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(54) **A support system for mounting a panel grid in ceiling or wall support structure**

(57) The present invention concerns a support system for mounting a suspending a panel grid in ceiling or wall support structure, said system comprising a plurality of panel retaining profiles each having an inverted T-shaped cross-section with a pair of laterally extending support flanges for supporting and retaining wall or ceiling panels, and an upwardly directed leg having a bulb portion at its distal end; and a plurality of clips with mounting means for fixing the clips to a support structure and receiving means for receiving and retaining the bulb portion of the leg of a panel retaining profile, wherein each

clip is provided with a base portion which is provided with the mounting means and two substantially parallel flanges on each side of said base portion, said flanges having inwardly protrusions pointing towards each other for receiving the bulb portion of a T-shaped profile. Such mounting system is found advantageous since the holding force is more accurately predictable and that demounting of the T-profile from the clips is still possible but in a predictable manner as canting or otherwise twisting the profile in the clip during demounting is eliminated.

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Description

[0001] The present invention relates to a support system for mounting a panel grid in ceiling or wall support structure, said system comprising a plurality of panel retaining profiles each having an inverted T-shaped cross-section with a web portion having a bulb portion at its distal end, and a pair of panel support flanges for supporting and retaining wall or ceiling panels; and a plurality of clips with mounting means for fixing the clips to a support structure and receiving means for receiving and retaining the bulb portion of the leg of a panel retaining profile.

[0002] A support system of such kind is known from US 6,892,500 B2, which relates to a suspended ceiling support structure, where a number of clips are mounted on the ceiling and T-shaped runners that are carrying the ceiling panels are mounted in the clips. The T-shaped runners are provided with a triangular pointy bulb portion which facilitates the penetration into the clip. The clip is provided with two distal flanges that are biased towards each other, but opened by the pointy triangular bulb of the T-shaped runner, which is subsequently retained inside the clip due to the spring force of the distal flanges of the clip.

[0003] If one or more panels of a ceiling suspended by this structure disclosed in US 6,892,500 are to be dismantled, there is a risk that the T-shaped profiles are being deformed when pulling out the bulb of the T-shaped profile from the clip. This deformation is also likely to occur if the profiles are canted in order to separate them from the clips. Although it is desirable to be able to reorganise or change the panels in the ceiling and therefore demount at least a portion of the ceiling, a sufficient holding force must be produced by the mounting structure so that the weight of the ceiling panels does not pull out the T-shaped profiles from the clips.

[0004] However, without compromising the holding force it is desirable to provide a support system which is easier demountable. Accordingly, this is an object of the present invention.

[0005] The present invention concerns a support system of the initially mentioned kind, wherein each clip is provided with a base portion which is provided with the mounting means and two substantially parallel flanges on each side of said base portion, said flanges having inwardly protrusions pointing towards each other for receiving the bulb portion of a T-shaped profile.

[0006] A mounting system according to the present invention is found advantageous since the holding force is more accurately predictable and that demounting of the T-profile from the clips is still possible but in a predictable manner as canting or otherwise twisting the profile in the clip during demounting is eliminated.

[0007] In a preferred embodiment, the bulb portion is rectangular. This allows for an accurate fit of the T-profile in the clip.

[0008] Moreover, preferably the protrusions are pro-

vided on the flanges at a predetermined first distance from the base portion, and that the bulb in the upwardly direction extends at a second distance which is equal to or smaller than said predetermined first distance. Hereby, the position of the T-shaped profile is very accurate when the profile is mounted in the clips, which in turn allows for a more accurate panel mounting.

[0009] Preferably, the protrusions are provided on a sub-flange on each of the two parallel flanges, said sub-flanges being integrally formed in the parallel flanges with their distal ends towards the base portion of the clip. Hereby, a predetermined spring force in the clip is achieved and thereby a better retention force for retaining the T-profile in the clip.

[0010] In an embodiment, the flanges may be provided with outwardly bent distal collar flange portions. Hereby, the receipt of the profiles may be facilitated during mounting, which may be advantageous in particular when the profile is to be mounted into several clips at once.

[0011] In a preferred embodiment, the clip protrusion comprises a first portion and a second portion, where the second portion is the closest to the base portion of the clip. In particular, said first portion may preferably have a receiving slope having an angle of less than 45°, preferably less than 30°, relative to the receiving flanges and the second portion having an oppositely sloping surface which is at least 30°, preferably at least 45° relative to the receiving flanges. This facilitates the receipt of the bulb portion during insertion into the clip during mounting and the second portion retains the bulb portion in the clip and prevents the profile from spontaneously demounting, e.g. when carrying the weight of the suspended ceiling.

[0012] A second aspect of the invention concerns a tool for demounting a T-shaped profile from a clip in a system, wherein said tool is a scissor-type demounting tool. Preferably, this tool comprises gripping members adapted to abut the panel-facing surface of the support flanges of the T-shaped profile for pulling the profile away from the clip. Hereby, the T-shaped profile can be easily gripped by the tool as the flat gripping members can be inserted between the support flanges and the ceiling or wall panels to establish a firm grip on the profile so that the profile can be pulled out of the clip.

[0013] In the following the invention is described in more detail by way of example and with reference to the accompanying drawings, in which:

fig. 1 is a perspective view of a clip mounted on a T-shaped profile according to the preferred embodiment of the invention;

fig. 2 is a schematic cross-section view of the mounting system;

fig. 3 is a schematic cross-sectional front view of the clip and the profile in a mounting system according to the invention;

fig. 4 is a perspective view of a clip of a mounting system according to a preferred embodiment of the invention; and

fig. 5 is a schematic cross-sectional view of a profile-clip assembly with a demounting tool gripped around the profile,

fig. 6 is a schematic cross-sectional view of a profile-clip assembly according to a second embodiment of the invention, and

fig. 7 is a top view of the assembly of fig. 6.

[0014] With reference to figures 1 to 4, detailed views are shown of a preferred embodiment of a support system for mounting a suspending a panel grid in ceiling or wall support structure according to the invention. A number of clips 2 are mounted by screws (not shown) or the like on a building element 3 such as a wall or ceiling. The clips 2 are mounted in rows in a grid structure (not shown) so that each row of clips is adapted to receive a panel retaining profile 1. This profile 1 is provided with an inverted T-shaped cross-section with a pair of laterally extending panel support flanges 11 for supporting and retaining wall or ceiling panels 4 (see fig. 2), and a web portion 12 having a bulb portion 10 at its distal end which is orthogonal to the panel support flanges 11.

[0015] When the clips 2 are fixed in the grid on the wall or ceiling structure 3, the panels 4 are positioned and then the T-shaped profile 1 is inserted between two panels 4 and into the receiving slot of the clip 2.

[0016] As shown in the figures, the clip 2 has a base portion 21, which is provided with mounting means in the form of two mounting holes 21a at each end of the base portion 21 for mounting the clip 2 to a support structure 3, such as an existing wall or a ceiling. The clip 2 is also provided with two substantially parallel flanges 22 on each side of said base portion 21. On these side flanges 22, receiving means are provided for receiving and retaining the bulb portion of the leg of a panel retaining profile 1 in the clip 2. These receiving means comprise inwardly protrusions 23 on each of the side flanges 22 pointing towards each other for receiving the bulb portion 10 of a T-shaped profile 1. Each clip protrusion 23 preferably comprises a first portion and a second portion, where the second portion is the closest to the base portion of the clip. The first portion has a receiving slope having an angle of less than 45°, preferably less than 30°, relative to the receiving flanges and the second portion having an oppositely sloping surface which is at least 30°, preferably at least 45° relative to the receiving flanges. The protrusions 23 are provided on a spring flange 22a cut out as shown especially in figures 1 and 4, to allow a spring force be exerted on the protrusions 23 when the profile 1 is inserted in the clip 2. These spring flanges 22a may give way to allow the bulb portion 10 of the profile 1 to penetrate into the clip and then to provide retention forces once the profile 1 is in place. The design of the clip 2 is also found advantageous in that the clip is made from a single sheet of metal which is cut and bent into the desired shape. This makes the clip 2 easy and inexpensive to manufacture.

[0017] The T-shaped profile 1 has a substantially rec-

tangular bulb portion 10 at its distal end. This bulb portion 10 preferably has a width corresponding to the inner distance between the two parallel side flanges 22 of the clip 2. The bulb portion 10 preferably also has a length, which is equal to or less than the distance between the protrusions 23 and the base portion 21 of the clip 2.

[0018] With reference to figure 5, a demounting tool 5 may be provided in a second aspect of the invention. The tool 5 is a scissor-type demounting tool, which comprises gripping members 51 adapted to abut the panel-facing surface of the support flanges 11 of the T-shaped profile 1 for pulling the profile 1 away from the clip 2 if the profile 1 is to be demounted from the clips 2. By using a scissor type tool 5 these gripping members 51 can easily be inserted in between the panel and the support flange 11 of the T-shaped profile 1. The profile 1 can then easily be gripped by the tool 5 as the flat gripping members 51 then has a firm connection with the profile 1 so that the profile 1 can be pulled out of the clip.

[0019] With reference to figures 6 and 7, an embodiment of a mounting system is shown. This embodiment is adapted for the so-called T24 profiles. T24 profiles have a 24mm wide front capping (visible side) for covering (and holding) the edges of the wall panels 4 underneath and with an approx. 6.5mm wide bulb 10 on the back side - the bulb 10 is clicked / pressed / pushed into the clips 2 (also referenced to as T fixing bracket for this embodiment). It was found that the connection of T24 profiles 1 to the clips 2 (or T fixing bracket) is strong and safe enough against accidental T24 removal with hands or fingers with damaging T24 front capping, when T24 profiles 1 are mounted on the wall in the T fixing brackets' channels between two wall panels 4, so the linear connections (gap) between two wall panels 4 are completely covered by T24 profiles' front capping (visible side). Furthermore, it is found that the connection is easily demountable afterwards with a removal tool 5 of special design shape without damaging T24 profile's front capping, so the T24 profile can be reused.

[0020] The T24 profile's bulb 10 is driven between two open ends 22b (wide wings) of special shape, driving the bulb 10 into the two narrow ends (narrow wings), open in a suitable angle, such as approx. 30° angle. An angle of approx. 30° ensures that T24 profile's bulb 10 can easily enter into the narrow wings 22. On the opposite side the narrow wings 22, the protrusions 23 are angled at 45°, so they keep the bulb 10 of the T24 profile 1 inside the T fixing bracket 2 in a firm and safe enough way. The narrow wings 22a integrated in the wide wings 23 are designed to achieve enough flexibility, which in connection with steel type and thickness thereof makes narrow wings 22a, 23 (45° angle on one side and 30° angled on second side) flexible enough and strong enough. The wide wings 22 of T fixing brackets are stiff enough to keep the T24 profiles positioned properly on the wall 3 - perpendicular to the wall surface - when T24 profiles 1 are fixed in the T fixing brackets 2. The surface of bigger wings can also deliver some bottom support for the 40mm

thick wall panels in common with supporting brackets accompanying. The load of each wall panel 4 is delivered individually to the wall mainly by angle supporting brackets, whilst T fixing brackets can transfer some load as well to support the supporting brackets.

[0021] T fixing brackets mounted properly on the wall around every single panel - min. 2 pieces of T fixing brackets under each panel and min. 1 piece of T fixing bracket on the left and right side of each panel - are also responsible for proper positioning of the wall panels on the wall.

[0022] The T fixing bracket 2 in fig. 6 and 7 is provided with a base portion having mounting flanges 21b arranged to one side of the T fixing bracket, and the mounting flanges 21b have mounting holes 21a arranged therein for mounting the T fixing bracket to a support structure 3. The shape of the holes 21a, preferably long holes, used in the T fixing brackets 1 gives a possibility to adjust the T fixing bracket's position on the wall 3 - left and right or up and down (depending on if it is side fixing brackets for vertical T24 profiles or bottom fixing brackets for horizontal T24 profiles on the wall) - even when the T24 profile is positioned in the T fixing bracket, but before the wall panels are installed between them - the holes 21a are "outside" the 24mm front capping surface, so the screws can be untwisted and twisted easily to ensure proper position of all the T fixing brackets 2 and T24 profiles 1 before the wall panels 4 are mounted.

[0023] In the event that it is preferred that the profiles 1 should be secured against removal from the clips 2, a very simple way of obtaining this is to provide a pin through the clip 2 and profile 1. Generally, T profiles 1 are provided with holes arranged in the web portion 12 thereof, and these holes can be used for this purpose. Alternatively, a screw or nail can be driven through the profile 1 and clip 2 to secure that the profiles 1 cannot be removed from the clips 2. This may also be an extra security measure when the clips 2 and profiles 1 are used for mounting on a ceiling, to avoid the potential risk that profiles 1 and panels 4 fall down.

[0024] Above the invention is described with reference to a preferred embodiment. In the description of the invention terms like upward, lateral, horizontal or the like should be understood as relative terms as it is realised that the invention may be used in relation panel mountings of different orientations, i.e. both horizontal or inclined ceiling mountings and vertical wall panel mountings. Thus the terms refer to the flanges and portions orientation relative to the surface of the building element 3, for instance "vertical" or the like refers to an essentially orthogonal orientation and "lateral" or the like refers to an orientation generally parallel to the surface of the building element 3.

Claims

1. A support system for mounting a panel grid in ceiling or wall support structure, said system comprising:

- a plurality of panel retaining profiles each having an inverted T-shaped cross-section with

- a web portion having a bulb portion at its distal end, and
- a pair of panel support flanges for supporting and retaining wall or ceiling panels; and

- a plurality of clips with mounting means for fixing the clips to a support structure and receiving means for receiving and retaining the bulb portion of the leg of a panel retaining profile,

characterised in that

each clip is provided with a base portion which is provided with the mounting means and two substantially parallel flanges on each side of said base portion, said flanges having inwardly protrusions pointing towards each other for receiving the bulb portion of a T-shaped profile.

2. A system according to claim 1, wherein the bulb portion is rectangular.
3. A system according to claim 1 or 2, wherein the protrusions are provided on the flanges at a predetermined first distance from the base portion, and that the bulb in the upwardly direction extends at a second distance, which is equal to or smaller than said predetermined first distance.
4. A system according to any of the preceding claims, wherein the protrusions are provided on a sub-flange on each of the two parallel flanges, said sub-flanges being integrally formed in the parallel flanges with their distal ends towards the base portion of the clip.
5. A system according to any of the preceding claims, wherein the flanges are provided with outwardly bent distal collar flange portions.
6. A system according to any of the preceding claims, wherein each of the clip protrusions comprises a first portion and a second portion, where the second portion is the closest to the base portion of the clip.
7. A system according to claim 6, wherein said first portion has a receiving slope having an angle of less than 45°, preferably less than 30°, relative to the receiving flanges and the second portion having an oppositely sloping surface which is at least 30°, preferably at least 45° relative to the receiving flanges.
8. A tool for demounting a T-shaped profile from a clip in a system according to any of the preceding claims, said tool being a scissor-type demounting tool.
9. A tool according to claim 8, wherein the tool com-

prises gripping members adapted to abut the panel-facing surface of the support flanges of the T-shaped profile for pulling the profile away from the clip.

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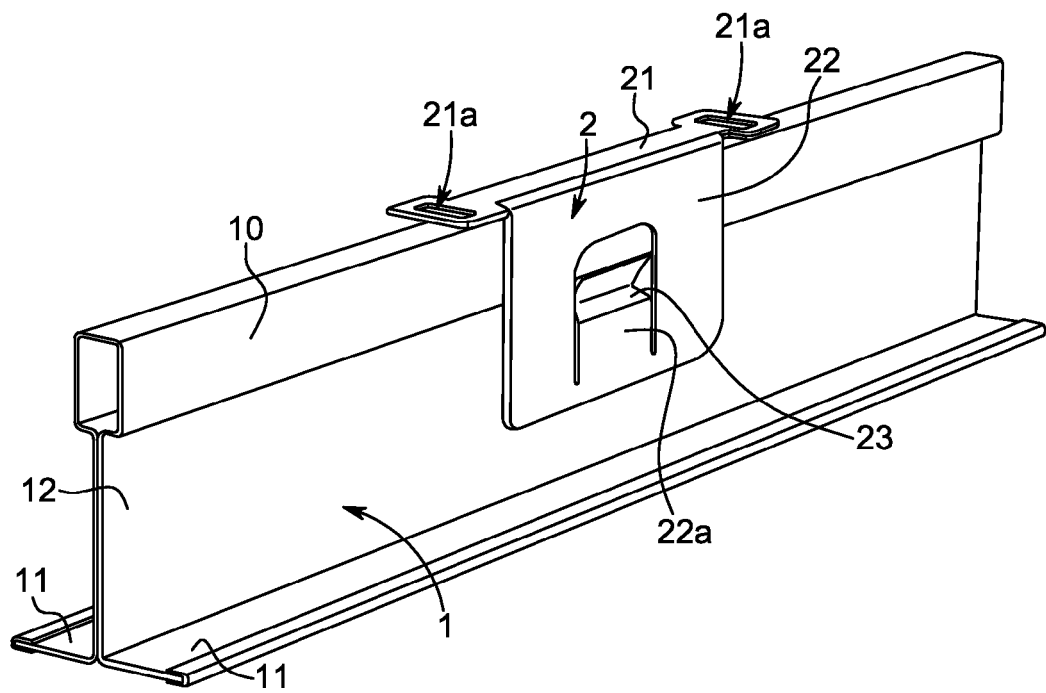


FIG. 1

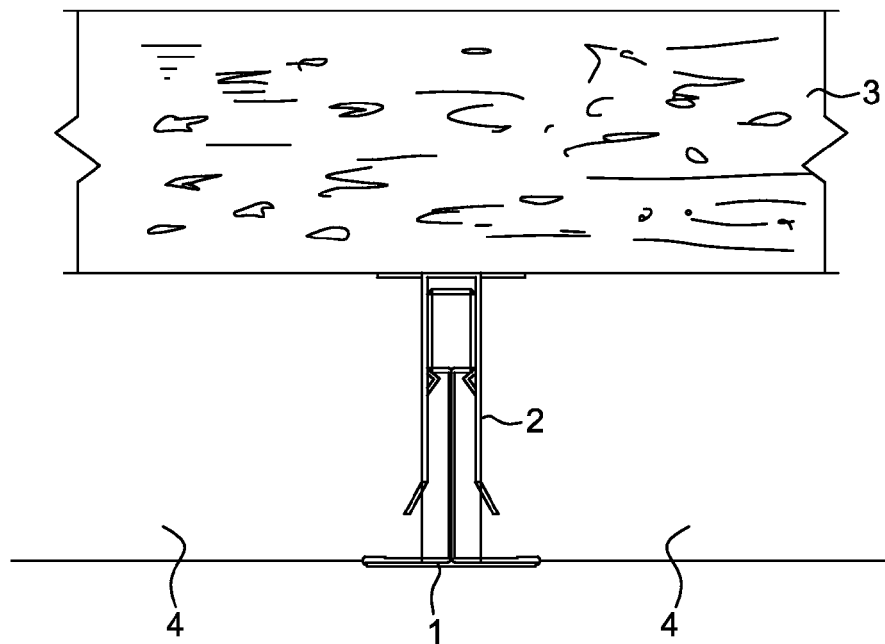


FIG. 2

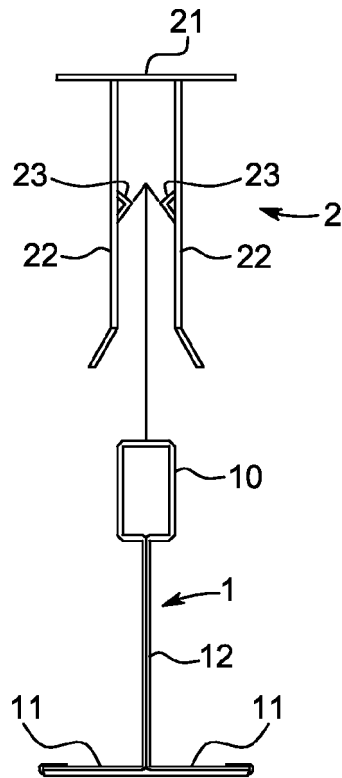


FIG. 3

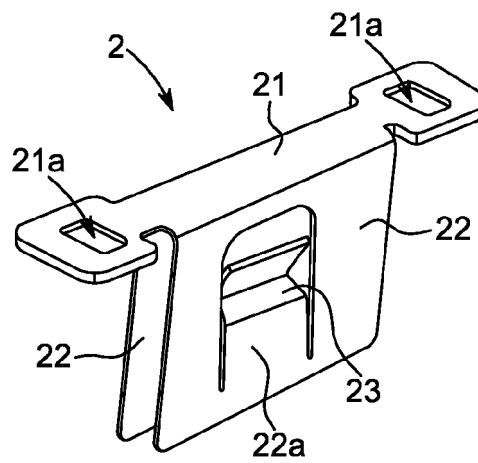


FIG. 4

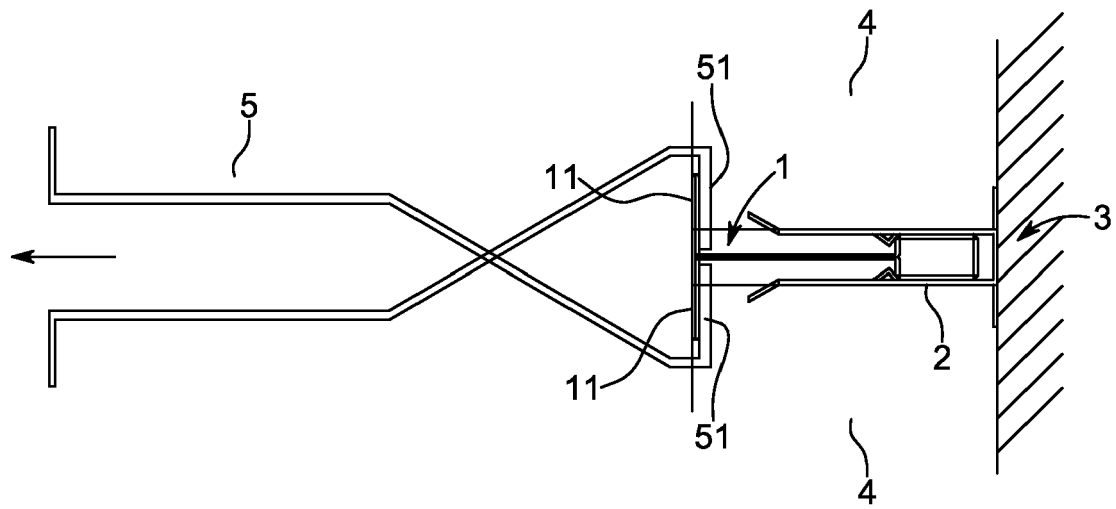


FIG. 5

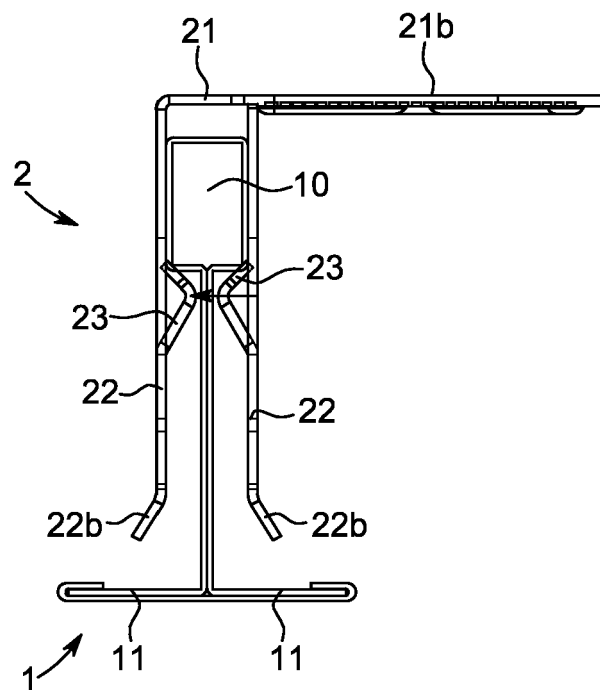


FIG. 6

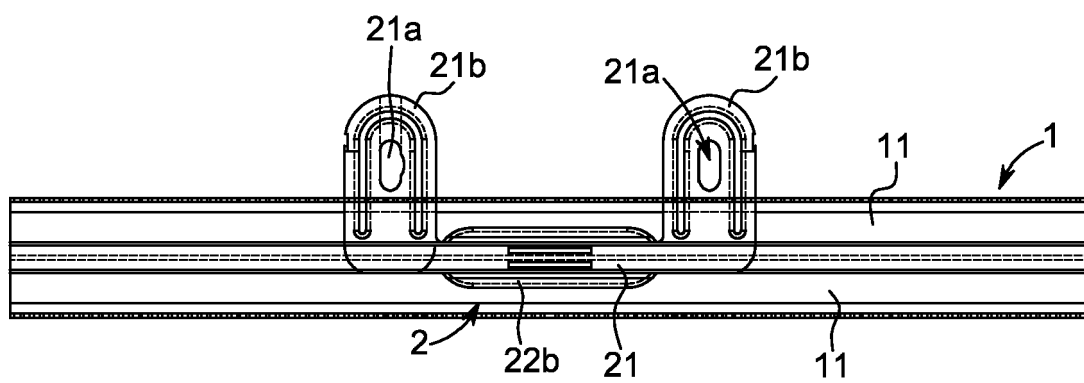


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 11 18 2511

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 541 958 A1 (RADEX HERAKLITH [AT] HERAKLITH AG [AT]) 19 May 1993 (1993-05-19) * column 15, lines 25-47; figures 9-13 * * column 19, line 57 - column 21, line 55 *	1-4	INV. E04B9/18 E04B9/06
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 February 2012	Examiner Stern, Claudio
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 18 2511

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