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

(11) **EP 2 811 082 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.12.2014 Bulletin 2014/50

(51) Int Cl.:
E04B 1/41 *(2006.01)*

(21) Application number: **14169875.3**

(22) Date of filing: **26.05.2014**

(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

(30) Priority: **04.06.2013 IT MO20130164**

(71) Applicant: **Terremilia S.r.l.**
42015 Correggio (RE) (IT)

(72) Inventor: **BERNI, Leonardo**
42121 REGGIO EMILIA (IT)

(74) Representative: **Casadei, Giovanni**
Bugnion S.p.A.
Via Vellani Marchi, 20
41124 Modena (IT)

(54) **An anchoring device between two walls**

(57) An anchoring device between the two walls, comprising: a first anchoring element (1), predisposed to be associated to a first wall (P1); a second anchoring element (2), predisposed to be associated to a second wall (P2); engaging means (3,4) predisposed to enable engaging between the first anchoring element (1) and second anchoring element (2); said engaging means (3,4) comprising: at least one eyelet (3), solidly constrained to the first anchoring element (1); at least one shank (4), solidly constrained to the second anchoring element (2), predisposed to assume a substantially vertical orientation and destined to be inserted sliding into the eyelet (3); said eyelet (3) being predisposed to accommodate the shank (4) sliding along a substantially vertical direction. [FIG. 1]

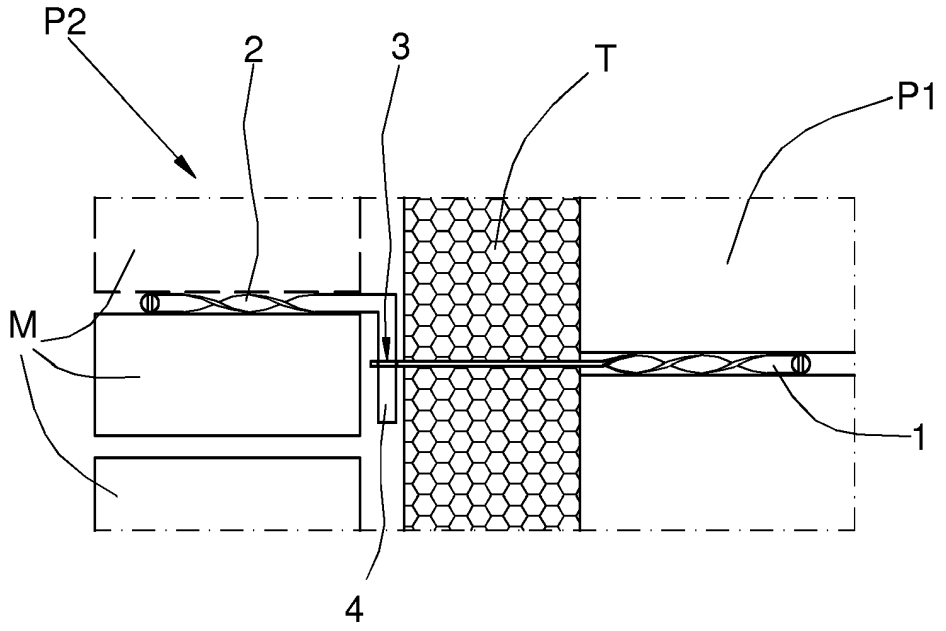


Fig.1

EP 2 811 082 A1

Description

[0001] The present invention relates to an anchoring device between two walls.

[0002] In the construction of buildings, the need to anchor two vertical walls arranged at a brief distance from each other is very frequent.

[0003] A typical case of this need occurs when a wall with a visible face, realised by superimposing several layers of bricks, must be anchored to a wall behind made of blocks of tile or cement, covered for example with an insulating layer, maintaining a hollow space of a specific width between the two walls.

[0004] Various anchoring devices which are suitable for realising an anchoring between two vertical walls are currently available. All the devices available are improvable both from the viewpoint of safety and from the viewpoint of easy use.

[0005] Concerning safety, numerous devices are not sufficiently capable of absorbing deformations caused by the various thermal expansions of the two anchored walls. Another unsatisfactory aspect of the known devices is the low capacity to absorb transversal movements between the two walls which occur, for example, during an earthquake.

[0006] Concerning easy use, the devices of the known type require complex positioning operations. Normally, in fact, the devices of the known type comprise a single element which must be anchored first to the inner wall and then to the outer wall.

[0007] In order for anchoring between the two walls to be possible, it is necessary for said walls to be positioned with the mortar joints at the same height, therefore limiting their flexibility.

[0008] The object of the present invention is offering an anchoring device which allows the problems and limitations of devices of the known type to be overcome.

[0009] Further characteristics and advantages of the present invention will more fully emerge from the detailed description of an embodiment of said invention, as illustrated in a non-limiting example in the accompanying drawings, in which:

- Figures 1 and 2 show a first embodiment of the anchoring device of the present invention, respectively a side view and a plan view;
- Figures 3 and 4 show a second embodiment of the anchoring device according to the present invention, respectively a side view and a plan view;
- Figures 5 and 6 show a third embodiment of the anchoring device according to the present invention, respectively a side view and a plan view;
- Figures 7 and 8 show a fourth embodiment of the anchoring device according to the present invention, respectively a side view and a plan view

[0010] The anchoring device according to the present invention comprises a first anchoring element (1), predisposed to be associated to a first wall (P1). A second anchoring element (2) is predisposed to be associated to a second wall (P2).

[0011] The anchoring device further comprises hooking means (3,4) predisposed to enable the engagement between the first anchoring element (1) and the second anchoring element (2).

[0012] Said hooking means (3,4) also comprise at least one eyelet (3), solidly constrained to the first anchoring element (1), and at least one shank (4), solidly constrained to the second anchoring element (2) and destined to be inserted sliding into the eyelet (3). Said shank (4) is predisposed to assume a substantially vertical orientation. The eyelet (3), solidly constrained to the first anchoring element (1), is predisposed to accommodate the shank (4) sliding along a substantially vertical direction.

[0013] The substantially vertical sliding of the shank (4), combined with vertically sliding coupling between it and the eyelet (3), enables engagement between the first (1) and the second (2) anchoring element simply by inserting the shank (4) in the eyelet (3), preferably from the top downwards. Once the shank (4) is inserted in the eyelet (3), the first (1) and the second (2) anchoring element cannot make reciprocal orthogonal movements to the planes of the walls (P1,P2), realising a so-called "push-pull connection", whereas reciprocal parallel movements to the planes of the walls are possible. This enables the movements in the plane of the outer wall (P2) to occur freely with minimum interferences with the wall or inner structure (P1), as well as facilitating the anchoring operations between the two walls, as will be better clarified in the description below.

[0014] Preferably the shank (4) has a flattened conformation on a substantially vertical plane. In particular, the shank (4), at one end, is connected by an end portion of the second anchoring element (2), the end portion of which is equally flattened on a substantially vertical plane. The shank (4) and the end portion of the second anchoring element (2) to which the shank is connected substantially form a flattened L-shape on a vertical plane. In this manner the shank (4) is extremely resistant to the stress directed orthogonally to the plane of the outer wall (P2). The shank (4) however is more flexible with respect to the stress directed parallel to the plane of the outer wall (P2). This characteristic is extremely advantageous as it limits the interferences between the outer wall and the inner wall and/or structure as an effect of the actions due, for example, to an earthquake.

[0015] In an alternative embodiment, the shank (4) has a slightly curved conformation with an end (41) destined to face towards the second wall (P2). Said conformation of the shank (4) assists insertion of said shank into the eyelet (3) by means of a rotational movement, preferably oriented from the top downwards. In the slightly curved conformation, the shank (4) encounters a partial obstacle to vertical sliding movements with respect to the eyelet (3) into which it is inserted. The shank (4) in a slightly

curved conformation is particularly advantageous in a particularly simplified embodiment of the second anchoring element (2), shown in figures 5 and 6. In this embodiment, the second anchoring element (2) comprises a rod iron folded to form one or two shanks (4).

[0016] Preferably the first anchoring element (1) is C-shaped and is provided with two eyelets (3) disposed parallel to each other. As shown in the appended figures, the first anchoring element has an intermediate portion (11) from which two end portions (12,13) substantially parallel and perpendicular with respect to the intermediate portion (11) project. The two eyelets (3) are disposed at the end portions of the two end portions (12,13).

[0017] The C-shaped conformation of the first anchoring element (1) increases the solidity of the coupling with the first wall (P1), above all in a preferred use of the anchoring device in which the first anchoring element (1) is encased in said first wall (P1), with solely the end portions (12,13) which project from the first wall (P1). The intermediate portion (11) in fact creates an extremely strong obstacle with respect to extraction of the first anchoring element (1) from the first wall (P1). In order further to increase solidity of the coupling with the first wall (P1), the first anchoring element (1) has at least one portion twisted longitudinally in a helical shape. In the embodiments shown in figures 1 to 4, the first anchoring element (1) is entirely twisted in a helical shape, with the exception of the end portions at which the eyelets (3) are disposed. The twisted conformation in a helical shape also increases the rigidity of the anchoring element (1).

[0018] As a measure to increase the ductility of the anchoring between the two walls, the first anchoring element (1) comprises an engaging element, not shown in detail, constrained to the intermediate portion (11). Preferably, said engaging element comprises an elongated body, such as a rod iron, for example, which is attached to the intermediate portion (11) so as to increase its longitudinal extension.

[0019] Preferably, the second anchoring element (2) is C-shaped and provided with two shanks (4). As shown in the appended figures, the second anchoring element has an intermediate portion (21) from which two end portions (22,23) project which are substantially parallel and perpendicular to each other with respect to the intermediate portion (21). The two shanks (4) are disposed at the end portions of the two end portions (22,23).

[0020] As in the case of the first anchoring element (1), the C-shaped conformation increases solidity of the coupling between the second anchoring element (2) and the second wall (P2), particularly in a use of the anchoring device in which the second anchoring element (2) is encased in the second wall (P2), with solely the end portions (22,23) which project from the second wall (P2). In particular, in a preferred use of the anchoring device wherein the second wall (P2) is made of bricks (M), the second anchoring element (2) may be embedded in the horizontal layer of mortar comprised between two rows of bricks. The intermediate portion (21) creates a very strong obstacle with respect to extraction of the second anchoring element (2) from the layer of cement mortar. In order further to increase the solidity of the coupling with the second wall (P2) and its own rigidity, the second anchoring element (2) has at least one portion twisted longitudinally in a helical shape. In the embodiments shown in figures 1 to 4, the second anchoring element (2) is entirely twisted in a helical shape, with the exception of the end portions at which the eyelet shanks (4) are disposed.

[0021] As a further measure to increase the ductility of the coupling with the second wall (P2), the second anchoring element (2) comprises an engaging element (6), constrained to the intermediate portion (21). Preferably said engaging element (6) comprises an elongated body, such as a rod iron, for example, shown in figures 3,4,7 and 8, which is engaged mechanically to the intermediate portion (21). One engaging element (6) may also be constrained to the intermediate portion (21) of several anchoring elements (2) aligned with each other. In the embodiment shown in figures 3 and 4, the intermediate portion (21) is wound in a helical shape around the engaging element (6) in the form of a rod iron. In the embodiment shown in figures 7 and 8, the engaging element is inserted through two holes afforded in the end portions (22,23) so as to be disposed substantially parallel to the intermediate portion (21).

[0022] The anchoring device according to the present invention also enables the anchoring between two vertical walls to be realised in a very simple manner, particularly in the case wherein the second wall (P2) comprises a plurality of substantially horizontal layers of bricks (M), such as, for example a wall with a visible face.

[0023] The characteristics of the device in fact enable the first wall (P1) to be realised disposing a plurality of first anchoring elements (1) with eyelets (3) projecting from an outer surface of the first wall (P1) and turned towards the side in which the second wall (P2) is to be placed. The first wall (P1), for example, may be realised in blocks of tile or cement, and the first anchoring elements (1) may be embedded in the mortar joint maintaining the eyelets (3) outside the wall (P1). It is also possible to envisage disposition of an insulating layer (T) coupled to the outer surface of the first wall (P1), as shown in the figures, without this particularly complicating the operations, since it is sufficient to maintain the first anchoring elements projecting for a greater section, so that the eyelets (3) also project from the insulating layer (T).

[0024] Subsequently to predisposition of the first wall (P1), with or without an insulating layer (T), it is possible to realise the second wall (P2). In the case of a wall with visible face, realisation of the second wall (P2) may occur progressively by laying successive layers of bricks (M) interposed between the layers of mortar.

[0025] When the last layer of bricks laid, which is above all the others, is positioned with its upper surface placed above a first anchoring element (1), it is possible to attach a second anchoring element (2) inserting the shanks (4) into the eyelets (3) of the first anchoring elements (1).

The second anchoring element may be embedded in the layer of mortar which is laid above the last layer of bricks laid and on which, subsequently, another layer of bricks (M) will be laid. In substance, as easily imagined from the figures, the second anchoring element (2) may be attached to the first anchoring element (1) turning the shanks (4) downwards and inserting them in the eyelets (3) from the top downwards until the second anchoring element rests on the row of bricks (M). Subsequently, the layer of mortar for a new layer of bricks (M) may be laid.

[0026] In order to facilitate realisation of the second wall (P2) it is preferable, even if not strictly necessary, that the first anchoring elements (1) be disposed along horizontal rows equidistant from each other. In effect, however, the structure of the anchoring device does not require any particular detail in positioning of the first anchoring elements. The extension of the shanks (4), oriented vertically, enables any gaps between the rows of bricks (M) and the first anchoring elements (1) to be compensated.

[0027] The conformation of the anchoring device also enables a prefixed distance between the first and the second wall to be easily maintained. It is, in fact, sufficient initially to establish by how much the first anchoring elements(1) project, changing their length from the first wall (P1).

Claims

1. An anchoring device between two walls, comprising: a first anchoring element (1), predisposed to be associated to a first wall (P1); a second anchoring element (2), predisposed to be associated to a second wall (P2); hooking means (3, 4) predisposed to enable an engagement between the first anchoring element (1) and the second anchoring element (2); **characterised in that** the hooking means (3, 4) comprise: at least an eyelet (3), solidly constrained to the first anchoring element (1); at least a shank (4), solidly constrained to the second anchoring element (2), predisposed to assume a substantially vertical orientation and destined to insert slidably in the eyelet (3); the eyelet (3) being predisposed to slidably accommodate the shank (4) along a substantially vertical direction.

2. The anchoring device according to claim 1, wherein the shank (4) exhibits a flattened conformation on a substantially vertical plane.

3. The anchoring device according to claim 1, wherein the shank (4) exhibits a curved conformation with an end (41) destined to face towards the second wall (P2).

4. The anchoring device according to claim 1, wherein the first anchoring element (1) is C-shaped and is provided with two eyelets (3) arranged parallel to one another.

5. The anchoring device according to claim 4, wherein the first anchoring element (1) exhibits at least a portion twisted longitudinally in a helical shape.

6. The anchoring device according to claim 4, wherein the first anchoring element (1) exhibits an intermediate portion (11) to which an engaging element is constrained that is destined to increase a solidity of the coupling between the first anchoring element (1) and the first wall (P1).

7. The anchoring device according to claim 1, wherein the second anchoring element (2) is C-shaped and is provided with two shanks (4).

8. The anchoring device according to claim 7, wherein the second anchoring element (2) exhibits at least a portion twisted longitudinally in a helical shape.

9. The anchoring device according to claim 7, wherein the second anchoring element (2) exhibits an intermediate portion (21) to which an engaging element (6) is constrained that is destined to increase a ductility of the coupling between the second anchoring element (2) and the second wall (P2).

10. A method for realizing an anchoring between two vertical walls (P1, P2), wherein a second wall (P2) comprises a plurality of substantially horizontal layers of bricks (M), comprising the following steps:

    - predisposing a first wall (P1) in which a plurality of first anchoring elements (1) are arranged, according to one of the preceding claims, the eyelets (3) projecting from an external surface of the first wall (P1);
    - predisposing a second wall (P2), by progressively depositing successive layers of bricks (M) interposed with layers of cementing material;
    - hooking a second anchoring element (2) according to one of the preceding claims to each first anchoring element (1), by inserting the shanks (4) in the eyelets (3);
    - embedding each second anchoring element (2) in the layer of mortar between two adjacent layers of bricks (M) which layer of mortar is in proximity of a respective first anchoring element (3).

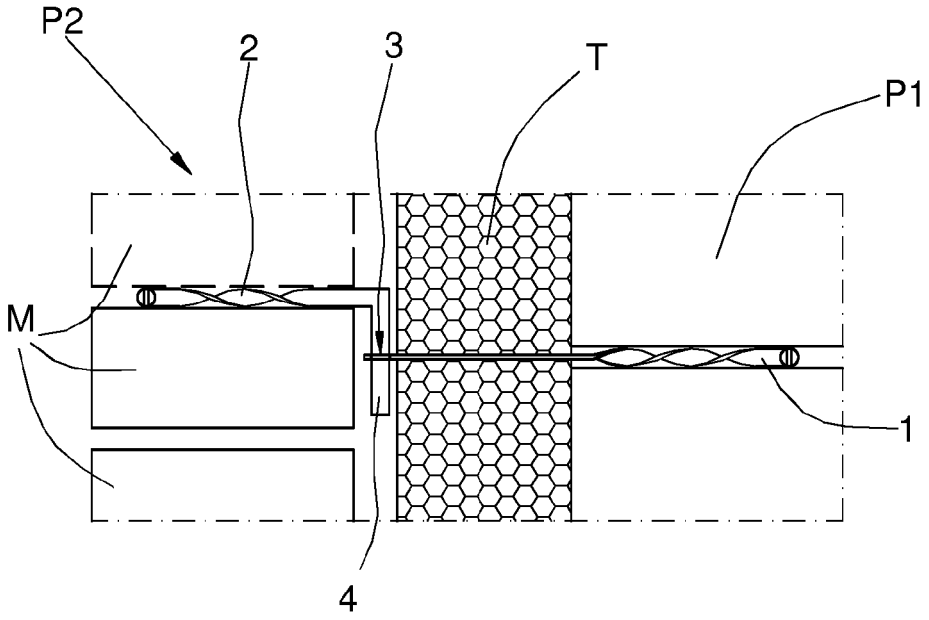


Fig.1

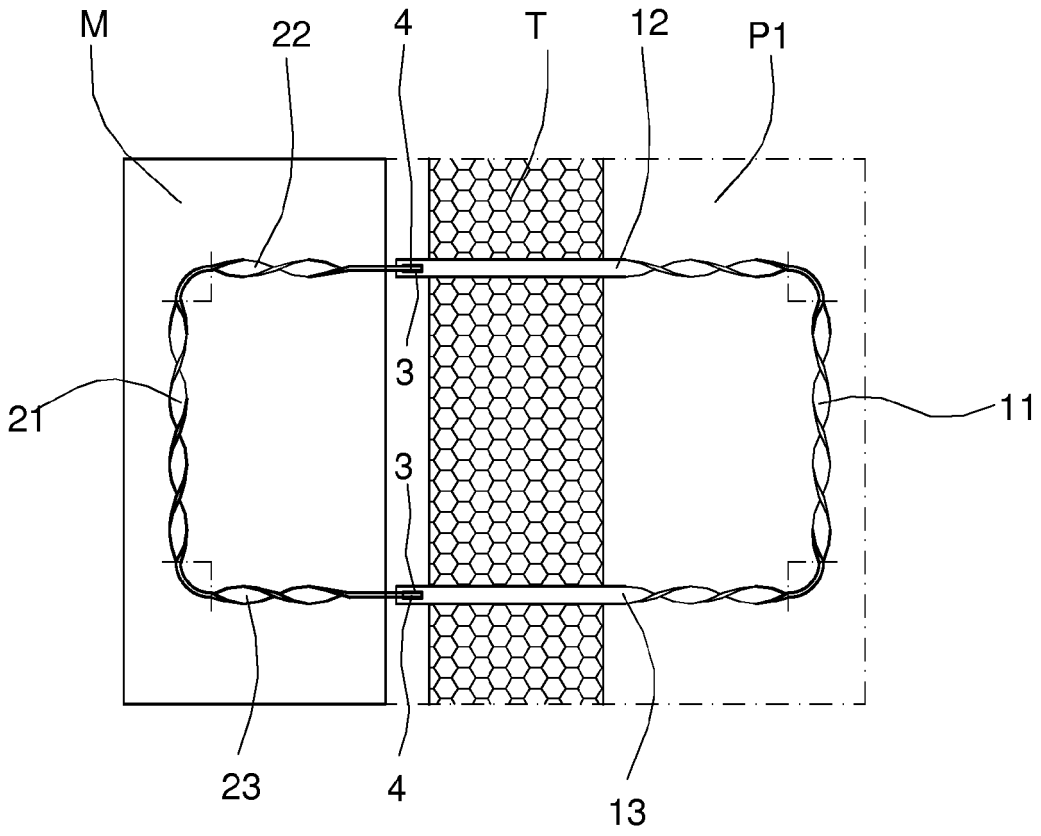


Fig.2

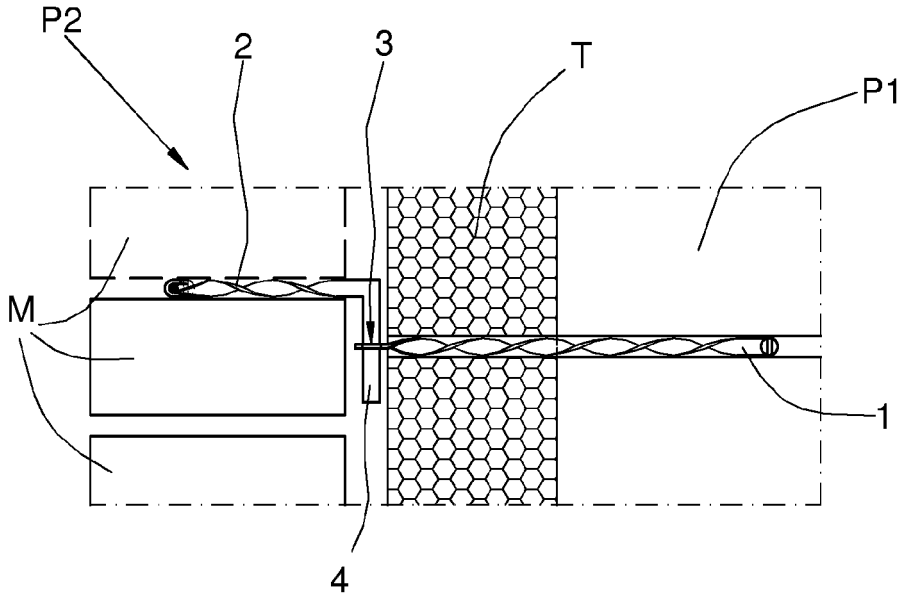


Fig.3

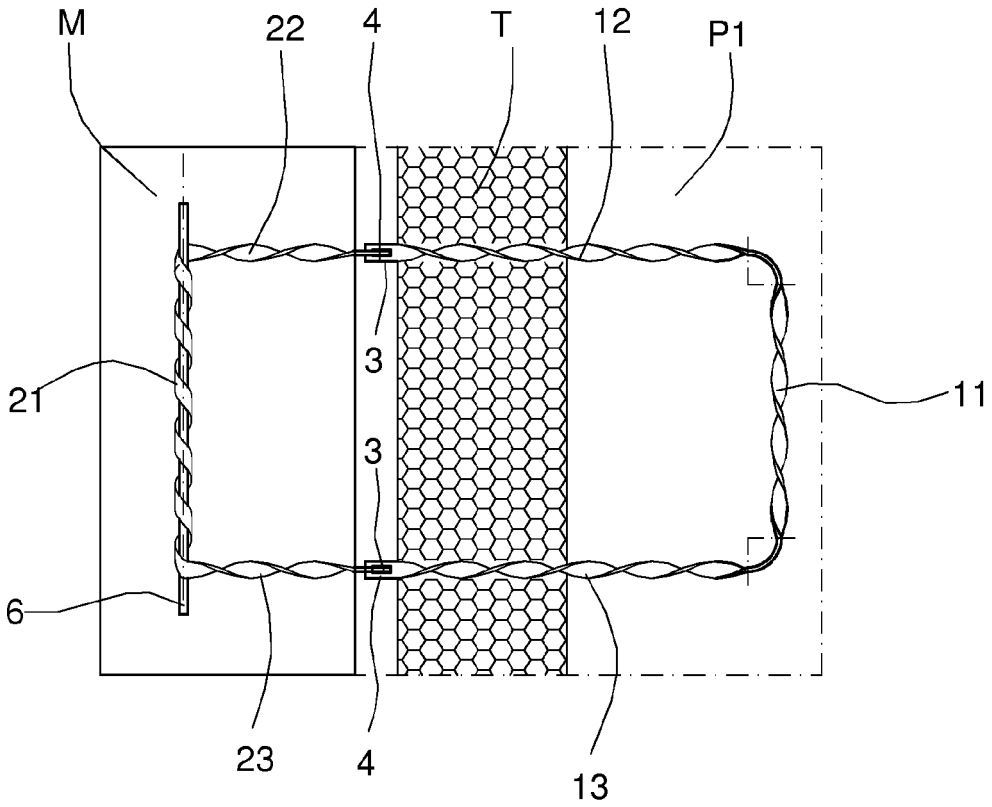


Fig.4

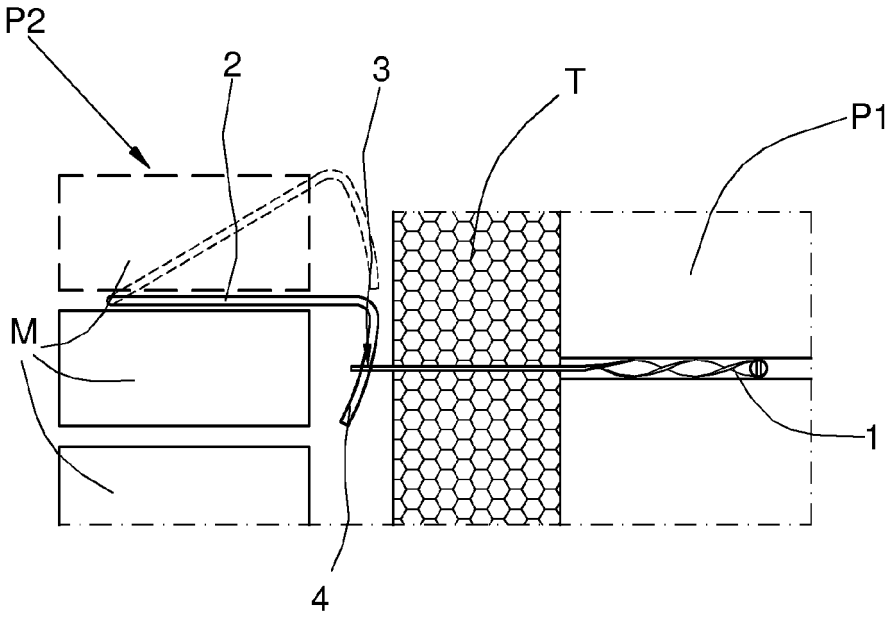


Fig.5

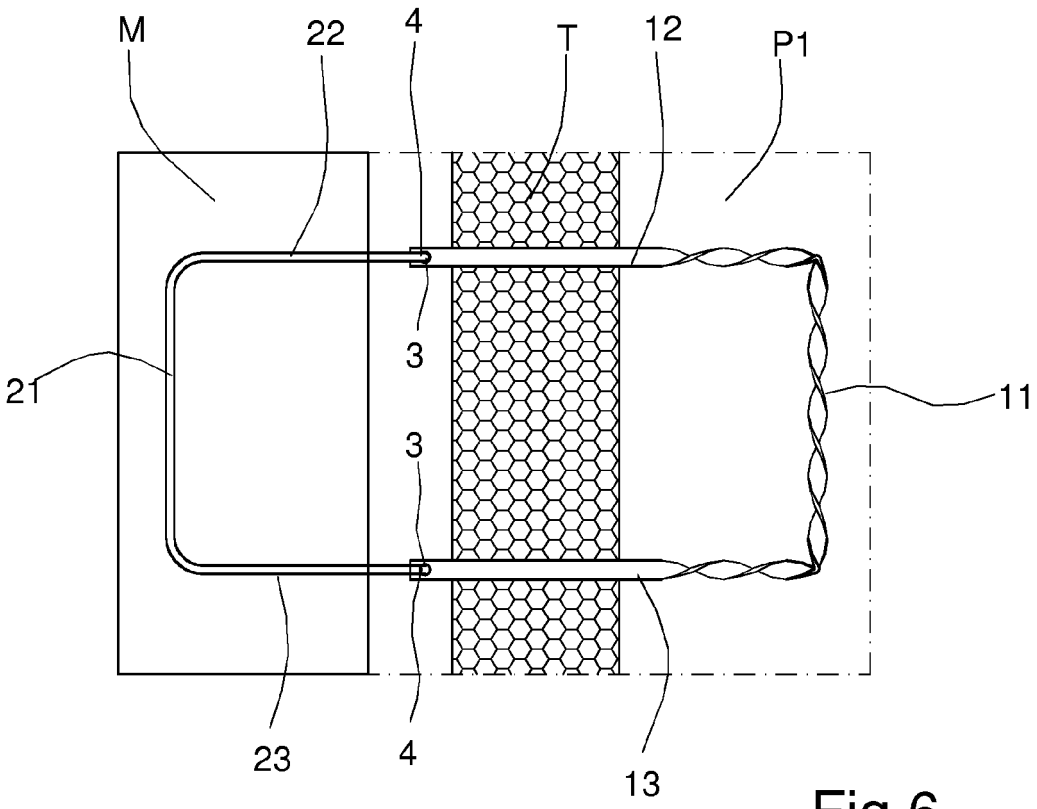


Fig.6

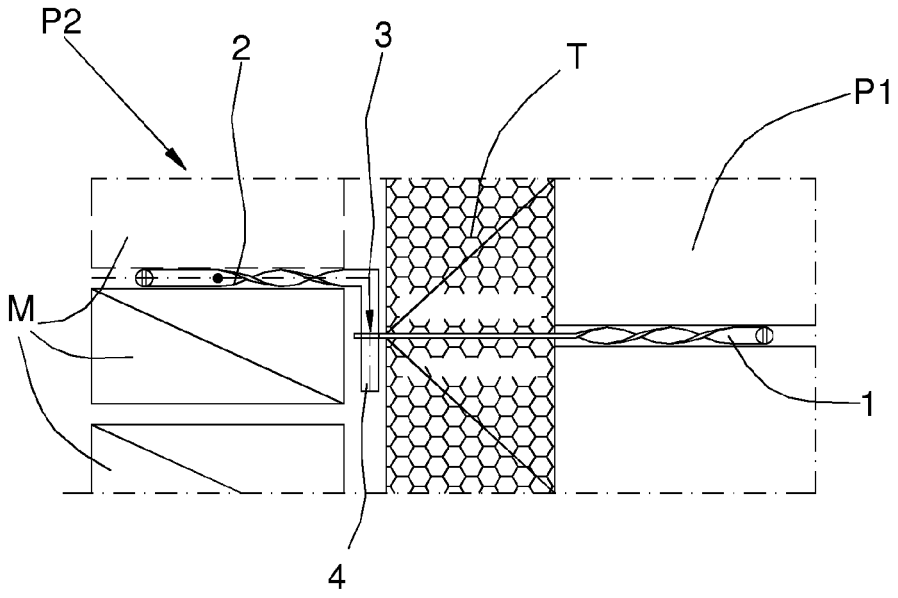


Fig.7

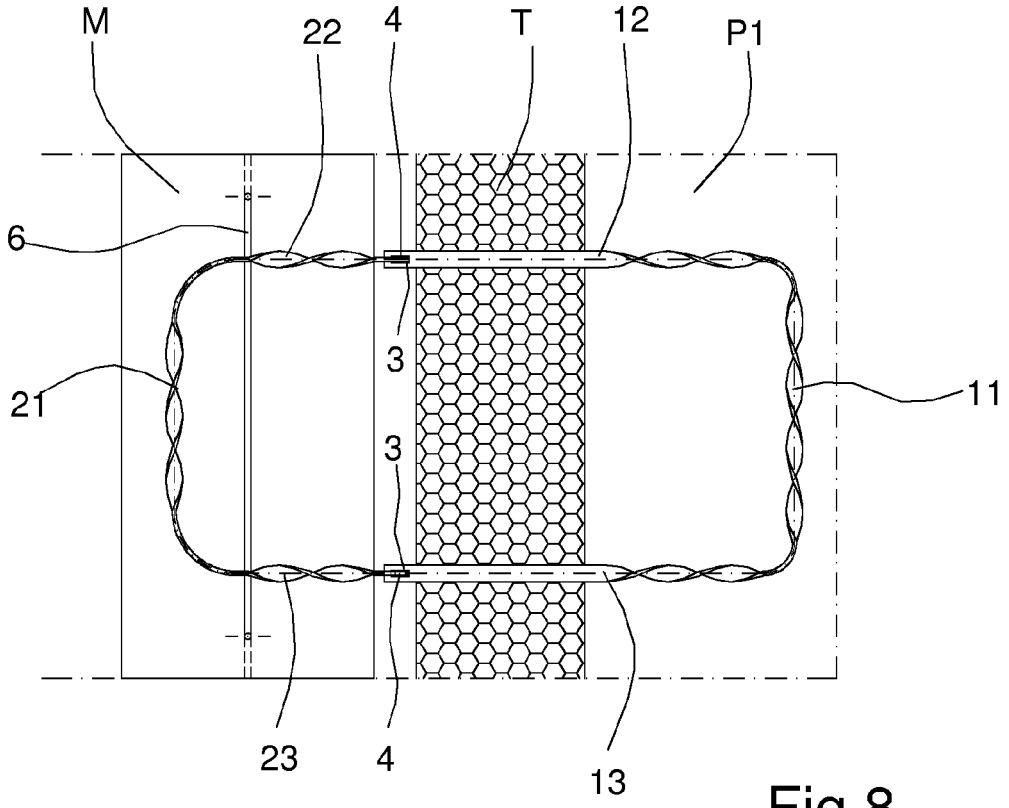


Fig.8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 16 9875

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 2013/074442 A1 (HOHMANN JR RONALD P [US]) 28 March 2013 (2013-03-28) * paragraph [0052] - paragraph [0079]; figures 1-4,8-9 *	1-10	INV. E04B1/41
X	US 7 325 366 B1 (HOHMANN JR RONALD P [US] ET AL) 5 February 2008 (2008-02-05) * column 5, line 45 - column 7, line 20; figures 1-3 *	1-10	
A	EP 0 302 613 A2 (HELIX REINFORCEMENTS [GB]) 8 February 1989 (1989-02-08) * column 1, line 1 - column 2, line 45; figures *	5,8	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 July 2014	Dieterle, Sibille

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 14 16 9875

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-07-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013074442 A1	28-03-2013	NONE	
US 7325366 B1	05-02-2008	US 7325366 B1	05-02-2008
		US 8096090 B1	17-01-2012
EP 0302613 A2	08-02-1989	NONE	

EPO FORM P0459

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