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(54) **Fastening device for attaching sandwich construction units to a support structure**

Befestigungsvorrichtung zum Befestigen von Sandwichplatten an einer Tragstruktur

Dispositif de fixation pour fixer des panneaux sandwich sur une structure porteuse

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Description

[0001] The present invention relates to a sandwich construction unit and a fastening device for attaching said sandwich construction unit to a support structure, said construction unit comprising a core element of a thermally insulating material and surface sheets on its two major surfaces, said surface sheets being attached to the core element by means of a bonding agent on the opposite major surfaces of the core element, each of said surface sheets having at least one of its edges provided with a tongue and its respective opposite edge with a groove, and said construction units being mountable to a wall in such a way that said tongues and grooves of adjacent construction units are placed against each other for providing a tongue-and-groove joint between the construction units, said device comprising a plate-like fastening member, which extends in a longitudinal direction of the construction unit and is arranged on the construction unit's one narrow side provided with tongue-and-groove edges and which in its lateral direction extends over some of the width of said narrow side, said fastening member being shaped in its outer edge portion appropriately for engaging under the outer surface sheet's tongue edge, said fastening member being formed with at least one recess for passing a construction unit fastening element therethrough to a support structure.

[0002] The fastening of a sandwich construction unit provided with a core element of some heat insulating material is generally performed by means of various fastening elements, which are designed to fit in a clamping joint of the units for cooperation with a tongue-and-groove design of the unit's surface sheet. The objective with these has been to conceal the fasteners as effectively as possible and to fit the same in a joint so as not to generate cold bridges or otherwise compromise the joint's tightness, such as by being placed discontinuously between the mating surfaces of a tongue-and-groove joint. One design of this type is described in the present Applicant's European patent No. 0839239, in which a fastening member engages under a tongue-and-groove edge and said fastening member is provided with a recess, through which a fastening element, such as a retention screw, can be passed to support structures.

[0003] It is an aim of the present invention to provide an improved fastening device for attaching sandwich construction units to frame structures by ensuring the transfer of attachment forces to the outer surface without subjecting the latter to local strains or deformations. In order to accomplish this objective, a fastening device of the invention is characterized in that the device further comprises a clamping member, which extends in a longitudinal direction of the construction unit and which is attachable to the fastening member, and which clamping member is shaped in its outer edge to be substantially complementary to the shape of the outer surface of the outer surface sheet's tongue edge, and which clamping member is engageable for a clamping attachment with

said tongue edge for securing the fastening member to the outer surface sheet.

[0004] The invention will now be described in more detail with reference to the accompanying drawings, in which:

Fig. 1 shows schematically in an axonometric view a fastening member for a fastening device of the invention,

Fig. 2 shows the fastening member of fig. 1 together with a clamping member connectable thereto, and

Fig. 3 shows the use of a fastening device of the invention in a joint between two adjacent panels.

[0005] As shown in fig. 3, a sandwich construction unit 1 comprises a core element 4 of some insulating material, preferably mineral wool, and a facade-forming outer surface sheet 2, as well as an inner surface sheet 3 set against support structures. The surface sheet of a lower unit has its top edge provided with a tongue 5 and the respective bottom edge of an upper unit is provided with a matching groove 6, whereby, in the process of mounting the units, the tongues and grooves will be interlocked for holding the units steady relative to each other. In view of resisting forces generated by wind loads and thermal expansions, the units must be fastened to support structures, typically with retention screws. In fig. 3, represented by reference numeral 13 is a narrow side of the construction unit, which remains between the lower unit's 1 tongue edges 5 and which is fitted with a fastening device of the invention in such a way that, in the process of mounting the units, the fastening device becomes hidden in a joint area between units. In this context, the terms lower and upper panel, as well as bottom edge and top edge, are only used in reference to the relative position of construction units depicted in fig. 3. In addition to a horizontal position, the units can be installed also in a vertical position or in an inclined position.

[0006] According to figs. 1-3, the inventive fastening device for sandwich construction units comprises a plate-like fastening member 7 positioned on the unit's 1 narrow side 13. The fastening member extends over some of the construction unit's 1 length, and in its lateral direction it extends over some of the width of said narrow side 13, thus, avoiding the formation of cold bridges through a joint area. The fastening member has a length which is preferably within the range of 200-500 mm, but it can be shorter or longer as necessary. The fastening member 7 has its outer edge 8 shaped appropriately for engaging under the outer surface sheet's 2 tongue 5. The fastening member is formed with one or more recesses 9 for passing a construction unit fastening element 12 therethrough to a support structure. In this example, the fastening element 12 comprises a screw which is passed through a fastening hole 10 in the recess portion 9 to support struc-

tures (not shown). The number of fastening elements can be one or more at each recess portion. The fastening member is further provided with a plurality of engagement slots 11 successive in its lengthwise direction. The engagement slots can also be arranged in more than one row and can also have a shape other than the depicted rectangle, e.g. circular or oval.

[0007] The fastening device comprises further a clamping member 14, having its inner edge provided with locking tabs 16 intended for cooperation with the fastening member's 7 engagement slots 11. As for its outer edge 15, the clamping member 14 is shaped to be substantially complementary to the shape of the outer surface of the outer surface sheet's 2 tongue 5. The fastening device is preferably preassembled by inserting the clamping member's tabs 16 in the fastening member's engagement slots 11 prior to fitting the fastening device in place on the side 13 of a unit. In the process of installing the fastening device, the clamping member is turned open, such that the fastening member's outer edge 8 can be fitted under the tongue 5. This is followed by turning the clamping member 14 on top of said tongue 5 for locking the clamping member, and thus the fastening member 7, to the outer surface sheet 2, and then by screwing the retention screws 12 securely into support structures through the holes 10. This way, it is possible to prevent a sinking of the fastening member 7 inside the core element 4, caused by possible excessive tightening of the fastening element 12 and/or by various external loads, such as e.g. wind loads and thermal stresses, and a weakening of the attachment as a result thereof, which may happen when using solely the engagement of a fastening member under the tongue edge 5 without a clamping member. The clamping member 14 becomes firmly secured on top of the tongue 5 as the next unit is laid in place for producing a tongue-and-groove joint.

[0008] The clamping member's 14 locking tabs 16 are preferably made hook-shaped in the cross-section of the clamping member for an improved clamping engagement.

[0009] In the process of mounting construction units in place, a lower construction unit is first secured in its position by means of the fastening device 7, 14 and the retention screws 12, followed by laying the next construction unit on top of the lower one in a tongue-and-groove joint resulting manner, the clamping member's shaped outer edge 15 becoming concealed within the tongue-and-groove joint. In order to reduce deformations in the joint, it is possible, whenever necessary, that, prior to laying the upper construction unit in place, an adhesive or bonding agent be applied within the space between the top surface of the clamping member's 14 outer edge 15 and the inner surface of the upper construction unit's groove 6.

[0010] The inventive fastening device can also be designed in such a manner that the clamping member is attached to the fastening member by means of screws, rivets or in the like manner, such that the tongue-and-

groove edge becomes clamped between said members of the fastening device. This solution is particularly suitable for fastening a single tongue or groove (when a tongue-and-groove joint is not produced), such as, for example, for fastening the top edge of the uppermost unit among construction units placed on top of each other.

Claims

1. A sandwich construction unit (1) and a fastening device for attaching said sandwich construction unit (1) to a support structure, said construction unit comprising a core element (4) of a thermally insulating material and surface sheets (2, 3) on its two major surfaces, said surface sheets being attached to the core element by means of a bonding agent on the opposite major surfaces of the core element, each of said surface sheets having at least one of its edges provided with a tongue (5) and its respective opposite edge with a groove (6), and said construction units being mountable to a wall in such a way that said tongues and grooves (5, 6) of adjacent construction units are placed against each other for providing a tongue-and-groove joint between the construction units, said device comprising a plate-like fastening member (7), which extends in a longitudinal direction of the construction unit and is arranged on the construction unit's (1) one narrow side (13) provided with tongue-and-groove edges and which in its lateral direction extends over some of the width of said narrow side (13), said fastening member (7) being shaped in its outer edge portion appropriately for engaging under the outer surface sheet's (2) tongue edge (5), said fastening member being formed with at least one recess (9) for passing construction unit fastening elements (12) therethrough to a support structure, **characterized in that** the device further comprises a clamping member (14), which extends in a longitudinal direction of the construction unit (1) and which is attachable to the fastening member (7), and which clamping member (14) is shaped in its outer edge (15) to be substantially complementary to the shape of the outer surface of the outer surface sheet's (2) tongue edge (5), and which clamping member (14) is engageable for a clamping attachment with said tongue edge (5) for securing the fastening member (7) to the outer surface sheet (2).
2. A sandwich construction unit (1) and a fastening device as set forth in claim 1, **characterized in that** the fastening member (7) is further formed with engagement slots (11), and that the clamping member (14) is at its innermost edge provided with locking tabs (16), which are insertable in said engagement slots (11) of the fastening member (7).
3. A sandwich construction unit (1) and a fastening de-

vice as set forth in claim 2, **characterized in that** the clamping member's (14) locking tabs (16) are made hook-shaped in the cross-section of the clamping member.

4. A sandwich construction unit (1) and a fastening device as set forth in any of claims 1-3, **characterized in that** a joint area between the mating surfaces of the clamping member's (14) edge portion (15) and the adjacent construction unit's tongue-and-groove edge is applied with a layer of adhesive prior to the engagement of construction units to each other with a tongue-and-groove joint.

Patentansprüche

1. Sandwichplatte (1) und Befestigungsvorrichtung zum Befestigen der Sandwichplatte (1) an einer Tragstruktur, wobei die Sandwichplatte ein Kernelement (4) aus wärmeisolierendem Material und Oberflächenplatten (2, 3) an ihren zwei Hauptoberflächen umfasst, wobei die Oberflächenplatten mittels eines Bindemittels an den gegenüberliegenden Hauptoberflächen des Kernelements angebracht sind, wobei jede der Oberflächenplatten an mindestens einer ihrer Kanten mit einer Feder (5) und an ihrer jeweiligen gegenüberliegenden Kante mit einer Nut (6) versehen ist und wobei die Sandwichplatten solcherart an eine Wand montierbar sind, dass die Nuten und Federn (5, 6) benachbarter Sandwichplatten aneinander angeordnet sind, um eine Nut-und-Feder-Verbindung zwischen den Sandwichplatte bereitzustellen, wobei die Vorrichtung ein plattenartiges Befestigungselement (7) umfasst, das in Längsrichtung der Sandwichplatte verläuft und an derjenigen Schmalseite (13) der Sandwichplatte (1) angeordnet ist, die mit den Nut-und-Feder-Kanten ausgestattet ist, und das in seiner seitlichen Richtung über einen Teil der Breite der Schmalseite (13) verläuft, wobei das Befestigungselement (7) an seiner Außenkante geeignet zum Eingreifen unter die Federkante (5) der äußeren Oberflächenplatte (2) geformt ist, wobei das Befestigungselement mit mindestens einer Vertiefung (9) zum Durchführen von Befestigungselementen (12) für die Sandwichplatte zu einer Tragstruktur geformt ist, **dadurch gekennzeichnet, dass** die Vorrichtung ferner ein Klemmelement (14) umfasst, das in Längsrichtung der Sandwichplatte (1) verläuft und das am Befestigungselement (7) angebracht werden kann und das an seiner Außenkante (15) im Wesentlichen komplementär zur Form der Außenoberfläche der Federkante (5) der äußeren Oberflächenplatte (2) geformt ist und das in eine Klemmbefestigung mit der Federkante (5) eingreifen kann, um das Befestigungselement (7) an der äußeren Oberflächenplatte (2) zu befestigen.

2. Sandwichplatte (1) und Befestigungsvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Befestigungselement (7) ferner mit Eingriffsschlitzen (11) geformt ist und dass das Klemmelement (14) an seiner innersten Kante mit Verriegelungsnasen (16) ausgestattet ist, die in die Eingriffsschlitze (11) des Befestigungselements (7) eingeführt werden können.

3. Sandwichplatte (1) und Befestigungsvorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Verriegelungsnasen (16) des Klemmelements (14) im Querschnitt des Klemmelements hakenförmig sind.

4. Sandwichplatte (1) und Befestigungsvorrichtung nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** ein Verbindungsbereich zwischen den Anschlussflächen des Randabschnitts (15) des Klemmelements (14) und der angrenzenden Nut-und-Federkante der Sandwichplatte mit einer Schicht Klebstoff versehen wird, bevor die Sandwichplatten mittels einer Nut-und-Feder-Verbindung miteinander in Eingriff gebracht werden.

Revendications

1. Unité de construction en sandwich (1) et dispositif de fixation pour fixer ladite unité de construction en sandwich (1) sur une structure support, ladite unité de construction comprenant un élément de noyau (4) en matériau isolant thermiquement et des films surfaciques (2, 3) sur ses deux surfaces majeures, lesdits films surfaciques étant fixés à l'élément de noyau au moyen d'un agent liant sur les surfaces majeures opposées de l'élément de noyau, chacun desdits films surfaciques ayant au moins un de ses bords équipé d'une languette (5) et son extrémité opposée respective équipée d'une rainure (6) et lesdites unités de construction pouvant être montées sur un mur de manière à ce que lesdites languettes et rainures (5, 6) des unités de construction adjacentes soient placées les unes contre les autres afin de créer un joint à languette et rainure entre les unités de construction, ledit dispositif comprenant un élément de fixation semblable à une plaque (7) qui s'étend dans un sens longitudinal de l'unité de construction et est disposé sur le côté étroit (13) de l'unité de construction (1) pourvu de bords à languette et rainure et qui, dans son sens latéral, s'étend sur une partie de la largeur dudit côté étroit (13), ledit élément de fixation (7) étant conformé dans sa section de bord extérieur de manière appropriée pour s'engager sous le côté languette (5) du film surfacique extérieur (2), ledit élément de fixation étant conformé avec au moins un retrait (9) destiné à y faire passer les éléments de fixation de l'unité de construction

(12) vers une structure support, **caractérisée en ce que** le dispositif comprend en plus élément de serrage (14) qui s'étend dans un sens longitudinal de l'unité de construction (1) et qui peut être rattaché à l'élément de fixation (7) et lequel élément de serrage (14) est formé dans son bord extérieur (15) de manière à être sensiblement complémentaire à la forme de la surface extérieure du bord à languette (5) du film surfacique extérieur (2) et lequel élément de serrage (14) peut s'engager en liaison de serrage dans ledit bord à languette (5) pour fixer l'élément de fixation (7) sur le film surfacique extérieur (2).

2. Unité de construction en sandwich (1) et dispositif de fixation selon la revendication 1, **caractérisé en ce que** l'élément de fixation (7) est par ailleurs conformé avec des fentes d'engagement (11) et que l'élément de serrage (14), à son bord situé le plus à l'intérieur, est équipé de pattes de verrouillage (16) qui peuvent être insérées dans lesdites fentes d'engagement (11) de l'élément de fixation (7).
3. Unité de construction en sandwich (1) et dispositif de fixation selon la revendication 2, **caractérisé en ce que** les pattes de verrouillage (16) de l'élément de serrage (14) sont réalisées en forme de crochets dans la section transversale de l'élément de serrage.
4. Unité de construction en sandwich (1) et dispositif de fixation selon l'une quelconque des revendications 1 à 3, **caractérisé en ce qu'une** zone de jointure entre les surfaces coïncidentes de la section de bord (15) de l'élément de serrage (14) et le bord à languette et rainure de l'unité de construction adjacente est appliquée avec une couche d'adhésif avant l'engagement des unités de construction les unes dans les autres au moyen d'un joint à languette et rainure.

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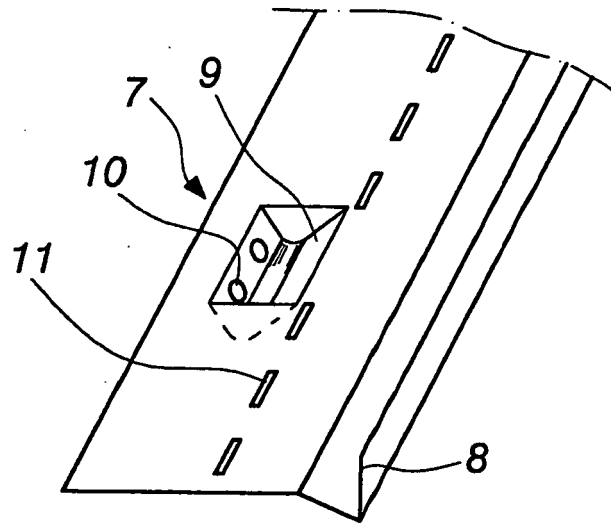


Fig. 1

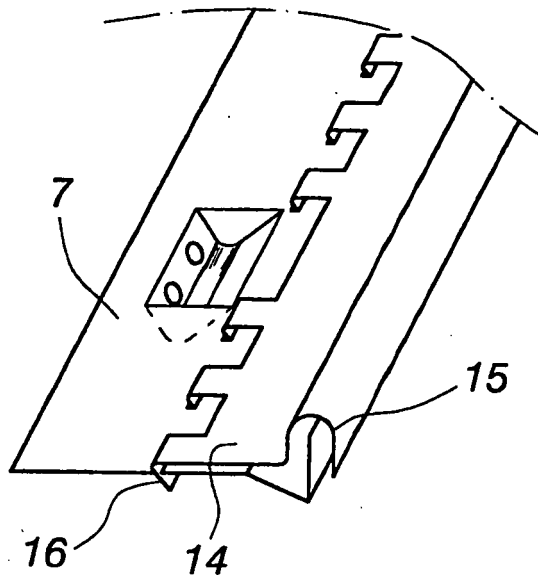


Fig. 2

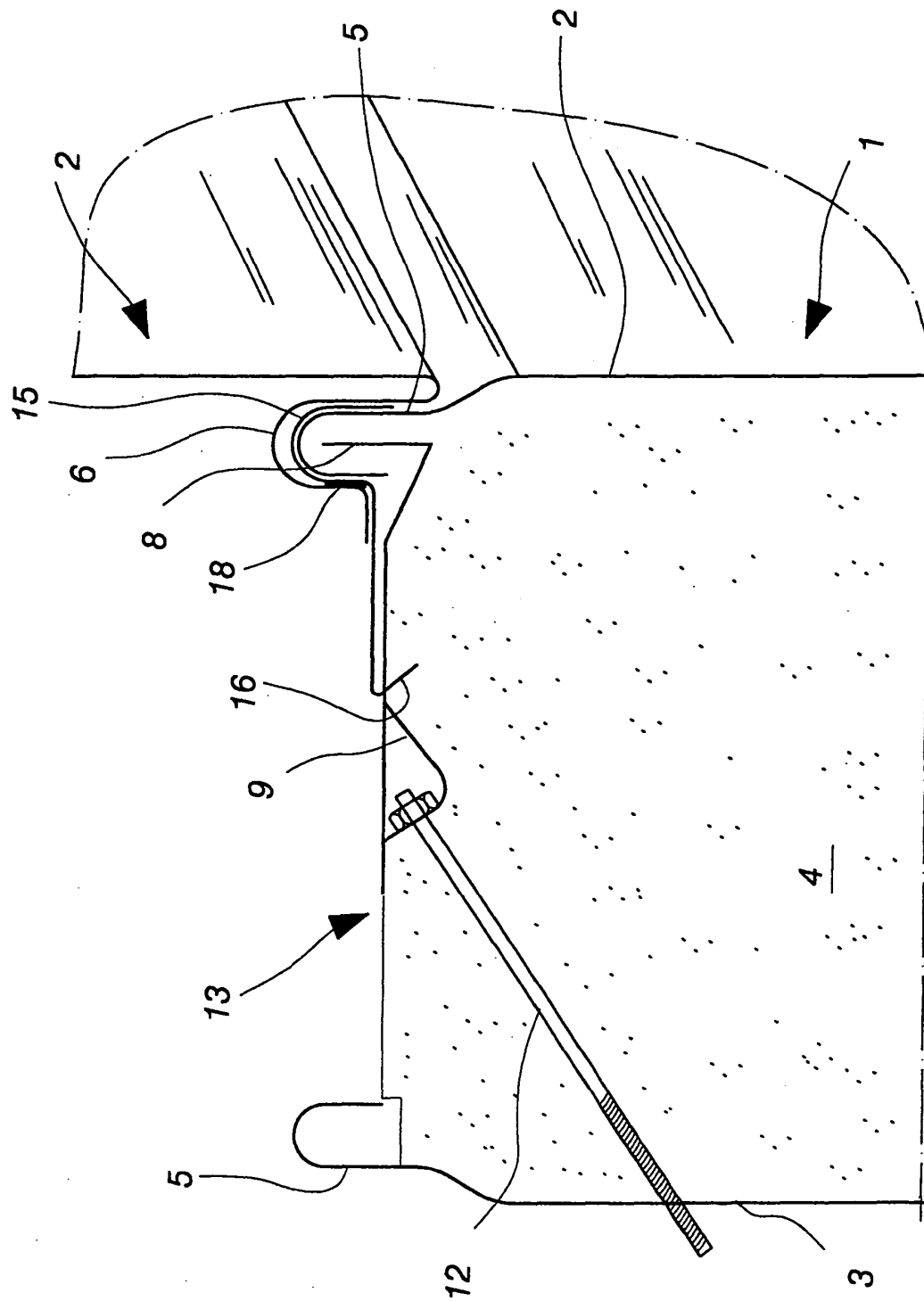


Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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