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(54) **Ventilated wall comprising support elements and cladding structure thereof**

(57) A support element (1) for cladding slabs (2) to be used on a wall (W) to be covered, comprises a metal section bar extending in a predetermined longitudinal direction (X-X), said section bar having a rear portion designed to be attached to the wall (W) to be covered and a front portion (1a) facing towards the cladding slabs (2) to be supported. Advantageously, said front portion (1a) of the section bar has a plurality of opposite crimping tabs (4) which are adapted to cooperatively engage corresponding portions of said cladding slabs (2) to ensure support of said cladding slabs (2) with respect to the wall (W) to be covered.

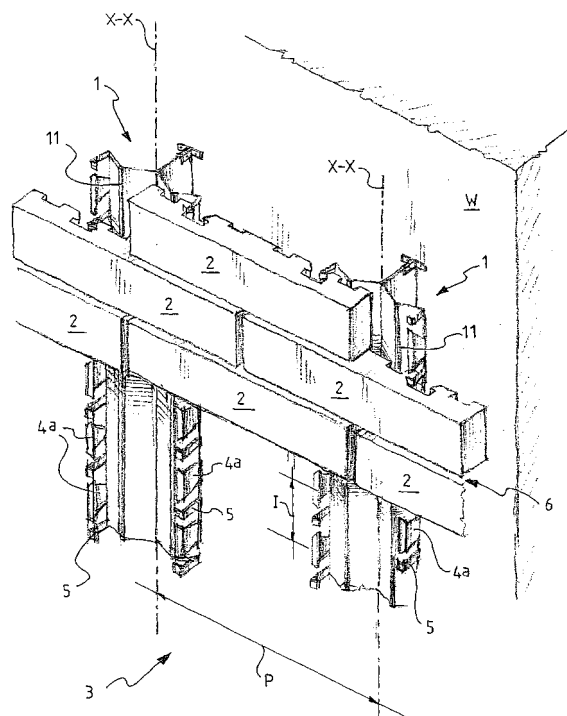


Fig. 1

## Description

**[0001]** The present invention relates to a support element for cladding slabs to be used on a wall to be covered as defined in the preamble of claim 1.

**[0002]** In a further aspect, the present invention relates to a cladding slab as defined in claim 15 for covering a wall.

**[0003]** In a further aspect, the present invention also relates to a cladding structure as defined in claim 32 for covering a wall, in which the support of the cladding material, such as slabs, tiles, bricks or similar elements, is provided by a metal support frame, to form a so-called ventilated cladding wall.

**[0004]** Although this wall cladding system is currently widespread particularly in newly constructed buildings, the steps of attaching the framework and later applying the cladding to the framework is both time-consuming and burdensome. As a result, to avoid inaccurate installation of the product, such steps should be carried out by professional personnel, thereby increasing the costs of the cladding structure due to the high labor costs being involved.

**[0005]** Therefore, in ventilated cladding walls the need is strongly felt of having support elements, frameworks and cladding slabs of quick and simple installation and anyway able to minimize cladding slab positioning errors. Also, any cladding slab that is damaged, worn or in an inaccurate position with respect to the framework shall be removable.

**[0006]** Prior art ventilated walls have frameworks composed of uprights and crosspieces, for supporting the cladding material through the use of fastening and/or anchoring plates. In spite of its dramatic effectiveness, this solution is economically disadvantageous, due to the high costs of the structure per square meter of wall to be covered. Particularly, the incidence of the cost of the cladding structure is highly disadvantageous if the cladding slabs are small tiles or bricks (e.g. 6 x 24 cm), such as those that are generally used for covering the walls of a residential building, instead of large slabs, such as those that are used for covering the walls of a commercial building. This is caused by the requirement of increasing both the number of uprights and the number of the fastening and/or anchoring plates to be used as the size of the cladding slabs decreases.

**[0007]** Furthermore, it shall be noted that the distance between the uprights of the framework is equal to the width of the cladding slabs to be supported by the framework. Nevertheless, if the cladding slabs are to be arranged in a staggered pattern with respect to the vertical, e.g. in the staggered pattern required for making walls of superimposed bricks, prior art structures require the distance between the uprights of the framework to be reduced to half the width of the cladding slabs, thereby apparently further increasing the costs of the cladding structure per square meter of the covered surface.

**[0008]** The problem at the basis of the present inven-

tion is to provide a support element for cladding slabs to be used on a wall to be covered, which has such structural and functional characteristics as to fulfill the above need, while obviating the above prior art drawbacks.

**[0009]** The above problem is solved by a support element for cladding slabs to be used on a wall to be covered according to claim 1.

**[0010]** In a further aspect, this problem is also obviated by a cladding slab according to claim 15 and a by a cladding structure for a wall to be covered according to claim 32.

**[0011]** Further features and advantages of the support element for cladding slabs to be used on a wall to be covered, as well as the cladding slab and the cladding structure for a wall to be covered according to the present invention will be apparent upon reading the following description of a few preferred embodiments thereof, which is given by way of illustration and without limitation with reference to the accompanying figures, in which:

- Figure 1 is a perspective view of a portion of a cladding structure comprising a plurality of support elements for cladding slabs according to the invention;
- Figure 2 shows a detail of Figure 1;
- Figure 3 is a perspective view of a support element for cladding slabs as shown in Figure 1;
- Figures 4 and 5 are two schematic views showing the sequence of steps for attaching a cladding element to a support element of the cladding structure;
- Figures 6a and 6b are a planar view and a plan view of a first mode for attaching cladding slabs to the support structure of the invention;
- Figures 7a and 7b are a planar view and a plan view of a second mode for attaching cladding slabs to the support structure of the invention;
- Figures 8a and 8b are a planar view and a plan view of a second mode for attaching cladding slabs to the support structure of the invention;
- Figure 9 shows a support element according to a different embodiment of the invention;
- Figure 10 is a schematic view of a fourth mode for attaching cladding slabs to the support structure of the invention;
- Figure 11 is a schematic plan view of a cladding slab as shown in Figure 10;
- Figure 12 is a schematic view of a fifth mode for attaching cladding slabs to the support structure of the invention;
- Figure 13 is a schematic plan view of a sixth mode for attaching cladding slabs to the support structure of the invention;
- Figure 14 is a schematic view of a different embodiment of a cladding slab of the invention;
- Figure 15 is a schematic plan view of a further embodiment of a cladding slab of the invention.

**[0012]** Referring to the accompanying figures, numeral 1 generally designates a support element according to

the invention, designed for cladding slabs 2 to be used on a wall W to be covered.

**[0013]** The support element 1 includes a section bar extending in a predetermined longitudinal direction X-X and comprises: a rear portion for attachment to said wall W and a front portion 1a facing towards the cladding slabs 2 to be supported. Preferably, this section bar is made of aluminum or another metal material, but other materials, such as plastic materials, may be also used.

**[0014]** It shall be noted that, in a preferred embodiment, the support element 1 is designed to be used as an element of a cladding structure 3 for the wall W to be covered. Particularly, the cladding structure 3 comprises a plurality of cladding slabs 2, which are supported by a bearing framework attached to the wall W and composed of a plurality of parallel and equally spaced support elements 1.

**[0015]** The support elements 1 are attached to the wall W with a vertically extending orientation, thereby forming uprights. While this orientation of the support elements is most generally used, different orientations of the support elements 1 with respect to the wall W may be also used in response to particular needs, such as a horizontal orientation, so that the support elements act as cross-pieces.

**[0016]** In the examples of the figures, the rear portion of the section bar consists of a flange which may be attached to the wall W to be covered by means of expansion bolts, screws, rivets or other equivalent fastener means, or may be embedded or inserted in the wall W to be covered during construction of the latter.

**[0017]** Concerning the cladding slabs 2, it shall be noted that these may include elements such as flat slabs, tiles, bricks, panels or similar elements of any suitable material. As used herein, the size of the cladding slabs 2 as measured in the longitudinal direction X-X of the support element 1 and in the direction perpendicular thereto will be indicated as height H and width L of the cladding slabs 2 respectively, each slab being preferably embodied by a brick.

**[0018]** Generally, the cladding slabs have a rectangular or square shape, but cladding slabs of different shapes may be also provided and employed.

**[0019]** The cladding structure 3, which is composed, as mentioned above, of a framework attached to the wall W to be covered and a plurality of cladding slabs 2 supported by such framework, defines a counterwall attached to the wall W to be covered.

**[0020]** In an advantageous aspect, said front portion 1a of the metal section bar of each support element 1 has a plurality of opposite crimping tabs 4 that are adapted to cooperatively engage corresponding portions of the cladding slabs 2 to fix such cladding slabs to the support element 1 and thence to the wall W to be covered.

**[0021]** As shown in Figures 1 to 10, the opposite crimping tabs 4 are in substantially facing relationship, so that a channel extending frontally in the longitudinal direction X-X of the section bar is defined at the front portion 1a

of the section bar. As shown in the figures and more clearly explained hereinafter, said channel is designed to receive at least part of the rear portion of the cladding slabs 2, when the latter are engaged by the crimping tabs 4 at an anchor portion 12 thereof.

**[0022]** In the preferred embodiments as shown in Figures 1, 2 and 3, the crimping tabs 4a are in such positions as to project out of the longitudinal edge of the section bar towards the centerline of the section bar, thereby forming lateral crimping tabs for crimping an anchor portion 12 of the cladding slabs 2.

**[0023]** As a result, said channel defined by the crimping tabs 4a substantially has a C shape.

**[0024]** According to the embodiment as shown in Figure 10, the section bar has opposite crimping tabs 4b at its front portion 1a, which are in such positions as to project out of the longitudinal edge of the section bar towards the centerline of the section bar, thereby forming lateral crimping tabs for crimping an anchor portion 12 of the cladding slabs 2. In this embodiment, said channel defined by the crimping tabs 4b substantially has a V shape, instead of the C shape as shown in Figures 2 and 3.

**[0025]** According to the embodiment as shown in Figure 12, the section bar has opposite crimping tabs 4c at its front portion 1a. As shown, the crimping tabs 4c are in such positions as to project out of the longitudinal edge of the section bar away from the centerline of the section bar, thereby forming lateral crimping tabs designed to fit in a second groove 7' formed in the rear wall of the cladding slabs 2 and having two opposite undercuts 8. More in detail, when the free ends of the crimping tabs 4c fit in a groove 7', the crimping tabs 4c engage with the two opposite undercuts 8 thereby securing the cladding slab 2 to the support section bar. In the preferred embodiment as shown in Figure 12, the crimping tabs 4c are formed from a U-section bar, having care to form the crimping tabs 4c from the free ends of the U shape. Optionally, the section bar that is used to form the crimping tabs 4c may be received in a further outer profile 14, e.g. having a U shape, which can contain and add stiffness to the internal section bar. As shown in the illustrated example, the external section bar 14 may contact the rear wall of the cladding slabs 2 and form a centering means between the support element and the cladding slabs 2, as more clearly shown hereinafter.

**[0026]** According to the embodiment as shown in Figure 13, the section bar has opposite crimping tabs 4d at its front portion 1a. As shown, the crimping tabs 4d are in such positions as to project out of the longitudinal edge of the section bar away from the centerline of the section bar, thereby forming lateral crimping tabs designed to fit in a second groove 7' formed in the rear wall of the cladding slabs 2 and having two opposite undercuts 8. More in detail, when the free ends of the crimping tabs 4d fit in a groove 7', the crimping tabs 4d engage with the two opposite undercuts 8 thereby securing the cladding slab 2 to the support section bar.

**[0027]** It shall be noted that said crimping tabs 4 are in a suitably spaced relationship, along the longitudinal direction X-X of the section bar, preferably defining a constant gap I.

**[0028]** The crimping tabs 4 are in such lateral positions as to define two opposed rows of crimping tabs 4, in a spaced relationship along the longitudinal edges of the front portion of the section bar.

**[0029]** According to a preferred embodiment, said crimping tabs 4 act as retaining clips, for snap fit with the cladding slabs 2, as more clearly explained hereinafter.

**[0030]** Particularly when the support elements 1 are oriented to act as uprights, the cladding slabs 2 may slip downwards under their own weight, even when an effective clipping action is exerted by the opposite crimping tabs 4. For instance, this may occur when the cladding structure, and particularly the cladding slabs 2, are subjected to vibrations or shocks.

**[0031]** To prevent the cladding slabs 2 engaged by the crimping tabs 4 from slipping down along the longitudinal direction X-X of the section bar, the support element 1 has crosswise stop means 5 at the front portion 1a of the section bar.

**[0032]** The provision of crosswise stop means 5 prevents the cladding slabs 2 from slipping down along the channel defined in the front portion of the section bar, by preventing a cladding slab from being loaded with the weight of the cladding slabs 2 above it.

**[0033]** Preferably, said crosswise stop means 5 are located in such positions as to fit in the crosswise joints 6 (i.e. the joints extending transverse to said longitudinal direction X-X), between adjoining cladding slabs in the longitudinal direction X-X.

**[0034]** Preferably, each cladding slab lies by its bottom edge on a corresponding crosswise stop means 5. For this purpose, the crosswise stop means 5 of each support element should be equally spaced by a distance D substantially corresponding to the height H of the cladding slabs 2 to be supported plus the height of the desired crosswise joint 6 between the cladding slabs 2.

**[0035]** In the case of Figures 1 and 2, two opposite lateral crimping tabs 4a (having a predetermined height K slightly smaller than the height H of the cladding slabs 2) are provided for each cladding slab 2 and two opposite crosswise stop means 5a are advantageously interleaved within the gap I between the crimping tabs 4a, as shown in Figures 1 and 2.

**[0036]** In the embodiment as shown in Figure 10, the section of the support element has two opposite lateral crimping tabs 4b (having a predetermined height K slightly smaller than the height H of the cladding slabs 2) for each cladding slab 2, and two opposite crosswise stop means 5b are advantageously interleaved within the gap I between the adjoining crimping tabs 4b.

**[0037]** In the example as shown in Figures 1 to 8 and 10, each crosswise stop means 5a, 5b is embodied in the form of a cleat that projects out of the longitudinal edge of the section bar towards the centerline of the sec-

tion bar, beyond the crimping tabs 4a, 4b, to create interference with the bottom or top edge of the cladding slabs 2.

**[0038]** Advantageously, the crimping tabs 4a, 4b and/or the crosswise stop means 5a, 5b are formed of one piece with the front portion 1a of the section bar of the support element 1. For instance, this can be achieved, using a section bar with two opposite flanges projecting towards the centerline at its front end, by cutting, trimming out or otherwise removing certain longitudinal portions of such flanges, to form the crimping tabs 4a, 4b, as well as the strips that act as crosswise stop means 5a, 5b. Depending on the amount of material removed from each of the two flanges of the section bar, crimping tabs 4a, 4b and/or stop means 5a, 5b may be obtained having different heights and/or different distances from each other.

**[0039]** By this arrangement, the crimping tabs 4a, 4b and the strips that act as axial stop means 5a, 5b of the same row are aligned in the longitudinal direction X-X of the section bar. This may provide advantages during mounting of the cladding slabs 2. Indeed, if the distance between the two opposite flanges of the section bar is smaller than the width of the anchor portion 12 of the cladding slab, an interference condition may be created between the crimping tabs 4a, 4b and the anchor portion 12 of the cladding slabs 2 (as shown, for instance, by Figure 4). As a result, by press fitting the anchor portion 12 of the cladding slabs 2 between the opposite crimping tabs 4a, 4b, the free ends of the crimping tabs 4a, 4b are opened apart (as shown, for instance in Figures 5 and 10). In practice, thanks to the elastic deformability of the crimping tabs 4a, 4b, the free ends of the latter are moved away from the centerline of the section bar thereby creating the space required for insertion of the cladding slabs 2. The displacement of the ends of the crimping tabs 4 remains within the range of elastic deformations, and causes a constant effective clipping action of the crimping tabs 4a, 4b on the cladding slabs 2. It will be noted that the parts of the opposite ends of the section bar that do not interfere with the anchor portions 12 of the cladding slabs 2, i.e. the cleats, remain in the original position, and act as axial stop means 5a, 5b for the cladding slabs 2.

**[0040]** Unlike the above, if the two opposite flanges of the section bar are at such a distance from each other that the strips that act as axial stop means 5 are at a distance longer than the width of the anchor portions 12 of the cladding slabs 2, the installation personnel shall simply bend the crimping tabs 4 towards the centerline of the section bar, when mounting the cladding structure 3. This is easily achieved by providing strips of small height, substantially equal to the height of the crosswise joints 6.

**[0041]** In accordance with the alternative embodiment as shown in Figure 9, a section bar may be provided which has, at its front portion, two opposite rows of separate strips, each strip being as high as the desired crosswise joints 6 between the cladding slabs 2 and being able

to create said interference condition with the bottom or top edge of the cladding slabs 2. As the cladding slabs are mounted, their insertion between said opposite strips causes the free ends of the opposite strips to be opened apart by elastic deformation, and to act as crimping tabs 4 for ensuring snap locking of the cladding slabs against the section bar. Obviously, the strips that have not been opened apart by the action of the cladding slabs 2 act as transverse retaining means to create the above described interference condition with the bottom or top edge of the cladding slabs.

**[0042]** According to a further alternative, a section bar may be provided which has, at its front portion, two opposite rows of separate crimping tabs 4 as high as the desired crosswise joints 6 between the cladding slabs 2. During or before mounting, some of said crimping tabs shall be simply slightly bent inwards to act as transverse stop means 5 thereby creating the above described interference condition with the bottom or top edge of the cladding slabs 2.

**[0043]** Referring to the cladding structure 3, it shall be noted that, if the cladding slabs 2 have a constant width L, the pitch P between the support elements 1 simply has to correspond to the width L of the cladding slabs 2.

**[0044]** The crimping tabs 4 of the support elements 1 may be directly engaged with the longitudinal sides of the cladding slabs 2. This solution is particularly suitable for the support of thin slabs of materials such as marble or granite, in which any processing to form grooves, notches or the like is excessively burdensome and laborious.

**[0045]** Otherwise, wherever possible, the cladding slabs 2 may include anchor portions 12 of such conformation as to allow coupling with complementary profiles of the crimping tabs 4 of the section bars. For instance, this is the case of cladding slabs 2 consisting of bricks or tiles, which can be easily processed with the desired grooves.

**[0046]** For effective coupling with the crimping tabs 4, the rear wall of the cladding slabs 2, i.e. the side designed to face towards the front portion 1a of the section bars, advantageously has at least one groove 7 extending in the longitudinal direction X-X and defining an undercut 8 for engagement with the crimping tabs 4.

**[0047]** Preferably, the rear wall 2a of the cladding slabs 2 is conformed with anchor portions 12 adapted for snap engagement with the crimping tabs 4 of the support elements 1.

**[0048]** Referring to the embodiments of Figures 1, 2, 4, 5, 6 to 8, 12 and 13, each cladding slab 2 has at least one first groove 10 and one second groove 7, both extending parallel to the longitudinal direction X-X, a respective anchor portion being defined therebetween.

**[0049]** In the example as shown in Figures 1, 2, 4, 5, 6, 7, 8, 12, 13 and 14, each cladding slab 2 has four first grooves 10 and two second grooves 7'.

**[0050]** The two second grooves 7' are equidistant from the centerline and from a corresponding longitudinal

edge of the cladding slab 2, with reference to the width L of the slab, so that the axes of these grooves 7' are at 1/4 and 3/4 the width of the cladding slab 2.

**[0051]** The four first grooves 10 are equally spaced and staggered by 1/8 of the width L of the cladding slab 2 with respect to the second grooves 7'.

**[0052]** The first grooves 10 have a substantially rectangular cross section. Otherwise, the second grooves 7' define a first undercut 8 at least along a first side of the groove, extending in said longitudinal direction (X-X) and preferably have an equal and opposite undercut 8 at the opposite side of the groove.

**[0053]** In the example as shown in Figures 10 and 11, each cladding slab 2 has four first grooves 10 and two second grooves 7".

**[0054]** Each of the two second grooves 7" has a central extension projecting from the bottom of the groove in a direction perpendicular to the rear wall 2a of the cladding slab 2.

**[0055]** The two second grooves 7" are equidistant from the centerline and from a corresponding longitudinal edge of the cladding slab 2, with reference to the width L of the slab, so that the axes of the central extensions are at 1/4 and 3/4 the width of the cladding slab 2.

**[0056]** The four first grooves 10 are equally spaced and staggered by 1/8 of the width L of the cladding slab 2 with respect to the axes of the central extensions of the second grooves 7".

**[0057]** Each central extension 12 is conformed with two opposite undercuts 8.

**[0058]** In all the above embodiments, each undercut 8 is at a predetermined distance Q from the surface of the rear wall 2a of the cladding slab 2, and is connected to such rear wall 2a by a first portion 13 of the side of its respective groove, said first portion 13 converging towards the inside of the respective groove 7.

**[0059]** Preferably, said first portion 13 of the side converges towards the inside of the corresponding second groove 7', to define a solid angle A of 100° to 125°, preferably of 106° to 118°, with the planar surface of the rear wall 2a, as shown in the embodiments of Figures 1, 2, 4, 5, 6, 7, 8, 14 and 15. In the case of the embodiments as shown in Figures 10, 11, 12 and 14, the angle A may be conveniently increased to 145°, with a preferred value of 140°.

**[0060]** In view of the above, in the embodiments as shown in Figures 1, 2, 4, 5, 6, 7, 8, 12, 13 and 14 each second groove 7 has a mushroom head shape, in which the outermost portion of each groove 7', i.e. the portion closest to the planar surface of the rear wall 2a, defines a V-shaped lead-in surface between two opposite walls 13 converging towards the inside of the groove.

**[0061]** Otherwise, referring to the embodiment as shown in Figures 11 and 12, the central extension of the second grooves 7" defines a mushroom head-shaped anchor portion 12 which is adapted to be gripped between the opposite crimping tabs 4b.

**[0062]** Referring to the embodiment as shown in Fig-

ures 1 to 9 and to the embodiment as shown in Figure 10, each of the opposite converging walls 13 of the second grooves 7' forms a sliding ramp which assists the free ends of the opposite crimping tabs 4a, 4b to open apart by elastic deformation, to grip the anchor portion 12 of the cladding slabs 2, as described above.

**[0063]** Otherwise, referring to the embodiments as shown in Figure 12 or 13, each of the opposite walls 13 of the central extension forms a sliding ramp which assists the free ends of the opposite crimping tabs 4c, 4d to open apart by elastic deformation, to crimp said tabs in the second groove 7', as described above.

**[0064]** Considering the conformation of the cladding slabs 2, such slabs may be supported by the framework composed of the plurality of support elements 1 at least in one of the two following manners or a combination thereof:

- Columnar mounting I: the centerline of each cladding slab 2 is in line with the centerline of the section bar of a support element 1, so that each cladding slab 2 is supported by the opposite crimping tabs of one support element 1, as shown in Figures 6a and 6b, and
- Columnar mounting II: the centerline of the cladding slabs 2 is staggered with respect to the centerline of the section bars of the support elements 1 by half of the pitch P between two adjoining support elements 1, so that each cladding slab 2 is supported by the crimping tabs 4 that project out of the facing longitudinal edges of the two support elements 1 between which the cladding slab 2 is placed (as shown, for instance, in Figures 7a and 7b).

**[0065]** It will be noted that a combination of the two columnar mounting arrangements I and II will provide a cladding structure 3 for the wall W to be covered in which the cladding slabs 2 are arranged in a staggered pattern with respect to the longitudinal line along which the support elements 1 extend (as shown, for instance, in Figures 1, 8a and 8b).

**[0066]** Referring to the embodiments as shown in Figures 1 to 9, it should be noted that said arrangements of the cladding slabs 2 can be obtained without increasing the number of support elements 1. In other words, said staggered pattern of the cladding slabs 2 can be obtained without reducing the pitch between the support elements to half the width L of the cladding slabs.

**[0067]** Referring to the embodiments as shown in Figures 1 to 9, it should be noted that, for easier positioning and centering of the cladding slabs 2 with respect to the support elements 1, the front portion 1a of the section bar of each support element 1 has centering means 9 adapted to engage with corresponding centering means of the cladding slabs 2.

**[0068]** As the cladding slabs 2 are mounted to the framework composed of the support elements 1, the coupling between said centering means 9 and said corre-

sponding complementary centering means, creates a mechanical condition for proper insertion, with the cladding slabs 2 being centered with respect to the support elements 1.

**[0069]** According to a preferred embodiment, said centering means 9 include projections frontally overhanging from the front portion 1a of the section bars, whereas the role of corresponding complementary centering means is advantageously played by the first grooves 10 in the rear wall 2a of the cladding slab 2, as shown in the figures. Due to the above, any wrong positioning of a cladding slab 2 with respect to the support elements 1 is prevented as well as immediately apparent to the mounting personnel, thanks to the interference occurring between the centering means 9 of the section bars and the rear side 2a of the cladding slabs 2.

**[0070]** Advantageously, such projections 9 consist of an edge defined by two joined slanted surfaces, e.g. obtained by folding the front portion 1a of the section bars. The provision of the two slanted surfaces assists centered fitting of the projections 9 in the recesses of the grooves 10 and allows for guided fitting of the cladding slabs 2 between the crimping tabs.

**[0071]** According to a preferred embodiment, the support elements 1 include elastically deformable gasket means 11, which are located at the corner area of such projections 9, to be interposed between the centering means 9 and the corresponding complementary centering means. In practice, the coupling between the projections 9 and the recesses of the grooves 10 causes elastic compression of the gasket means 11, which ensures compensation for any clearance between the centering means 9 and the rear side of the cladding slabs 2.

**[0072]** In these embodiments, during mounting of a cladding slab 2 to a support element 1, as the free ends of the crimping tabs 4 reach their respective undercut 8, the anchor portion 12 of their respective cladding slab 2 is gripped between the free ends of the crimping tabs 4 and the corner 9 defined by the two joined slanted surfaces of the section bars, thereby ensuring firm attachment of the slab to the section bar.

**[0073]** As clearly shown in the above description, the support element of the invention, designed for cladding slabs to be used on a wall to be covered according to the invention fulfills the above mentioned need and also obviates prior art drawbacks as set out in the introduction to this disclosure. Thus, when the support elements 1 that form the framework of the cladding structure 3 have been attached to the wall W to be covered, the cladding slabs 2 may be mounted thereto in a simple, quick and accurate manner without using any other external tool, such as fastening and/or anchoring plates. Such mounting step is carried out by frontally pressing the cladding slabs 2 against the front portion 1a of the section bars of the support elements 1, until part of each cladding slab 2 is inserted and/or engaged between the crimping tabs 4, thereby providing attachment/support of the cladding slabs by the crimping tabs.

**[0074]** Here, it should be noted that the provision of the centering means 9 and the corresponding complementary centering means, i.e. the grooves 10, facilitates proper positioning and centering of the cladding slabs 2 with respect to the framework composed of the support elements 1, thereby preventing any inaccurate positioning of the cladding slabs 2.

**[0075]** Another advantage of the support element and the cladding structure of the invention lies in their simple construction, which allows minimization of the required components and avoids the use of elements such as fastening and/or anchoring plates to be attached during mounting. Indeed, the support elements of the invention can be preventively formed at the factory with the crimping tabs and the crosswise stop means, so that such support elements need simply be attached to the wall to be covered on site, after cutting them to size when needed.

**[0076]** Further advantages of the support element and the cladding structure of the present invention consist in the possibility of:

- removing the individual cladding slabs for replacement or inspection,
- minimizing the required uprights,
- avoiding the provision of horizontal crosspieces in the cladding structure,
- arranging the cladding slabs in columnar or staggered patterns,
- allowing attachment of small cladding slabs, such as tiles or bricks,
- using aluminum or stainless steel to form the support elements,
- fabricating the support elements by profiling or extrusion and later processing them by cutting, trimming or folding.

**[0077]** Finally, it should be noted that, in a framework in which the support elements have an upright orientation, the lack of elements such as fastening and/or anchoring plates prevents undesired stagnation of rain water, which is known to impregnate the cladding slabs and cause the formation of unpleasant stains on the surface or ruptures of the cladding slabs in the presence of ice.

**[0078]** Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the support element of the invention and the cladding structure for a wall to be covered according to the invention as described hereinbefore to meet specific needs, without departure from the scope of the invention, as defined in the following claims.

**[0079]** Thus, for example, if the cladding slabs 2 are not of uniform height, there shall be provided support elements 1 having suitable crimping means and crosswise stop means of appropriate height.

**[0080]** If a wall has to be also covered at its corners, appropriately shaped cladding slabs can be provided. The figure 15 shows an "L"-shaped cladding slab, which is adapted to be attached to a wall by engagement with

support structures 1 as described above.

## Claims

1. A support element for cladding slabs to be used on a wall to be covered, comprising a section bar extending in a predetermined longitudinal direction (X-X), said section bar having a rear portion designed to be attached to a wall (W) to be covered and a front portion (1a) facing towards the cladding slabs (2) to be supported, **characterized in that** the front portion (1a) of said section bar has a plurality of opposite crimping tabs (4) which are adapted to cooperatively engage corresponding portions of said cladding slabs (2) to ensure support of said cladding slabs (2) with respect to the wall (W) to be covered.
2. A support element according to claim 1, wherein said opposite crimping tabs (4a, 4b) are in substantially facing relationship, so that a channel extending along said longitudinal direction (X-X) is defined at the front portion (1a) of said section bar, to receive at least part of a portion of said cladding slabs (2).
3. A support element according to claim 2, wherein said crimping tabs (4a, 4b) are in such positions as to project out of the longitudinal edge (X-X) of the section bar towards the centerline of the section bar.
4. A support element according to claim 3, wherein said crimping tabs (4a, 4b) are in such positions as to define a substantially C-shaped channel at the front portion (1) of the section bar.
5. A support element according to claim 1, wherein said opposite crimping tabs (4c, 4d) are in a substantially facing and spaced relationship.
6. A support element according to claim 5, wherein said opposite crimping tabs (4c, 4d) are in such positions as to project out of the longitudinal edge (X-X) of the section bar away from the centerline of the section bar.
7. A support element according to any one of claims 1 to 6, wherein said crimping tabs (4) are in a spaced relationship, along said longitudinal direction (X-X), thereby defining a gap I.
8. A support element according to claim 7, wherein said crimping tabs (4) are in such positions as to define two opposed rows of crimping tabs (4), in a spaced relationship along the opposite longitudinal edges of said section bar.
9. A support element according to any one of claims 1 to 8, comprising transverse stop means (5) at the

front portion (1a) of the section bar to prevent the cladding slabs (2) supported by the section bar from slipping down along said longitudinal direction (X-X).

10. A support element according to claim 9, wherein said transverse stop means (5) are formed of one piece with said section bar. 5
11. A support element according to claim 7 or 8 and to claim 9, wherein said transverse stop means (5) are located at the gaps defined between said crimping tabs (4). 10
12. A support element according to claims 8 and 11, wherein the crimping tabs (4) of each of said two opposite rows of crimping tabs (4) have one of said crosswise stop means (5) interleaved therebetween. 15
13. A support element according to any one of claims 1 to 12, wherein said crimping tabs (4) are formed of one piece with the section bar. 20
14. A support element according to any one of claims 1 to 13, wherein said crimping tabs (4) act as retaining clips. 25
15. A cladding slab for covering a wall, comprising a front wall and an opposite rear wall (2a) designed to face towards a wall to be covered (W), **characterized in that** said rear wall (2a) is conformed with anchor portions (12) adapted for snap engagement with the crimping tabs (4) of a support element according to any one of claims 1 to 14. 30
16. A cladding slab according to claim 15, wherein said anchor portions (12) have at least one first groove (10) and one second groove (7'), extending parallel to each other along a predetermined longitudinal direction (X-X), an anchor portion being defined between said first groove (10) and said second groove (7'). 35 40
17. A cladding slab according to claim 16, wherein said second groove (7') defines a first undercut (8) at least along a first side thereof, extending in said longitudinal direction (X-X). 45
18. A cladding slab according to claim 17, wherein said second groove (7') defines a second opposite undercut (8) at a second side, opposite to said first side. 50
19. A cladding slab according to claim 17 or 18, wherein said undercut (8) is connected to said rear wall (2a) by a first portion (13) of the side of the second groove (7'), said first portion (13) converging towards the inside of said second groove (7'). 55
20. A cladding slab according to claim 19, wherein said

first portion (13) of said side of the second groove (7') converges towards the inside of said second groove (7'), to define an angle (A) of 100° to 125°, with said rear wall (2a) of the cladding slab (2).

21. A cladding slab according to claim 20, wherein said angle (A) is of 106 to 118°.
22. A cladding slab according to claim 18 and any one of claims 19 to 21, wherein said second groove (7') has a mushroom head shape.
23. A cladding slab according to any one of claims 16 to 22, comprising at least two second grooves (7') equidistant from the centerline and from a corresponding longitudinal edge of the cladding slab (2), with reference to the width (L) of the slab.
24. A cladding slab according to claim 15, wherein said anchor portions (12) have at least one first groove (10) and one second groove (7''), extending parallel to each other along a predetermined longitudinal direction (X-X), said second groove (7'') having a central extension (12) projecting from the bottom of said groove (7'') in a direction perpendicular to the rear wall (2a) of the cladding slab (2).
25. A cladding slab according to claim 24, wherein said central extension defines two opposite undercuts (8) at the free end.
26. A cladding slab according to claim 25, wherein the free end of said central extension has a mushroom head shape.
27. A cladding slab according to claim 24, 25 or 26, wherein said central extension defines two opposite portions (13) diverging towards the bottom of the groove (7'').
28. A cladding slab according to claim 27, wherein said portions (13) diverge at an angle of 20° to 70°.
29. A cladding slab according to any one of claims 24 to 28, comprising at least two second grooves (7'') equidistant from the centerline and from a corresponding longitudinal edge of the cladding slab (2), with reference to the width (L) of the slab.
30. A cladding slab according to claim 16 or 24, wherein said first groove (10) has a substantially rectangular cross section.
31. A cladding slab according to any one of claims 16 to 30, wherein said at least one first groove (10) are four equidistant grooves (10) which are staggered by 1/8 of the width (L) of the cladding slab (2) with respect to the second grooves (7', 7'').

32. A cladding structure for a wall (W) to be covered, comprising a framework to be attached to the wall (W) to be covered and a plurality of cladding slabs (2) supported by said framework, **characterized in that** said framework comprises at least two support elements (1) according to any one of claims 1 to 14, which are disposed in parallel positions. 5
33. A cladding structure according to claim 32, wherein said cladding slabs are according to any one of claims 15 to 31. 10
34. A cladding structure according to claim 32 to 33, wherein said cladding slabs (2) have a constant width (L) and said support elements (1) extend along a vertical direction at a distance equal to the width (L) of said cladding slabs (2). 15
35. A cladding structure according to claim 32 or 33, wherein the crimping tabs (4) allow snap engagement of complementary section bars to said anchor portions (12) of said cladding slabs (2). 20
36. A cladding structure according to claim 16, wherein said first grooves (10) and said second grooves (7) extend parallel to said longitudinal direction (X-X) of said section bars. 25
37. A cladding structure according to any one of claims 32 to 36, wherein the front portion (1a) of the section bars of said support elements (1) has centering means (9) which engage corresponding complementary centering means (10) in the rear side (2a) of said cladding slabs (2) to create a mechanical condition for proper insertion, which ensures centering of the cladding slabs (2) with respect to the underlying section bars of the support elements (1). 30 35
38. A cladding structure according to claim 37, wherein said centering means (9) include projections and said corresponding complementary centering means (10) are said first grooves. 40
39. A cladding structure according to claim 38, wherein said projections (9) consist of two joined slanted surfaces. 45
40. A cladding structure according to claim 38 or 39, said support elements (1) include gasket means (11), which are located at said centering means (9), to be interposed between said centering means and said corresponding complementary centering means (10) of the cladding slabs (2). 50
41. A cladding structure according to any one of claims 32 to 40, wherein said transverse stop means (5) fit in the crosswise joints (6) which are defined between adjoining cladding slabs (2) along said longitudinal direction (X-X). 55
42. A cladding structure according to any one of claims 33 to 41, wherein said crimping tabs (4a) and said centering means (9) allow snap engagement with one of said anchor portions (12) of said cladding slabs (2).
43. A cladding structure according to any one of claims 32 to 42, wherein the opposite crimping tabs (4) are at such a distance from each other as to create interference with said cladding slabs (2) whereby, by press fitting the cladding slabs (2) between the opposite crimping tabs (4a, 4b), an elastic deformation of the crimping tabs (4a, 4b) is generated, which moves the free ends of the crimping tabs (4a, 4b) away from the centerline of the section bar.
44. A cladding structure according to any one of claims 32 to 42, wherein the opposite crimping tabs (4c, 4d) are at such a distance from each other as to create interference with said cladding slabs (2) whereby, by press fitting said crimping tabs (4c, 4d) in said first grooves (7') of the cladding slabs (2), an elastic deformation of the crimping tabs (4c, 4d) is generated, which moves the crimping tabs (4c, 4d) closer to each other.

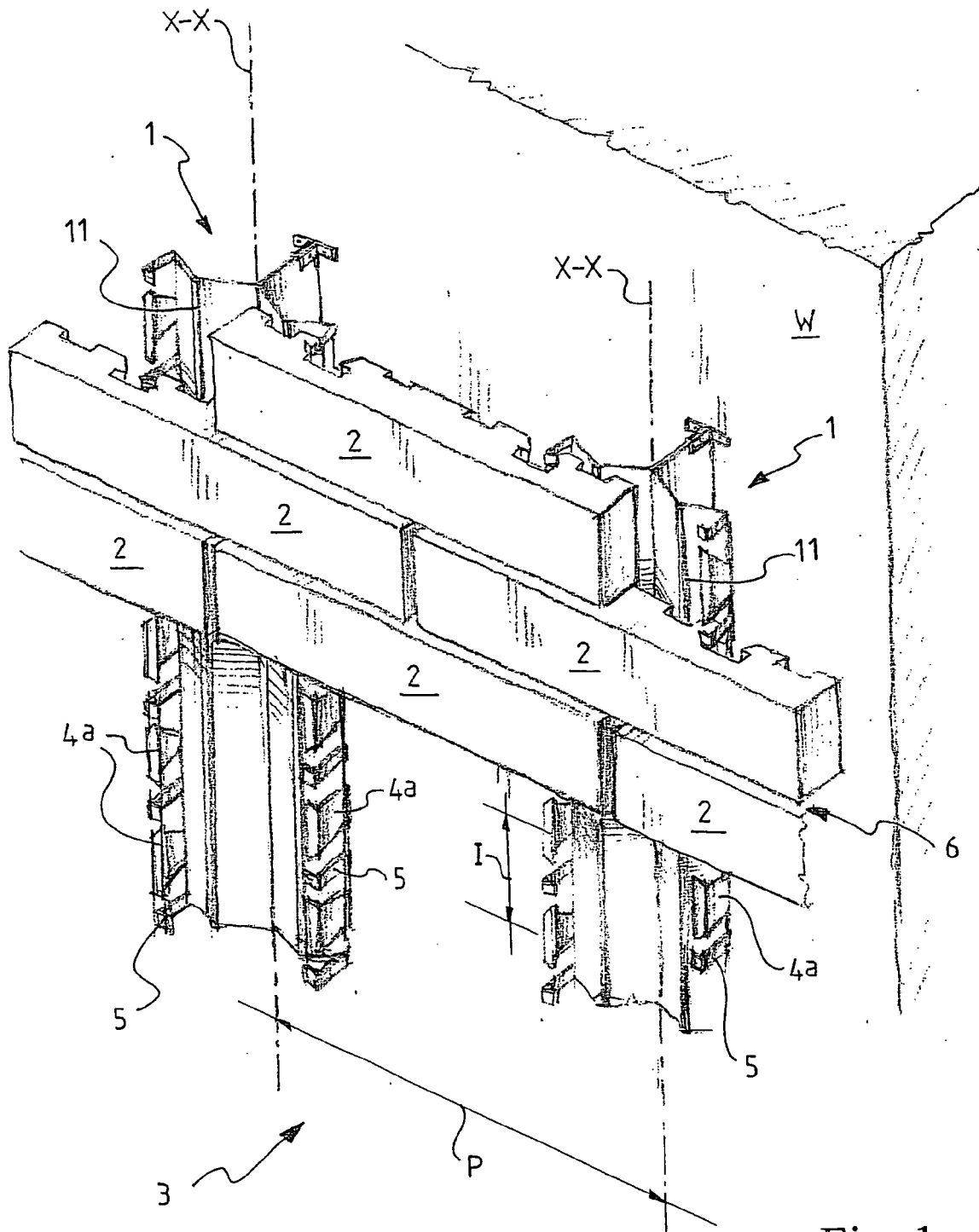


Fig. 1

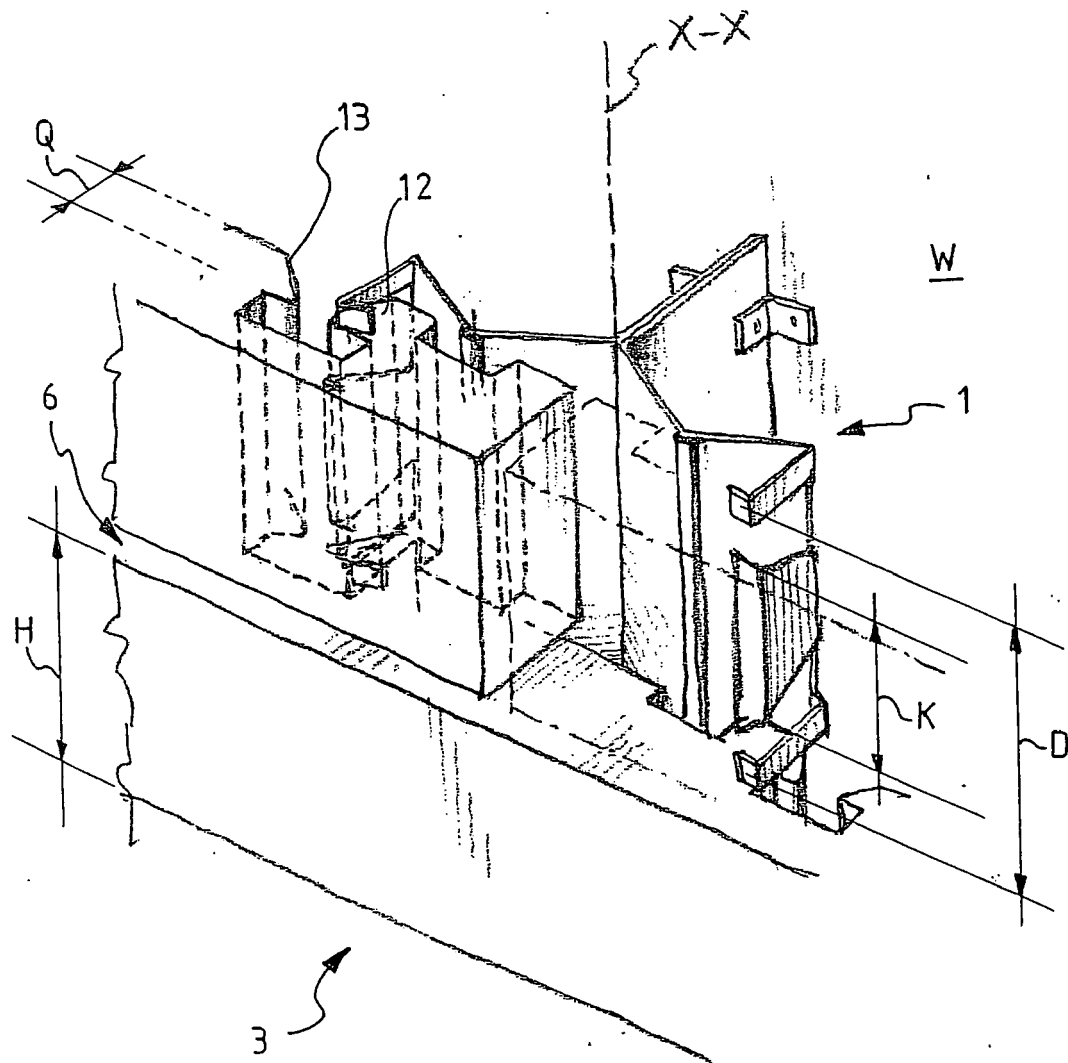


Fig. 2

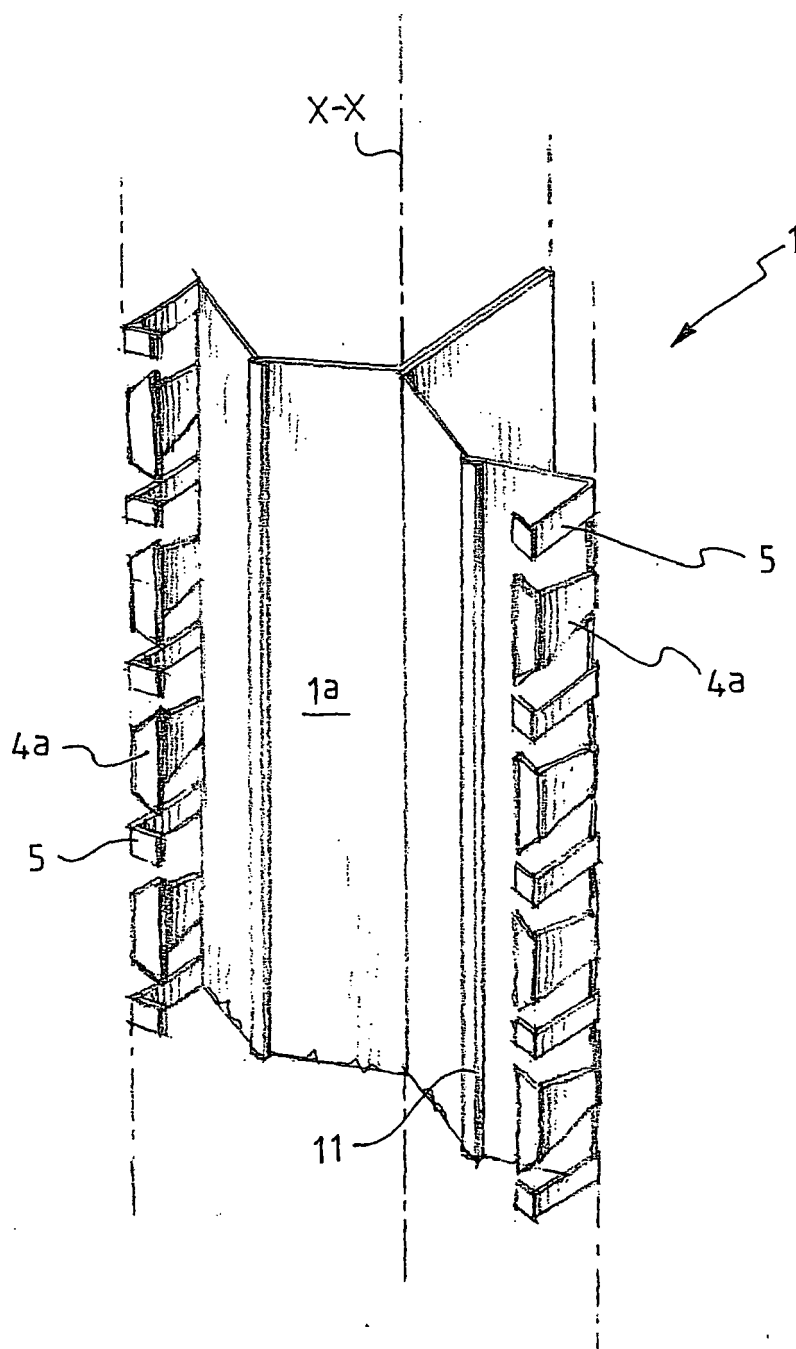
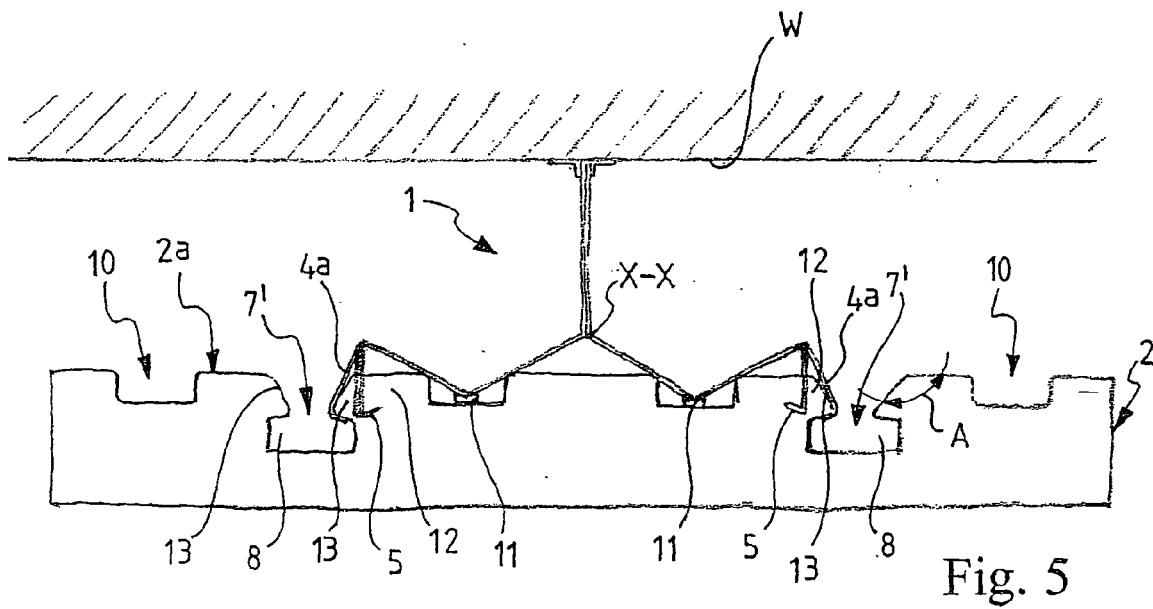
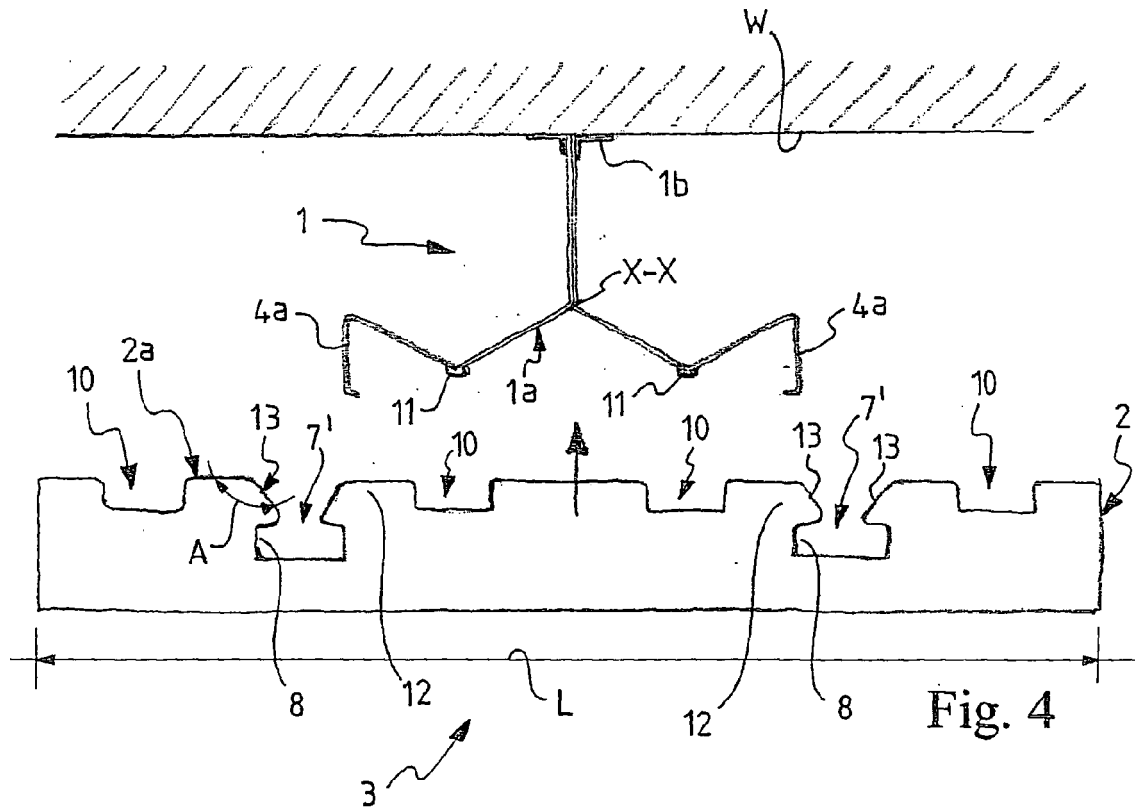


Fig. 3



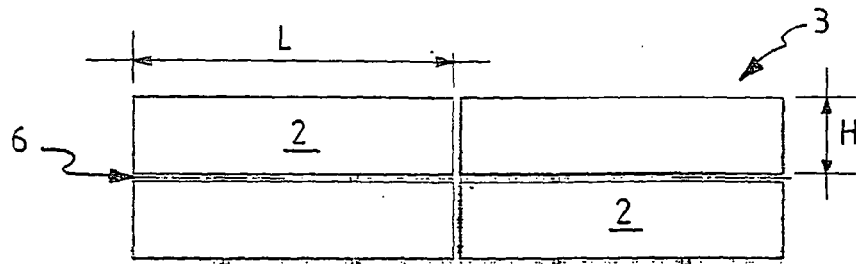


Fig. 6a

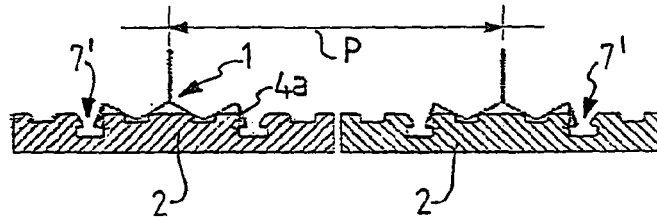


Fig. 6b

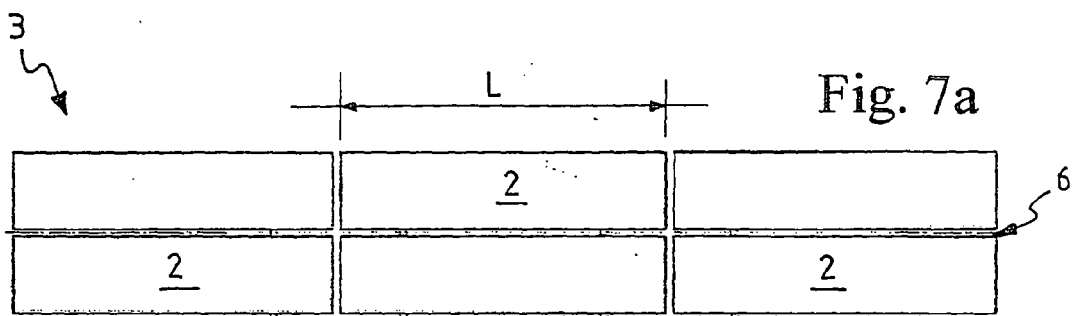


Fig. 7a

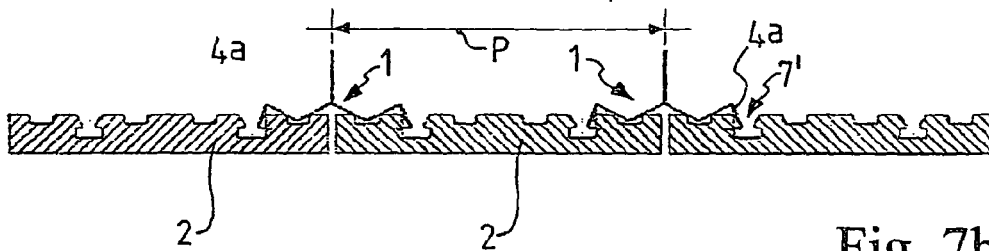


Fig. 7b

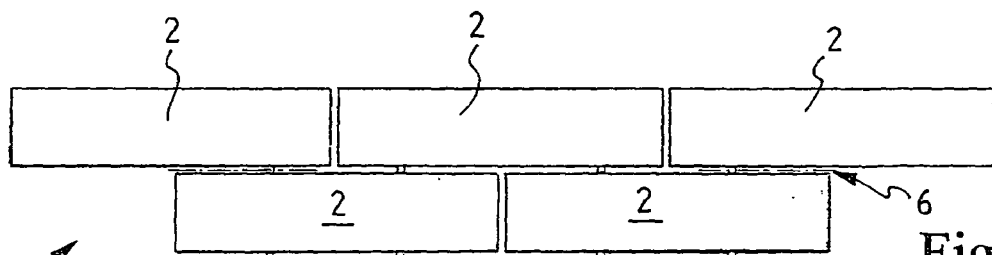


Fig. 8a

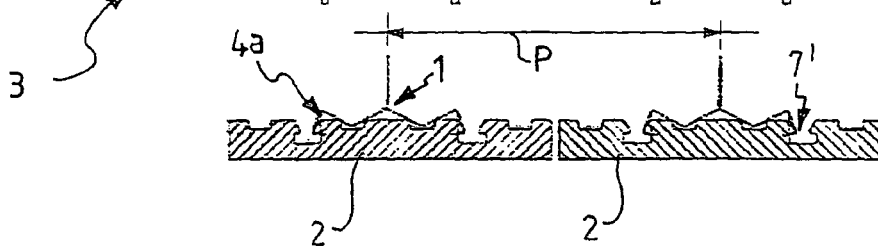


Fig. 8b

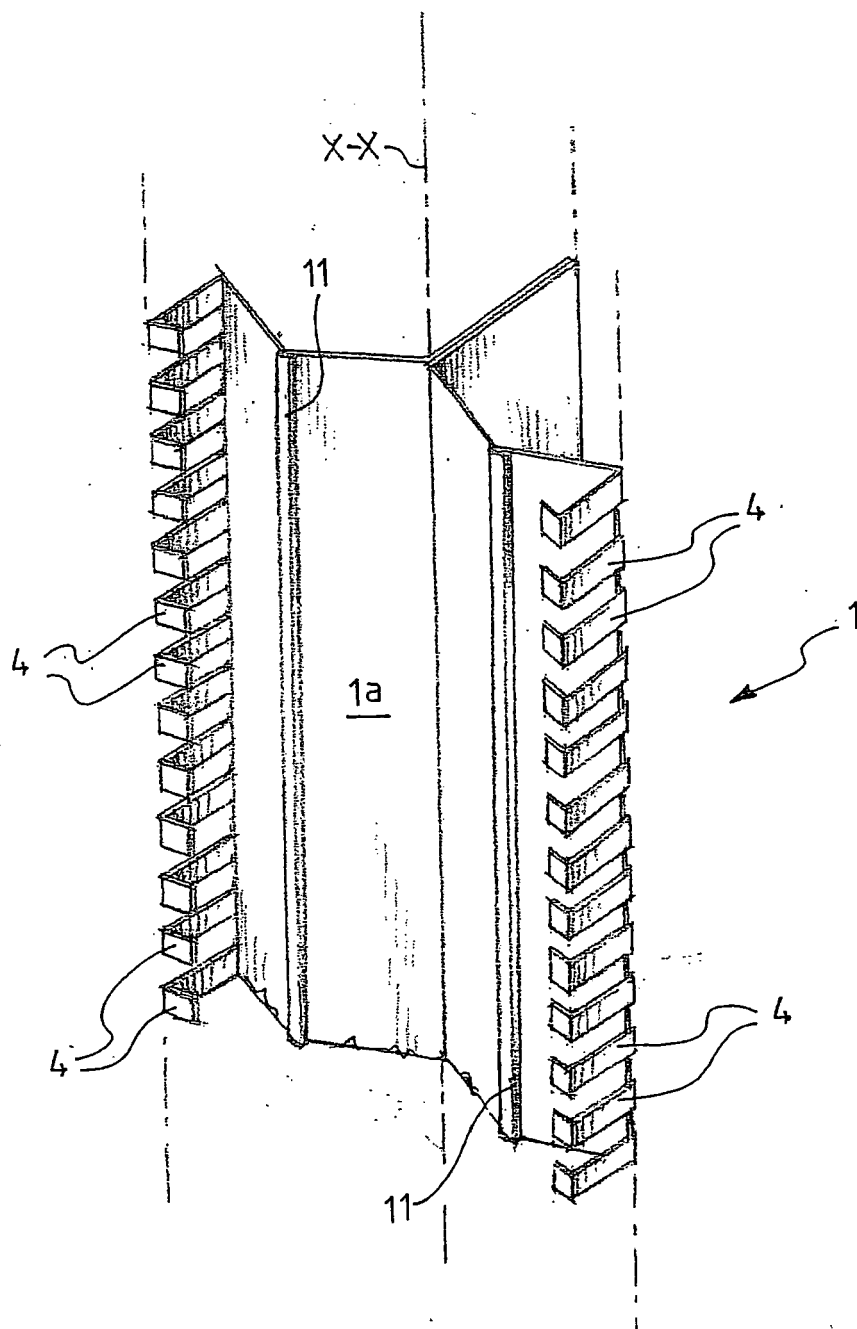
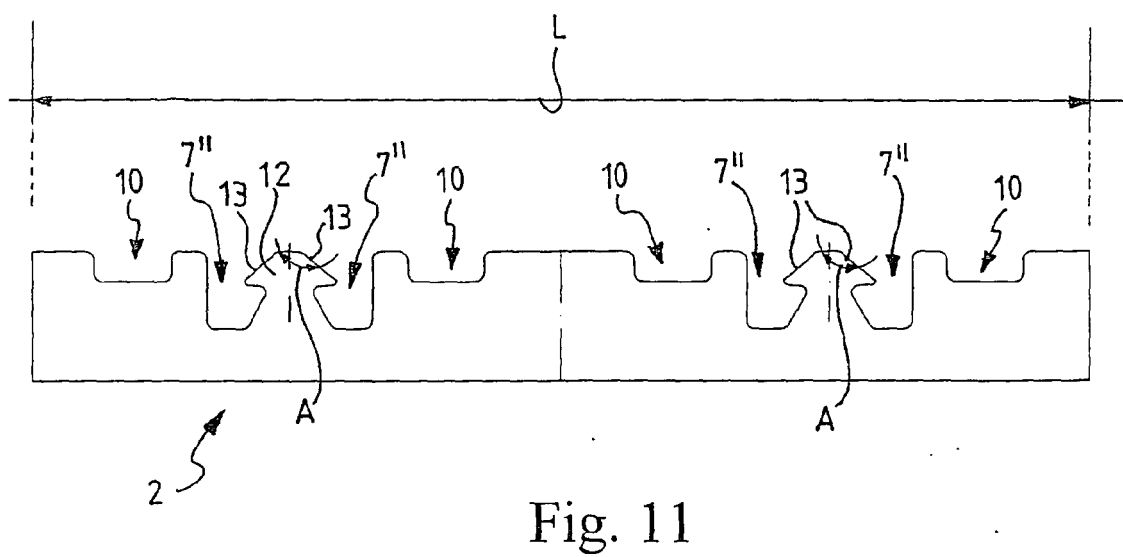
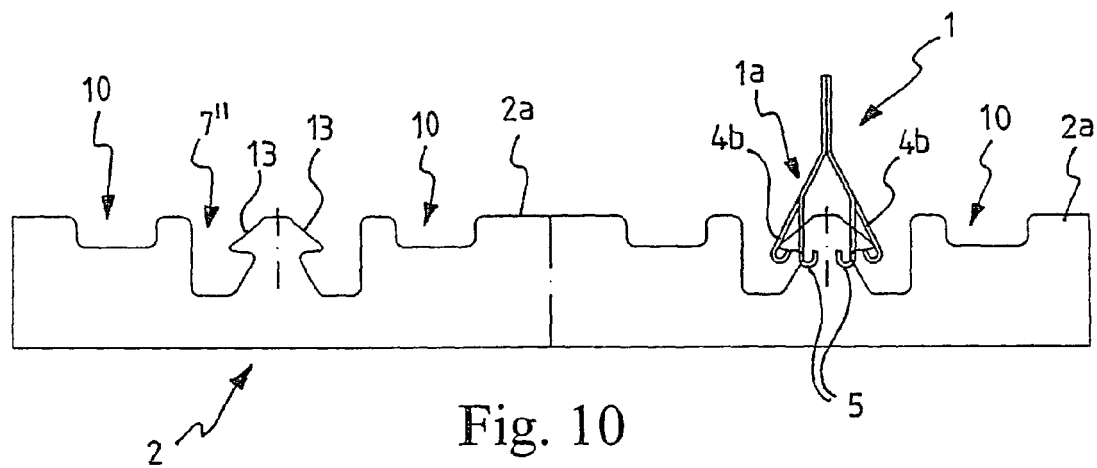


Fig. 9



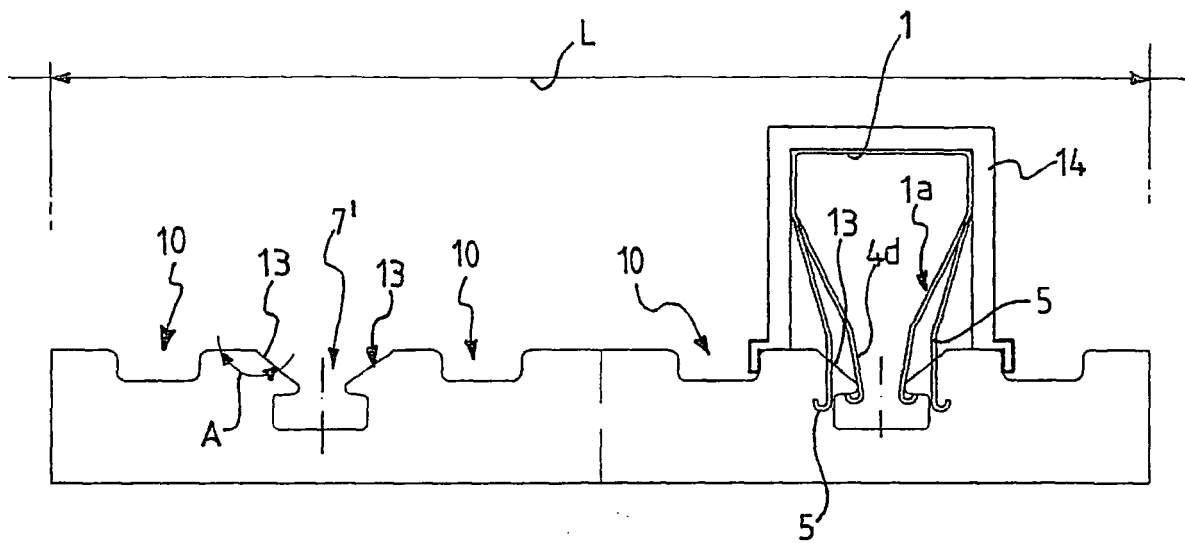


Fig. 12

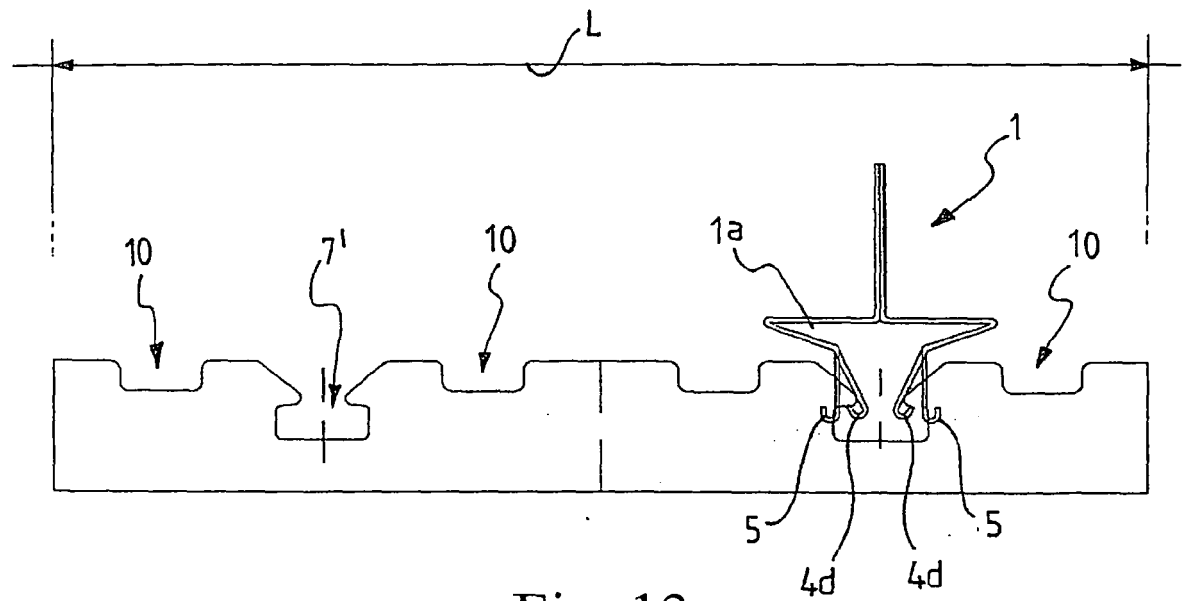
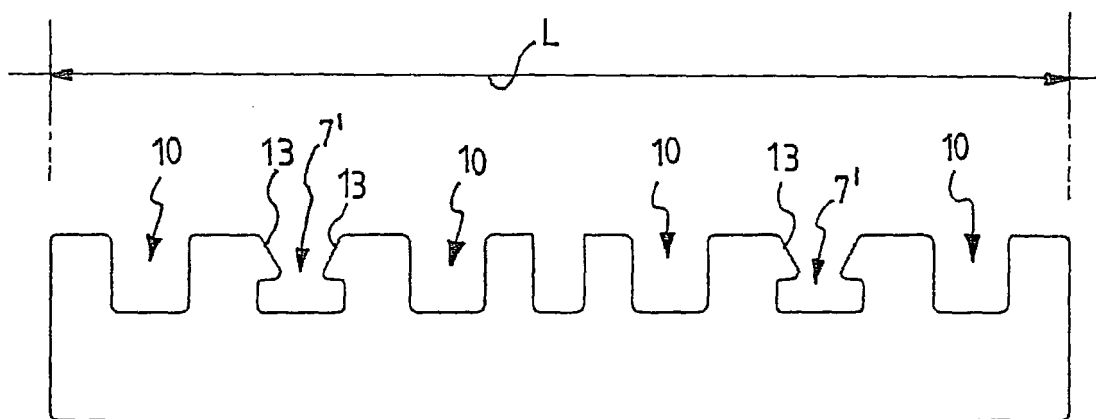


Fig. 13



2 ↗

Fig. 14

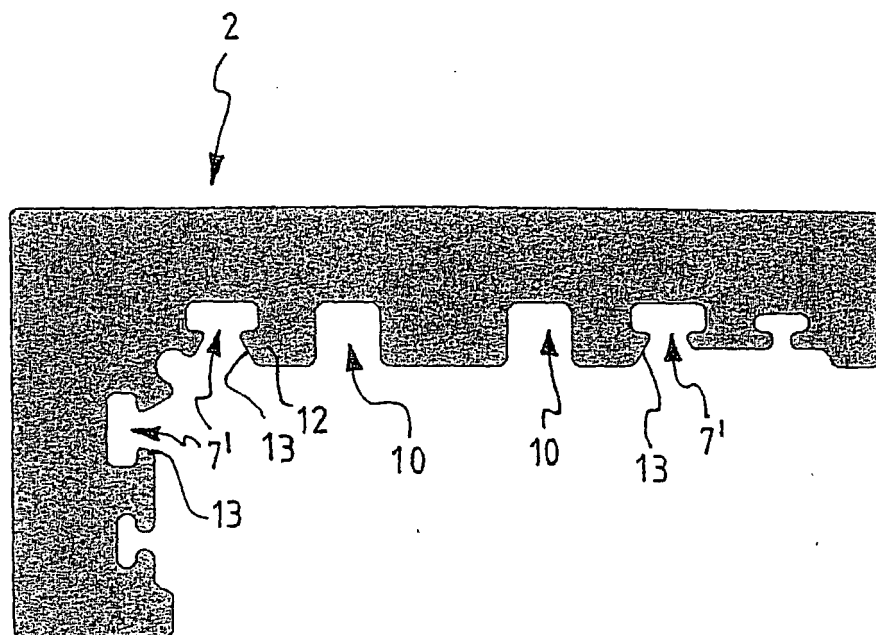


Fig. 15