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(54) **Suspended ceiling structure connected to a construction element and method of mounting a construction element to a suspended ceiling structure**

Abgehängte Deckenstruktur mit Bauelementanschluss und Verfahren zur Montage des Bauelements an der abgehängten Deckenstruktur

Structure de plafond suspendu connecté à un élément de construction et procédé d'assemblage d'un élément de construction sur une structure de plafond suspendu

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(56) References cited:
**EP-A- 0 681 070 GB-A- 2 407 826
US-A- 3 742 674 US-A- 4 209 953
US-A- 4 838 002**

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Description

[0001] The present invention relates to a suspended ceiling structure connected to a construction element, such as a partition wall or a dry wall, the suspended ceiling structure comprising a supporting structure composed by runners and a number of ceiling panels carried at edges by the supporting structure.

[0002] Suspended ceilings normally comprise a grid system, such as made up of runners having a section of inverted T, carrying a number of ceiling panels. This grid system is connected to a base ceiling, which is often a concrete storey partition. The space between the base ceiling and the suspended ceiling is used for installations, such as heat pipes. Partition walls to divide large rooms into smaller rooms are difficult to install with suspended ceilings, as the ceiling panels are usually not able to carry the partition walls themselves. This may be due to the fact that the ceiling panels rest on the runners of the grid system without other fixation means, or it may be due to the fact that the material of the ceiling panels is too soft for fastening of the partition walls. Prior art solutions involve removing the suspended ceiling at the position of the partition wall and fix the partition wall to the base ceiling. This is a somewhat complicated solution, and it is also difficult to remove the partition wall again.

[0003] EP 1 010 830 A1 discloses a partitioning installation and a suspended ceiling, whereby a bracket mounted on the top edge of a partition wall is connected to a number of runners of a suspended grid. This solution requires relatively wide gaps between adjacent ceiling panels to allow connection of the brackets to the runners of the grid. However, wide gaps are contrary to the common wish among architects to have a ceiling surface substantially without visible gaps between ceiling panels. Furthermore, mounting holes in the runners will be visible, if a partition wall is removed. In addition, if for instance a heavy lamp is to be mounted in the ceiling by this method, the position of the lamp is restricted by the exact position of the runners.

[0004] EP 0 269 830 A1 discloses a suspended ceiling having special runners for the grid system, whereby the runners are adapted for receiving a top bracket of a partition wall, so that the top edge of the partition wall extends along the runner. Such systems restrict the position of the partition walls to the exact positions of the runners. Further, a special runner of this type will be visible, if no partition wall is erected at the specific position of the runner.

[0005] US 3742 674 A discloses a suspended ceiling structure connected to a construction element according to the preamble of claim 1. The object of the present invention is to provide a suspended ceiling structure connected to a construction element, such as a partition wall, whereby the construction element easily may be located at substantially any position below the suspended ceiling structure.

[0006] SE 428597 discloses a fixation device for a sus-

pension element.

[0007] In view of this object, at least one fixation panel is mounted above a ceiling panel and is secured to at least one runner of the supporting structure, and the construction element is secured to the fixation panel by means of fasteners extending through said ceiling panel.

[0008] Thereby, the partition wall or other construction element may be fastened at any position below a ceiling panel by positioning a fixation panel above said ceiling panel, and at the same time the partition wall may be securely fastened to the supporting structure of the suspended ceiling structure.

[0009] The fixation panel is formed from a relatively thin plate material and comprises a panel body having opposed edges that are bent to form elastically deformable flanges engaging runners of the supporting structure. Thereby, the fixation panel may have good strength and be relatively light.

[0010] Each elastically deformable flange has a protrusion engaging under a shoulder of a runner and a gripping part spaced above the panel body, so that the protrusion may be brought out of engagement with the shoulder by pressing the gripping part in the direction of the panel body. Thereby, easy mounting as well as demounting of the fixation panel is enabled.

[0011] In an embodiment, the fixation panel is secured to neighbouring runners of the supporting structure. Thereby, the fixation panels may have the form of a modular element that may be positioned at any position of the suspended ceiling structure, thereby providing a very flexible solution. Furthermore, the fixation panels may be of a size corresponding to the ceiling panels, thereby enabling easy insertion of a fixation panel through a hole provided in the ceiling structure by removing a ceiling panel.

[0012] In an embodiment, the fixation panel is adapted to snap-on connection to runners of the supporting structure. Thereby, easy mounting as well as demounting of partition walls or the like is enabled.

[0013] In an embodiment, the panel body of the fixation panel is provided with strengthening ribs. Thereby, the fixation panel may have even better strength and/or be even lighter.

[0014] The present invention further relates to a method of mounting a construction element, such as a partition wall, to a suspended ceiling structure comprising a supporting structure composed by runners and a number of ceiling panels carried at edges by the supporting structure. The method is characterized as defined by claim 5. Thereby, the above-mentioned features may be obtained.

[0015] In an embodiment, a number of ceiling panels are removed from the suspended ceiling structure, thereby providing openings in the suspended ceiling structure through which openings, respectively, a number of fixation panels are arranged and mounted above ceiling panels carried by the supporting structure, and by that the removed ceiling panels are rearranged in the suspended

ceiling structure after mounting of the fixation panels. Thereby, easy connection of a partition wall or the like to an already mounted suspended ceiling is made possible.

[0016] In an embodiment, the construction element is secured to the fixation panel by drilling screw holes extending through both the ceiling panels and the fixation panels and subsequently connecting the construction element to the fixation panel by means of preferably self-tapping screws that are screwed into said screw holes. Thereby, the connection of a partition wall or the like to the suspended ceiling is facilitated in that the screw holes may be drilled at any suitable position under the fixation panel.

[0017] The invention will now be explained in more detail below by means of examples of embodiments with reference to the very schematic drawing, in which

Fig. 1 is a perspective view of a part of a suspended ceiling structure according to the invention, seen from above,

Fig. 2 is a cross-section through a suspended ceiling structure connected to a partition wall according to the invention,

Fig. 3 is a detail of Fig. 2 shown on a larger scale,

Figs. 4 and 5 show a suspended ceiling structure, and

Fig. 6 shows another embodiment of the fixation panel of the suspended ceiling structure according to the invention.

Fig. 1 shows a part of a suspended ceiling structure 1 according to the invention. The suspended ceiling structure 1 comprises a supporting structure 2 in the form of a grid composed by runners 3 and a number of ceiling panels 4 carried at their edges 5 by the supporting structure 2. The runners 3 may have a section of inverted T, so that the edges 5 of the ceiling panels 4 rest on a flange 6 in the form of a cross-bar, see Fig. 3. However, the runners 3 may also have other configurations well known in the art, whereby the edges 5 of the ceiling panels 4 are carried. For instance, the ceiling panels may have a notch along their edges 5, in which the runners 3 may engage in any suitable way. The ceiling panels 4 may be of any type suitable for suspended ceiling structures, such as mineral fibre boards. The supporting structure 2 is suspended from a not shown base ceiling by means of hangers 10 as illustrated in Figs. 2 and 3.

[0018] Fig. 1 illustrates the first steps of an embodiment of the method according to the invention of mounting a construction element in the form of a partition wall 7 under the suspended ceiling structure 1. A number of fixation

panels 8a, 8b, 8c are mounted above respective ceiling panels 4 and are secured to runners 3 of the supporting structure 2. As it may be seen, the fixation panel 8a has already been mounted and secured, whereas the fixation panels 8b, 8c are located above the ceiling panels and are about to be mounted and secured. The fixation panels 8a, 8b, 8c are arranged and mounted above the ceiling panels 4 through openings 9 in the suspended ceiling structure which have been provided by removing a number of ceiling panels from the suspended ceiling structure. After mounting and securing the fixation panels 8a, 8b, 8c, the removed ceiling panels are rearranged in the suspended ceiling structure. This embodiment of the method is advantageous, if for instance a partition wall is to be mounted in an already mounted suspended ceiling structure. However, if the suspended ceiling structure is not already mounted, the fixation panels may, for instance, be mounted consecutively with the mounting of the ceiling panels. Depending on the exact configuration of the connection between the fixation panels and the runners, a fixation panel and its corresponding ceiling panel may also be sandwiched and mounted together in one operation.

[0019] When the fixation panels 8a, 8b, 8c have been mounted and secured, the partition wall 7 is secured to the fixation panels 8a, 8b, 8c by insertion of fasteners 11 in the form of self-tapping screws through said ceiling panel and the fixation panels 8a, 8b, 8c. As it may be seen in Fig. 2, the partition wall 7 may be provided with a removable upper bracket 18 through which the self-tapping screws may be mounted. The bracket 18 may be mounted on the partition wall, for instance by means of screws, after mounting of said self-tapping screws. Other types of bracket may enable mounting of the bracket on the partition wall before mounting of the screws. The fixation panels are typically of a material that is harder than the material of the ceiling panels and are also typically of a material that is more rigid than the material of the ceiling panels. Consequently, the self-tapping screws will typically get a better grip in the fixation panels than in the ceiling panels.

[0020] The partition wall 7 may also be secured to the fixation panels 8a, 8b, 8c by other types of fastener than screws, such as clamping devices, special rivets or the like.

[0021] Although the construction element has been illustrated above in the form of a partition wall, it could also for instance be a lamp or a projector. Typically, ceiling panels will not be able to carry such an element, and without the fixation panel, the position of the element would be restricted to the position of the runners.

[0022] Fig. 3 illustrates in greater detail the connection between the fixation panels 8 and the runners 3 of the supporting structure, whereby the fixation panels are adapted to snap-on connection to the runners. It is seen that the fixation panels 8 are formed from a relatively thin plate material and each comprises a panel body 13 having opposed edges that are bent to form elastically de-

formable flanges 14 engaging the runners 3. Each elastically deformable flange 14 has a protrusion 15 engaging under a shoulder 16 of a runner 3 and a gripping part 17 spaced above the panel body 13, so that the protrusion 15 may be brought out of engagement with the shoulder 16 by pressing the gripping part 17 in the direction of the panel body 13. As shown, the gripping part 17 may advantageously have an end portion 18 that points in a direction upward and towards the centre of the panel body 13, whereby gripping of the gripping part 17 may be facilitated. The panel body 13 of the fixation panel 8 may be provided with not shown strengthening ribs.

[0023] If the ceiling panels 4 are of the type provided with perforation in the form of a large number of small bores, the partition wall may be mounted to the fixation panels 8 located above the ceiling panels 4 by means of screws inserted through some of the small bores in the ceiling panels. Thereby, the partition wall or other construction element may be removed again substantially without leaving any traces on the ceiling panels. The fixation panels may be provided with screw holes at positions corresponding to some of the small bores in the ceiling panels, thereby enabling the screw connection without having to drill holes in the fixation panels on the construction site.

[0024] Fig. 4 illustrates a suspended ceiling structure 1 not according to the invention. In this embodiment, a fixation panel 19 is connected to only one runner 3 of a supporting structure by means of an elastic bent portion 20 formed in the centre of the fixation panel 19 and gripping over a part of the runner 3. A construction element, such as a partition wall, may be connected to the fixation panel 19 as explained above.

[0025] Fig. 5 also not according to the invention shows a further development of the suspended ceiling panel shown in Fig. 4. In this embodiment, one fixation panel 21 is formed with two spaced elastic bent portions 20, each gripping over a runner 3. Correspondingly, a fixation panel could also have the form of one long element comprising several spaced elastic bent portions 20 or other connection means. Such a long standardized element could be shortened off to the desired length by breaking off a part of it, possibly at weakened lines made for this purpose. Although the fixation panels may abut the top side of the ceiling panels, this is generally not a requirement. Furthermore, in the embodiment of Fig. 5, a long fixation panel could be connected to only some of the runners it crosses, for instance by being placed above the runners.

[0026] Fig. 6 shows another embodiment of the fixation panel. The fixation panel 22 is at each of its four sides provided with elastically deformable flanges 14 adapted to engage runners. The fixation panel may be made of a suitable material. In some applications it may be advantageous to choose a non-combustible material, such as metal, in view of fire regulations.

[0027] The fixation panel may be adopted for easy gripping of a screw, such as by providing the face of the panel

with a nubby surface, indentations or perforations.

Claims

1. A system comprising a suspended ceiling structure (1) connected to a construction element (7), such as a partition wall or a dry wall, the suspended ceiling structure (1) comprising a supporting structure (2) composed by runners (3) and a number of ceiling panels (4) carried at edges (5) by the supporting structure (2), **characterized in that** at least one fixation panel (8a, 8b, 8c, 19, 21, 22) is mounted above a ceiling panel (4) and is secured to at least one runner (3) of the supporting structure (2), and **in that** the construction element (7) is secured to the fixation panel by means of fasteners (11) extending through said ceiling panel, wherein the fixation panel (8a, 8b, 8c, 19, 21, 22) is formed from a relatively thin plate material and comprises a panel body (13) having opposed edges that are bent to form elastically deformable flanges (14) engaging runners (3) of the supporting structure (2), and wherein each elastically deformable flange (14) has a protrusion (15) engaging under a shoulder (16) of a runner (3) and a gripping part (17) spaced above the panel body (13), so that the protrusion (15) may be brought out of engagement with the shoulder (16) by pressing the gripping part (17) in the direction of the panel body (13).
2. A system comprising a suspended ceiling structure according to claim 1, **characterized in that** the fixation panel (8, 21, 22) is secured to neighbouring runners (3) of the supporting structure (2).
3. A system comprising a suspended ceiling structure according to claim 1 or 2, **characterized in that** the fixation panel (8a, 8b, 8c, 19, 21, 22) is adapted to snap-on connection to runners (3) of the supporting structure (2).
4. A system comprising a suspended ceiling structure according to any preceding claim, **characterized in that** the panel body (13) of the fixation panel is provided with strengthening ribs.
5. A method of mounting a construction element (7), such as a partition wall or a dry wall, to a suspended ceiling structure (1) comprising a supporting structure (2) composed by runners (3) and a number of ceiling panels (4) carried at edges (5) by the supporting structure (2), **characterized by** mounting at least one fixation panel (8a, 8b, 8c, 19, 21, 22) above a ceiling panel (4) and securing the fixation panel to at least one runner (3) of the supporting structure (2), and by securing the construction element to the fixation panel by insertion of fasteners (11) through

said ceiling panel, wherein the fixation panel (8a, 8b, 8c, 19, 21, 22) is formed from a relatively thin plate material and comprises a panel body (13) having opposed edges that are bent to form elastically deformable flanges (14) engaging runners (3) of the supporting structure (2), and wherein each elastically deformable flange (14) has a protrusion (15) engaging under a shoulder (16) of a runner (3) and a gripping part (17) spaced above the panel body (13), so that the protrusion (15) may be brought out of engagement with the shoulder (16) by pressing the gripping part (17) in the direction of the panel body (13)..

6. A method according to claim 5, **characterized by** that a number of ceiling panels (4) are removed from the suspended ceiling structure (1), thereby providing openings (9) in the suspended ceiling structure through which openings, respectively, a number of fixation panel (8a, 8b, 8c, 19, 21, 22) are arranged and mounted above ceiling panels (4) carried by the supporting structure (2), and by that the removed ceiling panels are rearranged in the suspended ceiling structure after mounting of the fixation panels.
7. A method according to claim 5 or 6, **characterized by** that the construction element (7) is secured to the fixation panel (8a, 8b, 8c, 19, 21, 22) by drilling screw holes (12) extending through both the ceiling panels (4) and the fixation panels and subsequently connecting the construction element to the fixation panel by means of preferably self-tapping screws that are screwed into said screw holes.

Patentansprüche

1. System, das eine abgehängte Deckenstruktur (1) umfasst, die mit einem Bauelement (7), wie etwa einer Trennwand oder einer Trockenbauwand, verbunden ist, wobei die abgehängte Deckenstruktur (1) eine tragende Struktur (2), die aus Schienen (3) zusammengesetzt ist, und eine Anzahl von Deckenplatten (4), die an Rändern (5) von der tragenden Struktur (2) getragen werden, umfasst, **dadurch gekennzeichnet, dass** wenigstens eine Fixierungsplatte (8a, 8b, 8c, 19, 21, 22) oberhalb einer Deckenplatte (4) montiert ist und an wenigstens einer Schiene (3) der tragenden Struktur (2) befestigt ist und, dass das Bauelement (7) mittels Befestigern (11), die sich durch die Deckenplatte erstrecken, an der Fixierungsplatte befestigt ist, wobei die Fixierungsplatte (8a, 8b, 8c, 19, 21, 22) aus einem relativ dünnen Plattenmaterial gebildet ist und einen Plattenkörper (13) mit gegenüberliegenden Rändern aufweist, die gebogen sind, um elastisch verformbare Flansche (14) zu bilden, die mit Schienen (3) der tragenden Struktur (2) in Eingriff stehen und, wobei

jeder elastisch verformbare Flansch (14) einen Vorsprung (15), der unter einem Absatz (16) einer Schiene (3) in Eingriff steht und einen Greifteil (17) aufweist, der oberhalb des Plattenkörpers (13) beabstandet ist, sodass der Vorsprung (15) durch Drücken des Greifteils (17) in der Richtung des Plattenkörpers (13) aus dem Eingriff mit dem Absatz (16) gelöst werden kann.

2. System, das eine abgehängte Deckenstruktur gemäß Anspruch 1 umfasst, **dadurch gekennzeichnet, dass** die Fixierungsplatte (8, 21, 22) an benachbarten Schienen (3) der tragenden Struktur (2) befestigt ist.
3. System, das eine abgehängte Deckenstruktur gemäß Anspruch 1 oder 2 umfasst, **dadurch gekennzeichnet, dass** die Fixierungsplatte (8a, 8b, 8c, 19, 21, 22) für eine Rastverbindung mit den Schienen (3) der tragenden Struktur (2) angepasst ist.
4. System, das eine abgehängte Deckenstruktur gemäß einem vorhergehenden Anspruch umfasst, **dadurch gekennzeichnet, dass** der Plattenkörper (13) der Fixierungsplatte mit Verstärkungsrippen versehen ist.
5. Verfahren zum Montieren eines Bauelements (7), wie etwa eine Trennwand oder eine Trockenbauwand, an eine abgehängte Deckenstruktur (1), die eine tragende Struktur (2) umfasst, welche aus Schienen (3) zusammengesetzt ist, und eine Anzahl von Deckenplatten (4), welche an den Rändern (5) von der tragenden Struktur (2) getragen werden, umfasst, **gekennzeichnet, durch** das Montieren wenigstens einer Fixierungsplatte (8a, 8b, 8c, 19, 21, 22) oberhalb einer Deckenplatte (4) dem Befestigen der Fixierungsplatte an wenigstens eine Schiene (3) der tragenden Struktur (2) und **durch** das Befestigen des Bauelements an der Fixierungsplatte **durch** Einführen von Befestigern (11) **durch** die Deckenplatte, wobei die Fixierungsplatte (8a, 8b, 8c, 19, 21, 22) aus einem relativ dünnen Plattenmaterial gebildet ist und einen Plattenkörper (13) mit gegenüberliegenden Rändern aufweist, die gebogen sind, um elastisch verformbare Flansche (14) zu bilden, die mit Schienen (3) der tragenden Struktur (2) in Eingriff stehen und, wobei jeder elastisch verformbare Flansch (14) einen Vorsprung (15), der unter einem Absatz (16) einer Schiene (3) in Eingriff steht, und einen Greifteil (17) aufweist, der oberhalb des Plattenkörpers (13) beabstandet ist, sodass der Vorsprung (15) **durch** Drücken des Greifteils (17) in der Richtung des Plattenkörpers (13) aus dem Eingriff mit dem Absatz (16) gelöst werden kann.
6. Verfahren nach Anspruch 5, **dadurch gekennzeichnet, dass** seine Anzahl von Deckenplatten (4)

aus der abgehängten Deckenstruktur (1) entfernt werden, wodurch Öffnungen (9) in der abgehängten Deckenstruktur bereitgestellt werden, wobei durch die Öffnungen jeweils eine Anzahl von Fixierungsplatten (8a, 8b, 8c, 19, 21, 22) angeordnet werden und oberhalb von Deckenplatten (4), die von der tragenden Struktur (2) getragen werden, montiert werden, und, dass die entfernten Deckelplatten nach dem Montieren der Fixierungsplatten wieder in der abgehängten Deckenstruktur angeordnet werden.

7. Verfahren nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** das Bauelement (7) an der Fixierungsplatte (8a, 8b, 8c, 19, 21, 22) befestigt wird, indem Schraubenlöcher (12) gebohrt werden, die sich durch sowohl die Deckenplatten (4) als auch die Fixierungsplatten erstrecken, und das Bauelement danach mittels bevorzugt selbstschneidender Schrauben, die in die Schraubenlöcher geschraubt werden, an der Fixierungsplatte befestigt wird.

Revendications

1. Système comprenant une structure de plafond suspendu (1) reliée à un élément de construction (7), tel qu'une cloison ou une cloison sèche, la structure de plafond suspendu (1) comprenant une structure de support (2) composée par des coulisseaux (3) et un nombre de panneaux de plafond (4) supportés à des bords (5) par la structure de support (2), **caractérisé en ce qu'**au moins un panneau de fixation (8a, 8b, 8c, 19, 21, 22) est monté au-dessus d'un panneau de plafond (4) et est fixé à au moins un coulisseau (3) de la structure de support (2), et **en ce que** l'élément de construction (7) est fixé au panneau de fixation au moyen d'éléments de fixation (11) s'étendant à travers ledit panneau de plafond, dans lequel le panneau de fixation (8a, 8b, 8c, 19, 21, 22) est formé à partir d'un matériau en plaque relativement mince et comprend un corps de panneau (13) ayant des bords opposés qui sont cintrés pour former des brides déformables de façon élastique (14) entrant en prise avec des coulisseaux (3) de la structure de support (2), et dans lequel chaque bride déformable de façon élastique (14) comporte une protubérance (15) entrant en prise sous un épaulement (16) d'un coulisseau (3) et une partie de préhension (17) espacée au-dessus du corps de panneau (13), pour que la protubérance (15) puisse être mise hors de prise par rapport à l'épaulement (16) en comprimant la partie de préhension (17) dans la direction du corps de panneau (13).
2. Système comprenant une structure de plafond suspendu selon la revendication 1, **caractérisé en ce que** le panneau de fixation (8, 21, 22) est fixé à des coulisseaux voisins (3) de la structure de support (2).
3. Système comprenant une structure de plafond suspendu selon la revendication 1 ou 2, **caractérisé en ce que** le panneau de fixation (8a, 8b, 8c, 19, 21, 22) est adapté pour une liaison par encliquetage à des coulisseaux (3) de la structure de support (2).
4. Système comprenant une structure de plafond suspendu selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le corps de panneau (13) du panneau de fixation est pourvu de nervures de renfort.
5. Procédé de montage d'un élément de construction (7), tel qu'une cloison ou une cloison sèche, sur une structure de plafond suspendu (1) comprenant une structure de support (2) composée par des coulisseaux (3) et un nombre de panneaux de plafond (4) supportés à des bords (5) par la structure de support (2), **caractérisé par** le montage d'au moins un panneau de fixation (8a, 8b, 8c, 19, 21, 22) au-dessus d'un panneau de plafond (4) et la fixation du panneau de fixation à au moins un coulisseau (3) de la structure de support (2), et par la fixation de l'élément de construction au panneau de fixation par l'insertion d'éléments de fixation (11) à travers ledit panneau de plafond, dans lequel le panneau de fixation (8a, 8b, 8c, 19, 21, 22) est formé à partir d'un matériau en plaque relativement mince et comprend un corps de panneau (13) ayant des bords opposés qui sont cintrés pour former des brides déformables de façon élastique (14) entrant en prise avec des coulisseaux (3) de la structure de support (2), et dans lequel chaque bride déformable de façon élastique (14) comporte une protubérance (15) entrant en prise sous un épaulement (16) d'un coulisseau (3) et une partie de préhension (17) espacée au-dessus du corps de panneau (13), pour que la protubérance (15) puisse être mise hors de prise par rapport à l'épaulement (16) en comprimant la partie de préhension (17) dans la direction du corps de panneau (13).
6. Procédé selon la revendication 5, **caractérisé en ce qu'**un nombre de panneaux de plafond (4) sont retirés de la structure de plafond suspendu (1), fournissant ainsi des ouvertures (9) dans la structure de plafond suspendu, à travers lesquelles ouvertures, respectivement, un nombre de panneaux de fixation (8a, 8b, 8c, 19, 21, 22) sont agencés et montés au-dessus de panneaux de plafond (4) supportés par la structure de support (2), et **en ce que** les panneaux de plafond retirés sont agencés à nouveau dans la structure de panneau suspendu après avoir monté les panneaux de fixation.
7. Procédé selon la revendication 5 ou 6, **caractérisé en ce que** l'élément de construction (7) est fixé au panneau de fixation (8a, 8b, 8c, 19, 21, 22) en perçant des trous de vis (12) s'étendant à la fois à travers

les panneaux de plafond (4) et à travers les panneaux de fixation et par la suite en reliant l'élément de construction au panneau de fixation au moyen, de préférence, de vis auto-taraudeuses qui sont vissées dans lesdits trous de vis.

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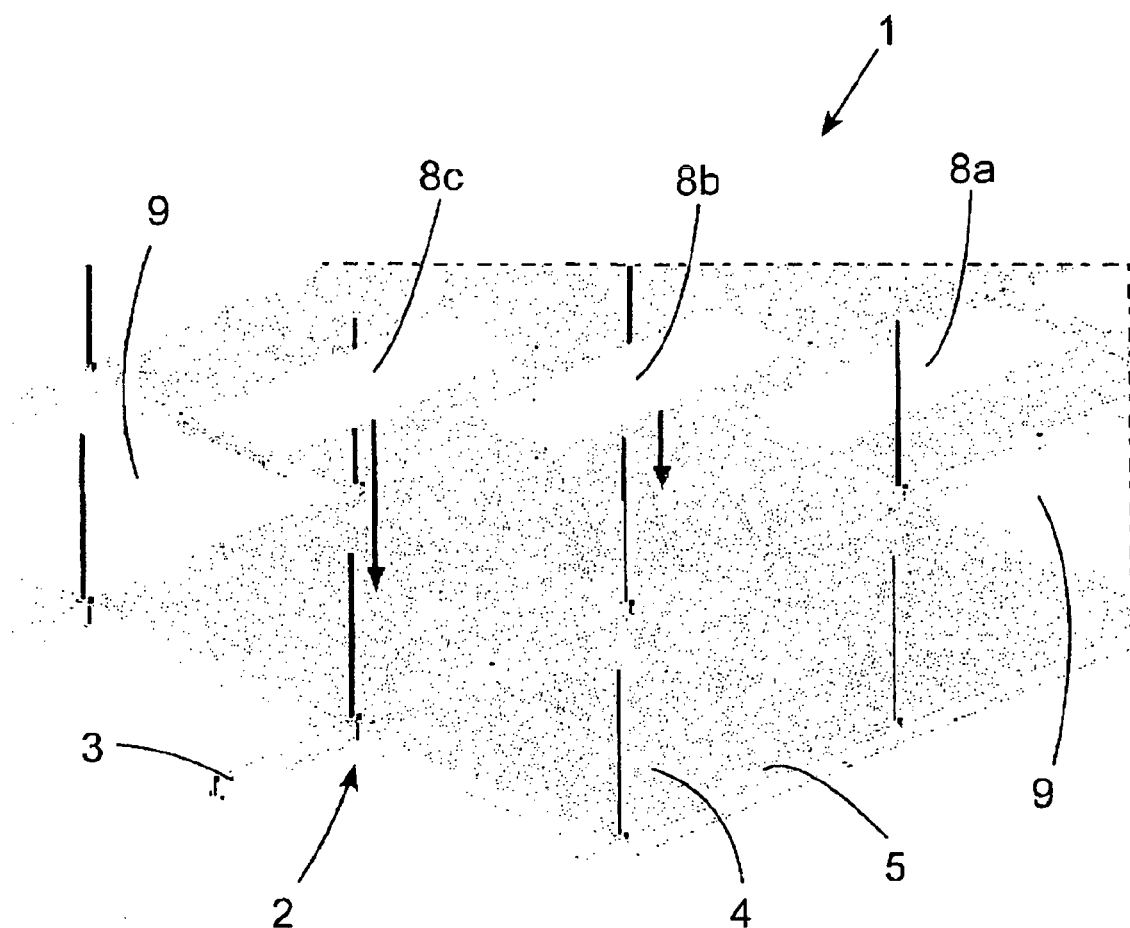


Fig. 1

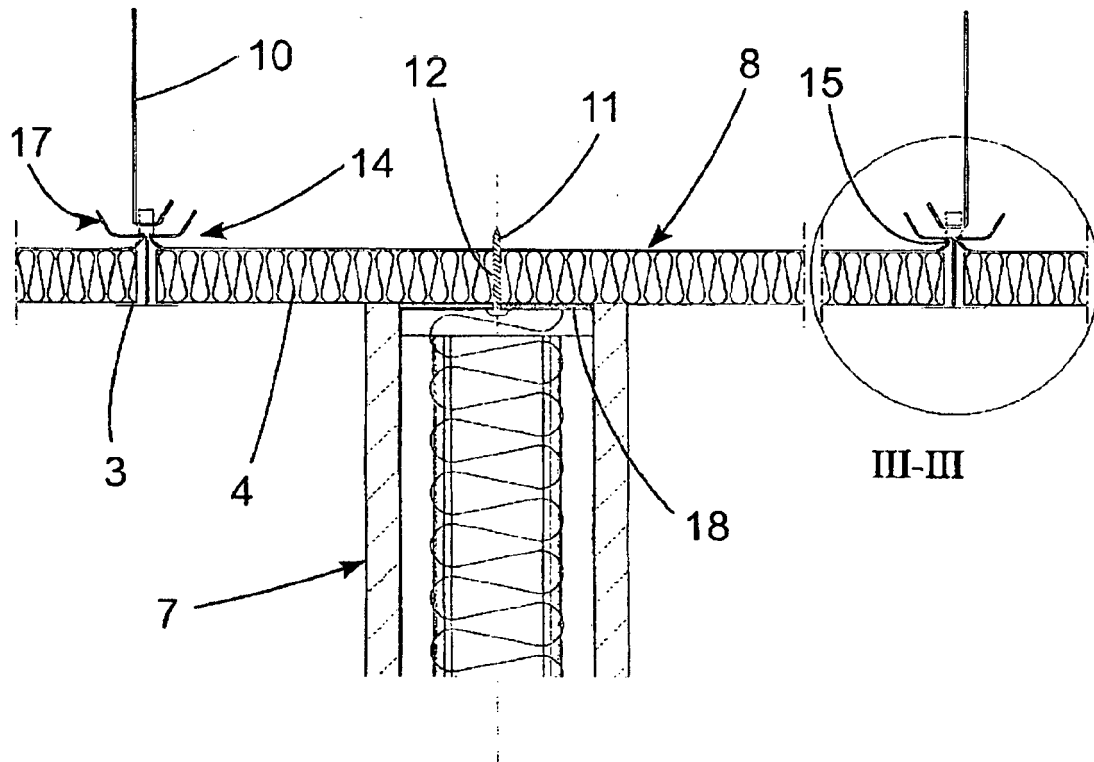


Fig. 2

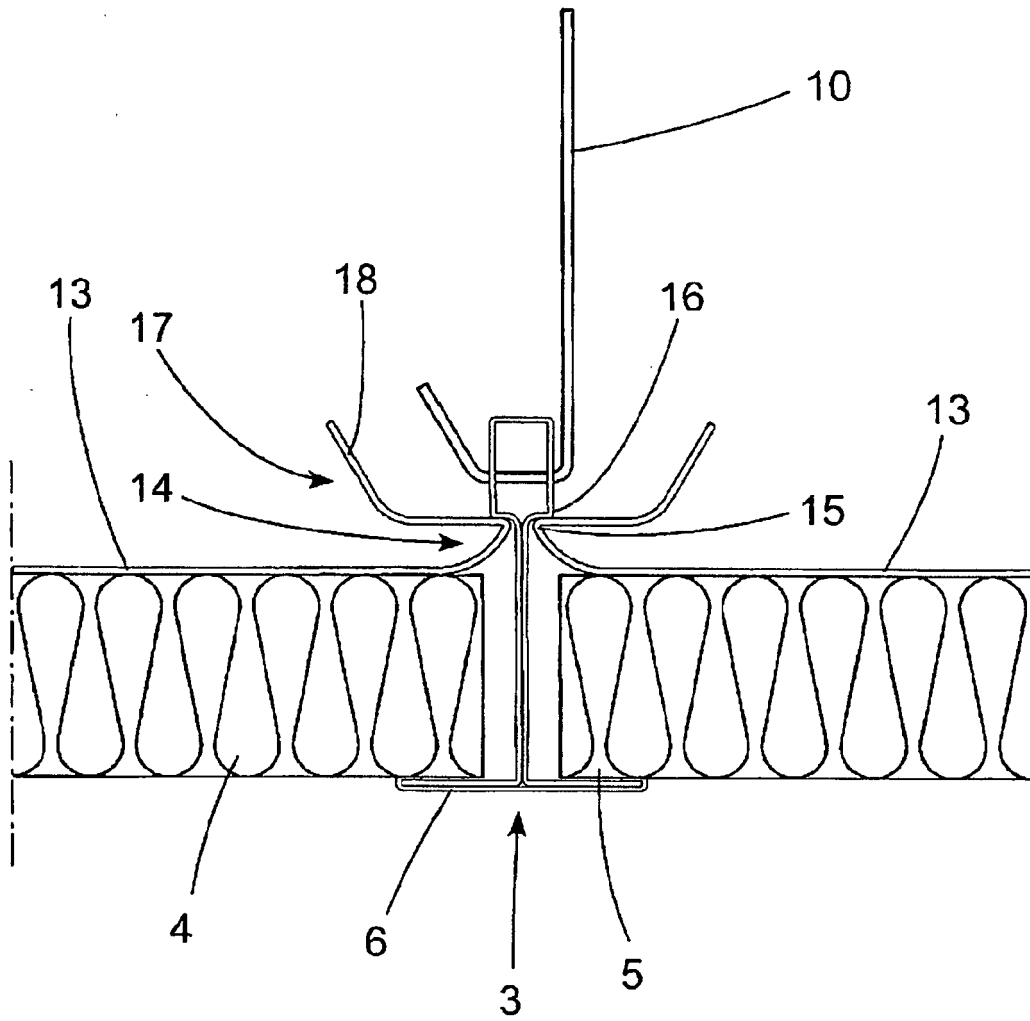


Fig. 3

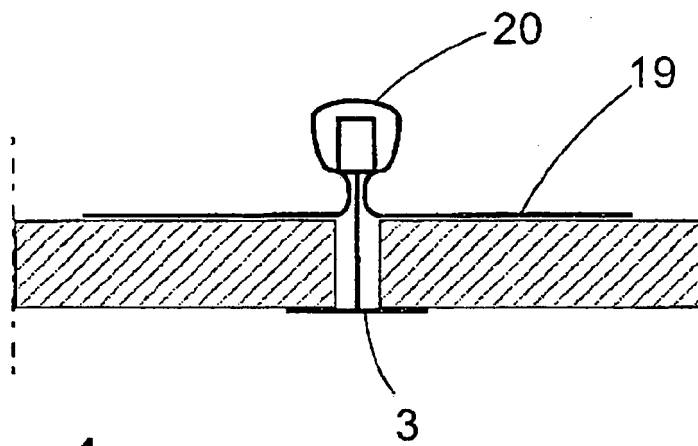


Fig. 4

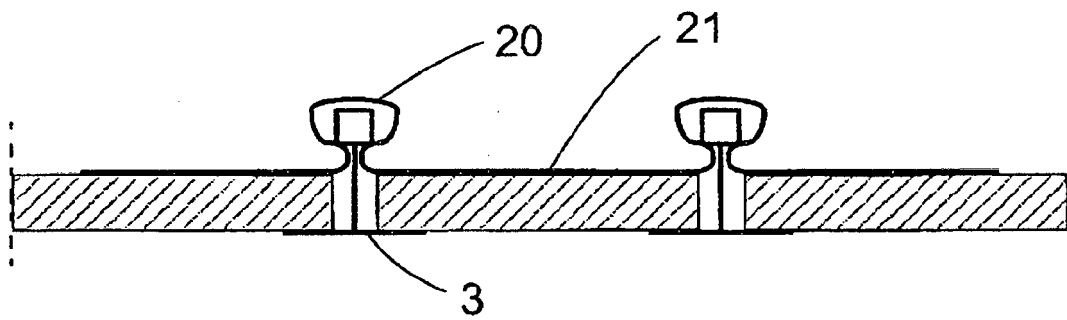


Fig. 5

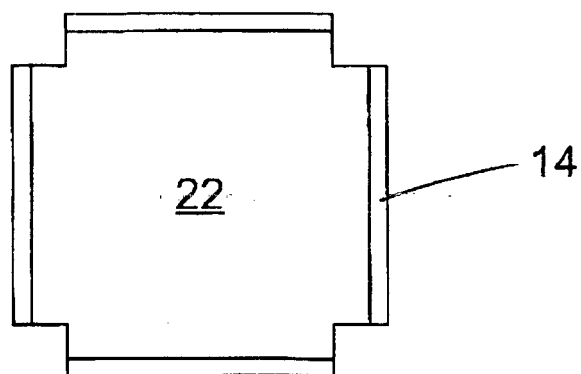


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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