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(54) Facade panel for supporting brickwork

(57) The panel (1) according to the invention for constructing building facades comprises a) a base (3) substantially shaped like a plate, shell, mesh or grill, b) a plurality of veneering anchorage elements (5), each of which forms a seat (7) arranged to accept and position a brick (M), a portion of brick or a tile. The plurality of veneering anchorage elements (5) is arranged on at least one larger face of the base (3) such that when a plurality of bricks (M) is inserted in the respective seats (7), a predetermined design or ornamental pattern is created. The seats (7) act as a guide in making the design or ornamental pattern, enabling the wall to be veneered much more quickly.

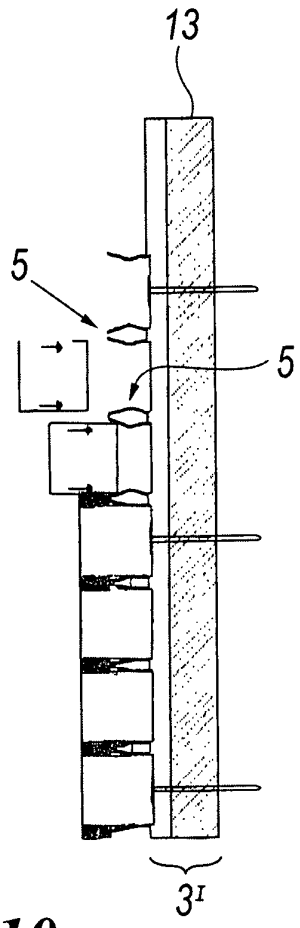

Fig. 10

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Description

Field of invention

[0001] The present invention relates to a panel for constructing building facades, in particular facades with facing brickwork.

State of the art

[0002] Currently, facing brickwork facades are made using just rulers, straight edges and plumb lines as the only aids for aligning the bricks of the facade. This exclusively manual procedure requires considerable ability by the bricklayer and, in any case, entails quite significant construction times, indicatively 8 man-hours for veneering a wall of 10 m^2.

[0003] With the present invention, it is intended to simplify the installation and reduce the costs of veneerings in facing brickwork, while at the same time reducing construction times for a facade with respect to current construction times.

Summary of invention

[0004] This object is achieved, according to a first aspect of the present invention, with a panel for constructing building facades having the features according to claim 1.
In a second aspect of the present invention, this object is achieved with a method for constructing building facades having the features according to claim 13.
Patent document US 2 087 931 describes a panel having the features specified in the preamble of claim 1.

[0005] The seats of the panel act as a guide for making the design or ornamental pattern that the bricks, tiles or other veneering elements of the wall must form, allowing the wall to be veneered quicker than with the known methods.

[0006] The panels according to the invention can be applied to outer walls, inner walls, columns, etc, using wall anchors, glue or other means.
Once fixed one close to another on the wall to be veneered, they form even panelling, into which the face bricks can be inserted later on. Preferably, square panels with an approximately 1 m x 1 m base 3 and 3" are used and fixed with five wall anchors, four close to the corners and one at the centre of the base.

[0007] Thanks to the present invention, it is possible to make a panel that can be laid very easily and therefore well suited to do-it-yourself laying, or rather, without the use of specialized labour. Laying is rapid, but with a very advantageous aesthetic effect and final cost for the veneering.
In a particular embodiment, the panel for brick veneering is characterized in that it is able to simplify erection and reduce the costs of veneering in face bricks, thanks to the ease of laying.
In a particular embodiment, the panel is characterized in that it can be fixed to any type of outer wall, inner wall, column or similar.

[0008] In a particular embodiment, the panel according to any of the previous claims is characterized in that it can be fixed to the walls with glues, wall anchors or other means.
In a particular embodiment, the panel according to any of the previous claims is characterized in that it is formed by two main elements: a panel and a tongued structure.

[0009] In a particular embodiment, the panel according to any of the previous claims is characterized in that, depending on the materials used, various tongue shapes can be applied.
In a particular embodiment, the panel according to any of the previous claims is characterized in that the tongued structure permits easy insertion and subsequent securing in place of the face bricks, without the aid of glues or other fixatives.
In a particular embodiment, the panel according to any of the previous claims is characterized in that the tongues are sufficiently flexible that after insertion of the brick, they tend to return to their initial position and consequently secure the brick in place.

[0010] In a particular embodiment, the panel according to any of the previous claims is characterized in that the veneering could have a different thickness by changing the length of the tongues.
In a particular embodiment, the panel according to any of the previous claims is characterized in that the tongued structure permits even veneering to be obtained, ready for cementing without the use of other elements.

[0011] In a particular embodiment, the panel according to any of the previous claims is characterized in that the notching of the tongued structure enables the lime to run deep inside.
In a particular embodiment, the panel according to any of the previous claims is characterized in that the lime used for cementing, once hardened, tends to anchor the brick to the structure.

[0012] In a particular embodiment, the panel according to any of the previous claims is characterized in that it could also be used for insulation, by applying an insulating panel, of thickness in accordance with existing regulations, to the structure.

[0013] Further advantages attainable with the present invention shall become more evident, to an expert in the field, from the following detailed description of some non-limitative examples of particular embodiments, given with reference to the following schematic figures.

List of Figures

[0014] Figure 1 shows a perspective view of a panel for constructing building facades according to a first embodiment of the invention, before face bricks are inserted,

Figures 2 and 3 each show a perspective view of the panel in Figure 1 with some bricks inserted,

Figures 4 and 5 show perspective views of the panel in Figure 1 with a growing number of bricks inserted,
Figure 6 shows a perspective view of the panel in Figure 1 with some bricks cemented,
Figure 7 shows a first lateral view, in cross-section along plane A-A, of the panel in
Figure 1 with a portion of the bricks cemented with mortar,
Figure 8 shows a second lateral view of the panel in Figure 1 with a portion of the bricks cemented with mortar,
Figure 9 shows a perspective view of a panel for constructing building facades according to a second embodiment of the invention before face bricks are inserted,
Figure 10 shows a lateral view, in cross-section along plane A-A, of the panel in
Figure 9 with a portion of the bricks cemented with mortar,
Figure 11 shows a perspective view of a sample brick, of a known type, which can be inserted in a seat of a panel according to the invention,
Figure 12 shows a perspective view of an anchorage element of the panel in
Figure 1,
Figure 13 shows a perspective view of a panel for building work according to a third embodiment of the invention, and
Figure 14 shows a perspective view of an anchorage element of the panel in
Figure 13.

Detailed description

[0015] Figure 11 shows a perspective view of a brick M, of known type, which lends itself to being inserted in the seats 7 of a panel according to the invention for veneering facades of facing brickwork. The brick M has a substantially a parallelepiped shape. The dimensions of an example of a standard brick used in Italy are:

- length LM approximately equal to 25 cm,
- width WM approximately equal to 12 cm,
- height HM approximately equal to 5 cm.

The term "half brick" is generally intended as a brick having a width WM' approximately equal to half the width WM of a standard brick, for example WM' = approximately 6 cm.

[0016] Figures 1-8 and 12 regard a panel for constructing building facades according to a first embodiment of the invention. This panel, indicated as a whole by reference numeral 1, comprises a base 3 on which a plurality of veneering anchorage elements 5 is arranged.
The base 3, also indicated in the present description as "board", essentially has the shape of a flat plate or variously curved shell, of single or double curvature for example.

Each veneering anchorage element 5 forms a seat 7 able to accept and position a brick M and advantageously comprises at least one elastic restraining element 9 susceptible to elastically deforming itself, for example by bending, so as to grip and hold one or more bricks M in the seat 7. In the present embodiment, each anchorage element comprises a piece of sheet metal bent in a U-shape, where the cavity of the U forms the seat 7, and the free wings of the piece - also called "tongues" in the present description - each form an elastic element 9. The piece of U-shaped sheet metal can be fixed to the base 3, for example, by screws, joints, glue or co-moulding.

[0017] The tongued structure is positioned longitudinally on the panel using techniques depending on the type of tongue and the material used, so as to allow the insertion of bricks and the subsequent creation of an even wall, i.e. the veneering anchorage elements 5 are aligned in a number of rows on the base 3, for example along straight lines as shown in the attached figures, so as to arrange the face bricks M, for example, as soldiers or headers.
With the invented system, the bricks M are inserted in this structure formed by tongues that, being relatively mobile, enable easy insertion and subsequent securing of the bricks in the seats 7. (See Figures 2-5).

[0018] The tongues 9 are, in fact, sufficiently flexible that, after insertion of the brick, they tend to return to their initial position and consequently secure the brick in place. (See Figure 7). It should be underlined that one of the particularities of the invention consists precisely in the functionality and flexibility of the tongues, which cause the face brick to be secured in place. As shown in Figures 3 and 12, at least part of the tongues, or more in general the elastic restraining elements 9, extend in a substantially perpendicular direction to the surface on which the panel itself lies and, in particular, to its base 3. According to one aspect of the invention, at least one elastic restraining element 9 comprises an anchorage end 50 by which it is fixed to the base 3, and a free end 52 that freely extends in a substantially perpendicular direction to the surface on which the panel itself lies, and:

A) when at least one elastic restraining element 9 is not deformed, moving from the anchorage end 50 towards the free end 52, the axis of the cross-sections of at least one elastic restraining element 9 gradually and progressively approaches the inside of at least one adjacent seat 7, reaches a section of maximum transversal projection 54 and then moves away from the inside of this seat 7 before reaching the free end 52 (Figure 12), and
B) when a brick M, portion of brick or a tile is inserted in the adjacent seat 7 and the at least one elastic restraining element 9 is deformed, the at least one elastic restraining element 9 presses against the brick M, portion of brick or tile at least in correspondence to the section of maximum transversal projection 54 (Figure 12). Thanks to the fact that after the

section of maximum transversal projection 54, the axis of the cross-sections of the at least one elastic restraining element 9 moves away, preferably gradually and/or progressively, from the inside of the seat 7 before reaching the free end 52, inserting a brick M or other building blocks in the seat 7 is particularly easy and convenient, unlike, for example, what happens with the clips 19 shown in Figures 3-15 and 16 of US patent 2 087 931.

The fact that when the at least one elastic restraining element 9 is not deformed, the axis of the cross-sections of the at least one elastic restraining element 9 gradually approaches the inside of at least one adjacent seat 7 to reach the section of maximum transversal projection 54, ensures that a brick M or other building block, once inserted in a seat 7, remains firmly positioned without moving, unlike, for example, what happens with the clips in Figures 8, 11 and 13 of US patent 2 087 931. In fact, in these last clips, the axis of the cross-sections of elastic elements 38 and 49 does not gradually approach the inside of the associated seats that accept the brick, but approaches abruptly, forming a considerable step and, more particularly, hooks 39 and 47 are bent towards the underlying base 4B and 48: after the user lets go of the brick, the elastic return of the hooks 39 and 49 tends to expel it from the seat where it has been inserted, or at least to displace it slightly, but enough to misalign it with respect to the other bricks inserted on the panel. Thus, the positioning of bricks in the clips of Figures 8, 11 and 13 of US patent 2 087 931 is much more unsteady and imprecise than with a panel according to the present invention. The same holds for the panels shown in Figures 3, 5 and 7 of US patent 2 300 258.

[0019] After the bricks have been inserted, it is possible to proceed with the final stage of cementing between these bricks, for example with mortar or cement, until the wall veneering is completed. (See Figure 6),

The panel 1 just described allows walls veneered with face bricks to be made much quicker with respect to known veneering techniques; in particular it has been verified that with the present invention it is possible to veneer 1 m^2 of wall in approximately 20 minutes, with a reduction on veneering times of up to approximately 40-50% with respect to known veneering techniques. Furthermore, with the present invention the face bricks are arranged on the wall with greater order and precision, or in any case not less than that attainable with known veneering techniques.

Advantageously, the axis of the at least one elastic restraining element 9, at least in correspondence to the section of maximum transversal projection 54, forms a fold with a radius of curvature between 0.003 and 4 times the height H of the same elastic restraining element 9 (Figure 12). More preferably, this radius of curvature is between 0.05 and 0.5 times the height H. These choices of radius of curvature facilitate the sliding of the brick M when it is inserted in the seats 7. Advantageously, when the at least one elastic restraining element 9 is not deformed:

- moving from the anchorage end 50 towards the free end 52, the axis of the cross-sections of the at least one elastic restraining element 9 gradually and progressively approaches the inside of at least one adjacent seat 7 along a convergent section 56, reaches a section of maximum transversal projection 54 and then moves away from this seat 7 along a diverging section 58 before reaching the free end 52 (Figure 12), and
- the section of maximum transversal projection 54 and the diverging section 58 are substantially straight and form an angle βbetween each other of between 5° and 55°, more preferably between 5° and 30°. In the embodiment in Figure 8, the angle β is approximately 15°.The aforementioned values for angle βfacilitate the insertion of bricks M in the seats 7 and permit the gaps between two adjacent rows of veneering anchorage elements 5 to be reduced and therefore create sufficiently thin and aesthetically agreeable filler or mortar gaps between the bricks, e.g. approximately 1 cm wide. Advantageously, the diverging section extends for at least a fifth of the overall height H of the elastic restraining element 9. More preferably, the diverging section extends for at least a quarter of the overall height H and even more preferably between a third and a half of the overall height H.

Advantageously, the dimensions of the seats 7 are such that, between A) the at least two elastic restraining elements 9 that, arranged with the respective sections of maximum transversal projection 54 facing each other, form part of the seat 7, and B) a brick M, portion of brick or tile inserted in the seat 7 itself,

there is a gap of between zero and 0.05 times the width of the brick M, portion of brick or tile. More preferably, this gas is approximately 0.5-1 mm.

These values for the gap between the seat 7 and brick M ensure that when the bricks are inserted in the seats 7, a large part of the surface of the tongues 9 or other elastic restraining elements 9 is in contact with the bricks and therefore secures them better and more solidly inside the seat 7.

[0020] Advantageously, the tongues 9 or other elastic restraining elements do not extend along the entire width or length of the base 3, but are interrupted, forming a plurality of openings 11, essentially forming notches (Figures 2, 3 and 13). The mortar used for cementing, thanks to the notching of the tongued structure and, in particular, by passing through the openings 11, enters in depth, penetrating behind the bricks enough to unite the same tongued structure 5 with the brick; in this way, the brick veneering is solidly cemented to the veneering anchorage elements 5. The base 3 is fixed by wall anchors, brackets, clamps, cementing or other suitable anchorage

system to the pre-existing load-bearing wall of the building to be veneered.

[0021] Advantageously, the tongues or other elastic restraining elements 9 are arranged so as not to touch the tongues or other elastic elements 9 of contiguous anchorage elements 5 when the bricks M are inserted in the seats 7 (Figure 8); in this way, as shown in Figure 8, the mortar rendering is in fact able to penetrate between two adjacent anchorage elements 5, reaching the base 3 and the rear part of the brick M. The veneered wall is thus altogether more solid and compact.

[0022] Many forms of veneering can be used with the inventive principle, including, for example, whole face bricks or strips obtained from bricks (obtained, for example, by cutting a brick along its length); it follows that suitable tongues of the right length are used for different thicknesses of the veneering.

In cases where insulation is required for the wall to be veneered, the panel for constructing building facades according to the invention could be fitted at the back with insulating panels 13 of different thickness in accordance with existing regulations. (See Figures 9 and 10).

Figures 13 and 14 regard a third embodiment of a panel according to the invention. This panel, indicated as a whole by reference numeral 1", comprises a base 3" and a plurality of anchorage elements 5". Both the base 3" and the anchorage elements 5" are made of a plastic material, preferably PVC. Advantageously, the anchorage elements are moulded, by injection moulding for example, separately from the base 3" and subsequently fixed to it via mechanical assembly. This mechanical assembly can be advantageously accomplished by means of coupling pins 60 provided with a snap-fit system that are inserted in and couple with coupling holes opportunely made in the base 3".

Advantageously, the base 3" is formed by a simple sheet or plate of substantially uniform thickness and/or not ribbed, in which the coupling holes are made by simple perforation or milling. In this way, it is possible to make a relatively large-sized panel 1" (e.g. 1 m x 1 m maximum size) with relatively inexpensive injection moulds: in fact, the latter are only needed for making the anchorage elements 5", almost always much smaller than the base 3". The base 3" has a thickness preferably between 4 mm and 12 mm, and more preferably between 5 and 8 mm. As shown in Figure 13, the various anchorage elements 5" are preferably aligned along mutually perpendicular rows and columns.

Preferably, in the direction of the length LM of the bricks M, parts of bricks or tiles to be secured, the tongues or other elastic restraining elements 9 of two different anchorage elements 5" are separated by spaces of width WS equal or greater than a third of the length LM of the bricks.

Preferably, the tongues or other elastic restraining elements 9 have a width WE equal or less than a third of the length LM of the bricks. In the case of standard bricks of length LM = 25 cm, this could give WS = WE = 5-7 cm approximately.

[0023] It is understood that the above has been described by way of non-limitative example, for which any variants of a practical/applicative nature are intended as falling within the scope of the invention. For example, in general, board and tongues can both be made of materials such as plastic, wood, metal, etc. (See Figure 1). In particular, the tongues could advantageously be made of spring steel. In alternative, it is particularly advantageous to make the base 3 and/or the anchorage elements 5 in a plastic material such as PVC, which is a good compromise between elasticity, mechanical resistance and low material costs. The base 3 and the anchorage elements 5 could be made as a single piece of plastic. The tongues 9 or other elastic restraining elements could also be absent and the panel according to the invention could also form substantially rigid seats for accepting and positioning the bricks. The base 3 could also not form a wall that is continuous and substantially devoid of openings, but be formed by a mesh or grill of opportune rigidity; this base, being very easy for the mortar to pass through, lends itself particularly for being anchored by cementing instead of just by wall anchors to a pre-existent building to be veneered, uniting the veneering in face bricks, the panel 1 and the pre-existing wall to be veneered in one particularly solid monolithic structure. The elastic restraining elements 9 could be made not just in the form of elastic tongues or tabs, but also with other shapes, for example, in the form of pins set up to deform by bending when a brick is inserted. The base and/or at least part of the veneering anchorage elements could be made in one or more materials such as wood or its derivatives, synthetic resin, metal, or still other materials. The base 3 could be provided with spacers on its rear face, arranged to create an air space approximately 0.5-3 cm deep from the load-bearing wall on which the panel 1 and 1" is fixed, so as to allow air to circulate in this air space. The perimeter of the base 3 could advantageously be provided with interlocking projections and/or recesses 62 arranged to interlock with corresponding recesses or projections of similar adjacent panels so as to connect the various panels to each other more solidly (Figure 13).

A panel according to the invention could also be arranged to accept and position not just bricks M of standard sizes in its seats 7, but also half-bricks, other portions of standard bricks, tiles or still other building blocks.

[0024] The examples and lists of possible variants of the present application are to be intended as non-exhaustive lists.

Claims

1. A panel for constructing building facades (1), comprising:

   a) a base (3) substantially shaped like a plate, shell, mesh or grill,

b) a plurality of veneering anchorage elements (5), each of which form or delimit at least part of a seat (7) arranged to accept and position a brick (M), a portion of brick or a tile,
and where:

- the plurality of veneering anchorage elements (5) is arranged on at least one larger face of the base (3) such that when a plurality of bricks (M), portions of bricks or tiles is inserted in the respective seats (7), a predetermined design or ornamental pattern is created,
- at least one veneering anchorage element (5) is provided with at least one elastic restraining element (9), arranged to secure and retain the brick (M), portion of brick or tile in the seat (7), thanks to a strong elastic return, and
- the at least one elastic restraining element (9) extends in a direction substantially perpendicular to the surface on which the panel itself lies,

and **characterized in that** the at least one elastic restraining element (9) comprises an anchorage end (50) by which it is anchored to the base (3) and a free end (52) that freely protrudes in a direction substantially perpendicular to the surface on which the panel itself lies and:
A) when the at least one elastic restraining element. (9) is not deformed, moving from the anchorage end (50) towards the free end (52), the axis of the at least one elastic restraining element (9) gradually approaches the inside of at least one adjacent seat (7), reaches a section of maximum transversal projection (54) and then moves away from this seat (7) before reaching the free end (52), and
B) when a brick (M), portion of brick or a tile is inserted in the adjacent seat (7) and the at least one elastic restraining element (9) is deformed, the at least one elastic restraining element (9) presses against the brick (M), portion of brick or tile at least in correspondence to the section of maximum transversal projection.

2. The panel according to claim 1 wherein, when a brick (M), portion of brick or a tile is inserted in the adjacent seat (7) and the at least one elastic restraining element (9) is deformed, the at least one elastic restraining element (9) presses against the brick (M), portion of brick or tile in correspondence to the section of maximum transversal projection, but not in correspondence to and/or near to the free end (52).

3. The panel according to claim 1, wherein the plurality of veneering anchorage elements (5) and/or the associated seats (7) and/or any associated elastic restraining elements (9) are aligned in one or more rows, for example straight rows, on at least one larger face of the base (3).

4. The panel according to claim 1, wherein the base (3) has a substantially rectangular layout.

5. The panel according to claim 1, wherein at least part of the elastic restraining elements (9) are arranged to deform by bending when the brick (M), portion of brick or tile are inserted in the associated seat (7).

6. The panel according to claim 1, wherein the base (3) has a perimeter that forms at least one substantially straight side, and the plurality of veneering anchorage elements (5) and/or associated seats (7) and/or associated elastic restraining elements (9) are aligned in one or more rows parallel to the at least one substantially straight side.

7. The panel according to claim 1, wherein the at least one elastic restraining element (9) comprises one or more of the following elements:

- an elastically deformable pin, for example, deformable by bending,
- an elastically deformable tongue, plate or tab, for example, deformable by bending.

8. The panel according to claim 1, wherein the axis of the cross-sections of the at least one elastic restraining element (9), at least in correspondence to the section of maximum transversal projection (54), forms a fold with a radius of curvature between 0.003 and 4 times the height (H) of the same elastic restraining element (9).

9. The panel according to claim 1, wherein, when the at least one elastic restraining element (9) is not deformed:

- moving from the anchorage end (50) towards the free end (52), the axis of the at least one elastic restraining element (9) progressively approaches the inside of the at least one adjacent seat (7) along a converging section (56), reaches a section of maximum transversal projection (54) and then moves away from this seat (7) along a diverging section (58) before reaching the free end (52),
- the section of maximum transversal projection (54) and the diverging section (58) are substantially straight and form an angle (13) between each other of between 5° and 55°.

10. The panel according to claim 1, wherein at least one veneering anchorage element (5) comprises at least

two elastic restraining elements (9) arranged with the respective sections of maximum transversal projection (54) facing each other such that, moving from the sections of maximum transversal projection (54) towards the free ends (52) of the at least two elastic restraining elements (9), the seat (7) that they form has progressively growing cross-sections of width and/or length forming an entrance that facilitates the insertion of a brick (M), portion of brick or tile in the seat (7).

11. The panel according to claim 1, wherein the base (3) and/or one or more veneering anchorage elements (5) are made at least for the most part of a plastic material.

12. The panel according to claim 1, wherein at least part of the veneering anchorage elements (5) comprises a tongue essentially bent in a U-shape, where the cavity of the U forms the seat (7) and the free wings of the tongue form at least two elastic restraining elements (9).

13. A method for constructing building facades, comprising the following steps:

- fixing one or more panels (1) having features according to one of claims 1-8 to a pre-existing wall of a building that is to be veneered,
- inserting a plurality of bricks (M), portions of bricks and/or wall tiles in the seats (7) of the one or more panels (1), so as to arrange them according to a predetermined order on the wall to be veneered,
- cementing or gluing the plurality of bricks (M), portions of bricks and/or wall tiles on the panels (1) and/or on the pre-existing wall of the building to be veneered.

14. The method according to claim 13, wherein one or more panels (1) are fixed to the pre-existing wall of the building that is to be veneered via wall anchors and/or cementing and/or gluing and/or welding and/or brackets and/or clamps and/or couplers or mechanical joints and/or friction fastening.

15. The method according to claim 13, comprising the following steps:

- providing a panel according to claim 10,
- inserting a brick (M), portion of brick or a tile in the seat (7) comprising the at least two elastic restraining elements (9) arranged with the respective sections of maximum transversal projection (54) facing each other, such that there is a gap of between zero and 0.05 times the width of brick (M), portion of brick or tile, widthwise to the latter, between this seat (7) and the brick (M), portion of brick or tile.

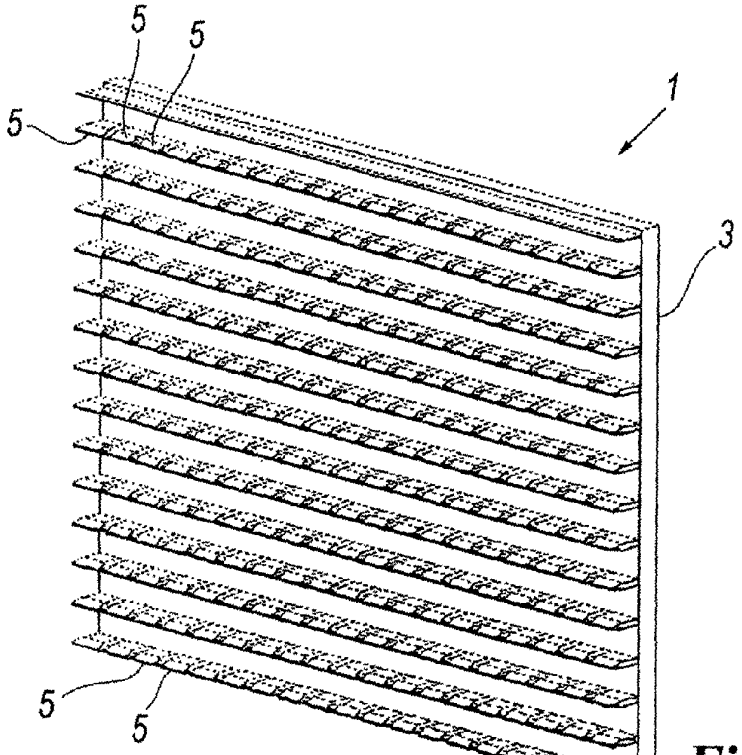

Fig. 1

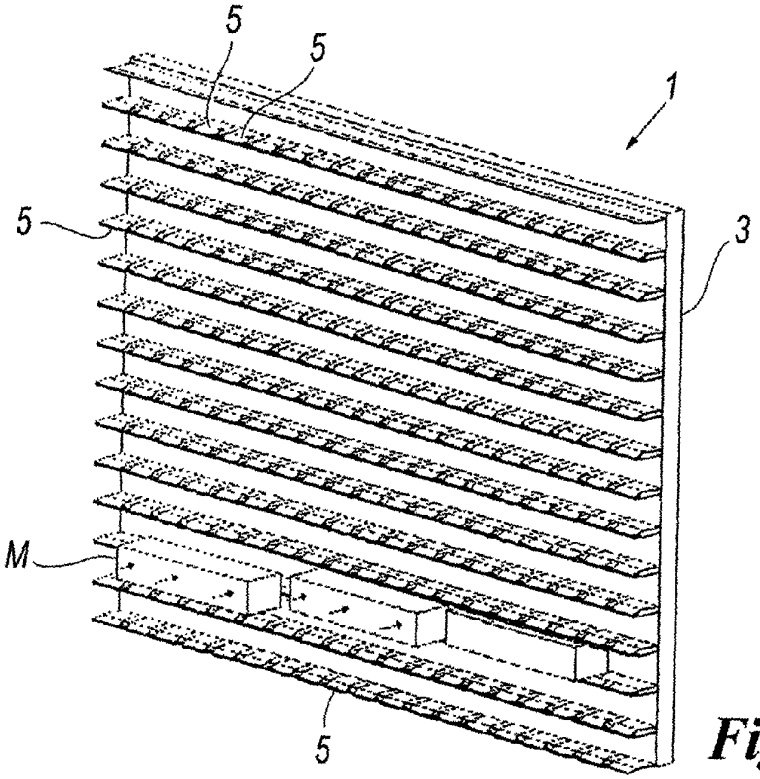

Fig. 2

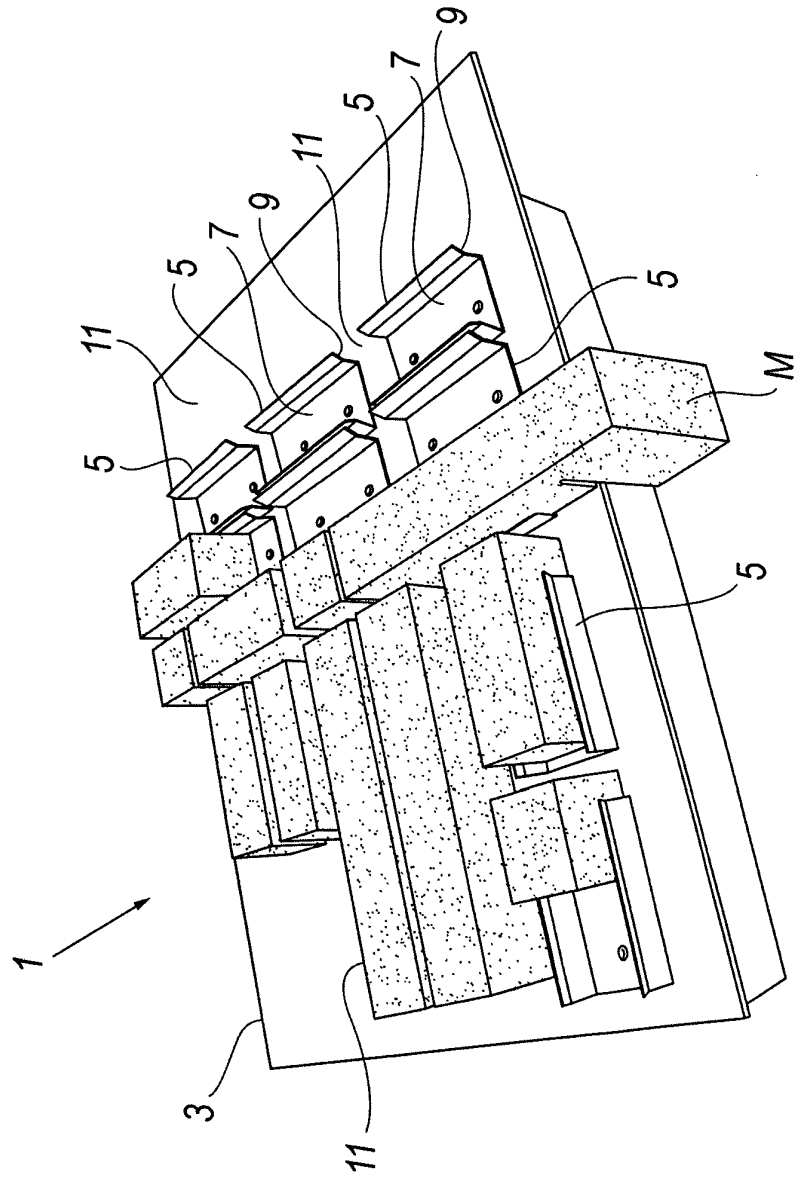

Fig. 3

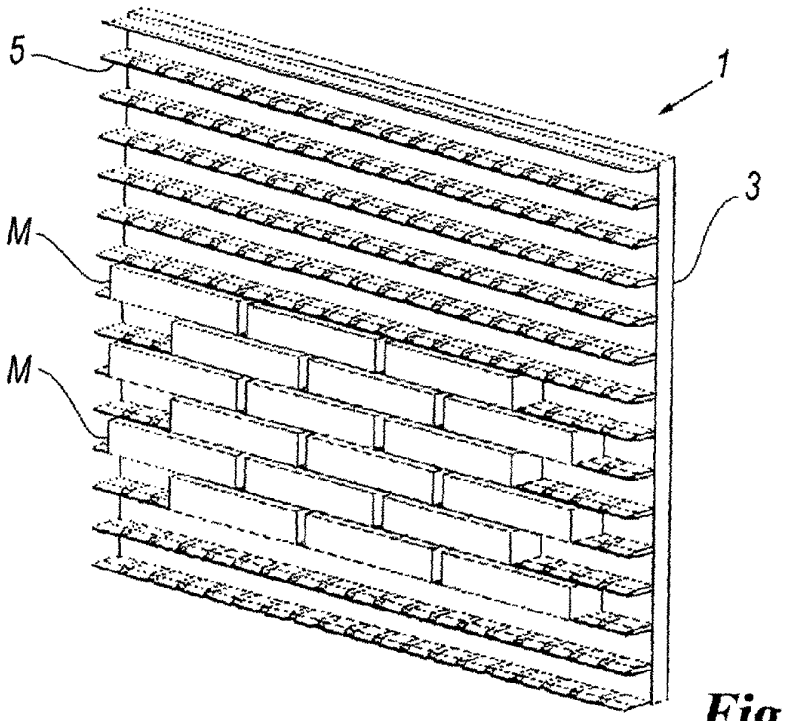

Fig. 4

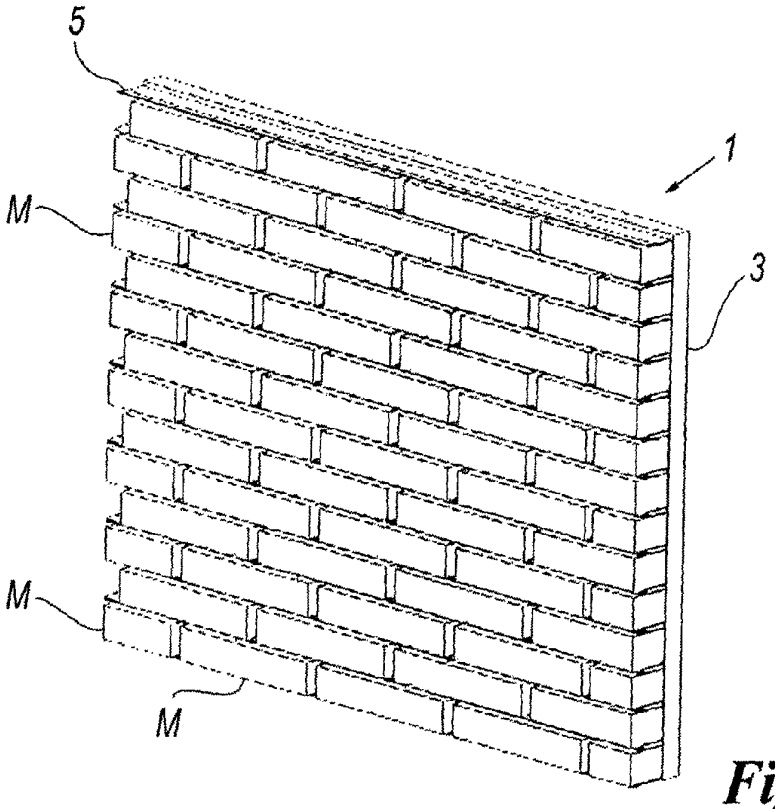

Fig. 5

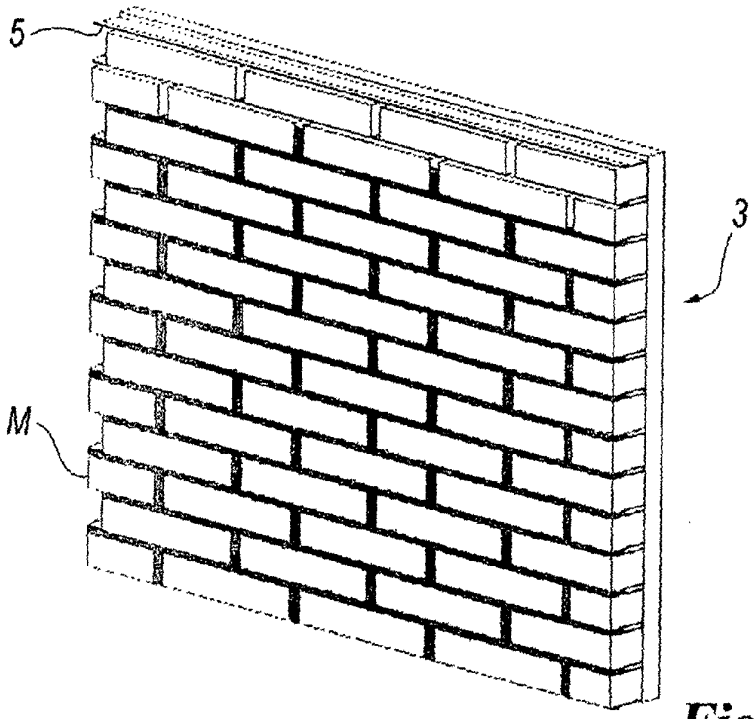

Fig. 6

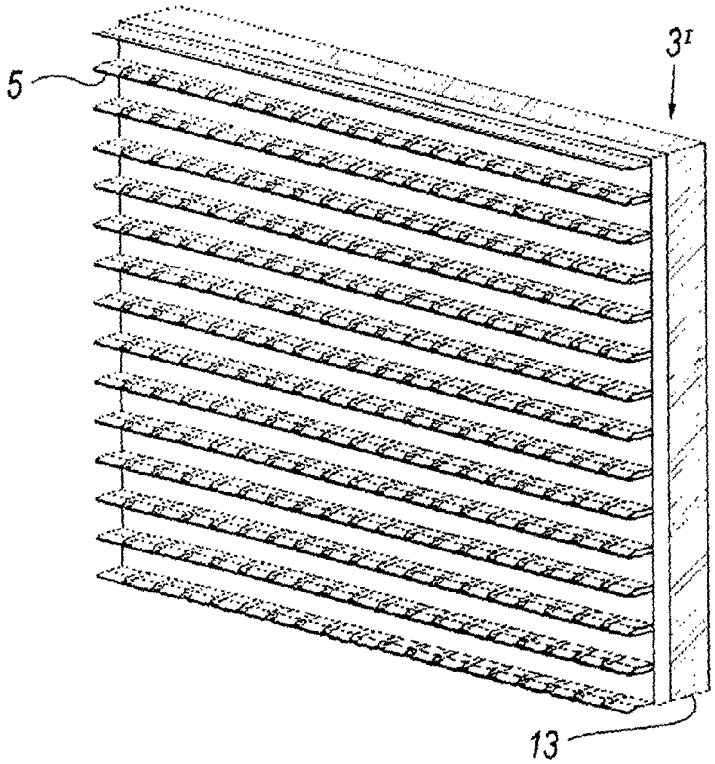

Fig. 9

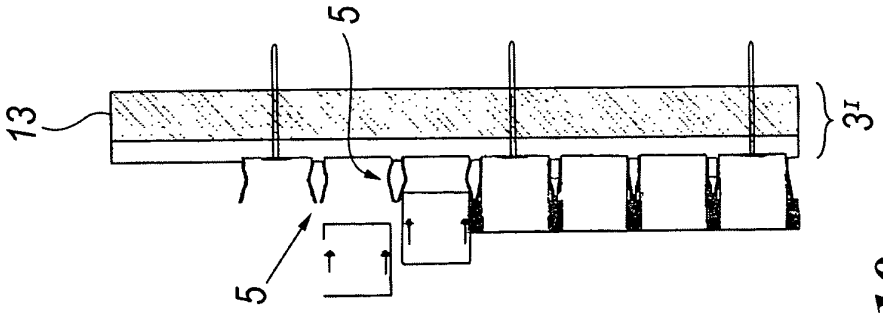

Fig. 10

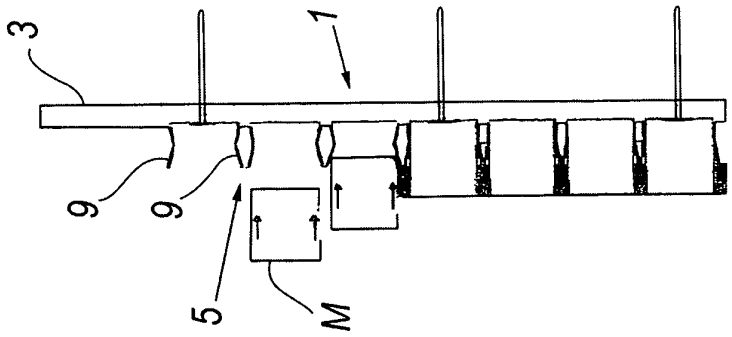

Fig. 7

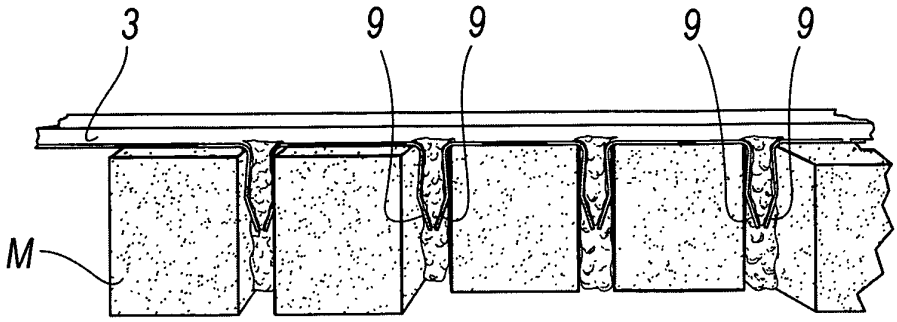

Fig. 8

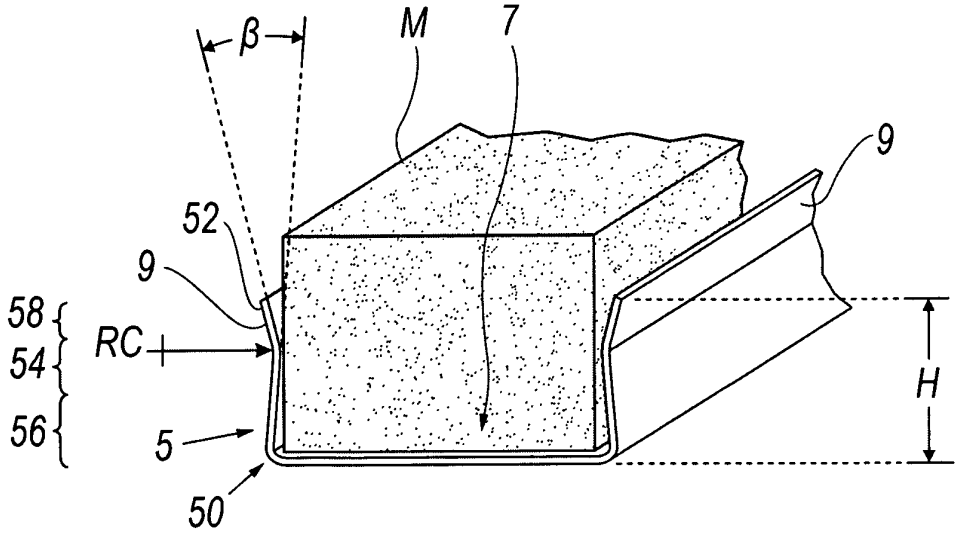

Fig. 12

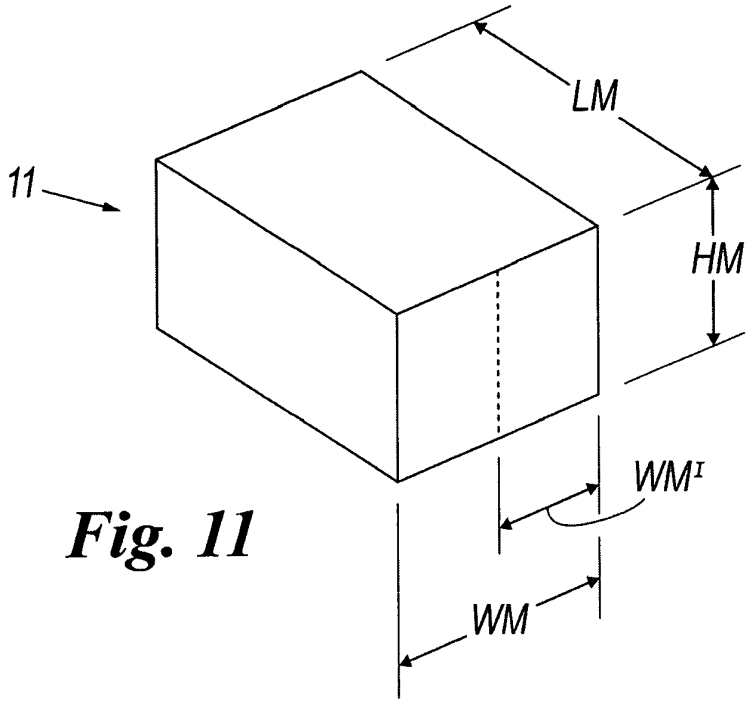

Fig. 11

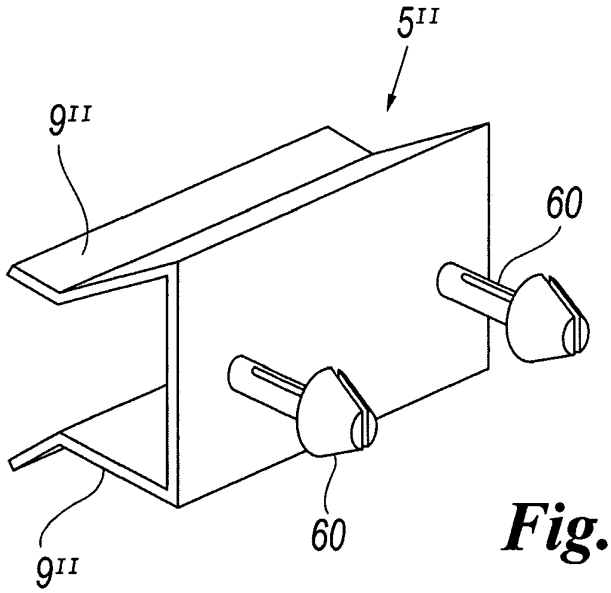

Fig. 14

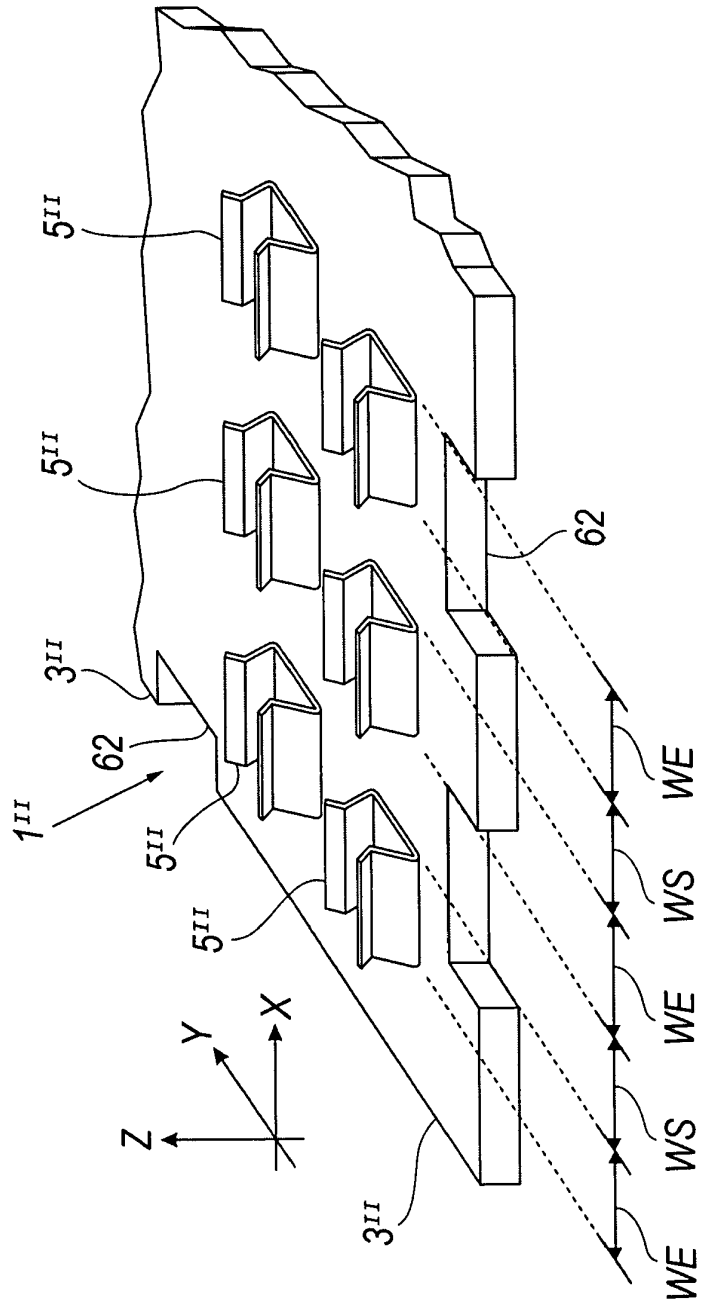

Fig. 13

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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