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## (54) Method and device for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like

(57) A method for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, comprising the steps of preparing, on a pair of panel-like elements (1a, 1b), at least one respective joining edge (2), which is inclined at an angle with respect to the plane of arrangement of the panel-like elements (1a, 1b); providing, on the joining edge (2) of each panel-like element (1a, 1b), at least one engagement seat (3), arranged at a preset distance from the corner edge (5) defined between the corresponding joining edge (2) and the face (6) of the corresponding panel-like element (1a, 1b) designed to be directed outward; inserting at least one portion of a connecting element (4) in the engagement seat (3) of one of the panel-like elements (1a, 1b); and coupling the panel-like elements (1a, 1b) along the corresponding joining edges (2), inserting the remaining portion of the connecting element (4) in the engagement seat (3) of the other panel-like element (1a, 1b).

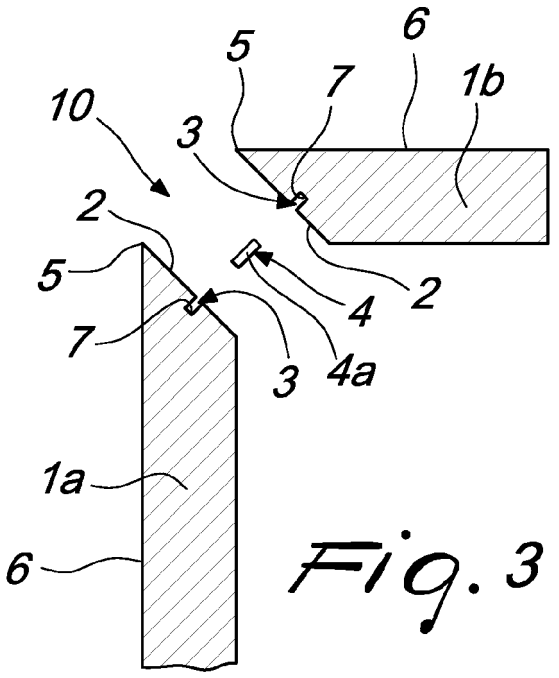


Fig. 3

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## Description

**[0001]** The present invention relates to a method and a device for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like.

**[0002]** As is known, in some implementation solutions, worktops for kitchens are made with panel-like elements made of stone-like material, such as natural or artificial stone, or of other materials that can be cut, or at any rate worked, similarly to stone-like materials, using diamond-edged utensils, such as, for example, glass, ceramic or the like.

**[0003]** In these implementations, it is normal to join, at an angle, the sides of the panel-like element that forms the worktop to other panel-like elements of stone-like material, which are intended to project downward at right angles from the panel-like element that provides the worktop, to create the illusion that the panel-like element that forms the worktop has a greater thickness than it actually has in reality.

**[0004]** Currently, for performing the corner joint between the panel-like element that forms the worktop and the other panel-like elements that are arranged along its sides, a cut is made at an angle of 45°, or at another angle, at the edges of the panel-like elements to be joined and the cut edges are glued together, taking care to position the panel-like elements so as to hide the joint line as much as possible.

**[0005]** As can readily be grasped, this type of connection, in addition to requiring a certain manual skill for its execution, offers a mechanical strength that relies solely on the strength of the glues used.

**[0006]** Similar solutions are also employed for performing the corner joining of panel-like elements designed to be used in other applications, such as, for example, the provision of claddings for corner portions of walls, staircases or the like.

**[0007]** The aim of the present invention is to overcome the above-mentioned drawbacks, by providing a method for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, that makes it possible, without difficulty and very conveniently and rapidly, to interconnect two panel-like elements arranged at an angle with respect to each other and made of stone-like material or other material that can be worked by means of diamond-edged utensils, in the process ensuring a high level of precision in the mutual positioning of the two panel-like elements.

**[0008]** Within this aim, an object of the invention is to provide a device for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, that is capable of providing a corner joint between two panel-like elements with high characteristics of mechanical strength.

**[0009]** Another object of the invention is to provide an apparatus for cutting slabs that makes it possible to prepare, very simply and very practically, the panel-like elements to be joined for the application of the device according to the invention.

**[0010]** Another object of the present invention is to provide a device for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, that can be obtained using elements and materials that are readily available on the market and that, moreover, is very inexpensive.

**[0011]** This aim and these and other objects which will become more apparent hereinafter, are achieved by a method for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, according to the invention, characterized in that it comprises the steps of:

- preparing, on a pair of panel-like elements to be corner joined to each other, at least one respective joining edge which is inclined at an angle with respect to the plane of arrangement of said panel-like elements;
- providing, on the joining edge of each one of said panel-like elements, at least one engagement seat for at least one connecting element, said at least one engagement seat being arranged at a preset distance from the corner edge defined between the corresponding joining edge and the face of the corresponding panel-like element designed to be directed outward;
- inserting at least one portion of said connecting element in the engagement seat of one of said panel-like elements;
- coupling to each other said panel-like elements along the corresponding joining edges, inserting the remaining portion of said connecting element in the engagement seat of the other panel-like element and interposing an adhesive material between the joining edges of said panel-like elements.

**[0012]** According to another aspect of the invention, a device is provided for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, that comprises, on one side of each one of the panel-like elements to be corner joined to each other, a respective joining edge which is inclined with respect to the plane of arrangement of the corresponding panel-like element, and is characterized in that it comprises at least one connecting element which is interposed between the panel-like elements and passes through the joining edge of each panel-like element.

**[0013]** Further characteristics and advantages of the invention will become more apparent from the description of a preferred, but not exclusive, embodiment of the method and of the device for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, according to the invention, which is illustrated for the purposes of nonlimiting example in the accompanying drawings wherein:

Figure 1 is a perspective view of two panel-like elements connected to each other, at an angle, along a rim thereof, by means of the device according to the invention;
Figure 2 is an exploded perspective view of the device according to the invention;
Figure 3 is a cross-sectional exploded view of the device according to the invention;
Figure 4 is a perspective view of an apparatus for cutting slabs in order to prepare the application of the device according to the invention;
Figure 5 is a front view of the apparatus in Figure 4;
Figure 6 is an enlarged view of a detail of Figure 5;
Figure 7 is a side view of the apparatus in Figure 4;
Figure 8 is a perspective view of a slab subjected to processing by means of the apparatus in Figure 4;
Figure 9 is a perspective side view of the slab in Figure 8;
Figures 10 and 11 are schematic perspective views of two steps of the method according to the invention.

**[0014]** With reference to the figures, the method for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, according to the invention, involves an initial step that consists in preparing, on a pair of panel-like elements 1a and 1b, to be corner joined to each other, at least one respective joining edge 2 which is inclined at an angle with respect to the plane of arrangement of the panel-like elements 1a, 1b.

**[0015]** It should be noted that the panel-like elements 1a and 1b can be made of a stone-like material, constituted, for example, by natural stone, such as marble, granite or the like, or artificial stone, such as stone-like agglomerates or the like, or of another material that can be cut or, more generally, worked, by using diamond-edged utensils, such as, for example, glass, ceramic, concrete or the like.

**[0016]** Subsequently, on the joining edge 2 of each panel-like element 1a, 1b, at least one engagement seat 3 is then provided for at least one connecting element 4, which is designed to be interposed between the two panel-like elements 1a and 1b to be joined, in order to achieve their connection to each other.

**[0017]** In particular, each engagement seat 3 is made so as to be positioned at a preset distance from the corner edge 5 that is defined between the corresponding joining edge 2 and the face 6 of the corresponding panel-like element 1a, 1b designed to be directed outward, with the panel-like elements 1a and 1b in the condition of final use.

**[0018]** Obviously, in general, there is no reason why the face of the panel-like elements 1a and 1b designed to be directed outward cannot, optionally, also be the one opposite to the face indicated with 6 in the figures, if, for example, a use of the panel-like elements 1a and 1b is planned which is different from the provision of worktops for kitchens.

**[0019]** With reference to Figure 10, at this point, a portion of the connecting element 4 is inserted in the engagement seat 3 of one of the panel-like elements, for example the one indicated in the drawings with the reference numeral 1a.

**[0020]** In this way, the remaining portion of the connecting element 4, protruding from the engagement seat 3 in which the connecting element 4 has been inserted, makes it possible to create an abutment that enables the operator to execute the successive steps of connecting the two panel-like elements 1a and 1b, in the certainty that he or she will position them correctly with respect to each other, in order to prevent the joint area from being seen too easily.

**[0021]** It will, in fact, be sufficient for the operator to insert this protruding part of the connecting element 4 in the engagement seat of the other panel-like element 1b, in order to connect the two panel-like elements 1a, 1b with the certainty of their correct positioning.

**[0022]** As shown schematically in Figure 11, the panel-like elements 1a and 1b are then coupled to each other along the corresponding joining edges 2, by insertion of the remaining portion of the connecting element 4 in the engagement seat 3 of the other panel-like element 1b and taking care to interpose an adhesive material between the joining edges 2 of the two panel-like elements 1a and 1b.

**[0023]** Advantageously, the step of providing the engagement seat 3 on the joining edges 2 of the panel-like elements 1a and 1b consists, in essence, in providing, on the joining edge 2 of each one of the panel-like elements 1a and 1b, a longitudinal groove 7, which runs along at least one portion of the corresponding joining edge 2, substantially parallel to the corner edge 5 of the corresponding panel-like element 1a, 1b.

**[0024]** In this case, the connecting element 4 is, advantageously, provided by a lamina 4a, made of plastic material or other suitable material, which can be accommodated in the longitudinal grooves 7 provided along the joining edges 2 of the panel-like elements 1a, 1b.

**[0025]** It should be noted that, generally, the joining edge 2 is provided on the panel-like elements 1a and 1b with an inclination of 45° with respect to the plane of arrangement of the corresponding panel-like element 1a, 1b. However, nothing is changed, conceptually speaking, if it is decided to form the joining edges with an inclination other than 45°, with respect to the plane of arrangement of the corresponding panel-like element 1a, 1b.

**[0026]** As illustrated, it can be seen that the method according to the invention makes it possible to obtain a device 10 for corner joining of panel-like elements, according to the invention, that provides, on one side of each one of the panel-like elements 1a and 1b to be corner joined to each other, a respective joining edge 2 which is arranged at an angle to the plane of arrangement of the corresponding panel-like element 1a and 1b.

**[0027]** The peculiarity of the device 10 according to the invention consists in that it comprises at least one connecting element 4 which is interposed between the panel-like elements 1 and which passes through the join-

ing edge 2 of each panel-like element 1a, 1b.

**[0028]** Due to the presence of the connecting element 4, the device 10 makes it possible to achieve a high level of mechanical strength in the join area between the two panel-like elements 1a and 1b.

**[0029]** More specifically, at least one engagement seat 3 is formed on the joining edge 2 of each one of the panel-like elements 1a, in which the connecting element 4 is inserted. It should be noted that, conveniently, the engagement seats 3 defined in the panel-like elements 1a and 1b only penetrate the corresponding panel-like element 1a and 1b to a limited extent, so as not to pierce it, thus being not visible on the outside faces of the panel-like elements 1a and 1b.

**[0030]** With this arrangement, the connecting element 4, being arranged inside the joining edges 2 of the panel-like elements 1a and 1b, is not visible from the face 6 of the panel-like elements 1a, 1b, so as not to alter the appearance of the corner joining with respect to the traditional techniques of corner joining currently in use.

**[0031]** It should also be noted that the device 10 provides, conveniently, for an adhesive material to be interposed between the joining edges 2 of the panel-like elements 1a, 1b.

**[0032]** Advantageously, the engagement seat 3 formed on each joining edge 2 is arranged at a preset distance from the corner edge 5 formed between the corresponding joining edge 2 and the face 6 designed to be directed outward from the corresponding panel-like element 1a, 1b, so as to be certain of the correct arrangement of the panel-like elements 1a, 1b, during the joining steps, as described above.

**[0033]** Preferably, as shown in the figures and as indicated above, the engagement seat 3 of each joining edge 2 is constituted by a longitudinal groove 7 that extends along the corresponding joining edge 2, substantially parallel to the corner edge 5 of the corresponding panel-like element 1a, 1b.

**[0034]** Conveniently, the connecting element 4 is provided by a lamina 4a, which can be made, for example, of plastic or other material, so as to ensure greater resistance to stress in the joint area between the panel-like elements 1a, 1b.

**[0035]** Preferably, again for ensuring a high level of mechanical strength in the joint, the lamina 4a is arranged substantially at right angles to each joining edge 2.

**[0036]** It should be noted that, in the longitudinal grooves 7, a single lamina 4a can be accommodated, extending over a portion or, more preferably, over the entire length of the longitudinal grooves 7, or a plurality of laminas 4a can be accommodated, distributed along the longitudinal grooves 7.

**[0037]** According to another important aspect of the invention, an apparatus for cutting slabs is provided, generally designated with the reference numeral 20, that makes it possible to provide a corner joint between panel-like elements 1a, 1b made of stone-like material or other material that can be cut by means of diamond-edged utensils, according to the method and the device 10 described above.

**[0038]** In particular, the cutting apparatus 20 comprises, on a supporting structure 21, a conveyor 22 of the slab 23 to be cut and means for cutting the slab 23, so as to obtain a pair of panel-like elements 1a and 1b to be corner joined to each other.

**[0039]** More specifically, the cutting means comprise a first cutting assembly 24a, which is designed to perform a first inclined cut in the slab 23 to form an inclined joining edge 2 for a first panel-like element, which, in the example shown in the drawings, is the element designated as 1a.

**[0040]** The cutting means comprise, moreover, a second cutting assembly 24b, which is designed to perform a second inclined cut in the slab 23 to be cut, to form an inclined joining edge 2 for a second panel-like element, which is represented in the drawings by the element designated as 1b.

**[0041]** Also according to the invention, the cutting apparatus 20 is provided with incision means 25, which are adapted to provide, on the joining edges 2 of the first panel-like element 1a and of the second panel-like element 1b, a respective longitudinal groove 7 for the engagement of at least one connecting element 4 to be interposed between the first panel-like element 1a and the second panel-like element 1b, so as to achieve the joining thereof.

**[0042]** These incision means 25 have, moreover, the peculiarity of providing the longitudinal groove 7 at a preset distance from the corner edge 5 that is formed between the joining edges 2 of the first and of the second panel-like element 1a, 1b and the faces 6 of the first and of the second panel-like element 1a and 1b, which are designed to be directed outward.

**[0043]** Advantageously, the first cutting assembly 24a comprises a first cutting disc 26a which is arranged at an angle to the plane of arrangement of the slab 23, while the second cutting assembly 24b comprises a second cutting disc 26b which is arranged at an angle in the direction opposite to the first cutting disc 26a with respect to the plane of arrangement of the slab 23.

**[0044]** The incision means 25 are, advantageously, constituted by at least one first auxiliary cutting disc 27a, arranged substantially parallel to the first cutting disc 26a and capable of providing the longitudinal groove 7 on the joining edge 2 of the second panel-like element 1b, and by at least one second auxiliary cutting disc 27b, which is, instead, arranged substantially parallel to the second cutting disc 26b and adapted to provide the longitudinal groove 7 on the joining edge 2 of the first panel-like element 1a.

**[0045]** Preferably, the first auxiliary cutting disc 27a is substantially coaxial to the first cutting disc 26a and has, again with respect to the first cutting disc 26a, a greater diameter. Similarly, the second auxiliary cutting disc 27b has a greater diameter than the second cutting disc 26b and is arranged substantially coaxially to it.

**[0046]** Advantageously, the first auxiliary cutting disc

27a and the second auxiliary cutting disc 27b are, moreover, arranged at a preset distance respectively from the first cutting disc 26a and from the second cutting disc 26b.

**[0047]** Conveniently, it is possible for the distance between the first auxiliary cutting disc 27a and the first cutting disc 26a as well as the distance between the second auxiliary cutting disc 27a and the second cutting disc 26b to be made adjustable, according to requirements and to the thickness of the slab 23.

**[0048]** Advantageously, the first cutting disc 26a and the first auxiliary cutting disc 27a are axially connected to a single first actuation engine 28a, whereas the second cutting disc 26b and the second auxiliary cutting disc 27b are, in turn, axially connected to a single second actuation engine 28b.

**[0049]** As illustrated, the first cutting assembly 24a and the second cutting assembly 24b are, conveniently, arranged in succession with respect to the advancement direction of the slab 23 on the conveyor 22.

**[0050]** From the foregoing it can be seen that the invention achieves the intended aim and objects and, in particular, attention is drawn to the fact that the method according to the invention makes it possible to couple, in a very simple and precise manner, two panel-like elements made of stone-like material, or other material that can be worked by means of diamond-edged utensils, and which are to be arranged at an angle to each other.

**[0051]** It must also be emphasized that the method and the device according to the invention, and also the apparatus according to the invention, can be validly used not only for performing the corner joining of panel-like elements designed to provide the covering of kitchen worktops or the like, but also for performing the corner joining of panel-like elements designed to provide coverings of other types, such as, for example, claddings for corner portions of walls, stairways or other, similar applications.

**[0052]** All the characteristics of the invention, indicated above as advantageous, advisable or similar, may also be missing or substituted by equivalent characteristics.

**[0053]** The individual characteristics set out with reference to general teachings or to specific embodiments may all be present in other embodiments or may substitute characteristics in such embodiments.

**[0054]** The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

**[0055]** In practice the materials employed, provided they are compatible with the specific use, and the dimensions and shapes, may be any according to requirements.

**[0056]** Moreover, all the details may be substituted by other, technically equivalent elements.

**[0057]** The disclosures in Italian Patent Application No. VR2010A000188 from which this application claims priority are incorporated herein by reference.

**[0058]** Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. A method for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, **characterized in that** it comprises the steps of:

   - preparing, on a pair of panel-like elements (1a, 1b) to be corner joined to each other, at least one respective joining edge (2) which is inclined at an angle with respect to the plane of arrangement of said panel-like elements (1a, 1b);
   - providing, on the joining edge (2) of each one of said panel-like elements (1a, 1b), at least one engagement seat (3) for at least one connecting element (4), said at least one engagement seat (3) being arranged at a preset distance from the corner edge (5) defined between the corresponding joining edge (2) and the face (6) of the corresponding panel-like element (1a, 1b) designed to be directed outward;
   - inserting at least one portion of said connecting element (4) in the engagement seat (3) of one of said panel-like elements (1a, 1b);
   - interconnecting said panel-like elements (1a, 1b) along the corresponding joining edges (2), inserting the remaining portion of said connecting element (4) in the engagement seat (3) of the other panel-like element (1a, 1b) and interposing an adhesive material between the joining edges (2) of said panel-like elements (1a, 1b).

2. The method according to claim 1, **characterized in that** the step of providing said at least one engagement seat (3) consists in providing, on the joining edge (2) of each one of said panel-like elements (1a, 1b), a longitudinal groove (7) that runs along at least one portion of the corresponding joining edge (2), substantially parallel to said corner edge (5).

3. The method according to one or more of the preceding claims, **characterized in that** said at least one connecting element (4) is constituted by a lamina (4a).

4. A device (10) for corner joining of panel-like elements, particularly for providing worktops for kitchens or the like, comprising, on one side of each one of the panel-like elements (1a, 1b) to be corner joined to each other, a respective joining edge (2) which is inclined with respect to the plane of arrangement of the corresponding panel-like element (1a, 1b), **char-**

**acterized in that** it comprises at least one connecting element (4), which is interposed between said panel-like elements (1a, 1b) and passes through the joining edge (2) of each panel-like element (1a, 1b).

**5.** The device according to claim 4, **characterized in that** an adhesive material is interposed between the joining edges (2) of said panel-like elements (1a, 1b).

**6.** The device according to one or more of claims 4 to 5, **characterized in that** at least one respective engagement seat (3) is formed on the joining edge (2) of each one of said panel-like elements (1a, 1b) and engages a corresponding portion of said at least one connecting element (4).

**7.** The device according to one or more of claims 4 to 6, **characterized in that** the engagement seat (3) of each joining edge (2) is arranged at a preset distance from the corner edge (5) that is formed between the corresponding joining edge (2) and the face (6) designed to be directed outward from the corresponding panel-like element (1a, 1b).

**8.** The device according to one or more of claims 4 to 7, **characterized in that** the engagement seat (3) of each joining edge (2) is constituted by a longitudinal groove (7) that runs along the corresponding joining edge (2) substantially parallel to said corner edge (5), said at least one connecting element (4) being constituted by a lamina (4a).

**9.** The device according to one or more of claims 4 to 8, **characterized in that** said lamina (4a) is arranged substantially at right angles to each joining edge (2).

**10.** An apparatus for cutting panels (20) for providing corner joints of panel-like elements comprising, on a supporting structure (21), a conveyor (22) for the panel (23) to be cut and means for cutting said panel (23) so as to obtain a pair of panel-like elements (1a, 1b) to be corner joined to each other, **characterized in that** said cutting means comprise a first cutting assembly (24a), which is adapted to perform a first inclined cut in said panel (23) to be cut so as to form an inclined joining edge (2) for a first panel-like element (1a), and a second cutting assembly (24b), which is adapted to provide a second inclined cut in said panel (23) to be cut to form an inclined joining edge (2) for a second panel-like element (1b), incision means (25) being provided which are adapted to provide, on the joining edges (2) of said first panel-like element (1a) and of said second panel-like element (1b), at least one respective longitudinal groove (7) for the engagement of at least one connecting element (4) to be interposed between said first panel-like element (1a) and said second panel-like element (1b), said incision means (25) being adapted to provide said at least one longitudinal groove (7) at a preset distance from the corner edge (5) that is formed between the joining edges (2) of said first panel-like element (1a) and of said second panel-like element (1b) and the faces (6) of said first panel-like element (1a) and of said second panel-like element (1b) designed to be directed outward.

**11.** The apparatus according to claim 10, **characterized in that** said first cutting assembly (24a) comprises a first cutting disc (26a), which is arranged at an angle to the plane of arrangement of said panel (23) to be cut, said second cutting assembly (24b) comprising a second cutting disc (26b), which is arranged at an angle in the direction opposite to said first cutting disc (26a) with respect to the plane of arrangement of said panel (23) to be cut, said incision means (25) comprising at least one first auxiliary cutting disc (27a), which is arranged substantially coaxially to said first cutting disc (26a) and is adapted to provide said at least one longitudinal groove (7) on the joining edge (2) of said second panel-like element (1b), and at least one second auxiliary cutting disc (27b), which is arranged substantially coaxially to said first cutting disc (26a) and is adapted to provide said at least one longitudinal groove (7) on the joining edge (2) of said first panel-like element (1a), said first auxiliary cutting disc (27a) and said second auxiliary cutting disc (27b) being arranged at a preset distance respectively from said first cutting disc (26a) and from said second cutting disc (26b), along a direction that is substantially parallel to the respective axis.

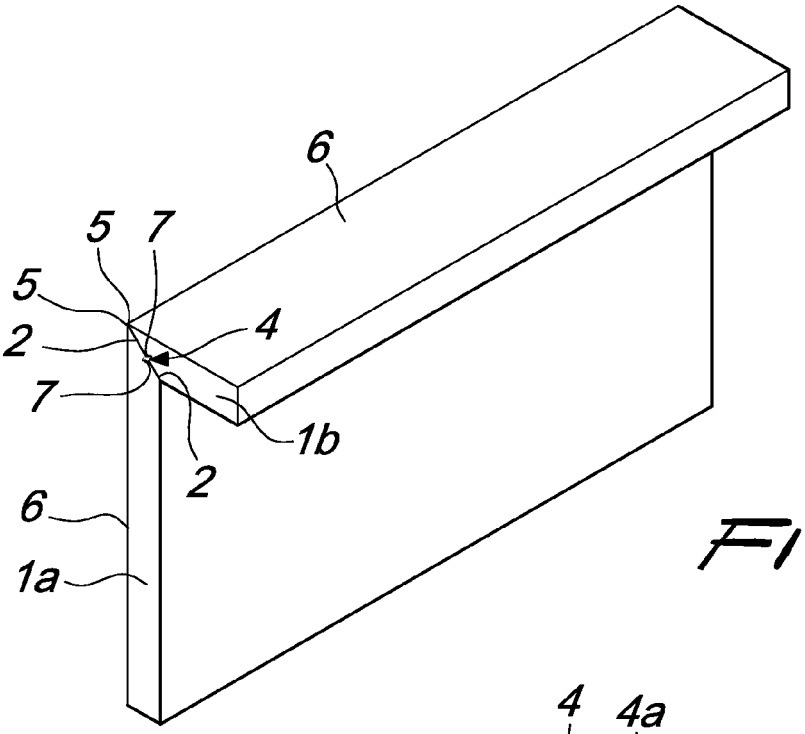


Fig. 1

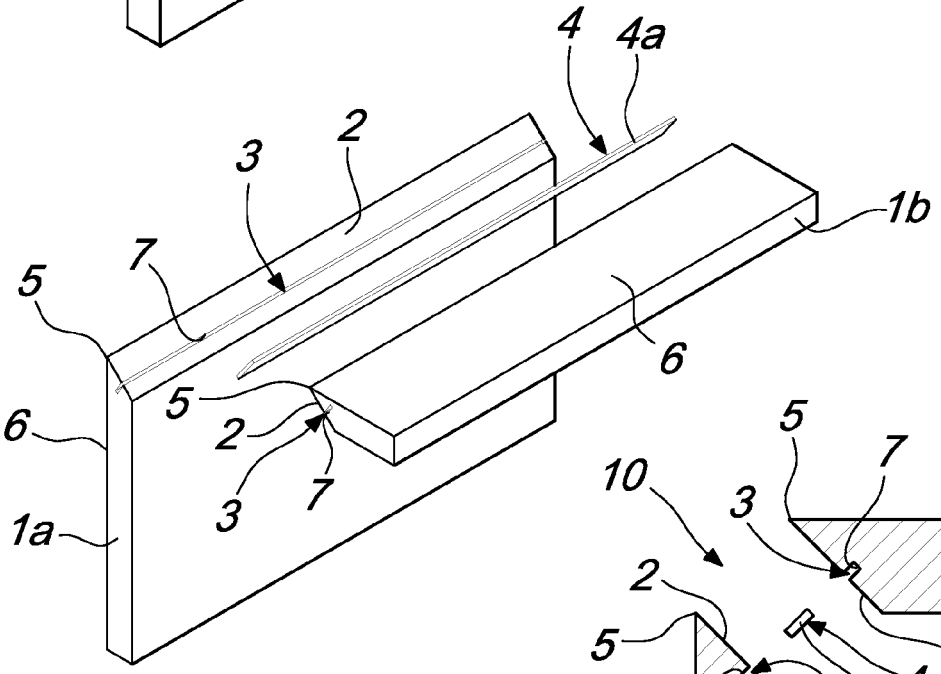


Fig. 2

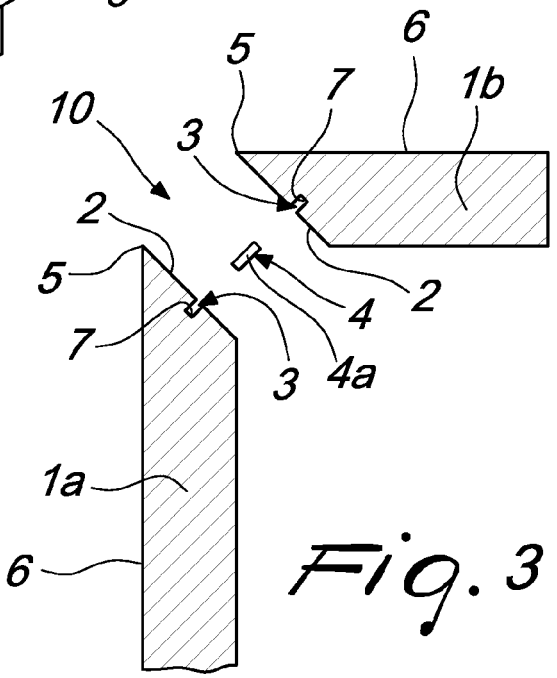


Fig. 3

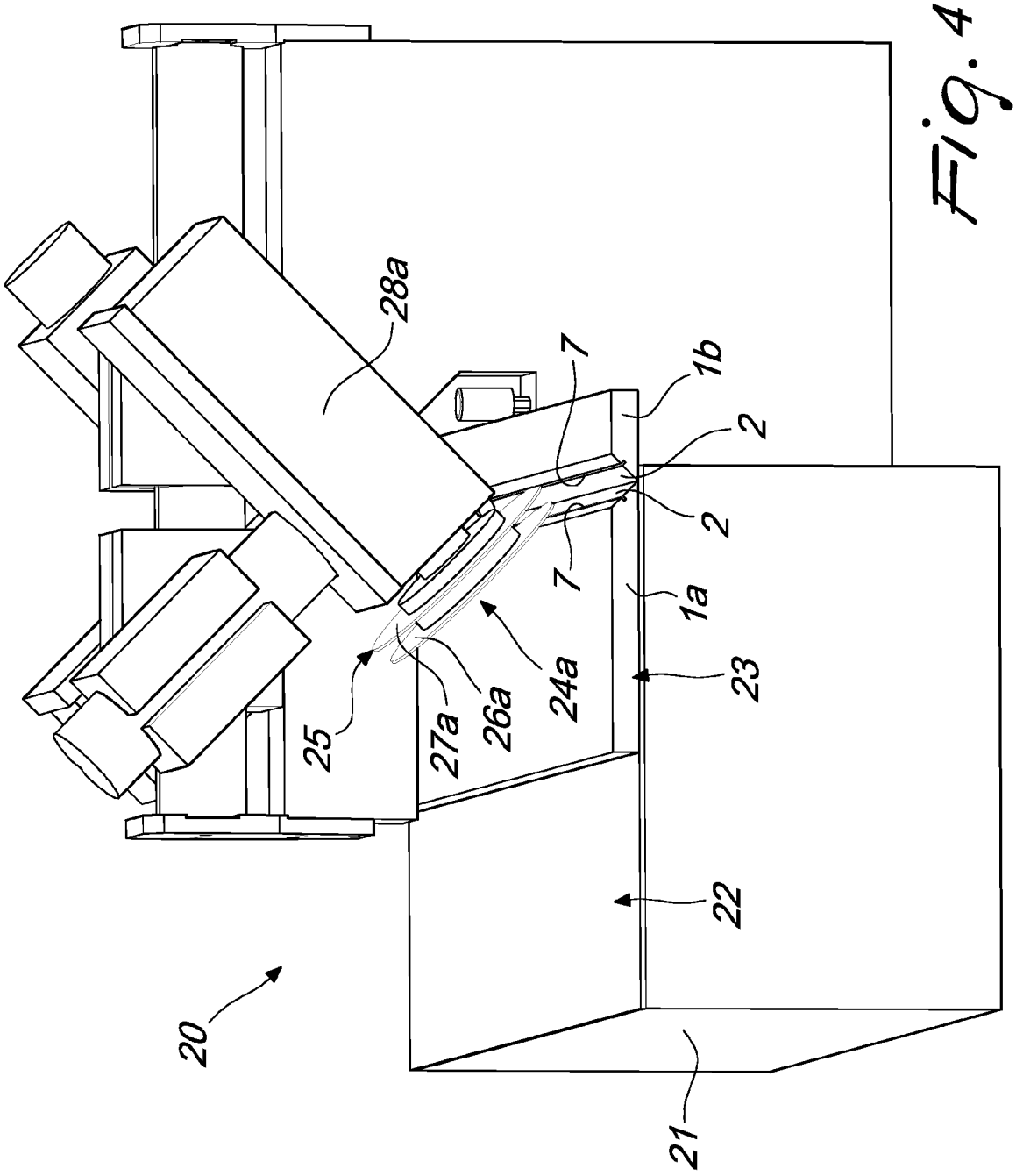


Fig. 4

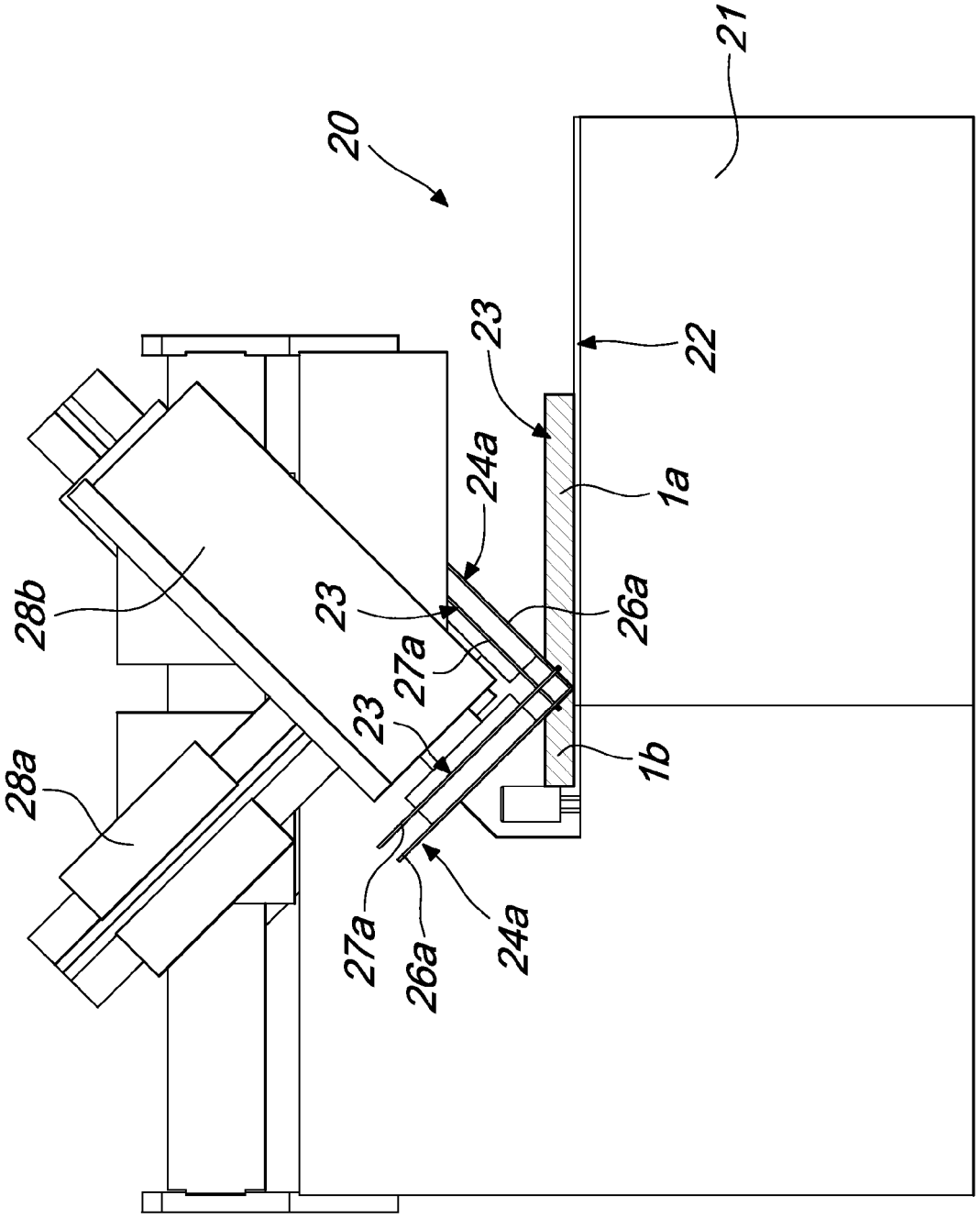


Fig. 5

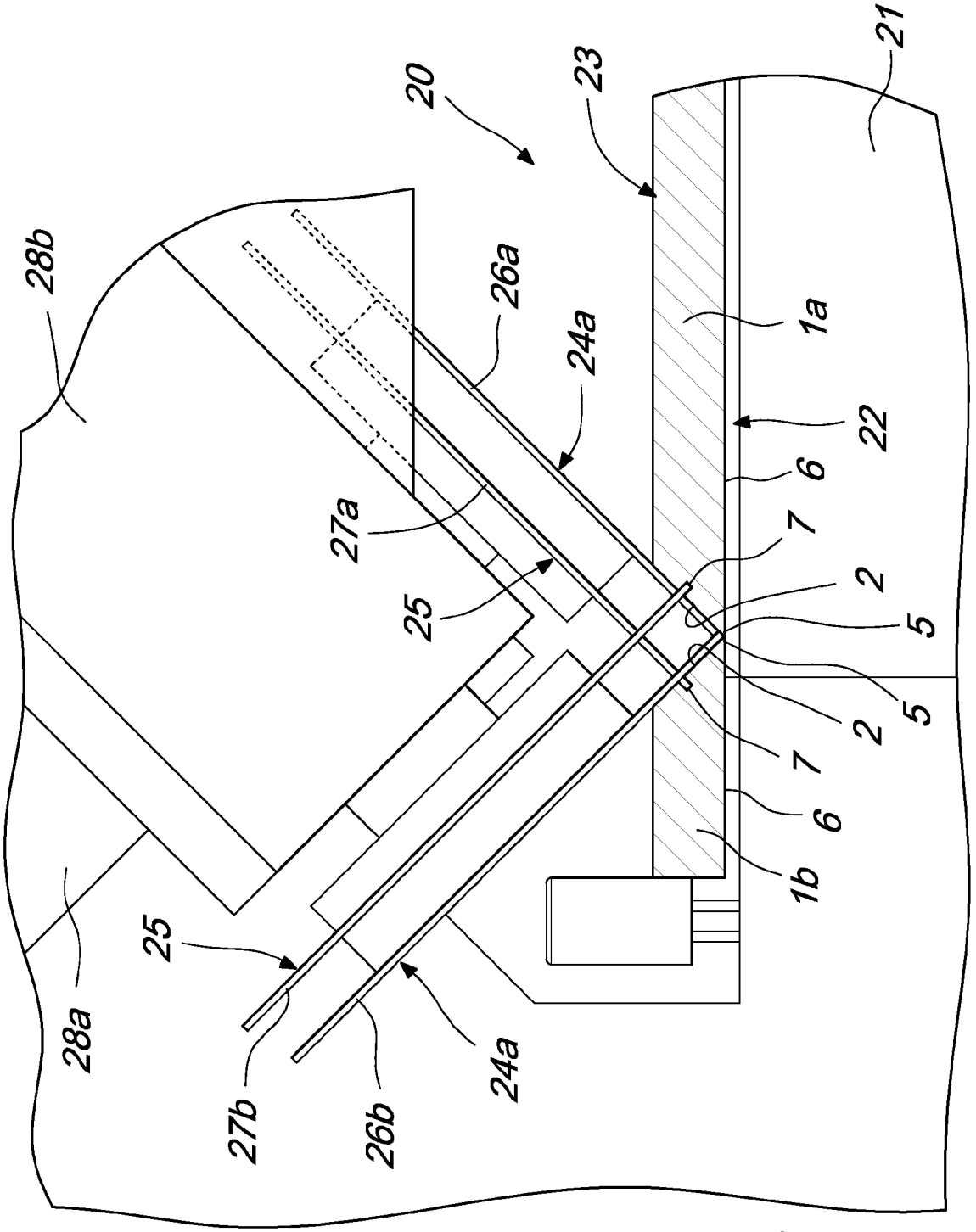


Fig. 6

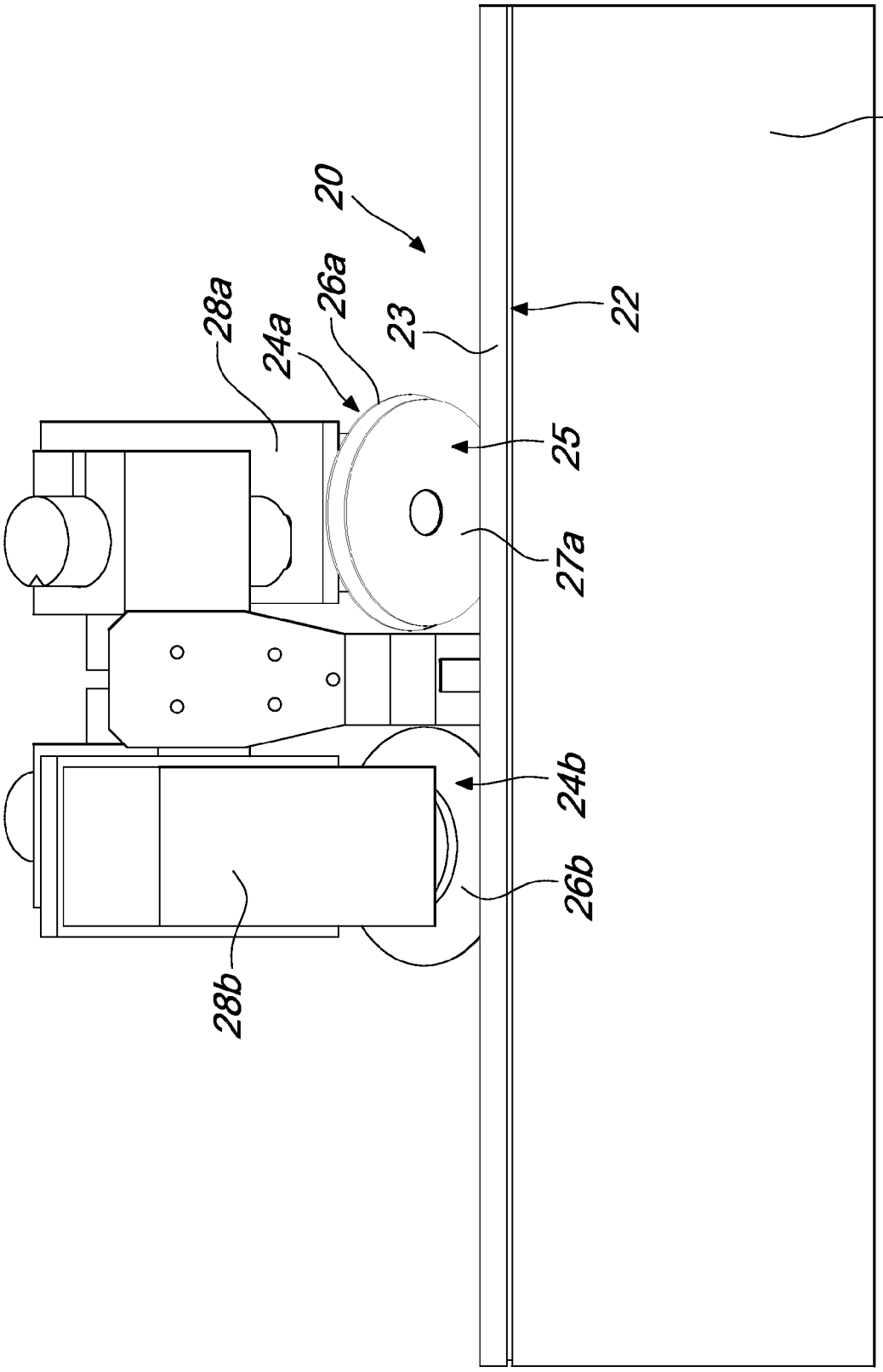


Fig. 7

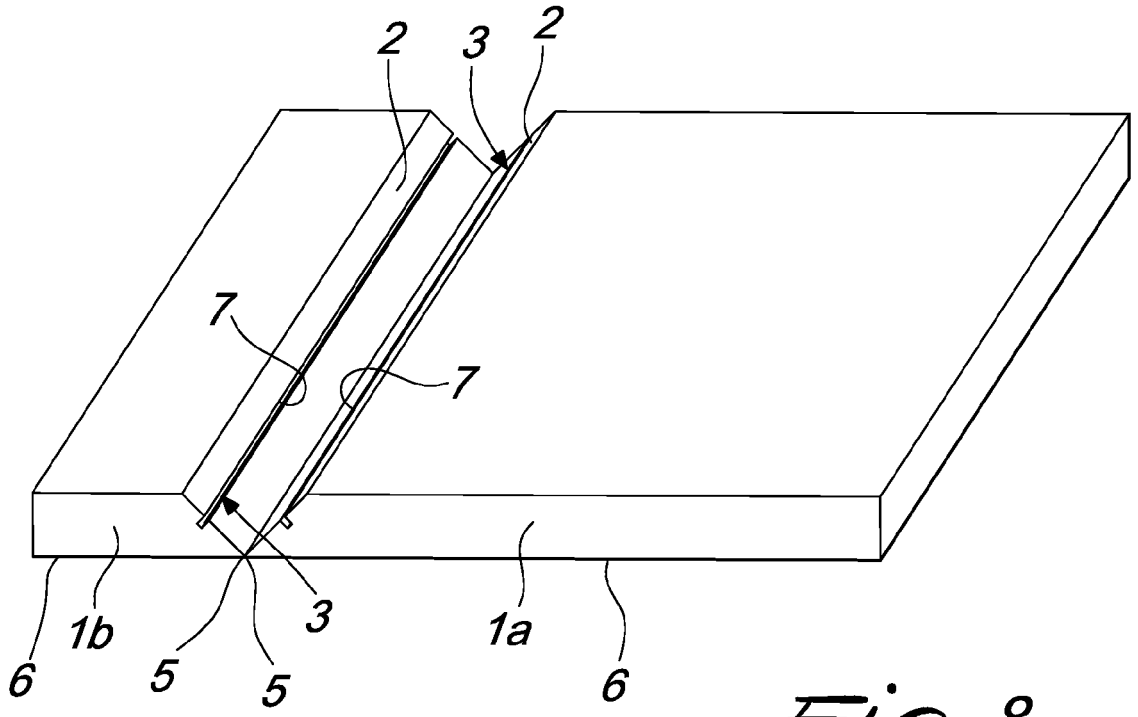


Fig. 8

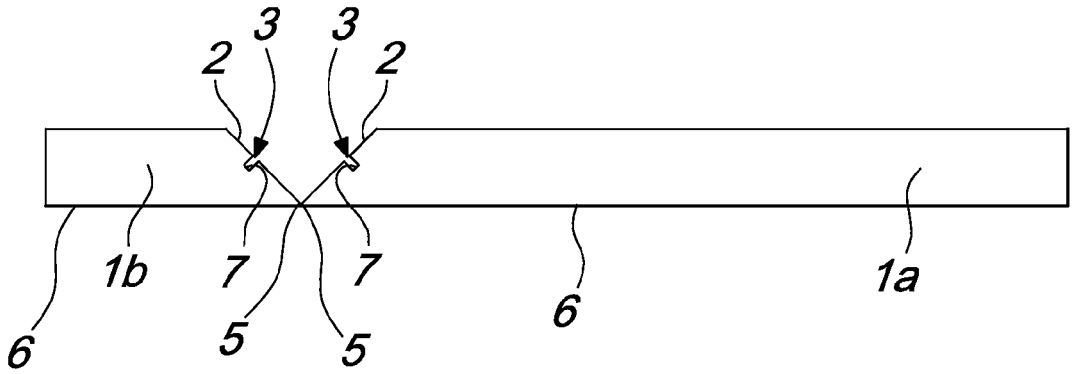


Fig. 9

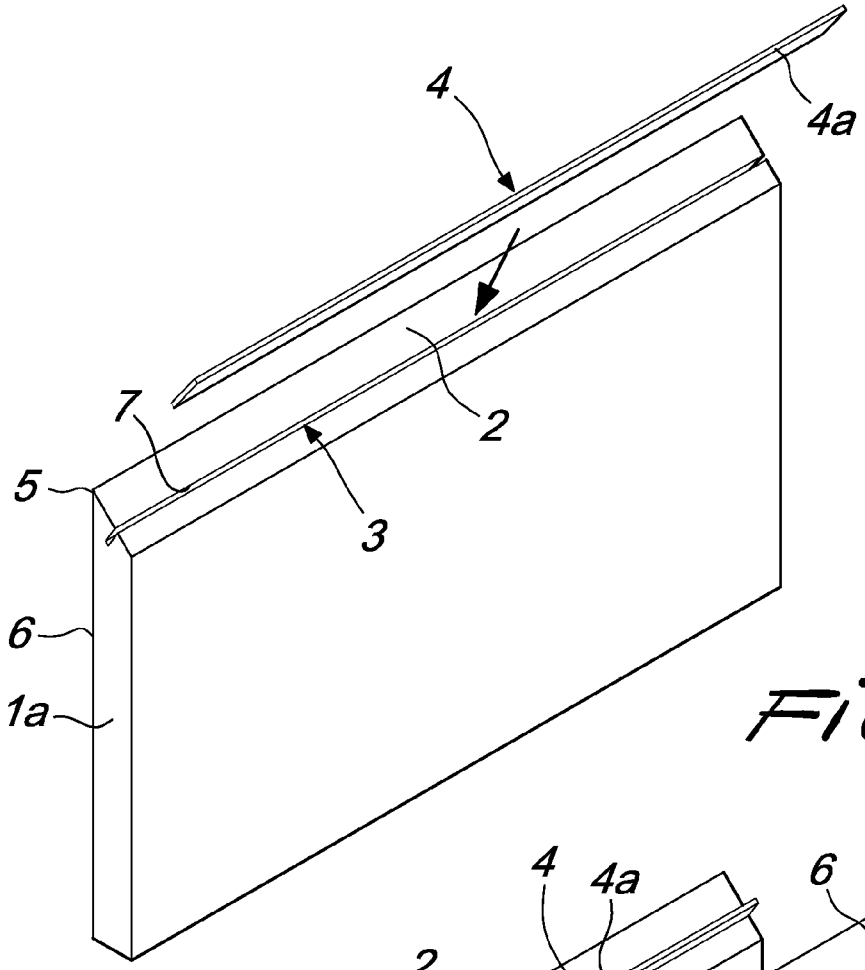


Fig. 10

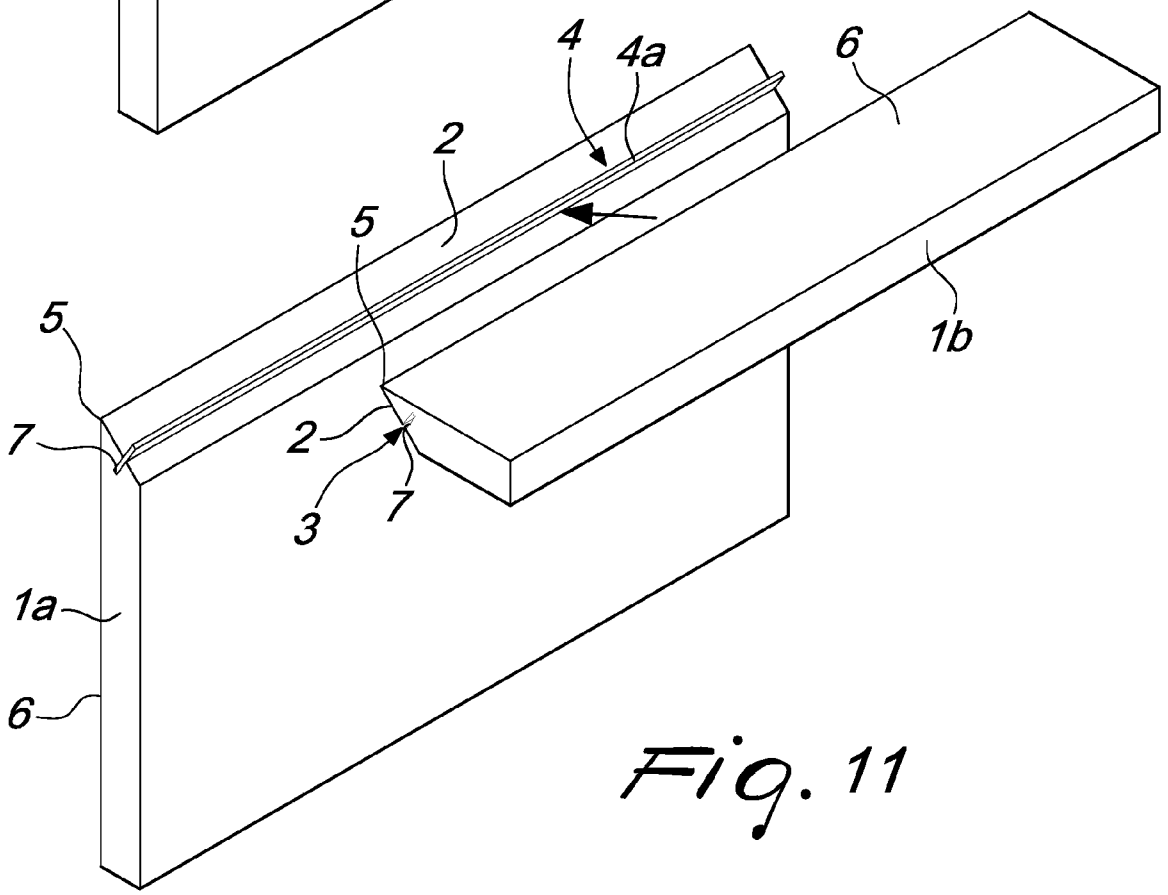


Fig. 11

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# EUROPEAN SEARCH REPORT

Application Number
EP 11 18 2492

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| The Hague | 26 January 2012 | Hamel, Pascal |

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