United States Patent

Cremer et al.

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[54] **MEANS FOR ATTACHING SLABS AND TILES ON BUILDING STRUCTURES**

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[52] **U.S. Cl.** **52/235,** 52/384, 52/391, 52/395, 52/489

[51] **Int. Cl.** **E04f 13/08**

[58] **Field of Search**.....52/268, 285, 484, 489, 391, 52/395, 384, 480, 481, 496, 498, 502, 731, 235

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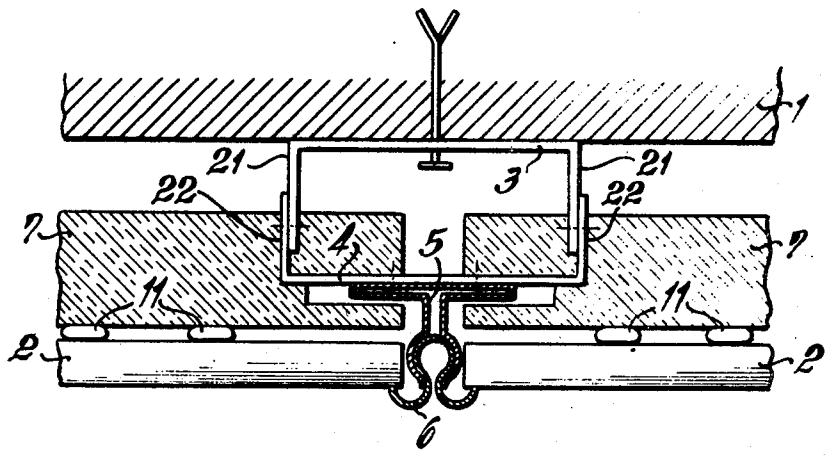
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[57] **ABSTRACT**

A method for attaching slabs or tiles of ceramic material on a building structure in which on lines on the building structure which are to be overlain by adjacent edges of tiles or slabs anchoring strips are attached which are of T-section. These anchoring strips have jaws or cheek pieces adapted to receive holding strips, also of T-section, which when fitted in the anchoring strips overlap adjacent edges of the tiles or slabs and hold them in place.

2 Claims, 7 Drawing Figures



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SHEET 1 OF 2

FIG. 1

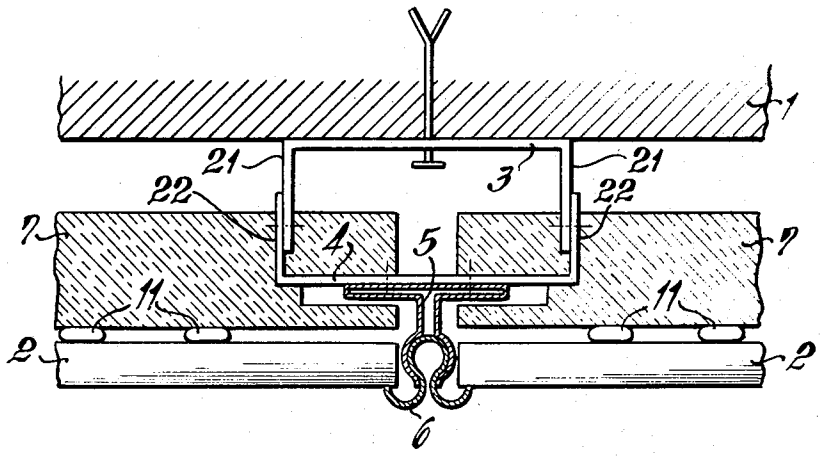
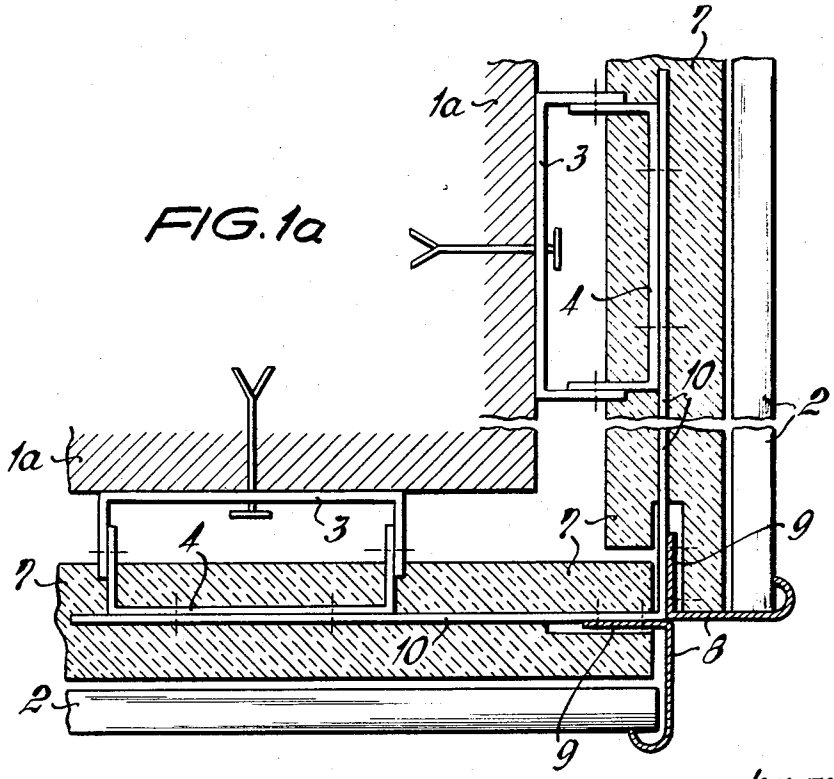


FIG. 1a



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FIG. 2b

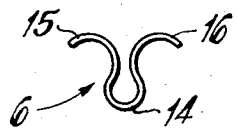


FIG. 2a

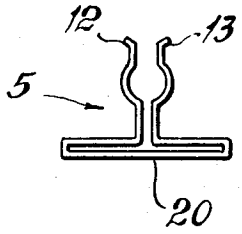


FIG. 4

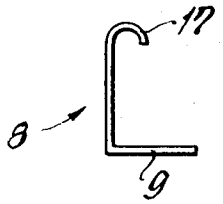


FIG. 3b

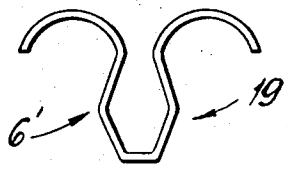
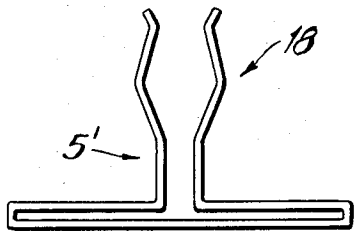


FIG. 3a



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MEANS FOR ATTACHING SLABS AND TILES ON BUILDING STRUCTURES

FIELD TO WHICH INVENTION RELATES

The present invention relates to the attachment of ceramic tiles and more particularly large ceramic surfacing slabs to a building structure. Preferably an intermediate space or air space is left between the rear side of the slab or tile and the building structure.

SUMMARY OF THE INVENTION

One object of the invention is to provide means for providing an attachment of slabs or tiles which makes it possible to replace the slabs or tiles at any time if they should be destroyed or damaged.

A further object of the invention is to provide a means for attaching slabs or tiles which meets all requirements as regards a slab or tile facade which has a ventilation space between it and the rest of the building and may, if required, be made air-tight.

A still further object of the invention is to provide an attachment means which provides for sealing the joints between the tile or slabs without hindering relative movement between them.

The attachment means in accordance with the invention is more particularly suitable for all wall and ceiling coverings which are spaced from the underlying or overlying building structure.

The present invention comprises a device for attaching slabs of ceramic material on a building structure comprising anchoring strips of T-section adapted for fixation to the building structure along lines to be overlain by the edges of the slabs, and T-section holding strips arranged to overlap the edges of the slabs to hold them in position and which extend between the edges of the slabs connect with the anchoring strips by to one of the strips fitting into the other so that the holding strips are held in position.

Preferably the anchoring strips are not directly attached to the building structure but on the web of a U-section girder or U-shaped cleat, whose limbs are connected with the limbs of a mounting cleat or girder of U-shaped section whose web or cross-piece is attached to the building structure.

The anchoring strips are preferably of folded sheet metal and are hollow.

A part of each holding strip is adapted to fit into the opening between jaw or cheek pieces of the anchoring strips. These male and female parts can be rounded in order to allow detachment of the holding strips from the anchoring strips more easily, though they can also be angular in section so that the gripping force is greater.

The holding strips can be made with wing-like flange portions so as to present a pleasing beading effect.

In accordance with a further development of the invention a L-section strip is provided for covering the free edges of the slabs of ceramic material, its upper edge being bent inwards in accordance with the construction of the holding strips.

DESCRIPTION OF SEVERAL VIEWS OF DRAWINGS

Embodiments of the invention are now described with reference to the accompanying drawings.

FIG. 1 shows a wall cladding structure held in place along a wall of a building in accordance with an embodiment of the present invention.

FIG. 1*a* shows a wall cladding structure held in place at the corner of a building in accordance with an embodiment of the present invention.

FIG. 2*a* is a cross-section through an anchoring strip used to hold the wall cladding structure in place along a wall of a building.

FIG. 2*b* shows a holding strip in cross-section to be used with the anchoring strip illustrated in FIG. 2*a* to hold the wall cladding structure in place along a wall of a building.

FIGS. 3*a* and 3*b* show a anchoring strip and a holding strip in accordance with a further embodiment of the invention.

FIG. 4 shows an edge strip in cross-section used to hold the wall cladding structure in place at a corner of the wall of a building.

DESCRIPTION OF PREFERRED EMBODIMENTS

In FIGS. 1 and 1*a* numerals 1, 1*a* denote a building structure which is to be clad by ceramic slabs as indicated by reference numeral 2.

On the building structure 1, 1*a* generally U-shaped first mounting cleats 3 are attached whose limbs 21 are connected with the limbs 22 of similar second cleats 4. As is shown in FIG. 1, each of these cleats 4 carries an anchoring strip 5 which is shown in detail in FIGS. 2*a* and 3*a* in two embodiments and will be described presently in more detail in connection with these figures.

Each strip 5 have T-shaped anchoring jaws or cheek pieces formed in its stem portion constituting a female connecting part into which a holding strip 6 is inserted which is of a generally T-shaped cross-section and has ends or arms 15, 16 which form wing-like flanges to engage the edge portions of ceramic slabs 2 or tiles to hold them in place.

Reference numeral 7 denotes filling or insulating slabs. In the right hand half of FIG. 1*a* the fixation at an arris, that is to say at the end of a series of slabs 2 is shown. At the arris a generally L-shaped edge strip 8 is attached which has a flange or limb 9 attached to a holding strip 10 which, like the holding anchoring strip 5, is mounted on the cleat 4. The outer edge of the edge trip 8 is bent round forming an arm 17 as is the case with the holding strips 6.

If necessary, distance pieces 11 can be provided between the filling 7 and the slabs 2.

The embodiment of the anchoring and holding strips shown in FIG. 1 corresponds with the embodiment in accordance with FIGS. 2*a* and 2*b*.

In accordance with this embodiment the generally T-shaped anchoring strip 5 is made of folded sheet metal having a mounted flange 20 and ends 12 and 13 in its stem portion broadened out to form an opening into which a suitably rounded part 14 on the holding strip 6 extends. The ends or arms 15 and 16 of the generally T-shaped holding strip 6 are also rounded.

There is a rounded shaped arm of edge strip 8 in accordance with FIG. 4, as denoted by reference numeral 17 which is adapted to engage the end portions of the ceramic slabs or tiles 2 to hold them in place.

In the case of the embodiment of the invention shown in FIGS. 3*a* and 3*b* the anchoring strip **5'** is also made of folded sheet metal. The cheek pieces are, however, not of rounded shape as in the embodiment shown in FIG. 2*a* , but are angles as indicated by reference numeral **18**. The angular construction **19** is also employed in the case of the holding strip **6'**. In this case the holding strip **6'** is held more securely in the anchoring strip **5'** than is the case with the construction of the holding strip **6** and anchoring strip **5** shown in FIGS. 2*a* and 2*b*.

The attachment means in accordance with the invention can be very easily applied. It is first necessary to attach the cleats **3** on the building structure **1**, **1***a* using, for instance, conventional mechanical attachment and connecting means as for example plugged holes, screws, and rivets. If suitable it is also possible to use an appropriate adhesive or mortar connection. After attaching cleat **3** to the building structure **1**, **1***a* , the cleat **4** is positioned relative to the cleat **3** so that the limbs **21** of cleat **3** are in slidable juxtaposition with the limbs **22** of cleat **3**. The cleat **4** can be moved relative to cleat **3** providing adjustability of the cleat **4** in both a plane of the cladding and in a plane perpendicular to the cladding, thus making it a simple matter to allow for all uneveness in the building structure **1**, **1***a*, and to provide adequate space between the building structure and the slabs or tiles for any insulation or filling material that may be used. Cleat **4** is then attached to cleat **3** by welding screwing, bolting, riveting or any other means in accordance with the nature of the material from which the cleats are fabricated, the limbs **21** to the limbs **22**. The anchoring strips **5** are attached to the cleats **4** aligned in the plane of the cladding to be produced. The same means can be used for attaching the anchoring strips **5** to the cleats **4** as used to attach the cleats **3** and **4** together. The anchoring strips **5** are arranged with the appropriate center distances having regard to the size of the tiles. Changes can be made in the anchoring spacing of the strips **5** as required within a certain tolerance range. The anchoring strips **5** are cut if required to have the desired lengths. After placing the tiles in position it is now only necessary to press the holding strips **6** in position in the manner of press studs. The generally L-shaped holding strip **10** and the generally L-shaped edge strip **8** are used in place of the anchor strip **5** and holding strip **6**, respectfully, at the edge of the building structure to be clad, as for example at the top, bottom, or vertical edge of the building structure. The holding strip **10** may be affixed to the cleat **4** in the same manner as anchoring strip **5** is affixed to cleat **4**, that is by any means appropriate to the material from which the holding strip **10** and cleat **4** are made, for example by welding, bolting, screwing or riveting. The edge strip **8** is then oriented with the building structure such that the arm **17** of the edge strip **8** overlaps the surface of the building structure to be clad and the limb **9** of the edge strip **8** is oriented to be adjacent the holding strip **10**. The limb **9** of the edge strip **8** is affixed to the holding strip **10** in a manner similar to that used to affix anchoring strip **5** to cleat **4**. The edge strips **8** are preferably applied at an earlier stage so that the laying off the tiles or slabs **2** can be begun at an edge strip **8** placed along the bottom side, the top or a vertical edge of a corner of the structure to be clad and the operation is finished by pressing the holding strips **6** into the anchoring strips **5** so as to attach the tiles or slabs **2** to the structure **1**, **1***a*. It is naturally possible to dispense with the cleats **3** and **4** if it is desired to fix the slabs or tiles **2** directly to the building structure **1**, **1***a* . In this case the flanges **20** of the anchoring strips **5** are fixed directly on the building structure **1**.

The embodiment of the invention shown in FIG. **1** using tiles or slabs **2** on the building structure not only provides a suitable air space between the rear face of the tiles or slabs and the surface of the building structure, but also allows for the provision of an additional insulating layer. Insulation material may be used in the space between the building structure and the cladding. The procedure for installing the cleats, anchoring strips, tiles or slabs and the holding strips remains as described above, however, the methods of installing the insulation will vary depending on the type of insulation used. If an insulating material that is used is in the form of a solid slab, or mat, as for example a woven fiberglas, then it must be cut to fit around the cleats, end strips, holding strip, and anchoring strips as the cladding is being erected. If it is a loose insulation, such as for example a granulated styrofoam, then it may be poured into the space between the building structure and the cladding after the cladding is erected. The type of insulation and method of installing the same is not part of the present invention, as almost any type may be used, and the installation procedure for installing the insulation will vary with the type used.

A particularly advantageous feature of the arrangement in accordance with the invention is that it is very adaptable and by mutually offsetting of the cleats **3** and **4** allows for the distance between the strips **6** and the building structure proper to be varied. For this purpose means for attaching cleat **3** to cleat **4** are preferably comprised of slotted openings in the limbs **21**, **22**, which slots are oriented to be substantially perpendicular to the face of the building structure when the cleat is placed against the structure. Conventional fasteners may be used, such as nuts and bolts, to fasten the cleat **3** to cleat **4** through the slotted openings in their limbs **20**, **21**. The cleat **4** may then be displaced relative to cleat **3** in a direction perpendicular to the face of the building structure after the fastener is installed in position in the slotted openings in the limbs of the cleats. It can be seen in the case of the embodiment shown that individual slabs or tiles **2** can be replaced as may be required.

The cleats **3** and **4** may be of any length desired, the length, to an extent, depending upon the esthetic effect desired in the cladding. For example, if it is desired to have the seams between adjacent slabs of ceramic material staggered the cleats may be of the same length, or shorter than the width of the slabs of ceramic material. If it is desired to have the seams between adjacent ceramic material in line with each other the cleats may be as long as the surface of the building structure to be clad. Other factors which may have an effect on the length of the cleats are the capacity of the equipment to produce them, and the capacity of the equipment and men used to install it on a building structure.

What we claim is:

1. A device for attaching slabs of ceramic material on a building structure defining a space between said building structure and said slabs suitable for the installation therein of an insulating filling, which comprises:

at least one generally U-shaped first cleat having two limbs, said cleat being secured to a surface of said building structure such that said limbs extend in a generally perpendicular direction away from said surface of said building structure;

at least one generally U-shaped second cleat having two limbs, said second cleat being positioned relative to said first cleat such that said limbs of said second cleat extend in a generally perpendicular direction toward said surface of said building structure, and are in slidable juxtaposition with said limbs forming said first cleat;

means to fasten said first U-shaped cleat to said second U-shaped cleat;

at least one generally T-shaped anchoring strip having a stem portion and two arms disposed perpendicular to said stem portion, said anchoring strip being secured to a surface of said second cleat most remote from the surface of said building structure such that said stem portion is disposed in a generally perpendicular direction away from said surface of said building structure;

at least one generally T-shaped holding strip having a stem portion which engages said stem portion of said anchoring strip, and having two arms perpendicular to said stem portion which are oriented in a plane generally parallel with said surface of said building structure when said stem of said holding strip is engaged in said stem portion of said anchoring strip, said arms each engaging an end portion of one of said slabs to be attached to said building structure exerting a force on said slabs in a direction toward the surface of said building structure to hold them in place thereon;

at least one generally L-shaped holding strip having two legs, one leg to be affixed to at least one of said U-shaped cleats; and

at least one generally L-shaped edge strip having two legs, one leg of which is a flange to be affixed to said second cleat and the other of said legs having a rounded arm to engage an end portion of said slabs to be attached to said building structure exerting a force on said slabs in a direction toward the surface of said building structure to hold them in place thereon, said generally L-shaped holding strip and said generally L-shaped edge strip being used to affix such slabs to said building structure at a corner thereof.

2. A device as defined in claim 1, further characterized in that:

said generally T-shaped anchoring strip has jaws formed in said stem portion; and

said generally T-shaped holding strip has a form in said stem portion which is inserted in, and engaged by said jaws said stem of said T-shaped anchoring strip to affix said holding strip to said anchoring strip.

* * * * *