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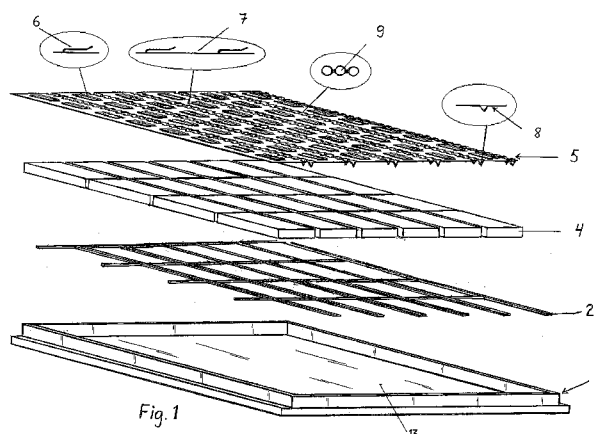
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(54) Title: A METHOD FOR MANUFACTURING OF FASADE PANEL



(57) Abstract: Manufacturing method of a facade panel meant for the outer lining of a building in which tiling (4) forming the outer surface of the mentioned panel is formed onto the surface of the back panel (5) meant to be the background of the facade panel, tiling is attached to the mentioned back panel and the seams between the tiles are seamed with the help of a seam mass whereupon a mould (1) equipped with a bottom panel (13) is used in the manufacturing method on top of which a tile controller (2) is set, such as a net to adjust the locations of the tiles positioned upside down and finally the back panel (5) is pressed on top of tiles whereupon attachment spikes (8) that belong to the back panel (5) become penetrated into the seams between the tiles and with the help of them tiling and the back panel (5) are bound with each other. The tile seams are filled with a jagged rough mass placed against the back panel (13) of the mould (1) and after that are filled with a hardening seam mass that binds tiles into which seam mass also the attachment spikes (8) of the back panel (5) become penetrated when the back panel (5) is installed to its location.

A Method for Manufacturing a Fasade Panel

Invention relates to a manufacturing method of a fasade panel meant for outer lining of a building in which manufacturing method tiling that forms the outer surface of the mentioned panel is formed onto the surface of the back panel meant to be the background of the fasade panel, the tiling is attached to the mentioned back panel and the seams between the tiles are seamed with the help of a seam mass whereupon a mould equipped with a bottom panel is used in the manufacturing method on top of which a tile controller is set, such as a net in order to adjust the locations of tiles that are positioned upside down and finally the back panel is pressed on top of the tiles whereupon attachment spikes belonging to the back panel penetrate into the seams between the tiles and with the help of them the tiling and the back panel are bound with each other.

Previously a method similar to a method described above is known from the patent publication FI-117485 in which a special foam gauze is installed on top of the bottom panel of the mould and the mould controller the task of which foam gauze is to prevent the extruding of the seam mass towards the seam controller and the bottom panel and to prevent them from becoming dirty. In addition to that the foam gauze prevents the seam mass from gripping to the tile controller and the bottom panel. The disadvantage of this method is the need to use the foam gauze and also the fact that the seam mass can be seen outwards from the tile seams. Unfortunately this seam mass often lets through white rust, like bricks and mortar seams usually do when the dampness varies. Thus in some cases the seam still needs to be separately covered with some other mass or a covering.

The use of foam gauze is known as a prior art method from the patent publications US 2266510 and 3642395, from a patent publication CH-498696 and from a published patent application FI932637. The penetration of the attachment spikes of the back panel to the seam mass is known from the patent publication US 4930278 and from the publication WO 9606246. The use of foam gauze as an aid of the tiling is however a difficult additional operation as well as separate extra seam works.

A pre-manufacturing method of a panel formed of ceramic tiles/bricks is known from the patent publication US 3892380 in which pre-manufacturing method the panel is

manufactured on top of a horizontal mould by setting the bricks to their locations with the help of controllers. In the method the seams are first filled from the bottom with a stiff mortar so that this mortar would not leak out underneath and on top of it, to the seams, this mortar is set in a more liquid form with which mortar the end part of the seam space is filled and this mortar is added so much that there will be the desired layer of this mass on top of the background surfaces of the tiles.

No attachment device is formed for the background surface of this kind of panel during its manufacturing stage in order to attach it onto a wall. The panel cannot endure processing even when the mortar has dried and thus it has to be lifted up supported by a mould and must be processed vertically. This kind of element gets support from the base and it cannot be installed to be hung from a wall.

In order to eliminate the above mentioned defects and disadvantages a new manufacturing method has been developed for the present invention of which it is characteristic that tile seams are first filled with a jagged rough mass located against the bottom panel of the mould and after that with a hardening seam mass that binds the tiles to which seam mass also the attachment spikes of the back panel become penetrated when the back panel is installed to its location.

In the method according to the invention there is no need for the foam gauze because a jagged rough mass, such as glass or stone chips having a granular size of 0,5 - 4 mm and also as coloured versions whereupon the seam can be modified to be better looking, if needed, is used as the first seaming agent. A layer of 3 - 5 mm rough mass is set on the bottom of the seam whereupon it will be a layer that is visible outwards. When an ordinary seam mass is set to the seam after the rough mass, this seam mass penetrates to the needed amount of rough mass binding it, but it does not penetrate through the rough mass till the bottom panel of the mould. According to the quality, colour and the consistency of the rough mass the appearance of the seams can be enlivened.

When a separate, metallic main panel will be set behind the panel, it can endure processing and it can be hung on the wall supported from the wall. The panel will be very thin whereupon it does not increase the thickness of the wall very much.

In the following the invention is described more detailed by referring to the accompanying drawing in which

Figure 1 shows the manufacturing process diagrammatically when the parts are separate
5 from each other.

Figure 2 shows the mechanical seaming between the tiles.

There is an assembly mould 1 in the figure 1 to which edges and a bottom panel 13
belong. A tile controller 2 that corresponds to the desired tiling is set on the bottom panel
10 13 which tile controller is for example net-like in such a way that its longitudinal and
horizontal bars or - tiles are a little bit smaller regarding their diameter or width than
what is meant to be the distance of the tiles. Thus the tiles can quickly be set to their right
locations and they stay there forming the tiling 4. After the positioning of the tiles the
controller can be removed.

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By using the tile controller 2 as an aid the tiling 4 is set on top of it upside down. This is
easy to do with the help of tiles that are essentially thinner than a normal brick when the
tile controller 2 functions as the controller of the positioning of the tiles. The tile controller
2 can be seen only in the seam spaces. When the tiles have been set the tile controller 2 is
20 removed by lifting it up through the seam spaces in which case there will be more room
and gripping surface for the seam mass at the edges of the tiles. After the tiling 4 a
mechanical seaming is performed most advantageously only to the seam spaces between
the tiles in a controlled way. First the mass to be installed is a jagged rough mass
according to the invention that does not have such flowing binding agent with it that might
25 lead to the dirtying of the bottom panel 13 or the fact that the rough mass becomes
adhered to it. The next stage is the stage whereupon the seam mass to be added is elastic
and flowing in which case it fills the gaps of the tiles without a mechanical penetration.
The amount of the mass is also easy to restrict to be at the level of the upper surface of the
tiles. This mass actually binds the tiles to each other.

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After the seam mass has been set, a back panel 5 can immediately be pressed on top of the
tiling 4 that is upside down. The back panel 5 has most advantageously been made of a
corrosion protected thin plate to which projections 6 and 8 and holes 9 have been
unlatched either by partial- or hole perforations. The back panel 5 has for example many

rows of attachment projections 6. The panel 5 has further level parts 7 from which a grip can be got with the help of a suction cup in order to lift and move the panel. Further the panel 5 has attachment projections 8 that have been located to match the seam spaces between the tiles and to grip the seam mass. Also the back panel 5 can have additional holes 9 made on purpose at least at the seam rows so that in order to make the seam mass to become dry the dampness could be let through the holes away from the seam. For example small vibration can be immediately used when the back panel is being installed whereupon possible air bubbles can be let out of the seam. Mass, which dries to the service durability most advantageously during 1 day or faster, can be used as a seam mass. The chosen mass will be such a mass the attachment durability of which is more than 500 N/seam metre.

In the figure 2 there is one example of the mechanical setting of the rough mass and the seam mass to spaces between the tiles. There is a portal carrier 10 in the device with which the nozzle 11 is moved in the seam spaces. The tiling 4 and the mould 1 move forward with the help of a conveyor 12 to the next station where the back panel 5 is installed. When the both seamings are performed from the back side of the tiles and the rough mass prevents the seam mass from gripping to the bottom panel, the seaming is possible to perform mechanically and to reach a end result that is good enough.

With the help of the manufacturing method the fasade panel can easily be manufactured with a very little handwork and only one whole back panel is enough to support the tiling that can be get for example from an automatic compressor line as a ready-made panel. The ready-made panel manufactured with the method is very thin, only about 3 - 5 mm thicker than the used tile thickness and thus very suitable for the lining.

CLAIMS

1. Manufacturing method of a facade panel meant for the outer lining of a building in
5 which tiling (4) forming the outer surface of the mentioned panel is formed onto the
surface of the back panel (5) meant to be the background of the facade panel, tiling is
attached to the mentioned back panel and the seams between the tiles are seamed with the
help of a seam mass whereupon a mould (1) equipped with a bottom panel (13) is used in
the manufacturing method on top of which a tile controller (2) is set, such as a net to
10 adjust the locations of the tiles positioned upside down and finally the back panel (5) is
pressed on top of tiles whereupon attachment spikes (8) that belong to the back panel (5)
become penetrated into the seams between the tiles and with the help of them tiling and
the back panel (5) are bound with each other, **characterized in that** the tile seams are
filled with a jagged rough mass placed against the back panel (13) of the mould (1) and
15 after that are filled with a hardening seam mass that binds tiles into which seam mass also
the attachment spikes (8) of the back panel (5) become penetrated when the back panel (5)
is installed to its location.
2. Manufacturing method according to the claim 1, **characterized in that** the rough mass
20 is placed into the seam first with the thickness of 3 - 5 mm.
3. Manufacturing method according to the claim 1, **characterized in that** the rough mass
functions as a layer against the bottom panel (13) of the mould which layer prevents the
seam mass that was set later from gripping to the bottom panel.
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4. Manufacturing method according to the claim 1, **characterized in that** glass and/or
stone chips are used as the rough mass.
5. Manufacturing method according to the claim 1, **characterized in that** the seam mass
30 is set only to the interstices of the tiles from the level of the bottom panel (13) to the level
of the background surface of the tiles (4).

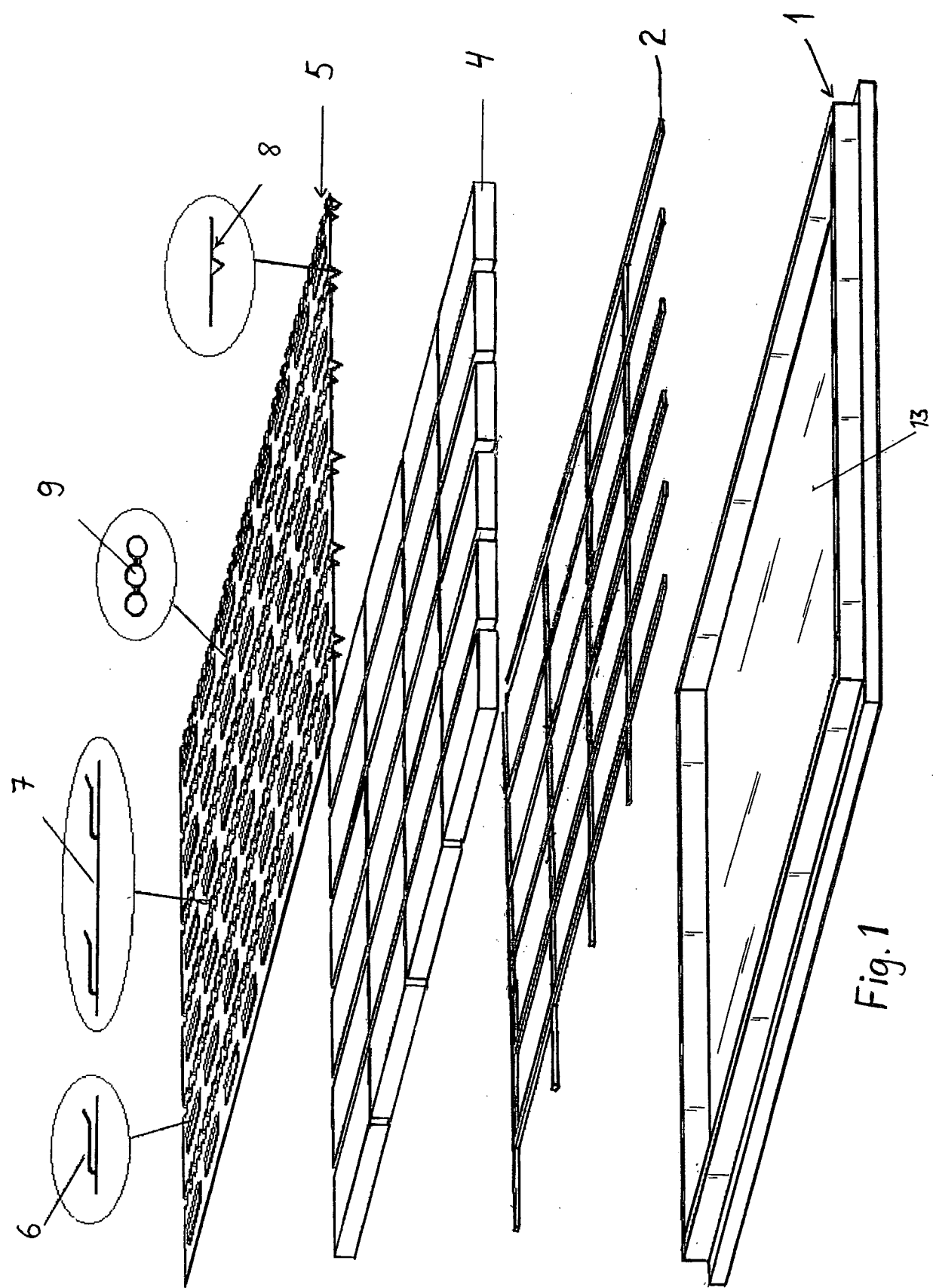
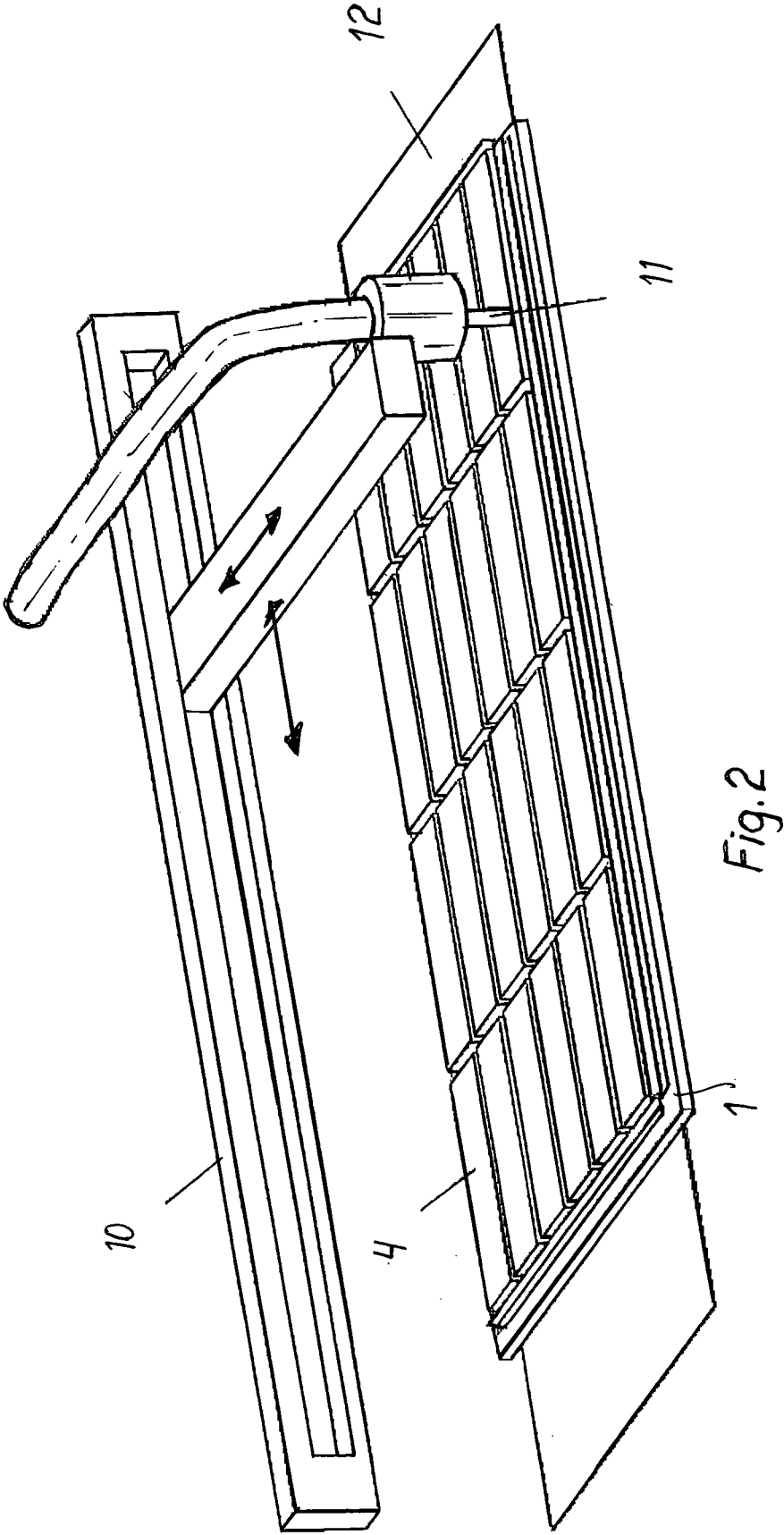


Fig. 1



INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2009/000060

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B28B, E04B, E04C, E04F, E04G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3892380 A (ANDERSON YNGVE R) 01 July 1975 (01.07.1975) column 4, row 36 – column 7, row 27; figures 2-5	1-3, 5
Y	column 4, row 36 – column 7, row 27; figures 2-5	4
Y	FI 7076 U (STONEL OY) 12 May 2006 (12.05.2006), the whole document	4

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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