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(54) **A WALL TIE, A WALL COMPRISING SUCH A WALL TIE AND A METHOD FOR CONSTRUCTING A WALL**

(57) A wall tie (10) for connecting an interior wall (11) to an exterior wall (12), comprising a first wall tie part (16) and a second wall tie part (17), wherein the first wall tie part (16) is connectable to the second wall tie part (17). The first wall tie part (16) comprises a first anchor portion (19) and an eye (20). The second wall tie part (17) comprises a second anchor portion (21), a first projection (23) connected to a second projection (24) through a connecting portion (22), the projections (23, 24) being spaced

apart, wherein the first projection (23) is provided with a first aperture (28), and wherein the second projection (17) is provided with a second aperture (29). The eye (20) is insertable between the projections (23, 24). The wall tie (10) also includes a pin (18) for insertion into the first aperture (28), the eye (20) and the second aperture (29) to connect the wall tie parts (16, 17). Disclosed is also a wall including such a wall tie and a method for constructing a wall.

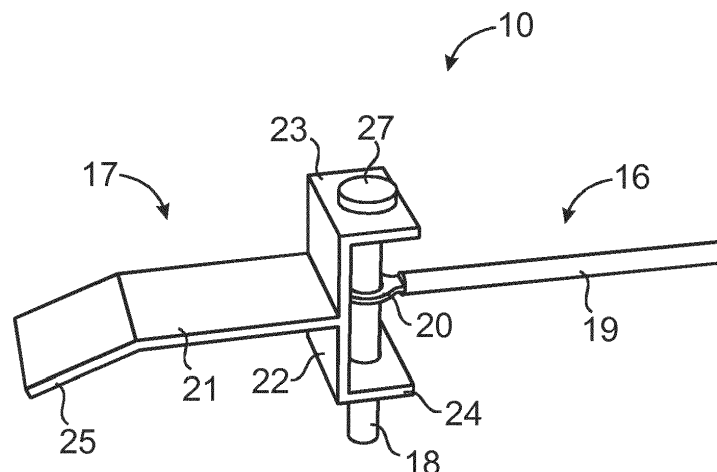


Fig. 2

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a wall tie. More specifically the present invention relates to a wall tie for connecting an exterior wall to an interior wall in a wall structure, such as a cavity wall. Cavity walls are wall structures, wherein the exterior wall is arranged with a gap to the interior wall forming a cavity between the inner wall and the exterior wall. The inner wall can be any type of wall, such as a masonry wall, e.g. comprising masonry building blocks, bricks, expanded clay, haydite, concrete or similar, or a wall comprising boards, studs, wood, gypsum and similar materials, wherein the exterior wall is a masonry wall. For example, the exterior wall comprises building blocks, such as masonry building blocks including concrete, expanded clay, haydite or similar. The cavity between the interior wall and the exterior wall can be provided with insulation materials. Wall ties are fastened to the interior wall and the exterior wall and are arranged to extend through the cavity for stabilising the exterior wall by connecting it to the interior wall. Hence, the wall tie is used to tie the internal and exterior walls, also called leaves or skins, together. Wall ties are connected to the interior wall and the exterior wall during construction and spans the cavity between the interior wall and the exterior wall. The present invention also relates to a wall comprising such wall ties. The present invention also relates to a method for constructing a wall.

PRIOR ART

[0002] A plurality of different types of wall ties is disclosed in the prior art. One type of such prior art wall ties for connecting an exterior wall to an interior wall comprises an inner component for fastening to the interior wall and an outer component to be embedded in a mortar joint of the exterior wall. The outer component is connectable to the inner component.

[0003] Even though a plurality of prior art wall ties is known there is a need to provide a wall tie with improved stability.

[0004] Hence, one problem of such prior art wall ties is that the stability can be deficient.

[0005] Another problem of some types of prior art wall ties is that they can be difficult to use and that the range of application can be limited.

BRIEF DESCRIPTION OF THE INVENTION

[0006] One object of the present invention is to provide a wall tie that result in a strong connection and is easy to mount while, according to some embodiments, being flexible and adaptable to the current circumstances.

[0007] The present invention relates to a wall tie for connecting an interior wall to an exterior wall, comprising a first wall tie part for fastening in one of the interior wall

and the exterior wall, and a second wall tie part for fastening in the other one of the interior wall and the exterior wall, wherein the first wall tie part is connectable to the second wall tie part, characterised in that the first wall tie part comprises a first anchor portion and an eye, that the second wall tie part comprises a second anchor portion, a connecting portion, a first projection and a second projection connected to the first projection through the connecting portion, the first and second projections being spaced apart, wherein the first projection is provided with a first through aperture, and wherein the second projection is provided with a second through aperture, that the eye is insertable between the first projection and the second projection, and that the wall tie includes a pin for insertion into the first aperture, the eye and the second aperture to connect the first wall tie part to the second wall tie part. The structure of the second wall tie part with the spaced apart projections and the pin connecting the first and second wall tie parts through the projections result in a strong connection being able to distribute loads between the first and second wall tie parts through both the first and second projections. Hence, a wall tie is provided with improved strength when it comes to vertical forces on the first anchor portion or the second anchor portion. To further improve the possibilities of load distribution the first and second apertures and the eye can be arranged for receiving the pin in a relatively snug fit, wherein the pin engages the first and second wall tie parts all the time or by a minor movement of any of the first and second wall tie parts. The wall tie can be arranged in three separate pieces, i.e. the first wall tie part, the second wall tie part and the pin, that are assembled prior to construction of the interior wall or after construction of the interior wall. Hence, the wall tie can be assembled before or during erection of the exterior wall.

[0008] The pin can be arranged with a circular cross section, so that the first and second wall tie parts are rotatable in relation to each other around the pin. Alternatively, the eye and/or the apertures can be formed with circular cross section so that the second wall tie part is rotatable around a longitudinal axis of the pin. Hence, the wall tie can be fastened to the internal wall and assembled, wherein the second wall tie part can be pivoted around the longitudinal axis of the pin to move it out of the way during positioning of one or more building block or one or more layers building blocks of the exterior wall. Then, the second wall tie part can be turned out into its wall attachment position so that the second anchor portion can be tied into a joint of the exterior wall. Consequently, the wall tie can be assembled and fastened to the interior wall prior to erection of the exterior wall and then connected to the exterior wall during erections of the exterior wall. Alternatively, the wall tie can be assembled when required during erection of the exterior wall.

[0009] The pin can be arranged with a regular cross section or diameter, so that the pin easily can run through the eye. Hence, the second wall tie part is adjustable in height before the second anchor portion has been en-

gaged to the wall or tied into the joint, so that the second anchor portion can be aligned with the top surface of a building block and with the joint in which it is to be received. For example, a distance between the first projection and the second projection is 10-100 mm, wherein the second wall tie part is height adjustable a corresponding distance.

[0010] The second anchor portion can be flat for a favourable fit in the joint. Hence, the wall tie can be used also for masonry exterior walls having thin bed mortar joints.

[0011] Disclosed is also a wall comprising the wall tie of the present invention, wherein the wall comprises an interior wall and an exterior wall being spaced apart to form a gap between them, wherein the first anchor is fastened to the interior wall and the eye projects from the interior wall, wherein the second anchor is embedded in a masonry joint of the exterior wall so that the first and second projections projects from the exterior wall towards the interior wall, wherein the eye is received between the first and second projections, and wherein the pin extends through the first aperture, the eye and the second aperture to connect the first and second wall tie parts.

[0012] Disclosed is also a method for constructing a wall, comprising the steps of

- a) erecting an interior wall,
- b) fastening an anchor of a first wall tie in the interior wall, so that an eye of the first wall tie part projects from the interior wall,
- c) bringing a first projection and a second projection of a second wall tie part to enclose opposite sides of the eye,
- d) aligning the eye with a through aperture in the first projection and a through aperture in the second projection,
- e) inserting a pin through the aperture in the first projection, the eye and the aperture in the second projection to connect the first wall tie part with the second wall tie part, and
- f) arranging an anchor of the second wall tie part in a mortar joint of a masonry exterior wall.

[0013] Further characteristics and advantages of the present invention will become apparent from the description of the embodiments below, the appended drawings and the dependent claims.

SHORT DESCRIPTION OF THE DRAWINGS

[0014] The invention will now be described in more detail with the aid of exemplary embodiments and with reference to the accompanying drawings, in which

Fig. 1 is a schematic perspective view of a part of a wall and a wall tie according to one embodiment, wherein the wall comprises an interior wall, an exte-

rior wall and a cavity between them, and wherein the wall tie is connected to the interior wall and engages the exterior wall,

Fig. 2 is a schematic perspective view of a part of the wall tie according to one embodiment, illustrating a first wall tie part connected to a second wall tie part through a pin,

Fig. 3 is a schematic side view of the wall tie of Fig. 2, Fig. 4 is a schematic side view partly in section of the wall tie of Fig. 3,

Fig. 5 is a schematic cross section view of the wall tie along line I-I in Fig. 3,

Figs. 6-8 are schematic views of different embodiments of the wall tie for different types of walls,

Figs. 9-16 are schematic views of a first wall tie part of the wall tie according to different embodiments,

Figs. 17-21 are schematic top views of wall ties according to different embodiments, and

Figs. 22-25 are a series of schematic perspective view illustrating construction of a wall including a wall tie according to one embodiment.

THE INVENTION

[0015] With reference to Fig. 1 a wall tie 10 connected to an interior wall 11 and engaging an exterior wall 12 in a cavity wall structure under construction is illustrated according to one embodiment. The wall tie 10 is arranged to stabilise the exterior wall 12 by connecting it to the interior wall 11. Hence, the wall tie 10 is arranged to extend across a cavity 13 between the interior wall 11 and the exterior wall 12. Hence, according to the illustrated embodiment the wall tie 10 is a cavity wall tie. For example, the interior wall 11 is any type of wall, such as a wall comprising studs and boards, wood, gypsum, composite materials, etc. Alternatively, the interior wall 11 is a masonry wall, e.g. including concrete, expanded clay, light ballast concrete, haydite or similar materials. The exterior wall 12 is a masonry wall, e.g. of building blocks 14 including concrete, expanded clay, haydite material or other types of masonry building blocks. For example, the building blocks 14 are light ballast concrete blocks. The exterior wall 12 comprises joints 15 between the building blocks 14, such as bed joints, in which a part of the wall tie 10 is arranged to be embedded. For example, the exterior wall 12 also comprises insulation (not illustrated). For example the cavity wall is a conventional cavity wall. The wall tie 10 is arranged to be tied into the mortar or cementitious material or similar type of material in the joints 15 of the exterior wall 12. For example, the joints 15 are thin bed mortar joints. For example, the wall tie 10 is arranged in stainless steel, composite materials, plastic materials or other corrosion resistant materials.

[0016] The wall tie 10 comprises a first wall tie part 16 and a second wall tie part 17. In the illustrated embodiment the first wall tie part 16 is arranged for fastening to the interior wall 11, wherein the second wall tie part 17 is arranged for fastening to the exterior wall 12. The first

wall tie part 16 is connectable to the second wall tie part 17 by means of a pin 18.

[0017] With reference also to Figs. 2 and 3 the first wall tie part 16 comprises an anchor portion, denoted first anchor portion 19 in this disclosure, and an eye 20 connected to the first anchor portion 19. The first anchor portion 19 is arranged to be fastened to the interior wall 11. In Figs. 2 and 3 only a part of the first anchor portion 19 is illustrated. The first anchor portion 19 can be designed in a plurality of different ways for fastening to different types of interior walls 11, which is described in more detail below. The eye 20 is, e.g. arranged in one end of the first anchor portion 19, wherein the opposite end of the first anchor portion 19 is arranged for attachment to the interior wall 11. The eye 20 is arranged for receiving the pin 18, so that the pin 18 extends through the eye 20. Hence, the anchor portion 19 is arranged for fastening to the interior wall 11 and for partially extending through the cavity 13, so that the eye is projecting from the interior wall 11 and is spaced from the interior wall 11.

[0018] The second wall tie part 17 comprises an anchor portion, denoted second anchor portion 21 in this disclosure. The second wall tie part 17 further comprises a connecting portion 22, a first projection 23 and a second projection 24. The second anchor portion 21 is arranged to be tied into the joint 15 of the exterior wall 12. The second anchor portion 21 extends from the connecting portion 22 to be able to extend into the joint 15, while the connecting portion 22 is arranged outside the joint 15 and the exterior wall 12 in the cavity 13. In the illustrated embodiment, the second anchor portion 21 comprises a slanted end portion 25, e.g. to be received in a central channel 26 of the building block 14, so that the second anchor portion 21 extends into the joint 15 and is terminated with the slanted end portion 25 in the central channel 26 of the building block 14. For example, the slanted end portion 25 is arranged to be slanted downwards when mounted in the exterior wall 12. In the illustrated embodiment, the second anchor portion 21 is flat and, e.g. formed in plate steel. For example, also the connecting portion 22 and optionally also the first and second projections 23, 24 are formed in plate steel.

[0019] The second anchor portion 21 is connected to the first projection 23 and the second projection 24 through the connecting portion 22. Further, the first projection 23 is connected to the second projection 24 through the connecting portion 22. The first and second projections 23, 24 extend from the connecting portion 22 to form a gap between them, wherein the first and second projections 23, 24 are spaced apart. In the illustrated embodiment, the second anchor portion 21 is connected to a central part of the connecting portion 22 and extends from it. For example, at least a part of the second anchor portion 21 extends perpendicular from the connecting portion 22. When connected to the exterior wall 12 the connecting portion 22 extends in a vertical direction upwards and downwards from the second anchor portion 21. For example, the connecting portion 22 and at least

a part of the second anchor portion 21 form a T-shape. For example, the first and second projections 23, 24 extend from opposite ends of the connecting portion 22. In the illustrated embodiment, the first and second projections 23, 24 extend perpendicular from the connecting portion 22, wherein the connecting portion 22 and the first and second projections 23, 24 substantially form a U-shape. For example, the first and second projections 23, 24 extend in parallel to each other and optionally also in parallel to a part of the second anchor portion 21. When the wall tie 10 is mounted the first and second projections 23, 24 extend horizontally, wherein the connecting portion 22 extends in the vertical direction. Alternatively, the first and second projections 23, 24 are inclined in relation to the connecting portion 22, e.g. forming a Y-shape, wherein the first and second projections 23, 24 are inclined upwards and downwards, respectively, so that free ends of the first and second projections 23, 24 are arranged further apart than their opposite ends which are connected to the connecting portion 22. For example, a distance X between the first and second projections 23, 24 is 10-100 mm.

[0020] The pin 18 is arranged to connect the first wall tie part 16 and the second wall tie part 17. In the illustrated embodiment the pin 18 comprises a head 27 for engaging the first projection 23, i.e. a top surface of the first projection when the wall tie 10 is mounted, so that the pin 27 is held in place by gravity. Alternatively, the pin 18 is provided with a conical portion or a flange or similar for engaging the top surface of the first projection.

[0021] With reference also to Fig. 4, the first projection 23 is provided with a first aperture 28, and the second projection 24 is provided with a second aperture 29. The first aperture 28 is arranged through the first projection 23 and is arranged for receiving the pin 18, so that the pin extends through the first aperture 28 and a part of the pin 18 is arranged inside the first aperture 28 when the first wall tie part 16 is connected to the second wall tie part 17. The second aperture 29 is arranged through the second projection 24 and is arranged for receiving the pin 18, so that the pin 18 extends through the second aperture 29 and a part of the pin 18 is arranged inside the second aperture 29 when the first wall tie part 16 is connected to the second wall tie part 17. The first and second apertures 28, 29 are aligned so that the pin 18 can be introduced into the first and second apertures 28, 29. For example, the pin 18 has a straight centre axis Y, wherein the first and second apertures 28, 29 e.g. are aligned axially. When the wall tie 10 is mounted the axis Y extends substantially vertically. The eye 20 is adapted to be arranged between the first and second projections 23, 24, so that the eye 20 is aligned with the first and second apertures 28, 29 and the pin 18 can be inserted through the first aperture 28, the eye 20 and the second aperture 29 to connect the first wall tie part 16 to the second wall tie part 17. Hence, the shape and dimensions of the eye 20 and the apertures 28, 29 are adapted for receiving the pin 18. For example, the cross section of

the pin 18 is constant in shape and dimension along the axis Y, wherein the second wall tie part 17 is movable along the pin 18 and along the centre axis Y of the pin 18, which is illustrated by means of the arrow A in Fig. 4, before the second wall tie part 17 has been tied to the exterior wall 12. Hence, the second wall tie part 17 is adjustable in the vertical direction before the second anchor portion 21 has been engaged with or fastened to the exterior wall 12, wherein the second wall tie part 17 is adjustable in height in relation to the building blocks 14 so that the second anchor portion 21 can be adapted to the position of the joint 15 in which it is to be arranged. The pin 18 is arranged to prevent the first and second wall tie parts 16, 17 from being pulled apart and also prevents the first and second wall tie parts 16, 17 from being pushed together when the wall tie 10 is mounted and attached to the interior wall 1 and the exterior wall 12. According to one embodiment, the first and second apertures 28, 29 and the eye 20 are arranged for receiving the pin 18 in a relatively snug fit, so that any forces applied to the first and/or second wall tie parts 16, 17, such as the first and/or second anchor portions 19, 21, in the vertical direction or in a direction parallel to the centre axis Y is received by the pin 18 and distributed to both the first and second projections 23, 24.

[0022] With reference also to Fig. 5 the second wall tie part 17 is rotatable around the pin 18, which is illustrated by means of the arrow B in Fig. 4. For example, the pin 18 and/or the apertures 28, 29 is/are formed with a circular cross section, wherein the second wall tie part 17 is pivotable around the centre axis Y.

[0023] With reference to Fig. 6 the wall tie 10 is arranged for connecting the interior wall 11 in the form of a masonry wall of building blocks 14 to an exterior wall comprising building blocks 14. For example, the building blocks 14 of the exterior wall 12 and the interior wall 11 are similar and are, e.g. building blocks 14 comprising haydite, concrete or similar, optionally with an insulation layer, reinforcement, etc. For example, the building blocks 14 are conventional building blocks.

[0024] In Fig. 7 the exterior wall 12 is a masonry wall comprising the building blocks 14, wherein the interior wall 11 is a wall comprising different layers, such as an outer board 30, an insulation layer 31 and an inner board 32. The outer and inner boards 30, 32 are, e.g. fastened to studs (not illustrated) in a conventional manner, wherein the insulation layer 31 is arranged between the studs. The outer board 30 and the inner board 32 are, e.g. a gypsum wallboard, a wood chip panel, a cementitious board, a composite board or any suitable type of board for wall construction. In the embodiment of Fig. 7 the first anchor portion 19 is formed with an angle portion 33 for engaging and attachment to the surface of the interior wall 11, e.g. by means of conventional fastening means, such as a screw or a nail, running through a hole in the first anchor portion 19.

[0025] In Fig. 8 the first anchor portion 19 is embedded in the interior wall 11. For example, the interior wall 11

comprises wood, gypsum, studs, insulation or other suitable construction materials. For example, the interior wall comprises an outer windshield layer or vapour barrier 35, the outer board 30, the insulation layer 31 and the inner board 32. The first anchor portion 19 is arranged with external threads 34 to be screwed into the interior wall 11, wherein the threads 34 are brought to engage the interior wall for fastening thereto. The exterior wall 12 in Fig. 8 is a brick wall. Of course, the different types of interior walls 11 and exterior walls 12 of Figs. 6-8 can be combined in any way.

[0026] With reference to Figs. 9-15 the first wall tie part 16 is illustrated according to different embodiment for fastening to different types of interior walls 11. The first wall tie part 16 comprises the eye 20 and the first anchor portion 19. For example, the first anchor portion 19 comprises a bar, such as a straight bar as illustrated in Fig. 9, to be embedded in the interior wall 11. Alternatively, the first anchor portion 19 is formed as a flat plate element, optionally provided with one or more slanted portions 36, which is illustrated in Fig. 10. In Fig. 11 the first anchor portion 19 is connected to the eye 19 through an intermediate portion 37, wherein the first anchor portion 19 is thin and flat.

[0027] illustrates the first wall tie portion 16 as described with reference to Fig. 8, wherein the first anchor portion 19 is provided with the external threads 34, so that the first wall tie part is formed as a screw with the eye 20. In Fig. 13 the first wall tie part 16 is formed with the non-threaded intermediate portion 37 and the first anchor portion is formed with a light concrete thread 38, e.g. of plastic materials, for screwing into the interior wall 11 in the form of haydite, light concrete or similar. Fig. 14 illustrates the first wall tie part 16 as described with reference to Fig. 7, i.e. with the angle portion 33 for engaging the interior wall 11 and the hole or an additional eye 39 for fastening to the surface of the interior wall 11. In Fig. 15 the first anchor portion 19 is provided with protrusions 40 for securing the first anchor portion in a mortar joint, concrete wall material or similar hardening construction material, wherein the first anchor portion 19 is arranged in the hardening material before it hardens. The protrusions 40 extend perpendicular to a longitudinal direction of the anchor portion 19, wherein the protrusions 40 are arranged on top and bottom surfaces of the first anchor portion 19 to extend vertically when the first wall tie part 16 has been mounted in the interior wall 11.

[0028] Figs. 16-20 illustrate the wall tie 10 according to different embodiments. With reference to Fig. 16 the first anchor portion 19 is arranged as a flat plate with the slanted end portion 25 similar to the second anchor portion 21. Hence, the first and second anchor portions 19, 21 in Fig. 16 are suitable for attachment to masonry walls. In Fig. 17 the first and second anchor portions 19, 21 are formed with a plurality of small holes 41 for engaging a hardening material. Hence, the first and second anchor portions 19, 21 in Fig. 17 are suitable for attachment to masonry walls. In Fig. 18 the first anchor portion 19 is

formed with the threads 34, wherein the second anchor portion 21 is formed as a flat plate with a few larger holes 41. The first anchor portion 19 is arranged for attachment to a non-masonry wall or a masonry wall. In Fig. 19 the first anchor portion 19 is formed with bends 42 to further secure the first anchor portion 19 in a hardening material and prevent the first anchor portion 19 from being displaced in a direction perpendicular to the plane of the interior wall 11. In Fig. 19 the second anchor portion 21 is provided with grooves 43 for engaging the material of the joint 15 and thereby prevent displacement in a direction perpendicular to the plane of the exterior wall 12. With reference to Fig. 20 the first anchor portion 19 is formed with an eye, e.g. by wire material, to tie the first anchor portion 19 to a hardening material of the interior wall 11.

[0029] With reference to Figs. 21-25 erection of a cavity wall and mounting of the wall tie 10 is illustrated schematically. The first wall tie part 16 is fastened to the interior wall 11. Hence, the first anchor portion 19 is attached to the interior wall 11. In the illustrated embodiment, the interior wall 11 comprises the outer board 30, the insulation 31 and the inner board 32 but the interior wall 11 can be any type of wall. Further, in the illustrated embodiment the first anchor portion 19 comprises the angle portion 33, wherein the first anchor portion 19 is attached to the surface of the interior wall 11 by means of conventional fastening means 44, such as a screw. Alternatively, the first anchor portion 19 is arranged to be embedded in the interior wall 11. The first anchor portion 19, or at least a part thereof, projects from the interior wall 11, such as perpendicular therefrom, so that the eye 20 projects from the interior wall 11 and, e.g. is spaced from the outer surface of the interior wall 11. Then, the first and second projections 23, 24 of the second wall tie part 17 are brought to enclose upper and lower sides of the eye 20, so that the eye 20 is arranged between the first and second projections 23, 24 and are aligned with the first and second apertures 28, 29, which is illustrated in Fig. 22. Hence, the first projection 23 is arranged above the eye 20, wherein the second projection 24 is arranged below the eye 20. Then the pin 18 is inserted into the first aperture 28 and further through the eye 20 and through the second aperture 29, which is illustrated by means of the arrow C in Fig. 22. Hence, in the illustrated embodiment, the pin 18 is inserted from above until the head 27 engages the first projection 23 and the pin 18 locks the second wall tie part 17 to the first wall tie part 16, which is illustrated in Fig. 23. For example, the pin 18 is inserted vertically into the apertures 28, 29 and the eye 20. The second wall tie part 17 is connected to the first wall tie part 16 through the pin 18, wherein the second wall tie part 17 is pivotable around the pin 18 and is vertically adjustable along the pin 18 between the first and second projections 23, 24. Hence, the second wall tie part 17 is adjustable along the pin 18 until one of the projections 23, 24 engages the eye 20. In Fig. 23 the second wall tie portion and the pin 18 are hanging in the eye 20 of the

first wall tie portion 16. Hence, in Fig. 23 the second wall tie part 17 is in its lowermost position. Then, optionally and depending on original mounting position of the second wall tie part 17, the second wall tie part 17 is rotated around the pin 18, which is illustrated by means of the arrow D in Fig. 24 to move the second wall tie portion out of the way during erection of the exterior wall 12 or a part thereof. For example, the second wall tie portion 17 is rotated to a position in which the second anchor portion 21 is arranged substantially in parallel to the interior wall 11 or is inclined towards the interior wall 11, so that the free end of the second anchor portion 21 is closer to the interior wall 11 than the opposite end thereof, which opposite end is connected to the connecting portion 22. Hence, the second anchor portion 21 is turned away, clockwise or counter-clockwise around the pin 18, from the area in which the exterior wall 12 is to be erected, so as not to obstruct arrangement of a layer of building blocks 24 at a height corresponding to the position of the wall tie 10. Then, a part of the exterior wall 12, such as a building block 14 or a layer of building blocks 24 thereof, is erected, wherein the second wall tie part 17 is adjusted in height to suitable position, which is illustrated in Fig. 25 by means of the arrow E, and turned out so that the second anchor portion 21 is brought to engage a top surface of a building block 14, which is illustrated by means of the arrow F. Hence, the second wall tie part 17 is displaced along the pin 18 to suitable height and pivoted around the pin 18 so that the second anchor portion 21 extends substantially perpendicular to the inner surface of the exterior wall 12 and substantially in a plane of the top surface of the building block 14 so as to be embedded in a joint 15 between the building block 14 and a building block to be arranged on top of said building block 14. Hence, the second anchor portion 21 is tied into the joint 15 and is fixed therein when the hardening material of the joint 15 solidifies. When the wall tie 10 has been tied into the exterior wall 12 it is fixed and secures the exterior wall 12 to the interior wall 11. Any load in vertical direction on any of the first anchor portion 19 and the second anchor portion 21 is distributed between said anchor portions 19, 21 through the pin 18 and the first and second projections 23, 24.

Claims

1. A wall tie (10) for connecting an interior wall (11) to an exterior wall (12), comprising a first wall tie part (16) for fastening in one of the interior wall (11) and the exterior wall (12), and a second wall tie part (17) for fastening in the other one of the interior wall (11) and the exterior wall (12), wherein the first wall tie part (16) is connectable to the second wall tie part (17), **characterised in**

that the first wall tie part (16) comprises a first anchor portion (19) and an eye (20),

- that** the second wall tie part (17) comprises a second anchor portion (21), a connecting portion (22), a first projection (23) and a second projection (24) connected to the first projection (23) through the connecting portion (22), the first and second projections (23, 24) being spaced apart, wherein the first projection (23) is provided with a through first aperture (28), and wherein the second projection (17) is provided with a through second aperture (29),
that the eye (20) is insertable between the first projection (23) and the second projection (24), and
that the wall tie (10) includes a pin (18) for insertion into the first aperture (28), the eye (20) and the second aperture (29) to connect the second wall tie part (17) to the first wall tie part (16).
2. The wall tie of claim 1, wherein the first and second apertures (28, 29) and the eye (20) are arranged for receiving the pin (18) in a snug fit.
 3. The wall tie of claim 1 or 2, wherein the first and second apertures (28, 29) are aligned.
 4. The wall tie of any of the preceding claims, wherein the pin (18), the eye (20) and/or the apertures (28, 29) is/are arranged with a circular cross section, so that the first and second wall tie parts (16, 17) are rotatable in relation to each other around the pin (18).
 5. The wall tie of any of the preceding claims, wherein the pin (18) is arranged with a longitudinal axis (Y) and a regular diameter, so that the pin (18) is displaceable in relation to the eye (20) along said longitudinal axis (Y) before the second anchor portion has been engaged to the wall.
 6. The wall tie of any of the preceding claims, wherein the first projection (23) is arranged in parallel to the second projection (24).
 7. The wall tie of any of the preceding claims, wherein a distance (X) between the first projection (23) and the second projection (24) is 10-100 mm.
 8. The wall tie of any of the preceding claims, wherein the second anchor portion (21) is connected to a central part of the connecting portion (22) and extends perpendicular from a first side of the connecting portion (22), and wherein the first and second projections (23, 24) extend perpendicular from an opposite second side of the connecting portion (22).
 9. The wall tie of any of the preceding claims, wherein the second anchor portion (21) is flat.
 10. The wall tie of any of the preceding claims, wherein the first wall tie part (16) is an inner wall tie part for fastening in the interior wall (11), and the second wall tie part (17) is an outer wall tie part for fastening in the exterior wall (12).
 11. A wall comprising the wall tie (10) according to any of the preceding claims, wherein the wall comprises an interior wall (11) and an exterior wall (12) being spaced apart to form a gap between them, wherein the first anchor portion (19) is fastened to the interior wall (11) and the eye (20) projects from the interior wall (11), wherein the second anchor portion (21) is embedded in a masonry joint (15) of the exterior wall (12) so that the first and second projections (23, 24) projects from the exterior wall (12) towards the interior wall (11), wherein the eye (20) is received between the first and second projections (23, 24), and wherein the pin (18) extends through the first aperture (28), the eye (20) and the second aperture (29) to connect the first and second wall tie parts (16, 17).
 12. Use of a wall tie according to any of claims 1-11 for connecting the exterior wall (12) to the interior wall (11) of a cavity wall.
 13. A method for constructing a wall, comprising the steps of
 - a) erecting an interior wall (11),
 - b) fastening an anchor portion (19) of a first wall tie part (16) in the interior wall (11), so that an eye (20) of the first wall tie part (16) projects from the interior wall (11),
 - c) bringing a first projection (23) and a second projection (24) of a second wall tie part (17) to enclose opposite sides of the eye (20),
 - d) aligning the eye (20) with a through aperture (28) in the first projection (23) and a through aperture (29) in the second projection (24),
 - e) inserting a pin (18) through the aperture (28) in the first projection (23), the eye (20) and the aperture (29) in the second projection (24) to connect the second wall tie part (17) with the first wall tie part (16), and
 - f) arranging an anchor portion (21) of the second wall tie part (17) in a joint (15) of a masonry exterior wall (12).
 14. A method according to claim 13, comprising the steps of arranging the pin (18) vertically, and rotating the second wall tie part (17) around the pin (18) into the desired position before step f).
- Amended claims in accordance with Rule 137(2) EPC.**
1. A wall tie (10) for connecting an interior wall (11) to

an exterior wall (12), comprising a first wall tie part (16) for fastening in one of the interior wall (11) and the exterior wall (12), and a second wall tie part (17) for fastening in the other one of the interior wall (11) and the exterior wall (12), wherein the first wall tie part (16) is connectable to the second wall tie part (17), and wherein

the first wall tie part (16) comprises a first anchor portion (19) and an eye (20),
the second wall tie part (17) comprises a second anchor portion (21), a connecting portion (22), a first projection (23) and a second projection (24) connected to the first projection (23) through the connecting portion (22), the first and second projections (23, 24) being spaced apart, wherein the first projection (23) is provided with a through first aperture (28), and wherein the second projection (17) is provided with a through second aperture (29), the eye (20) is insertable between the first projection (23) and the second projection (24), and
the wall tie (10) includes a pin (18) for insertion into the first aperture (28), the eye (20) and the second aperture (29) to connect the second wall tie part (17) to the first wall tie part (16),

characterised in that the first and second apertures (28, 29) and the eye (20) are arranged for receiving the pin (18) in a snug fit.

2. The wall tie of claim 1, wherein the first and second apertures (28, 29) are aligned.
3. The wall tie of any of the preceding claims, wherein the pin (18), the eye (20) and/or the apertures (28, 29) is/are arranged with a circular cross section, so that the first and second wall tie parts (16, 17) are rotatable in relation to each other around the pin (18).
4. The wall tie of any of the preceding claims, wherein the pin (18) is arranged with a longitudinal axis (Y) and a regular diameter, so that the pin (18) is displaceable in relation to the eye (20) along said longitudinal axis (Y) before the second anchor portion has been engaged to the wall.
5. The wall tie of any of the preceding claims, wherein the first projection (23) is arranged in parallel to the second projection (24).
6. The wall tie of any of the preceding claims, wherein a distance (X) between the first projection (23) and the second projection (24) is 10-100 mm.
7. The wall tie of any of the preceding claims, wherein the second anchor portion (21) is connected to a central part of the connecting portion (22) and ex-

tends perpendicular from a first side of the connecting portion (22), and wherein the first and second projections (23, 24) extend perpendicular from an opposite second side of the connecting portion (22).

8. The wall tie of any of the preceding claims, wherein the second anchor portion (21) is flat.
9. The wall tie of any of the preceding claims, wherein the first wall tie part (16) is an inner wall tie part for fastening in the interior wall (11), and the second wall tie part (17) is an outer wall tie part for fastening in the exterior wall (12).
10. A wall comprising the wall tie (10) according to any of the preceding claims, wherein the wall comprises an interior wall (11) and an exterior wall (12) being spaced apart to form a gap between them, wherein the first anchor portion (19) is fastened to the interior wall (11) and the eye (20) projects from the interior wall (11), wherein the second anchor portion (21) is embedded in a masonry joint (15) of the exterior wall (12) so that the first and second projections (23, 24) projects from the exterior wall (12) towards the interior wall (11), wherein the eye (20) is received between the first and second projections (23, 24), and wherein the pin (18) extends through the first aperture (28), the eye (20) and the second aperture (29) to connect the first and second wall tie parts (16, 17).
11. Use of a wall tie according to any of claims 1-9 for connecting the exterior wall (12) to the interior wall (11) of a cavity wall.
12. A method for constructing a wall, comprising the steps of
 - a) erecting an interior wall (11),
 - b) fastening an anchor portion (19) of a first wall tie part (16) in the interior wall (11), so that an eye (20) of the first wall tie part (16) projects from the interior wall (11),
 - c) bringing a first projection (23) and a second projection (24) of a second wall tie part (17) to enclose opposite sides of the eye (20),
 - d) aligning the eye (20) with a through aperture (28) in the first projection (23) and a through aperture (29) in the second projection (24),
 - e) inserting a pin (18) through the aperture (28) in the first projection (23), the eye (20) and the aperture (29) in the second projection (24) in a snug fit to connect the second wall tie part (17) with the first wall tie part (16), and
 - f) arranging an anchor portion (21) of the second wall tie part (17) in a joint (15) of a masonry exterior wall (12).
13. A method according to claim 12, comprising the

steps of arranging the pin (18) vertically, and rotating the second wall tie part (17) around the pin (18) into the desired position before step f).

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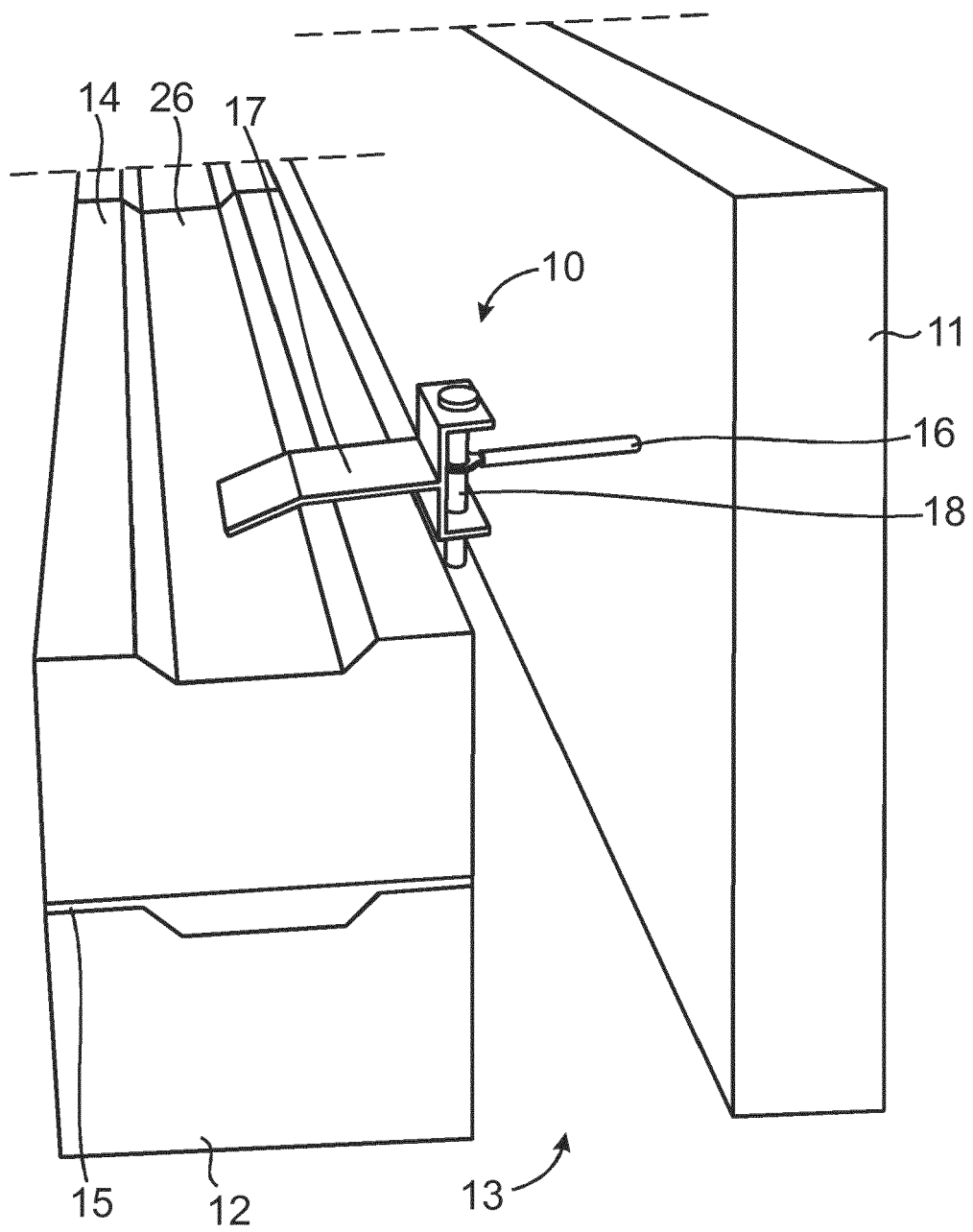


Fig. 1

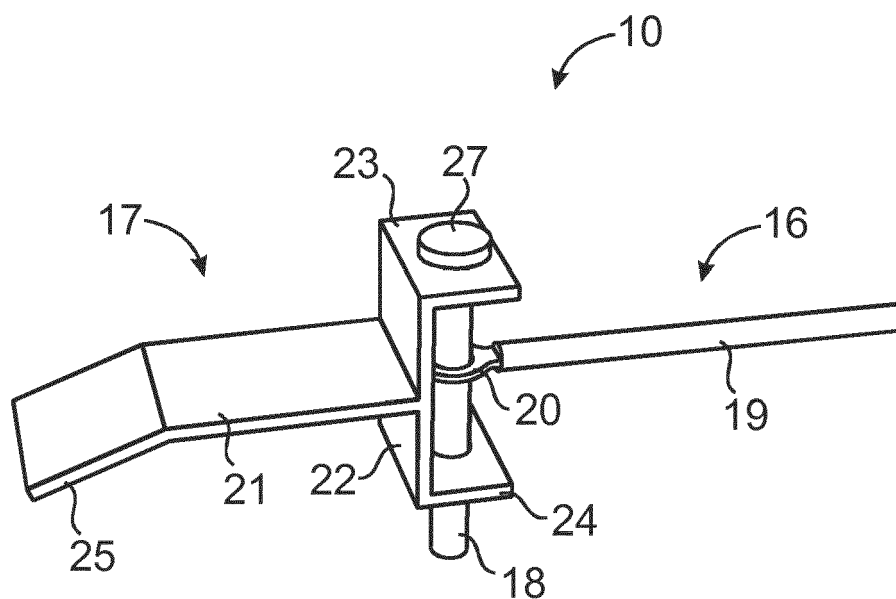


Fig. 2

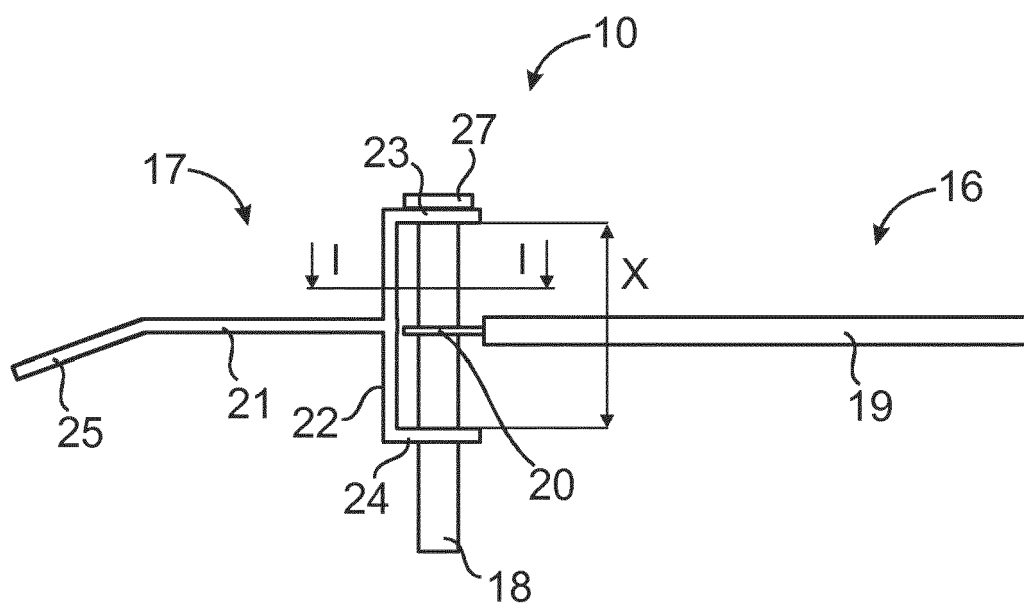


Fig. 3

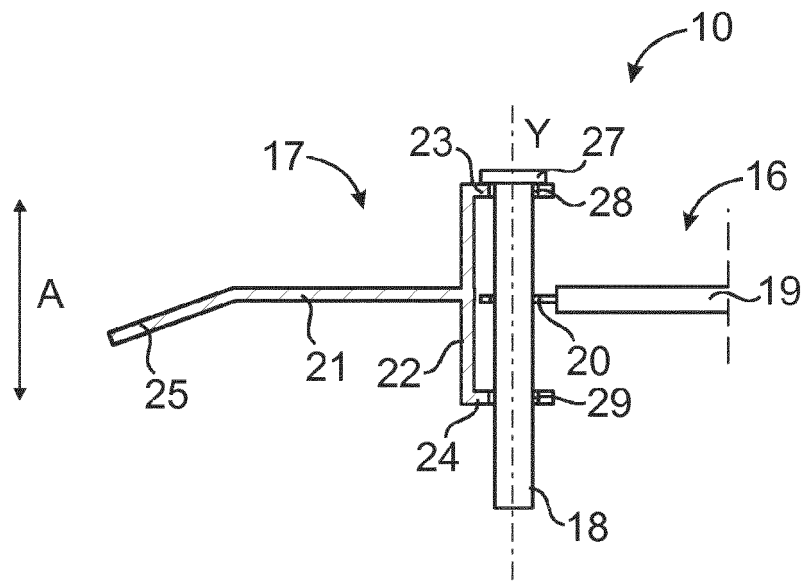


Fig. 4

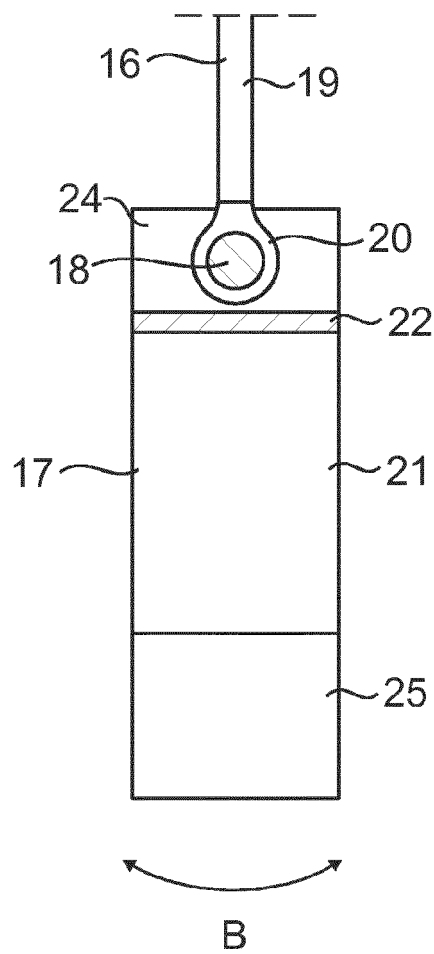


Fig. 5

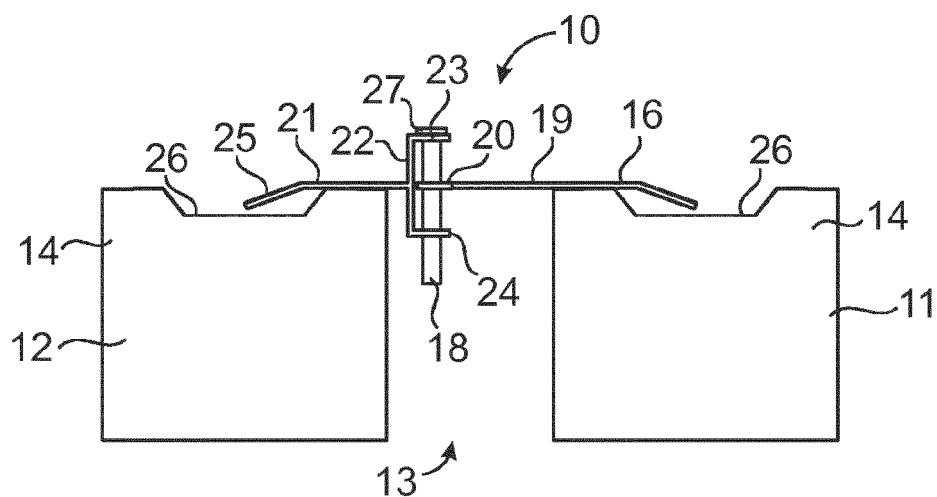


Fig. 6

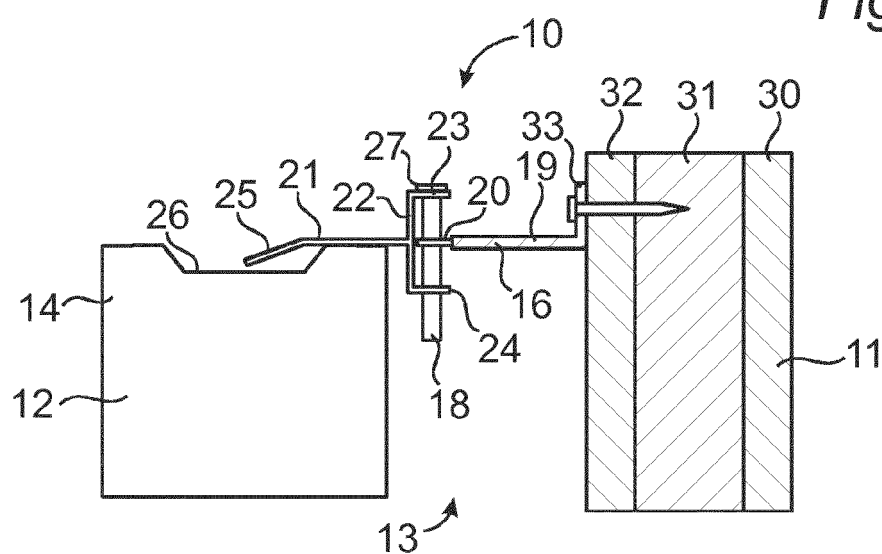


Fig. 7

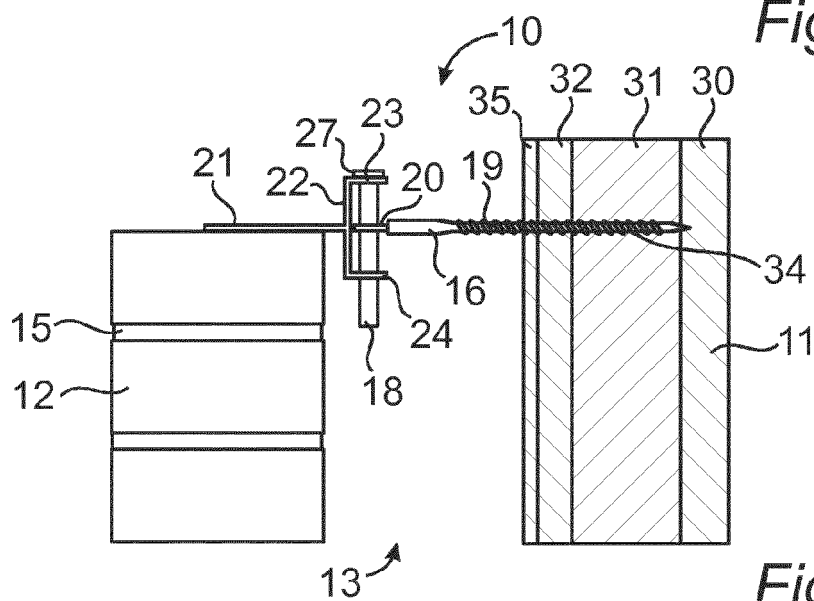


Fig. 8

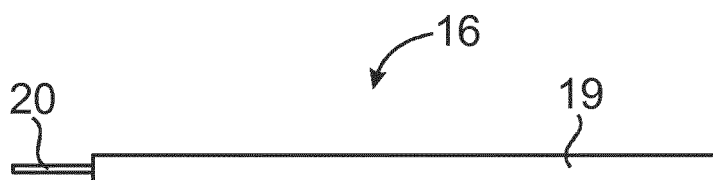


Fig. 9

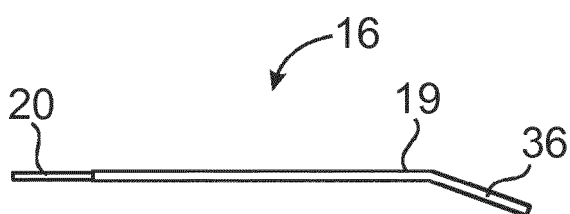


Fig. 10

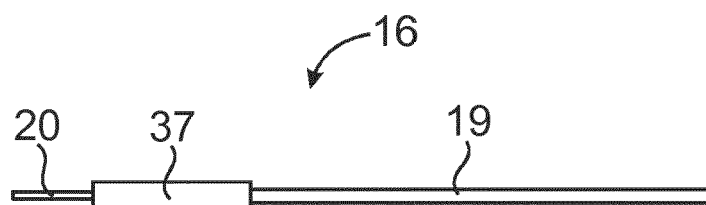


Fig. 11

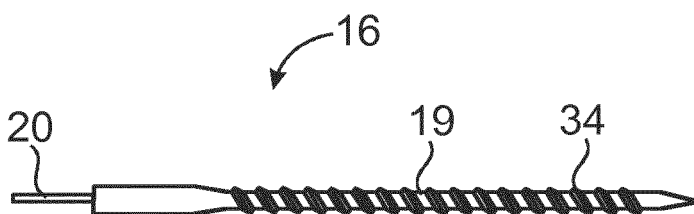


Fig. 12

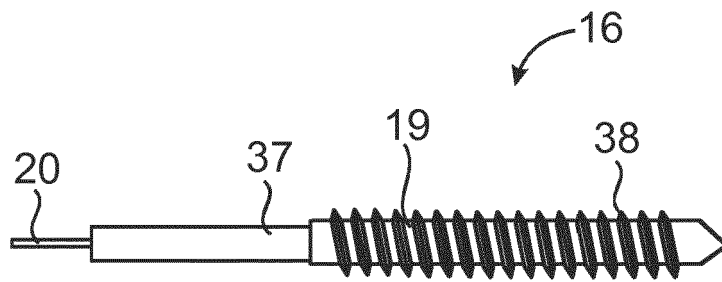


Fig. 13

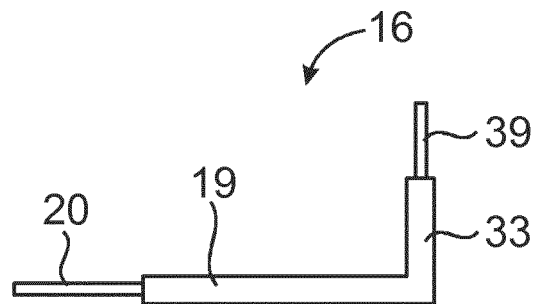


Fig. 14

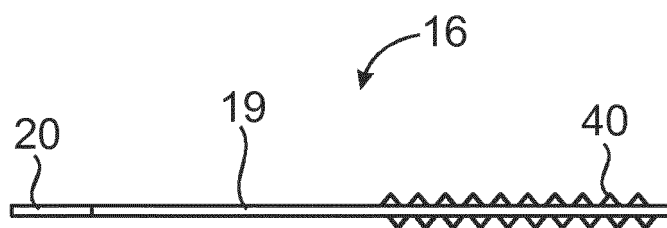


Fig. 15

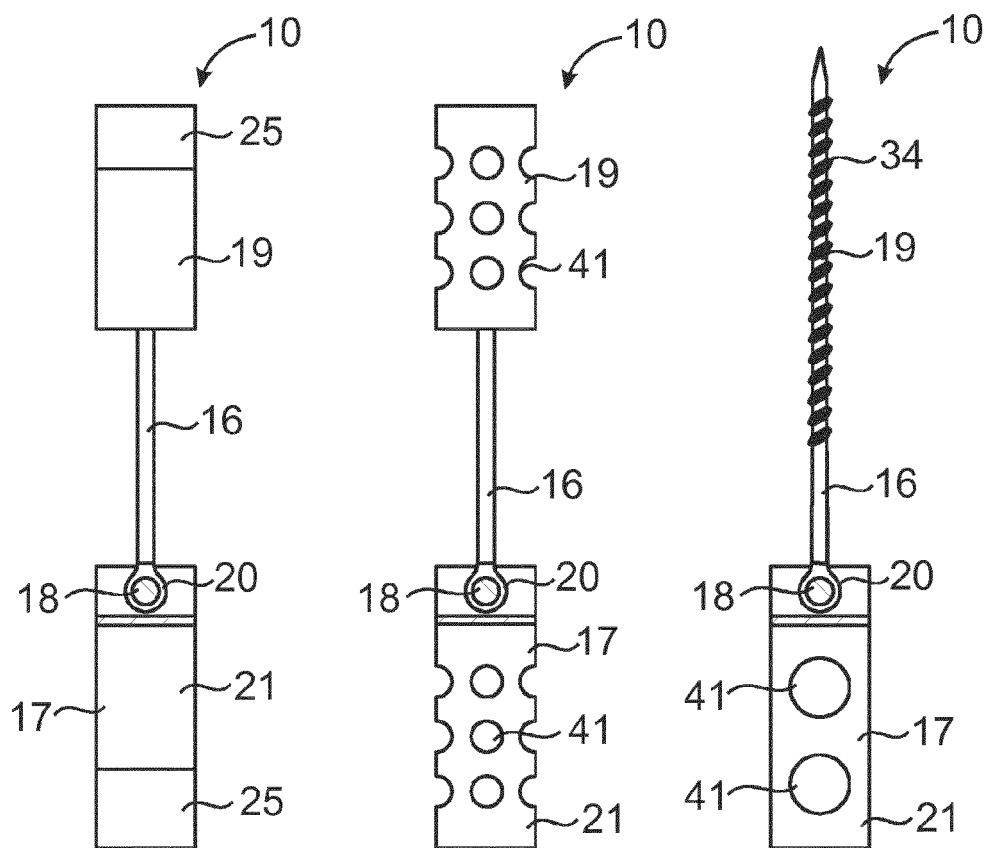


Fig. 16

Fig. 17

Fig. 18

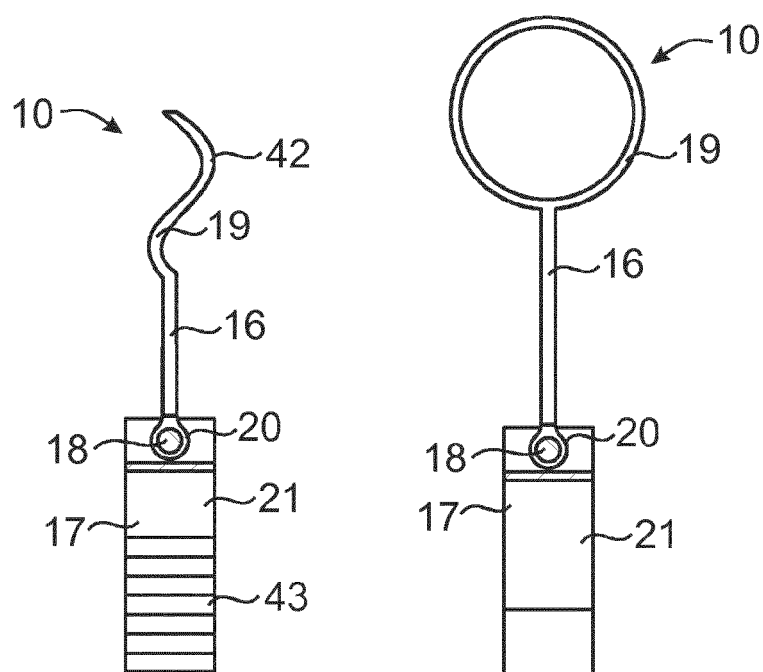


Fig. 19

Fig. 20

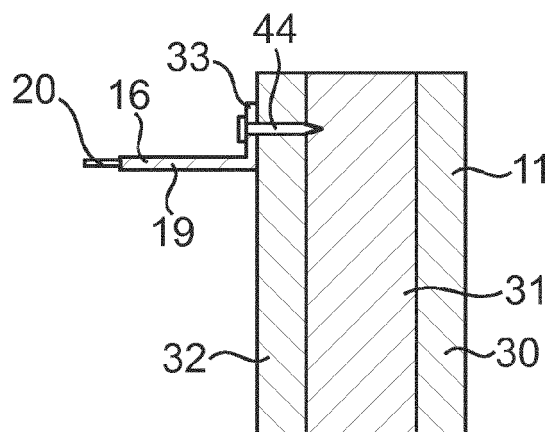


Fig. 21

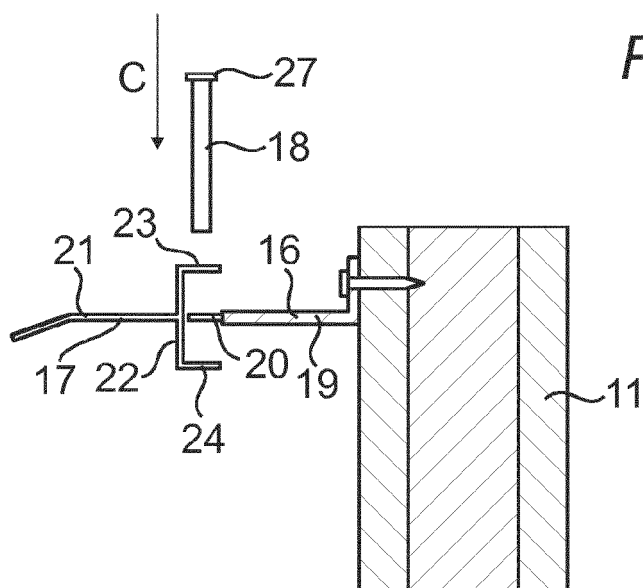


Fig. 22

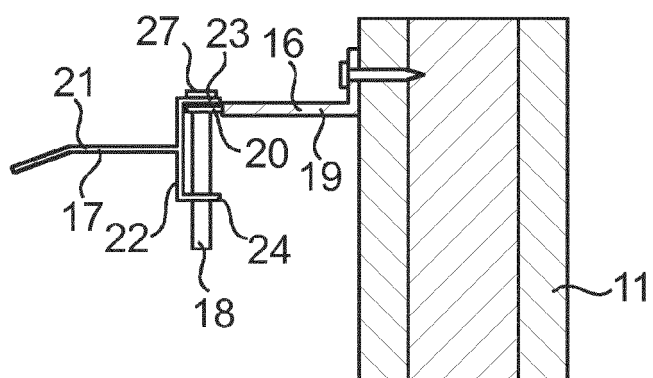


Fig. 23

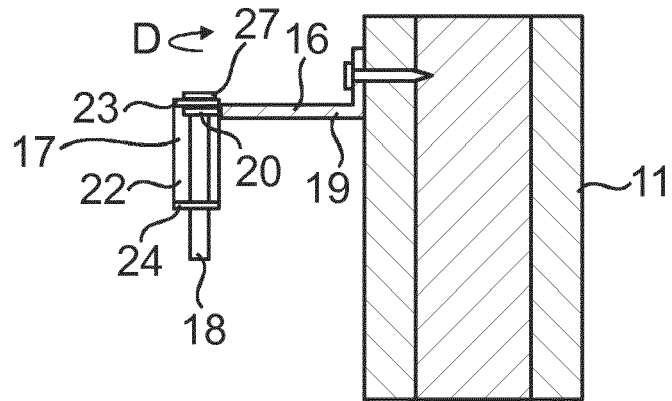


Fig. 24

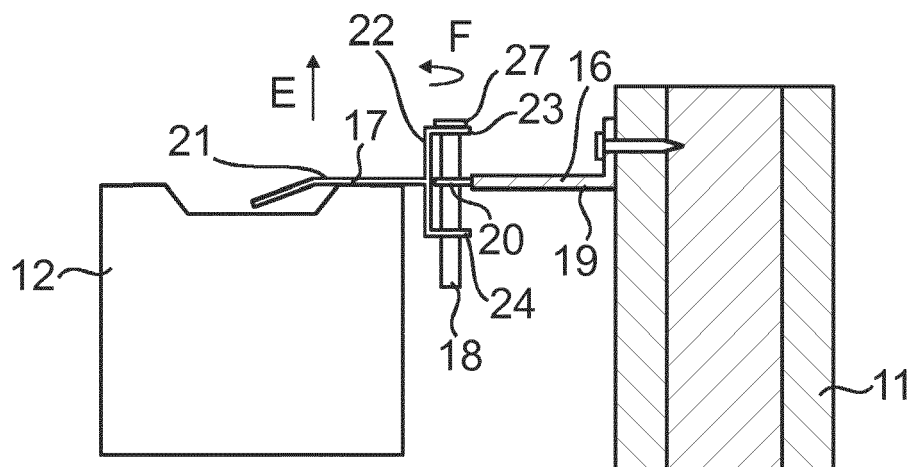


Fig. 25



EUROPEAN SEARCH REPORT

Application Number
EP 16 16 2036

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X A	GB 2 196 664 A (LAPISH ERNEST BERTRAM) 5 May 1988 (1988-05-05) * page 2, line 56 - page 5, line 49; figure 5 *	1,3-14 2	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 September 2016	Examiner 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			

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