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(71) Applicant: **Abaco Solutions S.r.l.**
31027 Spresiano (TV) (IT)

(72) Inventor: **Barbon, Matteo**
31027 Spresiano (TV) (IT)

(74) Representative: **Citron, Massimiliano**
Via Primo Maggio, 6
31020 San Fior (TV) (IT)

(54) **Building method for ventilated facade**

(57) To improve the assembly efficiency and the laying, a method is proposed to build a ventilated facade, characterized by building a carrier frame with vertical uprights (14), manufacturing horizontal elements (18) with an integrated blade or projecting edge (30), fixing the horizontal elements to the uprights; and mounting on the a horizontal elements (16) a slab, inserting a cavity (32) present on the back of the slab upon the blade or projecting edge.

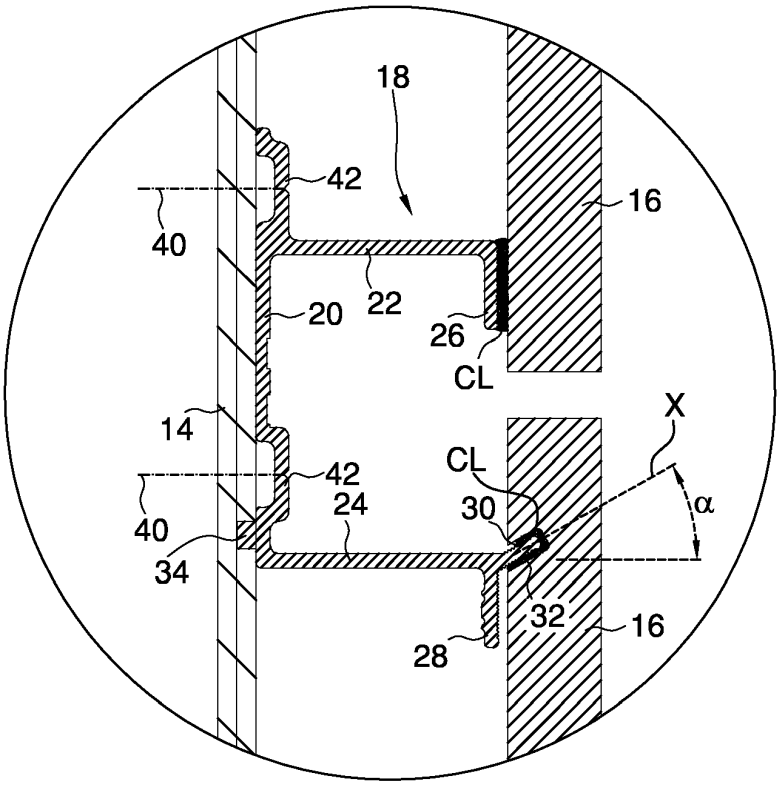


Fig. 3

EP 2 500 490 A1

Description

[0001] The invention relates to a construction method for ventilated facades and the facade thus obtained.

[0002] Known ventilated facades are described, for example. in EP 2110491 or WO 2006/097551. Here metal anchors are secured to some vertical uprights by special nails or tabs adapted to hold covering slabs.

[0003] There are other fixing systems, but they are suitable for non-friable materials. Two kerf cuts are made on the edges of the slab to create anchorings, but labor costs are very high and the slab gets weakened. Also, to change a broken slab is not easy and is expensive.

[0004] To lower the costs of these systems, vertical rungs are used, usually placed in grooves or cuts made on the edges of the slab, but there is the disadvantage of concentrating efforts on a few mm^2, and in brittle materials such as gres or marbles breakages are induced. Sometimes, especially with gres, the back of the slab is processed to make inverted frustoconical holes and insert screw anchors in them. The disadvantage is the high cost of the holes, which require expertise and time. Since it is not so easy to drill at precise positions (and it is even more difficult to be precise for 4 or 6 holes on the slab) almost always as a remedy a small bracket with height-adjustment screw is used, which translates into high costs of materials and installation.

[0005] In other known types of facade each slab is coupled by adhesive to a metal rail that runs horizontally along its entire back, and then the rail is fixed to the vertical uprights. See e.g. the products of Wandegar 2001. In general, the uprights are fixed to the rails by means of bolts, often with hammer-head nuts. The bolts can be adapted for any vertical pitch but all to be adjusted in height in the building yard, with huge labor and finishing costs. These types of facades with equipped slabs suffer from other several disadvantages. Since the slab is produced with standard lengths and must be anchored to the underlying metal chassis along its edges not to move with the wind thrust, the pitch between the uprights is determined accordingly (equal to the width of the slab). Besides requiring a lot of (expensive) precision in laying to keep the pitch constant, one must resort to additional uprights when the facade has obstacles or openings (e.g. windows or gutters) right at the theoretical pitch, or when a shorter width of slab is needed.

[0006] Note also that the smaller the slabs the greater the number of uprights necessary, with considerable costs. And one is forced to size the structure supporting the slabs not on the static load to bear but on the size of the slab, dramatically moving away from the optimum point of minimum cost.

[0007] Another disadvantage is the constraint of not being able to create offset facades, i.e. with slabs of different or identical widths having vertical spacings not aligned (except through an unacceptable thickening of the uprights). And last, but not least, the equipping of the slab is time consuming and expensive.

[0008] Object of the invention is to solve one or more of these problems by a constructive method which allows to build ventilated facades in a simple and less expensive way, and without constraints on the pitch of the uprights and the size of the slab. The object is achieved by a method as in Claim 1.

[0009] The aforementioned disadvantages are overcome by the claimed method because:

- the groove or removing machining step required on the back of the slab is reduced preferably to just one;
- no drilling requiring precision is made and thus the laying costs are lower;
- it is very easy to change the slab, because it is enough to demolish it and hang a new one.

[0010] E.g., the claimed method replaces the system of making multiple holes with only one cut, much faster to make and able to distribute the strains along all or most of the edge of the slab. A single cut is easier to make without locating errors with respect to many holes. In addition, making a lot of cuts as in the known art exposes to the risk that thermal expansions of the metal structure can tension the slab and break it. It is not easy to make two cuts equal and compatible with the underlying structure, and it is not assured that they come out mutually parallel. All this involves machining time and extreme precision that only one cut saves.

[0011] The cut or groove or furrow, preferably of a width of 2-5 mm and in particular about 3 mm, works to support the slab, particularly in the case an adhesive polymer (or glue) is present between the slab and the carrying underlying structure and for some reason has trouble in gripping. Secondly, it holds the slab until the glue hardens.

[0012] By the method all horizontal rails can be already installed on site and then one proceeds to apply the slabs, just like hanging some paintings.

[0013] The slab may be prepared prior to assembly, e.g. by milling, or may be already produced with the cut, e.g. by extrusion. It is also possible, instead of cutting the slab, that it has a lip or integral projection in its volume to be inserted in a groove or seat of the horizontal rail.

[0014] In the horizontal elements the projecting lip or blade is preferably an integral element and/or in one-piece, or a mounted piece.

[0015] The slab to which the invention is directed can be of stone, wood, wood fibers or wood composite material.

[0016] Further characteristics and advantages of the inventive concept will become apparent from the description of a preferred exemplary ventilated facade, together with the accompanying drawings in which:

Figure 1 shows a cross-section view of a ventilated facade;
Figure 2 shows a plan view of Fig. 1's facade;
Figure 3 shows enlarged the detail in the circle of fig.

1;

Figure 4 shows enlarged the detail in the circle of fig. 2.

[0017] The façade in fig. 1 is applied to a vertical wall 10, and is formed by a series of vertical parallel uprights 14 and rails or horizontal elements 18, e.g. profile sections. An upright 14 has e.g. T-section and is fixed to the wall 10 by brackets 12, while to the rails 18 are applied and hung slabs 16. Preferably each vertical upright 14 is as long as the height of the building facade to be covered, and the rail 18 too is as long as the width of the facade of the building to be covered.

[0018] With reference to Fig. 3, the enlarged section of the rail 18 is seen. This section is substantially U-shaped, with a base 20 for the contact and attachment to the upright 14, and two orthogonal wings 22, 24. The wing 22, in use the upper one, has one end 26 approximately parallel to the base 20, and facing the interior (or exterior) of the profiled section. The end 26 forms at the outside a bearing surface for the back of a slab 16. Preferably, this surface is knurled or grooved to improve the fixing.

[0019] The wing 24, in use the lower one, has an Y-shaped or forked end formed by a first segment 28 approximately parallel to the base 20, and facing the interior (or exterior) of the rail, and a second segment 30. The segment 28 forms at the outside a bearing surface for the back of a plate 16. Preferably, this surface is knurled or grooved to improve the fixing. The segment 30 is instead directed towards the inside of the rail 18 and has an axis X inclined by an angle α relative to the plane of the wing 24.

[0020] Once the rail 18 is mounted, the segment 30 is facing upward. The angle α is preferably contained in the range $25° \div 35°$, with a preferred value of 30°.

[0021] The slab 16 comprises a groove or cut 32 complementary to the segment 30 for receiving it during laying. The groove or cut 32 forms with the plane of the back of the slab an angle α, which has proved a olt better than the known 45° used in the slabs equipped with rail. In fact, the angle α is smaller because the field tests have shown that an angle of 45° is too wide and the strains that accumulate in the slab tend to make it prone to chipping and/or to not let it stay no longer vertical.

[0022] The segment 30 may be a continuous edge of the profiled section projecting along its entire length, or a lip-shaped or blade-shaped segment arranged at regular intervals. The rail 18 can be fixed to the upright 14 by screwing the base 20 with screws or bolts, of which is shown only the axis 40. To this aim, the rail 18 has through-holes and seats 42 for the head. On the outer side of the base 20 there is at least one tooth or longitudinal edge 34, to be inserted in a corresponding notch present on the upright 14 (e.g. made by milling); see fig. 3 and 4.

[0023] In this way the use of large, bulky and expensive bolts is avoided, because on the fixing means only the compression strains and not the cutting strains weigh. Also, during assembly it is sufficient to joint the profile 18 into the upright 14 in predefined position, quickly and without positioning errors.

[0024] It is preferred to use as an upright a member having longitudinal ribs 36 on the surface facing the section 18: by milling the ribs 36 at right angles to them a horizontal seat is created for the tooth or rim 34.

[0025] Operatively in the build site on the wall 10 there are fixed the uprights 14, then the rails 18 are applied and finally the slabs 16 are "hung" to the rails 18 by letting the segment 30 enter into the slot 32. Preferably adhesive CL is interposed between the slab 16 and the back structure at the supporting points as shown in Fig. 3.

Claims

1. Method to build a ventilated facade, **characterized by**

   - building a carrier frame with vertical uprights (14),
   - manufacturing horizontal elements (18) with an integrated blade or projecting edge (30),
   - fixing the horizontal elements to the uprights;
   - mounting on the horizontal elements (16) a slab, by inserting a cavity (32) present on the back of the slab upon the blade or projecting edge.

2. Method according to claim 1, wherein the blade or edge is, in use, tilted upward with respect to a horizontal plane.

3. Method according to claim 2, wherein, in use, the blade or edge, and the axis (X) of the corresponding cavity in the slab when mounted on the horizontal element, is inclined with respect to a horizontal plane by an angle (α) between 25° and 35°, preferably 30°.

4. Method according to any one of the preceding claims, wherein the horizontal elements protrude cantilevered from the vertical elements along a direction parallel to the facade.

5. Method according to any one of the preceding claims, wherein the uprights are arranged with non-constant pitch.

6. Method according to any one of the preceding claims, wherein a horizontal element extends over two or more uprights.

7. Method according to any one of the preceding claims, wherein a vertical upright is arranged having notches in which a tooth or blade of a horizontal element can be inserted, or vice versa.

8. Method according to any one of the preceding claims, wherein said cavity is obtained by making a single groove or furrow on the back of the slab.

9. Ventilated facade obtained by the method of the preceding claims.

10. Method for applying a slab (16) of a ventilated façade to a supporting frame (14, 18) behind it, **characterized by**

- hanging a slab on the frame by inserting in only one groove or seat (32) present on the back of the slab a projecting blade or edge (30) of the supporting frame, the blade or edge being, in use, tilted upward.

Fig. 1

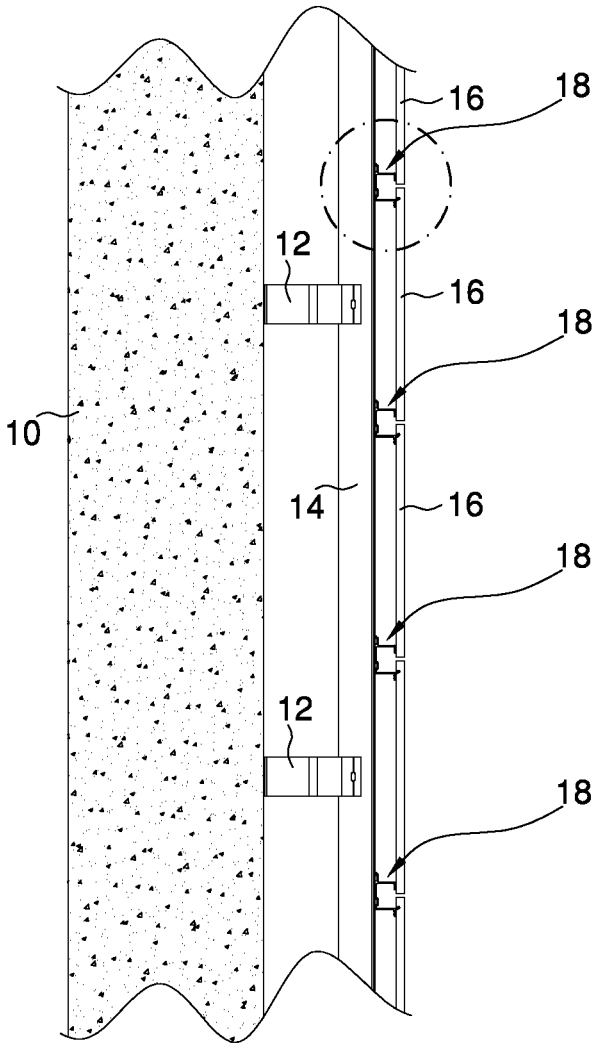
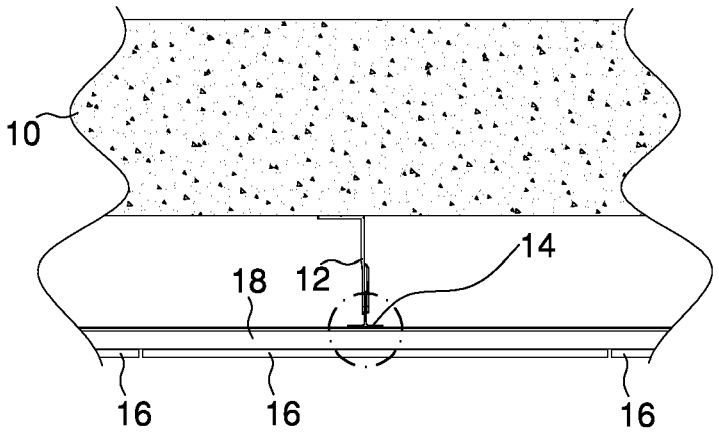
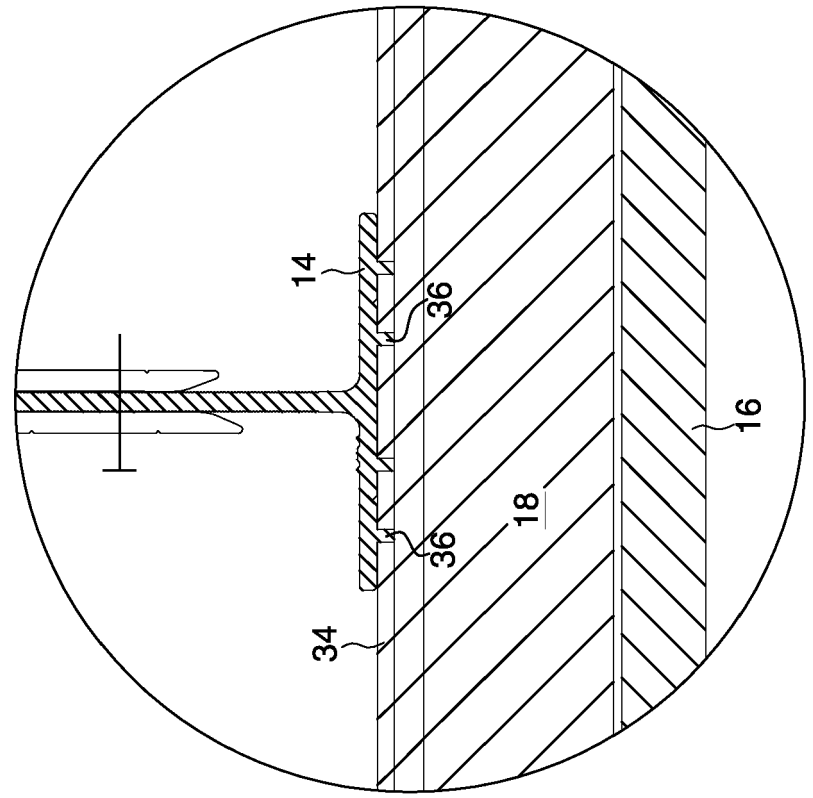


Fig. 2




14
36
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18
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Fig. 4

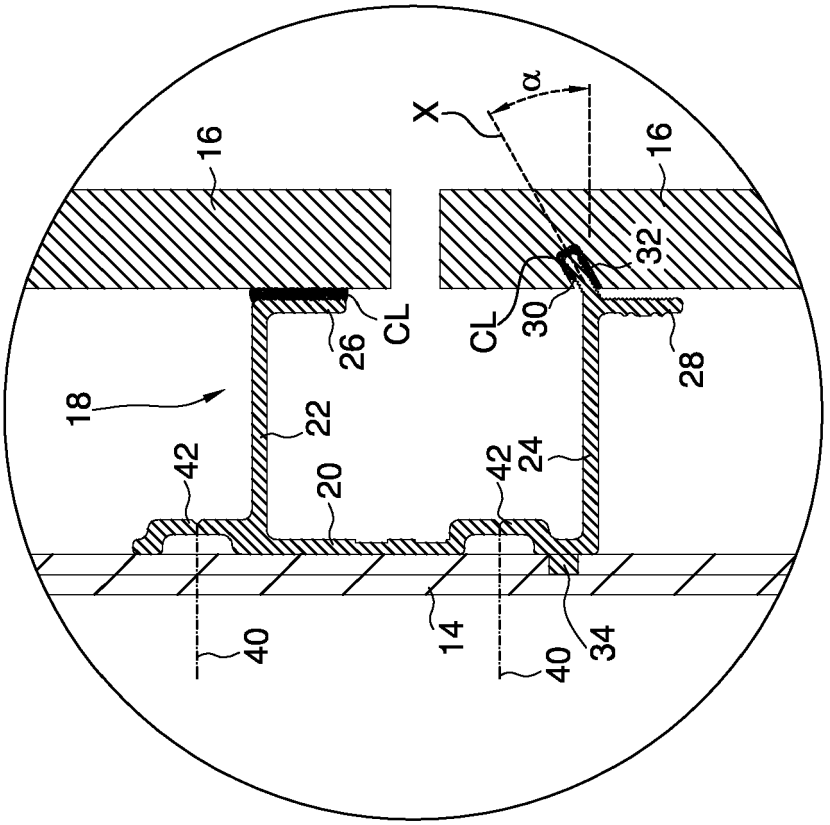
16
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Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 9069

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2009/121772 A1 (MUELLER MARTIN [CH]) 8 October 2009 (2009-10-08) * figures 2,4a,4b,5,8a,8b,8c *	1-5,8,9	INV. E04F13/08
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TECHNICAL FIELDS SEARCHED (IPC)

E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 August 2012	Severens, Gert

CATEGORY OF CITED DOCUMENTS

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