joint-sealing region (6a, 11a, 29, 31) in the region of the soft/resilient wear layer (3, 14, 18, 24), the horizontal locking surfaces (8a, 13a, 27, 28) and the joint-sealing regions (6a, 11a, 29, 31) being coordinated with one another such that, with two floor panels (5, 10, 16, 22, 35) in the connected state, it is possible to generate an initial pressing action of the joint-sealing regions (6a, 11a, 29, 31) in relation to one another, and thus to generate a press-sealed joint (F) in the region of the soft/resilient wear layer (3, 14, 18, 24).

Abstract

5 The invention relates to a floor panel (5, 10, 16, 22, 35) comprising a carrier layer (2, 17, 23), a wear layer (3, 14, 18, 24) made of a soft/resilient material, and at least two opposite pairs (36, 37) of locking edges, where at least the locking edges of one pair are designed as form-fitting edges
10 (6, 11, 20, 25) and in such a way that two floor panels (5, 10, 16, 22, 35) can be connected by means of these form-fitting edges (6, 11, 20, 25), and where the form-fitting edges (6, 11, 20, 25) each display a horizontal locking surface (8a, 13a, 27, 28) which, in connected state, together
15 counteract separation of the floor panels (5, 10, 16, 22, 35) in a direction lying in the floor plane and perpendicular to the form-fitting edges (6, 11, 20, 25), where each form-fitting edge (6, 11, 20, 25) displays a joint-sealing area (6a, 11a, 29, 31) in the area of the soft/resilient
20 wear layer (3, 14, 18, 24), and where the horizontal locking surfaces (8a, 13a, 27, 28) and the joint-sealing areas (6a, 11a, 29, 31) are coordinated in such a way that, in connected state of two floor panels (5, 10, 16, 22, 35), initial compression of the joint-sealing areas (6a, 11a, 29, 31) against each other can be produced and, as a result, a
25 tightly sealed joint (F) in the area of the soft/resilient wear layer (3, 14, 18, 24). (Fig. 4)

Floor panel with soft/resilient wear layer

5

The invention relates to a floor panel comprising a carrier layer, a wear layer made of a soft/resilient material, and at least two opposite pairs of locking edges, where at least the locking edges of one pair are designed as form-fitting
10 edges and in such a way that two floor panels can be connected by means of these form-fitting edges, and where the form-fitting edges each display a horizontal locking surface which, in connected state, together counteract separation of the floor panels in a direction lying in the floor plane and
15 perpendicular to the form-fitting edges.

Generic floor panels are known, whose wear layer is made of cork, linoleum or a plastic in order to create the required soft/resilient property. For the purpose of simple assembly, the floor panels display locking edges that can be connected
20 in form-fitting fashion, these being suitable for glueless production of a floor covering.

Also known for production of a floor covering, apart from floor panels with a soft/resilient wear layer, are so-called laminate panels with harder wear surfaces. The hard wear
25 layers are very thin in comparison with soft/resilient wear layers. They are likewise available in diverse embodiments suitable for glueless laying of a floor covering. All manufacturers refer to these laminate panels as "click laminate". The locking edges of click laminate are designed in
30 such a way that they permit form-fitting, occasionally snap-in, connection. The term "click laminate" is nowadays asserting itself as a synonym for quick and simple production of a floor covering, and is also applied in the broadest sense to floor panels displaying a soft/resilient wear layer

or a soft/resilient layer at some other point within a floor panel comprising several layers.

The different embodiments of locking edges familiar from click laminate can generally also be provided on floor panels having a soft/resilient wear layer. In this context, however, attention has to be paid to particular effects that have an impact during production of the locking edges and during laying, i.e. when connecting complementary locking edges.

EP 1 634 696 A1 describes so-called floor covering elements, including a floor covering element with a carrier layer and a soft/resilient wear layer. This prior art acknowledges floor covering elements laid in floating fashion, as well as click laminate, where one panel snaps into the other. The teaching of EP 1 634 696 A1 refers to the layer structure of a floor covering element and says nothing about the design of the panel edges.

Cutting processes, such as sawing or milling, are often used to produce locking edges on floor panels. The soft/resilient wear layer is elastically deformed during cutting. For instance, when a circular saw blade plunges into a soft/resilient wear layer, the latter is dented by the feed motion of the circular saw blade. A milling cutter likewise dents the soft/resilient wear layer. In the region of the cutting point, some areas of the soft/resilient material are stretched, other areas being compressed. The elastic deformation is reversed once the cutting operation is completed. After reversal of the elastic deformation, the surfaces created in this way do not match the contour along which the cutting tool travelled.

The material behaviour of the soft/resilient wear layer makes it difficult to machine locking edges on floor panels in such a way that adjacent soft/resilient wear layers of

connected floor panels contact each other smoothly, without any open joints being formed. If open joints do form, dirt can collect in them and moisture can penetrate between the locking edges.

- 5 The object of the invention is to propose a floor panel of the generic type indicated in the opening paragraph, that favours the production of floor coverings with a closed surface.

According to the invention, the object is solved in that
10 each form-fitting edge displays a joint-sealing area in the area of the wear layer, and in that the horizontal locking surfaces and the joint-sealing areas are coordinated in such a way that, in connected state of two floor panels, initial compression of the joint-sealing areas against each other
15 can be produced and, as a result, a tightly sealed joint in the area of the wear layer.

The joint-sealing areas are produced using cutting tools. They are selected and/or set for the cutting operation in such a way that the required contour of the joint-sealing
20 area of the wear layer is obtained when the elastic deformation of the soft/resilient wear layer is reversed after the end of the cutting operation. The contour obtained in this way guarantees contact and initial compression of the joint-sealing areas in locked state of two floor panels.

- 25 The required contour of the joint-sealing area can be produced by a cutting tool displaying a corresponding geometry that takes into account the elastic deformation of the wear layer during the cutting operation. Alternatively, by setting the position of the cutting tool appropriately, an influence can be exerted on the elastic deformation of the
30 soft/resilient wear layer, such that the required contour of the joint-sealing area is obtained in the finished state, following reversal of the elastic deformation.

Favourably, at least one of the joint-sealing areas is designed as a projecting compression area.

The projecting compression area can form a sealing lip, which can be designed in such a way that it ends in a tip
5 close to the top surface of the wear layer. The contour of the joint-sealing area of the wear layer is simply a surface inclined relative to the wear surface. This inclined surface, tapering to a tip towards the wear surface, is easy to manufacture.

10 The second joint-sealing area can be designed to be flat, or likewise as a projecting compression area with or without a sealing lip.

The joint-sealing area of the wear layer can be provided with an adhesive, at least on one of the form-fitting edges.

15 Expediently, the adhesive can be activated during laying of the floor panels.

A further benefit is seen as being that the adhesive displays two adhesive components.

The first adhesive component can be provided in the joint-sealing area of a first form-fitting edge of the floor
20 panel, and the second adhesive component can be provided in the joint-sealing area of the opposite, second form-fitting edge of the floor panel.

Exemplary embodiments of the invention are illustrated in a
25 drawing and described in detail below on the basis of several Figures. The Figures show the following:

Fig. 1 The start of production of locking edges on floor panels displaying a soft/resilient wear layer,

Fig. 2 Two panel edges produced by a parting cut,

Fig. 3 A form-fitting edge with modified groove profile that displays a horizontal locking surface,

Fig. 4 The form-fitting edge according to Fig. 3 and a complementary form-fitting edge during a rotary connecting movement,

Fig. 5 The form-fitting edges according to Fig. 4 in connected or locked state,

Fig. 6 An alternative embodiment of two form-fitting edges in connected or locked state,

Fig. 7 Two form-fitting edges with hook profiles that can be hooked together by means of a vertical movement or movement component,

Fig. 8 A top view of a floor panel with four panel edges and with a first pair of form-fitting edges on two opposite locking edges, and with a second pair of other form-fitting edges on the other two opposite locking edges.

Figures 1 and 2 show the start of production of locking edges on floor panels, namely the cutting of a larger panel 1 into individual panel sections 1' and 1'', which are subsequently provided with locking edges and further processed into floor panels. Panel 1 displays a carrier layer 2 and, on it, a soft/ resilient wear layer 3. Figures 1 and 2 illustrate the technical problem entailed by machining a panel 1 if the latter displays a soft/resilient wear layer 3.

Figure 1 shows a saw blade 4 that cuts through panel 1. Saw blade 4 performs a cutting movement and a feed movement. The feed movement compresses soft/resilient wear layer 3. In the region of the cutting point, this compression causes wear layer 3 to be stretched in some areas and compressed in some areas.

Once saw blade 4 has cut through panel 1, as illustrated in Fig. 2, the temporary elastic deformation of soft/resilient wear layer 3 is reversed again. In the area of wear layer 3, the parting cut produces parting planes 3a and 3b, which are inclined relative to the plane in which the feed movement of saw blade 4 takes place. Parting planes 3a and 3b lie opposite each other in roughly wedge-shaped fashion.

In contrast, as can be seen in Fig. 2, parting planes 2a and 2b created in the area of carrier layer 2 lie parallel to each other and also parallel to the plane of the feed movement of saw blade 4.

Figure 3 is a partial illustration of a floor panel 5. It displays a form-fitting edge 6, provided with a modified groove profile 7. Floor panel 5 displays a complementary form-fitting edge with modified tongue profile, although this has been omitted in the partial illustration in Fig. 3. A joint-sealing area 6a is formed in the region of soft/resilient wear layer 3. Floor panel 5 is shown in horizontal position in Fig. 3, illustration of the substrate being dispensed with.

Groove profile 7 displays an undercut 8 located in a horizontal direction, i.e. acting in the plane of floor panel(s) 5, by means of which plane separation of lying, connected floor panels perpendicularly to the form-fitting edge is counteracted. Upper groove wall 7a is shorter than lower groove wall 7b. Groove wall 7b displays a horizontal locking surface 8a for the purpose of horizontal locking. Joint-sealing area 6a of soft/resilient wear layer 3 is provided with a projecting compression area 9 that forms a sealing lip 9a. In this embodiment, sealing lip 9a has a tip 9b projecting distally from the panel body. Tip 9b is located on the surface of wear layer 3, which forms the wear surface of floor panel 5.

A second, similar floor panel 10 is added in Fig. 4. The illustration shows the complementary form-fitting edge 11 of second floor panel 10, which is provided with the modified tongue profile 12. In Fig. 4, second floor panel 10 is held at an angle to the first, lying floor panel 5, such that its tongue profile 12 reaches into groove profile 7 of first floor panel 5. Tongue profile 12 displays an undercut 13 and is provided with a horizontal locking surface 13a that, in locked state of the two floor panels 5 and 10, is in contact with horizontal locking surface 8a of groove profile 7 of the other floor panel 5. Form-fitting edge 11 likewise displays a joint-sealing area 11a in the area of a soft/resilient wear layer 14. Joint-sealing area 11a displays a compression area 15, which forms a sealing lip 15a. This is likewise provided with a tip 15b, like sealing lip 9a of groove profile 7.

The locked state is achieved by means of a rotary connecting movement, for which second floor panel 10 is swung downwards in the direction of arrow A into the plane of first floor panel 5. Complementary form-fitting edges 6 and 11 engage as a result, locking floor panels 5 and 10 together in form-fitting fashion.

The locked state is illustrated in the following Figs. 5 and 6. According to Fig. 5, a form-fitting lock has been created, where horizontal locking surface 13a of tongue profile 12 is in contact with horizontal locking surface 8a of groove profile 7. It can moreover be seen that sealing lip 9a of joint-sealing area 6a is in contact with sealing lip 15a of joint-sealing area 11a. The line symbols ((())) in Fig. 5 indicate that initial compression of joint-sealing areas 6a/11a is present, this generating compression of the soft/resilient material of wear layer 3 or 14 in the area of joint F. According to Fig. 5, sealing lips 9a/15a are designed in such a way that the compression is slight enough

not to result in bulging of the floor surface in the area of joint F.

Figure 6 shows an alternative embodiment, where sealing lips 9a/15a are designed in such a way that the initial compression is such that it brings about slight bulging a of the floor surface in the area of joint F. If this bulging a is kept slight, it can advantageously serve as an indicator of the presence of initial compression. A high bulge, however, is to be avoided, since the bulging joint areas would wear too rapidly.

Figure 7 is a partial illustration of two similar floor panels. Floor panel 16 displays a carrier layer 17 and a soft/resilient wear layer 18. The part shown is only its locking edge 19. The opposite, complementary locking edge of floor panel 16 has been omitted. Locking edge 19 is designed as form-fitting edge 20 and displays a lower hook profile 21. The complementary locking edge (not shown) of floor panel 16 corresponds to that of the illustrated second floor panel 22. The latter displays a carrier layer 23 and a soft/resilient wear layer 24. The part shown here is form-fitting edge 25, which displays an upper hook profile 26.

In hooked state, lower hook profile 21 is covered by upper hook profile 26 of floor panel 22.

Hook profiles 21 and 26 can be hooked together by means of a vertical movement or by means of a vertical movement component. Vertical means a movement component perpendicular to the panel plane. Lower hook profile 21 displays a horizontal locking surface 27, and upper hook profile 26 is provided with a horizontal locking surface 28. In connected state of the two floor panels 16 and 22, horizontal locking surfaces 27 and 28 are in contact and thus counteract separation of the two floor panels 16 and 22 in a direction lying in the floor plans and perpendicular to form-fitting edges 20/25.

On soft/resilient wear layer 18, form-fitting edge 20 displays a joint-sealing area 29, designed as a compression area 30. Compression area 30 forms a sealing lip 30a. Form-fitting edge 25 of floor panel 22 likewise displays a joint-sealing area 31, which is designed as a compression area 32 and forms a sealing lip 32a. In hooked state of hook profiles 21/26, sealing lips 30a/32a are pressed against each other and compressed, thereby producing a tightly sealed joint F.

10 According to Fig. 7, horizontal locking surface 27 of lower hook profile 21 is not arranged perpendicularly to the panel surface, but tilted from the perpendicular by an angle α , i.e. tilted perpendicularly to the panel plane. Horizontal locking surface 28 of upper hook profile 26 is parallel to
15 horizontal locking surface 27, i.e. tilted from the perpendicular by the same angle α , meaning that the two horizontal locking surfaces rest on each other when in hooked state.

Sealing lip 30a of floor panel 16 is tilted from the perpendicular by angle β . The same applies to sealing lip 32a,
20 which is arranged symmetrically to sealing lip 30a.

The larger angle α is, the more gently sealing lips 30a/32a can be brought into contact. Values in the range from 5° to 45° are preferred for angle α , and values in the range from 1° to 5° for angle β . The horizontal locking effect is best
25 if the lower limit of 5° is selected for angle α . In this case, however, the sealing lips are more severely deformed during the connecting movement than if a larger angle α is selected. This is because a larger angle α creates more space for the connecting movement. If more space is available for the connecting movement, sealing lips 30a/32a rub
30 less strongly against each other and the connecting movement is more gentle. It has proven to be a favourable compromise if an angle of $\alpha = 16^\circ$ is combined with an angle of $\beta = 2^\circ$.

A separate locking element 33 is provided for locking perpendicularly to the panel plane. Separate locking element 33 is accommodated in a groove 34 that is open in the distal direction. The distal direction is indicated by arrow D.

5 Groove base 34b is arranged proximally in relation to its groove opening 34a. Groove 34 extends into carrier layer 17 of floor panel 16. The complementary form-fitting edge of floor panel 16 is not shown. However, it corresponds to form-fitting edge 25 with upper hook profile 26, shown on
10 floor panel 22. The upper hook profile displays a locking groove S for separate locking element 33. Locking groove S is designed in such a way that, in hooked state, separate locking element 33 of the hook profiles is located partly in groove 34 and partly in locking groove S, or, after hooking
15 of the hook profiles, can at least be inserted in such a way that it is located partly in groove 34 and partly in locking groove S.

Apart from the functional design shown in Fig. 7, the separate locking element can also be of different other designs.
20 It can be of springy design and automatically snap into a locking groove. Alternatively, the separate locking element can be designed in such a way that it is only moved into the locking groove by lateral sliding within the accommodating groove, thus creating a locking effect. This lateral sliding
25 can take place with or without elastic deformation. The separate locking element can be designed in such a way that it can be applied before the hook profiles are hooked together, as illustrated in Fig. 7, for example. Alternatively, the separate locking element can be designed in such
30 a way that it can be fitted after the hook profiles have been hooked together. Examples of separate locking elements suitable for the invention are indicated in the following publications, for example: EP 1 415 056, EP 1 420 125, DE 20 2006 019 869, EP 2 049 749, EP 2 000 610, WO 01/51732 and WO
35 2008/004960.

A example of a floor panel 35 is illustrated schematically in Fig. 8. Floor panel 35 displays a first pair 36 of opposite locking edges and a second pair 37 of opposite locking edges. The locking edges of first pair 36 differ from the
5 locking edges of second pair 37.

First pair 36 displays a form-fitting edge 36a with a groove profile 7 (according to Fig. 5) and a form-fitting edge 36b with a tongue profile 12 (according to Fig. 5).

The second pair 37 with locking edges displays a form-
10 fitting edge 37a with a lower hook profile 21 (according to Fig. 7) and a form-fitting edge 37b with an upper hook profile 26 (according to Fig. 7). Lower hook profile 21 is provided with a separate locking element 33.

When attaching a new floor panel 35 to a previously started
15 floor covering, i.e. to a floor covering displaying a previous row of floor panels 35 and at least one floor panel 35 in the same row, form-fitting edge 36b can be connected by swinging down the new floor panel 35 (according to Fig. 5), in which context form-fitting edge 37b of new floor panel 35
20 is simultaneously locked with a form-fitting edge 37a of the floor panel already present in the same panel row.

List of reference numbers

5	1	Panel
	1'	Panel section
	1''	Panel section
	2	Carrier layer
	2a	Parting plane
10	2b	Parting plane
	3	Soft/resilient wear layer
	3a	Parting plane
	3b	Parting plane
	4	Saw blade
15	5	Floor panel
	6	Form-fitting edge
	6a	Joint-sealing area
	7	Groove profile
	7a	Upper groove wall
20	7b	Lower groove wall
	8	Undercut
	8a	Horizontal locking surface
	9	Compression area
	9a	Sealing lip
25	9b	Tip
	10	Floor panel
	11	Form-fitting edge
	11a	Joint-sealing area
	12	Tongue profile
30	13	Undercut
	13a	Horizontal locking surface
	14	Soft/resilient wear layer
	15	Compression area
	15a	Sealing lip
35	15b	Tip
	16	Floor panel

	17	Carrier layer
	18	Soft/resilient wear layer
	19	Locking edge
	20	Form-fitting edge
5	21	Lower hook profile
	22	Floor panel
	23	Carrier layer
	24	Soft/resilient wear layer
	25	Form-fitting edge
10	26	Upper hook profile
	27	Horizontal locking surface
	28	Horizontal locking surface
	29	Joint-sealing area
	30	Compression area
15	30a	Sealing lip
	31	Joint-sealing area
	32	Compression area
	32a	Sealing lip
	33	Separate locking element
20	34	Groove
	34a	Groove opening
	34b	Groove base
	35	Floor panel
	36	First pair of locking edges
25	36a	Form-fitting edge
	36b	Form-fitting edge
	37	Second pair of locking edges
	37a	Form-fitting edge
	37b	Form-fitting edge

Claims

1. Floor panel comprising:

a carrier layer,

a wear layer made of a soft/resilient material, and at least two opposite pairs of locking edges, where at least the locking edges of one pair are designed as form-fitting edges and in such a way that two floor panels are connectable to each other by means of these form-fitting edges, and where the form-fitting edges each display a horizontal locking surface which, in a connected state, together counteract separation of the floor panels in a direction lying in the floor plane and perpendicular to the form-fitting edges, w h e r e i n

each form-fitting edge displays a joint-sealing area that comprises a sealing lip that inclines outward to a tip at a top surface of the soft/resilient wear layer, and in that the horizontal locking surfaces and the sealing lips are coordinated in such a way that, in a connected state of two floor panels, initial compression of the sealing lips against each other can be produced and, as a result, a tightly sealed joint in the area of the soft/resilient wear layer.

2. Floor panel according to Claim 1, wherein at least one of the joint-sealing areas is designed as a projecting compression area.

3. Floor panel according to Claim 2, w h e r e i n the projecting compression area forms the sealing lip.

4. Floor panel according to any one of Claims 1 to 3, wherein the joint-sealing area of the soft/resilient wear layer is provided with an adhesive, at least on one of the form-fitting edges.
5. Floor panel according to Claim 4, wherein the adhesive are activated during laying of the floor panels.
6. Floor panel according to Claim 5, wherein the adhesive displays two adhesive components.
7. Floor panel according to Claim 6, wherein the first adhesive component is provided in the joint-sealing area of a first form-fitting edge of the floor panel , and in that the second adhesive component is provided in the joint-sealing area of the opposite, second form-fitting edge of the floor panel.

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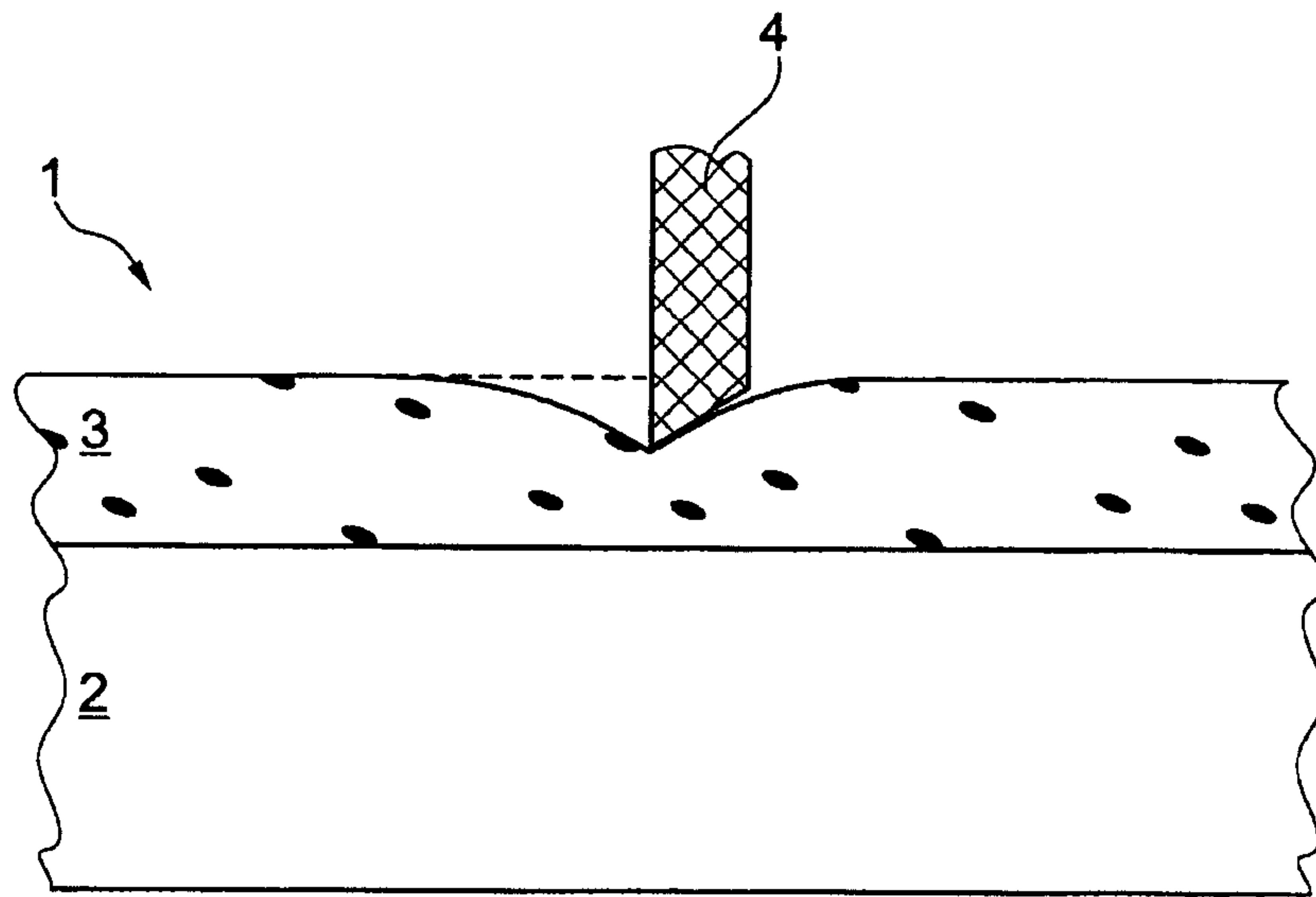


Fig. 1

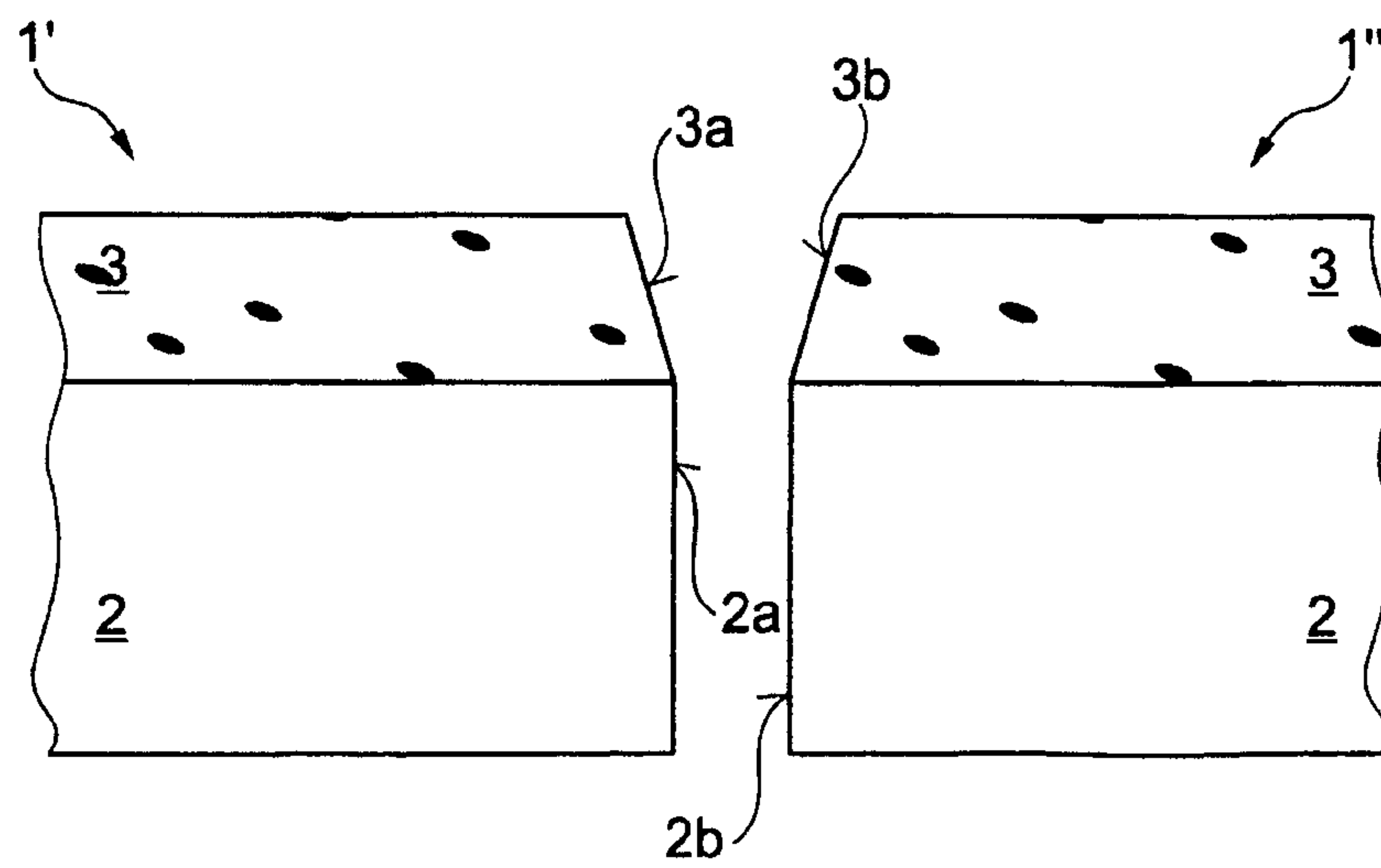


Fig. 2

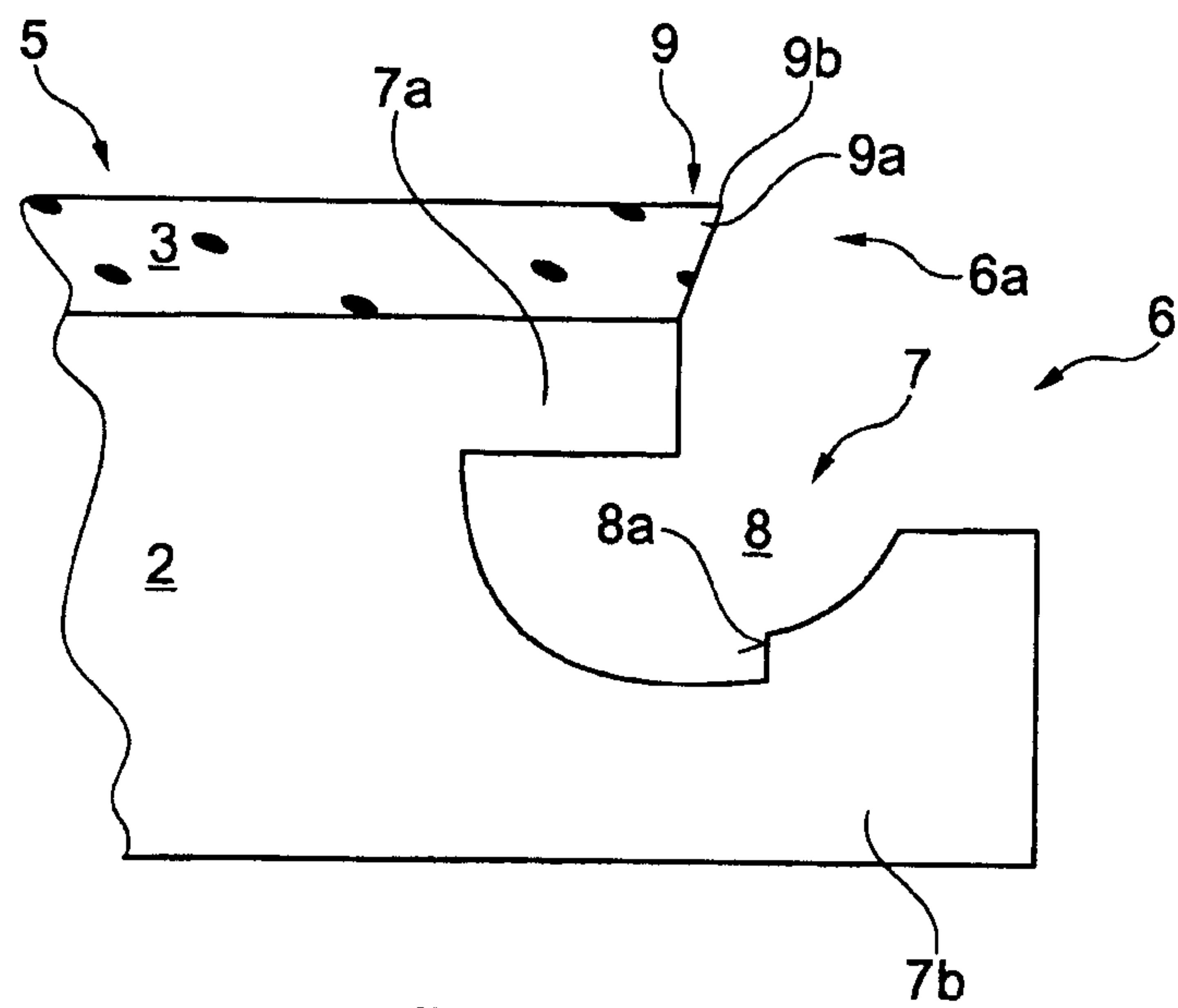


Fig. 3

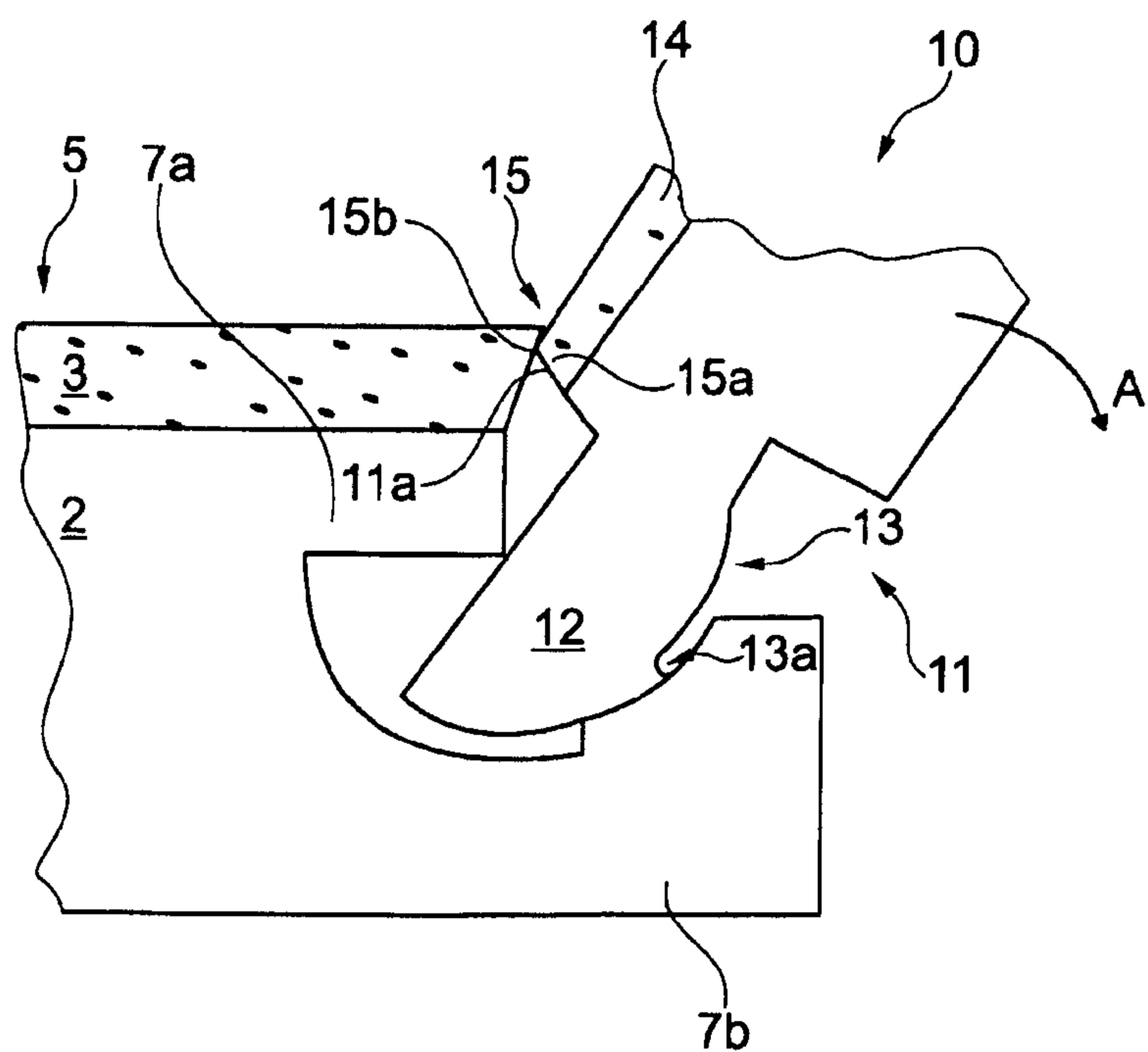


Fig. 4

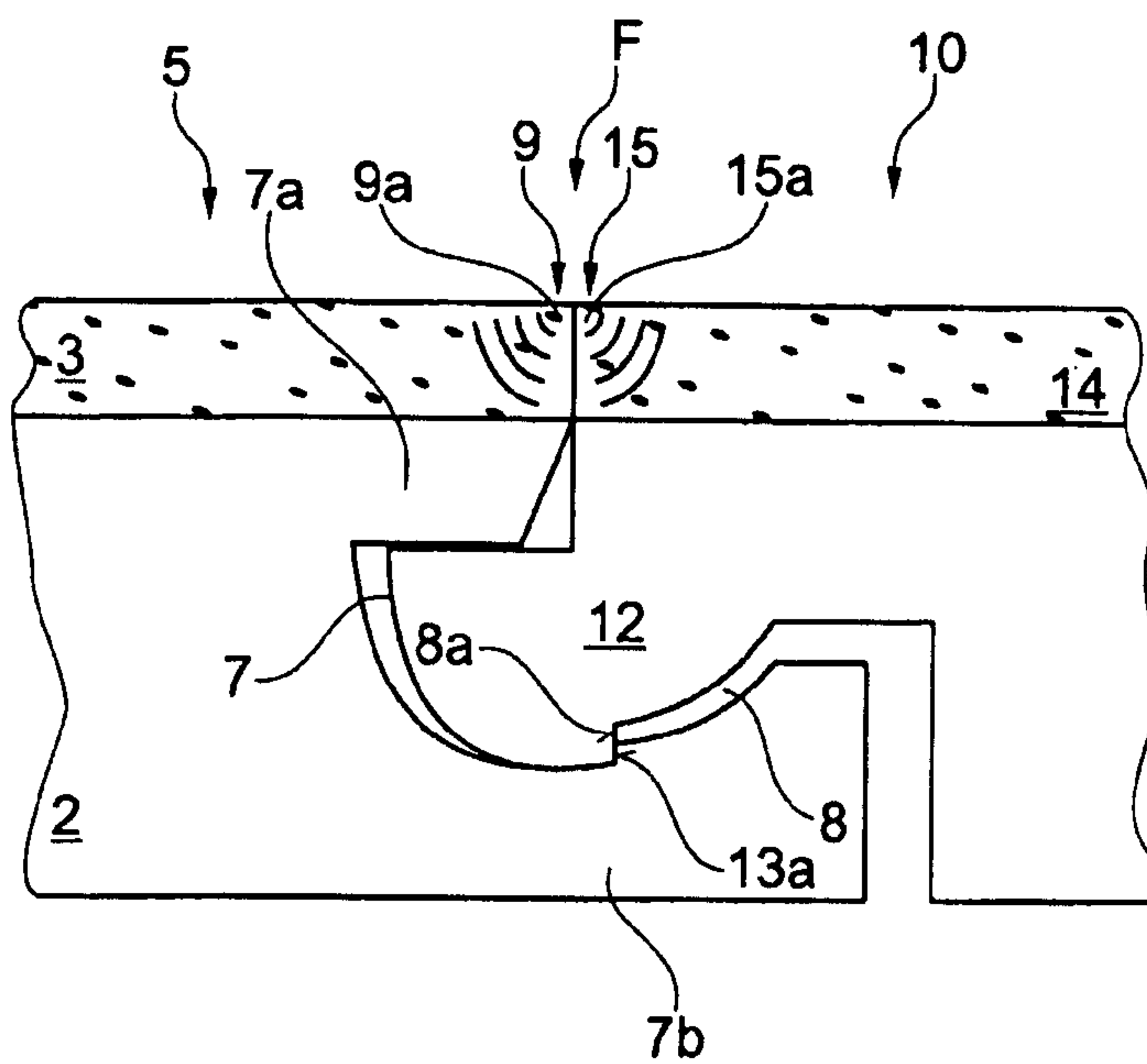


Fig. 5

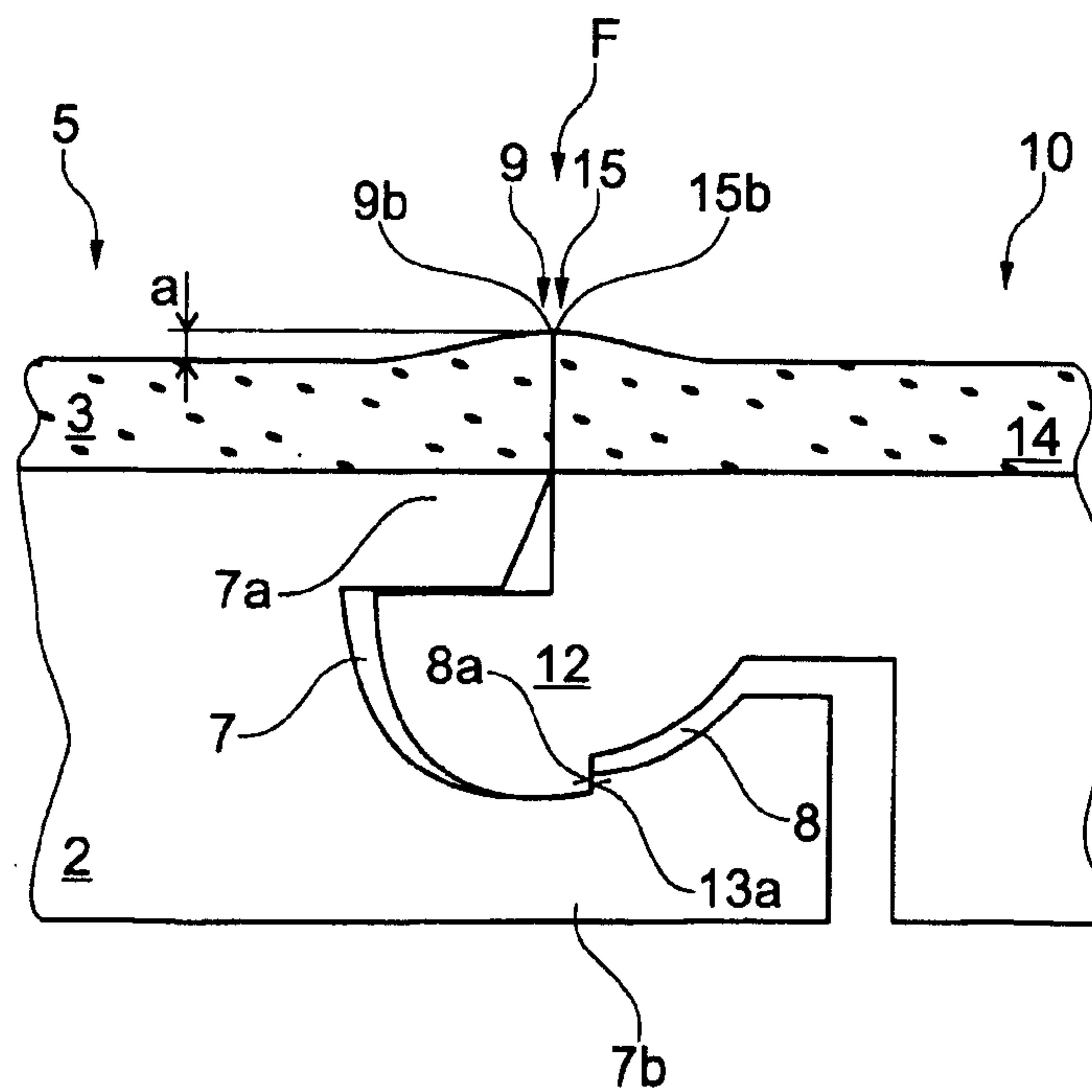


Fig. 6

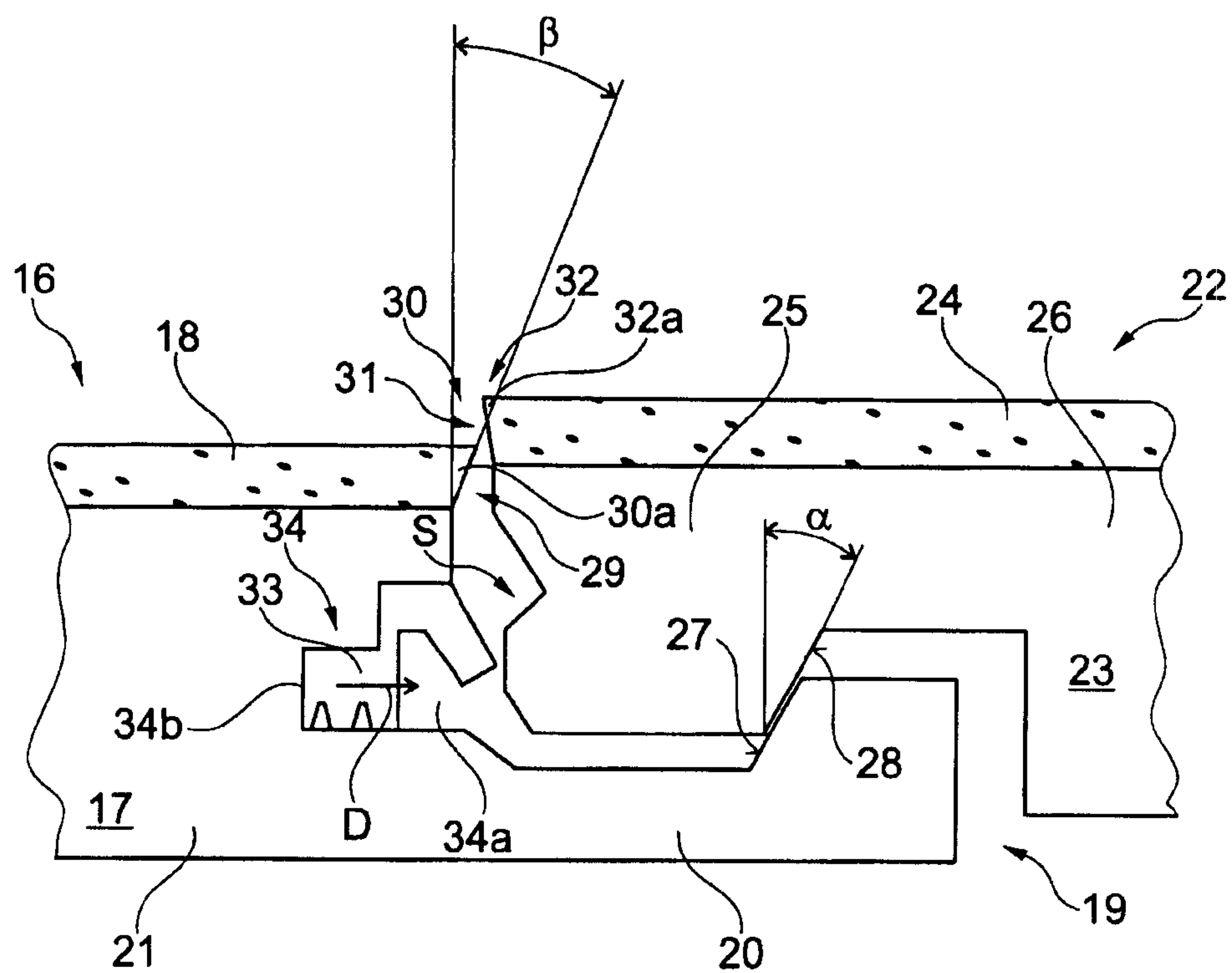


Fig. 7

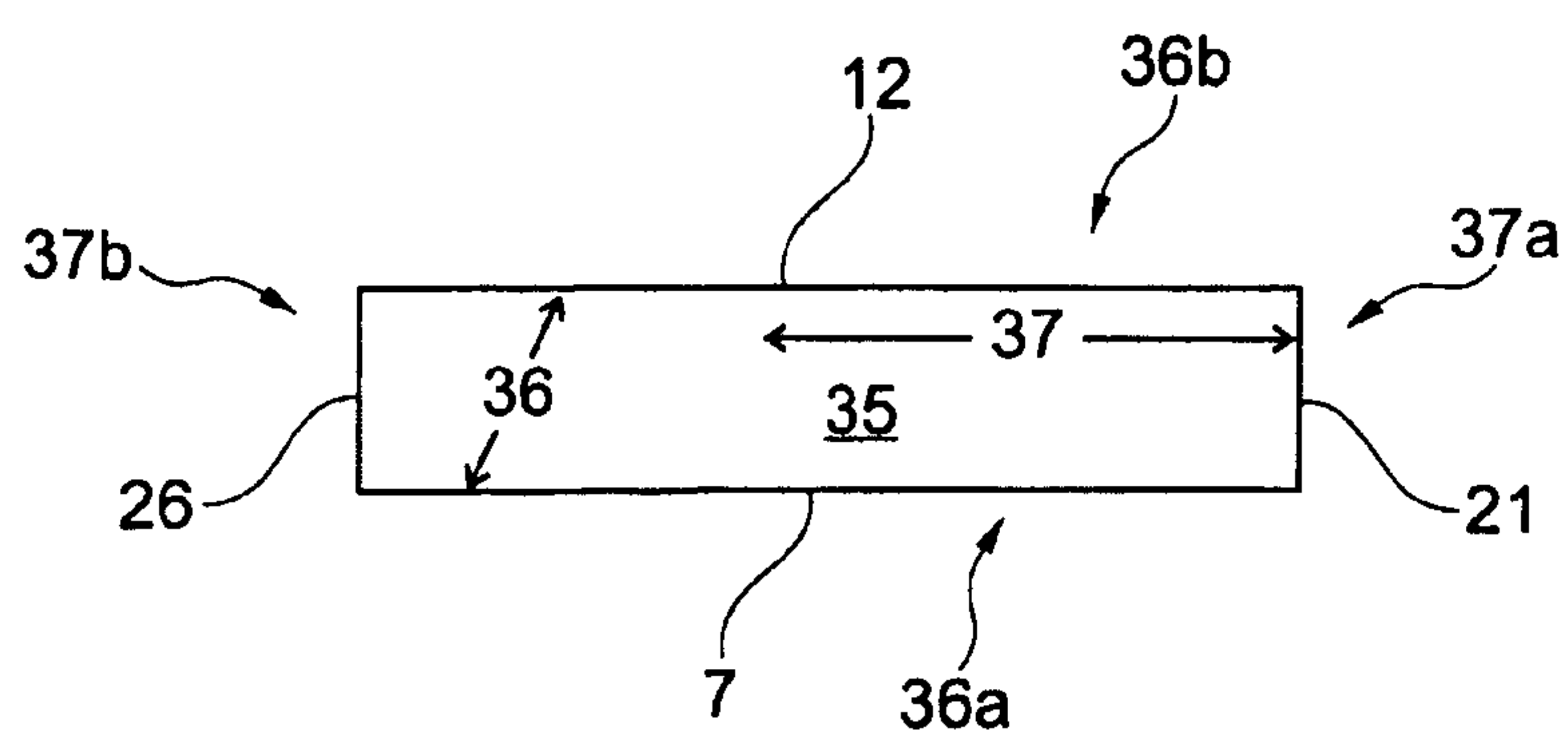


Fig. 8

