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(54) **Covering panels and a method for laying covering panels**

(57) A covering panel for surfaces comprising a covering slab (2) provided with a laying surface (20) to be laid facing towards the surface to be covered (A). A plastically-deformable compensating element (4) is fixed on the laying surface (20) and rests removably on the surface to be covered (A), plastically deforming when compressed between the covering slab (2) and the surface to be covered (A), such as to adapt a shape thereof to a shape of a hollow space defined between the laying surface (20) of the covering slab (2) and the surface to be covered (A).

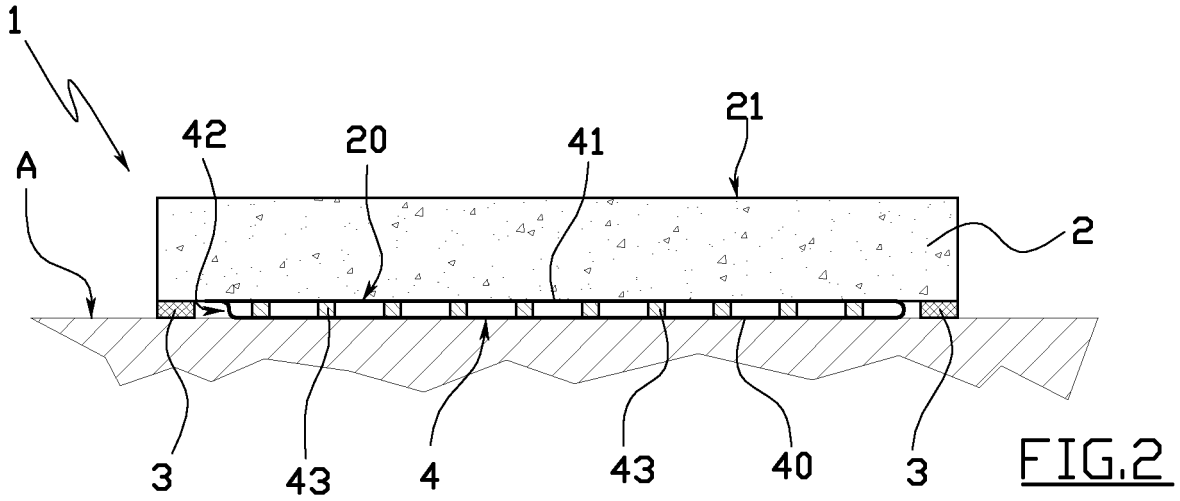

FIG.2

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Description

[0001] The invention relates to panels for covering surfaces and a method for laying the panels.

[0002] In more detail, the present invention relates to free-laying panels, i.e. panels which are destined to be laid on surfaces to be covered without any grouting using mastics or glues, for example for realising dismountable floors on concrete bases or on pre-existing but ruined or damaged floors.

[0003] As is known, the free-laying covering panels comprise a polygonal covering slab, generally made of a ceramic material or a natural stone, which is provided with a laying surface which can face towards the surface to be covered, and an in-view surface with is exposed to the outside to define the treading surface of the floor.

[0004] During laying of the floor, the covering slabs are generally rested on a plurality of support blocks or grids, which are first fixed on the surface to be covered, such as to receive the corners of the slabs in rest thereon.

[0005] The support blocks or grids must therefore be sufficiently precisely and stably predisposed and height-adjusted such as to guarantee that after laying the covering slabs are coplanar to one another.

[0006] As however the surfaces to be covered sometimes exhibit considerable irregularity, obtaining the coplanarity of the covering slabs via the above-mentioned support blocks or grids generally requires special measuring tools, such that the covering can only be done by expert professional layers, and requires considerable time to be completed.

[0007] To simplify and accelerate the laying operations, the applicant has in the past provided a covering system using panels which does not require installation of the above-mentioned support blocks or grids.

[0008] The system comprises covering panels which are singly provided with a covering slab, on the face of which a perimeter support frame is fixed, which is made of a closed-cell elastically-deformable plastic material.

[0009] During the laying operations, the support frame is compressed against the surface to be covered, such as to expel the air contained internally of the closed-cell plastic material of which it is made, thus creating a sucker effect which fixes the covering slab to the surface to be covered.

[0010] It still happens, however, that the covering slab is effectively supported only at the lateral edges thereof, while the central zone is distanced from the surface to be covered and is thus susceptible to high levels of flexional deformations, which limit the entity of the loads that are supportable without the risk that the covering slabs might buckle or break.

[0011] The aim of the present invention is to obviate the above-mentioned drawbacks, enabling realisation of a panel covering which can support greater weights than those of the prior art, and which can be realised perfectly planarly on the surfaces to be covered simply and rapidly.

[0012] A further aim of the invention is to reach the above-mentioned objectives in the ambit of a simple, rational and relatively inexpensive solution.

[0013] These aims are attained by the characteristics of the invention which are detailed in the independent claims. The dependent claims delineate preferred and/or particularly advantageous aspects of the invention.

[0014] In particular, the invention makes available a covering panel for surfaces comprising a covering slab provided with a laying surface which can be turned towards the surface to be covered, in which a shapeable compensating element is removably fixed on the laying surface, the shapable compensating element being plastically deformable when the covering panel is pressed against the surface to be covered, such as to adapt the shape thereof to the shape of the hollow space which is defined between the laying surface of the covering slab and the surface to be covered.

[0015] In this way the shapeable compensating element can effectively compensate for any irregularities or planarity errors in the surface to be covered, enabling simple and rapid realisation of a perfectly planar covering.

[0016] The shapeable compensating element is further designed to harden after the deformation, such as to be able to realise a valid support of the covering slab on the surface to be covered, enabling the covering slab to support heavy loads without any risk of buckling or breaking.

[0017] The compensating element is preferably removably fixed on the laying surface of the covering slab, for example by means of a low-adhesive grout.

[0018] In this way, the covering slab of the covering panel can be used many times, simply by separating the deformed compensating element and replacing it with another, new compensating element.

[0019] In a preferred aspect of the invention, the compensating element comprises at least a mass of a plastically deformable material which is subsequently able to harden, which is interposed between a first containing layer which goes into contact with the surface to be covered, and a second containing layer fixed to the laying surface of the covering layer.

[0020] The first and second containing layers are preferably flexible and are defined by a single flexible membrane folded on itself, and possibly closed along the lateral edges thereof, such as to define a containing wrapper for the plastically deformable material.

[0021] The invention also provides a method for manufacturing the above-described covering panel.

[0022] The method includes the stages of realising a covering slab provided with a laying surface which faces towards the covering surface, fixing a first portion of a flexible membrane on the laying surface of the covering slab, applying at least a mass of plastically deformable material which is subsequently hardenable on the first portion of the flexible membrane, and folding the flexible membrane such as to cover the at least a mass of plastically deformable material with a second portion of the

flexible membrane itself.

[0023] Finally, the invention provides a laying method for covering panels.

[0024] The laying method includes interposing a plastically-deformable compensating element of the above-described type between each covering panel and the surface to be covered. The compensating element rests removably on the surface to be covered and is designed to plastically deform when compressed between the covering panel and the surface to be covered, such as to adapt the form thereof to the hollow space defined between the covering panel and the surface to be covered. The compensating element is thus designed to harden after deformation, such as to realise a valid support for the covering panel.

[0025] Further characteristics and advantages of the invention will emerge from a reading of the following description, supplied by way of non-limiting example, with the aid of the figures of the appended drawings, in which:

- figure 1 is a view from below of a covering panel of the present invention;
- figures 2 and 3 show the section along line II-II denoted in figure 1, during two successive stages of the laying of the covering panel;
- figures 4 and 5 show the section of figure 2 during two stages of the manufacturing of the covering panel.

[0026] Figures 1 and 2 illustrate a self-laying covering panel 1 of the present invention, which is destined to be laid dry, i.e. without interposing mastics or grouts, on a surface to be covered A, such as to realise, with other identical free-laying covering panels 1, a continuous and dismountable planar covering, typically a dismountable floor for covering concrete bases or ruined or damaged pre-existing floors.

[0027] The covering panel 1 comprises a treadable covering slab 2 having a polygonal shape, for example a slab made of a ceramic or natural stone material, which exhibits a laying surface 20 which faces towards the covering surface A, and an in-view surface 21 which will remain in view to the outside, defining the treadable surface of the floor.

[0028] Four blocking strips 3 made of a plastic material are fixed on the laying surface 20, the plastic material being deformable and closed-cell, each of which strips develops parallel and adjacent to an edge of the covering slab 2, such as to realise overall a perimeter frame which is in direct contact with the surface to be covered A.

[0029] In more detail, the blocking strips 3 have identical thickness, preferably comprised between 0.5 mm and 50 mm, and the plastic material they are made of is a closed-cell polymer foam, for example PVC. The closed-cell polymer foam preferably has a density comprised between 50 and 300 Kg/m^3, a module of elasticity compression comprised between 0.8 and 9 N/cm2, and a Shore 00 hardness comprised between 10 and 60.

[0030] A compensating cushion, denoted in its entirety by 4, is fixed on the laying surface 20 of the covering slab, which cushion 4 is centrally arranged to substantially cover the whole area left free by the blocking strips 3.

[0031] The compensating cushion 4 is designed to be in direct contact with the surface to be covered A non-adhesively, i.e. without any cohesive force being realised with the surface, and is designed to plastically deform under the weight of the overlying covering slab 2 (see figure 3), such as to adapt to the eventual irregularities or defects in planarity of the surface to be covered A.

[0032] In particular, the compensating cushion 4 comprises two reciprocally opposite containing layers, of which a lower containing layer 40 which is in direct contact with the surface to be covered A, and an upper containing layer 41 which comes into contact with the laying surface 20 of the covering slab 2. Both the containing layers 40, 41 are preferably made of a thin flexibly membrane made of plastic material, typically of polymer such as polyethylene, or cellulose-based.

[0033] The upper containing layer 41 is at least slightly adhesive, for example it can be treated with a suitable glue, such as to be attached to the covering slab 2.

[0034] A plastic layer, denoted in its entirety by 42 in figure 2, is interposed between the containing layers 40, 41, which plastic layer is temporarily designed to plastically give when subjected to the compression exerted by the weight of the covering slab 2, then to harden, staying in the assumed conformation.

[0035] In particular, the plastic layer 42 comprises a plurality of masses 43 of a plastically-deformable material which subsequently hardens, which layers are identical to one another and are uniformly distributed in the hollow space between the containing layers 40 and 41, where they are reciprocally separated by hollow spaces.

[0036] The plastically deformable material is preferably a plastic material, for example a polymer material such as silicone or polyurethane. The polymer material preferably has a density comprised between 1.20 and 1.49 kg/dm^3, and resistance to traction comprised between 0.5 and 0.9 N/mm^2.

[0037] As illustrated in figure 2, during the laying of the covering panel 1, the weight of the covering slab 2 compresses the blocking strips 3 and the compensating cushion 4 against the surface to be covered A.

[0038] The compression causes the squeezing of the blocking strips 3, which expel the air contained in the closed-cell material of which they are made, thus creating a sucker effect which blocks the covering slab 2 on the covering surface A.

[0039] At the same time the containing layers 40, 41 of the compensating cushion 4 reciprocally near, squeezing the masses 43 of the plastically-deformable material.

[0040] In this way, the masses 43 are plastically deformed and expand into the space between the containing layers 40 and 41, thus realising a shaped support base 44 substantially having an intermediate shape between the original one and the one of the hollow space

which is defined between the covering slab 2 and the surface to be covered A, after the squeezing of the blocking strips 3.

[0041] The masses of plastically-deformable material 43 are preferably calibrated in size and are distributed among the containing layers 40, 41, so that the shaped support base 44 fills a percentage of between 25% and 70% of the hollow space.

[0042] The shaped support base 44 thus enables compensation of any irregularities or errors of planarity in the surface to be covered A, enabling simple and rapid realisation of a perfectly planar covering.

[0043] Thereafter the plastically-deformable material comprised between the containing layers 40 and 41 undergoes a spontaneous process of hardening, so that the shaped support base 44 provides a valid support for the covering slab 2, enabling the covering slab 2 to support large loads without any risk of buckling or breaking.

[0044] After laying, the covering panel 1 can be removed independently from all the other panels which realise the covering, simply by applying a force which can overcome the cohesive force due to the sucker effect.

[0045] The deformed compensating cushion 4 remains attached to the covering slab 2, and can thus be easily removed and replaced with a further undeformed compensating cushion 4, enabling re-use of the covering panel 1.

[0046] In a preferred embodiment of the invention, the lower containing layer 40 and the upper containing layer 41 of the compensating cushion 4 are reciprocally connected, for example fixed along one or more of the perimeter edges thereof, such as to define a closed or partially closed pack containing the masses 43 of plastically-deformable material.

[0047] In this case, the containing layers 40, 41 are preferably realised with a microporous material which, during the compression of the compensating cushion 4, is designed to enable exit of the air, thus retaining the plastically-deformable material.

[0048] Figures 4 and 5 illustrate a simple and effective method for realising the covering panel 1 of the invention.

[0049] The method includes providing a covering slab 2, possibly provided with a plurality of blocking strips which form a perimeter frame on the laying surface 20, and a flexible membrane 5 made of a plastic material, typically a polymer such as polyethylene, possibly exhibiting micro-porosity in the form of small holes.

[0050] A first portion of the flexible membrane 5 is fixed on the laying surface of the covering slab 2, in the area left free by the blocking strips 3, for example by a low-adhesive glue, such as to realise the upper containing layer 41 of the compensating cushion 4 (see figure 4).

[0051] The masses 43 of deformable plastic material, which then hardens, are applied on the first portion of the flexible membrane 5, the distribution and quantity of the masses 43 being calculated such that they fill, after compression of the blocking strips 3, the hollow space which is defined between the covering slab 2 and the wall A to be covered (figure 5).

[0052] In particular, in order to facilitate the application stage of the masses 43, with the method a plurality of reciprocally-separated graphic signs can be printed on the first portion of the flexible membrane 5, at each of which an operator will only have to place a mass 43 of plastically-deformable material having a predetermined volume.

[0053] After this stage, the second free portion of the flexible membrane 5 is folded and extended on the masses 43 of plastically-deformable material such as to realise the lower containing layer of the compensating cushion 4, and finally it is fixed along the lateral sides of the first portion of the flexible membrane 5 see figure 2).

[0054] Obviously an expert in the sector might bring numerous modifications of a technical-applicational nature to the covering panel as described herein, without its forsaking the ambit of the invention as claimed in the following claims.

Claims

1. A covering panel for surfaces comprising a covering slab (2) provided with a laying surface (20) to be laid facing towards a surface to be covered (A), **characterised in that** a plastically-deformable compensating element (4) is fixed on the laying surface (20), which compensating element (4) rests removably on the surface to be covered (A) and plastically deforms when compressed between the covering slab (2) and the surface to be covered (A), such as to adapt a shape thereof to a shape of a hollow space defined between the laying surface (20) of the covering slab (2) and the surface to be covered (A).

2. The covering panel of claim 1, **characterised in that** the compensating element (4) is designed to harden, such as to provide a stable support for the covering slab (2).

3. The panel of claim 1, **characterised in that** the compensating element (4) comprises at least a mass (43) of plastically-deformable material, which is interposed between the laying surface (20) of the covering slab (2) and a first containing layer (40) which comes into contact with the surface to be covered (A).

4. The panel of claim 3, **characterised in that** the plastically-deformable material (43) is designed to harden.

5. The panel of claim 3, **characterised in that** the first containing layer (40) is flexible.

6. The panel of claim 3, **characterised in that** the at least a mass of plastically-deformable material (43)

is interposed between the first containing layer (40) and a second containing layer (41) fixed to the laying surface (20) of the covering layer (2).

7. The panel of claim 6, **characterised in that** the first containing layer (40) and the second containing layer (41) are reciprocally joined such as to define a package in which the at least a mass of plastically-deformable material (43) is contained.

8. The panel of claim 6, **characterised in that** the first containing layer (40) and the second containing layer (41) are portions of a single flexible membrane (5).

9. The panel of claim 3, **characterised in that** it comprises a plurality of the masses of plastically-deformable material (43), which are reciprocally separated by empty spaces.

10. The panel of claim 1, **characterised in that** the compensating element (4) is removably fixed to the covering slab (2).

11. A method for manufacturing a covering panel for surfaces, comprising a stage of realising a covering slab (2) provided with a laying surface (20) designed to face towards a surface to be covered (A), **characterised in that** it comprises further stages of fixing a first portion of a flexible membrane (5) on the laying surface (20) of the covering slab (2), applying at least a mass of plastically-deformable material (43) on the first portion of the flexible membrane (5), and folding the flexible membrane (5) such as to cover the at least a mass of plastically-deformable material (43) with a second portion of the flexible membrane (5).

12. The method of claim 11, **characterised in that** the plastically-deformable material (43) is designed to harden.

13. The method of claim 11, **characterised in that** it includes applying a plurality of the masses of plastically-deformable material (43) separated by empty spaces on the first portion of the flexible membrane (5).

14. The method of claim 13, **characterised in that** it includes a stage of realising a plurality of graphic signs on the first portion of the flexible membrane (5), at point of application of the plastically-deformable masses of material (43).

15. A method for laying covering panels on a surface to be covered (A), **characterised in that** it comprises a stage of interposing a plastically-deformable compensating element (4) between a covering panel (1) and the surface to be covered (A), which compensating element (4) rests removable on the surface to be covered (A), and plastically deforms when compressed between the covering panel (1) and the covering surface (A), such as to adapt a shape thereof to a hollow space defined between the covering panel (1) and the surface to be covered (A).

16. The method of claim 15, **characterised in that** the compensating element (4) is designed to harden, such as to provide a stable support for the covering panel (1).

17. The method of claim 15, **characterised in that** the compensating element (4) comprises at least a mass of plastically-deformable material (43), which is interposed between the covering panel (1) and a first containing layer (40) which is in contact with the surface to be covered (A).

18. The method of claim 3, **characterised in that** the plastically-deformable material (43) is designed to harden.

19. The method of claim 17, **characterised in that** the first containing layer (40) is flexible.

20. The panel of claim 17, **characterised in that** the at least a mass of plastically-deformable material (43) is interposed between the first containing layer (40) and a second containing layer (41) which is fixed to the covering panel (1).

21. The panel of claim 20, **characterised in that** the first containing layer (40) and the second containing layer (41) are reciprocally joined such as to define a pack in which the at least a mass of plastically-deformable material (43) is contained.

22. The panel of claim 20, **characterised in that** the first containing layer (40) and the second containing layer (41) are portions of a single flexible membrane (5).

23. The panel of claim 17, **characterised in that** it comprises a plurality of the masses of plastically-deformable material (43), which are reciprocally separated by empty spaces.

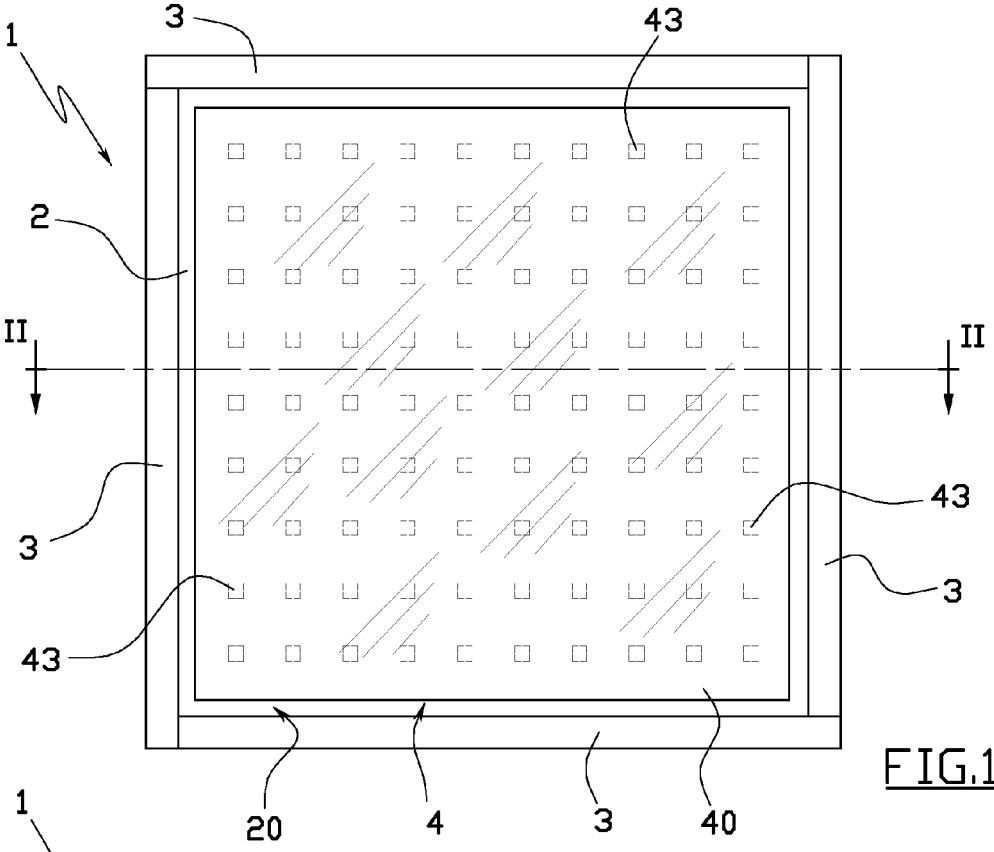

FIG.1

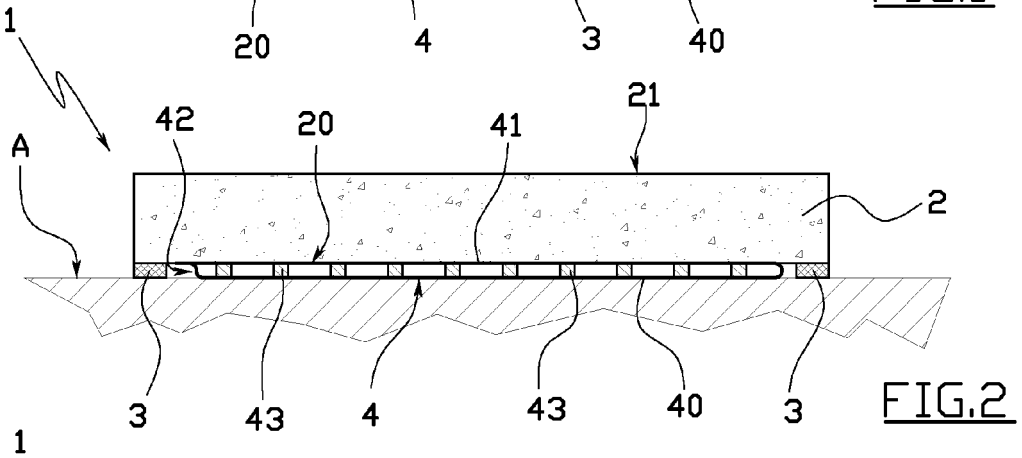

FIG.2

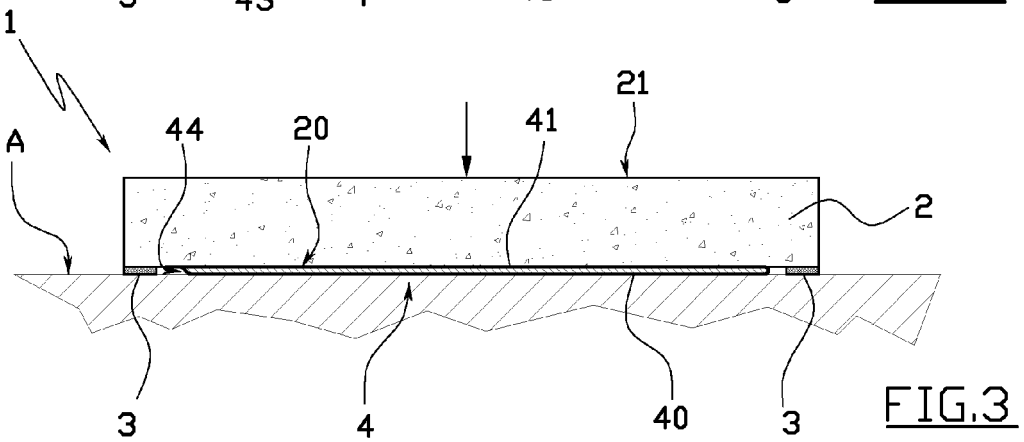

FIG.3

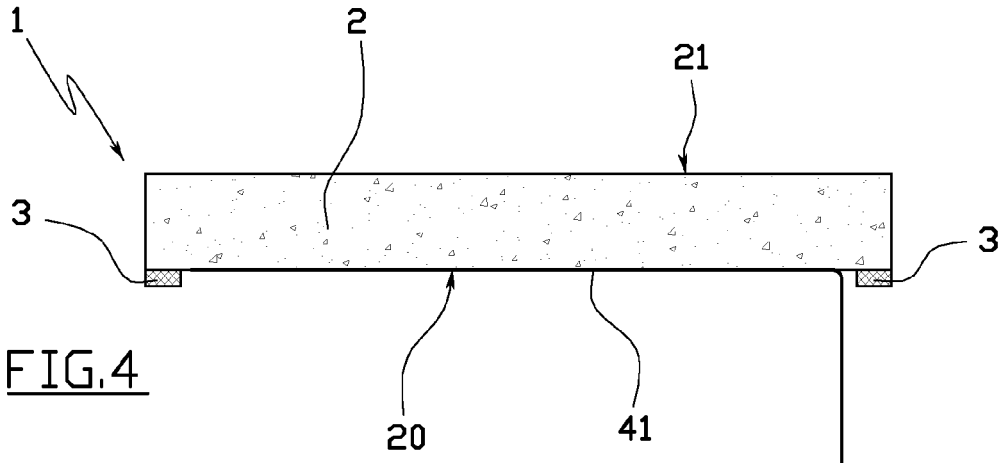

FIG.4

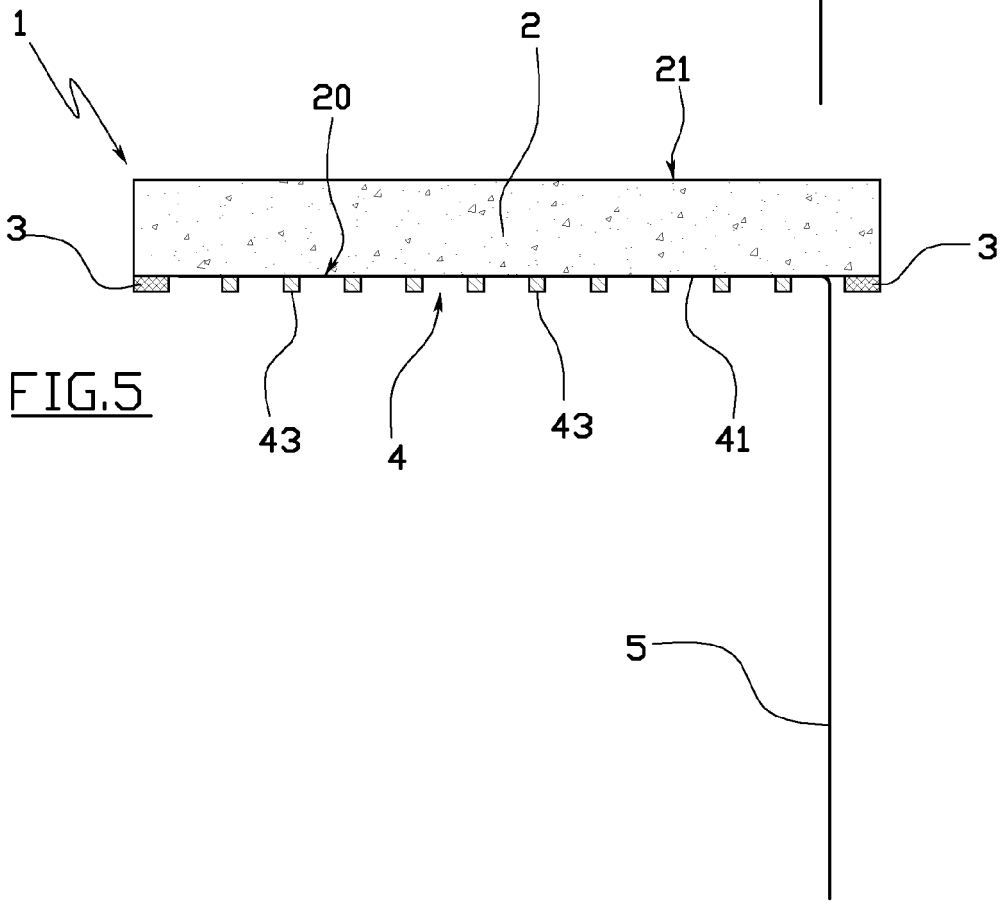

FIG.5