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(54) **AN ASSEMBLY FOR FASTENING A SELF-SUPPORTING WALL TO A HANGER**

VORRICHTUNG ZUM BEFESTIGEN EINER SELBSTTRAGENDEN WAND AN EINE HALTERUNG

ASSEMBLAGE SERVANT A ASSUJETTIR UN MUR AUTOPORTEUR A UN SUPPORT DE
SUSPENSION

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Description

[0001] The present invention relates to an arrangement serving to anchor a wall structure to an overlying support structure. The overlying support structure may be formed by any supporting part of a building situated immediately above the wall structure. However, it is a primary object of the present arrangement to serve a construction in which said overlying support is allowed to perform a limited vertical movement with regard to the other elements of the building construction. Such an overlying support may be formed, e.g., by an intermediate floor subjected to a varying surface load. Over large spans, this type of structure can sag several centimeters under a high load in a reversible manner permitting the magnitude of sag to decrease when the load is reduced. In the case that a building component such as a partition wall is to be mounted below such a structure in a manner not serving to bear the overlying load, the partition wall must be anchored in a fashion permitting changes in the sag of the overlying floor.

[0002] Particularly, the anchoring of a non-load-bearing fire-rated wall requires a special solution to cope with a changing magnitude of sag. Fire-rated walls are conventionally made into wall structures capable of bearing their own weight (i.e., self-supporting), which means that they also must remain integral under a fire to an extent defined in fire-rating codes. Such a fire-rated wall can be made using a conventional wall structure comprising a mineral wool core faced on both sides with sheet metal. The mineral wool grade used herein is a structurally rigid grade of mineral wool, and the skin plates are bonded with an adhesive to the core. This integral entity forms a multilayer wall structure which acts as a light-weight, effective thermal insulation, simultaneously offering sufficient rigidity to form a self-supporting wall. Moreover, all the basic members of the wall are made from noncombustible materials.

[0003] When used as a partition wall, such a wall is supported to the overlying structure, such as an overlying intermediate floor so that horizontal support rails are mounted to the underside of the intermediate floor so as to run parallel to both sides of wall surface. The support rails have downward projecting flanges. Thus, the wall structure will remain laterally supported in the slot formed between the flanges. The vertical height of the wall panel will be reduced from its nominal height by a small value equal to the estimated vertical sag movement of the overlying intermediate floor structure, and accordingly, if the flanges are not fastened in a permanent manner to the face of the wall panel, the arrangement facilitates a vertical mutual movement between the intermediate floor structure and the wall element without imposing additional stresses on the wall structure. One support construction following this principle is disclosed in US-A-4,361,994. The gap remaining between the upper edge of the wall structure and the underside of the intermediate floor structure is filled with a resilient ther-

mal insulation material such as mineral wool having a structure more resilient than that of the thermal insulation material used in the wall structure.

[0004] Under a fire, this type of wall is generally subjected to heat stresses from one side only, whereby the wall is required to resist the heat for a time specified in its fire rating. Herein, it is crucial that the wall can essentially maintain its initial integrity which is a primary criterion particularly with self-supporting walls. The fire stresses are chiefly imposed on structures related to the self-supporting character of the wall such as the bond mentioned as an example above between the skin plates and the insulation material. In the anchoring arrangement of the wall attention must be paid to prevent any member of the wall from collapsing in less than the rated time even if the bond between the skin plate and the insulation would fail on one side of the wall panel.

[0005] An approach to overcome this problem has been sought from an arrangement providing hanging support to the wall panel skin plates, whereby the above-mentioned lateral supporting is complemented with anchoring the skin plates to the overlying support. Naturally, such a hanging support must be designed to permit the above-mentioned vertical movement of the overlying structure. For this purpose, flexible strip-shaped clips have been applied that during the installation of the wall panel are anchored on one hand to the wall panel skin plate and on the other hand to the overlying support. Due to decoration appearance requirements, the anchoring to the skin sheet should preferably be made so that the hanging support elements remain as well as possible concealed in the internal structures. To this end, the hanging support elements used in the prior art are mounted to the area of the vertical joints between the wall panels forming the installed wall. The joints between the wall panels are implemented as tongue-and-groove joint structures formed from the skin sheets of the wall panels, whereby said joint structures involve members protruding into the interior of the wall panel. These inward projected members form suitable tabs to which the hanging support elements can be appropriately fastened.

[0006] Conventional arrangements are, however, hampered by the disadvantage that the hanging support elements can be mounted invisibly only at the areas of the interpanel joints, that is, at the wall panel corners. Moreover, the hanging support elements fastened to the opposite-side skin plates of the wall panel will be located close to each other due to the close proximity of their fastening points, at the area of the top-edge seal gap of the panel, whereby they will become essentially simultaneously subjected to equal heat stress imposed by the fire. Furthermore, the verification of proper installation of the support elements after the installation of the wall is almost impossible, which causes problems during fire-rating inspections.

[0007] The above-discussed shortcomings have now been solved by means of an arrangement according to

the present invention characterized by the specifications of appended claim 1.

[0008] The invention is next examined in greater detail with reference to the appended drawings in which:

Figure 1 is a cross-sectional view of the anchoring arrangement according to the invention in a wall; and

Figure 2 is an illustration of a mounting rail suitable for the implementation of the arrangement.

[0009] With reference to Fig. 1, a fire-rated wall 1 installed as shown in the diagram is supported by an overlying support structure 2 which may be, e.g., an overlying intermediate floor. The wall 1 comprises an insulating core 7 made from a structurally rigid grade of mineral wool which is faced on both broad sides with a skin plate 1' and 1'', respectively. The skin plates are made from sheet metal and adhesively bonded to the core in a conventional manner. The wall 1 is supported to the intermediate floor 2 using an L-shaped rail, whose one flange is fastened to the underside of the intermediate floor 2, whereby the other flange projects downward. Between the downward-projecting flanges 3' remains a trough so wide as to match the width of the wall 1 with a zero-clearance sliding fit between the inner sides of the rail flanges and the wall. Thus, the intermediate floor 2 can sag with respect to the top edge of the wall 1 without imposing a compressive vertical load on the wall 1. Obviously, the height of the wall 1 is dimensioned so that the maximum permissible sag of the intermediate floor can be accommodated. The sagging clearance remaining between the wall and the intermediate floor is appropriately sealed with a resilient insulation material such as elastic mineral wool.

[0010] In addition to the rails 3, which provide lateral support to the self-supporting wall 1, the arrangement according to the invention includes strip-formed hanging support clips 4. These angle clips are advantageously made from a flexible material. A practicable hanging support clip can be fabricated from sheet metal. The rigidity of the sheet metal material is advantageously higher than that of the skin plate material of the wall panel. Also other embodiments are possible in the design of the support element with the essential provision that the hanging support element is made flexible at least over a given area of its length, advantageously at its midpart.

[0011] In the arrangement according to the invention, the hanging support clips 4 are adapted on one hand between the support rails 3 and the wall 1, on the other hand, between the support rails 3 and the intermediate floor 2. The fastening of the hanging support clips 4 to the underside of the intermediate floor 2 is advantageously accomplished using the same type of anchoring elements as are used for mounting the support rails 3 to the underside of the intermediate floor. To the skin of

the wall panel 1, the hanging support clips 4 are fastened using appropriate fastener elements 6 such as screws, rivets or welding. In order to facilitate the latter fastening step, the downward-projecting flanges 3' of the support rails 3 are provided with mounting openings 5 which are advantageously also elongated in the vertical direction in order to permit vertical movement of the head of the fastener element 6 in the mounting opening 5. Alternatively, the accommodation of said movement can be accomplished by using a larger installation clearance between the inner sides of the flanges 3' and the sides of the wall.

[0012] The hanging support clip 4 is fabricated so that, in its L-shaped mounting position, it can yield at its bent area toward the seal gap when the sag of the intermediate floor 1 becomes larger. The hanging support clips are advantageously factory-mounted to the support rails 3 in the fashion shown in Fig. 2, and additionally, in order to accommodate installation of fastening screws, are provided with mount-through holes which are aligned with the mounting holes of the support rails. The portion of the hanging support clip 4 remaining under the flange 3' of the support rails 3 may also be provided with a mounting hole to permit, e.g., the use of fastener rivets.

[0013] The function of the hanging support clip 4 is to support the skin plate 1' or 1'', respectively, of the wall panel 1 in place under such a fire that causes the skin plate to detach from the wall panel core 7 due to the failure of the skin-core bond. Thus, the secured supporting of the skin plate in place serves to provide improved protection to the insulation core of the wall panel, thereby helping the opposite-side skin sheet to stay sufficiently cool for a prolonged time under a fire in order to retain the bonding integrity of that side. Tests have shown that the wall can keep its form, and thereby, its substantial fire-resisting effect even under conditions where both of the wall panel skin sheets 1' and 1'' have already undergone detachment from the wall panel core 7, provided that the wall is not subjected to bumps or other similar distorting stresses. Even after the mineral wool core acting as the thermal insulation had already lost its rigidity in the test, it was capable of retaining its shape up to the appearance of such a distorting factor.

Claims

1. An arrangement for anchoring a self-supporting wall (1)' particularly sandwich-structure fire-rated wall to an overlying support (2), such as an intermediate floor, in which arrangement the wall is supported laterally by means of support rails (3) mounted on the overlying support structure, said support rails comprising flanges (3') adaptable to a zero-clearance sliding fit against the surface of the wall, **characterized in that** said arrangement comprises strip-shaped hanging support elements (4) which are flexible at least over a given area of their length

and are fastened on one hand to the overlying support (2), and on the other hand, to surface of the wall (1) so as to remain concealed between said flange (3') of the support rail and the surface (1', 1'') of the wall.

2. An arrangement as defined in claim 1, **characterized in that** said hanging support strips (4) are fastened to said support rail (3) and are aligned to cooperate with the fastener elements used to fix the support rail to the overlying support (2).
3. An arrangement as defined in claim 1 or 2, **characterized in that** said flange (3') of said support rail (3) is provided with mounting holes (5) in order to facilitate the fastening of said support strips (4) to the surface of said wall (1).

Patentansprüche

1. Vorrichtung zum Befestigen einer selbsttragenden Wand (1), insbesondere einer feuerfesten Wand mit Sandwich-Struktur, an einer darüberliegenden Halterung (2), z.B. einem Zwischenboden, wobei die Wand seitlich mittels Halterungsschienen (3) abgestützt ist, die an der darüberliegenden Halterungsstruktur angebracht sind, wobei die Halterungsschienen Flansche (3') aufweisen, die ohne Spiel an einen Gleitsitz an der Oberfläche der Wand anpaßbar sind, **dadurch gekennzeichnet, daß** die Vorrichtung streifenförmige hängende Halterungselemente (4) aufweist, die zumindest in einem vorgegebenen Bereich ihrer Länge flexibel und einerseits an der darüberliegenden Halterung (2) und andererseits an der Oberfläche der Wand (1) befestigt sind, so daß sie zwischen dem Flansch (3') der Halterungsschiene und der Oberfläche (1', 1'') der Wand verborgen sind.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** die hängenden Halterungstreifen (4) an der Halterungsschiene (3) befestigt und so ausgerichtet sind, daß sie mit den Befestigungselementen, die zum Befestigen der Halterungsschiene an der darüberliegenden Halterung (2) verwendet werden, zusammenwirken.
3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** der Flansch (3') der Halterungsschiene (3) mit Montagelöchern (5) versehen ist, um das Befestigen der Halterungstreifen (4) an der Oberfläche der Wand (1) zu erleichtern.

Revendications

1. Dispositif d'ancrage d'un mur auto-porteur (1), en

particulier un mur à structure en sandwich de protection contre l'incendie, à un support (2) qui se trouve au-dessus, tel qu'un plancher intermédiaire, dans lequel le mur est supporté latéralement au moyen de rails de support (3) fixés à la structure de support située au-dessus, les dits rails de support ayant des ailes (3') réglables à un ajustement glissant à jeu nul contre la surface du mur, **caractérisé en ce que** le dit dispositif comprend des éléments de support de suspension en forme de bande (4) qui sont flexibles au moins sur une partie donnée de leur longueur et qui sont fixés d'une part au support situé au-dessus (2) et d'autre part à une surface du mur (1), de façon à rester cachés entre la dite aile (3') du rail de support et la surface (1', 1'') du mur.

2. Dispositif selon la revendication 1, **caractérisé en ce que** les dites bandes de support de suspension (4) sont fixées au dit rail de support (3) et sont alignées de façon à coopérer avec les éléments d'attache utilisés pour fixer le rail de support au support situé au-dessus (2).
3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** la dite aile (3') du dit rail de support (3) comporte des trous de montage (5) afin de faciliter la fixation des dites bandes de support (4) à la surface du dit mur (1).

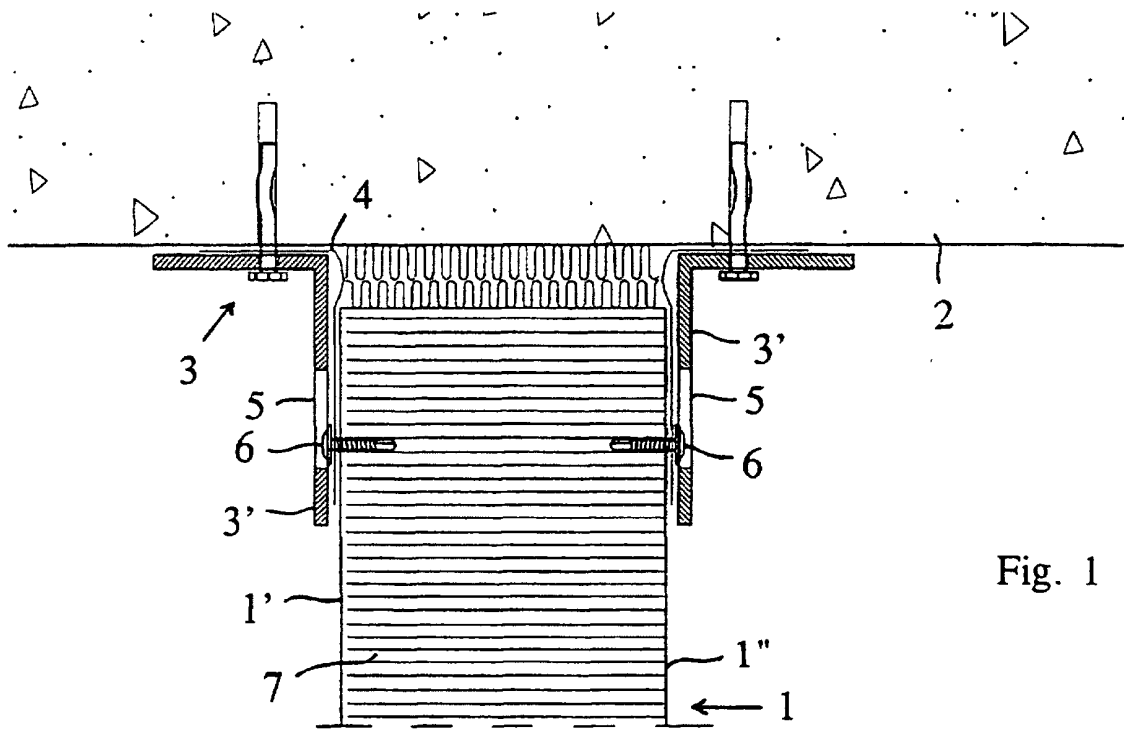


Fig. 1

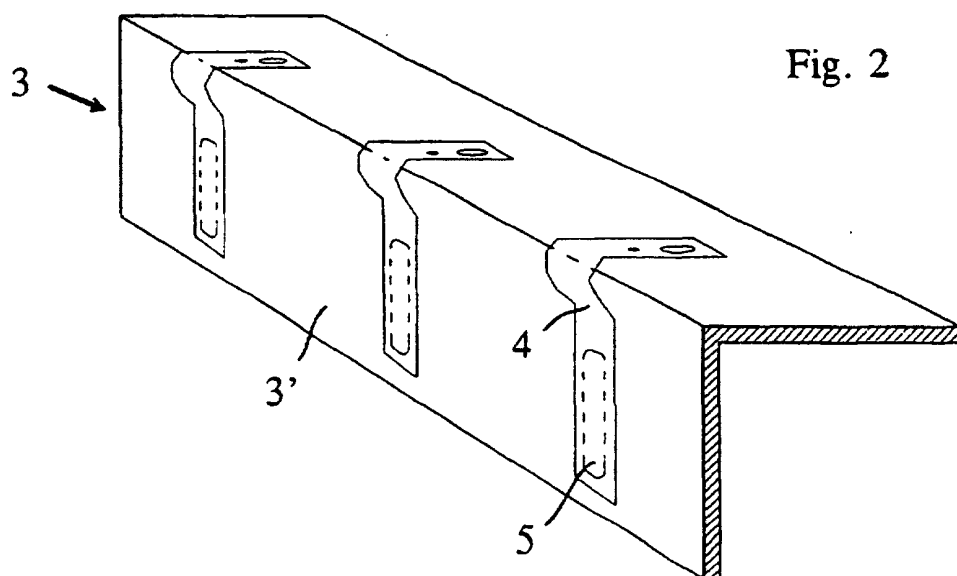


Fig. 2