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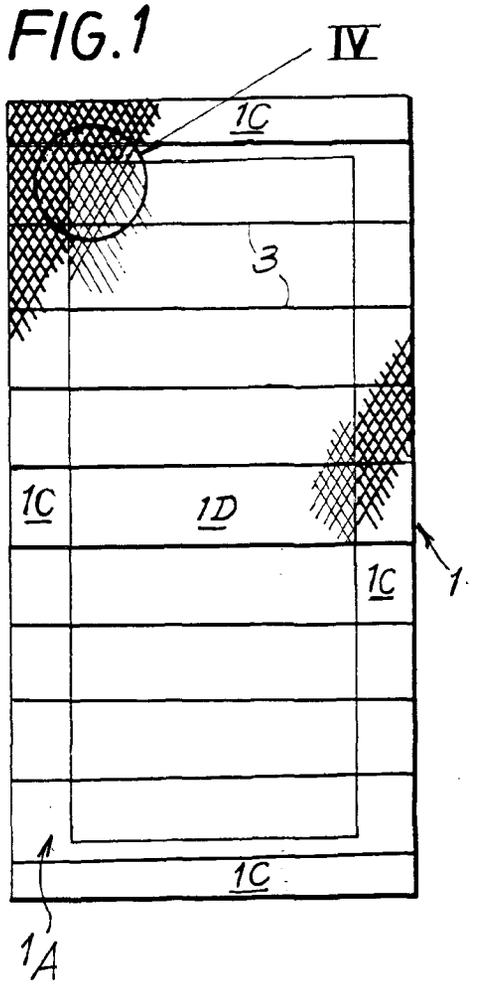
(54) A thermally insulating panel for application to surfaces of walls of buildings that are particularly exposed to sudden changes of temperature

(57) The opposite surface (1A) of the panel to that applied to the wall incorporates at least one multiplicity of incisions (3) extending for the most part over the whole of said surface (1A) of the panel. Other incisions can be provided on the opposite surface too.

FIG.1



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Description

[0001] The present invention relates to a thermally insulating panel for application to surfaces of walls of buildings that are particularly exposed to sudden changes of temperature, for forming an insulating cladding. More generally, the present invention relates to panels that can be laid on internal or external walls or portions of buildings or structures for any use (private, industrial, services, etc). These panels are usually fitted to prefabricated walls of industrial structures, which in themselves have little insulating power. They are placed edge to edge to form a continuous cladding fixed in some suitable way to the external faces of said walls, for example, by adhesive bonding, pinning in, mechanical fixing (e.g. with metal sections), or with a combination of these techniques. The opposite face of the panel from the adhesively bonded face is then protected by applying a plaster, typically reinforced with a mesh of polymer fibers, glass fibers, metal lathing or the like, and completed with a finish coat, generally an organic or inorganic plaster. This cladding system is usually termed "overcoat" cladding.

[0002] However, this type of cladding has a tendency to lift off the wall to which it is applied. Moreover, the plaster too tends to come away from the panel. This is caused by the relatively sharp gradient of deformation. The gradient of deformation can be caused by rising and/or falling temperatures and by the temperature gradient which is maintained by said insulating panels between their faces, the outward face being in contact with the plaster which is subject to direct insolation and to cooling, and the inward face in contact with the supporting wall. The deformations involve the insulating panel, the wall and the plaster. The gradient of deformations tends to cause each panel to bend, subjecting it to tensile and compressive stresses which tend to lift it off the wall to which it is applied. Also, these panels (which are usually made from expanded polystyrene cut from blocks, or preformed in slabs, or extruded, in mineral fibers, glass fibers, polyurethane or cork) sometimes offer poor adhesion to the glues and to the plaster itself so that its detachment is facilitated. The application of the glue and of the plaster is mostly done by hand. This does not ensure the ideal thickness of said components, which depend on having the correct thickness in order to withstand stresses. The adhesion of the plasters and their thickness, when not ideal, encourage detachment.

[0003] To eliminate or greatly reduce the problems described above, the present invention provides a thermally insulating panel in which at least the outward surface of the panel, i.e. the opposite surface to that applied to the wall, incorporates at least one multiplicity of incisions that extend preferably over the whole of said surface of the panel. This way the expansion of the outward surface of the panel, when it receives heat from the external environment, or gives heat up to the external environment, is at least partially absorbed by said incisions which reduce in thickness and modify the stresses by reducing the amount of area subject to these forces and avoiding the flexing and consequent detachment of the panel from the wall. The incisions may be distributed over part of the surface, but preferably over approximately the whole surface. They may be laid out at constant or variable intervals and/or parallel with each other or even in different directions for the different incisions.

[0004] The incisions are preferably continuous and run across the entire panel and, in a preferred embodiment of the invention, may be straight or curved and parallel with each other. The incisions preferably exhibit, transversely to the incisions themselves, a uniform distribution.

[0005] Furthermore, in a particularly advantageous embodiment of the invention, the panel incorporates, in addition to said at least one multiplicity of incisions, knurling distributed uniformly generally over the entire outward surface, in order to promote the adhesion of a plaster. In one possible embodiment the knurling may be distributed also over part or all of the inward surface of the panel, in order to provide a key for the adhesive for its bonding to the wall. In the context of this description and of the accompanying claims, "knurling" means any surface configuration with relief areas and depressed areas.

[0006] In a preferred embodiment of the invention, the depth of said knurling of the outward surface of the panel in a central area of the surface is shallower than the depth of the knurling of a peripheral band of the same surface. This reduces the use of mortar in said central area, limits the reduction in the insulating power of the panel caused by the presence of the knurling, and ensures good adhesion of the plaster in said band.

[0007] In order to reduce the amount of adhesive employed and limit the reduction in the insulating power of the panel, the knurling of the rear or inward surface may be distributed only over a peripheral band and in a moderate number of zones inside said band, while yet ensuring a sufficient degree of adhesion of the panel to the wall. However, complete distribution of the knurling over the entire inward or rear surface is not excluded.

[0008] Other advantageous features and embodiments of the panels according to the invention are defined in the accompanying claims.

[0009] A clearer understanding of the invention will be gained from the description and the attached drawing, the latter showing a practical and non-restrictive embodiment of the invention. In the drawing:

Figs. 1, 2, 3 show views of the outward face or surface, the edge and the face or surface of application (i.e. the rear or inward face), respectively, of a panel according to the invention; and

Figs. 4, 5 show detail IV from Fig. 1 enlarged, in plan view and in section on a plane marked V-V in Fig. 4 respectively.

[0010] Referring to Figs. 1-3, the panel 1 is rectangular in plan view, has a thickness of approximately 40 mm, and is produced by injection moulding of expanded beads of polystyrene.

[0011] It should be understood that the panel according to the invention may differ in shape from the rectangular and may have variably thicknesses, different than and in particular greater than 40 mm. The moulded expanded polystyrene is one of the preferred materials, but it should be understood that other materials can be used for the manufacture of the panel, such as expanded polystyrene cut from blocks, extruded expanded polystyrene, cork, glass wool, mineral wool and other materials.

[0012] On the opposite surface 1A to the surface 1B bonded to the supporting wall, the panel incorporates - in the example illustrated - straight incisions 3 parallel to its short sides. Altematively or in combination, incisions may also be provided along the long sides and/or non-straight non-parallel incisions with non-constant distribution. These incisions 3 have a width (s) (see Fig. 5) of approximately 0.5 mm in the example, so that the mortar of a plaster applied to the outside of the cladding composed of the panels does not penetrate into the incisions, or only to a limited extent. Different thicknesses may also be appropriate. The incisions 3 have a depth of the order of from approximately 0.5 mm to one half of the thickness of the panel and preferably of one third of the thickness of the panel. This allows the outward surface of the panels to expand in the direction of the greater dimension of each panel, absorbing this expansion with a contraction of the width (s) of said incisions 3, so that in this direction there are no excessive compressive and tensile stresses on each panel due to thermal expansion and so that the tendency of the panel to bend is therefore limited. In the direction of their depth, the incisions need not be perpendicular to the surface of the panel.

[0013] The outward surface 1A of the panel also comprises knurling in the form of protruding triangular islands 5 (see also Fig. 4) separated from one another by straight grooves 7 intersecting with each other in roughly circular intersections (9). In the example the triangular islands 5 and said intersections 9, respectively, have a height (h) and a diameter (d) of approximately 7 mm, and said grooves 7 have a width of approximately 1 mm, although these measurements should not be regarded as restrictive. Consequently the penetration of the mortar into the grooves 7 and into the intersections 9 enables the plaster to adhere to the surface 1A of the panel.

[0014] A peripheral band 1C of the surface 1A has a knurling depth (p1) (see Fig. 5) greater than the depth (p2) of the knurling of the rest of the surface 1D lying inside the band 1C. This ensures stronger adhesion of the plaster around the edge of the panel without excessively reducing the insulating power of the panel in area 1D, which is the greater part of the panel, such reduction being the result of replacing the insulating material with mortar in the sunken parts of the knurling.

[0015] The rear or inward surface 1B (Fig. 3) by which the panel is applied to the wall incorporates knurling of uniform thickness distributed in a peripheral band 1E and in zones 1F of the area lying inside said peripheral band 1E. In this case the knurling is intended to enhance the adhesion and to indicate correctly the distribution of the adhesive on the panel for attachment to the wall, specifically around the edge of the panel and on said zones 1F to avoid flexing caused by thermal expansions. This arrangement also makes it possible to limit the volume of adhesive employed and the reduction in insulating power of the panel due to a similar reason to that described above in respect of face 1A.

[0016] The perimeter of the panel may have any configuration, not necessarily the sharp edges illustrated, e.g. dovetail, tongue-and-groove or other configuration to permit the panels to be laid edge-to-edge and/or slotted into each other.

[0017] It will be understood that the drawing shows only an illustrative embodiment purely by way of a practical demonstration of the invention, and that the invention can be varied in its shapes and arrangements without thereby departing from the scope of the concept on which the invention is based. The presence of any reference numerals in the accompanying claims is for the purpose of facilitating the reading of the claims with reference to the description and drawing, and does not limit the scope of protection represented by the claims.

Claims

1. A thermally insulating panel for application to surfaces of walls of buildings that are particularly exposed to sudden changes of temperature, for forming an insulating cladding, characterized in that at least the opposite surface (1A) of the panel to that (1B) applied to the wall incorporates at least one multiplicity of incisions (3).

2. Panel as claimed in claim 1, characterized in that said incisions are parallel.

3. A panel as claimed in claim 1 or 2, characterized in that said multiplicity of incisions extends for the most part over the whole of said surface (1A) of the panel.

4. A panel as claimed in claim 1 or 2 or 3, characterized in that said incisions (3) are continuous and run across the entire panel.

5. A panel as claimed in one or more of claims 1-4, characterized in that said incisions (3) are straight.

6. A panel as claimed in one or more of claims 1-5, characterized in that said incisions (3) are curved.

7. A panel as claimed in any one of the previous claims, characterized in that said at least one multiplicity of incisions (3) exhibits, transversely to the incisions themselves, a uniform distribution.

8. A panel as claimed in any one of the previous claims, characterized in that said incisions (3) have a thickness of approximately 0.5 mm.

9. Panel as claimed in claim 8, characterized in that said incisions (3) have a depth of from approximately 5 mm to approximately one half of the thickness of the panel and preferably of approximately one third of the thickness of the panel.

10. A panel as claimed in any one of the previous claims, characterized in that it is of rectangular shape and incorporates a single multiplicity of straight incisions (3) oriented parallel to the short dimension of the rectangle.

11. A panel as claimed in any one of the previous claims, characterized in that it incorporates, in addition to said at least one multiplicity of incisions (3), knurling (5, 7, 9) distributed uniformly, preferably over approximately the entire outward surface (1A), in order to promote the adhesion of a plaster.

12. Panel as claimed in claim 11, characterized in that said knurling (5, 7, 9) is distributed also at least partly over the inward surface (1B) of the panel, in order to provide a key for the adhesive for its bonding to the wall.

13. A panel as claimed in at least claim 11 or 12, characterized in that the depth of said knurling (5, 7, 9) of the outward surface of the panel in a central area (1D) of the surface is shallower than the depth of the knurling of a peripheral band (1C) of the same surface.

14. A panel as claimed in claim 12 or 13, characterized in that said knurling of the inward surface (1B) is distributed only over a peripheral band (1 E) and in a moderate number of zones (1F) inside said band.

15. A panel as claimed in one or more of claims 11-14, characterized in that said knurling includes protruding islands (5) of equilateral triangular plan, separated from one another by straight channels (7) meeting in circular intersections (9).

16. A panel as claimed in claim 15, characterized in that said triangular islands have a height (h) of approximately 7 mm, said channels have a width (t) of approximately 1 mm and said intersections (9) have a diameter of approximately 7 mm.

17. A thermally insulating panel for application to surfaces of walls of buildings that are particularly exposed to sudden changes of temperature; all as described above and represented by way of example in the attached drawing.

FIG.1

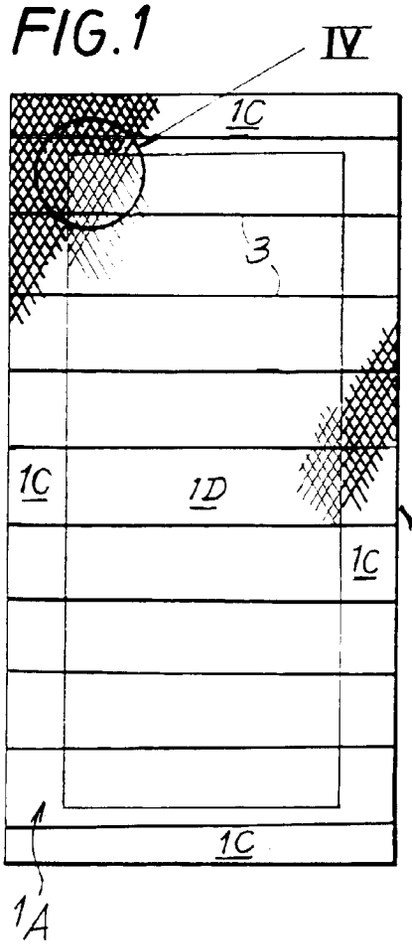

FIG.2

FIG.3

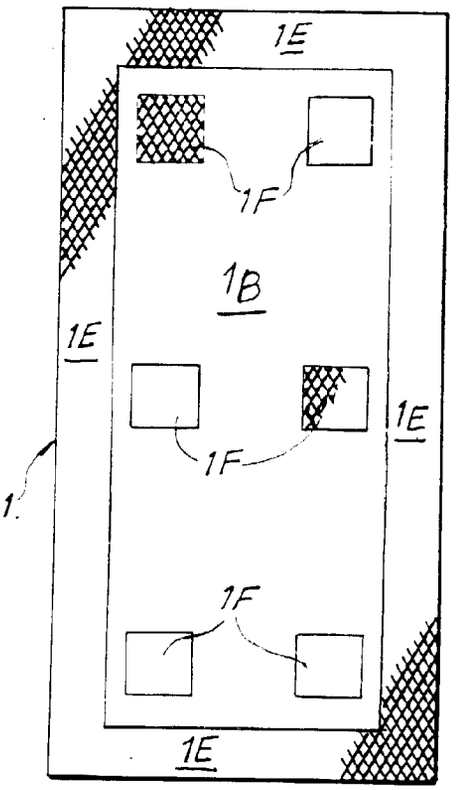

FIG.4

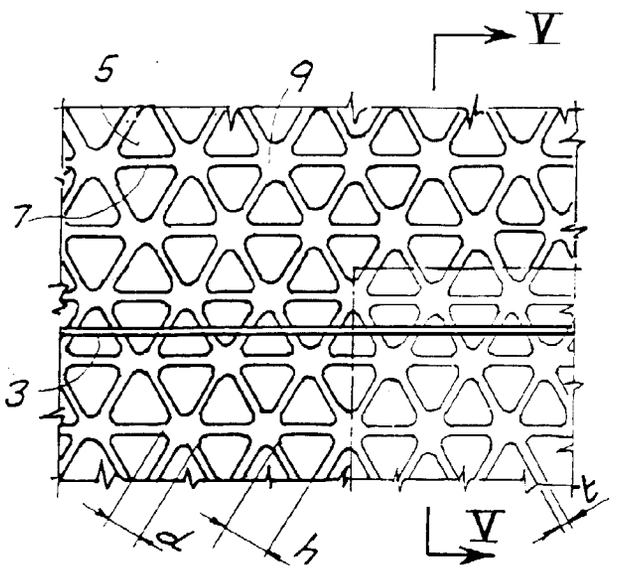

FIG.5