(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 905 330 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
11.01.2006 Bulletin 2006/02

(51) Int Cl.:
E04B 2/74 *(2006.01)* ***E04F 13/08*** *(2006.01)*

(21) Application number: **98117401.4**

(22) Date of filing: **14.09.1998**

(54) **Connection device for infill panels**

Befestigungsteil für Ausfachungstafeln

Fixation pour panneaux de remplissage

(84) Designated Contracting States:
AT CH DE ES FR GB LI PT
Designated Extension States:
RO

(30) Priority: **26.09.1997 IT MI972193**

(43) Date of publication of application:
31.03.1999 Bulletin 1999/13

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(56) References cited:
EP-A- 0 091 858
DE-A- 2 803 709
FR-A- 2 206 772

EP 0 905 330 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] This invention relates to devices for connecting together a supporting layer and a supported layer, separated by continuous insulation or by an air chamber, in infill panels, in accordance with the pre-characterising part of the respective independent claims.

[0002] A device of this kind has been disclosed in EP-A-0 091 858.

[0003] To connect the outer and inner layers together, it is known in the art to use a single support device positioned at the barycentre of the suspended layer in order to maintain continuous insulation without thermal bridges and avoid making between the two layers a rigid connection which would result in both temperature variation and unacceptable deformation in the plane in which the panel lies. This device must be able not only to support the entire weight of the supported layer, but also to resist the inevitable torsion to which the outer layer is subjected during removal from the mould, handling and installation. In this respect, the panel produced lies horizontally during its removal from the mould whereas it lies vertically with its longer side horizontal during storage, and during installation can undergo a vertical 90° rotation so that the longer side lies vertically.

[0004] The known support device, which passes through the entire thickness of the insulation to rigidly connect the outer layer to the inner layer only at one point, requires the provision of a plurality of "lacing" members in the form of retention elements inserted into the casting to prevent the two layers separating from each other while enabling them to slide to a limited extent due to temperature variation.

[0005] It should be noted that because of the presence of a central connection member between the layers , numerous retention elements have to be positioned a short distance from each other to allow the panel to be removed from the mould and handled. The central connection device and the perimetral retention devices have numerous drawbacks. The first is that relating to heat transmission. In this respect, because of the dimensions of the central device and the fact that it passes totally through the panel (ie the supporting, supported and intermediate layers), it creates a thermal bridge which generally considerably reduces the thermal insulation characteristics of the panel. In addition, essentially because of their large number the retention devices also cause further by no means negligible heat dispersion. A further drawback of the known connection system relates to the fact that, depending on the thickness of the supported and supporting layers and of the insulating layer, support and retention devices constructed and sized for the purpose must be used. It is therefore necessary to produce support and retention devices of different dimensions to satisfy design specifications. This inevitable affects the order time and involves the need to hold in store devices dimensioned for a vast range of thicknesses of the supporting, supported and insulating layers.

[0006] An object of this invention is to provide a system for connecting the two panel layers together which reduces heat dispersion to a minimum and uses support and retention devices of the same dimensions for any type of panel, ie which are designed for forming panels in which the supported layer, the supporting layer and the insulation of air chamber are of variable thickness. In addition to the support device, the connection system comprises a retention device allowing unidirectional movement plus retention devices able to withstand a considerable weight during removal from moulds and, whatever the insulation thickness, to always allow a high degree of movement between the two layers (ie movements of the order of 2 cm, which are normal for the temperature difference between the outside and inside in panels of more than 10 metres in height), so as to drastically reduce the number of retention devices compared with the known art, but without any loss in functionality.

[0007] This and further objects which will be apparent to an expert of the art are attained by a connection system consisting of a support device which can also become a unidirectional sliding device, and by retention devices in accordance with the characterising part of the independent claims.

[0008] The invention will be more apparent from the accompanying drawings, which are provided by way of non-limiting example and on which:

Figures 1 and 2 are schematic front views of a panel of the invention positioned vertically and horizontally respectively;

Figures 3 and 4 are schematic sections through two support devices of the invention, taken on the lines 3/3 and 4/4 of Figure 2 respectively;

Figures 5A-C are three mutually perpendicular schematic views of a first support device;

Figure 6 is a schematic view from above of a second support device;

Figures 7A, 8 are respectively a schematic front view and a section on the line 7B/7B of Figure 6, showing a guide element for the second support device;

Figure 8 is a partly sectional schematic view of a retention device of the invention;

Figure 9 is a schematic section through the retention device taken on the line 9/9 of Figure 2.

[0009] Figures 1-4 show a prefabricated infill panel comprising a supported outer layer 1, a supporting inner layer 2, and an insulating intermediate layer 3. The panel layers are separated by continuous insulation or a thermal cut-off and are constructed of usual materials for this purpose, such as concrete or other similar material. The insulating layer is constructed for example of a polystyrene or polyurethane insulating material, or is in the form of a ventilated air chamber or a combination of insulation and an air chamber. Advantageously, the supporting layer 2 can also comprise a lightening insert 2A, for example polystyrene. To secure the layers 1 and 2 together the

panel comprises fixed support devices (Figures 3 and 5A-C), support devices partly slidable unidirectionally (Figures 4, 6, 7A, 78), and retention devices 6 (Figures 8, 9). The fixed support devices 4 comprise a substantially pin-shaped body 8 (Figures 5B, 5C), for example a 40 mm diameter rod of galvanized or stainless steel. In the present contest the term "pin" means an elongate body with a cross-section of any polygonal shape (circular in the example).

[0010] At that end 8A to be embedded in the supporting layer 2, the pin-shaped body 8 comprises a recessed annular portion 7 (Figures 5B, 5C) for improving the anchoring of the body within the panel. At the other end 8B of the body 8 there is provided a T-shaped (in front view) fixing head 9 of greater width L than the pin diameter D and joined lowerly to the pin body 8. The head 9, which has a greater surface area than the body of the pin, performs simultaneously the function of distributing the weight of the outer layer over a greater metal surface and of anchoring the device to the suspended layer.

[0011] If the static calculations require it, a concrete reinforcement element 10, which is in the form of a spring in the example (Figures 3, 4, 6), can be secured to the pin body 8. In the described embodiment, this element rests against a disc 11 (Figure 6) which before the supporting layer is cast can slide along the body of the fixed pin and abut against the inner wall 3A of a pocket 3B provided in the insulating material. As shown in Figures 3 and 4, for correct fixing of the pin into the supporting panel 2, that portion T (Figure 6) of the body 8 lying between the disc 11 and the end 8A must be totally embedded in the concrete. For this purpose, if necessary, a part of the insulating layer is removed in order to form the pockets 3B (as shown in Figures 3 and 4). In this manner, the pin always has a fixed nominal loading capacity, independently of the thickness of the insulating layer.

[0012] It should also be noted that, as shown in Figure 3, the pin does not totally pass through either the supported panel 1 or the supporting panel 2, but penetrates into and engages only a distance M of the thickness S1 of the supported panel and in addition has an insulating disc at its front. In this manner the pin reduces to a minimum the "thermal bridge" between the outside and inside of the construction element, to ensure a more effective thermal insulation the known devices.

[0013] The support device with unidirectional sliding 5 comprises a body 8 identical to that of the aforedescribed device 4, the head 9 being however inserted into a rectilinear guide 12 having a C-shaped profile to engage the head 9 of the pin, so that when installed the pin is able to undergo a longitudinal movement along the guide, but not a transverse movement relative to the guide.

[0014] When the head 9 has been inserted into the central part of the guide 12, this latter is filled with a conventional foam able to prevent the guide becoming filled with concrete. The guide and its relative associated pin are then embedded in the supporting panel with the guide arranged parallel to the longer side of the panel, for example along the central line L (Figures 1 and 2).

[0015] By virtue of this device, the supported layer can freely expand longitudinally, without any deformation of the entire panel due to prevented expansion, and which remains always supported by the support devices. In the case of a vertical panel, as in Figure 1, the supported panel can be connected for example by providing two fixed connection pins 4, which carry all the weight of the supported layer in two central positions indicated by the arrows C, and two unidirectional sliding pins 5 in two more extreme positions, indicated by the arrows E, but lying on the same longitudinal line L on which the fixed pins are provided.

[0016] In the case of horizontal panels, as in Figure 2, it is sufficient to provide a single central fixed device (indicated by the arrow C'), in addition to the unidirectional sliding devices 4 in the positions E. This is because in this case the unidirectional sliding devices are also supporting.

[0017] The retention devices 6 comprise substantially a flexible cable 13, for example of 4 mm diameter stainless steel, bent to form an eyelet 13' and closed for this purpose by a ring or splice 14.

[0018] A central portion of the cable is housed in a plastic tube 15. This tube is pointed at one end, and at its other end comprises a collar 15A acting as a stop for a cylindrical spacer 16 mounted on the tube and constructed of a yieldable and easily cut material, such as polystyrene. The ends of the cable 13 could also be untwisted (as in Figure 9). The spacer 16, of previously adjustable depth, enables the device to be accurately positioned relative to the position of the insulation. It should also be noted that the use of a stainless steel cable instead of a stainless steel rod as in the known art offers a much higher resistance to traction and does not present the problem of fatigue due to the daily temperature cycles, so allowing larger displacement of the supported layer relative to the supporting layer. Moreover, for equal performance, the number of retention devices required is much reduced, with considerable saving both in working time and in material cost. The smaller number of retention devices results in reduced heat dispersion. Moreover, as can be seen from Figure 9, the retention devices are of fixed dimensions, and hence independent of the insulation thickness. In this respect, the dimensions of the spacer 16 can be modified if the thicknesses of the layers 1, 2, 3 makes it necessary.

[0019] By virtue of the connection system formed by the fixed support devices 4, the sliding support devices 5 and the retention devices 6, according to the invention, panels can be formed which do not deform outwards, and offer high insulation and/or ventilation, with thermal bridges absent. The same support and retention devices 6 can also be used on panels of different supported layer, supporting layer and insulating layer thicknesses.

[0020] Both the connection devices 4 and 5 and the retention devices 6, according to the invention, could also be used in combination with retention devices or support

devices of the known art respectively.

[0021] Finally, it should be noted that the aforedescribed embodiment is provided by way of non-limiting example and that numerous modifications are possible all falling within the same inventive concept, for example the form of the head 9 or of the anchoring end 7 could be different from that illustrated, and the spring 10 could be replaced by other reinforcement elements conventional to the expert of the art, for example one or more lugs extending from the body 8. In addition, instead of in the guide 12 the head 9 could be inserted in a rectilinear element of yieldable material, for example a polystyrene parallelepiped having substantially the same dimensions as the guide 12. Finally, the cable 13 could be replaced by another conventional element suitable for the purpose, for example flexible braiding.

Claims

1. A retention device for infill panels, particularly of prefabricated type constructed of concrete or similar material, which comprise a supported outer layer (1), a continuous intermediate insulating layer (3) and a supporting inner layer (2), the device being arranged to connect the supported outer (1) and the supporting inner (2) layers together, **characterised by** comprising at least one flexible cable (13) formed in such a manner as to be able to be anchored into the supported layer (1) and into the supporting laye (2).

2. A device as claimed in claim 1, **characterised in that** the cable (13) is bent to form an eyelet (13)' at one end and comprises an element (14) for closing said eyele: and for acting as a stop for a tubular element (15) in which part of said cable is inserted.

3. A device as claimed in claim 1, **characterised in that** a spacer element (16) is mounted about that portion of the cable (13) embedded in the supporting layer (2).

4. A device as claimed in claim 3, **characterised in that** the spacer element (16) is formed in such a manner as to be able to vary its dimensions so that it can be adapted to various thicknesses of the panel insulating layer (3).

5. A device as claimed in claim 2, **characterised in that** the tubular element (15) has one of its ends pointed, to enable it to be inserted into the insulating layer (3).

6. A device according to claim 1, **characterised by** further comprising a pin (8) to be inserted into the supported outer (1) and the supporting inner (2) layers and into the insulating layer (3) and be embedded at least in the supporting layer, and by being formed in such a manner as to be able to support the weight of the supported layer (1) or support the weight of the supported layer (1) and to allow the supported layer (1) to slide unidirectionally relative to the supporting layer (2).

7. A device as claimed in claim 6, **characterised in that** at an end (8B) inserted into the supported layer the pin (8) comprises a head (9) formed in such a manner as to be able to act both as an anchoring element when the head is embedded in the concrete of the supported layer (1), and as a slidable element when said head is associated with a guide element (12) embedded in the concrete of the supported layer (1).

8. A device as claimed in claim 7, **characterised in that** the head (9) has greater transverse dimensions than the transverse dimensions of the pin.

9. A device as claimed in claim 8, **characterised in that** the head (9) is substantially of T-shape.

10. A device as claimed in claim 7, **characterised in that** the guide element (12) has a profile of substantially C-shaped cross-section enabling the head (9) of the pin (8) to slide unidirectionally.

11. A device as claimed in claim 7, **characterised in that** the guide element (12) comprises a rectilinear insert constructed of yieldable material.

12. A device as claimed in claim 6, **characterised in that** in correspondence with that portion embedded in the supporting layer (2), the pin (8) comprises a concrete reinforcement element (10) connected to the body of the pin and extending from said body.

13. A device as claimed in claim 12, **characterised in that** the reinforcement element comprises a spring (10) slideable along the body of the pin (8).

14. A device as claimed in claim 6, **characterised in that** in correspondance with that portion thereof embedded in the supporting layer (2), the pin (8) comprises anchoring means (7).

15. A device as claimed in claim 14, **characterised in that** at an end (8A) of the pin (8) inserted into the supported panel (2), the anchoring means comprise a recessed portion (7).

16. A device as claimed in claim 6, **characterised in that** the pin (8) is shaped in such a manner that its ends 9, BA) lie completely within the interior of the inserting in said inner and outer layer, and are invisible from the exterior of the construction element.

17. A device as claimed in claim 6, **characterised in that** the pin (8) has a substantially cylindrical body (8).

18. A retention method for infill panels, particularly of prefabricated type constructed of concrete or similar material, which comprise a supported outer layer (1), a continuous intermediate insulating layer (3) and a supporting inner laye-(2), wherein the supported outer (1) and the supporting inner (2) layers are connected together, **characterised by** inserting in said inner and outer layer at least one flexible cable (13) formed in such a manner as to be able to be anchored into the supported layer (1) and into the supporting layer (2).

19. A method as claimed in claim 18, **characterised in that** the cable (13) is bent to form an eyelet (13)' a one end and comprises an element (14) for closing said eyelet and for acting as a stop for a tubular element (15) in which part of said cable is inserted.

20. A method as claimed in claim 18, **characterised by** mounting a spacer element (16) about that portion of the cable (13) embedded in the supporting layer (2).

21. A method as claimed in claim 20, **characterised in that** the spacer element is formed in such a manner as to be able to vary its dimensions so that it can be adapted to various thicknesses of the panel insulating layer (3).

22. A method claimed in claim 19, **characterised in that** the tubular element (15) has one of its ends pointed, to enable it to be inserted into the insulating layer (3).

23. A method according to claim 18, **characterised by** securing the supported layer and supporting layer (1, 2) together by at least a first fixed central pin (4) embedded in the supported outer (1) and supporting inner (2) layers, and passing through the insulating layer (2), such that the ends of said pin lie within said layers, and at least one second pin (8) having one portion embedded in the supporting layer (2) and another portion arranged to slide unidirectionally within a guide element (12) embedded in the supported layer (1).

24. A method as claimed in claim 23, **characterised in that** the 24. two pins, namely the fixed pin (9) and the slidable pin (8), are positioned along a longitudinal line (L) of the construction element, the slide means being positioned in such a manner as to allow at least partial sliding of the supported panel (1) along a direction parallel to said longitudinal line (L).

25. A method as claimed in claim 23, **characterised in that** the fixed and slidable pins (4, 8) are embedded in the supported outer (1) and supporting inner (2) layers in such a manner as to be invisible from the exterior of the construction element.

26. A method as claimed in claim 23, **characterised in that** within the insulating layer (3), in correspondence with the pins (4), there is provided a pocket (38) in order to be able to vary that pin portion (T) embedded in the supporting layer (2) and to be able to use one and the same pin for panels having different layer thicknesses.

Patentansprüche

1. Halteeinrichtung für Füllplatten, insbesondere solcher von vorgefertigter Art, die aus Beton oder ähnlichem Material hergestellt sind und eine unterstützte äußere Schicht (1), eine kontinuierliche mittlere Isolierschicht (3) und eine innere unterstützende Schicht (2) aufweisen, wobei die Einrichtung dazu ausgestaltet ist, die unterstützte äußere (1) und die unterstützende innere (2) Schicht miteinander zu verbinden, **dadurch gekennzeichnet, dass** sie wenigstens ein flexibles Seil (13) aufweist, das in solcher Weise gebildet ist, um in der unterstützten Schicht (1) und in der unterstützenden Schicht (2) verankert werden zu können.

2. Einrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Seil (13) gebogen ist, um eine Öse (13) an einem Ende zu bilden, und ein Element (14) aufweist, um die Öse zu schließen und um als Stopper für ein röhrenförmiges Element (15) zu wirken, in das ein Teil des Seils eingeführt ist.

3. Einrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Abstandshalteelement (16) um denjenigen Bereich des Seils (13) angebracht ist, der in der unterstützenden Schicht (2) eingebettet wird.

4. Einrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** das Abstandshalteelement (16) in einer solchen Weise gebildet ist, um in der Lage zu sein, um seine Abmessungen zu variieren, so dass es an verschiedene Dicken der Isolierschicht (3) der Platte angepasst werden kann.

5. Einrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** ein Ende des röhrenförmigen Elements (15) zugespitzt ist, damit es in die Lage versetzt ist, in die Isolierschicht (3) eingeführt zu werden.

6. Einrichtung nach Anspruch 1, weiter **dadurch gekennzeichnet, dass** sie einen Stift (8) aufweist, der

in die unterstützte äußere (1) und die unterstützende innere (2) Schicht und in die Isolierschicht (3) einzusetzen ist und wenigstens in der unterstützenden Schicht einzusetzen ist, und dass sie in einer solchen Weise geformt ist, um in der Lage zu sein, das Gewicht der unterstützten Schicht (1) zu unterstützen oder das Gewicht der unterstützten Schicht (1) zu unterstützen und der unterstützten Schicht (1) zu erlauben, in einer Richtung relativ zu der unterstützenden Schicht (2) zu gleiten.

7. Einrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** ein in die unterstützte Schicht eingesetztes Ende (88) des Stifts (8) einen Kopf (9) aufweist, der in solcher Weise gebildet ist, um in der Lage zu sein, um sowohl als Verankerungselement zu dienen, wenn der Kopf in dem Beton der unterstützten Schicht (1) eingebettet ist, und als ein gleitfähiges Element zu dienen, wenn der Kopf einem Führungselement (12) zugeordnet ist, das in dem Beton der unterstützten Schicht (1) eingebettet ist.

8. Einrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** der Kopf (9) größere Querabmessungen hat als die Querabmessungen des Stifts.

9. Einrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** der Kopf (9) im Wesentlichen T-Form hat.

10. Einrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** das Führungselement (12) ein Profil mit im Wesentlichen C-förmigen Querschnitt hat, was es dem Kopf (9) des Stifts (8) ermöglicht, in einer Richtung zu gleiten.

11. Einrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** das Führungselement (12) einen rechtwinkligen Einsatz aufweist, der aus einem nachgiebigen Material hergestellt ist.

12. Einrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** entsprechend dem Bereich, der in die unterstützende Schicht (2) eingebettet ist, der Stift (8) ein Betonverstärkungselement (10) aufweist, das mit dem Körper des Stifts verbunden ist und von dem Körper absteht.

13. Einrichtung nach Anspruch 12, **dadurch gekennzeichnet, dass** das Verstärkungselement eine Feder (10) aufweist, die gleitfähig entlang des Körpers des Stifts (8) angeordnet ist.

14. Einrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** entsprechend dem Bereich des Stiftes, der in der unterstützenden Schicht (2) eingebettet ist, der Stift ein Verankerungsmittel (7) aufweist.

15. Einrichtung nach Anspruch 14, **dadurch gekennzeichnet, dass** an einem in die unterstützte Platte (2) eingesetzten Ende (8A) des Stiftes (8) das Verankerungsmittel einen verengten Bereich (7) aufweist.

16. Einrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** der Stift (8) in einer solchen Weise geformt ist, dass seine Enden (9, 8A) vollständig im inneren der unterstützten äußeren (1) und der unterstützenden inneren (2) Schicht liegen und von außerhalb des Konstruktionselements unsichtbar sind.

17. Einrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** der Stift (8) einen im Wesentlichen zylindrischen Körper (8) hat.

18. Verfahren zum Halten von Füllplatten, insbesondere solchen vom vorgefertigten Typ, der aus Beton oder ähnlichem Material hergestellt ist, die eine unterstützte äußere Schicht (1), eine kontinuierliche mittlere Isolierschicht (3) und eine unterstützende innere Schicht (2) aufweisen, wobei die unterstützte äußere (1) und die unterstützende innere (2) Schicht miteinander verbunden sind, **gekennzeichnet durch** Einsetzen wenigstens eines flexiblen Seils (13) in die innere und äußere Schicht, wobei das Seil in einer solchen Weise gebildet ist, dass es in der unterstützten Schicht (1) und in der unterstützenden Schicht (2) verankert werden kann.

19. Verfahren nach Anspruch 18, **dadurch gekennzeichnet, dass** das Seil (13) gebogen ist, um eine Öse (13) an einem Ende zu bilden und um als Stopper für ein röhrenförmiges Element (15) zu wirken, in das ein Teil des Seils eingeführt ist.

20. Verfahren nach Anspruch 18, **gekennzeichnet durch** Anbringen eines Abstandshalterelement (16) um denjenigen Bereich des Seils (13), der in die unterstützte Schicht (2) eingebettet wird.

21. Verfahren nach Anspruch 20, **dadurch gekennzeichnet, dass** das Abstandshalterelement so gebildet ist, dass seine Abmessungen variiert werden können, so dass es an verschiedene Dicken der Plattenisolationsschicht (3) anpassbar ist.

22. Verfahren nach Anspruch 19, **dadurch gekennzeichnet, dass** das röhrenförmige Element (15) an einem seiner Enden angespitzt ist, um es in die Lage zu versetzen, in die Isolationsschicht (3) eingeführt zu werden.

23. Verfahren nach Anspruch 18, **gekennzeichnet durch** das Befestigen der unterstützten Schicht und der unterstützenden Schicht (1, 2) aneinander **durch** wenigstens einen ersten fixierten Mittelstift

(4), der in die unterstützte äußere (1) und die unterstützende innere (2) Schicht eingebettet ist und **durch** die Isolierschicht (2) verläuft, so dass die Enden des Stiftes innerhalb der Schichten liegen, und **durch** wenigstens einen zweiten Stift (8), der einen in die unterstützende Schicht (2) eingebetteten Bereich und einen anderen Bereich hat, der dazu ausgestaltet ist, in einer Richtung innerhalb eines Führungselements (12) zu gleiten, das in die unterstützte Schicht (1) eingebettet ist.

24. Verfahren nach Anspruch 23, **dadurch gekennzeichnet, dass** die zwei Stifte, nämlich der fixierte Stift (4) und der gleitfähige Stift (8) entlang einer Längslinie (L) des Konstruktionselements angeordnet sind, wobei die Gleiteinrichtung in der Weise positioniert ist, dass wenigstens ein teilweises Gleiten der unterstützten Schicht (1) entlang einer Richtung parallel zu der Längslinie (L) möglich ist.

25. Verfahren nach Anspruch 23, **dadurch gekennzeichnet, dass** der fixierte und der gleitfähige Stift (4, 8) in der unterstützten äußeren (1) und der unterstützenden inneren (2) Schicht in einer solchen Weise eingebettet sind, dass sie von außerhalb des Konstruktionselements unsichtbar sind.

26. Verfahren nach Anspruch 23, **dadurch gekennzeichnet, dass** innerhalb der Isolierschicht (3), entsprechend mit den Stiften (4), eine Tasche (38) vorgesehen ist um zu ermöglichen, den in die unterstützende Schicht (2) eingebetteten Stiftbereich (T) zu variieren, und um zu ermöglichen, den gleichen Stift für Platten mit unterschiedlichen Schichtdicken zu verwenden.

Revendications

1. Dispositif de retenue pour panneaux de remplissage, en particulier du type préfabriqué construit en béton ou en un matériau similaire, qui comprend une couche extérieure supportée (1), une couche d'isolation intermédiaire continue (3) et une couche intérieure de support (2), le dispositif étant agencé pour relier ensemble la couche extérieure supportée (1) et la couche intérieure de support (2), **caractérisé en ce qu'**il comprend au moins un câble souple (13) formé de manière à pouvoir être ancré dans la couche extérieure supportée (1) et dans la couche intérieure de support (2).

2. Dispositif selon la revendication 1, **caractérisé en ce que** le câble (13) est plié pour former un oeillet (13') à une extrémité et comprend un élément (14) pour fermer ledit oeillet et pour servir de butée pour un élément tubulaire (15) dans lequel est insérée une partie dudit câble.

3. Dispositif selon la revendication 1, **caractérisé en ce qu'**un élément d'écartement (16) est monté autour de la partie du câble (13) encastrée dans la couche de support (2).

4. Dispositif selon la revendication 3, **caractérisé en ce que** l'élément d'écartement (16) est formé de manière à pouvoir faire varier ses dimensions pour qu'il puisse être adapté à différentes épaisseurs de la couche d'isolation de panneau (3).

5. Dispositif selon la revendication 2, **caractérisé en ce que** l'une des extrémités de l'élément tubulaire (15) est pointue pour permettre son insertion dans la couche d'isolation (3).

6. Dispositif selon la revendication 1, **caractérisé en ce qu'**il comprend, en outre, une tige (8) à insérer dans la couche extérieure supportée (1) et dans la couche intérieure de support (2) et dans la couche d'isolation (3) et à encastrer au moins dans la couche de support, et **en ce qu'**il est formé de manière à pouvoir supporter le poids de la couche supportée (1) et à permettre à la couche supportée (1) de coulisser unidirectionnellement par rapport à la couche de support (2).

7. Dispositif selon la revendication 6, **caractérisé en que**, à une extrémité (88) insérée dans la couche supportée, la tige (8) comprend une tête (9) formée de manière à pouvoir servir à la fois d'élément d'ancrage lorsque la tête est encastrée dans le béton de la couche supportée (1) et d'élément coulissant lorsque ladite tête est associée avec un élément de guidage (12) encastré dans le béton de la couche supportée (1).

8. Dispositif selon la revendication 7, **caractérisé en ce que** la tête (9) a des dimensions transversales supérieures aux dimensions transversales de la tige.

9. Dispositif selon la revendication 8, **caractérisé en ce que** la tête (9) a une forme sensiblement en T.

10. Dispositif selon la revendication 7, **caractérisé en ce que** l'élément de guidage (12) a un profil présentant une section transversale sensiblement en forme de C permettant à la tête (9) de la tige (8) de coulisser unidirectionnellement.

11. Dispositif selon la revendication 7, **caractérisé en ce que** l'élément de guidage (12) comprend une pièce d'insertion rectiligne constituée d'un matériau déformable.

12. Dispositif selon la revendication 6, **caractérisé en ce que**, en correspondance avec la partie encastrée dans la couche de support (2), la tige (8) comprend

un élément d'armature à béton (10) raccordé au corps de la tige et s'étendant à partir dudit corps.

13. Dispositif selon la revendication 12, **caractérisé en que** l'élément d'armature comprend un ressort (10) coulissant le long du corps de la tige (8).

14. Dispositif selon la revendication 6, **caractérisé en ce que**, en correspondance avec sa partie encastrée dans la couche de support (2), la tige (8) comprend un moyen d'ancrage (7).

15. Dispositif selon la revendication 14, **caractérisé en ce que**, à une extrémité (8A) de la tige (8) encastrée dans le panneau supporté (2), le moyen d'ancrage comprend une partie évidée (7).

16. Dispositif selon la revendication 6, **caractérisé en ce que** la tige (8) a une forme telle que ses extrémités (9, 8A) se trouvent complètement à l'intérieur de la couche extérieure supportée (1) et de la couche intérieure de support (2) et sont invisibles de l'extérieur de l'élément de construction.

17. Dispositif selon la revendication 6, **caractérisé en ce que** la tige (8) a un corps sensiblement cylindrique.

18. Procédé de retenue pour panneaux de remplissage, en particulier du type préfabriqué construit en béton ou en matériau similaire, qui comprend une couche extérieure supportée (1), une couche d'isolation intermédiaire continue (3) et une couche intérieure de support (2), dans lequel la couche extérieure supportée (1) et la couche intérieure de support (2) sont reliées ensemble, **caractérisé par** l'insertion dans lesdites couches intérieures et extérieures, d'au moins un câble souple (13) formé de manière à pouvoir être ancré dans la couche extérieure supportée (1) et dans la couche intérieure de support (2).

19. Procédé selon la revendication 18, **caractérisé en ce que** le câble (13) est plié pour former un oeillet (13') à une extrémité et comprend un élément (14) pour fermer ledit oeillet et pour servir de butée pour un élément tubulaire (15) dans lequel est insérée une partie dudit câble.

20. Procédé selon la revendication 18, **caractérisé par** le montage d'un élément d'écartement (16) autour de la partie du câble (13) encastrée dans la couche de support (2).

21. Procédé selon la revendication 20, **caractérisé en ce que** l'élément d'écartement est formé de manière à pouvoir faire varier ses dimensions pour qu'il puisse être adapté à différentes épaisseurs de la couche d'isolation de panneau (3).

22. Procédé selon la revendication 19, **caractérisé en ce que** l'une des extrémités de l'élément tubulaire (15) est pointue pour permettre son insertion dans la couche d'isolation (3).

23. Procédé selon la revendication 18, **caractérisé par** la fixation de la couche supportée (1) et de la couche de support (2) ensemble à l'aide d'au moins une première tige fixe centrale (4) encastrée dans la couche extérieure supportée (1) et dans la couche intérieure de support (2) et passant à travers la couche d'isolation (2) de manière à ce que les extrémités de ladite tige se trouvent à l'intérieur desdites couches, et d'au moins une seconde tige (8) dont une partie est encastrée dans la couche de support (2) et une autre partie est agencée pour pouvoir coulisser unidirectionnellement à l'intérieur d'un élément de guidage (12) encastré dans la couche supportée (1).

24. Procédé selon la revendication 23, **caractérisé en ce que** les deux tiges, à savoir la tige fixe (4) et la tige coulissante (8), sont positionnées le long d'une ligne longitudinale (L) de l'élément de construction, le moyen coulissant étant positionné de manière à permettre un coulissement au moins partiel du panneau supporté (1) le long d'une direction parallèle à ladite ligne longitudinale (L).

25. Procédé selon la revendication 23, **caractérisé en ce que** la tige fixe (4) et la tige coulissante (8) sont encastrées dans la couche extérieure supportée (1) et dans la couche intérieure de support (2) de manière à être invisibles de l'extérieur de l'élément de construction.

26. Procédé selon la revendication 23, **caractérisé en ce que**, à l'intérieur de la couche d'isolation (3), en correspondance avec les tiges (4), il est prévu une poche (38) pour pouvoir faire varier la partie de tige (T) encastrée dans la couche de support (2) et pour pouvoir utiliser une seule et même tige pour des panneaux ayant des épaisseurs de couches différentes.

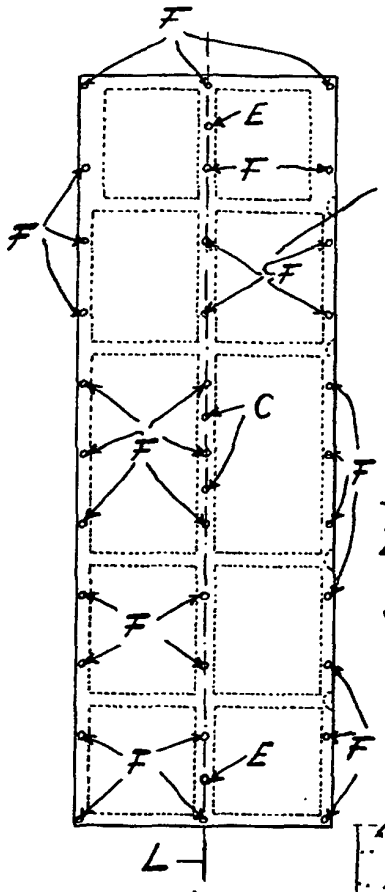

Fig. 1

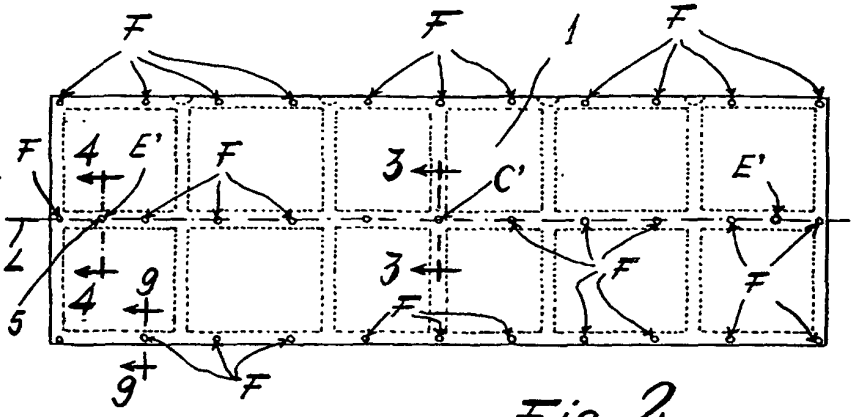

Fig. 2

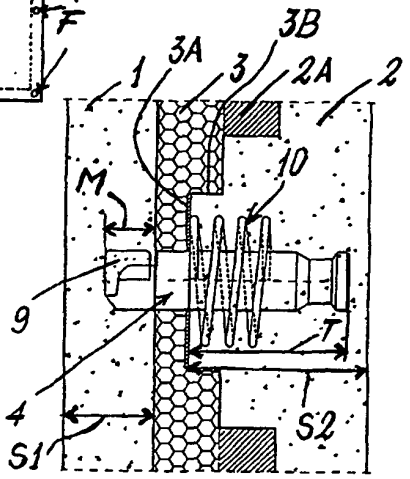

Fig. 3

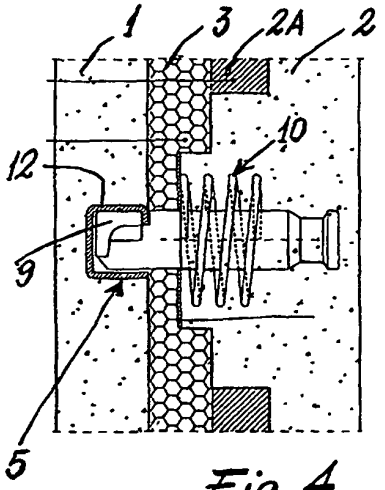

Fig. 4

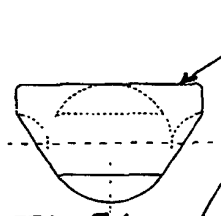

Fig. 5A

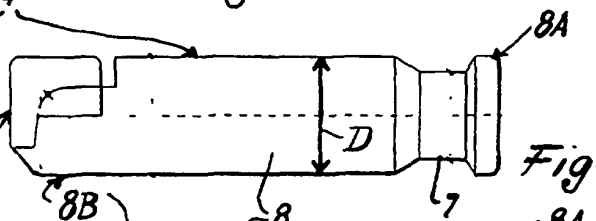

Fig. 5B

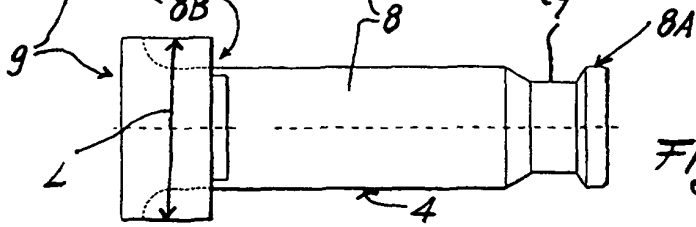

Fig. 5C

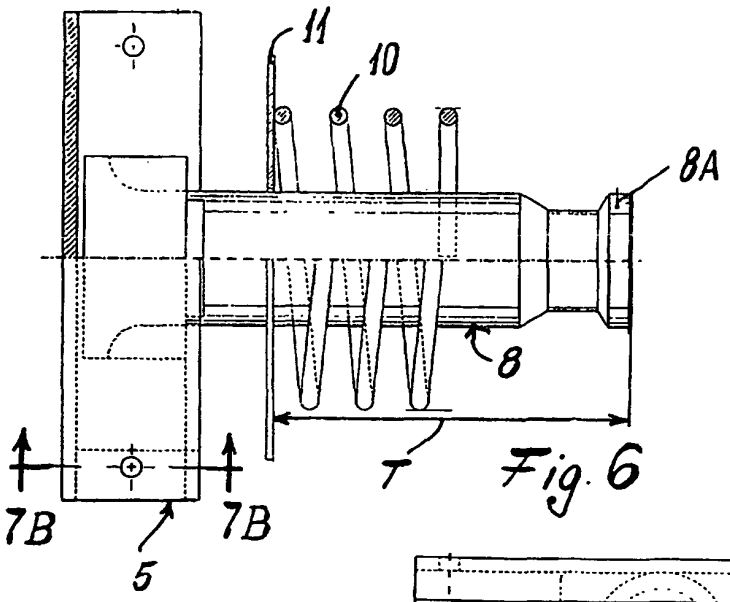

Fig. 6

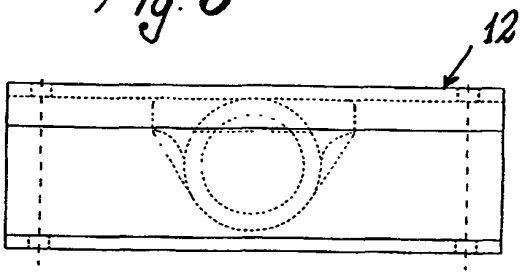

Fig. 7A

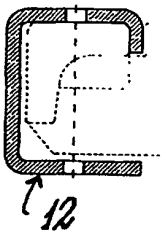

Fig. 7B

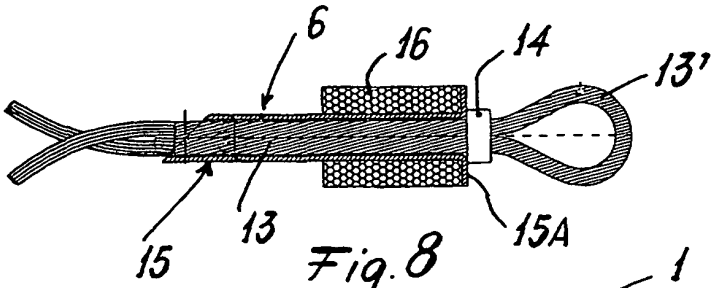

Fig. 8

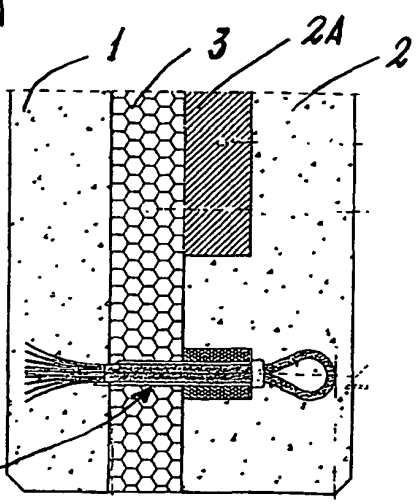

Fig. 9