(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 660 241 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.06.2020 Bulletin 2020/23

(51) Int Cl.:
E04F 15/02 *(2006.01)*

(21) Application number: **19212439.4**

(22) Date of filing: **29.11.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **29.11.2018 IT 201800010700**

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(54) COUPLING UNIT FOR PANELS

(57) Coupling unit (1) for panels, which comprises a base body (9) intended to be fixed to a support structure (8); at least two retention bodies (13), which are fixed to the base body (9) and each comprise a stem portion (14) and an engagement portion (19), which is projectingly extended only from a face (17) of the stem portion (14) and is configured for being inserted in the longitudinal groove (6) of the panel (2) arranged on the corresponding side of the coupling unit (1); at least one adjustment element (21), which is inserted in a through hole (20) of the retention body (13) and is configured for rigidly fixing the retention body (13) to the base body (9) in an adjustable manner.

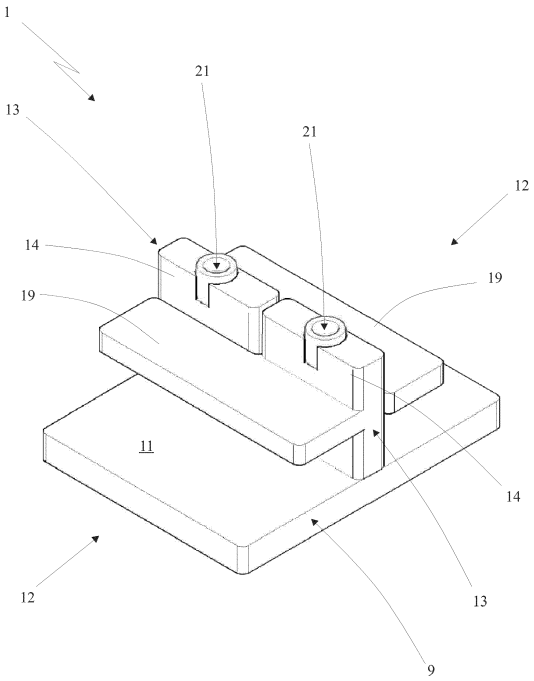

Fig. 1

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Description

Field of application

[0001] The present invention refers to a coupling unit for panels, according to the preamble of the independent claim No. 1.

[0002] The present coupling unit is intended to be advantageously employed for fixing panels (such as boards or strips) to a support under-structure, in particular for attaining flooring (such as strip-like foundations, parquet for outdoor settings, decking, etc.) or for attaining facade cladding, both for external and internal settings.

[0003] In general, the present coupling unit is inserted in the field of production of fixing systems (in particular carpentry components) for making cladding by means of panels of any material (such as wood, synthetic material, WPC, metal material, etc.).

State of the art

[0004] As is known, the typical structure of a strip-like foundation or of a panel cladding comprises a load-bearing under-structure (also termed nailing/gluing strip in the jargon of the field) constituted by a framework of different materials (such as wood, metal, synthetic material) intended to be abutted against the ground or anchored to the wall to be clad. On such load-bearing under-structure, a series of side-by-side covering panels are fixed, which constitute the treadable surface of the floor or the facade cladding.

[0005] The covering panels are fixed by means of coupling systems which retain each strip rigidly fixed to the load-bearing under-structure.

[0006] One of such coupling systems of known type provides for anchoring the panels to the load-bearing under-structure by means of a fitted connection. For example, on the load-bearing under-structure, appendages or engagement teeth are made which are adapted to be engaged on corresponding notches or grooves made on the panels, and shaped with geometry such to retain the panels to the load-bearing under-structure without requiring further engagement elements. Such coupling system of known type, however, complicates the removal of a panel from the under-structure (e.g. in order to substitute it) and it is subject, especially as time progresses, to forming loosening between the panel and the load-bearing under-structure.

[0007] Coupling systems are also known which provide for simply abutting the panels against the load-bearing under-structure and fixing them by means of screws or nails which transversely perforate the panels up to being engaged in the load-bearing under-structure. The latter system of known type, even if it is structurally simple and allows easily removing each single panel, has the disadvantage of subjecting the panels to greater stresses and of having to apply screws or nails to the panels which remain visible, deteriorating the aesthetic appearance of the floor or cladding.

[0008] For the purpose of at least partly resolving such drawbacks, coupling systems have been introduced on the market which provide for anchoring the panels to the load-bearing under-structure by means of hooked plates which engage suitable longitudinal grooves made in the thickness of the sides of the panels.

[0009] A first type of the latter coupling systems (an example of which is described in the patent application US 2009/0019805) comprises multiple plates that are substantially T-shaped, each provided with a stem intended to be fixed to the load-bearing under-structure and with two opposite lateral wings intended to be engaged in the longitudinal grooves of two corresponding adjacent sides of two side-by-side panels. In particular, the stem of each shaped plate is provided with a through hole in which a screw, a nail or a pin is inserted which is adapted to retain the shaped plate to the under-structure.

[0010] The main drawback of this solution of known type is due to the fact that it is not possible to remove a single strip without also removing the adjacent one since each shaped plate retains the sides of two separate panels. Therefore, if it is necessary to substitute an internal panel, it is necessary to also remove all of the other panels starting from the edge of the floor or of the cladding up to the panel to be substituted, hence requiring long operating times.

[0011] A further drawback is due to the fact that the lateral wings of each shaped plate can be arranged at a single fixed distance from the under-structure (given for example by the length of the stem). Since, in the market, multiple types of panels are present with different thicknesses and with longitudinal grooves in different positions from the panel faces, it is necessary to arrange different specific shaped plates for each panel type.

[0012] A coupling system is also known which comprises a base body provided with a circular seat, and a T-shaped retention body, constituted by a stem rotatably engaged in the circular seat of the base body, and by a semicircular tab adapted to engage, on opposite sides, two adjacent panels. The retention body can be rotated in order to facilitate the installation or the removal of the panels. Such solution, however, is hard to use since, in particular, it requires rotating the retention body multiple times in order to fix or remove the panels.

[0013] For the purpose of at least partly resolving such drawbacks, coupling systems were introduced in the market in which each retention group comprises two separate lateral wings, slidably movable with respect to each other (e.g. by means of a cam mechanism), respectively mutually away or approaching in order to engage or free the corresponding adjacent sides of two side-by-side panels. An example of such retention group is described in the patent EP 2267241.

[0014] Such solution of known type is however structurally complex and costly to make. In addition, since the movement of one wing of the retention group is kinematically constrained to the movement of the other wing, the

removal of one panel also involves unfastening the two side-by-side panels.

[0015] Coupling systems are also known that can be employed for fixing panels which have the lateral sides with different shape and/or with shape that is asymmetric with respect to the plane of the panel. An example of such coupling system is described in the patent application US 2017/0058534. Such coupling system comprises L-shaped coupling clips, each of which provided with a stem which can be constrained, e.g. via fitting, in a suitable seat made in the load-bearing structure, and only one lateral wing inserted in the longitudinal groove of the corresponding panel.

[0016] Also the latter solution of known type has however demonstrated that it does not lack drawbacks.

[0017] A first drawback is due to the fact that arranging sides, of each panel, with different or asymmetric shape increases the production costs of the panel itself, since it is necessary to execute specific processing and use special machines. In addition, the asymmetric shaping of the panel requires that the latter always be applied with the same face visible, preventing the attainment of finishes or decorations on both faces of the same panel which would render it suitable for two different applications.

[0018] A further drawback is due to the fact that it is necessary to execute suitable seats in the load-bearing under-structure for coupling clips, hence rendering such system complex to make and non-versatile in application. A further drawback is due to the fact that each clip can be used for constraining only one single panel, therefore requiring the application of a great number of clips and consequent lengthy times for making the floor and the cladding.

Presentation of the invention

[0019] In this situation, the problem underlying the present invention is that of remedying the drawbacks manifested in the prior art up to now, by providing a coupling unit for panels which is structurally simple and which simultaneously allows easily substituting each single panel, in particular without having to remove the side-by-side panels.

[0020] Further object of the present invention is to provide a coupling unit for panels, which is adapted for use with strips of different thicknesses.

[0021] Further object of the present invention is to provide a coupling unit for panels, which does not require the use of particular processing on the lateral sides of the panels.

[0022] Further object of the present invention is to provide a coupling unit for panels, which which allows a quick and easy installation of the panels themselves.

Brief description of the drawings

[0023] The technical characteristics of the invention, according to the aforesaid objects, can be clearly seen in the contents of the below-reported claims and the advantages thereof will be more evident in the following detailed description, made with reference to the enclosed drawings, which represent several merely exemplifying and nonlimiting embodiments, in which:

- figure 1 shows an axonometric view of the present coupling unit, in accordance with a first embodiment of the present invention;
- figure 2 shows an exploded view of the coupling unit illustrated in figure 1;
- figure 3 shows a plan view of the coupling unit of figure 1;
- figure 4 shows a side view of a detail of the coupling unit of figure 1, relative to a base body;
- figures 5a and 5b show, respectively in side view and front view, a further detail of the coupling unit of figure 1, relative to a retention body;
- figures 6 and 7 show the coupling unit, according to the aforesaid first embodiment, in two corresponding applications respectively for single panel and at the head of two successive panels;
- figure 8 shows an exploded axonometric view of the present coupling unit, in accordance with a second embodiment of the present invention;
- figure 9 shows an axonometric view of the coupling unit illustrated in figure 8, in assembled configuration;
- figure 10 shows a plan view of the coupling unit of figure 8, in which the retention bodies are illustrated transparent;
- figures 11 and 12 show the coupling unit, according to the aforesaid second embodiment, in two corresponding applications respectively for single panel and at the head of two successive panels;
- figure 13 shows an axonometric view of the present coupling unit, in accordance with a third embodiment of the present invention;
- figure 14 shows an exploded view of the coupling unit illustrated in figure 13;
- figures 15 and 16 show the coupling unit, according to the aforesaid third embodiment, in two corresponding applications respectively for single panel and at the head of two successive panels;
- figure 17 shows an axonometric view of the present coupling unit, in accordance with a fourth embodiment of the present invention;
- figure 18 shows an exploded view of the coupling unit illustrated in figure 17;
- figures 19 and 20 show the coupling unit, according to the aforesaid fourth embodiment, in two corresponding applications respectively for single panel and at the head of two successive panels;
- figure 21 shows an axonometric view of the present coupling unit, in accordance with a fifth embodiment of the present invention;
- figure 22 shows an exploded view of the coupling

unit illustrated in figure 21;

- figures 23 and 24 show the coupling unit, according to the aforesaid fifth embodiment, in two corresponding applications respectively for single panel and at the head of two successive panels;
- figure 25 shows an exploded view of the present coupling unit, in accordance with a sixth embodiment of the present invention;
- figure 26 shows the coupling unit, according to the aforesaid sixth embodiment, in an application at the head of two successive panels;
- figures 27a-27d show four corresponding embodiments of the present coupling unit with different types of panel or load-bearing structure;
- figures 28a and 28b show two different views of the present coupling unit, in accordance with a seventh embodiment of the present invention;
- figures 29a and 29b show two different views of the present coupling unit, in accordance with one variant of the aforesaid seventh embodiment of the present invention;
- figures 30a-c show three different embodiments of the aforesaid seventh embodiment of the present coupling unit.

Detailed description of a preferred embodiment

[0024] With reference to the enclosed drawings, reference number 1 overall indicates a coupling unit for panels, object of the present invention.

[0025] The present coupling unit 1 is intended to be advantageously employed for fixing panels (such as boards or strips) in particular adapted to form flooring (such as strip-like foundations, parquet for outdoor settings, decking, etc.) or wall facade cladding.

[0026] In a per se known manner, each panel 2 (which can be made of different materials, such as wood, synthetic, WPC, etc.) is provided with two opposite main faces 3 (of which one is intended to remain visible) and is extended linearly, preferably with elongated shape, between two head edges 4 along a longitudinal axis L. In addition, each panel 2 is transversely delimited by two lateral sides 5 which are extended along the longitudinal axis L, preferably parallel to each other, to connect the two head edges 4. In particular, each lateral side 5 of the panel 2 is provided with a longitudinal groove 6 made in the thickness between the two main faces 3 and extended between the two head edges 4 parallel to the longitudinal axis L. In particular, the longitudinal groove 6 is delimited width-wise by two corresponding shoulders 7, preferably parallel to each other. The longitudinal groove 6 can be positioned symmetrically at the same distance from the two main faces 3 of the panel 2 (as in the examples of figures 27a and 27b) or at different distances from the main faces 3 (as in the examples of figures 27c and 27d).

[0027] In particular, in application conditions, the panels 2 are intended to be arranged one next to the other, with a lateral side 5 of each panel 2 adjacent to the lateral side 5 of the adjacent panel 2, and possibly also in succession one after the other with the head edge 4 of each panel 2 adjacent to the head edge 4 of the successive panel 2 (as exemplified in figures 6, 7, 15, 16, 19, 20, 23, 24, 26, 27a-d).

[0028] The coupling unit 1 according to the invention is advantageously intended to be applied between at least two side-by-side panels 2 in order to act on the corresponding adjacent lateral sides 5 of such panels 2, in intermediate position between the head edges 4 (in a manner such to act on only one panel 2 per side, as in the examples of figures 6, 11, 15, 19, 23) or at one of the head edges 4 (in a manner such to act, on at least one side, on two successive panels 2, as in the examples of figures 7, 12, 16, 20, 24, 26).

[0029] From the application standpoint, it is provided in a per se known manner to arrange multiple coupling units 1 spaced from each other along the lateral sides 5 of the panels 2, in a manner such that each lateral side 5 of the panel 2 is retained by a corresponding series of coupling units 1.

[0030] The present coupling unit 1 is adapted to integrally fix the panel 2 to a support structure 8 (in technical jargon termed nailing/gluing strip) anchored to the ground or to the wall to be clad. For example, such support structure 8 can comprise a framework with parallel boards, made of different materials such as wood (as in figures 27b and 27d) or metal (as in figures 27a and 27c).

[0031] With reference to the embodiments illustrated in the enclosed figures, the present coupling unit 1 comprises a base body 9 intended to be fixed to the support structure 8. More in detail, the base body 9 is provided with two opposite faces 10, 11, preferably flat and parallel to each other, including a bottom face 10 intended to be abutted against the support structure 8 and an opposite front face 11 against which the panel 2 is advantageously intended to be abutted (in particular with a portion of the main face 3 of the latter intended to remain concealed). Preferably, the base body 9 has plate-like shape extended on a lying plane intended to be parallel to that of the panels 2.

[0032] In addition, the base body 9 is provided with two opposite sides 12, at each of which the lateral side 5 of the corresponding panel 2 is intended to be arranged.

[0033] More in detail, the base body 9 is arranged between two side-by-side panels 2, receiving, in abutment against one of its sides 12, the lateral side 5 of a panel 2, and against the other side 12 the lateral side 5 of the adjacent panel 2. Of course, if the coupling unit 1 is arranged at the head of the panel 2 (as in the examples of figures 7, 12, 16, 20, 24, 26), the two adjacent head edges 4 of the two successive panels 2 will be abutted against at least one side 12 of the base body 9.

[0034] In accordance with the exemplifying embodiments illustrated in the enclosed figures, the base body 9 has substantially quadrangular shape (e.g. rectangular or square) with two lateral edges, parallel to each other, at the two sides 12. Of course, without departing from

the protective scope of the present patent, the base body 9 can have shape different from quadrangular, e.g. circular, with the lateral edges that can even be non-parallel and/or non-rectilinear.

[0035] Preferably, the bottom face 10 of the base body 9 is substantially flat so as to facilitate an easy abutment against the support structure 8, without the latter requiring particular processing for allowing the installation of the panels 2.

[0036] Advantageously, the base body 9 is extended, in particular on its lying plane, at least according to an alignment direction X intended to be parallel to the longitudinal axis L of the panels 2 and which defines, on both sides, the two sides 12 of the base body 9 itself.

[0037] According to the invention, the coupling unit 1 comprises at least two retention bodies 13 fixed to the base body 9 and adapted to engage, on the opposite sides 12 of the base body 9, the two side-by-side panels 2 between which the coupling unit 1 itself is arranged.

[0038] Each of the aforesaid retention bodies 13 comprises a stem portion 14 which is extended along an extension direction Y' orthogonal to the front face 11 of the base body 9 (and in particular orthogonal to the lying plane of the latter).

[0039] More in detail, with reference in particular to the views of figures 5a and 5b, the stem portion 14 is extended, along the aforesaid extension direction Y', between a first end 15, which is directed towards the front face 11 of the base body 9, and an opposite second end 16, preferably free and intended to be directed outward.

[0040] In addition, the stem portion 14 is provided with a first face 17 and with a second face 18 which are directed in opposite directions with respect to each other and are extended between the first end 15 and the second end 16 of the stem portion 14 itself. In particular, the aforesaid first face 17 of the stem portion 14 is intended to be directed, substantially exclusively, towards the lateral side 5 of the corresponding panel 2 on which the retention body 13 acts. For such purpose, the first face 17 is substantially exclusively oriented on the corresponding side 12 of the base body 9.

[0041] Hence, each retention body 13 is provided, only on its first face 17, with an engagement portion 19, which is projectingly extended from such first face 17 with a length such to be inserted in the longitudinal groove 6 of the lateral side 5 of the corresponding panel 2 in order to be engaged with the latter.

[0042] Preferably, the engagement portion 19 is extended parallel to the front face 11 of the base body 9 and preferably is extended from the first face 17 of the stem portion 14 orthogonally to the extension direction Y' of the latter (and in particular to its first face 17).

[0043] Advantageously, the engagement portion 19 is placed at the second end 16 of the stem portion 14, in a manner such that the retention body 13 has a transverse profile (obtained with a section on a plane orthogonal to the alignment direction X) of substantially overturned L-shape.

[0044] The two retention bodies 13 of the coupling unit 1 are positioned with their respective engagement portions 19 arranged, with respect to each other, on the opposite sides 12 of the base body 9 so as to be engaged with the adjacent lateral sides 5 of two side-by-side panels 2. In particular, at least one of the retention bodies 13 has its engagement portion 19 exclusively arranged on one of the sides 12 of the base body 19, and at least another of the retention bodies 13 has its engagement portion 19 exclusively arranged on the other of the sides 12 of the base body 19.

[0045] In particular, the second face 18 of the stem portion 14 of the retention body 13 lacks engagement portions, in a manner such to not interfere with the panel 2 adjoining that against which the engagement portion 19 of such retention body 13 acts.

[0046] Of course, the coupling unit 1 can also comprise more than two retention bodies 13, as a function for example of the shapes of the engagement portions 19 and of the particular application conditions.

[0047] For example, in the configuration of figure 20, three retention bodies 13 are provided, of which one is directed with its engagement portion 19 on a side 12 of the base body 9, and the other two are directed with their engagement portions 19 towards the other side 12 in order to be engaged with two successive corresponding panels 2 at the adjacent head edges 4 of the latter.

[0048] Advantageously, the retention bodies 13 are arranged with their step portions 14 aligned one next to the other according to the alignment direction X of the base body 9.

[0049] According to the invention, the stem portion 14 of each retention body 13 is provided with at least one through hole 20 extended from the second end 16 up to the first end 15 of the stem portion 14 itself.

[0050] With reference to the examples illustrated in enclosed figures, the stem portion 14 is advantageously provided with multiple through holes 20 (e.g. two) preferably arranged aligned with each other according to the alignment direction X of the base body 9.

[0051] In accordance with the idea underlying the present invention, the coupling unit 1 comprises, for each retention body 13, at least one adjustment element 21 (or multiple adjustment elements 21), which is inserted in the corresponding through hole 20, being engaged with the retention body 13, and is configured for rigidly fixing the latter to the base body 9 in an adjustable manner along the aforesaid extension direction Y'.

[0052] In particular, the adjustment element 21 acts on the retention body 13, forcing it towards the base body 9, in a manner such that the engagement portion 19 of the retention body 13 acts in abutment against a shoulder 7 of the longitudinal groove 6 in which it is inserted, pressing the panel 2 against the front face 11 of the base body 9. Advantageously, the adjustment element 21 is capable of fixing the retention body 13 at different distances from the base body 9, in a manner such that the coupling unit 1 is capable of being adapted to panels 2 with different

thickness or with longitudinal grooves 6 arranged at difference distances from the main faces 3 of the panel 2. In particular, the adjustment element 21 is configured for continuously varying the position of the retention body 13 with respect to the base body 9 along the extension direction Y'.

[0053] Advantageously, following the action of the corresponding adjustment element 21, each retention body 13 acts, with its engagement portion 19, only on the corresponding side of the coupling unit 1 (i.e. only side 12 of the base body 9 on which the engagement portion 19 is extended) and keeps fixed only the panel/panels 2 present on that side 12.

[0054] Advantageously, the adjustment element 21 is provided with a threaded portion 22 extended, preferably with elongated shape, along an extension axis Y" parallel to the extension direction Y' of the stem portion 14 of the retention body 13. Such threaded portion 22 is provided with a thread 23 extended around the extension axis Y" and adapted to be engaged in order to fix the retention body 13 at a specific distance from the base body 9 according to the aforesaid extension direction Y'.

[0055] Preferably, the threaded portion 22 of the adjustment element 21 is adapted to be engaged via screwing to the support structure 8 and/or to the base body 9, in accordance, in particular, with the embodiment versions described in detail hereinbelow.

[0056] Advantageously, the adjustment element 21 is provided with a head portion 24 which acts in abutment against the retention body 13, in a manner such that, following the engagement via screwing of the threaded portion 22, it is adapted to push against the retention body 13 in order to force the engagement portion 19 of the latter to act on the shoulder 7 of the longitudinal groove 6 of the panel 2 in order to retain it with support structure 8. Preferably, the head portion 24 of the adjustment element 21 is adapted to abut against the second end 16 of the stem portion 14 of the retention body 13, in particular within a seat 25 made in such second end 16. Advantageously, in accordance with the embodiments illustrated in the enclosed figures, the adjustment element 21 is in screw form, the stem being inserted in the corresponding through hole 20 (and engaged via screwing with the base body 9 or with the support structure 8) and the head acting in abutment against the second end 16 of the stem portion 14 of the retention body 13.

[0057] Of course, in accordance with different non-illustrated embodiments, the adjustment element 21 can for example be in the form of a tie rod, grub screw, pin, etc., preferably threaded, and configured for adjustably fixing the retention body 13 to the base body 9, in accordance with that discussed above.

[0058] Advantageously, the adjustment element 21 can also act as element for fixing the base body 9 to the support structure 8 (as in the examples of figures 1-24) or separate fixing elements 27 can be provided for constraining the base body 9 to the support structure 8 (as in the examples of figures 25 and 26).

[0059] With reference to the embodiment versions illustrated in the examples of figures 1-24, in which the adjustment element 21 also acts as fixing element for the base body 9, the latter is provided with one or more passage holes 26, each of which aligned with the corresponding through hole 20 of the retention body 13 in which the adjustment element 21 is inserted. In this manner, such adjustment element 21 passes through the corresponding passage hole 26 in order to be engaged with the support structure 8 so as to fix the latter the base body 9.

[0060] In particular, the adjustment element 21 engages via screwing, with its threaded portions 22, the support structure 8, and pushes, in abutment with its head portion 24, the retention body 13 which consequently pushes the panel 2 against the front face 11 of the base body 9, retaining the latter rigidly fixed to the support structure 8.

[0061] Such embodiment, in which the adjustment element 21 also determines the fixing of the base body 9, involves a greater installation speed as well as a structural simplification.

[0062] In accordance with a different embodiment, one such example illustrated in the embodiment illustrated in figures 25 and 26, the coupling unit 1 comprises, in addition to the adjustment elements 21, one or more fixing elements 27 separate from the adjustment elements 21 and adapted to rigidly constrain the base body 9 to the support structure 8. For such purpose, the base body 9 is provided with one or more fixing holes 28 (separate from the through holes 20) intended to be traversed by the corresponding fixing elements 27.

[0063] More in detail, each fixing hole 28 is extended in a through manner from the front face 11 to the bottom face 10 of the base body 9 in order to allow the passage of the fixing element 27. More in detail, the latter is inserted in the corresponding fixing hole 28 in order to be engaged with the support structure 8 and acts on the base body 9 in order to rigidly fix such base body 9 to the support structure 8.

[0064] In particular, the fixing element 27 comprises an elongated body 29 (preferably threaded) inserted in the corresponding fixing hole 28, penetrating with one end (in particular via screwing) into the support structure 8 and being provided at the other end with a widened portion 30 adapted to abut against the front face 11 of the base body 9.

[0065] For example, the fixing element 27 is obtained by means of a screw (as in the example of figure 25), or otherwise with other fixing systems such as a grub screw, a nail, etc.

[0066] Such embodiment, which provides for separate fixing elements 27 and adjustment elements 21, involves a greater standardization and versatility in use.

[0067] In accordance with a further different non-illustrated embodiment, the base body 9 is fixable to the support structure by means of different fixing means, such as fitting, glue etc.

[0068] Advantageously, in accordance with the afore-

said embodiment variant provided with fixing elements 27 separate from the adjustment elements 21, the base body 9 is provided with one or more adjustment holes 31, preferably threaded, in each of which the corresponding adjustment element 21 - and, in particular, the threaded portion 22 of the latter - being engaged. Such adjustment holes 31 can be through, or blind (i.e. open only on the back of the front face 11 of the base body 9).

[0069] In accordance with a further embodiment variant, the coupling unit 1 can be provided with separate fixing elements 27 and it can also be provided that adjustment elements 21 penetrate into the support structure 8 as further constraining element.

[0070] Advantageously, the base body 9 of the coupling unit 1 is provided at least with a guide 32 extended orthogonally to the front face 11 of the base body 9 and with which the retention body 13 is slidably engaged, in a manner such to guide the latter during its application and during the application of the adjustment elements 21, maintaining the engagement portion 19 substantially parallel to the front face 11 of the base body 9 and, hence, to the panel 2.

[0071] Advantageously, the guide 32 of the base body 9 blocks the retention body 13 with respect to rotation movements around the extension direction Y' of the stem portion 14 of the retention body 13 itself, so as in particular to apply the latter to the base body 9, maintaining its engagement portion 19 exclusively directed towards the corresponding side 12 of the base body 9.

[0072] Preferably, the guide 32 of the base body 9 is extended parallel to the extension direction Y' of the stem portion 14 of the retention body 13 and, in particular, orthogonal to the engagement portion of the latter. Advantageously, the guide 32 comprises one or more guide portions 33, each of which projectingly extended from the front face 11 of the base body 9 orthogonal to such front face 11.

[0073] Advantageously, the retention body 13 is provided with corresponding guide seats 34, in each of which the respective guide portion 33 being inserted, in a manner so as to allow the retention body 13 to slide along the guide portion 33 itself.

[0074] Preferably, the guide portion 33 comprises a pin which is extended according to an axis parallel to the extension direction Y' of the stem portion 14 and orthogonal to the front face 11 of the base body 9.

[0075] Advantageously, the guide seat 34 comprises a guide hole which is extended with axis parallel to the extension direction Y' of the stem portion 14 and in which the corresponding pin of the guide portion 33 is inserted.

[0076] Preferably, the guide hole is made in the stem portion 14 of the retention body 13 and is extended starting from the first end 15 of the stem portion 14 itself. In particular, the guide hole can be blind (as in the examples of figures 1-12 and 25-26) or through, reaching up to the second end 16 of the stem portion 14 (as in the examples of figures 13-24).

[0077] Advantageously, the guide seat 34 is at least partially counter-shaped with respect to the corresponding guide portion 33, in a manner such to be able to allow the slidable coupling, preventing displacements transverse to the extension direction Y'.

[0078] In particular, the guide portion 33 (and the corresponding guide seat 34) can have cross section (with respect to their axis) with circular shape (as in the examples of figures 1-24) or quadrangular shape (as in the example of figure 25-26), or even with another shape (e.g. elliptical) not illustrated in the enclosed figures. Advantageously, with reference to the example of figure 25, the adjustment holes 31 are made in the guide portions 33, and in such holes the adjustment elements 21 (in particular in the case of separate fixing elements 27) are engaged.

[0079] The engagement portion 19 of each retention body 13 is provided with an abutment surface 35 directed towards the front face 11 of the base body 9 and intended to abut against the shoulder 7 of the longitudinal groove 6 of the corresponding panel 2 in order to push the latter (following the action of the adjustment elements 21) against the base body 9 so as to fix the panel 2 itself.

[0080] Advantageously, with reference to the examples of figures 17-26, the abutment surface 35 of the engagement portion 19 is provided with projecting portions 36 adapted to be engaged in the shoulder 7 of the longitudinal groove 6, at least partially penetrating into such shoulder 7, so as to better anchor the retention body 13 to the panel 2.

[0081] In particular, such projecting portions 36 comprise a plurality of tips or teeth (as in the illustrated example), or roughness, knurling, spikes, etc.

[0082] Advantageously, the stem portion 14 of the retention body 13 is extended width-wise between a first side 37' and a second side 37", between which the first face 17 and the second face 18 of the stem portion 14 itself are extended.

[0083] In particular, with reference to the enclosed figures, the stem portion 14 is extended width-wise parallel to the alignment direction X of the base body 9, preferably with shape elongated according to such alignment direction X.

[0084] Preferably, according to particular embodiment solutions, the engagement portion 19 is extended widthwise beyond at least one of the aforesaid sides 37', 37", in particular parallel to the alignment direction X. Advantageously, with reference to the examples of figures 1-7 and 13-16, the engagement portion 19 is extended projectingly beyond only one of the sides 37', 37" of the stem portion 14, and with reference to the examples of figures 8-12 and 21-24, the engagement portion 19 is extended projectingly beyond both sides 37', 37" of the stem portion 14.

[0085] In particular, the part of the engagement portion 19 of each retention body 13 that projects beyond the side 37', 37" of the corresponding stem portion 14 is extended, at least partially, in front of the second face 18 of the retention body 13 oriented on the opposite side 12

of the base body 9.

[0086] In accordance with a seventh embodiment illustrated in figures 28a, 28b, 29a, 29b, the bottom face 10 of the base body 9 is provided with one or more storage cavities 37, each obtained around the corresponding passage hole 26, and preferably positioned coaxial with the latter.

[0087] Functionally, such storage cavities 37 have the function of collecting, at their interior, the chip that is generated when the threaded portion 22 of the adjustment element 21 is screwed in the support structure 8. This prevents the chip from being accumulated between the support structure 8 and the bottom face 10 of the base body 9, hence preventing such chip accumulations from displacing the base body 9 and misaligning its alignment direction X with respect to the position that the panels 2 must assume.

[0088] In accordance with an embodiment variant of the invention, the storage cavities 37 can be arranged, as an alternative or additionally, at the fixing holes 28 if present in the base body 9 (for example provided in the example of figures 25 and 26).

[0089] Preferably, the base body 9 is extended along the alignment direction X between a first edge 9' and a second edge 9", preferably substantially parallel to each other and orthogonal to the alignment direction X itself. Advantageously, the base body 9 is provided with one or more alignment teeth 38, which are projectingly extended from the first edge 9' of the base body 9, preferably parallel to the alignment direction X and in particular coplanar with the bottom face 10 of the base body 9 itself.

[0090] In addition, the base body 9 comprises one or more alignment grooves 39 made on the second edge 9" of the base body 9 (in particular starting from the bottom face 10 of the latter) and intended to receive, at their interior, corresponding alignment teeth 38 of an adjacent base body 9.

[0091] Advantageously, if the base body 9 comprises both alignment teeth 38 and alignment grooves 39, each alignment groove 39 is aligned with the corresponding alignment tooth 38 (placed on the first edge 9') according to the alignment direction X.

[0092] Preferably, each alignment groove 39 has shape at least partly corresponding with that of the corresponding alignment tooth 38 (e.g. with the same width).

[0093] The alignment teeth 38 and the alignment grooves 39 are configured in a manner such that multiple base bodies 9 can be arranged one after the other (along their alignment direction X) by inserting the alignment teeth 38 of a base body 9 in the alignment grooves 39 of the successive base body 9, such that the two base bodies 9 are correctly aligned with each other and are not subjected to mutual displacements (transverse to the alignment direction X) during the steps of application of the coupling unit 1, for example during the application of the adjustment elements 21.

[0094] Advantageously, the base body 9 is provided with at least one weakening line 40 which is made on the front face 11 and/or on the bottom face 10 of the base body 9 itself, is extended parallel to the alignment direction X of the base body 9, and is positioned on one side of the passage holes 26 (and advantageously of the guide portions 33) with respect to the alignment direction X.

[0095] The weakening line 40 (obtained for example with an elongated groove) defines a first portion 41 in the base body 9, which contains the passage holes 26 (and advantageously the guide portions 33), and a remaining second portion 42, arranged on the side opposite the first portion 41 with respect to the weakening line 40. In this manner, such weakening line 40 allows breaking the base body 9 into the aforesaid portions 41, 42, allowing the use of the first portion 41 at the terminal panels 2 which delimit the lateral edge of the floor or of the cladding, receiving in abutment such terminal panels 2 in a manner such that such first portion 41 projects from the opposite side of the panel 2 only for a brief section where the passage holes 26 are made. In addition, on such portion 41, one or more retention bodies 13 are made which are directed with their engagement portion 19 only towards the corresponding terminal panel 2.

[0096] The base bodies 9 can be arranged with different lengths according to the alignment direction X, as exemplified for example in the two embodiment variants illustrated in figures 28a-b and 29a-b. This allows configuring the base bodies 9 separately or in series as a function of the different application situations, as illustrated by way of example in the examples of figures 30a-c.

[0097] Of course, the abovementioned characteristics of the aforesaid seventh embodiment (storage cavities 37, pins and alignment grooves 38, 39, weakening line 40) can be arranged independently without one or more of the others and, in particular, they can be arranged, separately or together, in the other embodiments of the present invention which were described above.

[0098] Advantageously, the base body 9 and the retention body 13 of the coupling unit 1 are made of substantially rigid material, e.g. metallic material or rigid synthetic materials.

[0099] The invention thus conceived therefore attains the pre-established object.

[0100] In particular, the present coupling unit 1 allows being able to easily substitute a single panel 2 (or two adjacent panels), independently from the surrounding panels 2 of the floor or of the cladding, since each retention body 13 is fixed to the base body 9 in an independent manner with respect to the other retention bodies 13 and is configured for keeping fixed the panel or panels 2 arranged only on the corresponding side 12 of the base body 9. In addition, the adjustment elements 21 according to the invention allow obtaining such advantage without requiring complex processing of the lateral sides 5 of the panels 2 or of the support structure 8, with a consequent improved efficiency and versatility of use, in particular continuing to allow viewing one of the main faces 3 of the panel 2 or the other, allowing the application of different surface finishes for different uses on such main

faces 3. In particular, it is not necessary to execute particular processing operations on the panels 2, since a simple milling will suffice which allows making the longitudinal groove 6 for housing the engagement portion 19 of the retention body, hence without requiring the use of any special mill or machinery.

[0101] In addition, advantageously, the possibility of adjustment given by the adjustment elements 21 of the coupling unit 1 renders it suitable for any thickness of panel 2. In particular, it is possible to use, even for different thicknesses of the panels 2, always the same base body 9 and always the same retention body 13.

[0102] Moreover, advantageously, the substantially flat arrangement of the bottom face 10 of the base body allows the installation thereof without requiring the use of specific shapes of the support structure 8, nor requiring particular processing (e.g. milling or channeling) on the latter.

Claims

1. Coupling unit (1) for panels, which comprises:

- a base body (9) intended to be fixed to a support structure (8); wherein said base body (9) is provided with a bottom face (10) intended to be abutted against said support structure (8) and with an opposite front face (11), and is provided with two opposite sides (12), at each of which a lateral side (5) of at least one corresponding panel (2) is intended to be arranged, in abutment against said front face (11), such lateral side (5) being provided with a longitudinal groove (6);
- at least two retention bodies (13), which are rigidly fixed to said base body (9) and each comprise a stem portion (14) which is extended, along an extension direction (Y') substantially orthogonal to the front face (11) of said base body (9), between a first end (15), which is directed towards the front face (11) of said base body (9), and an opposite second end (16); wherein said stem portion (14) is provided with at least one through hole (20), extended from said second end (16) to said first end (15), and is provided with a first face (17) and with a second face (18) which are directed in opposite directions with respect to each other and are extended between said first end (15) and second end (16); wherein said first face (17) is oriented only on the corresponding said side (12) of said base body (9) in order to be directed towards the lateral side (5) of said panel (2) arranged on said side (12);

wherein each said retention body (13) is provided, only on said first face (17) of said faces (17, 18), with an engagement portion (19), which is projectingly extended from said first face (17) and is positioned only on the corresponding said side (12) of said base body (9) for being inserted in the longitudinal groove (6) of the lateral side (5) of said panel (2);
wherein said at least two retention bodies (13) are positioned with their respective engagement portions (19) arranged, with respect to each other, on opposite said sides (12) of said base body (9);
said coupling unit (1) being **characterized in that** it comprises, for each said retention body (13), at least one adjustment element (21), which is inserted in said through hole (20), is engaged with said retention body (13) and is configured for rigidly fixing said retention body (13) to said base body (9) in an adjustable manner along said extension direction (Y').

2. Coupling unit (1) according to claim 1, **characterized in that** said base body (9) has substantially plate-like shape, being mainly extended over a lying plane orthogonal to said extension direction (Y').

3. Coupling unit (1) according to claim 1 or 2, **characterized in that** said at least one adjustment element (21) is provided with a threaded portion (22) which is extended along an extension axis (Y") parallel to said extension direction (Y') and is provided with a thread (23) extended around said extension axis (Y").

4. Coupling unit (1) according to any one of the preceding claims, **characterized in that** said adjustment element (21) comprises at least one screw.

5. Coupling unit (1) according to any one of the preceding claims, **characterized in that** said base body (9) is provided with at least one passage hole (26) aligned with said at least one through hole (20) of said retention body (13);
wherein said adjustment element (21) passes through said passage hole (26) in order to be engaged with said support structure (8) so as to fix said base body (9) to said support structure (8).

6. Coupling unit (1) according to any one of the preceding claims, **characterized in that** said base plate is provided with at least one fixing hole (28);
wherein said coupling unit (1) comprises at least one fixing element (27), separate from said adjustment element (21), inserted in said fixing hole (28) in order to be engaged with said support structure (8) and acting on said base body (9) in order to rigidly fix said base body (9) to said support structure (8).

7. Coupling unit (1) according to any one of the preceding claims, **characterized in that** said base body (9) is provided at least with a guide (32) extended parallel to said extension direction (Y') and with which said retention body (13) is slidably engaged.

8. Coupling unit (1) according to claim 7, **characterized in that** said guide (32) comprises at least one guide portion (33) projectingly extended from the front face (11) of said base body (9), and said retention body (13) is provided with at least one guide seat (34) in which said guide portion (33) is slidably inserted.

9. Coupling unit (1) according to claim 7 or 8, **characterized in that** said guide (32) blocks said retention body (13) with respect to rotation movements around the extension direction (Y') of the stem portion (14) of said retention body (13).

10. Coupling unit (1) according to any one of the preceding claims, **characterized in that** the engagement portion (19) of said retention body (13) is provided with an abutment surface (35) directed towards the front face (11) of said base body (9) and provided with projecting portions (36) adapted to be engaged in a shoulder (7) of the longitudinal groove (6) of said panel (2).

11. Coupling unit (1) according to any one of the preceding claims, **characterized in that** the bottom face (10) of said base body (9) is substantially flat.

12. Coupling unit (1) according to any one of the preceding claims, **characterized in that** said base body (9) is extended at least according to an alignment direction (X) which defines, from one side to the other, the two said sides (12) of said base body (9); wherein said stem portion (14) is extended width-wise parallel to said alignment direction (X) with shape elongated according to said alignment direction (X).

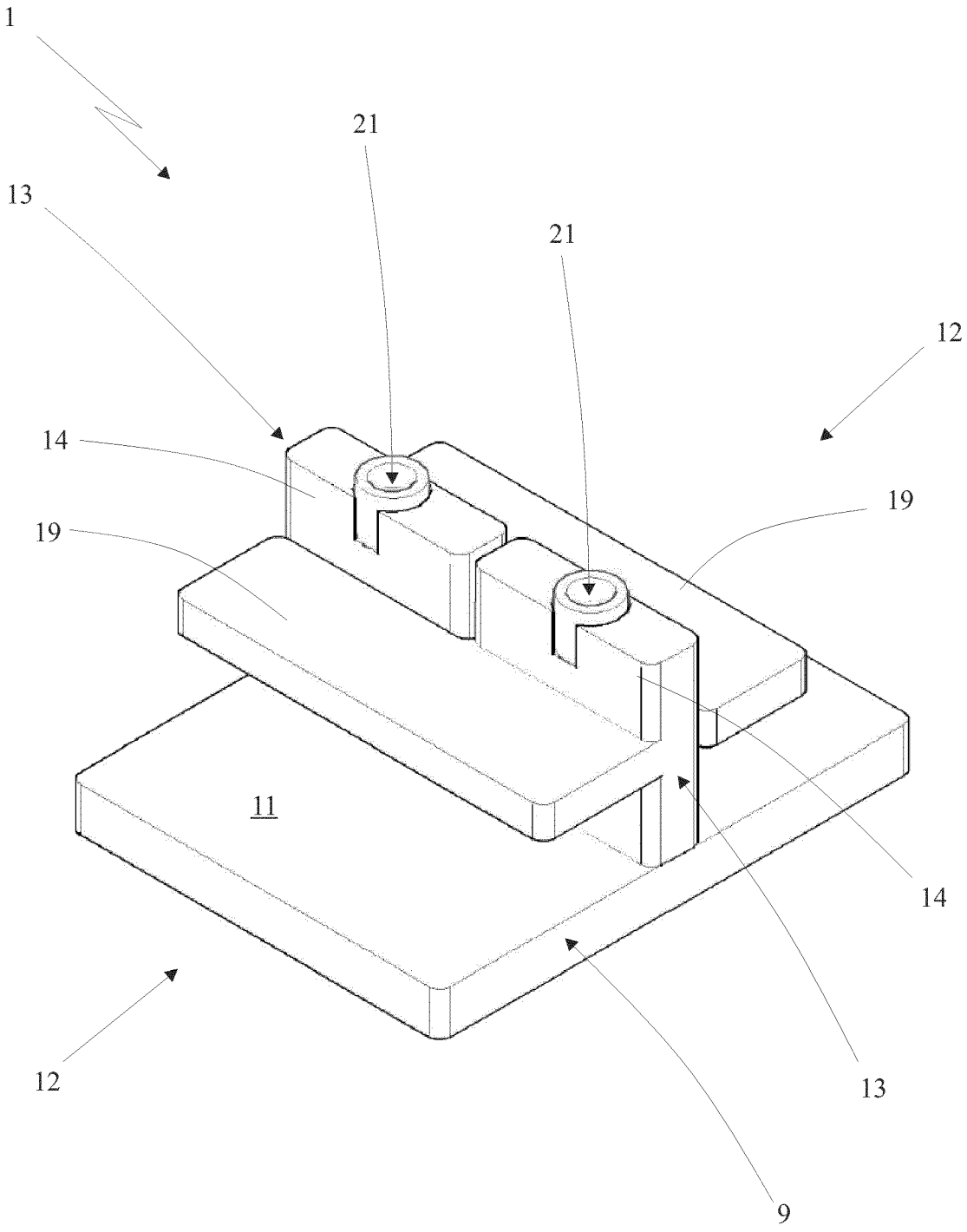

Fig. 1

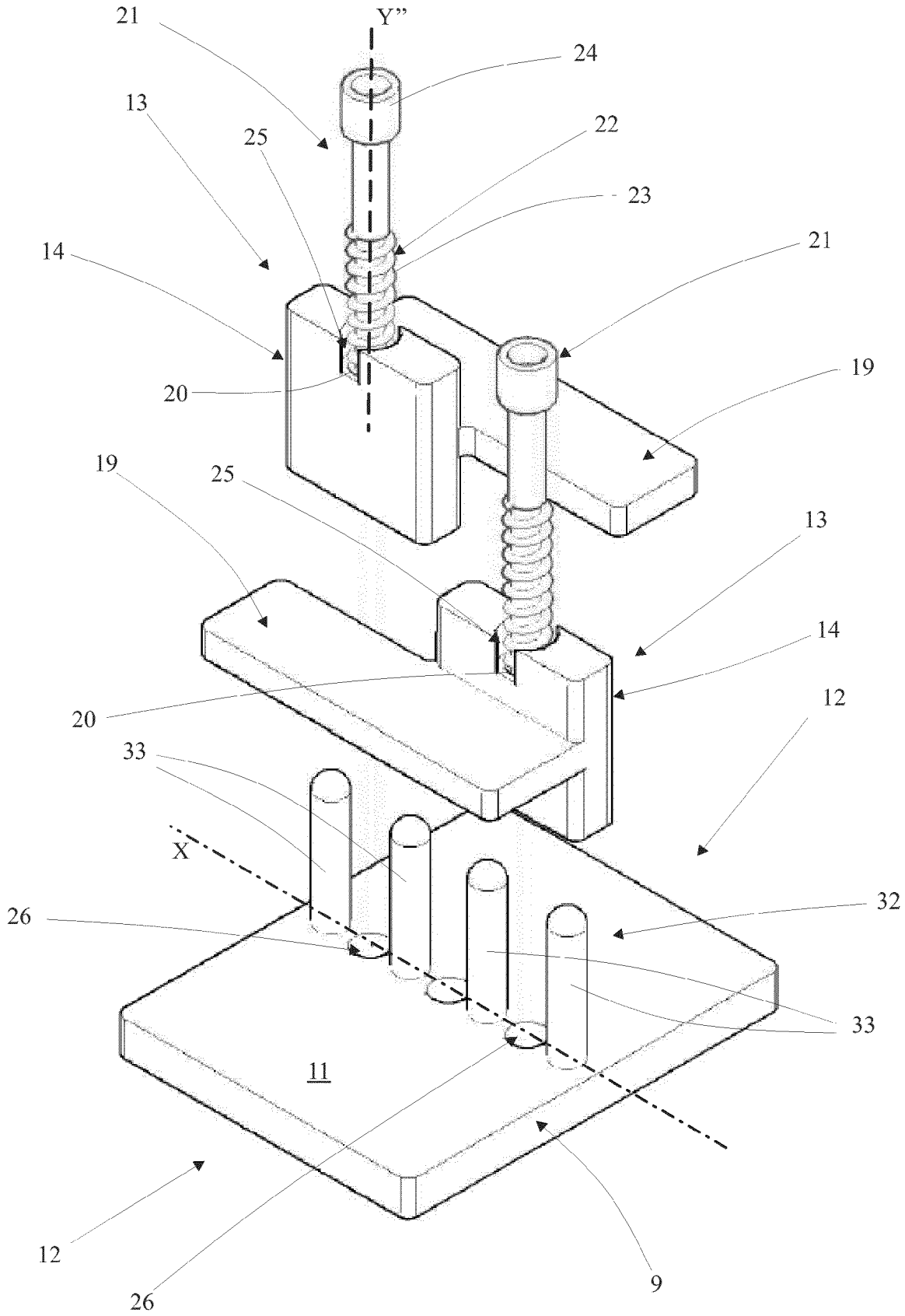

Fig. 2

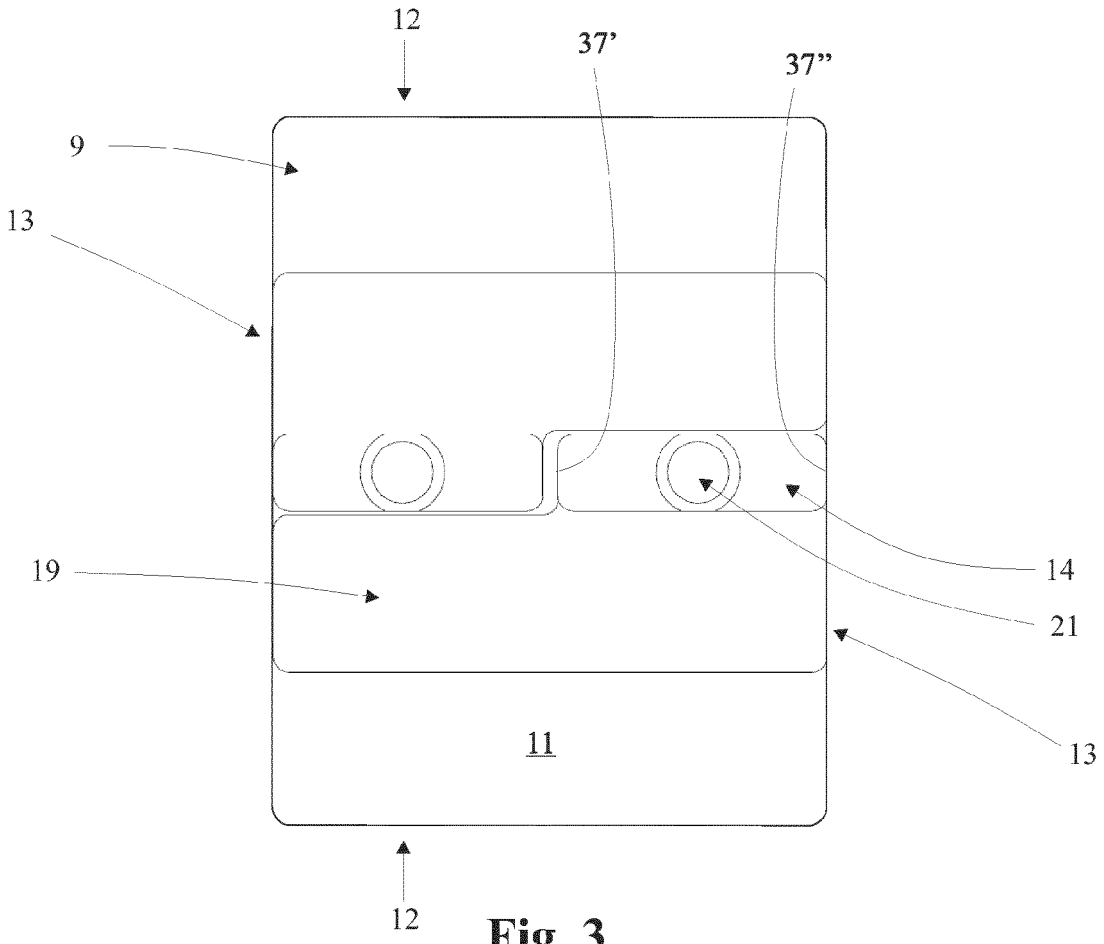

Fig. 3

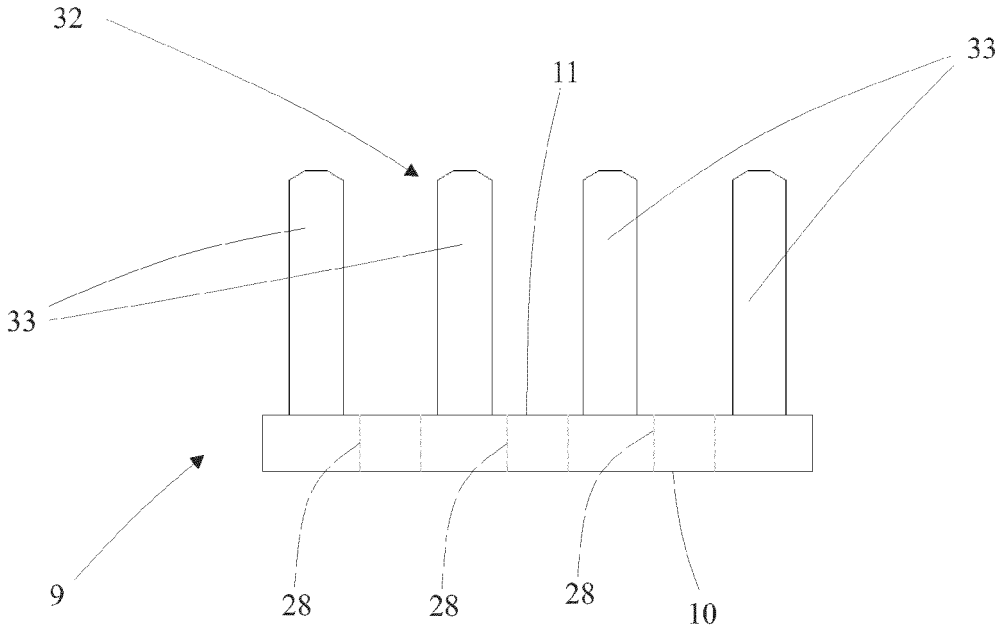

Fig. 4

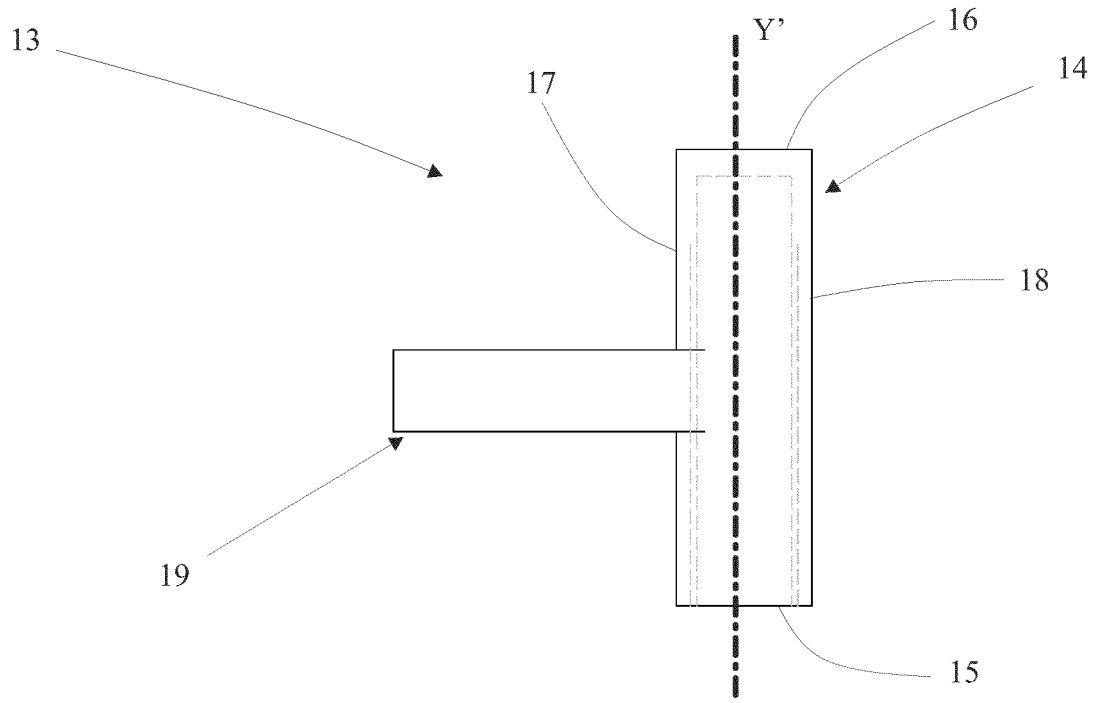

Fig. 5a

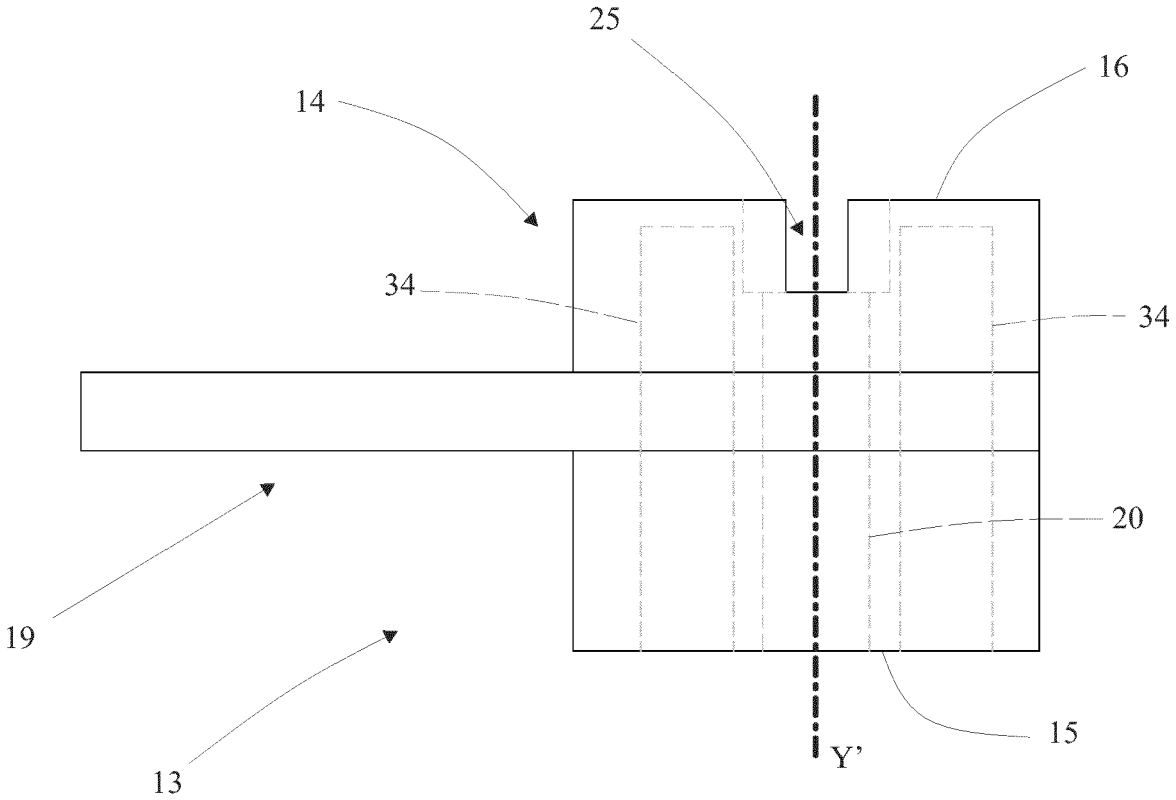

Fig. 5b

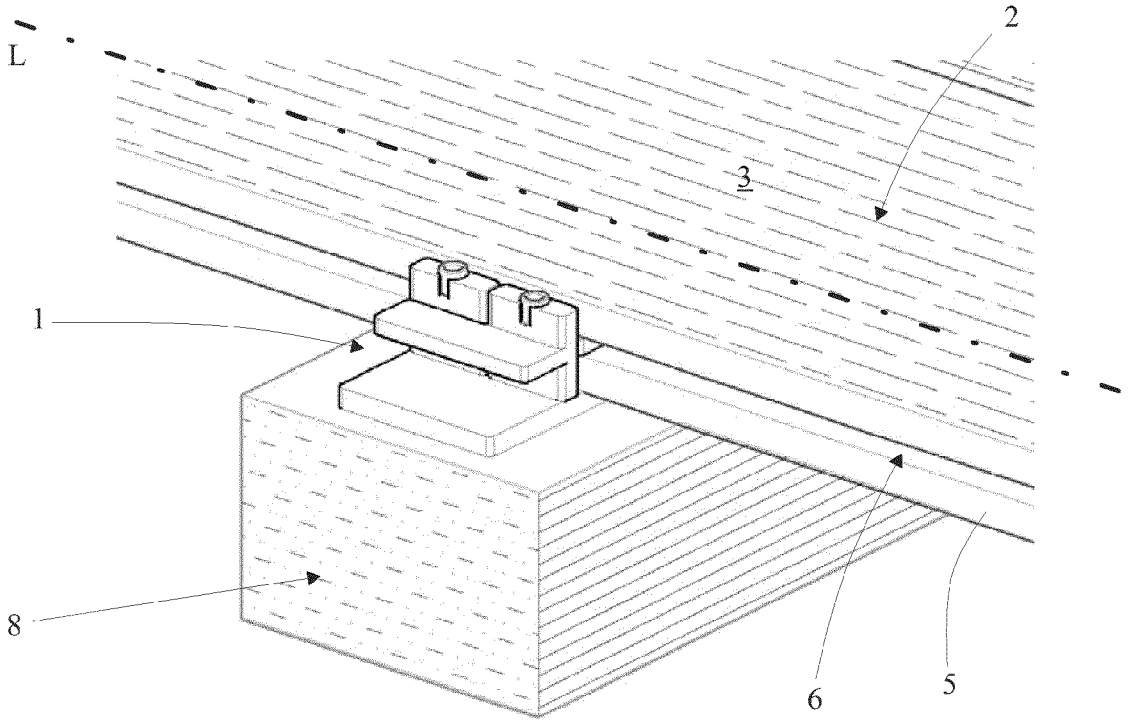

Fig. 6

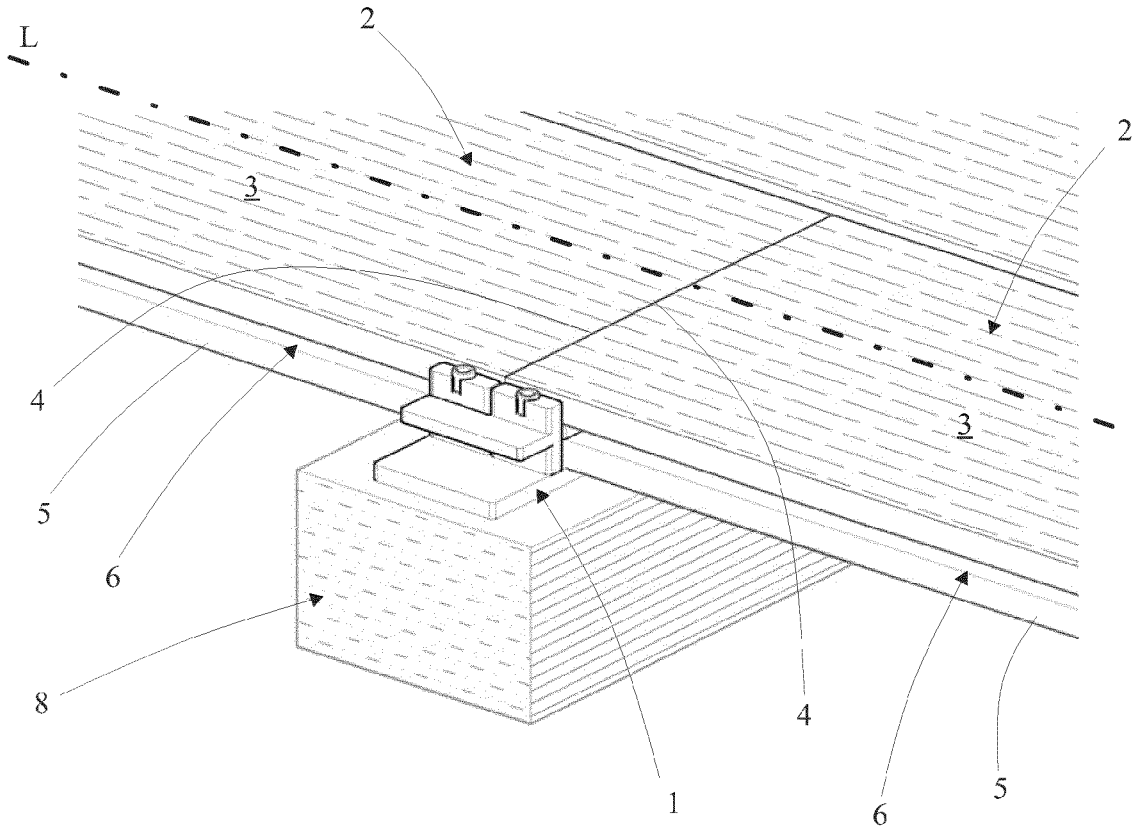

Fig. 7

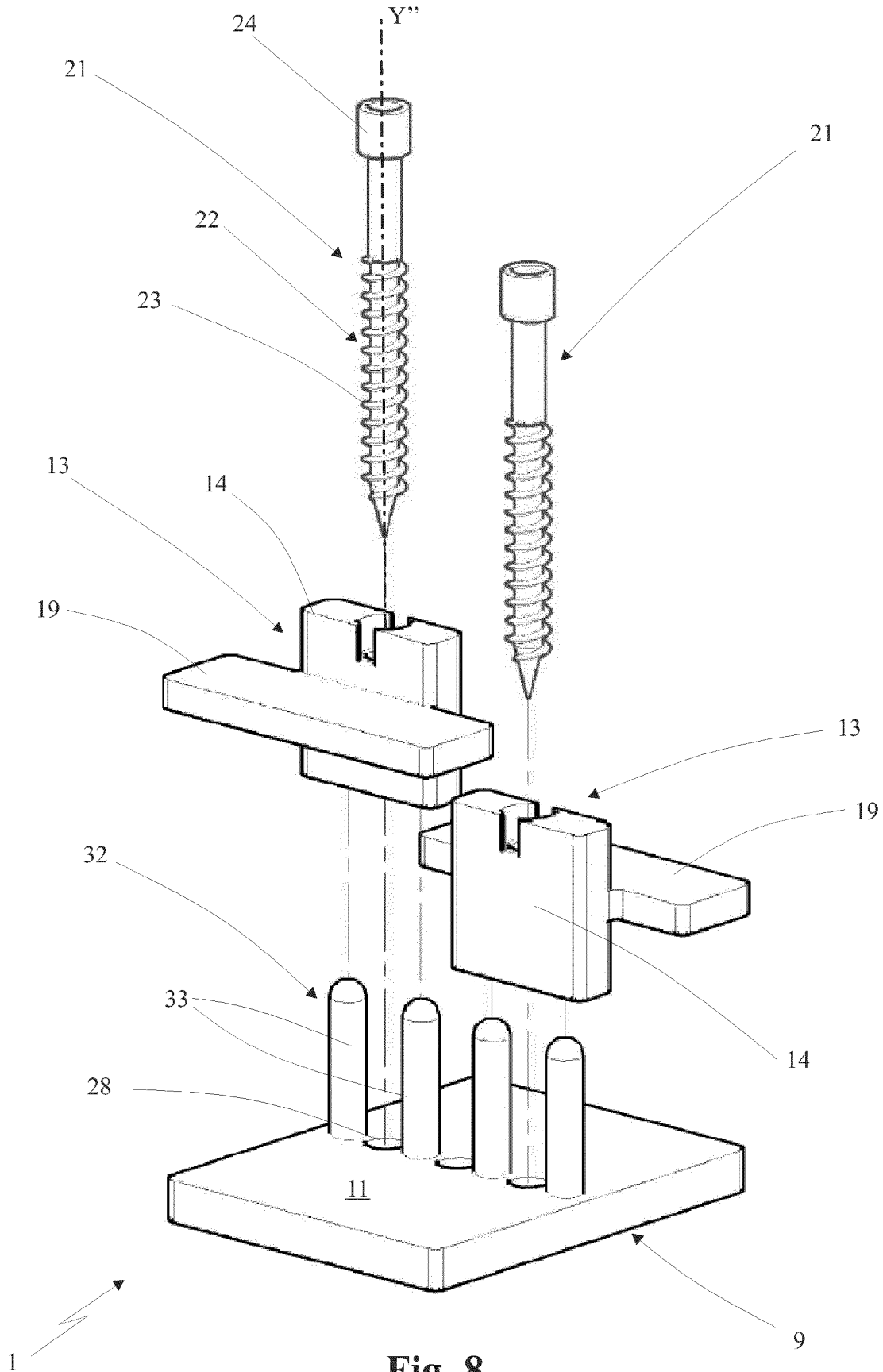

Fig. 8

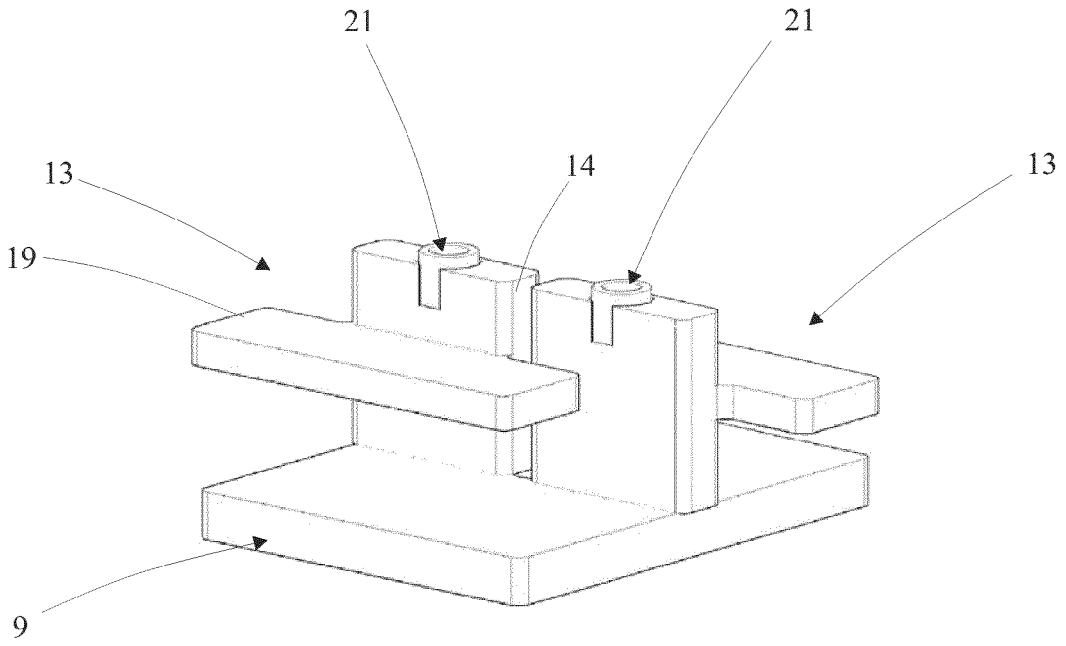

Fig. 9

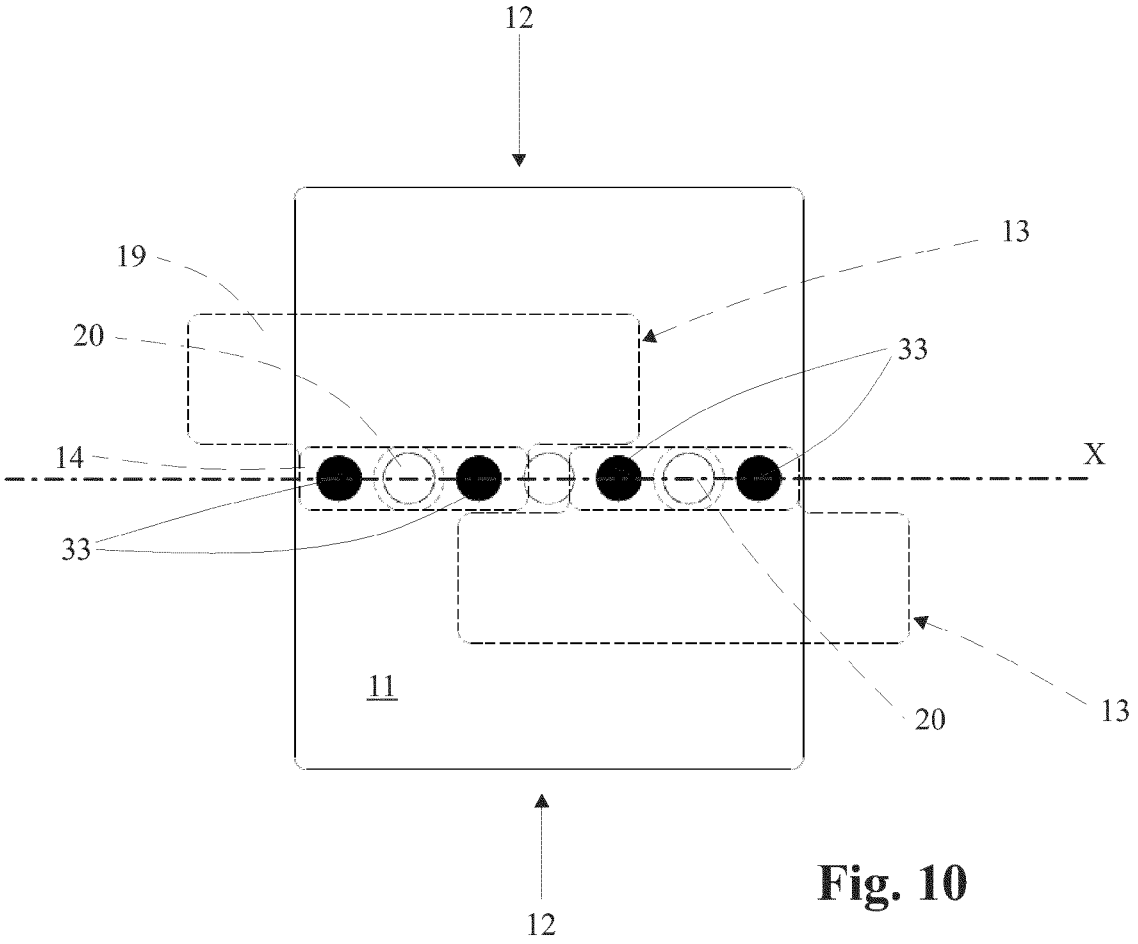

Fig. 10

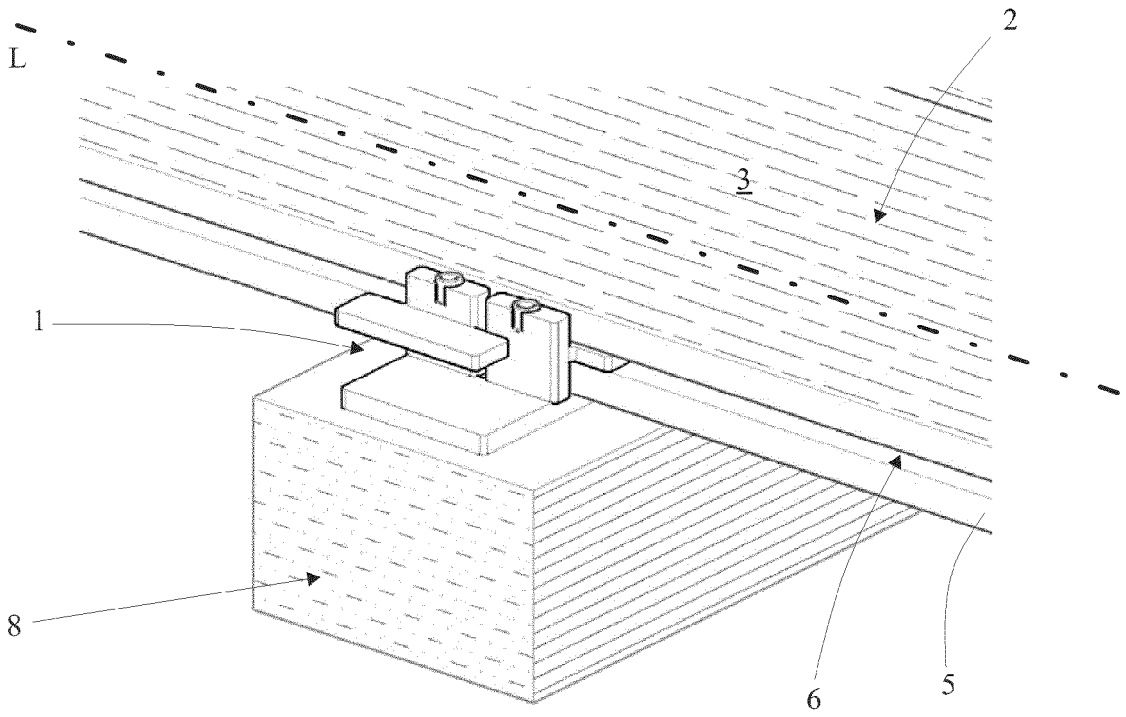

Fig. 11

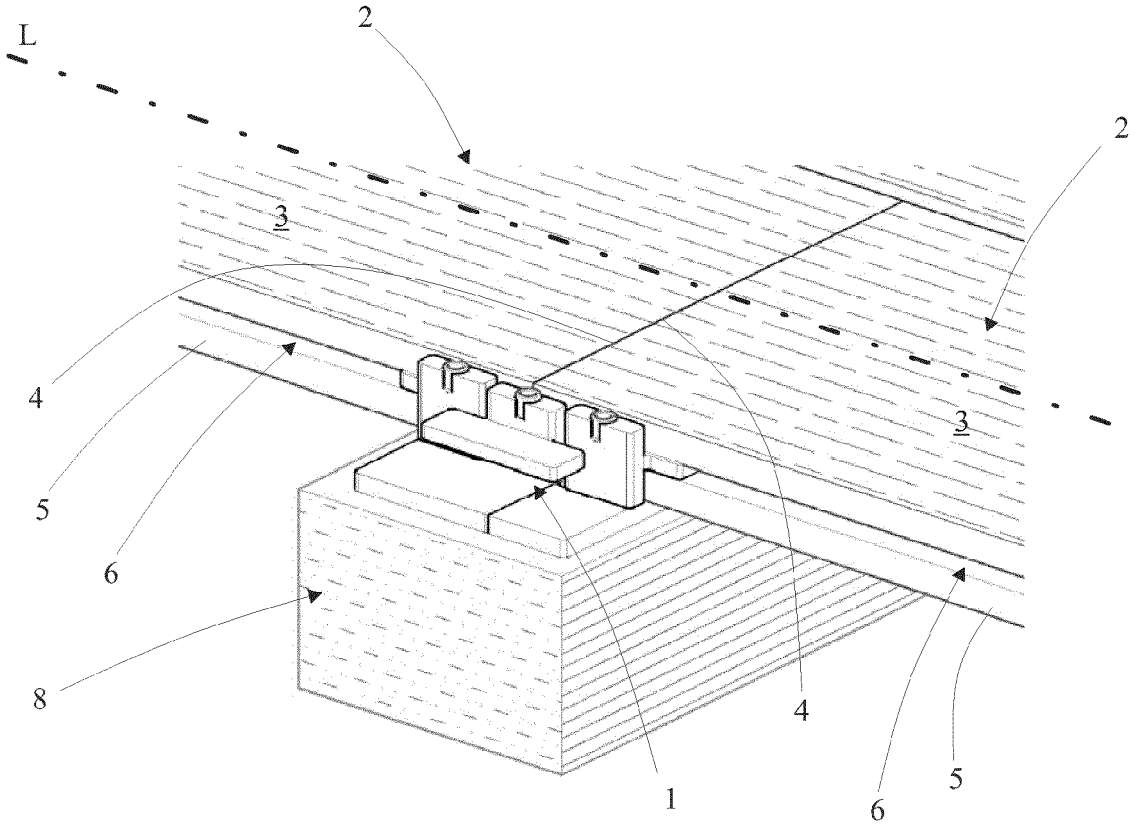

Fig. 12

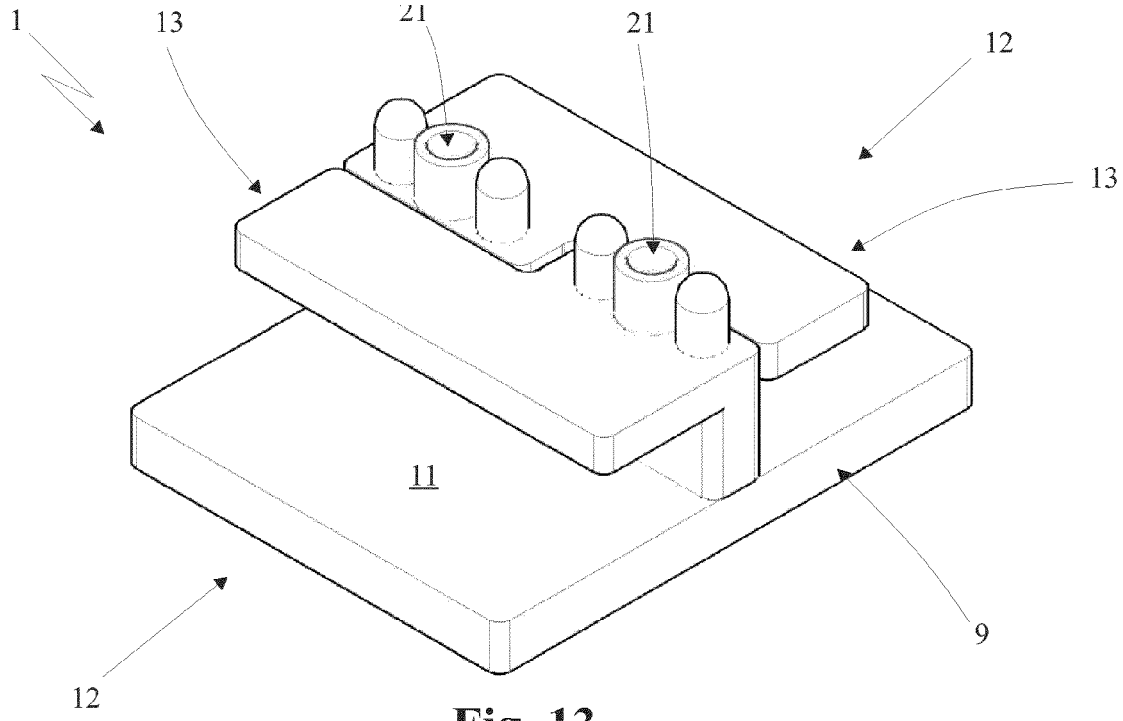

Fig. 13

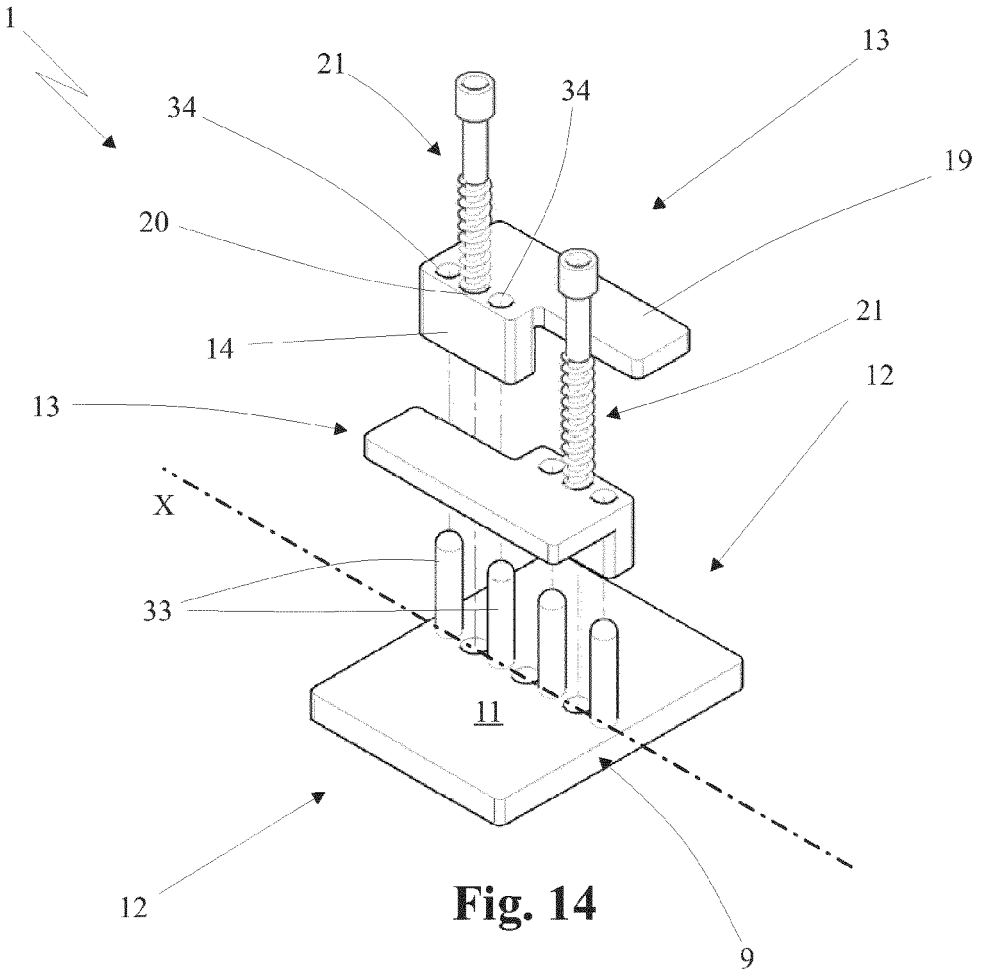

Fig. 14

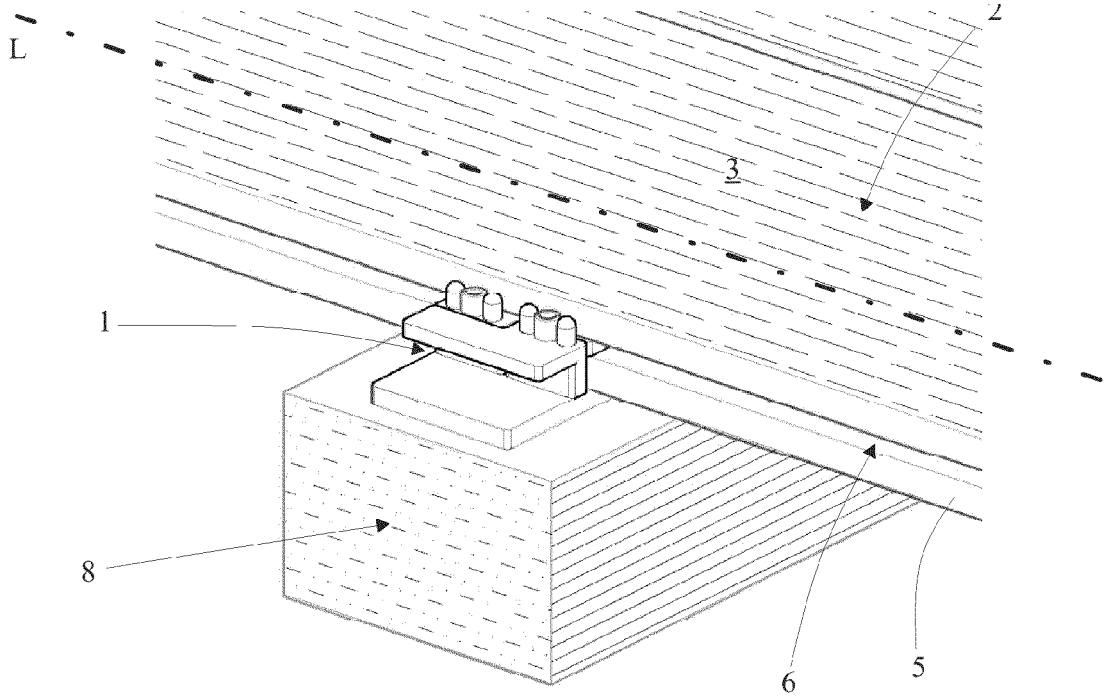

Fig. 15

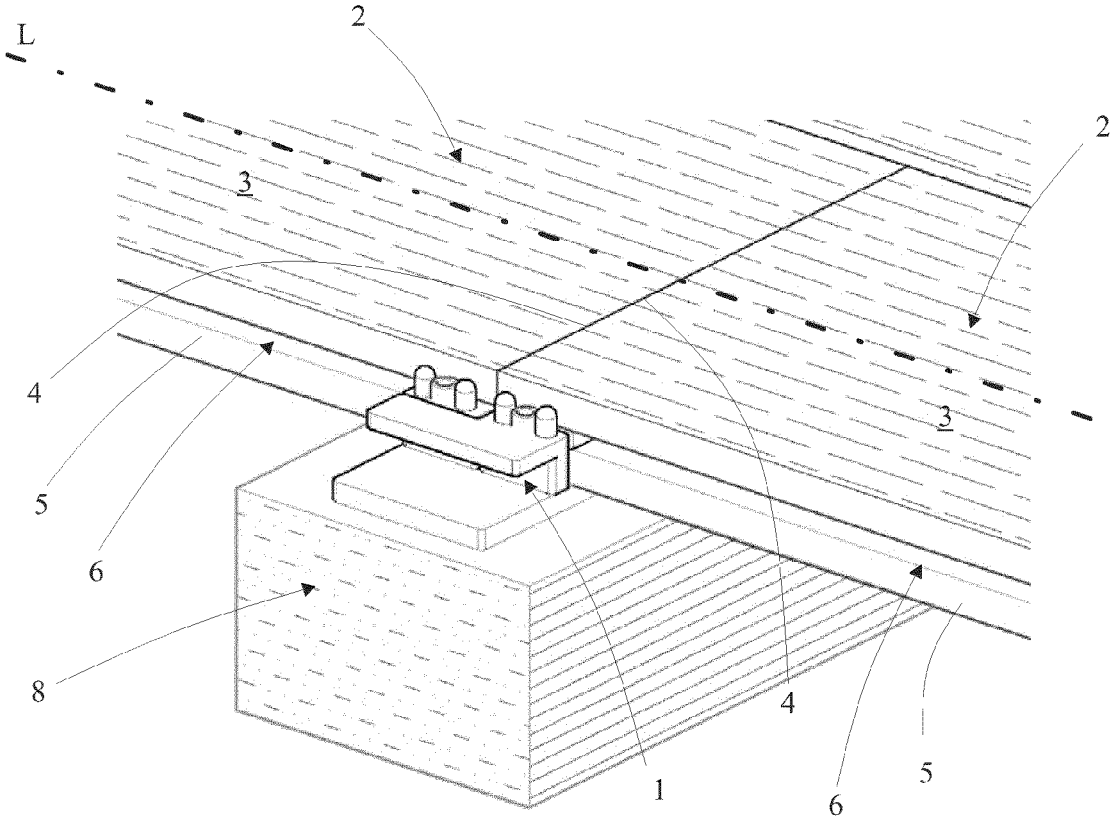

Fig. 16

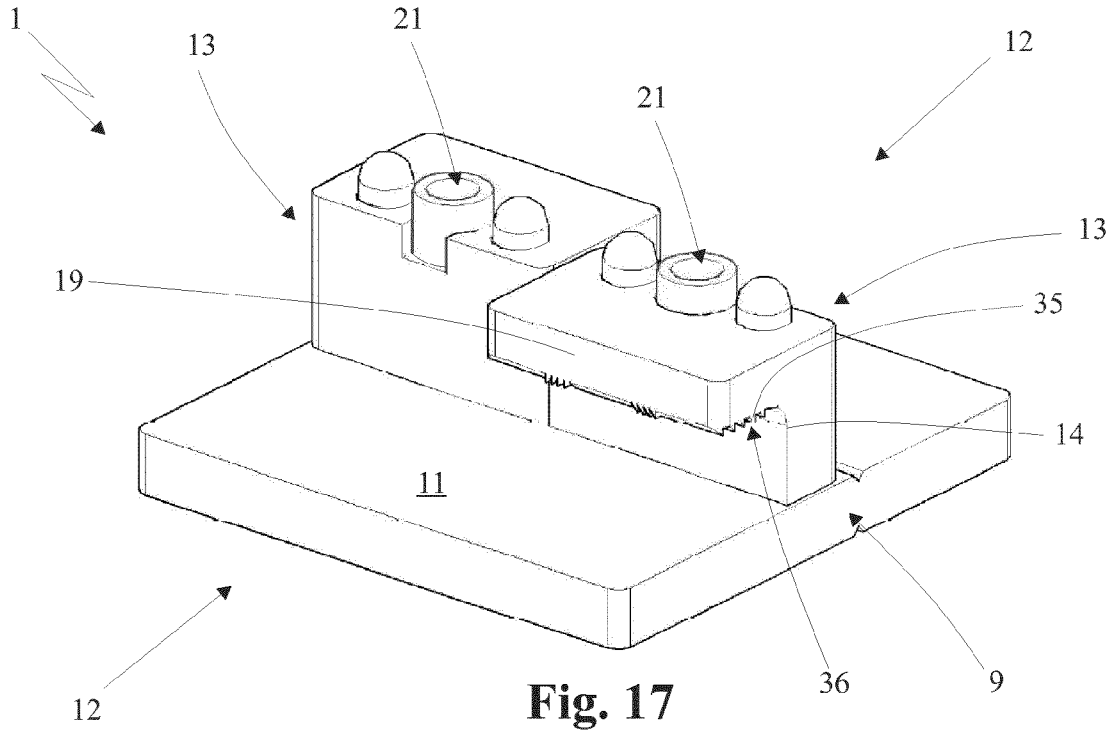
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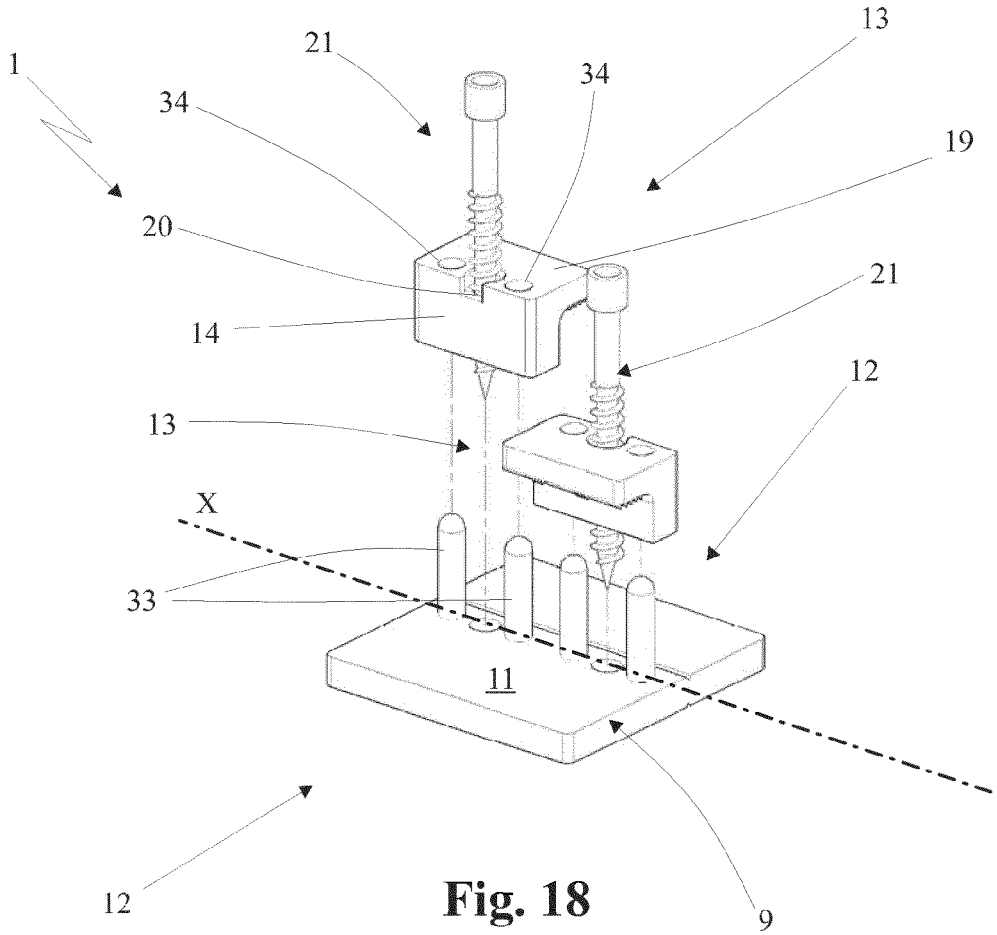
Fig. 17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9

Fig. 18

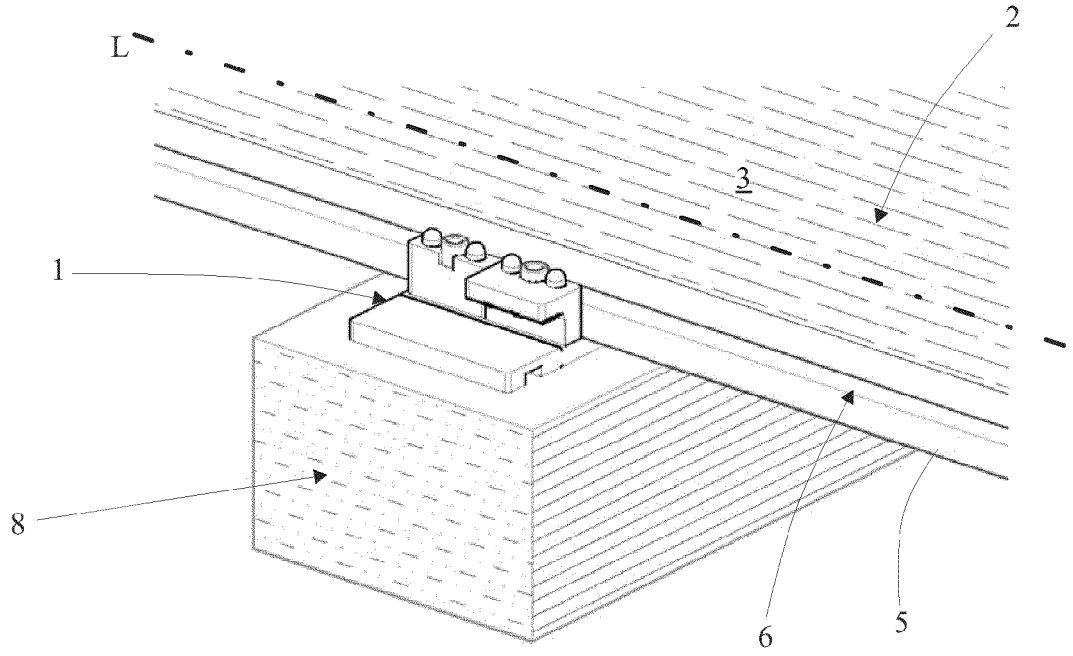

Fig. 19

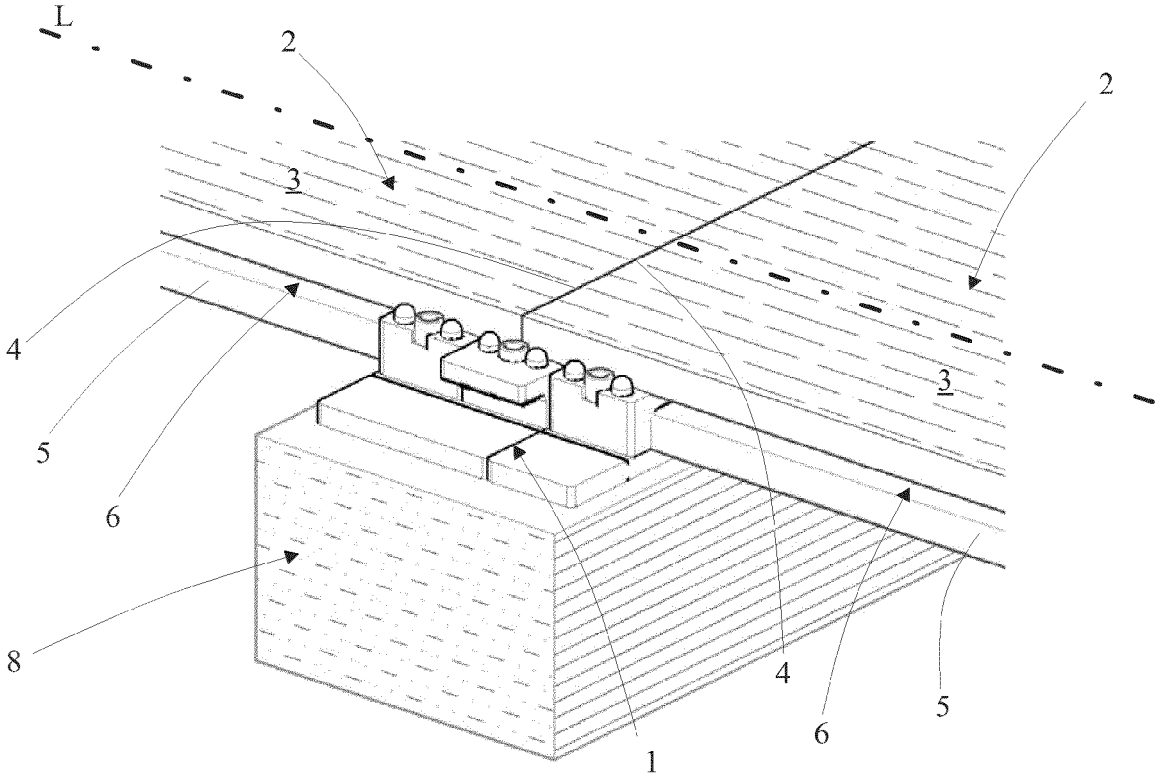

Fig. 20

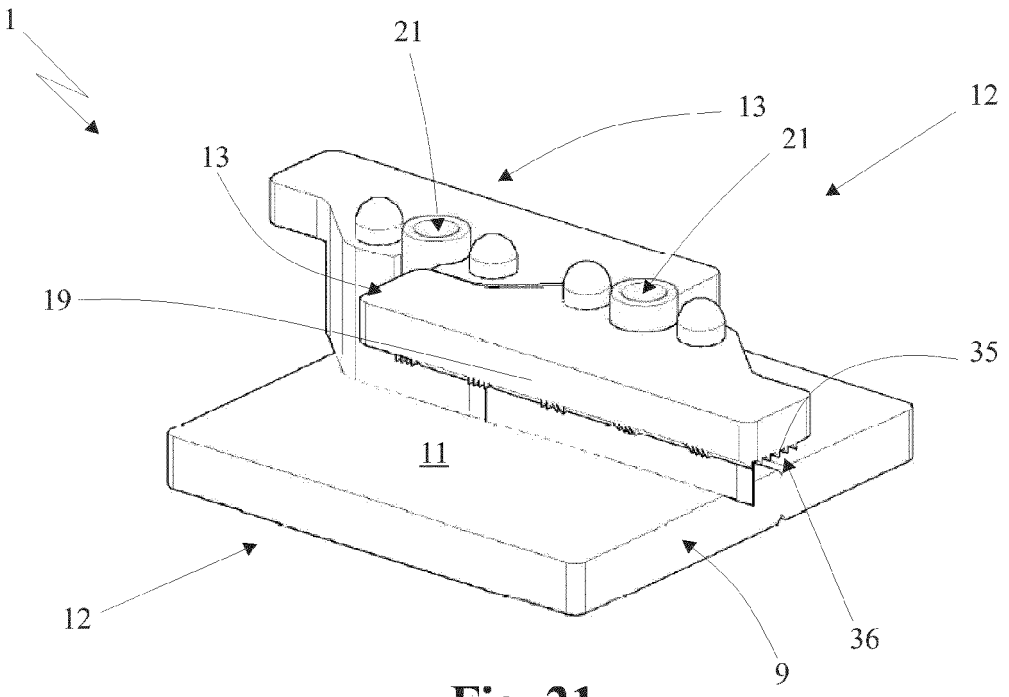
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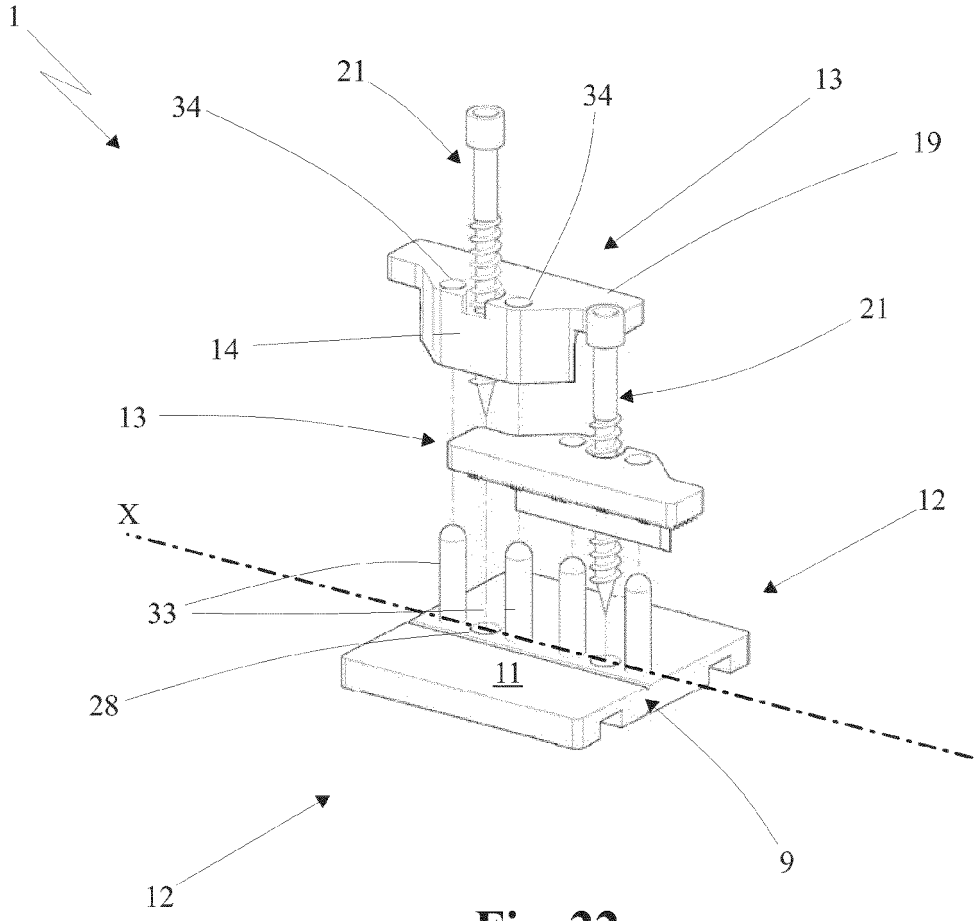
Fig. 21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28
9
12

Fig. 22

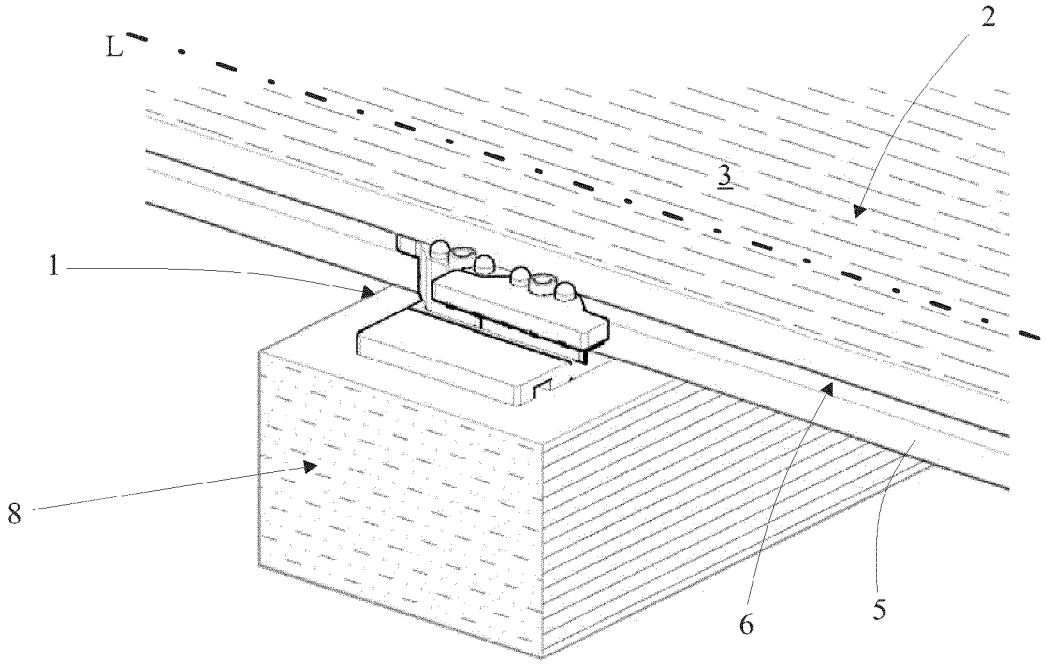

Fig. 23

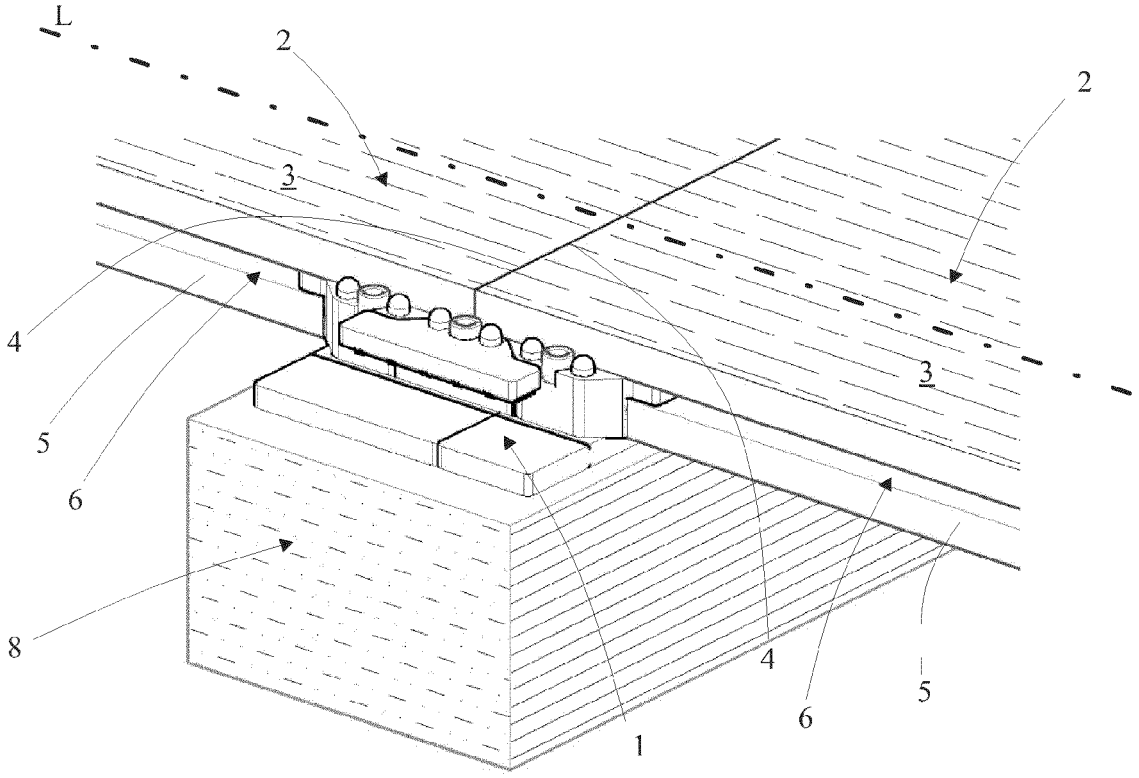

Fig. 24

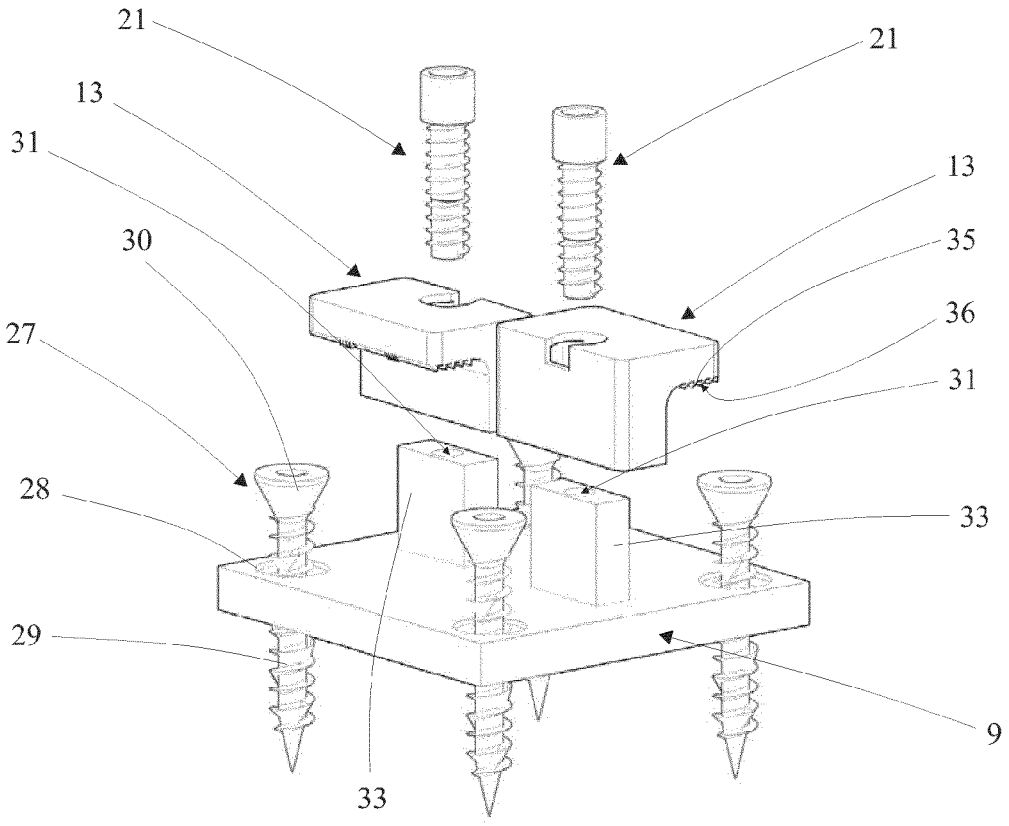

Fig. 25

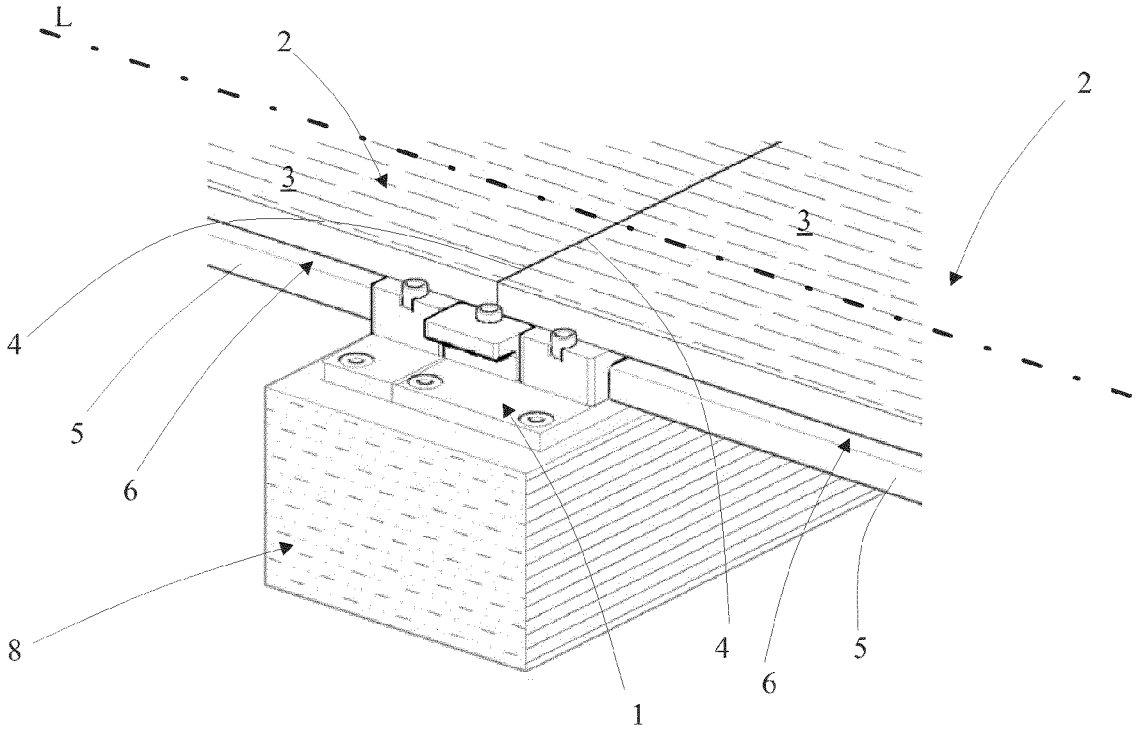

Fig. 26

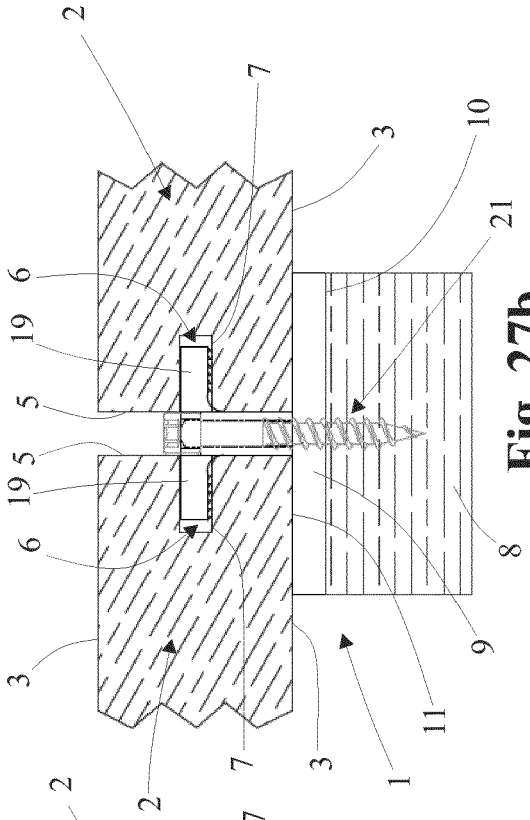

Fig. 27b

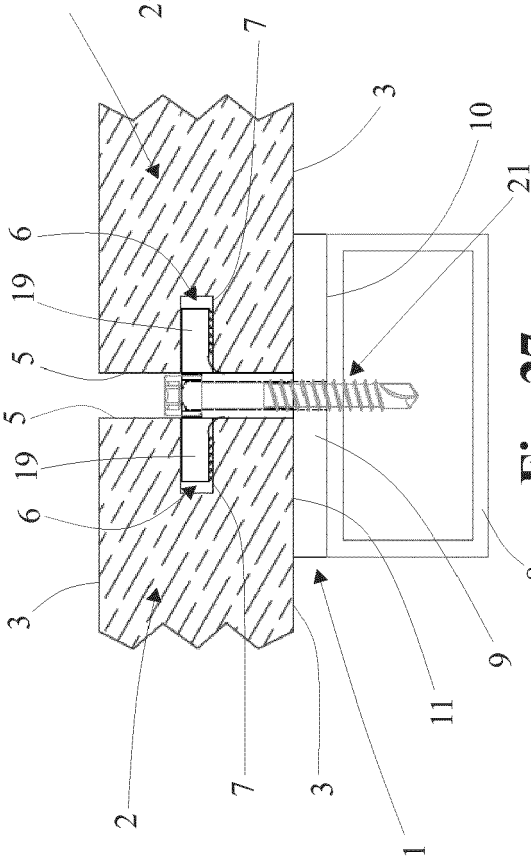

Fig. 27a

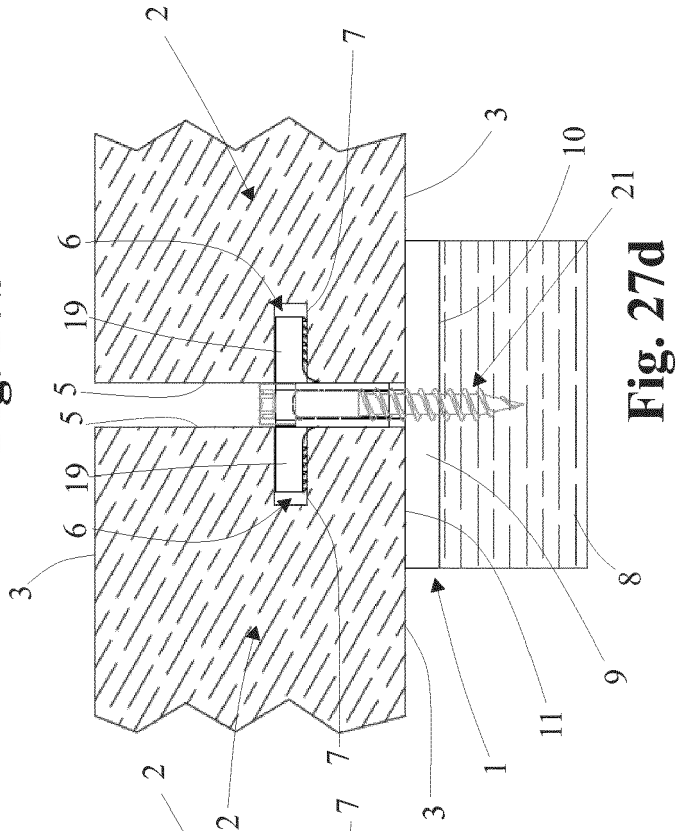

Fig. 27d

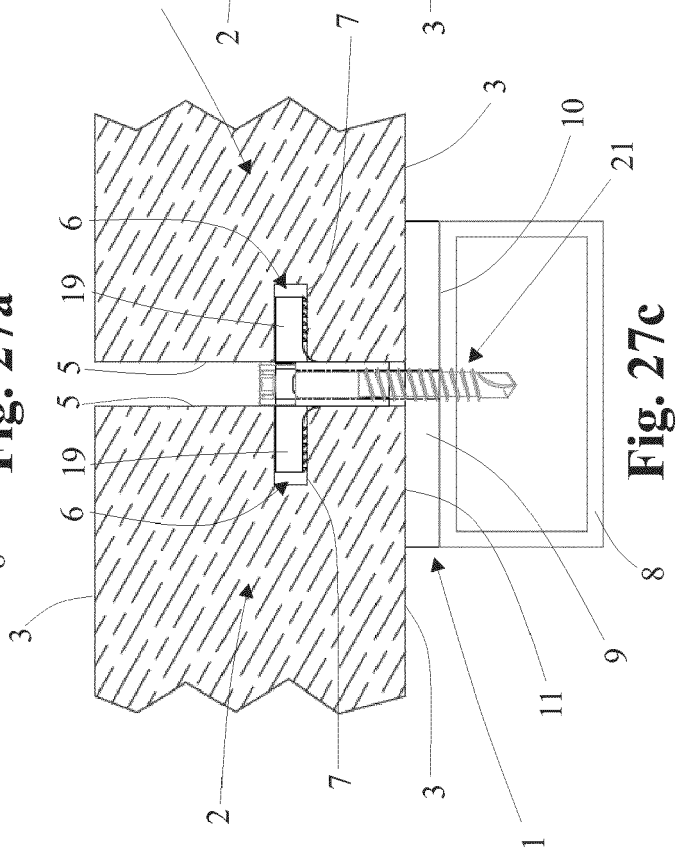

Fig. 27c

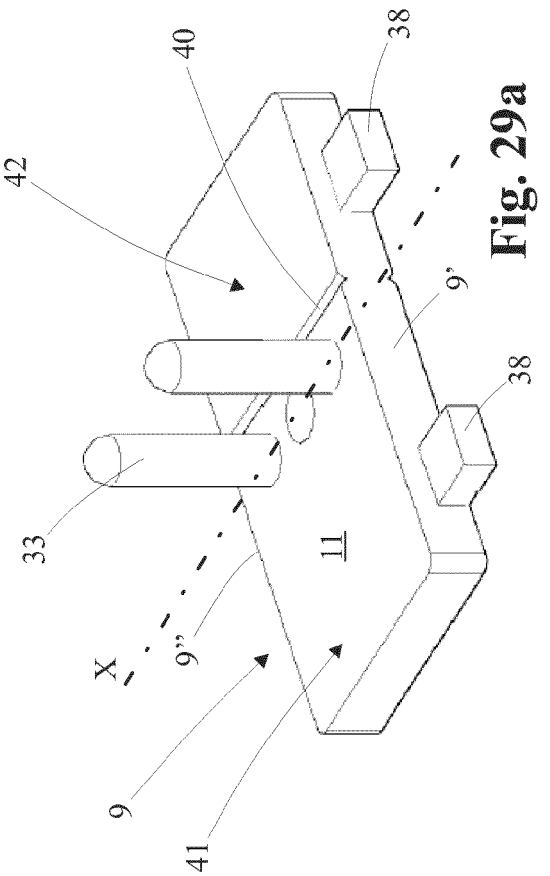

Fig. 29a

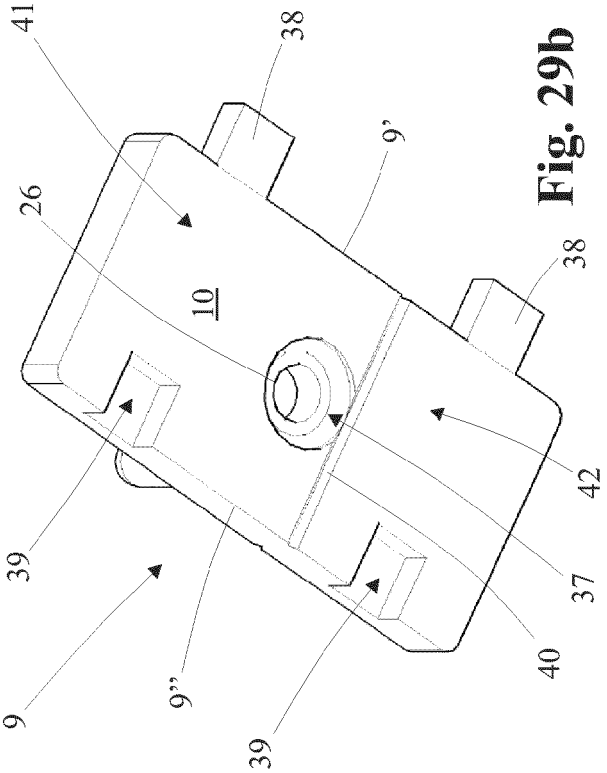

Fig. 29b

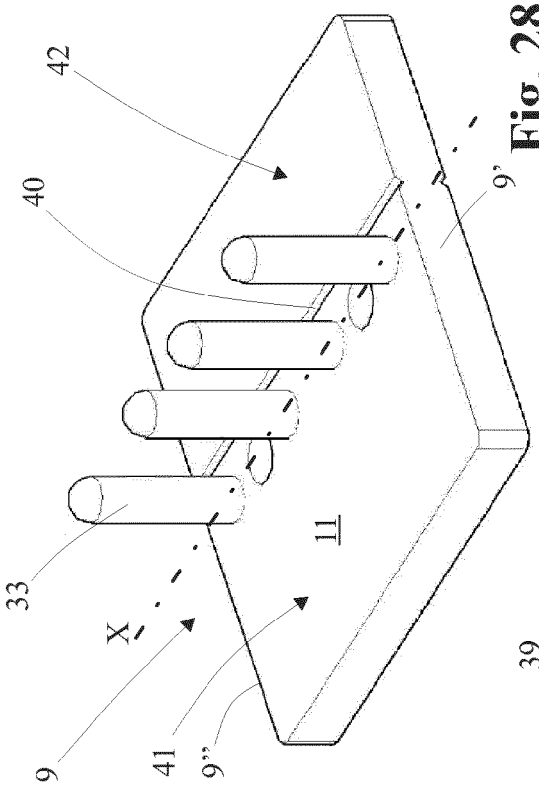

Fig. 28a

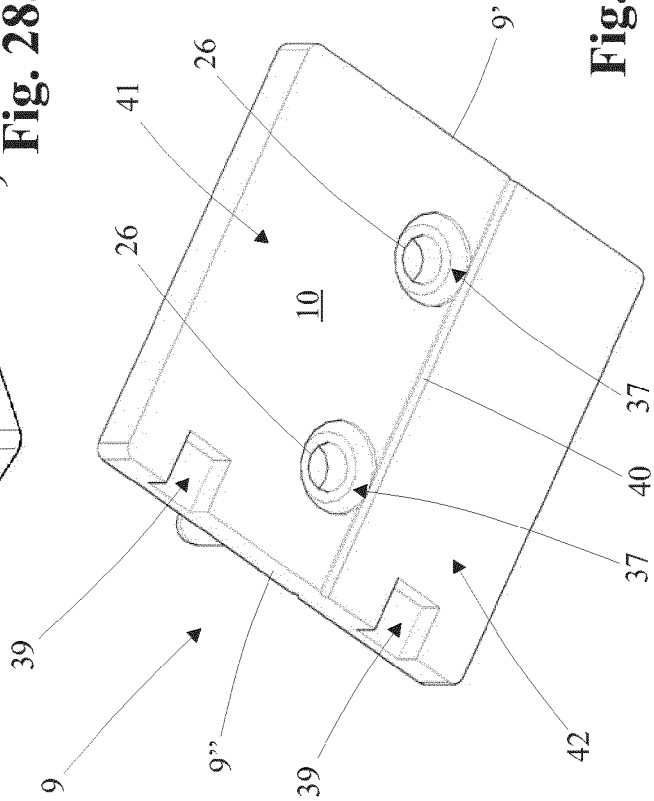

Fig. 28b

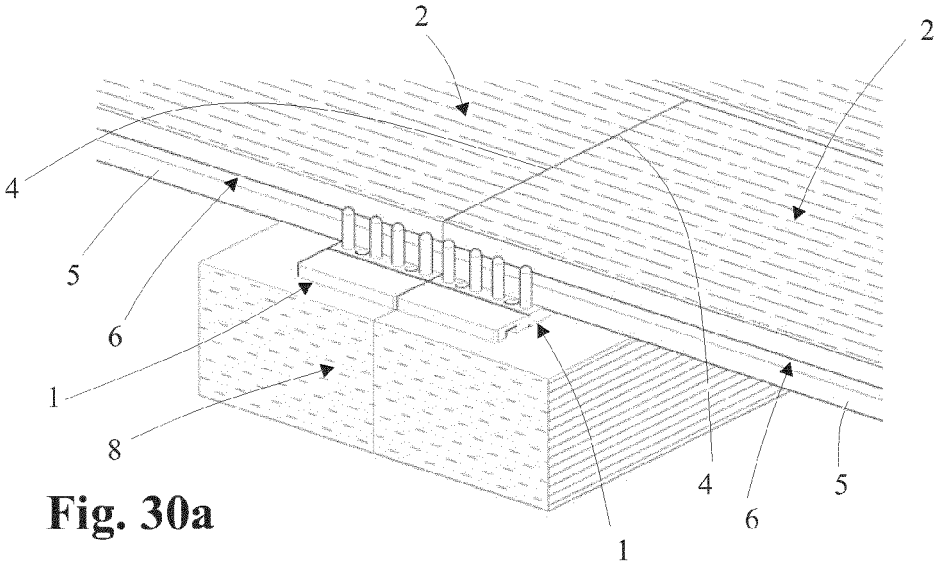

Fig. 30a

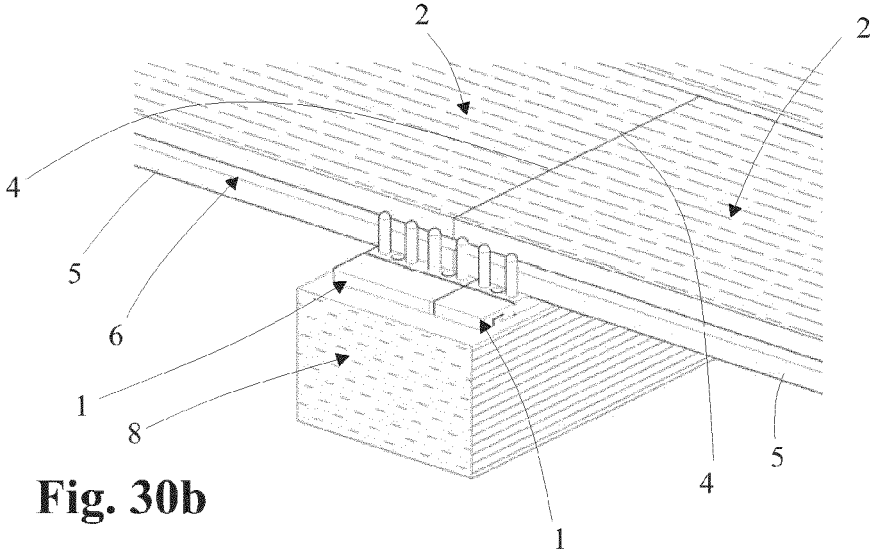

Fig. 30b

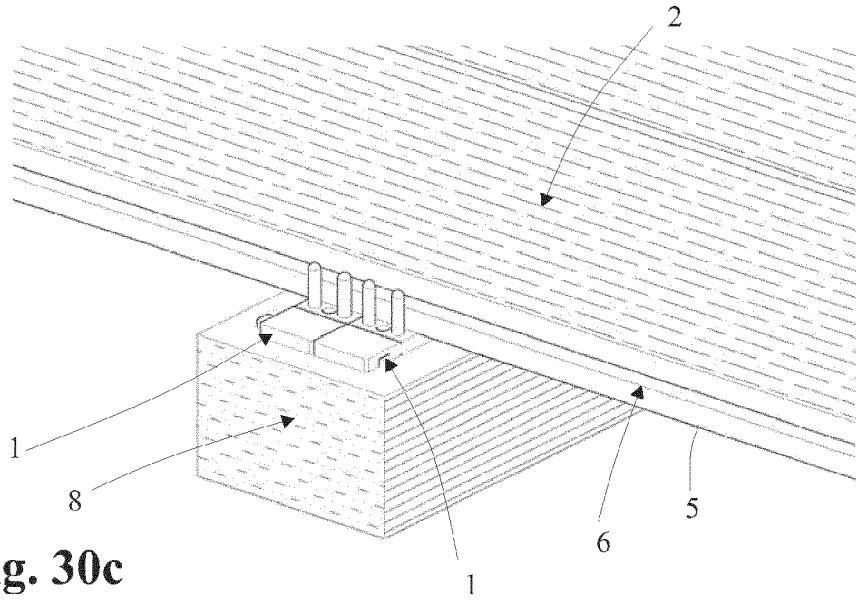

Fig. 30c

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 January 2020	Estorgues, Marlène

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