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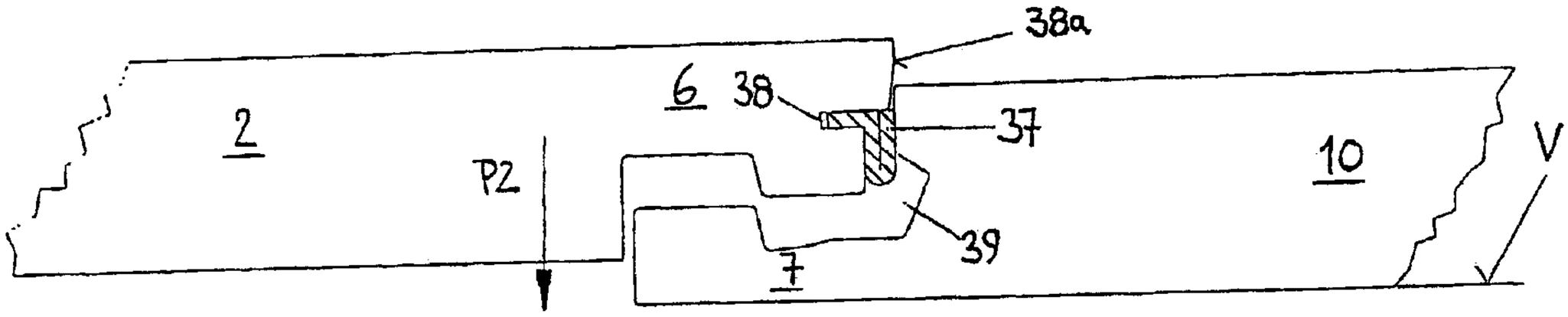

(57) Abrégé/Abstract:
The invention relates to a fastening system (1) for rectangular, tabular panels (2, 3, 10), especially floor panels, comprising retaining profiles disposed on the small faces of said panels (2, 3, 10). Opposite retaining profiles match said retaining profiles in such a manner that similar panels (2, 3, 10) can be interlinked. The panels are provided with opposite first retaining profiles that are configured in such a manner that on a panel (2, 3, 10) being in first line a new panel (2) can be locked in second line by attaching the new panel (2) to the installed panel (3) at a temporary angle relative to the installed panel (3) and then swiveling it down into the plane of the installed panel (3). The panel further comprises opposite second retaining elements that comprise corresponding hook elements (6, 7). A hook connection (8) can be established by means of one of the hook elements (6, 7) of the new panel (2) and a hook element (6, 7) of a panel (3) that is already installed in second line by swiveling down the new panel (2). Every hook connection (8) is associated with an additional locking element (13, 22, 26, 27, 34, 35, 36, 40, 46) that prevents, in the hooked state of two panels (2, 3, 10), the hook connection (8) from being released in a direction perpendicular to the plane of the installed panels (2, 3, 10).

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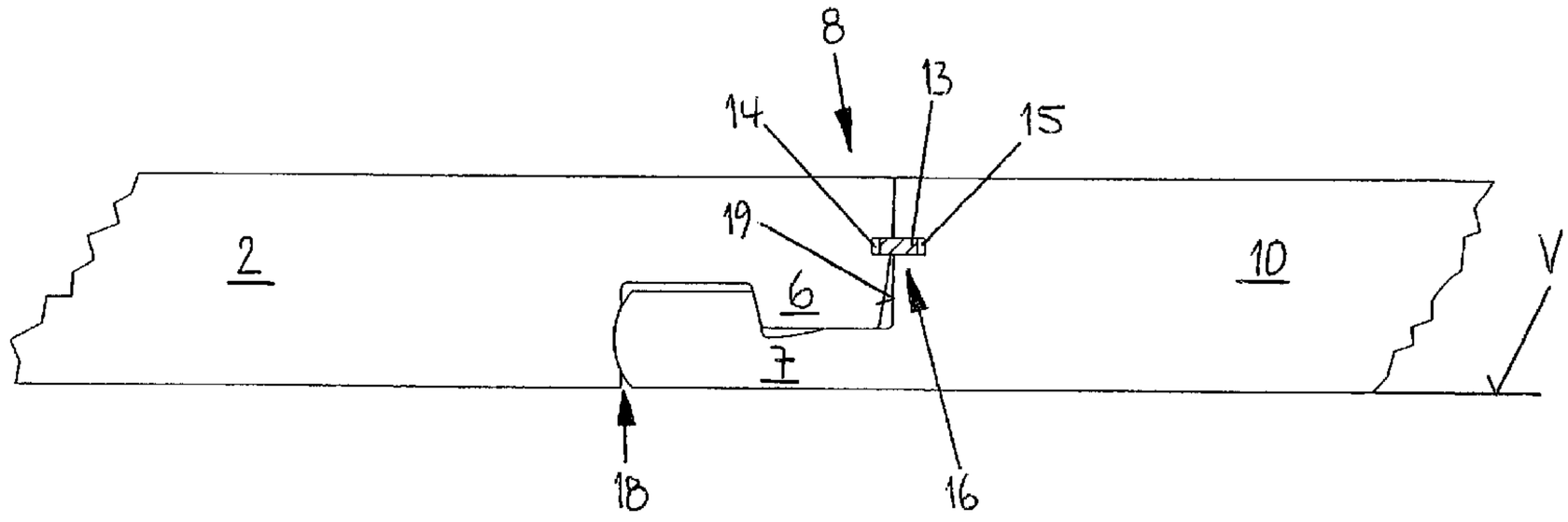
(54) Title: PANEL AND FASTENING SYSTEM FOR SUCH A PANEL

(54) Bezeichnung: PANEEL SOWIE BEFESTIGUNGSSYSTEM FÜR PANEELE



(57) Abstract: The invention relates to a fastening system (1) for rectangular, tabular panels (2, 3, 10), especially floor panels, comprising retaining profiles disposed on the small faces of said panels (2, 3, 10). Opposite retaining profiles match said retaining profiles in such a manner that similar panels (2, 3, 10) can be interlinked. The panels are provided with opposite first retaining profiles that are configured in such a manner that on a panel (2, 3, 10) being in first line a new panel (2) can be locked in second line by attaching the new panel (2) to the installed panel (3) at a temporary angle relative to the installed panel (3) and then swiveling it down into the plane of the installed panel (3). The panel further comprises opposite second retaining elements that comprise corresponding hook elements (6, 7). A hook connection (8) can be established by means of one of the hook elements (6, 7) of the new panel (2) and a hook element (6, 7) of a panel (3) that is already installed in second line by swiveling down the new panel (2). Every hook connection (8) is associated with an additional locking element (13, 22, 26, 27, 34, 35, 36, 40, 46) that prevents, in the hooked state of two panels (2, 3, 10), the hook connection (8) from being released in a direction perpendicular to the plane of the installed panels (2, 3, 10).

(57) Zusammenfassung: Die Erfindung betrifft ein Befestigungssystem (1) für viereckige tafelförmige Paneele (2, 3, 10) mit an den Schmalseiten der Paneele (2, 3, 10) angeordneten Halteprofilen, von denen gegenüberliegend angeordnete Halteprofile derart zueinander passen, dass gleichartige Paneele (2, 3, 10) miteinander verbindbar sind, insbesondere für Fussbodenpaneele, mit gegenüberliegend angeordneten ersten Halteprofilen, die so ausgebildet sind, dass an einem in erster Reihe liegenden Paneel (2, 3, 10) in zweiter Reihe ein neues Paneel (2) verriegelbar ist, indem das neue Paneel (2) zunächst in Schrägstellung relativ zu dem liegenden Paneel (3) an das liegende Paneel (3) angefügt und nachfolgend in die Ebene

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— *mit internationalem Recherchenbericht*

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

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des liegenden Paneels (3) herabgeschwenkt wird, sowie mit gegenüberliegend angeordneten zweiten Halteprofilen, die korrespondierende Hakenelemente (6, 7) aufweisen, wobei mit einem der Hakenelemente (6, 7) des neuen Paneels (2) und einem Hakenelement (6, 7) eines bereits in zweiter Reihe liegenden Paneels (3) durch das Herabschwenken des neuen Paneels (2) eine Hakenverbindung (8) herstellbar ist, wobei jeder Hakenverbindung (8) ein zusätzliches Sperrelement (13, 22, 26, 27, 34, 35, 36, 40, 46) zugeordnet ist, das im verhakten Zustand zweier Paneele (2, 3, 10) ein Lösen der Hakenverbindung (8) in einer Richtung senkrecht zu der Ebene der verlegten Paneele (2, 3, 10) unterbindet.

15 September 2003

PCT/DE 02/02444

Panel and fastening system for such a panel

The invention relates to a fastening system for rectangular, tabular panels, especially floor panels, comprising retaining profiles disposed on the small faces of said panels. Opposite retaining profiles match said retaining profiles in such a manner that similar panels can be interlinked. The retaining profiles are designed as first retaining profiles on opposite small faces and as second retaining profiles on the remaining small faces, in such a way that, on a panel in a first line, a new panel can be locked in a second line by attaching the new panel to the installed panel at a temporary angle relative to the installed panel and then swivelling it down into the plane of the installed panel, where the opposite second retaining elements display corresponding hook elements and where a hook connection can be established by means of one of the hook elements of the new panel and a hook element of a panel that is already installed in the second line by swivelling down the new panel. Each hook connection is associated with an additional, loose locking element which, in the hooked state of two panels, prevents release of the hook connection in a direction perpendicular to the plane of the installed panels, provided that the locking element is located in a locking groove of one of the hook elements of a first panel and the locking groove is provided on a surface of the hook element that, in the installed state of the panels, is oriented approximately perpendicular to the plane in which the panels are installed.

A fastening system without an additional locking element is

known from DE 199 29 896 A1. A characteristic feature of a fastening system of this kind is that the first and second retaining profiles used have very different geometries and that the joining methods of the different types of retaining profile differ greatly as a result. In particular, the second retaining profiles, which are designed as hook elements and joined to form a hook connection, involve a technical problem. While the familiar hook connection effectively prevents floor panels from being slid apart in the plane at right angles to the small faces of the connected panels, it does not afford satisfactory resistance to the hook elements being released in a direction perpendicular to the plane of the installed panels.

A fastening system of this kind is used with preference for so-called laminate flooring, which displays a core made of a wood material, such as MDF, HDF or particle board material. The mechanical retaining profiles are generally milled into the small faces of boards made of wood materials.

Laminate flooring is predominantly laid in floating fashion. To reduce footstep sound, a footstep sound-insulating intermediate layer is usually laid between the base surface and the laminate panels. It is also known for a footstep sound-insulating layer to be permanently attached to the underside of laminate panels that faces the base surface.

The hook connection of the known fastening system is particularly problematic if, in the region of a hook connection, only the panel whose hook element is at the bottom, i.e. facing the base surface, is exposed to a high load. The upper hook element of the adjacent panel, hooked into this hook, is not exposed to loading, as a result of which the load only presses the panel with the hook element at the bottom into the generally soft footstep sound-insulating intermediate layer. The top hook element of the non-loaded panel releases itself from the bottom hook element of the adjacent panel in the process. The hook

connection ceases to function, and the function can usually not be restored.

According to the prior art, undercuts are integrated in the hook connection, by means of which releasing of the hook connection perpendicular to the installation plane of the panels is said to be prevented. These undercuts have, however, proven to be insufficient to afford this kind of fastening element sufficient strength.

A generic fastening system displaying an additional locking element in known from WO 01/51732 A1. Following interlocking of the hook elements, the locking element has to be subsequently inserted at the point of connection. This requires an additional work step. Moreover, fitting of the locking element causes problems if a row of panels is located very close in front of a wall. Insufficient space is then available for the locking element to insert it at the point of connection.

The object of the invention is to develop a locking element in such a way that it can be fitted more easily, even close to a building wall.

According to the invention, the object is solved in that the locking element displays a resilient snap tab, where the locking groove of the associated hook element of the opposite small face of a second panel forms an undercut snap-in depression, into which the snap tab of the hook element of the first panel snaps automatically during installation.

This innovative locking element can be supplied loose with panels, so that the layer himself can attach it at the envisaged point on the hook element during installation, or it is already pre-mounted for the layer when he installs the panels. Consequently, the layer does not have to work with any loose connecting parts. When the hook connection has been swivelled down

almost to its locking position, the snap tab automatically springs forwards into the snap-in depression of the adjacent panel, locking the hook connection in the vertical direction, i.e. perpendicular to the plane of the installed panels.

The locking element can be a very simple component, for which there are various designs. It can be a locking element that is pre-mounted on one of the hook elements, a loose locking element that is fitted after hooking the hook elements together, or a locking element integrated into the core material of the panel.

In a particularly simple embodiment, each of the hook elements of the opposite small faces of a panel displays a locking groove extending in the longitudinal direction of the small face. When the hook elements are connected, the locking grooves of two panels are adjacent to each other, forming a common locking recess. When profiling the hook elements with milling tools, the locking grooves can very easily be included in the milling process. Appropriate contours must be provided on the milling tools for this purpose.

If the locking recess has a round or rectangular cross-section, this has the advantage that particularly inexpensive standard material can be used for the locking elements. Any desired material is open to consideration for locking elements with a round or rectangular cross-section. Corresponding rod material can, for example, be purchased in ready-made form, or by the metre for cutting into locking elements of appropriate length. For locking grooves that together form a locking recess with a round cross-section, it is particularly favourable if a nail is used as the locking element, or if the locking element is designed in the manner of a nail. The head of a nail facilitates not only insertion of the locking element into the hook connection during installation, but also removal of the locking element if the hook connection needs to be released again for the

purpose of disassembling the panels.

It is very useful if, in the hooked state of two panels, the locking element can simply be inserted into the locking recess and the cross-section at least partially protrudes into the cross-section of the locking groove of the one panel and partially into the cross-section of the locking groove of the other panel. The division of the cross-section between the locking grooves can be selected virtually at random. It can, for example, be made dependent on whether one of the hook elements in which the locking groove is located is designed more stably than the other. The locking element can be inserted into the locking recess by sliding or hammering. The tolerances of the locking element and the locking recess can be designed in such a way that the locking element can be inserted into the locking recess either loosely or tightly.

Preferably when a simple locking element with a round or polygonal cross-section is involved, it is advantageous for the locking grooves to be provided on hook element surfaces that, in the installed state of the panels, are oriented roughly perpendicular to the plane in which the panels are installed.

This design can straightforwardly be provided with a locking element displaying a snap tab projecting far beyond the small face in relaxed state, which comes into contact with the hook element of the adjacent panel during downward swivelling of a new panel into the plane of the installed panels and is automatically bent so far back that the snap tab no longer projects beyond the outer end of the hook element on the small face. When the hook connection has almost reached its locking position, the snap tab automatically springs forwards into the snap-in depression of the hook element of the adjacent panel, locking the hook connection in the vertical direction, i.e. perpendicular to the plane of the installed panels.

An automatic snap element of this kind can be pre-mounted in one of the hook elements, or enclosed separately so that the layer can attach it to the envisaged hook element himself during installation of the panels.

The automatic locking element and the snap-in depression are expediently designed in such a way that the locking element can easily be pulled out of the hook connection in the longitudinal direction of the small faces at any time using a simple tool, such as pointed pliers, if the panels need to be disassembled. To this end, a free space is provided on either side of the snap tab, so that pliers can be applied.

The fundamental advantage of locking by means of a snap-in locking element, as opposed to a locking element to be slid in, is that no space is required in front of the small face of a row of panels for positioning the locking element against a locking recess and sliding it into said recess. Close to a wall, a locking element that needs to be slid in can no longer be inserted into a locking recess, whereas the snap-in locking element can easily be attached laterally to one of the hook elements and locked by swivelling down a new panel.

The purpose of a further useful improvement is that one and the same locking recess formed by locking grooves of two hook elements can serve to accommodate different locking elements that display different geometries and afford the hook connection the necessary strength by means of different locking mechanisms. The locking grooves and locking elements are specially coordinated with each other to this end. In this context, either a rod-shaped locking element can be slid into the locking recess in its longitudinal direction or, alternatively, a locking element displaying a resilient snap tab can be accommodated in the same locking recess, where one of the locking grooves then forms a retaining mount for the locking element provided with the snap tab, and the associated locking groove forms an under-

cut snap-in depression which the resilient snap tab engages automatically during assembly of the hook connection.

A panel with a fastening system according to the invention displays two different types of interacting retaining profiles. The retaining profiles via which the individual rows of a laid floor are interlocked display retaining profiles that are interlocked according to the principle of inclined attachment of a new panel with subsequent downward swivelling of the same. The type of retaining profile required for this makes it possible to mechanically interlock a new panel on a row of installed panels by means of a hinge-like swivelling movement. As a result, the individual panel rows are protected against being pulled apart in the plane in a direction perpendicular to the interlocked retaining profiles.

On the remaining two small faces of the panel, retaining profiles are provided in the form of hook elements, where a first hook element projects from the small face and, in the installed state, faces the base surface, and the second hook element projects from the small face and faces the decorative top side of the panel. Both hook elements of a hook connection are protected by an additional locking element against moving apart in a direction perpendicular to the plane of the installed panels.

An example of the invention is illustrated below in a drawing and described in detail on the basis of the Figures. The Figures show the following:

Fig. 1 A perspective view of a retaining profile that can be mechanically interlocked by attaching a new panel at an angle and subsequently swivelling it down into the plane of the installed panels,

Fig. 2 The attachment at an angle of the retaining profiles according to Fig. 1,

Fig. 3 The retaining profiles according to Fig. 1 in the interlocked state,

Fig. 4 Retaining profiles in the form of hook elements according to the prior art,

Figs. 5-8 An embodiment of a hook connection with a locking element with a resilient snap tab that automatically engages an associated snap-in depression during assembly of the hook connection,

Fig. 9 A further locking element with a resilient snap tab and a locking groove adapted to accommodate the locking element,

Fig. 10 A hook connection with the locking element according to Fig. 9 during the connecting procedure,

Fig. 11 A hook connection with the locking element according to Fig. 9 in engaged state,

Fig. 12 A hook connection with the same locking grooves and the same locking recess as according to Fig.11, where the snap tab locking element is replaced by a locking element with a round cross-section, and

Fig. 13 A perspective view of an embodiment of a hook connection with a locking element as shown in Figs. 5-8, wherein the locking element is rotated 90 degrees.

Figure 1 of the drawing shows a perspective view of one type of retaining profile for fastening system 1 according to the invention. The opposite small faces of panels 2 and 3 are provided with corresponding retaining profiles, so that adjacent panels 2 and 3 can be connected to each other. This type of retaining profile is a modified tongue-and-groove joint, where tongue 4 engages an undercut in the lower groove wall of groove 5, so that, in the installed state, the two panels 2 and 3 are protected against being pulled apart in the plane of installed

panels 2 and 3 and perpendicular to the direction of the interlocked small faces.

Figure 2 shows the attachment of a new panel 2 at an angle. In this context, tongue 4 of new panel 2 is always engaged with groove 5 of installed panel 3 in the direction of arrow P1, and new panel 2 is subsequently swivelled down onto base surface V until the position illustrated in Fig. 3 is reached. It is easily comprehensible that a curved area 4a of the cross-section of tongue 4 engages a depression 5a with a curved cross-section in bottom groove wall 5b of groove 5 in such a way that panels 2 and 3 are prevented from being slid apart in the plane perpendicular to the interlocked small faces.

The remaining small faces of a panel 2 or 3 equipped with fastening system 1 according to the invention are provided with corresponding retaining profiles with hook elements 6 and 7. These have the advantage that they hook into each other simultaneously, as it were, with the interlocking of the retaining profiles described according to Figs. 1 to 3, tongue 4 and groove 5, following attachment at an angle, as a result of new panel 2 being swivelled down onto base surface V. No lateral joining movement of any kind whatsoever is necessary to establish resultant hook connection 8.

Hook connection 8, illustrated in Fig. 4, disengages. This occurs, for example, on uneven substrates, where there is air between the panels and base surface V, and also when a soft, footstep sound-insulating intermediate layer 9 is located between the panels and base surface V. The symbolically represented weight 11 in Fig. 4 illustrates how a panel whose hook element faces the base surface sinks into soft, footstep sound-insulating intermediate layer 9 when exposed to the load of weight 11. This results in vertical offset 12 at the surface of panels 2 and 10.

A further embodiment of hook connection 8 is illustrated in Figs. 5 to 8. Figure 5 shows a loose locking element 36 with a resilient snap tab 37, which is wide open in the relaxed state illustrated. Figure 6 shows the gradual joining of hook connection 8 according to the direction of arrow P2. In this context, locking element 36 according to Fig. 5 is inserted in a groove 38 in the freely projecting surface 38a of upper hook element 6. Resilient snap tab 37 is bent back by the joining movement itself. As soon as hook connection 8 almost reaches the locking position shown in Fig. 7, snap tab 37 of locking element 36 automatically springs into locking depression 39 of corresponding hook element 7. In the position shown, snap tab 37 is less wide open than in the relaxed position illustrated in Fig. 5, meaning that it permanently exerts spring pressure on locking depression 39, thus securely locking hook connection 8.

A floor-layer can insert locking element 36 into groove 38, provided for this purpose in upper hook element 6, as a loose element, or it can be pre-mounted on hook element 6 by the manufacturer. Locking element 36 can extend over the entire length of the small face of a panel, or over only part of the length of the small face. In the practical example, it starts at one end of the small face and extends over half its length.

Figure 7 shows that free spaces are present on both sides of snap tab 37. These can be used, for example, to pull locking element 36 out of hook connection 8 with the help of pointed pliers, and thus to release hook connection 8, for the purpose of disassembling panels 2 and 10.

Figures 6 and 7 show a design where the outer end of hook element 7, which faces base surface V, displays a free space 17 between it and corresponding hook element 6.

A further embodiment of the hook connection with a locking element 36 displaying an automatic snap tab 37 is illustrated in

Fig. 8. The only difference compared to the embodiment according to Fig. 6 and Fig. 7 is that the free outer end of hook element 7 of panel 10, which faces base surface V, does not display a free space 17 between it and corresponding hook element 6 of connected panel 2. Instead, an undercut connection 18 is again provided, which, just like locking element 36, prevents hook connection 8 from moving apart in a direction perpendicular to the plane of installed panels 2 and 10.

Figure 9 shows a locking element 50 with a special cross-section, which can in practice be replaced by locking element 51 shown in Fig. 12. The latter locking element 51 displays a simple, round cross-section. In addition, Fig. 9 shows an empty locking groove 52, in which locking element 51 can be accommodated in captive fashion. This captive design ensures that locking element 50 cannot fall out of locking groove 52 during handling of a panel 2 and during interlocking of hook connection 8 according to the direction of arrow P3. To permit the exchange of locking elements 50 and 51, locking grooves 52 and 53, provided in hook elements 6 and 7, are specially adapted to the geometry of the different locking elements 50 and 51.

Locking element 50 is a development of locking element 36, shown in Fig. 5. It displays a snap tab 54, which is shown in wide-open, relaxed state in Fig. 9. On back 55, locking element 50 displays a round form which, according to Fig. 10, matches and fits into locking groove 52 of hook element 6. Locking element 50 is provided with retaining elements 56 and 57, via which it can be fixed in locking groove 52 of hook element 6 in captive fashion. Retaining elements 56 and 57 additionally serve to prevent slipping or rotation of locking element 50 in locking groove 52 or in locking recess 58, formed by locking grooves 52 and 53. In the present embodiment, retaining elements 56 and 57 are designed as blunt toes. It can be seen on empty locking groove 52 in Fig. 9 that it has material recesses 56a and 57a at the edges of its semi-circular cross-section,

these serving to accommodate retaining elements 56 and 57. Dimension A indicated on locking groove 52 is slightly smaller than dimension B indicated on locking element 50. This results in captive clamping of locking element 50 in locking groove 52.

In a different embodiment, the retaining elements of locking element 50 are designed as barbs or claw elements (not shown), which can be fixed in part of the groove wall of locking groove 52 and hold locking element 50 in captive fashion on hook element 6. The material recesses in locking groove 52 are not necessary with this design.

Figure 10 shows the joining procedure for hook connection 8. Panel 2 is swivelled down onto base surface V according to the direction of arrow P3, as a result of which hook elements 6 and 7 of panels 2 and 10 interlock. It is easily recognisable that locking element 50 is securely retained in locking groove 52 while the hook elements are connected in the manner described. As soon as the free end of snap tab 54 has passed upper edge 53a of locking groove 53, snap tab 54 automatically springs into locking groove 53, which serves as a locking depression for it and locks the hook connection, as illustrated in Fig. 11.

Figure 13 shows an alternate embodiment of the hook connection 8 incorporating locking element 36. However, in this embodiment, the locking element 36 is rotated 90 degrees with respect to the position of the locking element 36 shown in Figs. 5-8. The function of the locking element 36, however, remains unchanged.

L/fl

9 September 2003

PCT/DE 02/02444

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D-56759 Kaisersesch

Panel and fastening system for such a panel

List of reference numbers

1	Fastening system
2	Panel
3	Panel
4	Tongue
4a	Curved area
5	Groove
5a	Curved depression
5b	Lower groove wall
6	Hook element
7	Hook element
8	Hook connection
9	Footstep sound-insulating intermediate layer
10	Panel
11	Weight
12	Vertical offset
36	Locking element
37	Snap tab
38	Groove
38a	Projecting surface
39	Snap-in depression
50	Locking element
51	Locking element

AMENDED PAGE

52 Locking groove

53 Locking groove

53a Upper edge

54 Snap tab

55 Back

56 Retaining element

56a Material recess

57 Retaining element

57a Material recess

58 Locking recess

A Dimension

B Dimension

P1 Direction of arrow

P2 Direction of arrow

P3 Direction of arrow

V Base surface

AMENDED PAGE

1. A fastening system (1) for rectangular, tabular panels (2, 3, 10), each of said panels (2, 3, 10) having four small faces with two opposite small faces defining a first set of opposite small faces, the remaining two opposite small faces defining a second set of opposite small faces, said fastening system (1) comprising retaining profiles located on said small faces of each of said panels (2, 3, 10), of which the retaining profiles on opposite sides of said panels correspond in such a manner that similar panels can be interconnected, wherein the retaining profiles on said first set of opposite small faces are designed as first retaining profiles, and the retaining profiles on said second set of opposite small faces are designed as second retaining profiles, such that on a first of said panels (2, 3, 10) installed in a first row, a second of said panels (2, 3, 10) can be locked in a second row by first attaching a first retaining profile of said second panel to a corresponding first retaining profile on said first panel at a temporary angle relative to said first panel and then swivelling the second panel down into the plane of the first panel, the second retaining profiles of said panels (2, 3, 10) including corresponding hook elements (6, 7) such that a hook connection (8) can be established by means of one of the hook elements (6, 7) of a third panel and a corresponding hook element (6, 7) of said second of said panels (2, 3, 10) already installed in said second row by swivelling down said third panel, each hook connection (8) being provided with an additional locking element (36, 50) which, in the hooked state of two of said panels (2, 3, 10), prevents the hook connection (8) from being released in a direction perpendicular to the plane of installed panels (2, 3, 10) subject to the provision that the locking element (36, 50) is located in a locking groove (52) in one of the hook elements (6) of said hook connection (8), the locking groove (52) being provided on

a surface of the hook element (6) such that, in the installed state of said panels (2, 3, 10), said surface is aligned approximately perpendicular to the plane in which the panels (2, 3, 10) are installed, and wherein at least one such locking element (36, 50) is provided that includes a resilient snap tab (37, 54), where a locking groove (53) on the hook element (7) corresponding to the hook element (6) which is provided with the locking element (36, 50) includes an undercut snap-in depression (39) into which the snap tab (37, 54) of said locking element (36, 50) snaps automatically during installation of said panels.

2. A fastening system according to Claim 1, wherein said locking grooves (52, 53) are provided on surfaces of the hook elements (6, 7) that, in the installed state of the panels (2, 3, 10), are oriented roughly perpendicular to the plane in which the panels are installed.

3. A fastening system according to Claim 1 or 2, wherein the locking grooves (52, 53) of the hook connection (8) form a common locking recess and are designed in such a way that either a rod-shaped locking element (51) can be slid into the common locking recess in its longitudinal direction or, alternatively, a locking element (50) having a resilient snap tab can be accommodated in the same common locking recess, where one of the locking grooves (52, 53) then forms a retaining mount for the locking element (50) provided with the snap tab (54), and the other (53) of said locking grooves (52, 53) forms an undercut snap-in depression which the resilient snap tab (54) engages automatically during assembly of the hook connection (8).

4. A fastening system according to any one of claims 1 to 3, wherein said panels are floor panels.

5. A panel comprising a fastening system according to any one of claims 1 to 3.

6. A locking element for use in a hook connection of rectangular, tabular panels to prevent release of the hook connection between at least two of the panels in a direction perpendicular to the plane of the panels when the panels are in a hooked state, each of said panels having corresponding hooking elements formed on a pair of opposite small faces of each of said panels, said locking element being mounted on one of said small faces having one of said hooking elements when in use with said panels, wherein the locking element has a cross-section perpendicular to the plane of the panels and perpendicular to the plane of the small face on which said locking element is mounted, said locking element having a relaxed state in which said locking element has a projecting portion extending from and projecting beyond the plane of the small face and a compressed state wherein the projecting portion is retracted from its fully extended position during engagement of the corresponding hooking elements between two of said panels when forming said hooked connection.

7. The locking element as claimed in claim 6, wherein the locking element is pre-mounted on said panels prior to use.

8. A locking element as claimed in claim 6 or 7, wherein the projecting portion is in the form of a resilient snap tab.

9. The locking element as claimed in claim 8, wherein said resilient snap tab has elastic flexibility thereby permitting

said resilient snap tab to change between said relaxed state to said compressed state, and vice versa, with a resilient springing action.

10. The locking element as claimed in claim 8 or 9, wherein the locking element has a first end forming the resilient snap tab and a second end forming an insertion area for mating with a corresponding groove formed in the hooking element of said small face of the panel on which said locking element is mounted, said first end projecting from said small face when said locking element is mounted on said panel.

11. The locking element as claimed in claim 10, wherein the resilient snap tab of said first end of the locking element includes a contact surface.

12. The locking element as claimed in claim 11, wherein when said second end of said locking element is pre-mounted in said groove on said hooking element of said panel, said contact surface is located in a plane that is inclined relative to the plane of the panel.

13. The locking element as claimed in claim 11 or 12, wherein when the at least two panels are engaged in said hooked connection, said contact surface is located in a plane that is inclined relative to the plane of the panels.

14. The locking element as claimed in any one of claims 11 to 13, wherein the contact surface of said locking element engages a corresponding snap-in depression formed in the small face of

the corresponding panel of said at least two panels when said hooked connected is established.

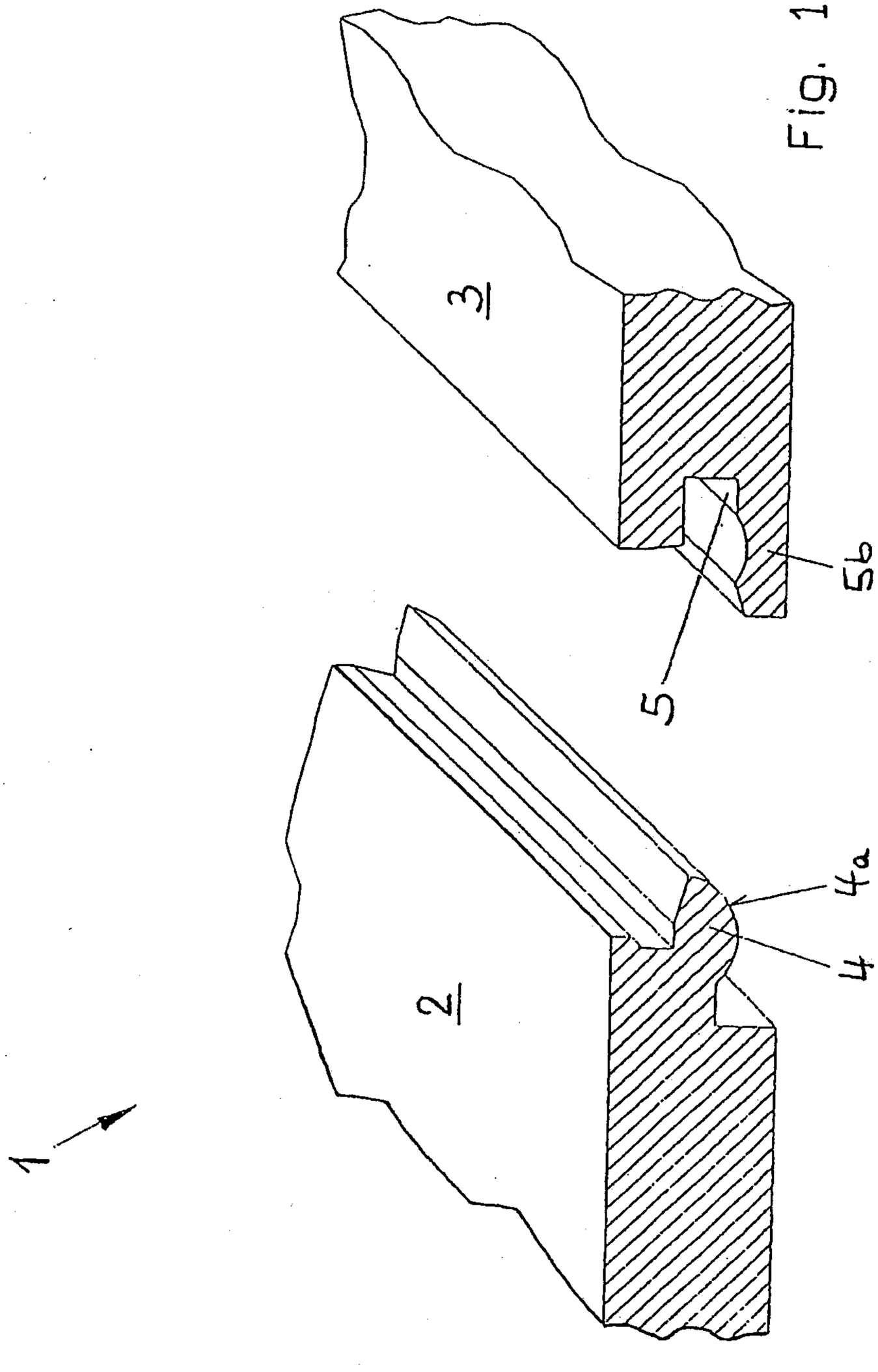

Fig. 1

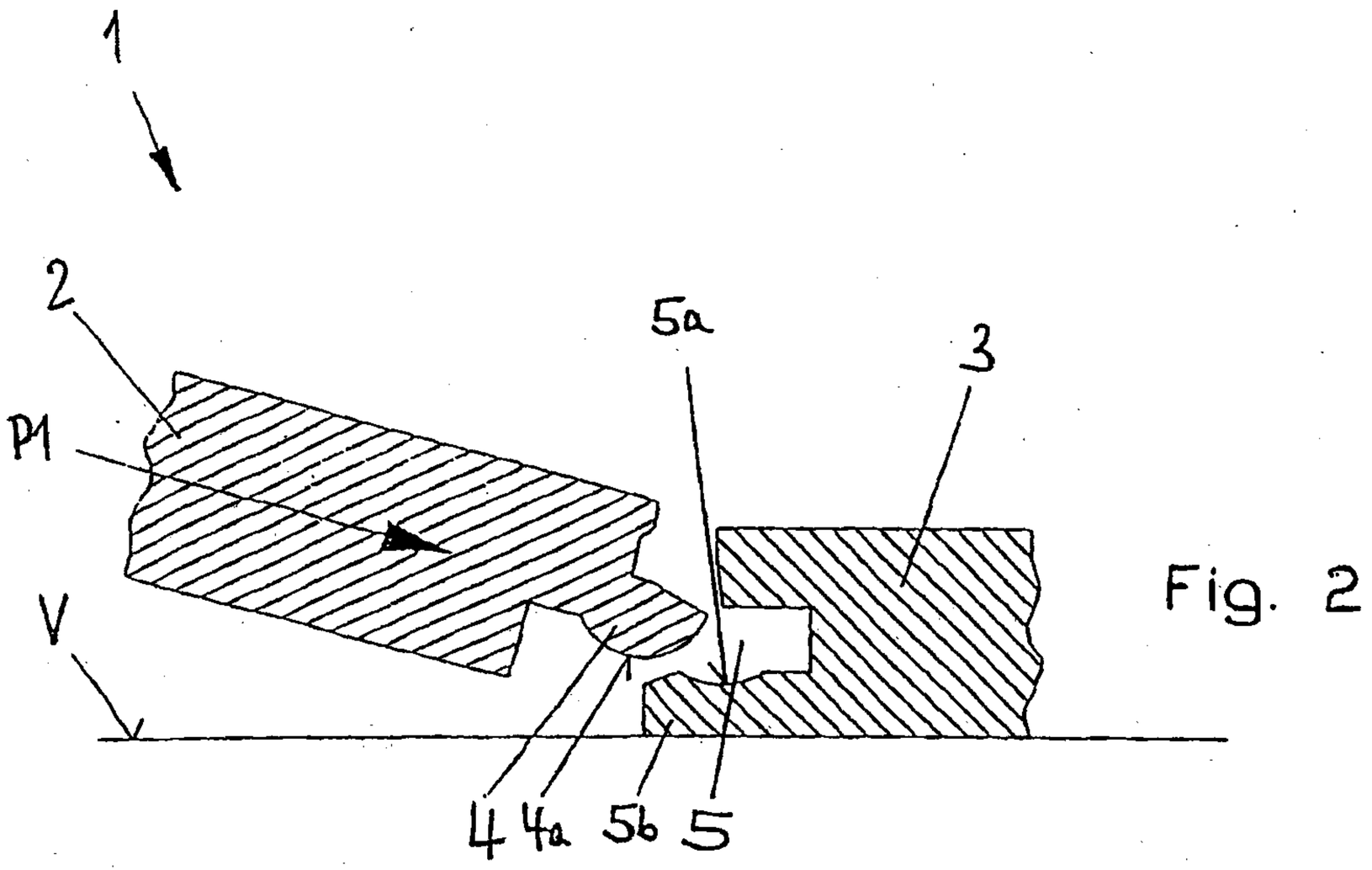

Fig. 2

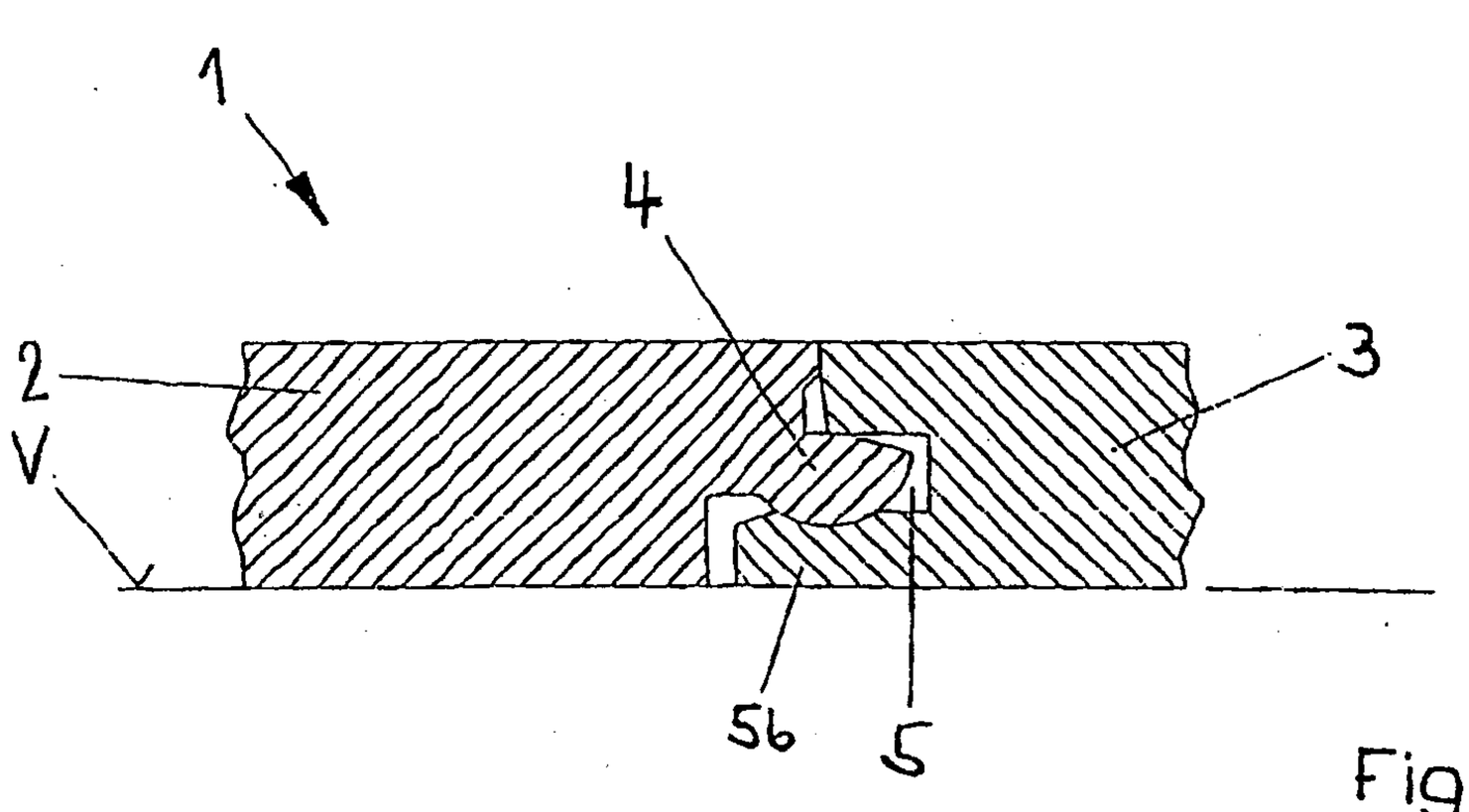

Fig. 3

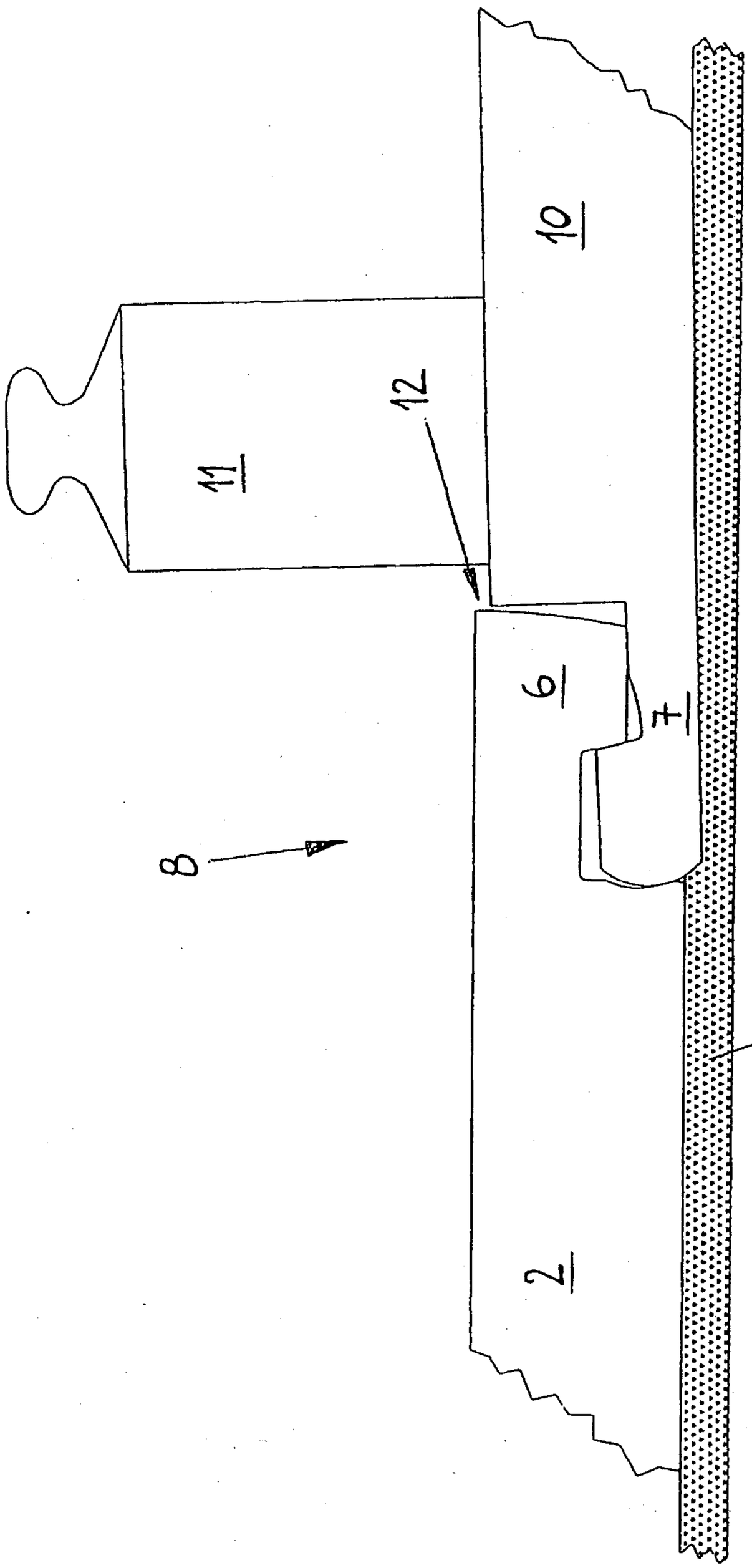

Fig. 4
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Fig. 5

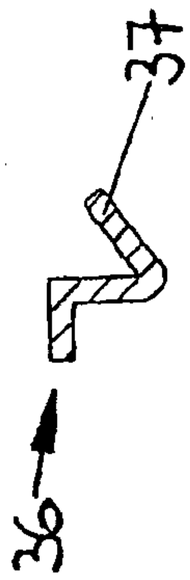


Fig. 6

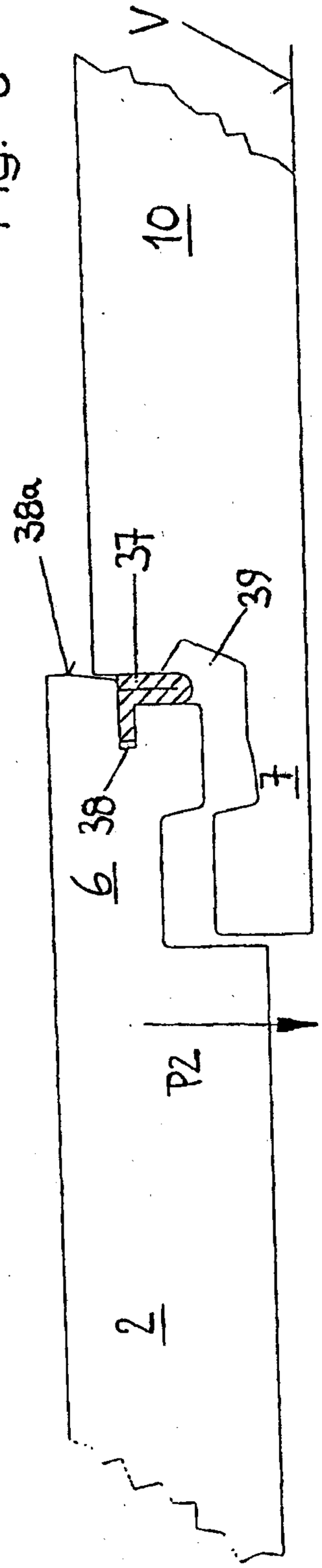


Fig. 7

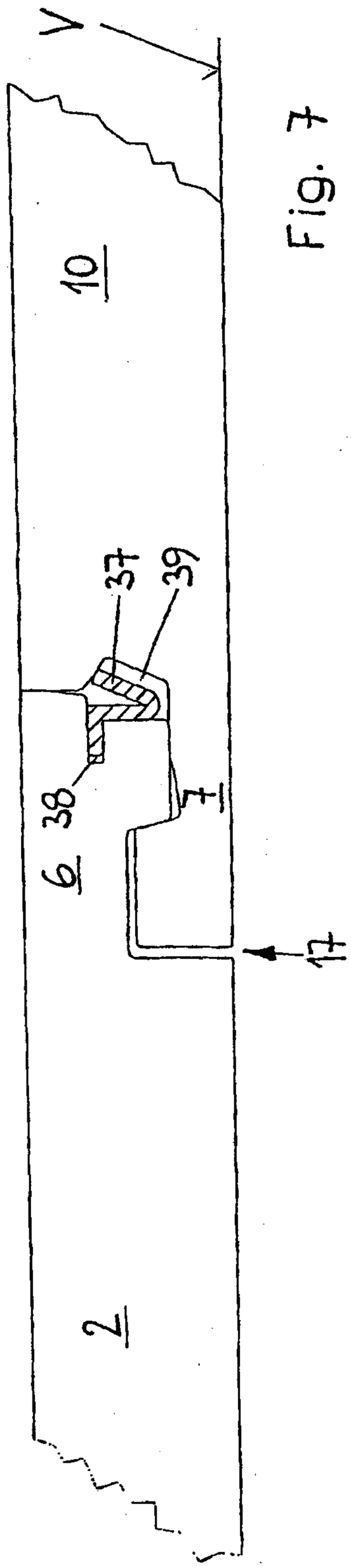
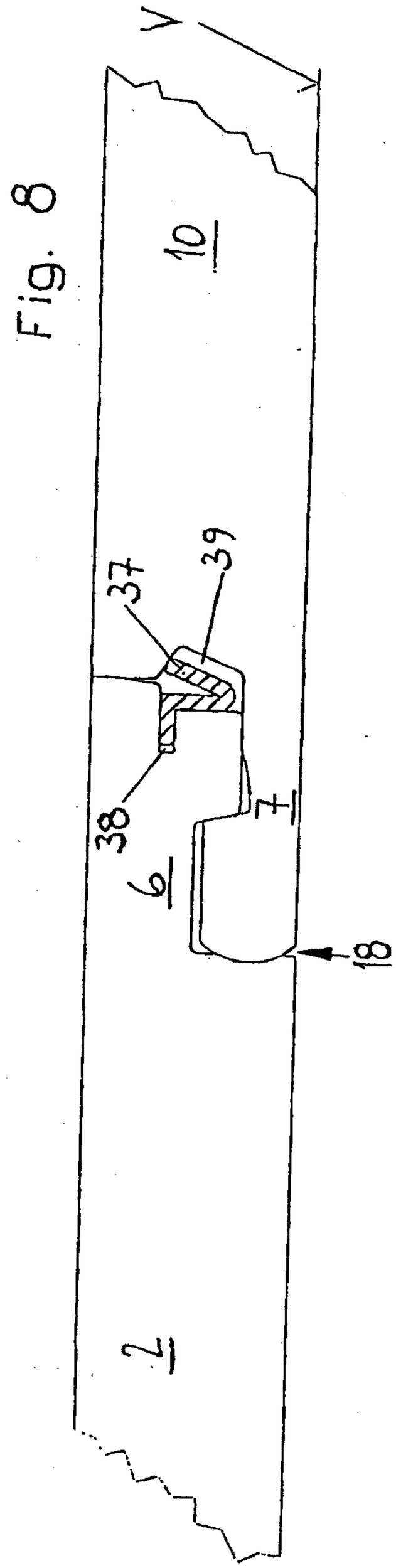


Fig. 8



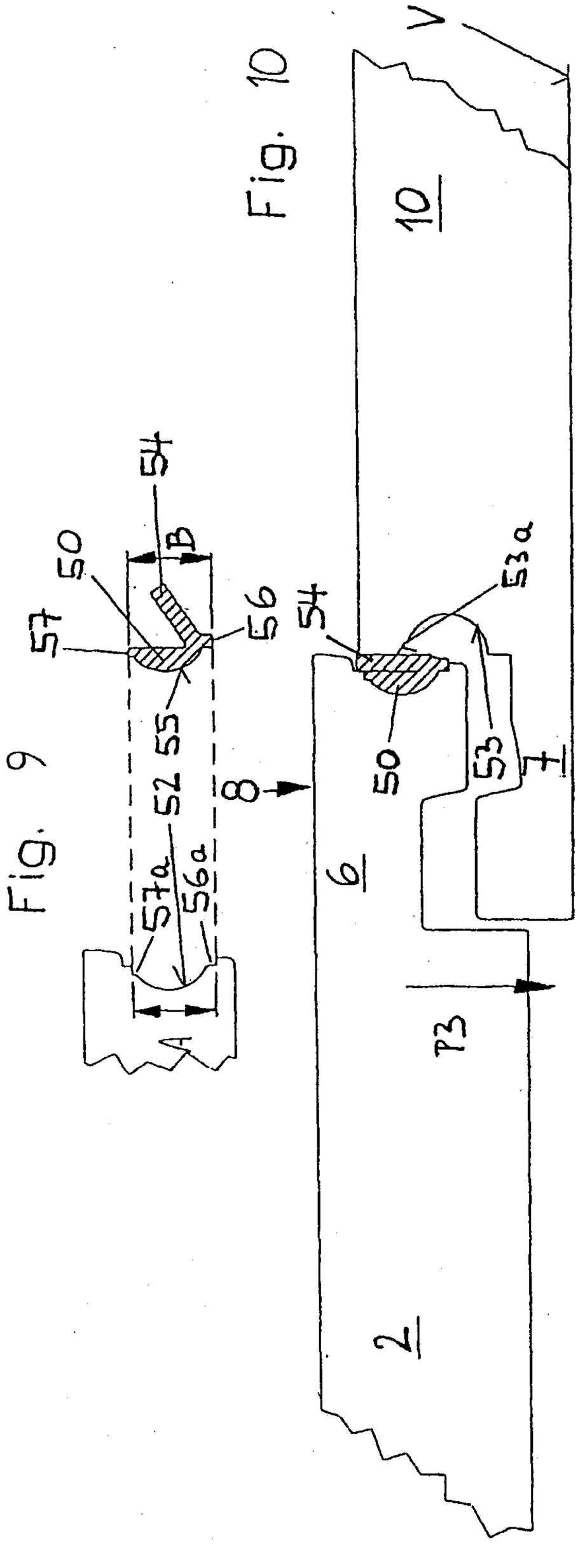


Fig. 10

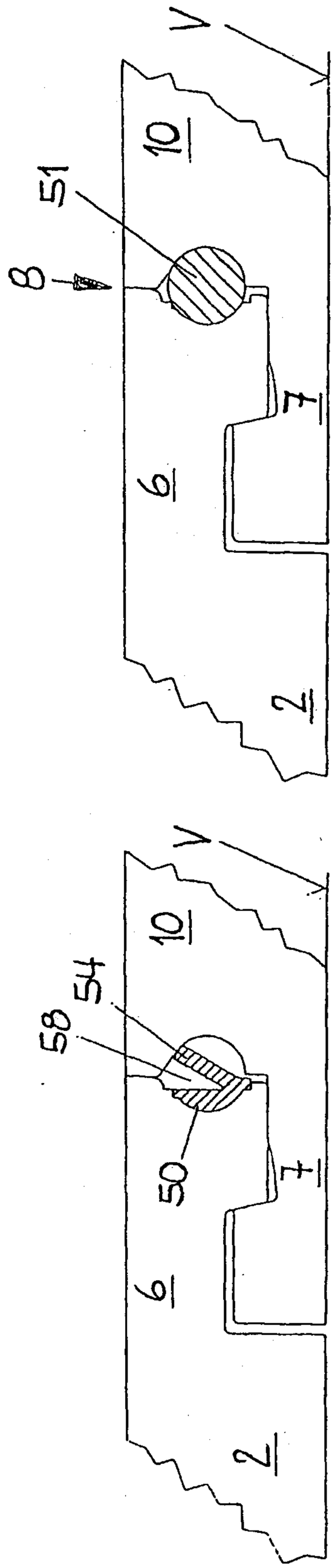


Fig. 12

Fig. 11

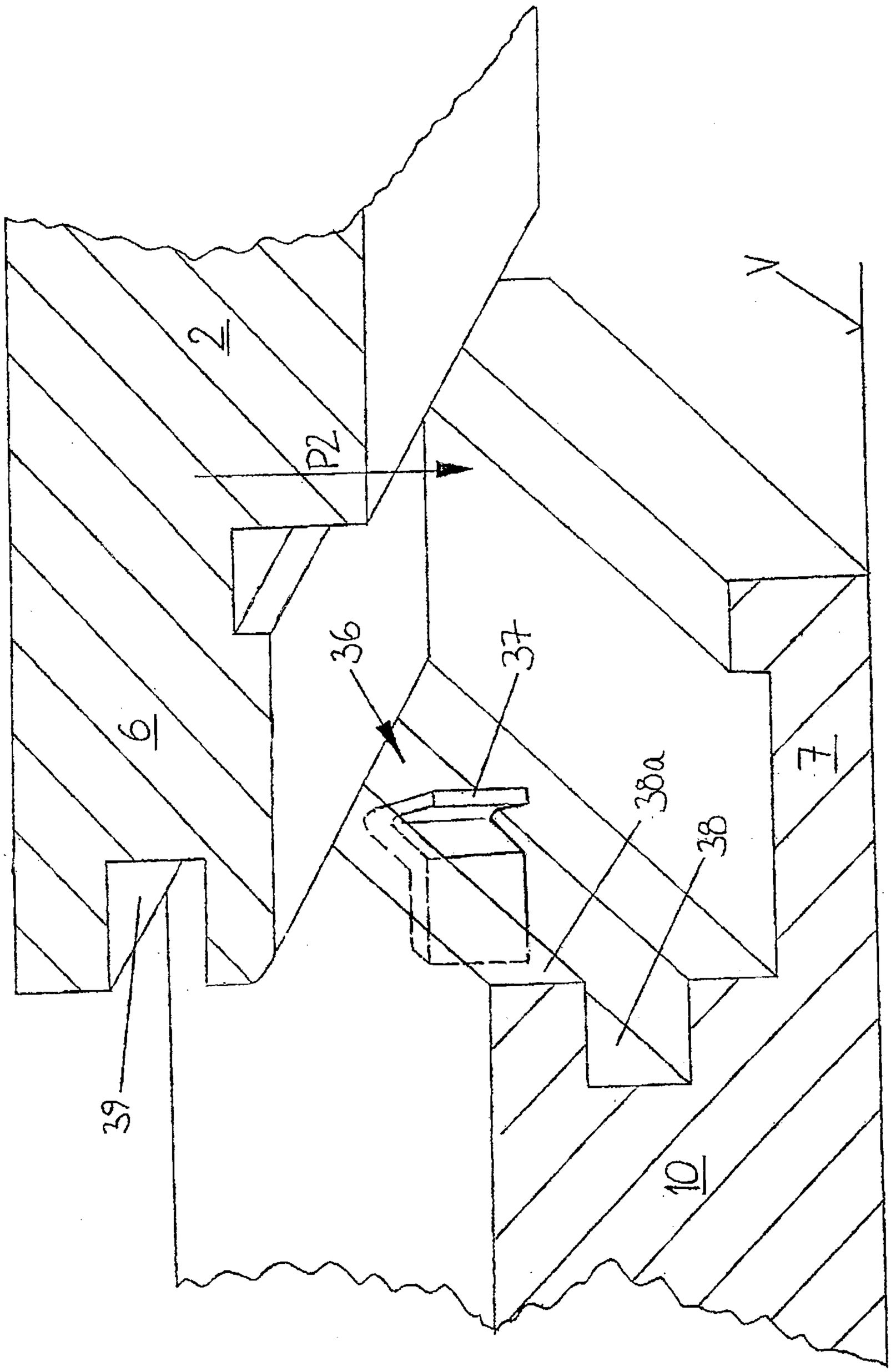
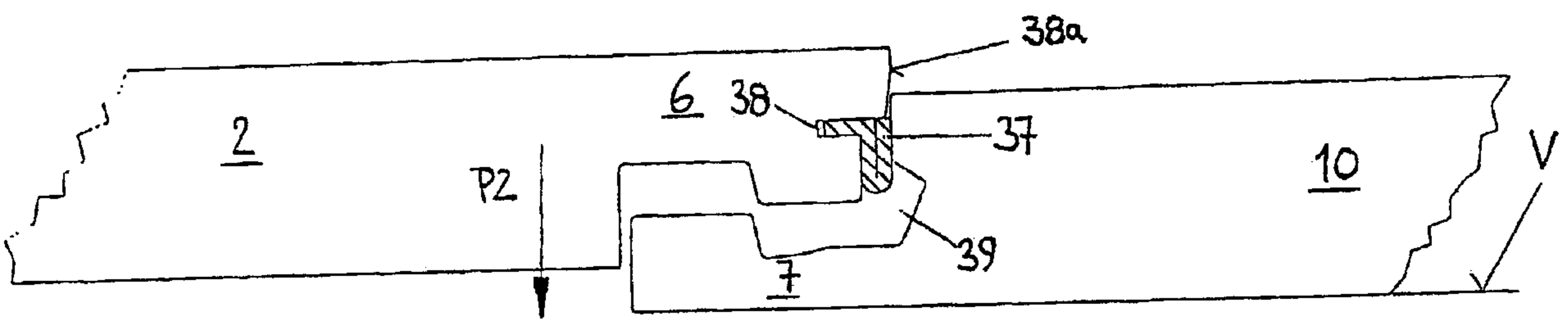


FIG. 13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