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(54) **FASTENER AND WALL ELEMENT OF BUILDING**

(57) A fastener (1) comprises a body portion (2) of the fastener (1), having a first end (2') and a second end (2''). At the first end (2') of the body portion (2) of the fastener (1) there is at least one fastening element by means of which a part separate from the fastener (1) may be arranged to be supported by the fastener (1). At least two retainer parts (3, 4) are connected to the second end (2'') of the body portion (2) of the fastener (1), by means of which the fastener (1) may be fastened to its target of

use. The retainer parts (3, 4) are directed at least partly into the direction indicated by the second end (2") of the body portion (2) of the fastener (1), and on at least their portions connected to the body portion (2) of the fastener (1), to mutually different directions.

In addition, a wall element (8) of a building, which comprises a concrete frame (9) and an insulating layer (10) arranged on at least one side of said frame (9) as well as at least one fastener (1).

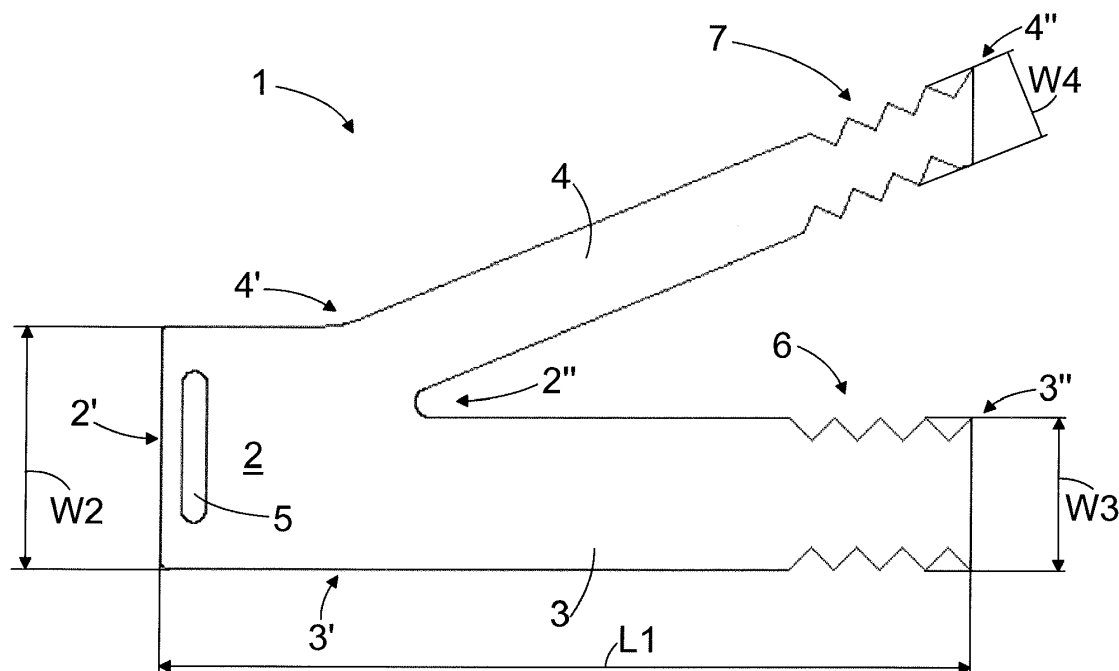


FIG. 2

Description

Background of the invention

[0001] The invention relates to a fastener, which comprises a body portion of the fastener, which has a first end and a second end, at least one fastening element at the first end of the fastener body portion, by means of which a part separate from the fastener may be arranged to be supported by the fastener, and at least two retainer parts connected to the second end of the fastener body portion, by means of which the fastener may be fastened to its target of use, wherein the retainer parts are directed at least partly into the direction indicated by the second end of the body portion of the fastener, and on at least their portions connected to the body portion of the fastener, to mutually different directions.

[0002] The invention further relates to a wall element of a building, which comprises a concrete frame and an insulating layer arranged on at least one side of said frame.

[0003] Lining boards, such as lining boards provided with lining panels, or lining boards formed of a single material or material mixture, are used on the external cladding of buildings to form the facade of the building. According to a solution, the lining boards are placed on the wall structure to be supported by supporting rails fastened by means of fasteners.

Brief description of the invention

[0004] The purpose of the invention is to achieve a new type of fastener.

[0005] The fastener according to the invention is characterised that the fastener is one uniform piece formed of one uniform slab.

[0006] The inventive wall element of a building is characterised in that the wall element comprises at least one fastener according to any one of claims 1 to 9.

[0007] The disclosed fastener is simple and easy to manufacture. In addition, it is easy to install on a wall element having a concrete frame and provided with an insulating layer as early as at the manufacturing stage of the element. In such a case, the supporting rails used for installing the lining boards are easy to install on the element without damaging its insulating layer.

Brief description of the drawings

[0008] The invention will now be described in closer detail in connection with the preferred embodiments and referring to the accompanying drawings, in which

Figure 1 is a schematic view of a fastener,
Figure 2 is a schematic side view of the fastener according to Figure 1,
Figure 3 is a schematic top view of the fastener according to Figures 1 and 2,

Figure 4 is a schematic view of the fastener according to Figures 1 and 2 as seen towards the direction of the second ends of the fastening portions of the fasteners,

Figure 5 is a schematic cross-sectional side view of a wall element of a building, and

Figures 6, 7, 8, 9, and 10 are schematic side views of other embodiments of the fastener.

[0009] The figures show embodiments of the invention in a simplified form for reasons of clarity. In the figures, like reference numerals identify like parts.

Detailed description of the invention

[0010] Figure 1 is a schematic view of a fastener 1, which may be used to fasten lining boards 12 to a wall element 8 of a building, such as the one described in closer detail in Figure 5 below, either so that the lining board 12 is arranged directly to be supported by one or more fasteners 1 arranged in the wall element, or so that supporting rails 11, 11b are arranged in connection with one or more fasteners arranged in the wall element 8, whereby the lining board 12 is arranged to be supported by said one or more supporting rails 11a, 11b.

[0011] Figure 2 is a schematic side view of the fastener 1 according to Figure 1. The fastener is shown in Figure 2 in the usage position in which it is in particular intended to be used in the purpose of use to be disclosed in greater detail in Figure 5. However, the fastener 1 may be used in another usage position, if that is appropriate for the purpose of use in question.

[0012] The fastener 1 illustrated by Figure 2 comprises a body portion 2 of the fastener 1, which has a first end 2' and a second end 2". The fastener 1 further comprises a first retainer part 3 connected to the second end 2" of the body portion 2 of the fastener 1 and directed away from said second end 2" of the body portion 2 of the fastener 1, or in other words, a first retainer part 3 directed towards the direction indicated by the second end 2" of the body portion 2 of the fastener 1, which has a first end 3' connected to the second end 2" of the body portion 2 of the fastener 1, and a second end 3" directed away from the second end 2" of the body portion 2 of the fastener 1. Further, the fastener 1 comprises a second retainer part 4 of the fastener 1, connected to the second end 2" of the body portion 2 of the fastener 1 and directed away from said second end 2" of the body portion 2 of the fastener 1, or in other words, a second retainer part 3 directed towards the direction indicated by the second end 2" of the body portion 2 of the fastener 1, which has a first end 4' connected to the second end 2" of the body portion 2 of the fastener 1, and a second end 4" directed away from the second end 2" of the body portion 2 of the fastener 1. The second retainer part 4 of the fastener 1 is directed to a direction deviating from the direction of the first retainer part 3, that is, the first retainer part 3 and the second retainer part 4 are directed to mutually differ-

ent directions. The second retainer part 4 of the fastener is directed to a direction that deviates from the direction of the first retainer part 3 so that the second retainer part 4 is aimed away from the first retainer part 3, in other words, the first retainer part 3 and the second retainer part 4 are directed away from each other or to directions aimed away from each other. The fastener 1 is arranged to fasten to its target of use by means of said retainer parts 3, 4.

[0013] At the first end 2' of the body portion 2 of the fastener 1 there is an opening 5 formed through the second end 2', through which at least one fastening member may be arranged, such as a screw or bolt, to arrange a part that is separate from the fastener 1, such as the aforementioned supporting rails 11a, 11b, to be supported by the fastener 1. Said opening 5 therefore forms a possible fastening element at the first end 2" of the body portion 2 of the fastener 1, by means of which a part separate from the fastener 1 may be arranged to be supported by the fastener 1. Said opening 5 could also be replaced by fastening hooks or claws, for example, arranged at the first end 2 of the body portion 2 of the fastener 1, supported by which the part separate from the fastener 1 could be positioned without any fastening members, such as a screw or bolt, between the said part separate from the fastener 1 and the fastener 1.

[0014] Figure 3 is a schematic top view of the fastener according to Figures 1 and 2, and Figure 4 is a schematic view of the fastener 1 according to Figures 1 and 2 as seen towards the direction of the second ends 3", 4" of the fastening portions 3, 4 of the fastener 1.

[0015] The fastener 1 shown in Figures 1 to 4 is made by cutting from one uniform sheet slab, such as a metal plate, for example a steel plate, whereby the body portion 2, first retainer part 3 and second retainer part 4 of the fastener 1 are of one uniform piece to begin with, that is, the first retainer part 3 and the second retainer part 4 connect seamlessly to the body portion 2 of the fastener 1. Alternatively, the body portion 2, first retainer part 3, and second retainer part 4 of the fastener 1 are originally separate parts joined to each other by welding or gluing, for example.

[0016] In the plate-like fastener 1 shown in Figures 1 to 4, the body portion 2, first retainer part 3, and second retainer part 4 of the fastener 1 are substantially in the same plane with respect to each other, so through the body portion 2, first retainer part 3, and second retainer part 4 of the fastener 1, one imaginary plane, common to all of said parts of the fastener 1, may be adapted to pass, that is, in the position of the fastener 1 shown in Figure 2, a vertical plane, which touches all of said parts of the fastener 1 in a parallel direction with them. In this embodiment, the retainer parts 3, 4 are directed substantially entirely in the direction indicated by the second end 2" of the body portion 2 of the fastener 1, in the same plane with regard to each other.

[0017] Alternatively, the first retainer part 3 and/or the second retainer part 4 could be bent, for example, in the

transverse direction in relation to the longitudinal direction of the first retainer part 3 and/or the second retainer part 4 so that the body portion 2, first retainer part 3, and second retainer part 4 of the fastener 1 would no longer all be in the same plane. In this embodiment, at least one of the fasteners 3, 4 would only partially be directed in the direction indicated by the second end 2" of the body portion 2 of the fastener 1.

[0018] Figure 5 is a schematic cross-sectional side view of a wall element 8 of a building.

[0019] The wall element 8 comprises a concrete frame 9 that has a first side 9' and a second side 9". In the element 8 of Figure 5, the first side 9' of the frame 9 forms the back side of the frame 9, directed inward of the building, and the second side 9" of the frame 9 forms the front side of the frame 9, directed outward of the building.

[0020] The wall element 8 further comprises an insulating layer 10 arranged on the second side 9" of the frame 9 and fastened to the frame 9. The insulating layer 10 may be a thermal insulating layer or a soundproofing layer or both a thermal insulating layer and a soundproofing layer. The insulating layer 10 may be an insulating layer composed of mineral wool, wood fibre wool, polystyrene, or polyurethane. The insulating layer 10 may be formed of insulating boards that are fastened to the surface of the second side 9" of the concrete frame 9 by gluing, for example. The insulating layer 10 may also be directly squeezed or extruded onto the surface of the second side 9" of the concrete frame 9, if the insulation layer 10 is one formed of polystyrene or polyurethane. In such a case, it is also possible to arrange a specific adhesion layer between the second side 9" of the concrete frame 9 and the insulating layer 10 to improve the adhesion of the insulating layer 10 to the concrete frame 9.

[0021] The wall element 8 further comprises fasteners 1 embedded in it. The fasteners 1 are embedded in the wall element 8 so that the second ends 3", 4" of the retainer parts 3, 4 of the fasteners 1 are left inside the concrete frame 9 and that at least the portion comprising the opening 5 or another fastening element of the frame parts 2 of the fasteners 1 extends outside the insulating layer 10. So, the fasteners 1 are fastened to the element 8 by embedding the second ends 3", 4" of the retainer parts 3, 4 of the fasteners 1 in the concrete frame 9. The positioning of the fasteners 1, that is, the number of fasteners 1, and their distance to each other in the element 8 may vary.

[0022] When the frame 9 of the element 8 is being constructed, the fasteners 1 may be arranged in place in the casting mould before casting the frame 9, so that the second ends 3", 4" of the retainer parts 3, 4 of the fasteners 1 remain inside the concrete frame 9 during its casting. Alternatively, the second ends 3", 4" of the retainer parts 3, 4 of the fasteners 1 may be embedded in the concrete material of the frame 9 during the casting of the frame 9 or following that before the concrete material is set.

[0023] The wall element 8 further comprises supports fastened to the fasteners 1, which may be, for example, vertical supporting rails 11a and/or horizontal supporting rails 11b. In the embodiment of Figure 5, vertical supporting rails 11a are fastened to the fasteners 1, and the horizontal supporting rails 11b are fastened to the vertical supporting rails 11a by bolts 11c.

[0024] Further, the wall element 8 shown in Figure 5 comprises one or more lining boards 12. A lining board 12 comprises a back side 12' directed towards the frame 9 of the element 8, and a front side 12" that shows outwards. In the embodiment of Figure 5, the lining board 12 comprises lining panels 13 placed at a distance from each other, such as brick panels the gaps between which are filled with adhesive putty that fastens the lining panels 13 to each other.

[0025] The lining board 12 shown in Figure 5 further comprises a back plate 15 that forms the frame of the lining board 12. The back plate 15 has grippers 16 directed towards the front side 12" of the lining board 12, which are embedded in the adhesive putty in the gaps 14 between the lining panels 13, which consequently attaches the lining panels 13, the adhesive putty in the gaps between them, and the back plate 15 to each other.

[0026] The back plate 15 of the lining board 12 shown in Figure 5 further comprises hangers 17 directed away from the back side 12" of the lining board 12. When the lining board 12 is being installed in place in the wall element 8, the lining board 12 is placed by its hangers 17 to be supported by the horizontal supporting rails 11b fastened in the element 8. When the lining board 12 is installed in place, there will be a ventilating slot 18 between the lining board 12 and the insulating layer 10.

[0027] According to an alternative, the wall element 8 may comprise exclusively vertical supports rails 11a fastened to the fasteners 1, whereby the lining board 12 may be set to be supported by said vertical supporting rails 11a, if the vertical supporting rails 11a comprise mating parts that are suitable for the hangers 17 of the lining board 12.

[0028] According to a second alternative, the wall element 8 may comprise exclusively horizontal supporting rails 11b fastened to the fasteners 1, whereby the lining board 12 may be set to be supported by said horizontal supporting rails 11b, if the horizontal supporting rails 11b comprise mating parts that are suitable for the hangers 17 of the lining board 12.

[0029] The supporting rails 11a, 11b may be fastened to the fasteners 1 by means of a screw or bolt fastening arranged through the opening 5 in the fastener 1.

[0030] According to a third alternative, the wall element 8 does not comprise any supporting rails 11a, 11b but the lining board 12 may be set to be directly supported by the fasteners 1, if the fastening element at the first end 2' of the body portion 2 of the fastener 1 comprises a suitable mating part for the hanger 17 of the lining board 12.

[0031] Instead of the lining board 12 implemented with

lining panels 13 shown in Figure 5, the lining board may be a board made of a single material or material mixture, in connection with which hangers have been arranged or are arranged to install the lining board to be supported by the fasteners 1 or supporting rails 11a, 11b.

[0032] Wall elements 8 similar to those of Figure 5 are typically used as the external wall elements of a building, but the wall elements 8 may also be used on the inside walls of a building to separate warm and cool, or completely cold, areas within the building from each other.

[0033] The degree of readiness of the wall element 8 when delivered from a factory may vary. According to an embodiment a wall element 8 delivered from a factory only comprises a concrete frame 9, insulating layer 10, and fasteners 1 embedded in the element 8. In such a case, the vertical and/or horizontal supporting rails 11a, 11b fastened in connection with the fasteners 1 and the lining boards 12 are fastened to the element 8 at the construction site of the building. If the lining boards 12 are fastened directly to the fasteners 1 without the supporting rails 11a, 11b, the fastening of the supporting rails 11a, 11b is left out.

[0034] According to a second embodiment, a wall element 8 delivered from a factory comprises a concrete frame 9, insulating layer 10, fasteners 1 embedded in the element 8 as well as vertical and/or horizontal supporting rails 11a, 11b fastened in connection with the fasteners 1. In this case, only the lining boards 12 are fastened to the element 8 at the construction site of the building.

[0035] According to a third embodiment, a wall element 8 delivered from a factory comprises a concrete frame 9, insulating layer 10, fasteners 1 embedded in the element 8, vertical and/or horizontal supporting rails 11a, 11b fastened in connection with the fasteners 1, as well as lining boards 12 fastened or hanged on said supporting rails 11a, 11b. In this case, the wall element 8 is delivered by the factory completely finished, including the lining, too.

[0036] According to a fourth embodiment, a wall element 8 delivered from a factory comprises a concrete frame 9, insulating layer 10, fasteners 1 embedded in the element 8, and lining boards 12 fastened or hanged directly on said fasteners 1 if the lining boards 12 can be fastened directly in said fasteners 1 without the aforementioned supporting rails 11a, 11b.

[0037] The disclosed fastener 1 is simple and easy to manufacture, and in addition easy to install in a wall elements 8 having a concrete frame 9 as early as its manufacturing stage. In such a case, the vertical supporting rails 11a and/or horizontal supporting rails 11b may be easily installed on the side of the insulating layer 10 of the element 8, without damaging the insulating layer.

[0038] In the fastener 1 according to Figures 1 to 4, the first retainer part 3 and the second retainer part 4 are substantially straight so that the first retainer part 3 is arranged substantially parallel to the body portion 2 of the fastener 1, and the second retainer part 4 is arranged at an angle in relation to the first retainer part 3 so that

in the typical usage position, shown in Figure 2, the second retainer part 4 of the fastener 1 is positioned above the first retainer part 3 and is obliquely aligned, at an angle smaller than 90 degrees, upward in relation to the first retainer part 3. In such a case, an angle is established between the first retainer part 3 and the second retainer part 4, which may vary between 15 and 50 degrees, for example.

[0039] Because the first retainer part 3 and the second retainer part 4 are substantially straight for their entire length or dimension, the first retainer part 3 and the second retainer part 4 are directed for their entire length or dimension to mutually different directions.

[0040] In the fastener according to Figures 1 to 4, the horizontal first retainer part 3 is intended to receive the horizontal forces present in the wall element 8, and the second retainer part 4 directed obliquely upward is intended to receive the forces caused by the weight of the part or parts placed to be supported by the fastener 1.

[0041] Because in the fastener 1 shown in Figures 1 to 4, and in the fasteners of Figures 6, 7, 9, 0 and 10 to be shown below, at least the portions of the retainer parts 3, 4 connected to the body portion 2 of the fastener 1 are directed to mutually different directions, the fastener 1 bonds securely to the concrete frame 9 of the element 8. Further, because at least the portions of the retainer parts 3, 4 connected to the body portion 2 of the fastener 1 are directed to mutually different directions, the fastener is able to receive forces of different directions it is subjected to, in a reliable manner.

[0042] The dimensions of the fastener 1 may differ in many ways, on the basis of the actual target of use or purpose of use, for example. The length L1 of the fastener 1 of Figures 1 to 4, that is, the dimension of the fastener 1 from the first end 2' of the body portion 2 of the fastener 1 all the way to the second end 3" of the first retainer part 3 of the fastener 1 may be 270 mm, for example. The width W2 of the body portion 2 of the fastener 1, that is, the dimension of the body portion 2 of the fastener 1 from the top edge to the bottom edge of the body portion 2 in the usage position shown in Figure 2 may be 80 mm, for example. The width W3 of the first retainer part 3 of the fastener 1, that is, the dimension of the first retainer part 3 from its top edge to its bottom edge in the usage position of Figure 2 may be 50 mm, for example, so approximately two thirds of the width W2 of the body 2 of the fastener 1. The width W4 of the second retainer part 4 of the fastener 1, that is, the dimension of the first retainer part 4 from its top edge to its bottom edge may be 30 mm, for example, so approximately one third of the width W2 of the body portion 2 of the fastener 1. The thickness T of the fastener 2, that is, the dimension of the fastener 1 in the direction that is in the perpendicular direction in relation to both the length L1 of the fastener 1 and the width of the body portion of the fastener 1, may be 2 mm, for example. A fastener 1 provided with said dimensions is well suited for use in a wall element 8 according to Figure 5, where the thickness of the insulating layer 10 is ap-

proximately 200 mm.

[0043] In the fastener according to Figures 1 to 4, there is arranged yet another portion 6 at the second end 3" of the first retainer part 3, and a portion 7 to the second end 4" of the second retainer part 4, these portions 6, 7 having the shape or dimension of the cross section of the first retainer part 3 and the second retainer part 4 in the longitudinal direction of said retainer parts 3, 4 adapted to vary according to the saw-edged shape. Said saw-edged shaping on the end portion of the retainer parts 3, 4, that is, in the vicinity of the second ends 3", 4" of the retainer parts 3, 4, forms a shape comprising subsequent recesses and protrusions, so one after the other, which helps the bond of the fastener 1 to the concrete frame 9 of the wall element 8 by means of the second end 3" of the first retainer part 3 and the second end 4" of the second retainer part 4.

[0044] Figures 6, 7, 8, 9, and 10 are schematic side views of other embodiments of the fastener 1.

[0045] In the embodiments of Figures 6, 7, 8, 9, and 10, the first retainer part 3 and the second retainer part 4 of the fastener 1 are directed away from each other so that on their portions connected to the body portion 2 of the fastener 1, the first retainer part 3 is directed downward and the second retainer part 4 upward at a substantially equal angle but one that opens in an opposite direction in relation to the body portion 2 of the fastener 1. The angle between the portions of the first retainer part 3 and the second retainer part 4 connected to the body portion 2 of the fastener 1 may vary between 15 and 70 degrees, for example, such as between 15 and 50 degrees, for example.

[0046] In the fasteners 1 according to Figures 6 to 8, portions 6, 7 consisting of successive recesses and protrusions, are arranged both at the second end 3" of the first retainer part 3 and the second end 4" of the second retainer part 4 to help the fastener 1 bond to the concrete frame 9 of the element 8.

[0047] In the fasteners 1 according to Figures 9 and 10, a fold or a change-of-direction point is formed to the first retainer part 3 and the second retainer part 4, in the vicinity of the second ends of the first retainer part 3 and the second retainer part 4, as a result of which the direction of the first retainer part 3 and the second retainer part 4 differs in the vicinity of the second ends 3", 4" from the direction of the portions of the first retainer part 3 and the second retainer part 4 connected to the body portion 2 of the fastener 1. With said change of direction of the first retainer part 3 and the second retainer part 4, a shaping comprising at least one successive recess and protrusion of the first retainer part 3 and the second retainer part 4 is accomplished to help the adhesion of the fastener 1 to the concrete frame 9 of the element 8.

[0048] It is obvious for a person skilled in the art that as technology advances, the basic idea of the invention may be implemented in many different ways. The invention and its embodiments are thus not restricted to the examples described above but may vary within the scope

of the claims. Therefore, the number of retainer parts in a fastener may also be higher than two.

Claims

1. A fastener (1), which comprises
a body portion (2) of the fastener (1), which has a first end (2') and a second end (2'')
at least one fastening element at the first end (2') of the fastener (1) body portion (2), by means of which a part separate from the fastener (1) may be arranged to be supported by the fastener (1), and
at least two retainer parts (3, 4) connected to the second end (2'') of the body portion (2) of the fastener (1), by means of which the fastener (1) may be fastened to its target of use,
wherein the retainer parts (3, 4) are directed at least partly into the direction indicated by the second end (2'') of the body portion (2) of the fastener (1), and on at least their portions connected to the body portion (2) of the fastener (1), to mutually different directions,
characterised in that
the fastener (1) is one uniform piece formed of one uniform slab.
2. A fastener as claimed in claim 1, **characterised in that** the retainer parts (3,4) are directed to mutually different directions substantially on their entire dimensions.
3. A fastener as claimed in claim 1 or 2, **characterised in that** the body portion (2) and retainer parts (3,4) of the fastener (1) are substantially in the same plane in relation to each other, whereby the retainer parts (3, 4) are directed substantially in their entirety to the direction indicated by the second end (2'') of the body portion (2) of the fastener (1).
4. A fastener as claimed in any one of the preceding claims,
characterised in that the angle between the portions of the retainer parts (3, 4) connected to the body portion (2) of the fastener (1) is between 15 and 70 degrees.
5. A fastener as claimed in any one of the preceding claims,
characterised in that at least one retainer part (3) is arranged substantially parallel to the body portion (2) of the fastener (1), and at least one other retainer part (4) is arranged at an angle in relation to the first retainer part (3).
6. A fastener as claimed in claim 5, **characterised in that** the retainer parts (3, 4) of the fastener (1) are substantially straight.
7. A fastener as claimed in any one of the preceding claims,
characterised in that in the usage position of the fastener (1) at least one retainer part (4) of the fastener (1) is arranged above at least one other retainer part (3).
8. A fastener as claimed in any one of the preceding claims,
characterised in that the fastening element at the first end (2') of the body portion (2) of the fastener (1) is an opening (5) formed through the body portion (2) of the fastener (1), through which at least one fastening member may be adapted to arrange at least one part separate from the fastener (1) to be supported by the fastener (1).
9. A fastener as claimed in any one of the preceding claims,
characterised in that at the end of the retainer part (3, 4) of the fastener (1) directed away from the body portion (2) of the fastener (1) there is a portion (6, 7) comprising successive recesses and protrusions.
10. A wall element (8) of a building, which comprises a concrete frame (9) and an insulating layer (10) arranged on at least one side of said frame (9),
characterised in that the wall element (8) comprises at least one fastener (1) as claimed in any one of claims 1 to 9.
11. A wall element of a building as claimed in claim 10, **characterised in that** the fastener (1) is arranged in the wall element (8) so that the ends (3'', 4'') of the retainer parts (3, 4), directed away from the body portion (2) of the fastener (1), are embedded in the concrete frame (9), and the first end (2') of the body portion (2) of the fastener (1) is adapted to extend outside of the insulating layer (10) of the wall element (8).
12. A wall element as claimed in claim 10 or 11, **characterised in that** the insulation layer (10) is an insulating layer formed of polystyrene or polyurethane.
13. A wall element as claimed in any one of claims 10 to 12,
characterised in that the wall element (8) comprises supporting rails (11a, 11b) arranged in connection with the fasteners (1) to install lining boards (12) on the wall element (8) to be supported by said supporting rails (11a, 11b).
14. A wall element as claimed in any one of claims 10 to 13,
characterised in that the wall element (8) comprises at least one lining board (12) installed on the wall element (8), the lining board (12) forming at least a

part of the lining of the wall element (8).

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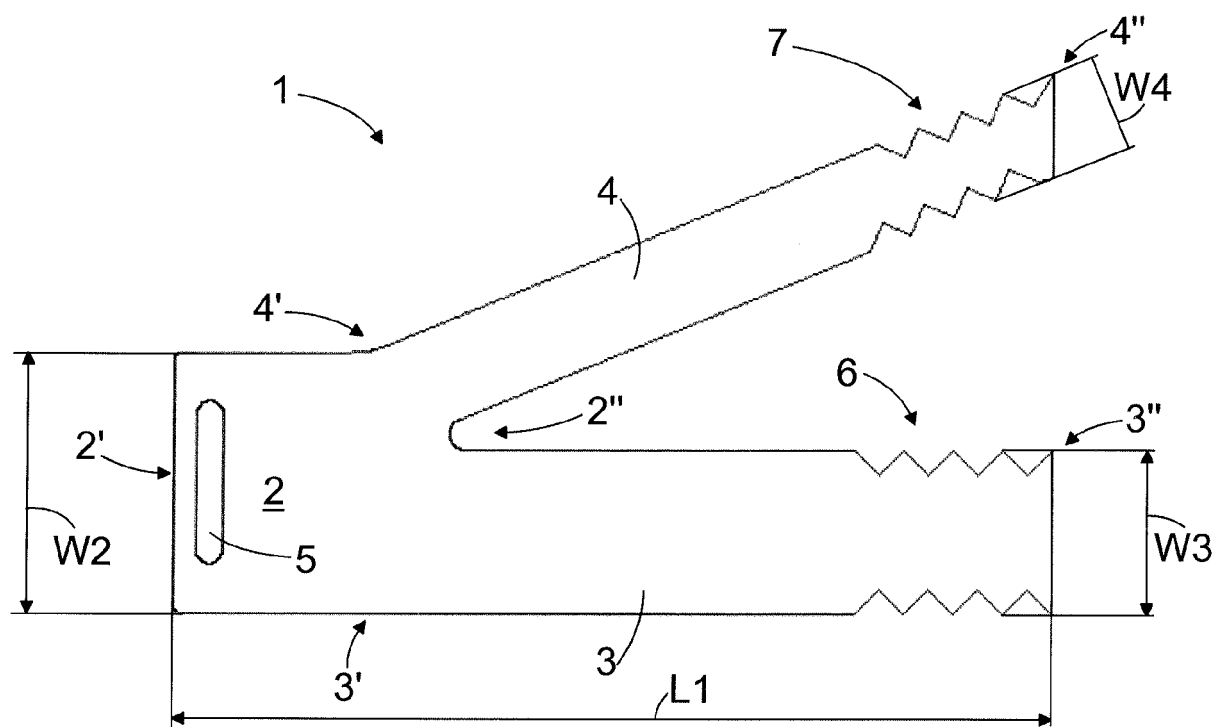


FIG. 2

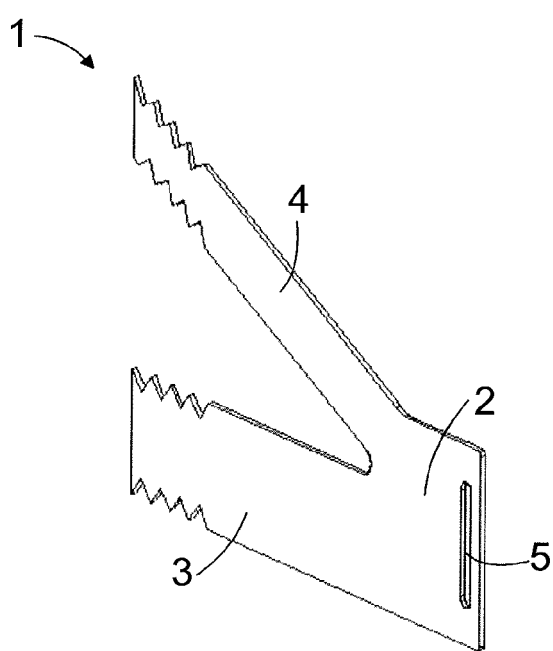


FIG. 1

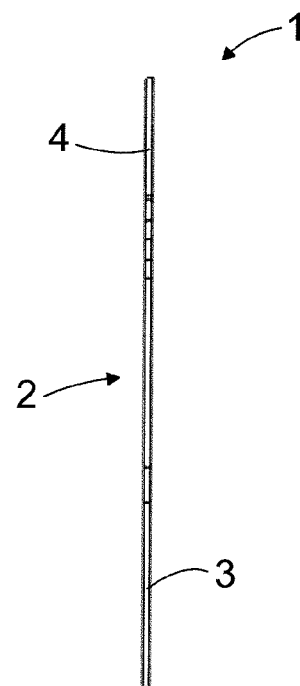


FIG. 4

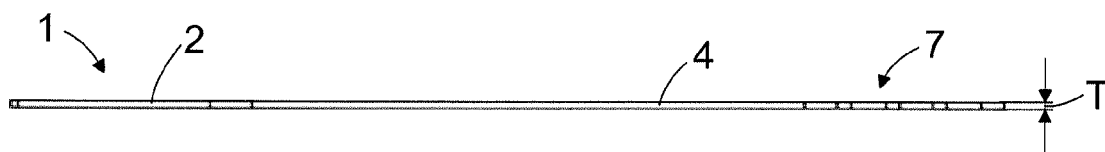


FIG. 3

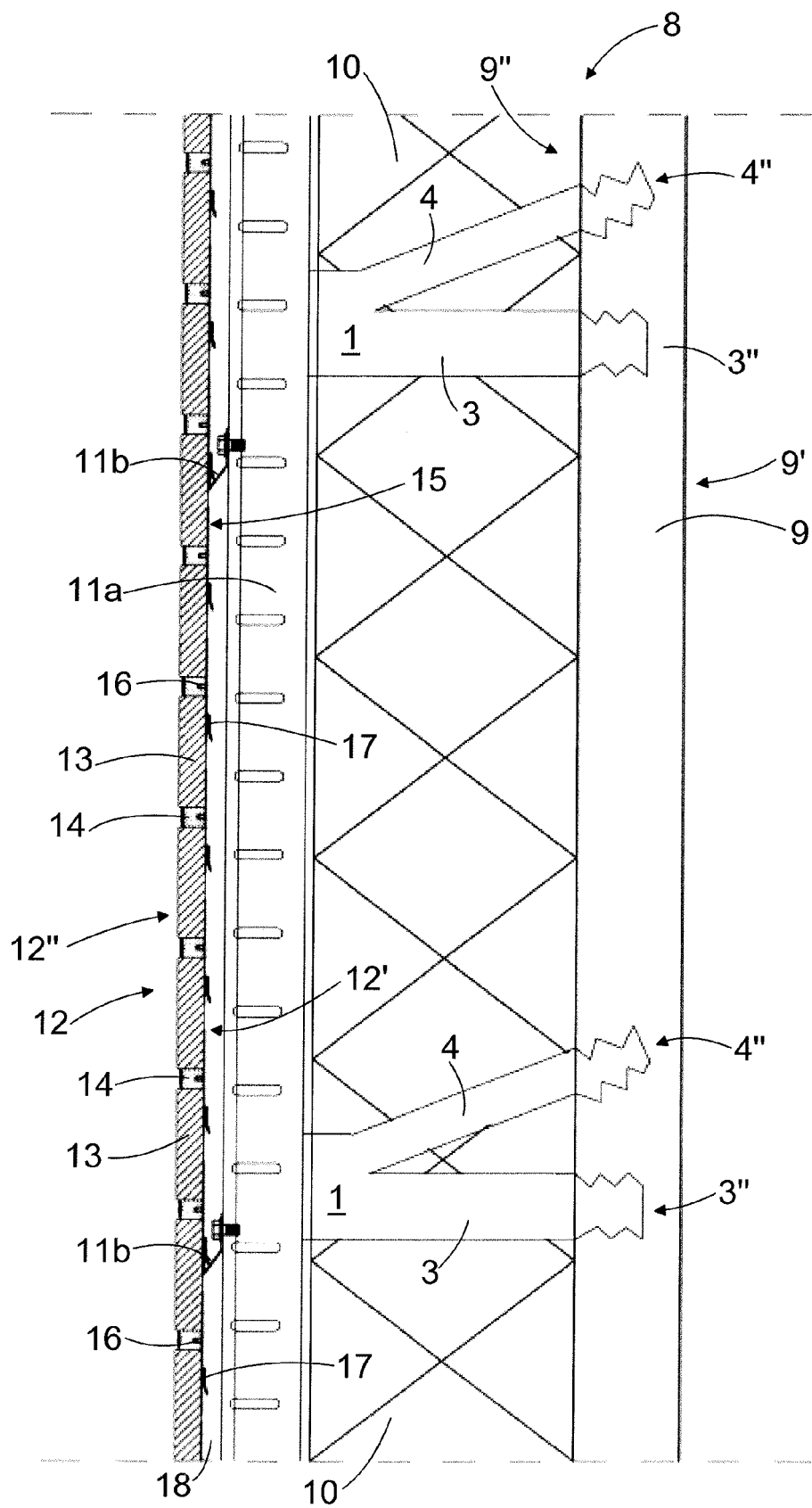


FIG. 5

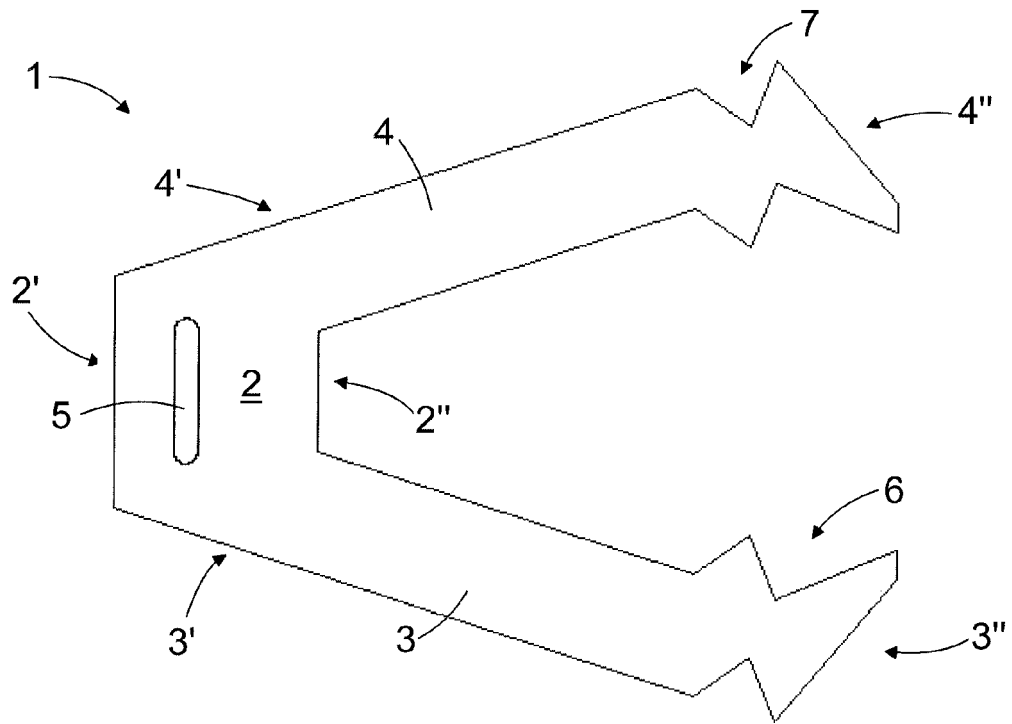


FIG. 6

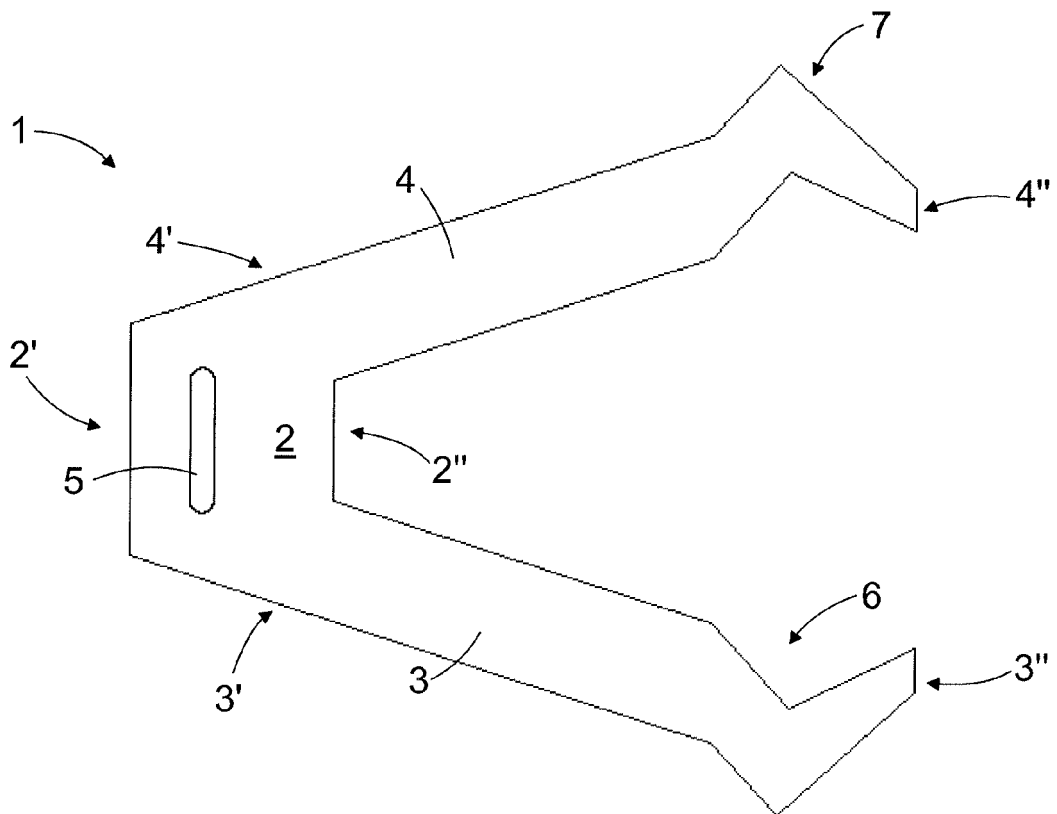


FIG. 7

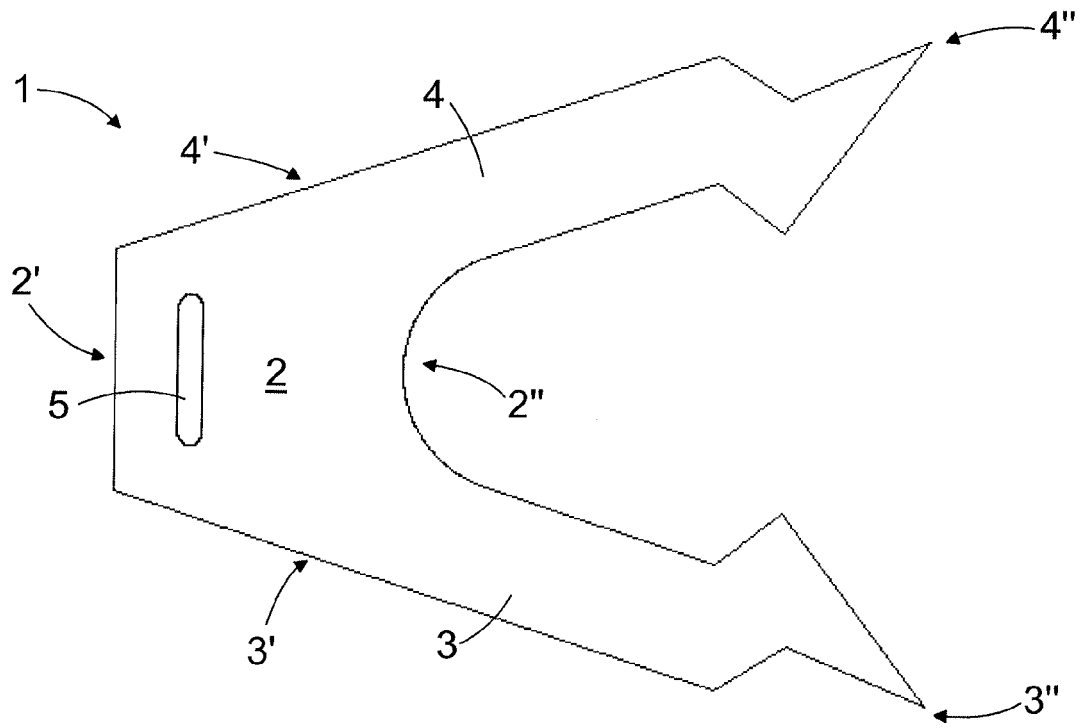


FIG. 8

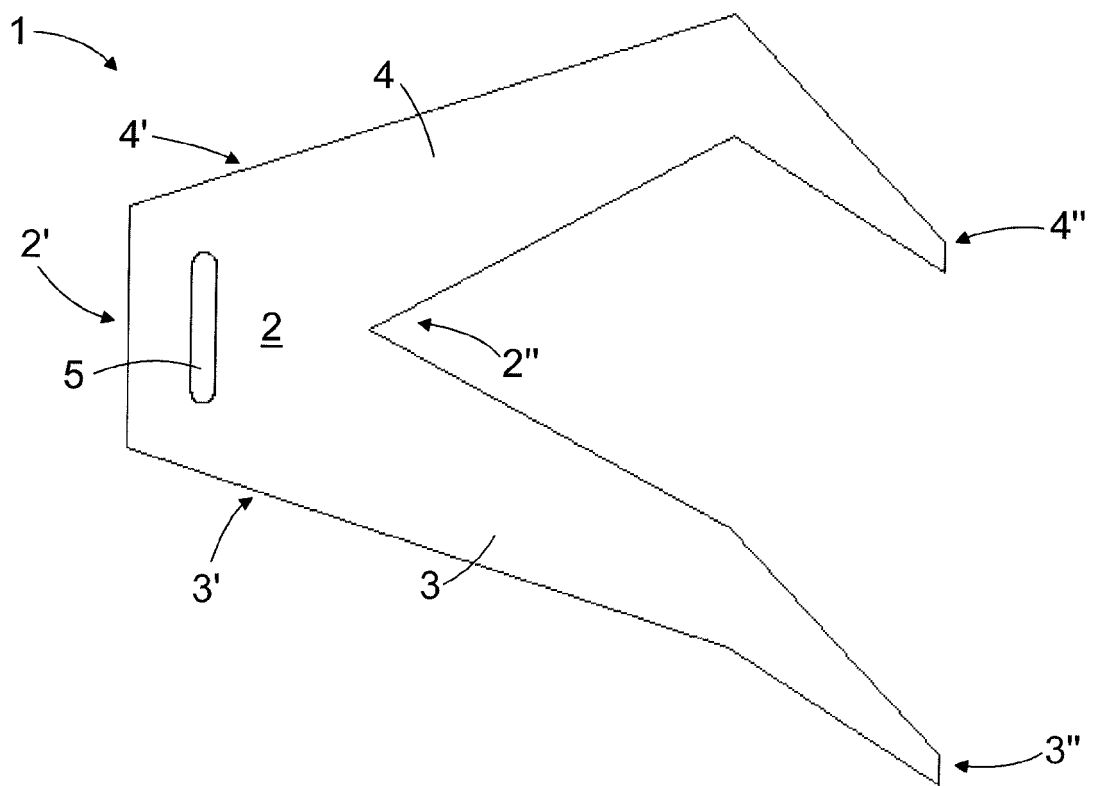


FIG. 9

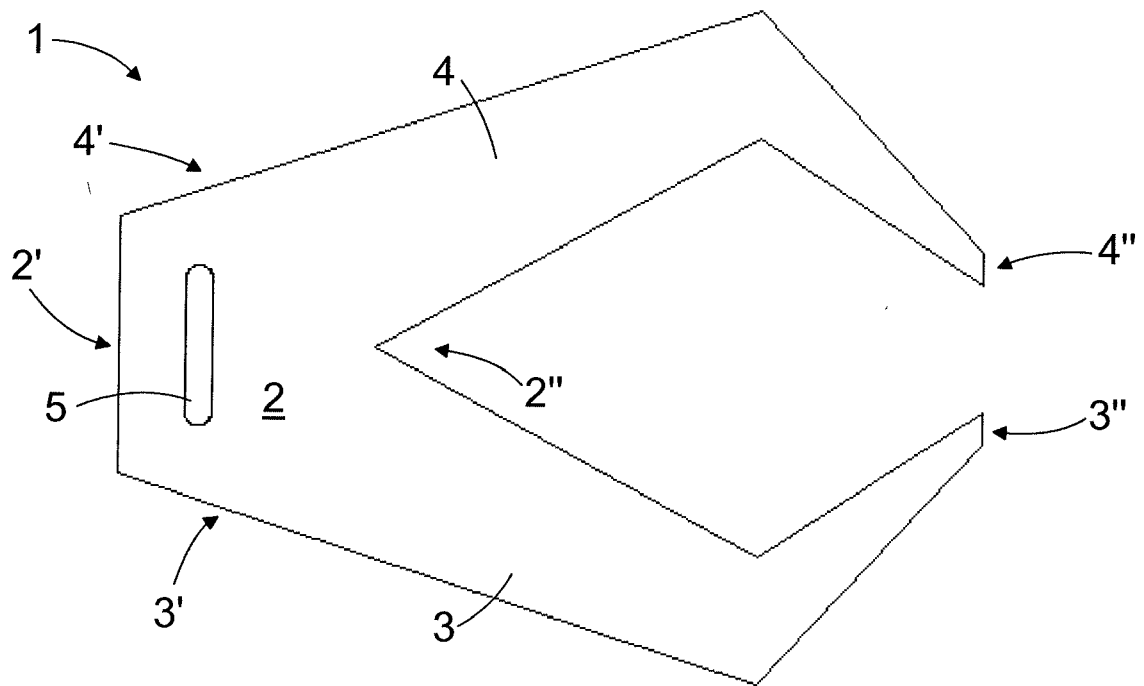


FIG. 10



EUROPEAN SEARCH REPORT

Application Number
EP 17 16 0569

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2013/160393 A1 (STEINMETZ MOSHE [US]) 27 June 2013 (2013-06-27)	1-4,6,7	INV. E04F13/08
Y	* figures 2-4,6,8 * * paragraph [0026] - paragraph [0029] *	5,8-14	
Y	US 4 495 741 A (PASIECZNIK EUGENE [CA]) 29 January 1985 (1985-01-29) * figures 2-4 * * column 3, line 13 - line 15 * * column 4, line 45 - line 48 *	5,8	
Y	GB 2 069 564 A (CATNIC COMPONENTS LTD) 26 August 1981 (1981-08-26) * figures 2-3 * * page 1, line 81 - line 88 *	9	
Y	FR 3 005 668 A1 (GERVAIS MATHIEU [FR]) 21 November 2014 (2014-11-21) * figures 1,4 * * page 1, line 20 - line 27 * * page 7, line 5 - line 6 * * page 7, line 13 - line 19 * * page 9, line 13 - line 20 *	10-14	
Y	WO 2011/085507 A1 (FLUMROC AG [CH]; WINTELER HANS [CH]) 21 July 2011 (2011-07-21) * figure 2 * * page 7, line 18 - line 22 *	13,14	TECHNICAL FIELDS SEARCHED (IPC) E04F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 June 2017	Examiner Estorgues, Marlène
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 16 0569

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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09-06-2017

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013160393 A1	27-06-2013	NONE	
US 4495741 A	29-01-1985	CA 1197361 A US 4495741 A	03-12-1985 29-01-1985
GB 2069564 A	26-08-1981	NONE	
FR 3005668 A1	21-11-2014	NONE	
WO 2011085507 A1	21-07-2011	CA 2786790 A1 CH 702578 A1 CN 102812188 A EA 201290665 A1 EP 2526235 A1 HU E029219 T2 JP 5813009 B2 JP 2013517397 A PL 2526235 T3 US 2012279156 A1 WO 2011085507 A1	21-07-2011 29-07-2011 05-12-2012 30-01-2013 28-11-2012 28-02-2017 17-11-2015 16-05-2013 30-09-2016 08-11-2012 21-07-2011

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82