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(54) A wall anchor system for securing an insulation board within a cavity wall

(57) The present invention concerns a wall anchor system for securing an insulation board (11) within a cavity wall, comprising an inner wall (1), an outer wall (6) and a cavity (7) in between said inner and outer walls in which insulation boards (5) are accommodated, said inner wall comprising at least one wall element having at least one retention groove (31) for receiving at least one wall anchor (2) having a protruding rod member (21) extending from the wall element, when the wall anchor is inserted in the retention groove and secured therein by rotation of the wall anchor, and that at least one insulation board is mounted on said at least one wall anchor. Hereby, an inexpensive wall anchor system is achieved which is particularly suitable for use in relation to lime stone elements.

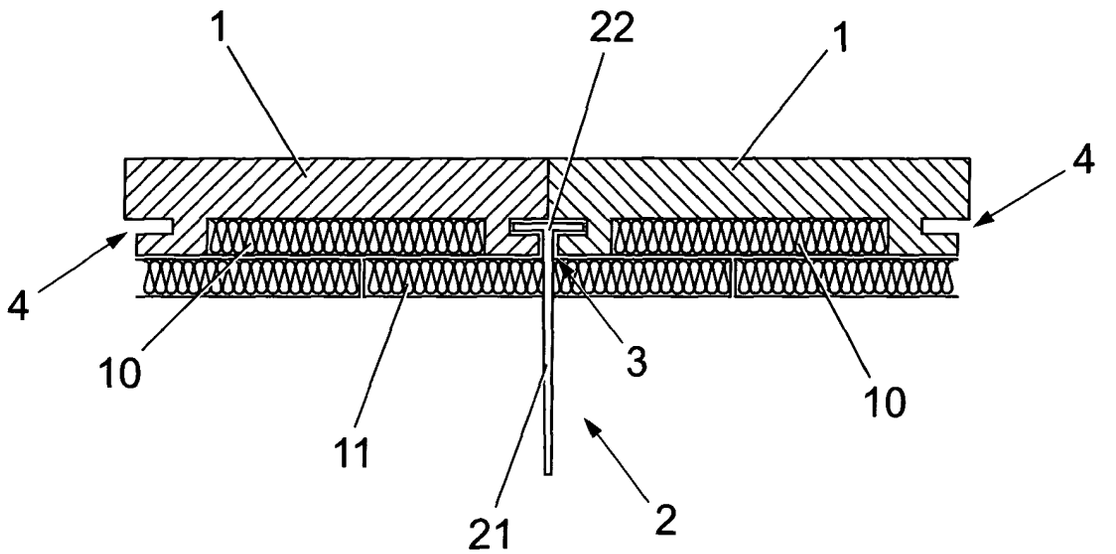

Fig. 1

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Description

[0001] The present invention relates to a wall anchor system for securing an insulation board within a cavity wall, comprising an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accommodated.

[0002] In a cavity wall with an inner wall and an outer brick wall, wall anchors are used to connect the inner and outer wall in order to stabilise the building wall. In the cavity, insulation boards are provided. These boards are supported by the wall anchors in the cavity. The wall anchors consists of transverse pins, e.g. wire pieces, which are fixed to the inner wall during its construction. The insulation boards are then positioned between these protruding wires or mounted by penetrating the wires through the insulation board. Either way, this has the disadvantage that the boards are not accurately mounted, and may be dislocated when the wall anchors are bend to fit between the bricklayers of the outer wall.

[0003] However, it is realised that a major disadvantage of these protruding wall anchors, is that construction workers risk getting hurt when working on a site where cavity walls are under construction. The wall anchors often are quite numerous, typically 4-6 pieces per square meter, in order to provide the required strength in the construction to withstand the wind load. By bending the wall anchors in order to make them fit with the outer wall construction, the strength of these wall anchors is somewhat reduced and there is a risk of some wall anchors breaking off.

[0004] A way of overcoming such problems of permanently protruding wall anchors is known from EP 0 469 870 B1, in which a wall anchor unit for a cavity wall is described, in which a P-shaped anchor is attached to the wall by insertion into a horizontally disposed groove in an insert block, which is mounted in the cavity between the inner and outer wall elements. The anchors are inserted in between two wall elements and further anchors may be secured to the insert block for establishing receipts supporting the insulation in the cavity. The drawback of this solution is that the insulation is not firmly secured, but merely supported. Moreover, the anchors may be difficult to mount, just as the installation of the insert block is time consuming and involves an extra activity when erecting the cavity wall. From an insulation point of view, this wall anchor unit is also unattractive, since the insulation boards cannot be placed directly on top of each other, since the insert block will space the insulation boards apart. This means that a thermal bridge is established, since the insert block does not have the same thermal insulation properties as the insulation boards.

[0005] On this background, it is the object of the present invention to provide a wall anchor system, which is inexpensive in manufacture and simple in use during mounting and which fixes the insulation boards firmly in place and which ensures a good thermal insulation of the cavity wall reducing or eliminating inherent thermal bridges.

[0006] These objects are achieved by a wall anchor system for securing an insulation board within a cavity wall, comprising an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accommodated, said inner wall comprising at least one wall element having at least one retention groove for receiving at least one wall anchor having a protruding rod member extending from the wall element, when the wall anchor is inserted in the retention groove and secured therein by a rotation of the wall anchor, and that at least one insulation board is mounted on said at least one wall anchor. In another aspect of the invention, a wall anchor for use in this wall anchor system is provided, wherein the wall anchor consists of an elongated rod member having a retaining member at one end. In a further aspect, a wall element for use in the wall anchor system is provided, wherein said wall element includes at least one brick element wherein the retention groove is formed in said brick element.

[0007] Hereby, an inexpensive wall anchor system is achieved which is particularly suitable for use in relation to e.g. lime stone elements. Moreover, with a system according to the invention, all elements can be fitted by the bricklayer.

[0008] The wall anchor system offer great flexibility in its use. An advantage of using a rod member for the wall anchor is that the anchor or wall anchor rod can be pushed through the insulation and thereby fixes the insulation within the cavity. Alternatively, the insulation can be placed on top of the rod member, if it is not required that the insulation must be fixedly secured. A rod is easier to secure, as there is no directional requirement in its position, since it is not required to support an insulation board along a planar surface, as it is the case with the wall anchor unit known in the prior art.

[0009] The wall anchor for use in this wall anchor system consists of an elongated rod member having a retaining member at one end. The retaining member may include a resilient blade member on each side of the elongated rod member. In this embodiment, this blade member is preferably provided with teeth or similar retention means at the distal end. Hereby, the wall anchor may be firmly secured in the groove and when it is rotated, any counter-rotation may be prevented by the teeth on the blade ends so that the blades do not loose their grip once the wall anchor is installed in the groove.

[0010] In another embodiments of the wall anchor may be provided with a retaining member, which is a traversely oriented elongated member with a triangular shape. Hereby, it may be secured that the retaining member makes contact with both the front and the back edges of the groove, also if the groove is made up between "half-grooves" of two neighbouring brick elements which are slightly off-set.

[0011] In yet another embodiment, retaining member is a traversely oriented semi-tubular member made in a

resilient material, preferably with convex-shaped blades, so that the retaining member only allows rotation in one direction and resists any counter-rotation once installed in the grooves.

[0012] In order to resist rotation of the wall anchor once installed in the cavity wall, the elongated rod member is preferably provided with means for resisting withdrawal of the elongated rod once said rod is cast in mortar of the outer wall.

[0013] In an embodiment of the invention, the elongated member is provided with a retention sleeve having a tubular section encompassing the elongated rod and retention members mounted on said sleeve; and that an inner portion of said sleeve is provided with grasping means cooperating with grasping means on at least a section of the elongated rod member for locking the wall anchor in a groove. Hereby, the wall anchor according to the invention may be provided with a telescopic locking mechanism.

[0014] In another aspect of the invention a wall anchor system for securing an insulation board within a cavity wall is provided. According to this aspect, the wall anchor system comprises an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accommodated, said inner wall comprising at least one wall element having at least one retention groove for receiving at least one wall anchor having a protruding rod member extending from the wall element, when the wall anchor is inserted in the retention groove and secured therein by an expanding retaining member of the wall anchor, and that at least one insulation board is mounted on said at least one wall anchor. The wall anchor for use in this wall anchor system consists of an elongated rod member having a flexible retaining member at one end. Hereby, the retaining member can be "clicked" passed the narrow opening of the groove and expand when it is pressed into the groove, whereby the wall anchor is locked in the groove.

[0015] The flexible retaining member may be a resilient plate member or a flexible steel plate, whereby the resilient or otherwise flexible plates or blades may elastically bend and thereby compressed when the wall anchor is pressed into the groove and flips out to its normal shape when it is inserted into the groove preventing the wall anchor from falling out of the groove.

[0016] In a preferred embodiment of this embodiment of the wall anchor, the elongated rod member is axially shiftable in the retaining member for extending the rod member into the groove and abutting the rod against the back of the groove. In particular, the rod may be provided with a threaded portion engaging a correspondingly threaded aperture in the resilient member. Hereby, the wall anchor can be locked in the groove by screwing the rod further into the groove after the retaining member has been inserted. Hereby, the wall anchor is clamped into a fixed position in the groove.

[0017] In another aspect of the invention, the wall element includes at least one brick element wherein the retention groove is integrally formed in said brick element. In addition or alternatively, the retention groove may be formed by two adjacently arranged brick element having abutting edges which are provided with correspondingly shaped half-grooves. The brick elements are advantageously provided with edge grooves along at least one side and said sides are adapted to abutting neighbouring brick elements on the inside of the edge relative to the groove. Hereby, many mounting positions of the wall anchors are possible making a wall anchor system according to the invention particularly flexible in use.

[0018] In a preferred embodiment of the invention, the retention groove is T-shaped. Alternatively, the groove may take any other suitable geometric shape which corresponds to the geometry of the retaining member of the wall anchor for securing the wall anchor therein.

[0019] In a first embodiment, the retention groove is oriented in a substantially vertical direction. The grooves may also be generally horizontally oriented, and the brick elements may be provided with grooves in both vertical and horizontal directions or just one of the directions.

[0020] The at least one brick element may be provided with integrated insulation either at the factory or on the building site. Hereby, a thinner cavity wall construction may be achieved with a smaller cavity. Alternatively, if keeping the same thickness of the cavity and the cavity wall, and using the original thickness of additional insulation a higher thermal performance of the cavity wall may be achieved.

[0021] In the following, the invention is described in more detail with reference to the accompanying drawings, in which:

Fig. 1	is a schematic cross-section view of a wall anchor system according the invention;
Fig. 2	is a cross-section view of a brick element according to an embodiment of the invention;
Fig. 3 a	is a schematic side view of a wall anchor according to an embodiment of the invention;
Fig. 3b	is a front view of the same when installed in a groove;
Figs. 4a and 4b	are schematic side views of two shapes according to a second embodiment of a wall anchor according to the invention;
Fig. 5	is a schematic cross-section view of the wall anchor of fig. 4a installed in a groove created by two brick elements;
Fig. 6	is a perspective view of a third embodiment of a wall anchor according to the invention;
Figs. 7a and 7b	are schematic cross-section views

of a fourth embodiment of a wall anchor according to the invention;

Fig. 8 is a cross-section view of a cavity wall with a wall anchor system according to an embodiment of the invention; and

Figs. 9a and 9b are schematic views of different stages of the mounting of a wall anchor according to a fifth embodiment of the invention.

[0022] In figure 1, two adjacent brick elements 1 forming part of an inner wall element is shown. In the brick elements 1, a wall anchor 2 is mounted in a groove 3, which may be formed by the adjoined edges of the two brick elements 1. On these edges, half-grooves 4 are formed to create a wall anchor receiving T-shaped groove 3 between the two brick elements 1. The brick elements 1 may be integrally fitted with insulation panels 10. The wall anchor consists of an elongated rod-like member 21 and a retaining member 22. Insulation boards 11 are fitted over the wall anchors 2. A shown in figure 2, the brick element 1 may be provided with half-grooves 4 on the edges, which together with a half-groove 4 from a neighbouring brick element 1 (see fig. 1) form a T-shaped groove 3. A T-shaped groove 31 for receiving the wall anchors 2 may also be formed in the cavity side of the brick element 1.

[0023] A first embodiment of the wall anchor 2 is shown in figures 3a and 3b, where two resilient blade members 23 constitute the retaining member 22. The blade members 23 extend from the anchor rod 21 and are preferably provided with teeth or the like on their distal ends. As shown in fig. 3b, the resilient blades 23 will bend as the wall anchor is inserted into the groove 3 and rotated therein.

[0024] In figs. 4a and 4b and fig. 5 a second embodiment of the wall anchor 2 is shown. In this embodiment, the retaining member 22 is formed as a triangular body, which is sufficiently narrow to be inserted into the groove 3 created by the two half grooves 4 of two neighbouring brick elements 1 (see fig. 5). When inserted, the wall anchor is rotated, and as shown in fig. 5, the triangular wall anchor retaining member 24 will make contact with both the front and the back of the groove 3 at the contact points 25 (see fig. 5) even if - as shown in fig. 5 - the two brick elements are out of plane.

[0025] According to a third embodiment, the retaining member 22 is made as a resilient, semi-tubular piece 26 (see fig. 6), which preferably is convex in its shape on one side of the rod and concave in its shape ion the other side. Hereby, the resiliency will only allow rotation in one direction and resist the retaining member in being rotated in the other direction.

[0026] In figs. 7a and 7b a fourth embodiment of the invention is shown. In this embodiment, the object of firmly securing the wall anchor in the groove 3 is solved by providing a wall anchor with a tubular sleeve 27 around the base portion of the rod member 21. This sleeve 27 is provided with a retention portion 22a and may be drawn axially away from the retaining member 22 of the wall anchor. Since the rod member 21 and the inner tube of the sleeve 27 is provided with grasping means 28 allowing the sleeve only to be moved in the outward direction. By inserting the wall anchor with sleeve in the groove, rotating the wall anchor and then pulling the sleeve outwards, the wall anchor will be clamped in the grooved and thereby firmly secured.

[0027] In figure 8, a cross-section of a cavity wall is shown where the inner wall is made up of a number of sand or lime stone brick elements 1, which are provided with grooves 3 on the cavity side. An outer wall 6 is provided and in the cavity 7 between the inner and outer walls, insulation boards 5 are firmly secured to the inner wall by a number of wall anchors 2 of which one is shown in the figure 8. This particular embodiment of a wall anchor 2 shown in figure 8 is provided with a bending 29 in the rod member 21, such as a loop or other bending out of the rotation axis, in order to provide the anchor rod 21 with means for locking it in place in the outer wall once the is placed in a mortar layer between the bricks in the outer wall 6.

[0028] In figures 9a and 9b, a fifth embodiment of a wall anchor according to the invention is shown. The wall anchor is provided with a flexible retaining member 31, which is inserted into the groove 3, as indicated in position A in fig. 9a and pressed through the narrow outer portion of the groove 3 and into the wider inner portion of the groove 3, as indicated in position B in fig. 9a. Hereafter, the retaining member 31 expands or bends back to its initial position, as shown in fig. 9b, position C. A threaded portion 32 of the retaining member 31 and the elongated rod 21 is provided and the rod 21 is screwed against the innermost groove surface so that the wall anchor is fixed by clamping the wall anchor to the groove 3. The flexible retaining member 31 is preferably a small steel plate with wing-like blades that are bend to an inclined position, so that the shape of the plate 31 only allows axial movement in one direction, i.e. into the groove. It is realised that the flexible steel plate alternatively could be a resilient plastic plate or similar plate-like member, so that the wall anchor cannot be retracted from the groove.

[0029] Above, some preferred embodiments of the invention are described. However, it is realised that other similar equivalent solutions may be provided without departing from the scope of the invention as specified in the accompanying claims.

Claims

1. A wall anchor system for securing an insulation board within a cavity wall, comprising an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accom-

modated, said inner wall comprising at least one wall element having at least one retention groove for receiving at least one wall anchor having a protruding rod member extending from the wall element, when the wall anchor is inserted in the retention groove and secured therein by a rotation of the wall anchor, and that at least one insulation board is mounted on said at least one wall anchor.

2. A wall anchor for use in a wall anchor system according to claim 1, wherein the wall anchor consists of an elongated rod member having a retaining member at one end.

3. A wall anchor according to claim 2, wherein the retaining member includes a resilient blade member on each side of the elongated rod member.

4. A wall anchor according to claim 3, wherein said blade member is provided with teeth or similar retention means at the distal end.

5. A wall anchor according to claim 2, wherein said retaining member is a traversely oriented elongated member with a triangular shape.

6. A wall anchor according to claim 2, wherein said retaining member is a traversely oriented semi-tubular member made in a resilient material.

7. A wall anchor according to any of the claims 2 to 6, wherein the elongated rod member is provided with means for resisting withdrawal of the elongated rod once said rod is mounted in the outer wall.

8. A wall anchor according to any of the claims 2 to 7, wherein the elongated member is provided with a retention sleeve having a tubular section encompassing the elongated rod and retention members mounted on said sleeve; and that an inner portion of said sleeve is provided with grasping means cooperating with grasping means on at least a section of the elongated rod member for locking the wall anchor in a groove.

9. A wall anchor system for securing an insulation board within a cavity wall, comprising an inner wall, an outer wall and a cavity in between said inner and outer walls in which insulation boards are accommodated, said inner wall comprising at least one wall element having at least one retention groove for receiving at least one wall anchor having a protruding rod member extending from the wall element, when the wall anchor is inserted in the retention groove and secured therein by an expanding retaining member of the wall anchor, and that at least one insulation board is mounted on said at least one wall anchor.

10. A wall anchor for use in a wall anchor system according to claim 9, wherein the wall anchor consists of an elongated rod member having a flexible retaining member at one end.

11. A wall anchor according to claim 10, wherein the flexible retaining member is a resilient plate member.

12. A wall anchor according to claim 10, wherein the flexible retaining member is a flexible steel plate.

13. A wall anchor according to any of the claims 10 to 12, wherein the elongated rod member is axially shiftable in the retaining member for extending the rod member into the groove and abutting the rod against the back of the groove.

14. A wall anchor according to claim 13, wherein the rod is provided with a threaded portion engaging a correspondingly threaded aperture in the resilient member.

15. A wall element for use in a wall anchor system according to claim 1 or 9, wherein said wall element includes at least one brick element wherein the retention groove is formed in said brick element.

16. A wall element according to claim 15, wherein the retention groove formed by two adjacently arranged brick element having abutting edges which are provided with correspondingly shaped half-grooves.

17. A wall element according to claim 16, wherein the brick elements are provided with edge grooves along at least one side and said sides are adapted to abutting neighbouring brick elements on the inside of the edge relative to the groove.

18. A wall element according to any of the claims 15 to 17, wherein the at least one retention groove is T-shaped.

19. A wall element according to any of the claims 15 to 18, wherein the at least one retention groove is oriented in a substantially vertical direction.

20. A wall element according to any of the claims 15 to 19, wherein the at least one brick element is provided with integrated insulation.

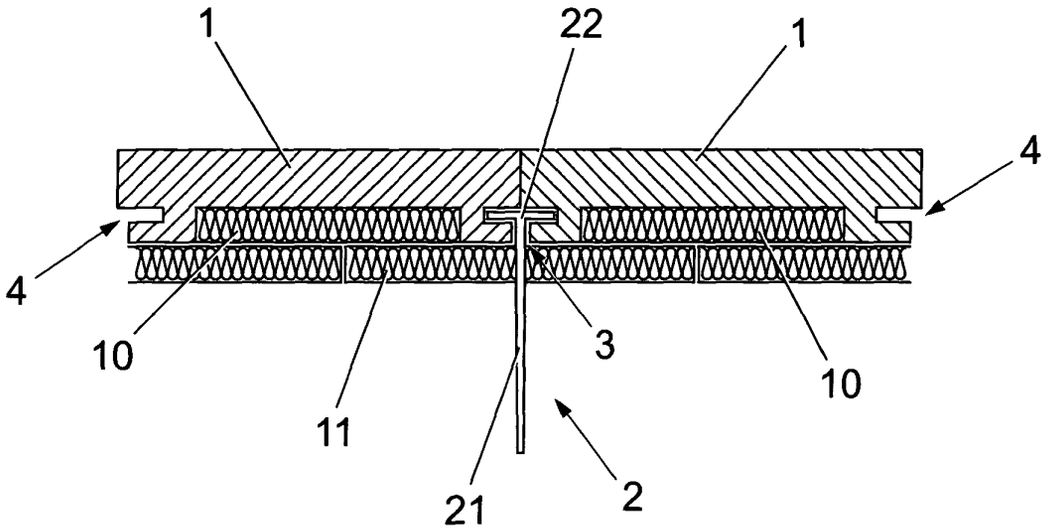

Fig. 1

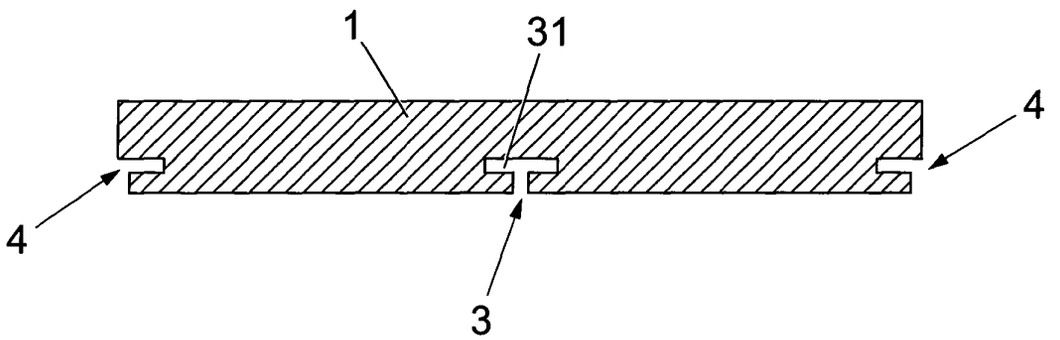

Fig. 2

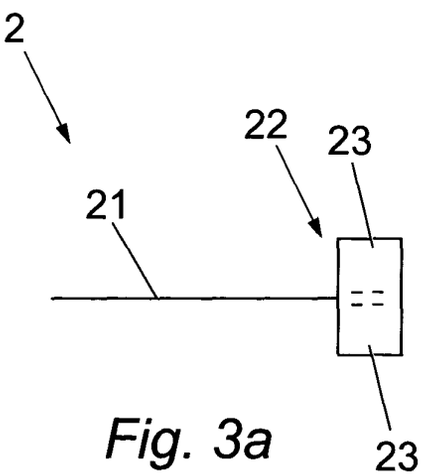

Fig. 3a

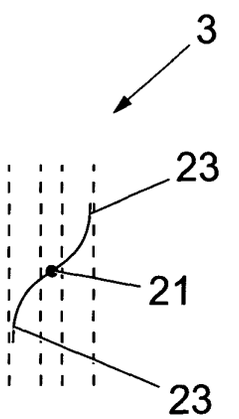

Fig. 3b

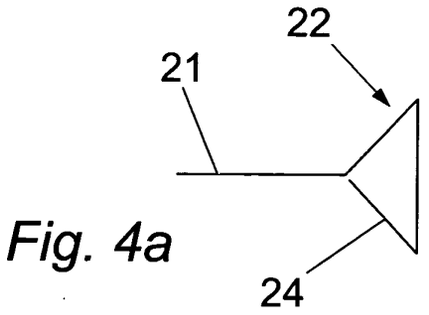

Fig. 4a

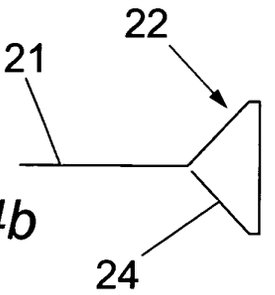

Fig. 4b

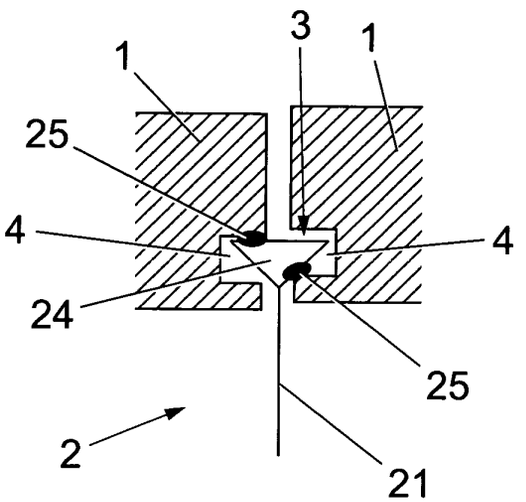

Fig. 5

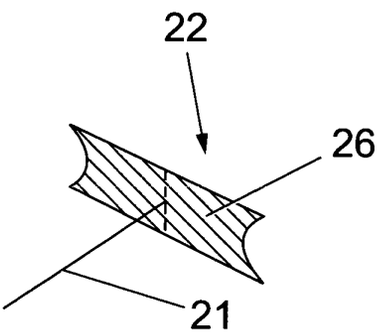

Fig. 6

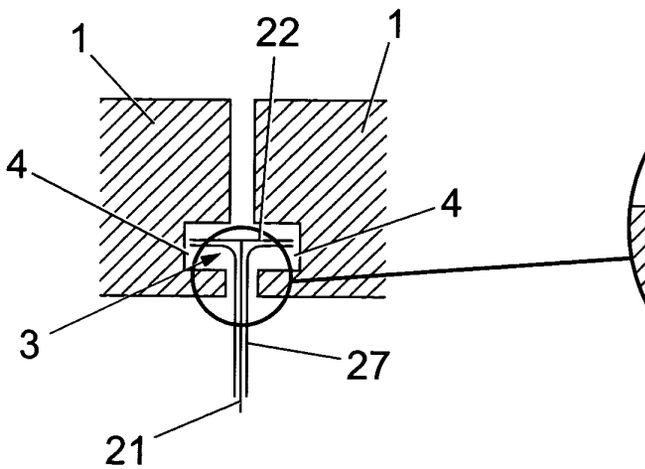

Fig. 7a

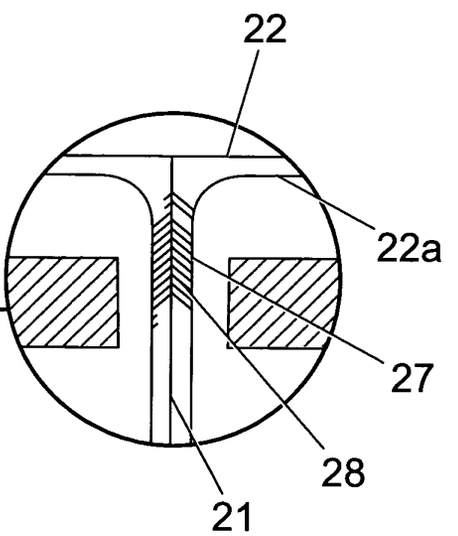

Fig. 7b

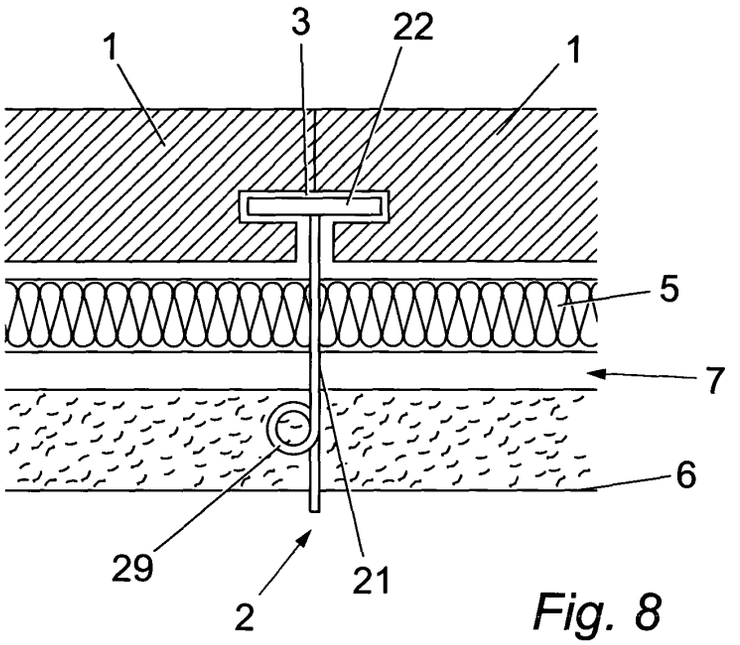

Fig. 8

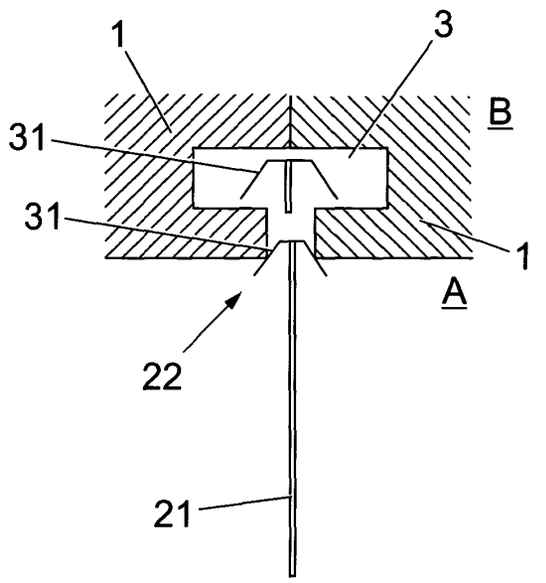

Fig. 9a

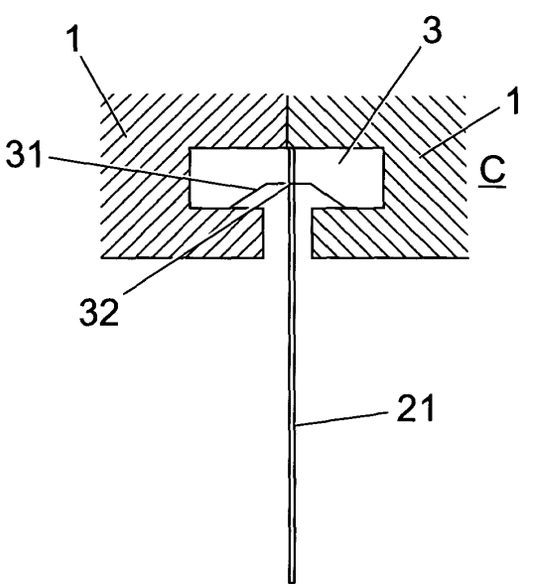

Fig. 9b

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 07 8050

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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	16 February 2004	Rosborough, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 07 8050

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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