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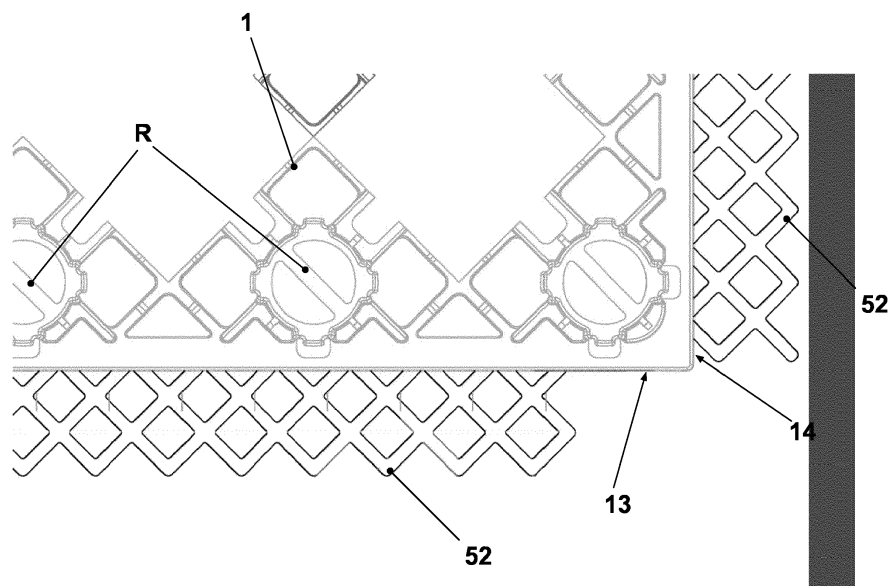
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(54) **MODULAR INSULATED AND REINFORCED CLADDING LAYER FOR WALLS IN GENERAL AND METHOD FOR MAKING THE CLADDING LAYER**

(57) The invention is a covering (R) for walls (M), comprising an insulating layer, a layer of cement plaster (C) incorporating a layer made up of modular lattices (1, 1') defining a counteracting plane (B) that is spaced from the insulating layer, projections or protrusions or spacer elements in general (R, R1, 21, 22, 23, P21) positioned between said lattices (1, 1') and the insulating layer and defining a hollow space filled with said layer of cement

plaster (C), fixing means (3) suited to constrain said lattices (1, 1') to said wall (M). The system that is the subject of the invention achieves several important results, such as: refurbishment of already existing overcladding, improved heat insulation, improved resistance to fire, high mechanical performance, improved acoustic insulation, improved anti-seismic properties, easy and quick application with reduced costs, optimal finishing of the plaster.

**Fig. 1b****EP 3 128 101 A1**

Description

[0001] The present patent concerns products for the building construction sector, and in particular it concerns a new insulating and reinforced modular covering for walls in general and a process for making said covering.

[0002] The new covering for walls of buildings or surfaces in general comprises:

- at least one insulating layer directly or indirectly in contact with the wall to be covered, said insulating layer being constituted by one or more insulating modular panels having any origin, natural, organic or mineral;
- at least one layer of cement plaster, positioned in such a way that it adheres to said insulating layer and incorporating at least one layer made up of one or more modular lattices defining at least one counteracting plane spaced from said insulating layer,
- one or more projections or protrusions or spacer elements in general, located between said one or more lattices and said one or more insulating panels, suited to define at least one hollow space between the counteracting plane and said one or more insulating panels, said hollow space being filled with said at least one layer of cement plaster,

the whole being made integral with the wall to be insulated by means of fixing elements, in such a way as to obtain an overcladding layer, and wherein the heads of the fixing elements are completely or partially buried in the cement plaster, in order to obtain a continuous connection between the wall and the cement plaster, with the insulating layer interposed between them.

[0003] In case of improvement of a wall that is already insulated but has a deteriorated plaster covering, the lattice may be applied directly to the existing plaster and insulating layer, once the resistance of the fixing means has been verified.

[0004] Walls provided with an overcladding layer are known, said walls typically being the external perimeter walls of a building.

[0005] Said overcladding layers comprise at least one layer of insulating material applied to the external surface of the perimeter wall with bonding agents and mechanical fixing elements, a first, cement-based, a few millimetres thick levelling layer being successively applied to said layer of insulating material. A fibreglass plaster mesh is buried in said first levelling layer and then a second levelling layer, at least 3 mm thick, is applied on it. Once the whole has dried up, a finishing layer is applied onto the overcladding. The insulating layer is generally constituted by panels made of an insulating material, for example synthetic foam material, or mineral wool, or organic material, etc.

[0006] The covering layer applied to said panel is usually very thin, just a few millimetres, and therefore there is the problem of guaranteeing the adhesion of the cov-

ering to the insulating layer and of the latter to the wall, in addition to guaranteeing the stability of the system over time.

[0007] An overcladding system is also known, which is specifically used for mineral wools, and which in order to make up for the low resistance of the latter to compression requires the application of a metallic plaster mesh to be applied to the entire wall. This plaster mesh needs many special supports intended to keep it well stretched and spaced from the insulating panels previously fixed to the wall. Furthermore, special fixing elements are needed to make the plaster mesh and its plaster layer integral with the underlying wall.

[0008] The application of this system in three application steps is extremely complicated and expensive.

[0009] Document DE 32 06 163 concerns a construction element intended to be used as a support for plaster, in particular in the cases where there is the need to create a rather thick and uniform plaster layer on large surfaces.

[0010] According to the technique known up to that moment, metallic nets were used, which however did not allow the thickness of the plaster layer to be determined, as this was done using gauges, spacers, etc.

[0011] The construction element illustrated in the document mentioned above is a plate-like element with a uniform shape, with portions projecting crosswise from the upper and from the lower side of the construction element itself.

[0012] Said portions, for example, are in the shape of a frustum of pyramid with four sides or of a frustum of pyramid with eight sides or of a truncated cone.

[0013] Said portions have closed sides and open opposite bases.

[0014] The construction element obtained in this way thus comprises a plurality of openings extending through the element itself, in which the plaster to be applied is introduced.

[0015] In a solution described in the document mentioned above, the portions projecting from the upper side are open, while the portions projecting from the lower side are closed. In this embodiment, the construction element cannot be considered a net, but rather a plate-like formwork with projections and recesses, of which only the projections towards the upper side are provided with openings for the introduction of plaster.

[0016] The document mentioned above shows an example of use of the construction element applied to a bearing wall, wherein the closed portions face towards the wall, while the open portions allow the introduction of plaster, which reaches and adheres to the bearing wall.

[0017] According to the document mentioned above, "the construction elements serve as a reinforcing structure for the insulating plaster and at the same time as a gauge suited to measure the thickness of the insulating plaster layer".

[0018] A drawback posed by the method described above lies in that practically the plaster is in contact with the bearing wall only on a part of the total surface of the

construction element, and in particular only at the level of the open portions, while in the area where the closed bases of the closed portions rest there is no contact between plaster and wall. The partial contact between the plaster layer and the wall does not guarantee at all the effective adhesion of the covering to the wall.

[0019] In the construction element described in the document mentioned above, the sides of the projecting portions are solid and therefore the plaster layer that is obtained is substantially constituted by a plurality of plaster sectors included between the sides of the projecting portions, said sectors being completely separated from one another.

[0020] The sides of the projecting portions are smooth and inclined in the plaster shake-out direction, which therefore will tend to slide downwards as no gripping effect is possible. These projecting portions are plaster containers and are separated from one another by their own sides. The plaster layer obtained in this way is thus divided into many small cells and for this reason it cannot be considered a reinforced monolithic structure, so that a second reinforcing metallic net needs to be applied.

[0021] The plaster layer obtained in this way is thus discontinuous and furthermore the plaster adheres only to the inclined surfaces of the projecting portions and only to a part of the bearing wall. This leads to the inevitable formation of cracks and to the concrete risk of the layer coming off.

[0022] In fact, in the document itself it is explained that in order to obtain a stable plaster layer it is necessary to use reinforcing bars positioned in the free spaces between the aligned projecting portions.

[0023] Differently from what has been explained above, the lattices used in the new covering work as a real reinforcing structure for very thick plaster layers, as each lattice is completely buried in the cement plaster, exerting its action horizontally and vertically within the plaster layer.

[0024] The lattice described in the present patent application, in fact, in its preferred embodiment is constituted by a plurality of portions arranged in such a way as to substantially form a reticulated structure with three-dimensional meshes open in all directions, parallel and transverse with respect to the plane of the lattice itself, and this allows the cement plaster to penetrate the lattice in all directions and thus to incorporate the lattice completely.

[0025] The lattice thus forms a real reinforcing structure for the layer of cement plaster obtained by proceeding as described, with no need for the addition of further reinforcing bars.

[0026] In this way, the layer of cement plaster obtained is characterized in that it is continuous and also completely in contact with the bearing wall, over the entire surface of the lattice.

[0027] Between the lattices and the insulating panels there is a plurality of solid and empty spaces that are such as to guarantee the continuity of the layer of cov-

ering cement material or cement plaster and the adhesion of said layer to said wall or surface to which said modular element is applied.

[0028] In addition to the above, in the modular system that is the subject of this patent application the lattice is coupled with an insulating panel, creating a sort of kit to be installed with the aid of suitable fixing means.

[0029] It should furthermore be noted that the construction element described above is configured in such a way that it needs to be partially overlapping other identical construction elements in order to join them. In particular, said projecting portions are arranged and shaped in such a way that they need to overlap those present on a corresponding part of another identical construction element.

[0030] The partial overlapping of two construction elements implies that the construction element cannot be coupled individually with an insulating panel. On the contrary, the installation process is very complicated and articulated, as the construction elements can be constrained to the insulating layer only after being joined to one another so as to form a continuous layer.

[0031] The construction element described in the above mentioned document, in fact, cannot be coupled directly with the insulating panels before they are laid, as the overlapping of the projections joining the elements is a limitation to the positioning of the underlying panel. This leads either to the presence of thermal bridges between the panels or to the imprecise overlapping of the elements.

[0032] In order to avoid this problem, all of the insulating panels should be first laid precisely side by side, then the elements should be overlapped in such a way that they can freely fit in position.

[0033] The invention described in the above mentioned document, however, cannot be applied to walls, as it does not seem possible for plaster to get into the upper holes of the projecting portions having their base facing towards the wall, which represent 50% of the total projections.

[0034] As these elements are positioned vertically, air pockets will form inside each projecting portion, as the latter will never be completely filled with plaster. In the best case, they can be just half filled. On the contrary, in the case of horizontal laying, as in the case of floors or coverings, as claimed, the construction element can serve as a container intended to receive loose insulating materials and to prevent such materials from moving.

[0035] This element is not a reinforcing net, but rather a counter formwork for plaster, so that the latter takes the shape of the underlying element, in the form of cells or niches. Actually, the element constitutes a separator between the upper layer and the lower layer of plaster, provided that the latter can flow through the holes of the projections and fill their cavity completely, which is impossible.

[0036] The element proposed in the above mentioned document is a continuous element and is constituted by

a series of projections in various truncated cone shapes that are specular to the separation plane, so that they can be partially or completely overlapping on their entire surface, differently from the element proposed herein, which does not overlap another element due to its different configuration.

[0037] Figures 23, 24, 25 of the above mentioned document also show fixing means suited to fix the construction element to the wall and resting on the lower part of the construction element, so that said fixing means do not cooperate with the plaster, differently from the invention proposed herein, in which the fixing washer works within the cement plaster layer, which means that also the structural design of the two systems is necessarily different.

[0038] To conclude, the two construction elements are structurally different from each other, and require different application methods that adopt different solutions to solve the same problems.

[0039] Document EP 2871301 concerns a process and supporting elements for the application of insulating means for the building construction sector, such as heat insulating panels, plaster or other elements for the renovation or improvement of existing overcladding layers of buildings.

[0040] The technical problem addressed by the document just mentioned above concerns the application of a new layer of insulating panels or plaster to a wall with pre-existing plaster or pre-existing insulating panels that need refurbishing or where it is necessary to repair damaged finishing surfaces.

[0041] The supporting element described in the document mentioned above comprises a substantially parallelepiped and elongated element, delimited by longitudinal crosspieces and front crosspieces arranged in an arrow-shaped layout, wherein the longitudinal crosspieces are generally much longer than the front crosspieces.

[0042] Inside said supporting elements there are reticulated structures provided with through holes for the introduction of means for fixing said supporting elements to the wall.

[0043] The front crosspieces arranged in an arrow-shaped layout make it possible to join said supporting elements orthogonally to one another, thus forming square or U-shaped self-bearing structures suited to be constrained to the bottom.

[0044] The structure obtained in this way is a frame which is empty inside and adheres to the support, to which it is possible to apply glue for construction elements or plaster.

[0045] The structure obtained by joining together said supporting elements, therefore, is not a continuous surface, but a series of frames that are empty inside, with which it is not possible to obtain a continuous reinforced plaster layer.

[0046] These discontinuous elements are fixed individually to the wall to be renovated, forming frames that are empty inside; they are not and cannot be applied to the

insulating panel before the laying procedure, therefore their use and their applications are limited.

[0047] The heat insulating layer, if any, is thus applied onto said supporting elements, not in direct contact with the wall to be renovated. Furthermore, said insulating panels or other construction elements are constrained to the supporting elements by means of bonding agents, while there is no further fixing means between the insulating panels and the wall.

[0048] Document WO 2008/018081 concerns a method and a corresponding system for applying plaster in such a way that it remains detached from the wall, and can be applied in particular to walls having deposits of salt crystals on their surface, as it normally happens in marine environments.

[0049] The document mentioned above describes a system that keeps the plaster layer detached from the bearing wall by means of an intermediate element suited to ensure complete separation.

[0050] The system comprises a first intermediate element suited to be placed on the bearing surface and provided with a plurality of empty spaces facing towards the wall itself, in which the salt crystals that form on the wall can be collected.

[0051] The opposite part of the intermediate element, instead, is provided with a smooth surface to which the plaster layer can be applied, and wherein said intermediate element has also the function of preventing any communication and penetration of material between the side to be rendered and the side facing towards the bearing wall.

[0052] In this way, the plaster is completely separate from the bearing wall and cannot be affected by the presence of the salt crystals.

[0053] In greater detail, the solutions proposed in the mentioned document are substantially two.

[0054] According to the first solution, a panel with polycarbonate through cells closed laterally in a honeycomb configuration is rested against the bearing wall in order to define empty spaces suited to collect the salt crystals, while a separation cloth is laid on the opposite side to prevent the passage of plaster.

[0055] According to the second solution, instead, the intermediate element is made of a foam material having, on its surface facing towards the bearing wall, a series of recesses suited to form empty spaces where the salt crystals are collected, while the opposite surface is smooth and continuous, so as to prevent the passage of plaster.

[0056] Both of these solutions require the application of a plaster mesh.

[0057] Also in this case, the plaster mesh used does not add anything to the known technique, according to which meshes are used to guarantee the adhesion of thin layers of plaster. Furthermore, no part of the description addresses the problem of how layers of plaster with increased thickness can be obtained. On the other side, the mesh used is a normal honeycomb mesh, with closed

sides defining sectors which are separate from one another.

[0058] The new covering that is the subject of the present patent application, instead, in its preferred embodiment uses a sort of three-dimensional net, specifically provided with openings in all directions, in such a way that the cement plaster that incorporates the net completely forms a continuous layer, meaning without any internal partition creating discontinuity.

[0059] In addition to the above, no part of the description explains how the connection between adjacent intermediate elements is obtained, as there is no reference to overlapping elements between adjacent elements. This aspect, on the contrary, is of crucial importance in order to obtain a continuous and stable plaster layer.

[0060] A further aspect that differentiates the new covering from the system described in the document mentioned above lies in that it is necessary to face and solve technical problems that are completely different from and independent of one another.

[0061] The document mentioned above, in fact, describes a system that, as already explained, has the purpose of maintaining the plaster layer detached from the bearing wall by means of an intermediate element that provides for separating them completely.

[0062] The invention, instead, has the object to provide an overlapping layer for buildings, comprising a very thick plaster layer made mechanically on a special reinforcing plaster mesh which is applied directly onto the insulating panels and which can be used for all buildings and in any context. The object of the new covering is to speed up the laying procedure and make it safer, improving the insulating, mechanical, acoustic, and fire resistance performance.

[0063] Document DE 20 2010 007 659 concerns an insulating panel provided with an insulating layer for heat insulation of the external walls of buildings, wherein said insulating layer is constituted by a panel made of an insulating material and by a bidimensional grid fixed to the external side of said insulating layer.

[0064] According to the technique known up to that time, in order to provide heat insulation for the external walls of buildings, the insulating layers were fixed by means of common screw anchors and successively a plastic mesh was laid for the layer of resin plaster.

[0065] The technical problem that the above mentioned document intends to solve is to make it possible to lay a uniform plaster layer, as when the known technique was used the insulating layer could present lowered portions at the level of the screw anchors which were driven too deep into the wall, and projections at the level of screw anchors driven less deep into the wall.

[0066] This aspect is rather important in the case of insulating panels in mineral fibre and it is exactly for these panels that the invention has its exclusive field of application.

[0067] The panel illustrated in the document mentioned above thus solves this technical problem through

the application of a net directly in contact with and at the level of the external side of the insulating panel, having the function of offering well defined fixing points, in such a way that the surface on which plaster will be successively applied is uniformly plane.

[0068] Therefore, the plaster mesh does not work and cannot work as an element suited to reinforce the plaster layer, as it cannot be buried into it.

[0069] The use of the panel described herein makes it possible to obtain a thin plaster layer and furthermore of the resin-based instead of the cement-based type.

[0070] Furthermore, it should be noted that the plaster mesh is constituted by a plurality of supporting rings joined to one another through crosspieces. The rings serve to define the points where the screw anchors are driven, through the use of cylindrical elements that are introduced in said rings and in the insulating panel. The screw anchors are inserted in said cylindrical elements and their head rests against the lower or inner edges of the cylindrical elements.

[0071] The innovative aspect, therefore, is represented by the rings, which have the purpose of moving the fixing point away from the plaster mesh, so that "on one side, during the fixing step the structure of the insulating panel is subject to a reduced risk of deformation, and on the other side, thanks to the distance of the steps from the surface of the grid, there is no risk of these remaining visible as projecting spots after the application of plaster."

[0072] Furthermore, the plaster mesh is glued to the insulating layer "not only in the area of the supporting rings, but also in the area of the crosspieces located on the insulating layer itself: in this way ample support is obtained, so that the grid adheres to the insulating layer also in the presence of thin crosspieces."

[0073] Therefore, it is immediately evident that the plaster mesh does not have the function of reinforcing a cement plaster layer, but serves as a counteracting element for the screw anchors of the insulating panel.

[0074] This is even more evident considering that the plaster layer applied remains always completely above the grid, which therefore is not buried in it at all.

[0075] Analogously, the fixing screws are not buried in the plaster layer, and do not contribute to the stability of the same.

[0076] On the contrary, the further use of a reinforcing structure is necessary, meaning a further mesh of the type used at present.

[0077] The description, in fact, reads as follows: "the plaster applied in the conventional manner fills the spaces between the projecting supporting rings, wherein a reinforcing structure can be finally added at the same level as the upper corners of the supporting rings".

[0078] Another aspect confirming that the plaster mesh cannot be used as a reinforcing structure is represented by the fact that no part of the description deals with the problem of the lateral overlapping of the mesh with other meshes, said overlapping being necessary to guarantee the continuity of the net itself as well as of the plaster

layer.

[0079] In addition to the above, in a possible embodiment of the plaster mesh the height of the crosspieces can extend to the upper corners of the rings. In this way, however, each crosspiece substantially becomes a closed side that projects from the surface of the insulating panel up to the height of the rings. The plaster layer that is obtained in this case is thus discontinuous, being formed by a series of sectors which are separated from one another by said crosspieces and by the sides of the rings.

[0080] Very concisely, a first difference between the covering described in the document mentioned above and the new covering that is the subject of the present invention lies in that the lattice of the new covering is constrained to the insulating panel only in certain points, at the level of the lowered portions, while the plane mesh remains completely spaced from the insulating panel and thus can be completely buried in the cement plaster.

[0081] The cement plaster thus adheres to the entire insulating panel and completely encloses the mesh, which thus constitutes a real reinforcing and bearing element for the layer of cement plaster obtained.

[0082] The layer of cement plaster which can be obtained in this way is at least thicker than the overall thickness of the lattice, meaning even 2-4 cm thicker.

[0083] A second important difference between the covering described in the document mentioned above and the new covering that is the subject of the present invention lies in that the heads of the screw anchors are always maintained above the mesh, and not under the insulating layer, as explained in the mentioned document.

[0084] In the new covering, in fact, also the heads must be buried in the cement plaster layer, in order to guarantee the structural stability of the entire system constituted by wall, insulating panel, lattice and cement plaster layer.

[0085] Document US 1808976 concerns an insulating panel coated with plaster, comprising a panel made of an insulating material, a waterproof covering sheet applied to one side of said insulating panel, an expanded metal sheet applied to said waterproof covering sheet and intended to face towards the outside so that a plaster layer can be applied to it. These three layers, meaning the insulating panel, the waterproofing sheet and the expanded metal sheet, are constrained to one another by means of clips.

[0086] The document mentioned above says that if the insulating layer is yielding, or even the waterproofing sheet is yielding, the plaster applied thereto incorporates the expanded metal sheet completely, even coming to be interposed between the latter and the waterproofing sheet.

[0087] On the other hand, if the insulating layer is not yielding, the expanded metal sheet can be deformed, thus defining transverse ribs in contact with the waterproofing sheet, and at the level of which the fixing clips are applied, while the remaining part of the expanded metal sheet is spaced from the waterproofing sheet. In

this way the plaster gets under the expanded metal sheet and incorporates it completely.

[0088] The innovation at the base of the panel illustrated in the document lies in the fact that plaster panels are obtained which are insulating and modular at the same time and can be applied to the wall to be insulated, wherein the waterproof sheet has the function of protecting the insulating layer, while the expanded metal sheet is protected against humidity, being completely buried in the plaster layer.

[0089] The ribs in the net are not intended to increase the thickness of the plaster layer that is going to be obtained, either, but only to allow the plaster to reach the back of the mesh in the case of insulating layers that are not yielding.

[0090] This is further proved by the fact that the fixing means provided are simple clips that constrain the three layers to one another, but said clips are not expected to contribute to the stability of the plaster layer which will be obtained, as they remain well constrained at the level of the waterproof sheet, without allowing plaster to get under them.

[0091] No part of the above mentioned document describes fixing means suited to constrain the insulating layer and the plaster mesh to the wall. No part of the document, therefore, explains how to use fixing means that cooperate with the plaster layer, as instead this patent application does.

[0092] In addition to the above, the panel that is the subject of the above mentioned document has been clearly designed for use in interiors. This can be easily understood both from the type of material used, meaning plaster and any further plaster finishing layer, and from the presence of the waterproofing layer that serves as a vapour barrier and that, as already known, is always positioned on the warm side of a wall, meaning towards the inside.

[0093] Furthermore, in 1931, meaning when the above mentioned document was filed, external overcladding as we intend it today did not exist and therefore such teaching cannot be contained in said document.

[0094] The panel structured in this way, therefore, cannot be used to make overcladding systems with a reinforced cement plaster layer, substantially for two reasons. First of all, it lacks a specially shaped mesh suited to hold a thick layer of cement plaster and to serve as a reinforcing structure for the layer itself. The second reason is the absence of fixing means capable of cooperating with the cement plaster layer in order to fix the layer itself to the wall to be covered. The above mentioned document, in fact, does not define the procedures for fixing the layer to the wall but, considering the time when the document was written and the type of application, it can be inferred that such fixing operation is carried out through adhesion obtained using bonding agents or plaster.

[0095] The drawbacks posed by the systems described above are eliminated by the new reinforced and

insulating modular covering for walls in general and by the process for making said covering.

[0096] The main object of the present invention is to provide a system that facilitates and quickens the application of layers of cement plaster and guarantees the stable adhesion of cement plaster to the wall or to any underlying insulating panel.

[0097] The new covering, in fact, makes it possible to obtain a layer of cement plaster characterized by a heavier weight compared to the resin-based plaster or simple plaster used in the known techniques up to now.

[0098] It is another object of the invention to make the application of said cement plaster layer safer, increasing the insulating, mechanical, as well as acoustic and fire resistance performance, as the cement plaster layer is thicker.

[0099] It is another object of the invention to provide a stable overlapping solution with a continuous cement plaster layer, with defined, constant and considerable thickness, in order to obtain high mechanical resistance to impacts and to allow all the fixing systems with screw anchors to be safely used.

[0100] Furthermore, the acoustic insulation of the wall is considerably improved thanks to the stratigraphy of the mass spring mass system. The thermal inertia of the wall is improved, as well as the sun heat insulation resulting from the larger mass applied externally.

[0101] It is another object of the invention to reinforce and bind the cement plaster layer, preventing cracks or fissures due to shrinkage or structural movements of the walls.

[0102] It is another object of the invention to create an overlapping system with any type of insulating material, in which the thickness of the cement plaster layer is such as to protect the underlying insulating material from external fire.

[0103] It is another object of the invention to simplify the application of the overlapping layer, as it will no more be necessary to resort to specialized teams for the application; in fact, it can be installed with common technologies and building site equipment, that is, with mechanical fixing systems and a common plaster sprayer.

[0104] It is a further object of the invention to provide a new covering that also serves to improve the anti-seismic characteristics of the wall, thanks to the very thick layer of reinforced cement plaster which is constrained to the wall itself.

[0105] It is another object of the invention to provide a new covering that also allows the successive application of stone covering elements, which is possible thanks to the layer of reinforced cement plaster. This cannot be done on walls plastered according to the presently known techniques.

[0106] It is another object of the invention to provide a new covering that allows the installation of a ventilated wall.

[0107] It is another object of the invention to provide a new covering that can be applied also to walls with

curves, as it can be deformed in one or more directions in such a way as to follow the curvature of the wall itself.

[0108] These and other direct and complementary objects are achieved by the new insulating and reinforced modular covering for walls in general (M) and by the process for making said covering, wherein said covering comprises:

- at least one plane and modular panel made of an insulating material and suited to be applied in direct/indirect contact with said wall so as to form at least one insulating layer;
- at least one layer of cement plaster adhering to said insulating layer;
- at least one reinforcing structure incorporated in said layer of cement plaster, in turn comprising at least one bidimensional or three-dimensional modular lattice which has a substantially rigid structure but is preferably flexible in one or more directions, in a metallic or non-metallic material, defining at least one plane, or counteracting plane, spaced from said insulating layer, said lattice being suited to house and hold a layer of cement plaster at least between said spaced plane and said insulating layer;
- means for fixing said lattice to said cement plaster and said wall, with said at least one insulating panel interposed between said wall and said lattice,

and wherein said lattice comprises one or more reinforced portions, at the level of which there are holes or seats for the insertion and application of said fixing means suited to fix said lattices to said wall, so that the heads of said fixing means are raised from said insulating layer, in such a way that they can be completely or partially buried in said layer of cement plaster, thus obtaining an overlapping solution with a layer of reinforced cement plaster.

[0109] The present patent application concerns also a process for making the new covering, including the following main steps:

- preparation of a plurality of modules, each constituted by at least one lattice joined in certain points to at least one insulating panel, wherein said connection can be obtained through mechanical glueing or another method;
- assembly and fixing of said modules made up of lattices and panels to the wall, with said insulating panel facing towards the wall, through a plurality of fixing means, with possible glueing points if necessary, and wherein said modules are placed side by side in such a way that said insulating panels are adjacent to one another, while said lattices are preferably partially overlapping;
- conveniently laying of the cement plaster layer on said lattices of said modules through a mechanical spraying process, so as to cover said lattices completely;

- levelling.

[0110] According to the preferred embodiment, in the new process the levelling operation is performed through the temporary application of linear bars, distributed so that they are parallel to one another and constrained in a removable manner to said lattices, for example through coupling means. Said bars serve as a guide for laying the levelling layer by means of suitable tools. At the end of the levelling operation, said bars are removed and the chases are filled.

[0111] The process finally includes the finishing of the covering, which is conveniently carried out once the cement plaster has dried completely, for example after 28 days.

[0112] Said finishing step may comprise the following operations:

- simple painting;
- application of stone materials;
- application of a ventilated wall.

[0113] The new covering obtained by proceeding as described above thus comprises a very thick plaster layer, wherein the minimum thickness of the cement plaster layer is defined by the distance between said counter-acting plane defined by said lattices and said insulating layer.

[0114] The application of cement plaster is thus carried out mechanically on a special reticulated reinforcing structure for cement plaster applied directly to the insulating panels and suited to be used in all types of building and in any context.

[0115] Furthermore, the heads of the fixing means rest against specially shaped portions of the lattice, in such a way that they are constantly maintained above the plane where the lattice lies. In this way, also the heads of the fixing means are buried in the cement plaster layer, for the purpose of ensuring the structural stability of the entire system constituted by wall, insulating panel, lattice and cement plaster layer.

[0116] Said reinforcing structure or lattice is modular, bidimensional or three-dimensional, and serves as a cement plaster mesh suited to be directly or indirectly constrained to a wall and to be completely buried in the cement plaster through the superimposition of the meshes on two adjacent sides of each panel.

[0117] Said lattice has a substantially rigid structure, though being flexible in one or preferably both of the orthogonal directions.

[0118] Said lattice or grid-shaped modular element can be made of any material, metallic or non-metallic.

[0119] In a possible solution, said lattice is made of a metallic material and is obtained through a joining or welding or deformation process or through any of the processes used to make metal lattices.

[0120] In a further possible preferred solution, said lattice is mainly or exclusively made of a plastic material,

for example obtained through a thermoforming or injection process, and is preferably in a single piece.

[0121] Said cement plaster may conveniently have more advanced technical characteristics compared to common plasters, for example it may be already coloured as a whole so that it would be possible to avoid the final painting of the overcladding layer, or be a special mortar with heat insulation or self-cleaning characteristics, or be capable of absorbing polluting substances present in the air, or be another type of plaster.

[0122] The lattice may come in various shapes, but however it must be suitable for holding and retaining the cement plaster with its meshes, independently of how they are made.

[0123] Said lattice comprises also said one or more reinforced portions, substantially coplanar with or in any case parallel to the plane where the lattice lies, and ready for the insertion of means or screws for fixing said lattice to said wall.

[0124] Said fixing means comprise, for example, one or more screw anchors or screws or means suited to be inserted in apposite seats or through holes obtained in said reinforced portions of said lattice and suited to constrain said lattice to said wall.

[0125] In particular, said fixing means are inserted in said seats or through holes in such a way that the head of said fixing means is raised with respect to the surface resting on the insulating panel and coplanar with the net, so that said heads will be completely or at least partially incorporated in said layer of cement plaster.

[0126] Each one of said lattices preferably comprises also overlapping parts that join adjacent lattices, described and claimed here below and having the purpose of guaranteeing the continuity of the meshes along the wall, thus avoiding possible cracks in the plaster in the areas where the edges of the panels are adjacent to each other.

[0127] In the preferred solution, said overlapping parts comprise at least one grid strip constrained to said lattice in proximity to one or more of its edges, preferably adjacent; said strips are arranged parallel to the edge of the panel and partially project from the latter, in such a way that they can overlap the edges of adjacent lattices. Said strips have the function of holding the cement plaster, thus guaranteeing the continuity of the reinforcing structure in the cement plaster layer also along the adjacent edges of adjacent lattices of each panel.

[0128] Said lattice may also comprise one or more reference marks located on the side of said lattice not facing the wall, that is, facing towards the outside. Said reference marks, which can be in the shape of projections or elements in general, can be conveniently used as reference indicators for the correct application of the cement plaster.

PREFERRED EMBODIMENT

[0129] In the preferred embodiment of the invention,

the new reinforcing structure comprises said at least one rigid lattice shaped as a net with open meshes suited to reinforce and contain a very thick layer of cement plaster, and a plurality of projections or protrusions in general suited to space the plane of said lattice, meaning the surface near the levelling layer, from the underlying insulating layer, in order to define in this way a hollow space with solid and empty spaces, suited to be filled with cement plaster, wherein said cement plaster adheres to the meshes of the lattice.

[0130] In this solution, said lattice is substantially like a three-dimensional net with openings in all directions, so that the cement plaster which incorporates the net completely forms a continuous layer, meaning a layer without any internal partition creating discontinuities. In a possible solution, said projections or protrusions are integral with or in any case joined to said lattice, being raised from the surface of said lattice intended to be facing towards said insulating panel or towards the wall, meaning towards the inside. Therefore, said lattice is in contact with the insulating panel only in certain points, at the level of the edge of said projections.

[0131] In other words, the lattice is open in all directions, parallel and transverse to the plane of the lattice itself, and this allows the cement plaster to penetrate the lattice in all directions and thus to incorporate it completely.

[0132] The lattice thus forms a real reinforcing structure for the layer of cement plaster obtained, wherein said reinforcing structure is developed with vertical and horizontal components, and therefore with no need for the addition of further reinforcing bars.

[0133] In this way, the cement plaster layer obtained is characterized in that it is provided with a continuous reinforcing structure and furthermore adheres completely to the insulating panel, over the entire surface of the lattice. The latter, therefore, constitutes a real reinforcing and bearing structure for the cement plaster layer obtained.

[0134] The cement plaster layer that can be obtained in this way is at least thicker than the lattice as a whole, meaning even 2-4 cm.

[0135] The preferred configuration of these projections is preferably a closed geometrical shape, for example a cylindrical shape. Said projections are distributed on the lattice at a preset distance from one another, also in order to allow the positioning of pipes for cooling or heating the wall, in a possible solution.

[0136] Radiant pipes, suitable for the circulation of water or another heat exchange fluid in general and for connection to geothermal or accumulation systems, are constrained to the lattice itself by means of special undercut protrusions obtained in the upper part of said projections.

[0137] In this application including the installation of radiant pipes, said lattice is positioned on the insulating panel with the projections arranged towards the outside, meaning towards the side that is going to be plastered.

[0138] In all the other cases, said projections will be

facing towards the insulating panel and in direct/indirect contact with it, wherein at the level of said projections said lattice is joined to said insulating panel in certain points, while the reticulated portion will be facing towards the cement plaster.

[0139] In general, said reticulated reinforcing structure or lattice is configured with solid and empty spaces included between said two planes, in such a way as to guarantee the continuity of the cement plaster layer and the adhesion of said cement plaster to the panel on which said lattice rests.

[0140] Said lattice, in this solution, can be in different shapes and sizes, but in any case will have to meet the following requirements, which are the object of the present invention, in order to fulfil its functions:

- 1) it must define two spaced and parallel planes, one of which rests on said insulating layer, to which it is fixed by means of glues or screw anchors or pins that can be obtained from the reticulated structure itself, while the other plane is raised by a few centimetres from the base plane to which it is rigidly connected; said two planes can be defined by the main plane on which the lattice lies and by said projections which are raised from said lattice;
- 2) it can have various configurations, but in any case it must be suited to hold and retain cement plaster with its meshes, independently of how these are made.

[0141] The new covering furthermore comprises said mechanical fixing means suited to fix said modular elements to the wall to be covered, in order to guarantee the safety and the stability of the plastered wall.

[0142] Said fixing means preferably comprise a special load distribution washer, coplanar with the external portion of the lattice, which is maintained integrally constrained to the insulating panel and to the wall, forming a stable unit, in which said washers of the fixing means, being completely buried in the external layer of cement plaster, guarantee the firmness and safety of the wall.

OTHER POSSIBLE EMBODIMENTS

[0143] In the case where said lattice is made of a metallic material, said projections or protrusions in general can be made separately, for example in a plastic material, and then applied to the lattice in any way.

[0144] Alternatively, according to the invention said projections and protrusions can also be made of a metallic material, be generically formed together with said lattice or applied to it in any way.

[0145] Alternatively, according to the invention said projections or protrusions can be integral with said insulating panels, joined to them or formed together with them, for example and in particular in the case where said insulating panels are made through a moulding process or another technology.

[0146] Said projections can have various shapes and different orientations: they can be pin-shaped or in any case linear, substantially orthogonal, in the shape of a variously oriented blade or partition, with a cylindrical or prismatic surface or a closed geometric shape in general, complete or partial, with or without an enlarged base suited to rest on the underlying insulating panel, with or without further lower nails or protrusions suited to be driven in said insulating panel, with or without transverse through holes for the passage of cement plaster.

[0147] In a further alternative embodiment of the invention, said modular element is a grid-shaped element substantially constituted by at least one net with three-dimensional meshes.

INSULATING PANEL

[0148] Said insulating layer is in turn constituted by a plurality of modular insulating panels. The insulating panel can be of different types: with organic origin, such as EPS, XPS, polyurethane, or mineral, such as glass or rock wool, or natural, such as wood fibres, cork, natural fibres obtained from waste deriving from the processing of rice, maize, hemp, wool, etc.

[0149] In particular, according to the invention each one of said modular lattices is coupled with at least one of said modular insulating panels.

[0150] According to the invention, said insulating panel may be shaped in such a way as to maximize adhesion to the cement plaster layer.

[0151] In a possible embodiment of the invention, the surface of said insulating panel facing towards said lattice and intended to come into contact with the cement plaster may be provided with a plurality of recesses, preferably in the shape of grooves parallel to one another, suitable for the introduction of cement plaster, in order to improve the grip of the cement plaster itself onto the insulating panels, so that the screw anchors are not loaded with the weight of the cement plaster.

[0152] Said insulating panels will be preferably installed on the wall in such a way that said grooves are arranged in horizontal direction.

[0153] According to the invention, furthermore, said grooves may be provided with undercuts having the object to prevent the cement plaster from coming off the insulating panels.

[0154] In a further possible embodiment, said lattice is substantially bidimensional and is kept spaced from the insulating layer through projections obtained on said insulating panels themselves, facing towards the lattice and having the double function of maintaining said lattice raised while at the same time creating said recesses intended to facilitate the grip of cement plaster onto the insulating layer.

[0155] According to the invention, however, said grid-shaped modular element can be constrained to said insulating panel through suitable fixing means like pins, glues, etc.

FIXING MEANS

[0156] The fixing means belonging to the new covering are sized according to the characteristics of the wall, to the thickness and the characteristics of the insulating layer, to the possible presence of a ventilated wall or of a stone finishing layer, and finally to the self-weight of the plaster layer and of the applied loads in general.

[0157] Furthermore, the fixing means are sized taking into account the traction forces, as in traditional overcladding systems, but also the shearing and bending stress.

[0158] According to a possible solution, said fixing means comprise, for example, screw anchors with fixing screws, wherein said screw anchors preferably comprise an enlarged head or fixing washer resting against the reinforced portions of said lattice.

[0159] Said reinforced portions and said head of the fixing means are raised with respect to the insulating layer, for example by at least 10 mm or by such a distance that said head of said screw is buried in the layer of cement plaster, and thus exert its effect within the cement plaster layer.

[0160] This is preferably obtained by positioning said fixing means in the points defined on the lattice, which counteract the heads of the fixing means, thus keeping them raised from the plane of the insulating panel on which the lattice is laid and arranging them so that they are coplanar with or higher than the counteracting plane.

[0161] In a preferred solution, said fixing means comprise at least one screw anchor, suited to be driven in and constrained to the wall, and at least one composite fixing screw suited to be screwed into said anchor.

[0162] In a preferred solution, said fixing means can be of the type with reinforced load distribution washer in a plastic material, with terminal portions in a synthetic plastic material suited to avoid the generation of thermal bridging due to the metallic fixing element.

INSULATING OVERCLADDING LAYER

[0163] The new covering comprises said fixing means or screw anchors, whose length is sufficient to guarantee that said lattice is fixed to a wall with said at least one insulating layer interposed between them, said insulating layer being thus constrained to said wall even through said fixing means or screw anchors, with or without the aid of bonding agents.

[0164] In this way it is possible to obtain a covering consisting of reinforced cement plaster, that is, provided with a reticulated reinforcing structure buried in the plaster layer and connected to the fixing elements, the heads of the latter being in turn buried in the cement plaster, while the opposite ends are inserted in and fixed to the wall. Said fixing elements thus serve as load distributors suited to hold the insulating layer between said cement plaster and said wall.

COVERING APPLIED TO VARIOUSLY CURVED WALLS

[0165] The new covering can also be applied to walls having one or more curves in one or more different directions.

[0166] This is possible thanks to the fact that said insulating panels in a flexible and/or elasticized material can be used, wherein said insulating panels can be coupled with corresponding lattices which in turn are flexible in one or more directions, even though having a rigid reticulated structure, and thus create modules that can be curved and follow the shape of the wall to be covered.

REINFORCED COVERING

[0167] According to the invention, the new covering can be conveniently used to reinforce the wall to be covered or even to improve the anti-seismic characteristics of the wall itself.

[0168] The reinforced covering that achieves the said object comprises, in addition to the elements described above, also one or more metallic reinforcing nets, for example the electrowelded ones which are commonly used, coupled outside said lattices, for example through common clips or other coupling means, and wherein said electrowelded net serves as a reinforcing structure for a further layer of cement plaster or concrete, for example with anti-seismic characteristics, resting on a previously prepared slab or ground.

[0169] The covering obtained in this manner has an overall minimum thickness determined by the thickness of the lattices, which can also be 5-6 cm, and by the thickness of said concrete layer reinforced with said electrowelded net.

PROCESS FOR MAKING THE COVERING DESCRIBED ABOVE

[0170] With the process illustrated herein, it is thus possible to obtain a covering for the walls of buildings or surfaces in general, comprising:

- at least one layer of cement plaster, incorporating at least one layer made up of one or more of said modular lattices which have a rigid structure but are flexible in one or more directions;
- at least one insulating layer made up of one or more of said modular insulating panels, said at least one layer of cement plaster being laid in such a way that it adheres to said insulating layer,
- one or more projections or protrusions or spacer elements in general between said one or more lattices and said one or more insulating panels, suited to define at least one hollow space between the counteracting plane and said one or more insulating panels, said hollow space being filled with at least one layer of cement plaster,

the whole being made integral with the wall to be insulated with the aid of fixing elements, in order to obtain an overcladding system, and wherein the heads of the fixing elements are completely or partially buried in the cement plaster in order to provide a continuous connection between the wall and the cement plaster, with the insulating layer interposed between them.

[0171] As already explained, and summing up, according to a first solution said projections or protrusions or spacer elements are made together with said lattice and therefore are integral with it.

[0172] According to a further possible solution, said projections or protrusions or spacer elements in general can be conveniently made separately and be in any case joined to said lattice or to said insulating panel.

[0173] According to a further possible embodiment, said projections are obtained by making said lattices as a three-dimensional net.

[0174] According to a further possible solution, said projections or protrusions or spacer elements in general can be made together with said insulating panel.

[0175] The characteristics of the invention are highlighted in greater detail in the following description, with reference to the attached drawings that are enclosed hereto by way of non-limiting example.

Figure 1 shows a view of a lattice (1) according to the preferred embodiment of the invention, in which it is possible to observe the projections (R1, R2) and the connection means (52) between adjacent lattices (1).

Figures 1a and 1b show in detail a top and a bottom view of an edge of a lattice (1) with overlapping strips (52) that overlap other adjacent lattices (2).

Figure 2 shows a perspective view of a detail of the lattice (1) illustrated in Figure 1.

Figure 3 shows a perspective view of a detail of the lattice (1) illustrated in Figure 1 with radiant pipes (T) housed therein.

Figure 4 shows a detail of the new covering, formed by a lattice (1) coupled with an insulating panel (P), both of which are constrained to the wall through fixing means (3).

Figure 5 shows a three-dimensional view of a lattice (1) according to a possible different embodiment.

Figure 6 shows a detail of a lattice (1), with projections (21) made according to the embodiment illustrated in Figure 5.

Figure 7 shows a detail of a lattice (1), with projections (22) made according to a further embodiment.

Figure 8 shows a detail of a lattice (1), with projections (23) made according to a further embodiment.

Figure 9 shows a sectional view of a detail of the new integrated and reinforced overcladding layer (R), comprising a lattice (1) constrained to a wall (M) through fixing means (3), at least one plane panel made of an insulating material (P) being interposed between them.

Figure 10 shows a sectional view of a detail of the new covering (R) in the solution comprising a substantially plane lattice (1) and an insulating panel (P) with projections (P21) suited to space said lattice (1) from said insulating panel (P).

Figure 11 shows a three-dimensional view of a lattice (1') according to an alternative embodiment configured as a three-dimensional net, while Figure 11a shows a detail of the same.

Figure 12 shows a side view of the lattice (1') illustrated in Figure 11.

Figure 13 shows a sectional view of the lattice (1') illustrated in Figure 11.

Figure 14 shows a sectional view of a detail of said lattice (1') according to Figure 11 and according to a possible alternative solution, constrained to a wall (M) and having at least one panel made of an insulating material (P) interposed between them, so as to form an integrated and reinforced overlaid solution (R), and wherein the solid or reinforced portion (15) of said lattice (1') is raised, in such a way that the head (33) of the fixing means (3) is completely buried in the cement plaster layer.

Figure 15 shows a sectional view of a detail of said lattice (1) constrained to a wall (M), with at least one panel made of insulating material (P) interposed between them, said insulating panel being specially shaped and provided with grooves (P3) suited to ensure the grip of the cement plaster.

[0176] The invention is a new insulating and reinforced modular covering (R) for wall or surfaces (M) in general.

[0177] Said covering (R) comprises a plurality of reticulated reinforcing structures or lattices (1, 1'), coupled in any way with insulating panels (P) interposed between said wall (M) and said lattices (1, 1'), fixing means (3) suited to fix said lattices (1, 1') to said wall (M) and at least one layer of cement plaster (C).

[0178] Said at least one lattice (1, 1') is mainly modular and bidimensional, has a rigid structure but is flexible in one or more directions, is made of any material, metallic or non-metallic, preferably and mainly of a plastic material.

[0179] Said lattice (1, 1') is preferably coupled with at least one plane modular panel (P) made of an insulating material, suited to be interposed between the wall (M) to be insulated and said lattice (1, 1').

[0180] Each one of said lattices (1, 1') is generally included between two opposite imaginary planes (A, B), parallel to and spaced from each other, a plane (A) that rests on said insulating panels (P) and a counteracting plane (B) near the levelling plane, indicated by broken lines in Figures 9, 10, 14, 15, and wherein the cement plaster is suited to be contained and held at least between said two planes (A, B), thus forming a continuous layer that adheres to the insulating panel to which said lattice (1, 1') is constrained.

[0181] The continuity and the adhesion of the cement

plaster layer are guaranteed by the presence of solid and empty spaces defined by said lattice (1, 1') between said two planes (A, B).

[0182] In a preferred solution, said lattice (1) is mainly made of a plastic material and is suited to be plastered, as it holds the cement plaster between the solid and empty spaces defined by its meshes (11).

[0183] According to a possible solution, said lattice (1) is bidimensional and is substantially rectangular in shape, for example with two pairs of parallel opposite sides (13, 14).

[0184] As an alternative, said lattice (1, 1') can also be made in a three-dimensional mesh, that is, a very thick mesh, defining the hollow space with solid and empty spaces in which the cement plaster layer is held.

[0185] Said lattice (1) is suited to be coupled in any way with said modular panel (P) made of an insulating material, wherein one or more projections (R, R1, 21, 22, 23, P21) are interposed between said lattice (1) and said at least one panel (P), said one or more projections (R, R1, 21, 22, 23, P21) being suited to space from the insulating panel (P) the counteracting plane (B) defined by said lattice (1), thus creating a hollow space made of solid and empty spaces suited to hold a layer of cement plaster.

[0186] In the solution shown in Figures 1, 1a, 1b, 2 and 3, a plurality of said projections (21, 22, 23, R, R1), joined to one another by crosspieces (V) that define the meshes (11) of the lattice (1), are raised from the surface (12) of said lattice (1) facing towards the inside, meaning intended to be facing towards the panel (P).

[0187] In the preferred solution illustrated in Figures 1, 2 and 3, said projections (R, R1) have a substantially closed geometric shape, for example prismatic and preferably cylindrical, with side (R2) and base (R3) provided with holes for the passage of cement plaster, in order to guarantee the continuity of the layer of cement plaster.

[0188] Said projections (R, R1), furthermore, are suited to allow radiant pipes to be housed between them, as schematically shown in Figure 3, in which it can be observed that said projections (R, R1) may conveniently comprise protrusions (R4) in proximity to said base (R3), said protrusions being suited to hold radiant pipes (T) housed between said projections (R, R1).

[0189] A plurality of said projections (R1), arranged at a constant distance from one another and distributed on said lattice, are suited to receive the fixing means (3), in such a way that the head (33) of said fixing means is raised with respect to the plane resting on the insulating panel (P), and preferably at least at the level of the counteracting plane (B), thus being completely or partially buried in the layer of cement plaster (C).

[0190] Said circular base (R3) of said projections (R1) for said fixing means (3) comprises a reinforced solid portion (15) which is holed so as to allow the insertion of the fixing screw (32).

[0191] As shown in Figures 1a and 1b, each lattice (1) has edges provided with overlapping strips (52) suited

to overlap adjacent lattices (1) and to guarantee the continuity of the covering, avoiding possible cracks in the cement mortar in the connection areas.

[0192] In the preferred solution, said overlapping strips (52) are grid portions constrained to said lattice (1) in proximity to one or more of its edges (13, 14), said strips (52) being arranged so that they are parallel to the edge (13, 14) itself and partially projecting, so that they can overlap the edges of adjacent lattices.

[0193] It is also possible, but not necessary, to provide for said lattices (1, 1') to comprise further means for connection to adjacent lattices.

[0194] In Figure 4, said lattice (1) is arranged with said projections (R, R1) facing towards the insulating panel (P), meaning with said circular base (R3) resting on the insulating panel (P), and constrained to the wall through fixing means (3) and a distribution washer (324) on which the head (33) of the fixing screw (32) rests.

[0195] Said lattices (1) are thus constrained to said insulating panels (P) only in certain points, at the level of the edges of said holed circular bases (R3), so that the layer of cement plaster (C) that is obtained adheres completely to the insulating panels (P).

[0196] The heads (33) of the fixing screws (32) are spaced from said insulating panel (P), in such a way that they are completely or partially buried in the layer of cement plaster.

[0197] In particular, said heads (33) of the fixing screws (32) should be preferably spaced from said panel (P) by a distance corresponding to at least half the thickness of the cement plaster layer.

[0198] In the solution illustrated in Figures 1, 5, 6, 7, 8 and 11, said projections (21, 22, 23, R, R1) are in any case joined to or formed together with said lattice (1), while in the solution shown in Figure 10 said projections (P21) are projections joined to said insulating panel (P) or formed together with said insulating panel (P).

[0199] Said projections (21, 22, 23, R, R1), for example, are substantially and preferably positioned at the level of the crossing points of the meshes (11) of the lattice (1).

[0200] In the solution illustrated in Figures 5 and 6, said projections (21) in turn comprise substantially linear or plane elements (211) raised from said surface (12) of said lattice (1).

[0201] In the solution shown in Figure 7, said projections (22) comprise a variously oriented partition (221) which is generically arranged so that it is orthogonal to the plane of said lattice (1). Said partitions (221) are variously oriented with respect to one another or are all oriented in the same direction, in such a way that they serve also as containment elements suited to prevent the cement plaster from coming off.

[0202] Said partitions (221) may comprise one or more through openings (222) for the passage of the cement plaster, intended to favour the stability of the layer of cement plaster itself.

[0203] In the solution shown in Figure 8, said projec-

tions (23) are in a closed geometric shape and comprise a generically cylindrical or prismatic surface (231), with or without said through openings (232).

[0204] Said projections (21, 22, 23) may be variously oriented with respect to one another and may comprise a base (212), for example an enlarged base suited to rest on said insulating panel (P).

[0205] Said projections (21, 22, 23) may also comprise one or more lower pins or nails (212) suited to be driven in said insulating panel (P).

[0206] In the example of Figure 10, said projections (P21) are raised from the surface (P2) of said insulating panel (P) facing towards said lattice (1).

[0207] In a solution illustrated in Figures 11, 11a, 12, 13, said lattice (1') comprises a three-dimensional net, for example substantially rectangular in shape, with two pairs of parallel opposite sides (13, 14), formed by three-dimensional meshes (11').

[0208] The new lattice (1') comprises a plurality of wide or narrow segments or sections (43, 44, 45) generally arranged so as to form a reticulated structure with three-dimensional meshes (11') and to define said two opposite planes (A, B) parallel to and spaced from each other.

[0209] Said two opposite planes (A, B) of said lattices (1') are spaced from each other, preferably by at least 5 mm / 20 mm.

[0210] In particular, said lattice (1') comprises a base plane net (4), wherein a plurality of reticulated projections (11') in the shape of a prism or frustum of pyramid or truncated cone are raised from a surface (41) of said net (4).

[0211] One or more reinforced, non reticulated portions (15) are arranged on said lattice (1, 1'), said portions (15) being provided with through holes or seats (16) for the insertion of fixing means (3).

[0212] The lattice (1, 1') is preferably rectangular in shape, in the same size as the underlying insulating layer, for example measuring 120 x 60 cm, in addition to the 2-4 cm overlapping parts on the two adjacent sides, with a thickness that is generically less than 2-3 cm. Other sizes are however possible.

[0213] The size of said panel (P) substantially and preferably corresponds to the size of said lattice (1, 1').

[0214] The new covering is completed with fixing means (3) whose length is sufficient to guarantee that said lattice (1, 1') is fixed to said wall (M), with said insulating panel (P) interposed between them.

[0215] Said fixing means (3) comprise, for example, one or more screw anchors (31) with fixing screws (32), wherein said fixing screws (32) have an enlarged counteracting head (33) and/or a distribution washer (324) resting on said solid portion (15) of said lattice (1).

[0216] Said enlarged heads (33), completely buried in the cement plaster, meaning that they do not project from the counteracting plane (B), are furthermore preferably holed in such a way as to allow the introduction of cement plaster, thus further guaranteeing the continuity and the stability of the covering.

[0217] Furthermore, the terminal portion of the metallic screws is preferably made of a plastic and synthetic insulating material.

[0218] In the solution illustrated in Figure 15, the surface (P2) of said insulating panel (P) facing towards said lattice (1, 1') and intended to come into contact with the cement plaster comprises a plurality of recesses (P3) suitable for the introduction of the cement plaster, in order to improve the grip of the cement plaster itself onto the insulating panels (P).

[0219] Said recesses are preferably and conveniently in the shape of parallel grooves suited to be arranged horizontally and if necessary provided with undercuts (P31) in order to prevent the cement plaster layer from coming off.

[0220] Therefore, with reference to the above description and the attached drawings, the following claims are expressed.

Claims

1. Covering (R) for walls (M) or surfaces in general, **characterized in that** it comprises:

- at least one insulating layer directly or indirectly in contact with the wall to be covered, said insulating layer being constituted by one or more modular insulating panels (P),
- at least one layer of cement plaster (C), positioned in such a way that it adheres to said insulating layer (P) and incorporating at least one layer formed by one or more bidimensional or three-dimensional modular lattices (1, 1'), metallic and/or non-metallic, defining at least one counteracting plane (B) that is spaced from said insulating layer (P),
- one or more projections or protrusions or spacer elements in general (R, R1, 21, 22, 23, P21) located between said one or more lattices (1, 1') and said one or more insulating panels (P), suited to define at least one hollow space between said counteracting plane (B) and said one or more insulating panels (P), said hollow space being filled with said at least one layer of cement plaster (C),
- fixing means (3) suited to constrain said lattices (1, 1') to said wall (M), wherein said lattices (1, 1') are incorporated in said cement plaster (C) and the insulating layer (P) is interposed between them,

and wherein said lattice (1, 1') comprises one or more reinforced portions (15), at the level of which there are holes or seats (16) suitable for the application of said fixing means (3), so that the heads (33) of said fixing means (3) are completely or partially buried in the layer of cement plaster (C) in order to provide a

continuous connection between the wall and the cement plaster, with the insulating layer interposed between them.

2. Covering (R) according to claim 1, **characterized in that** said modular lattices (1, 1') have a rigid structure and are flexible in one or more directions.
3. Covering (R) according to claim 1 or 2, **characterized in that** said one or more projections and/or protrusions and/or spacer elements in general (21, 22, 23) are integral with said lattice (1, 1'), being joined to or formed together with said lattice (1, 1') itself.
4. Covering (R) according to claim 1 or 2, **characterized in that** said one or more projections and/or protrusions and/or spacer elements in general (P21) are raised from the surface (P2) of said insulating panel (P) that faces towards said lattice (1, 1'), and wherein said projections and/or protrusions and/or spacer elements in general (P21) are joined to or formed together with said insulating panel (P) itself.
5. Covering (R) according to any of the preceding claims, **characterized in that** the heads (33) of said fixing means (3) are provided with holes, in such a way as to allow the cement plaster to be introduced therein, thus further guaranteeing the continuity and the stability of the covering.
6. Covering according to one or more of the preceding claims, **characterized in that** said lattices (1, 1') are joined to the corresponding insulating panels (P) in given points, meaning at the level of said projections (21, 22, 23, R, R1, P21).
7. Covering (R) according to claim 3, **characterized in that** said projections (R, R1), joined to one another by crosspieces (V) that define the meshes (11) of the lattice (1), have a substantially cylindrical or prismatic or closed geometric shape, with side (R2) and base (R3) holed so as to allow the cement plaster to flow through them for the purpose of guaranteeing the continuity of the layer of cement plaster.
8. Covering (R) according to claim 3 or 4, **characterized in that** said projections (21, 22, 23, P21) in turn comprise substantially pin-shaped or linear or plane elements (211) and/or one or more linear and/or curvilinear (231) partitions (221), generically arranged in such a way that they are orthogonal to said counteracting plane (B) defined by said lattice (1, 1'), and wherein said partitions (221) furthermore are oriented in different directions with respect to one another or are all oriented in the same direction, so that they also serve as containment elements suited to prevent the cement plaster from coming off.

9. Covering according to claim 6, **characterized in that** said partitions (221, 231) comprise one or more through openings (222, 232) suited to allow the cement plaster to flow therethrough, so as to favour the stability of the layer of cement plaster itself. 5
10. Covering according to claim 1 or 2, **characterized in that** said lattice (1') comprises a plurality of wide or narrow segments or sections (43, 44, 45) generally arranged in such a way as to form a reticulated structure with three-dimensional meshes (11') defining said counteracting plane (B) and a plane (A) resting on said insulating panels (P). 10
11. Covering according to claim 10, **characterized in that** said lattice (1') comprises said reinforced portions (15) with said seats (16) for the introduction of the fixing means (3), and wherein said seats (16) comprise a cylindrical element (17) that is integral with and orthogonal to said lattice (1) and is raised from said surface (12) facing towards the inside, and wherein said cylindrical elements (17) are suited to be inserted in corresponding holes (P1) made in said panel (P), the length of said cylindrical elements being substantially equal to the thickness of said panel (P). 15 20 25
12. Covering according to one or more of the preceding claims, **characterized in that** the surface (P2) of said insulating panel (P) facing towards said lattice (1, 1') and intended to come into contact with the cement plaster comprises a plurality of recesses (P3) suitable for the introduction of the cement plaster, in order to improve the grip of the cement plaster itself onto the insulating panels (P). 30 35
13. Covering according to claim 11, **characterized in that** said recesses (P3) are in the shape of grooves that are parallel to one another, suited to be positioned horizontally and possibly provided with undercut portions (P31). 40
14. Covering according to any of the preceding claims, **characterized in that** said lattice (1, 1') comprises overlapping strips (52) in turn comprising grid portions constrained to said lattice (1) in proximity to one or more of its edges (13, 14), arranged parallel to the edge itself (13, 14) and partially protruding, in such a way that they can overlap the edges of adjacent lattices. 45 50
15. Covering according to one or more of the preceding claims, **characterized in that** it comprises one or more pipes for the circulation of water or exchange fluid in general which are positioned and held between said projections (21, 22, 23, P21) of said lattices (1, 1'). 55
16. Covering according to the preceding claims, **characterized in that** said counteracting plane (B) defined by said lattices (1, 1') is spaced from said insulating panels by at least 5 mm / 20 mm.
17. Covering according to any of the preceding claims, **characterized in that** said lattice (1, 1') comprises joining means (52) suited to join it to adjacent lattices (1).
18. Covering according to any of the preceding claims, **characterized in that** said insulating layer (P) is a pre-existing layer and is integral with the wall (M), and wherein said at least one lattice (1, 1') and said layer of cement plaster (C) are made integral to said wall (M) and to said insulating layer (P) through said fixing means (3).
19. Process for making the covering according to one or more of the preceding claims, **characterized in that** it comprises the following steps:
- preparing a plurality of modules, each one formed by at least one lattice (1, 1') joined to at least one insulating panel (P) in certain points;
 - installing and fixing said modules consisting of lattices and panels to the wall (M), with said insulating panel (P) facing towards the wall (M), through a plurality of fixing means (3), and wherein said modules are positioned side by side in such a way that said insulating panels (P) are adjacent to one another, while said lattices (1, 1') preferably partially overlap one another;
 - laying a layer of cement plaster (C) on said lattices (1, 1') of said modules through a convenient mechanical spraying process, in such a way as to cover said lattices (1, 1') completely;
 - levelling and possibly finishing the covering.

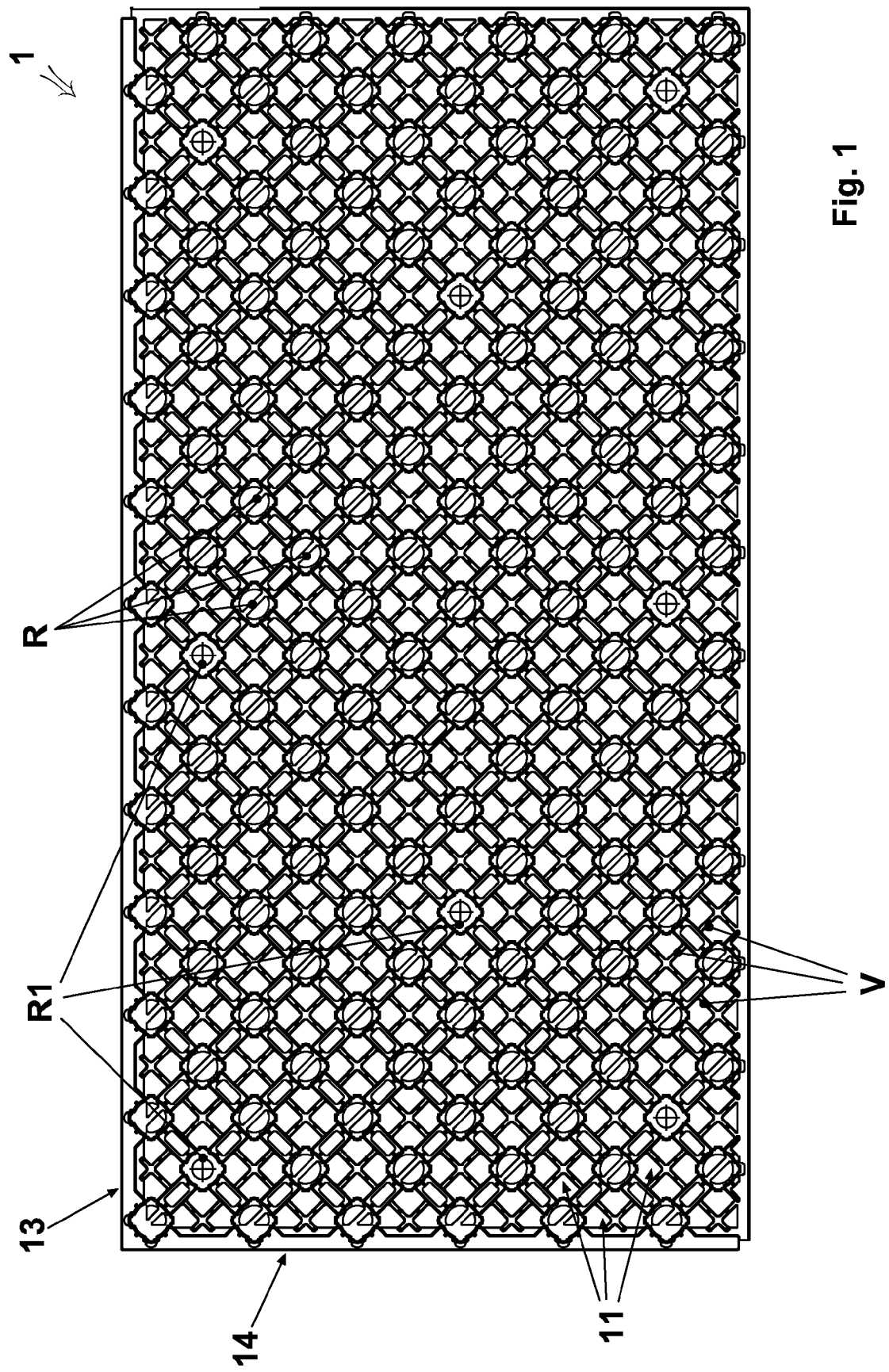


Fig. 1

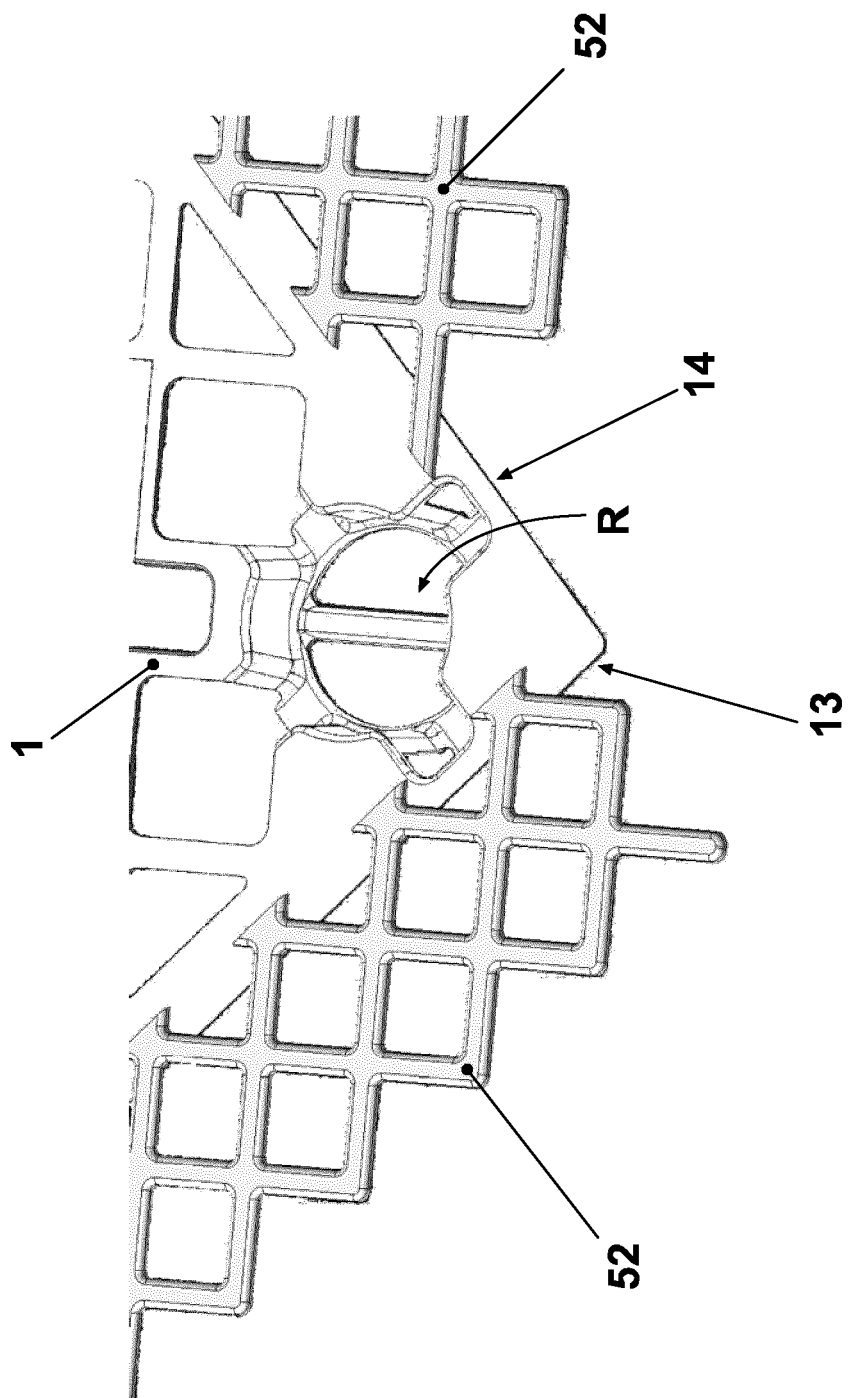


Fig. 1a

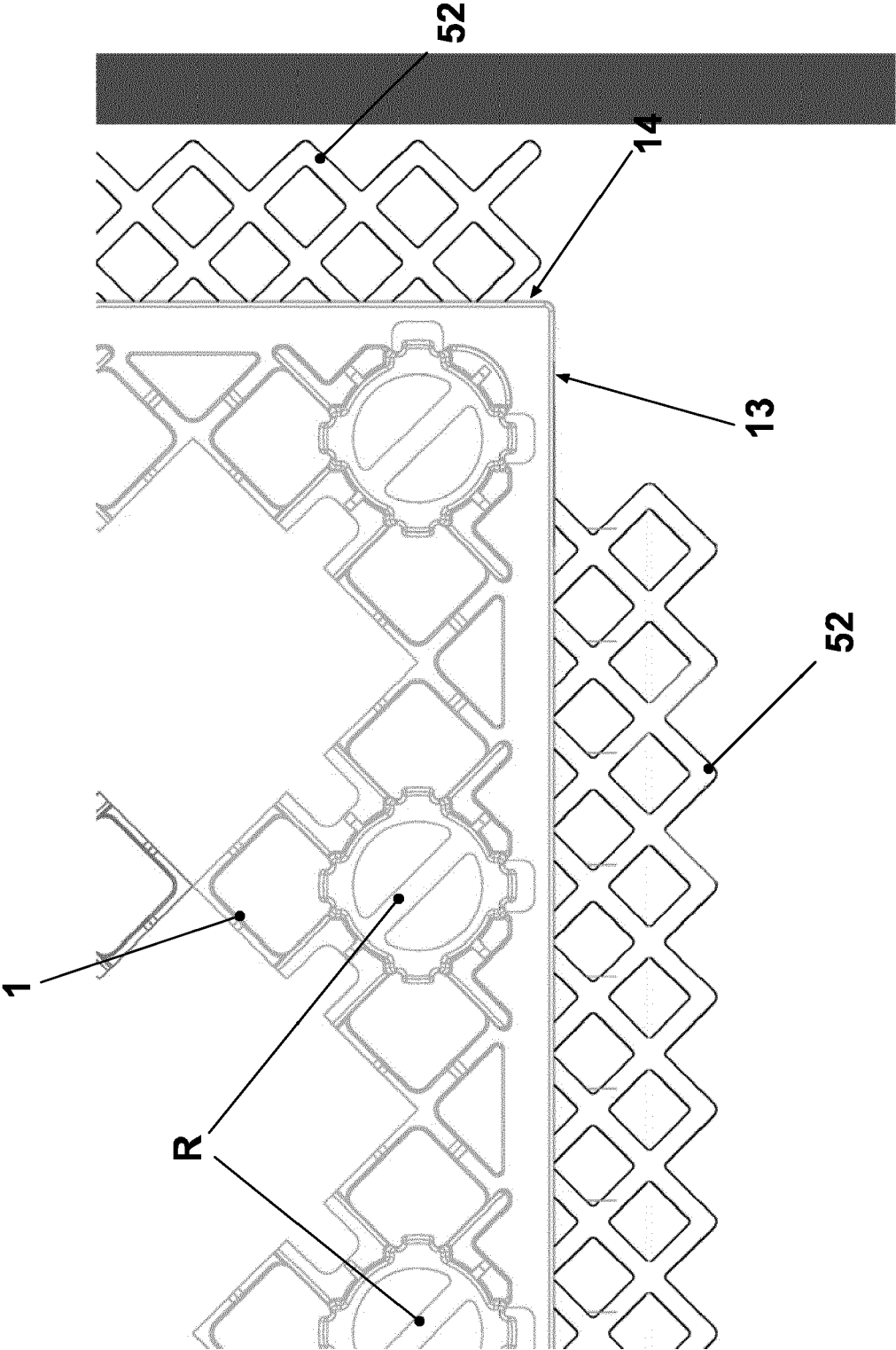
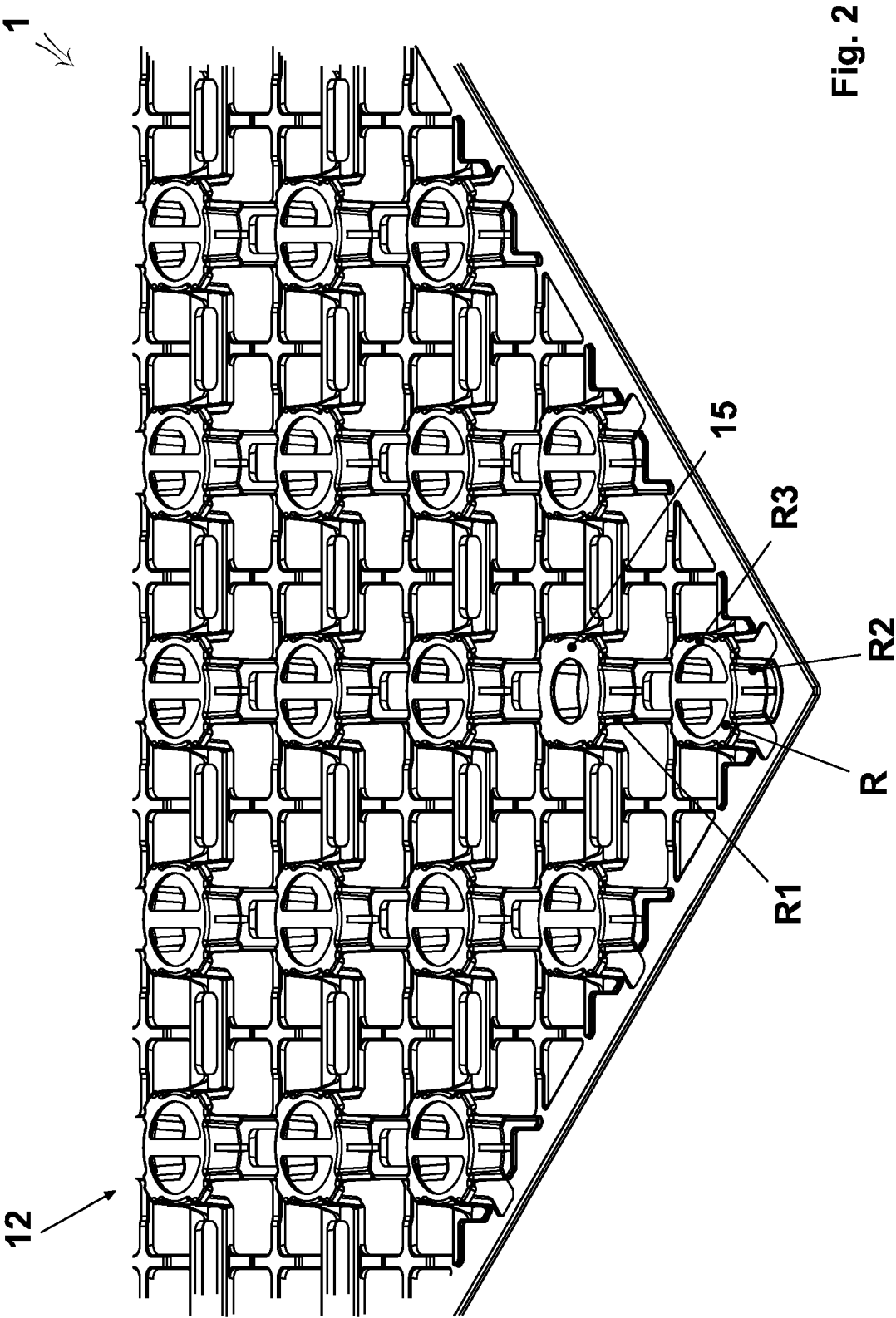


Fig. 1b



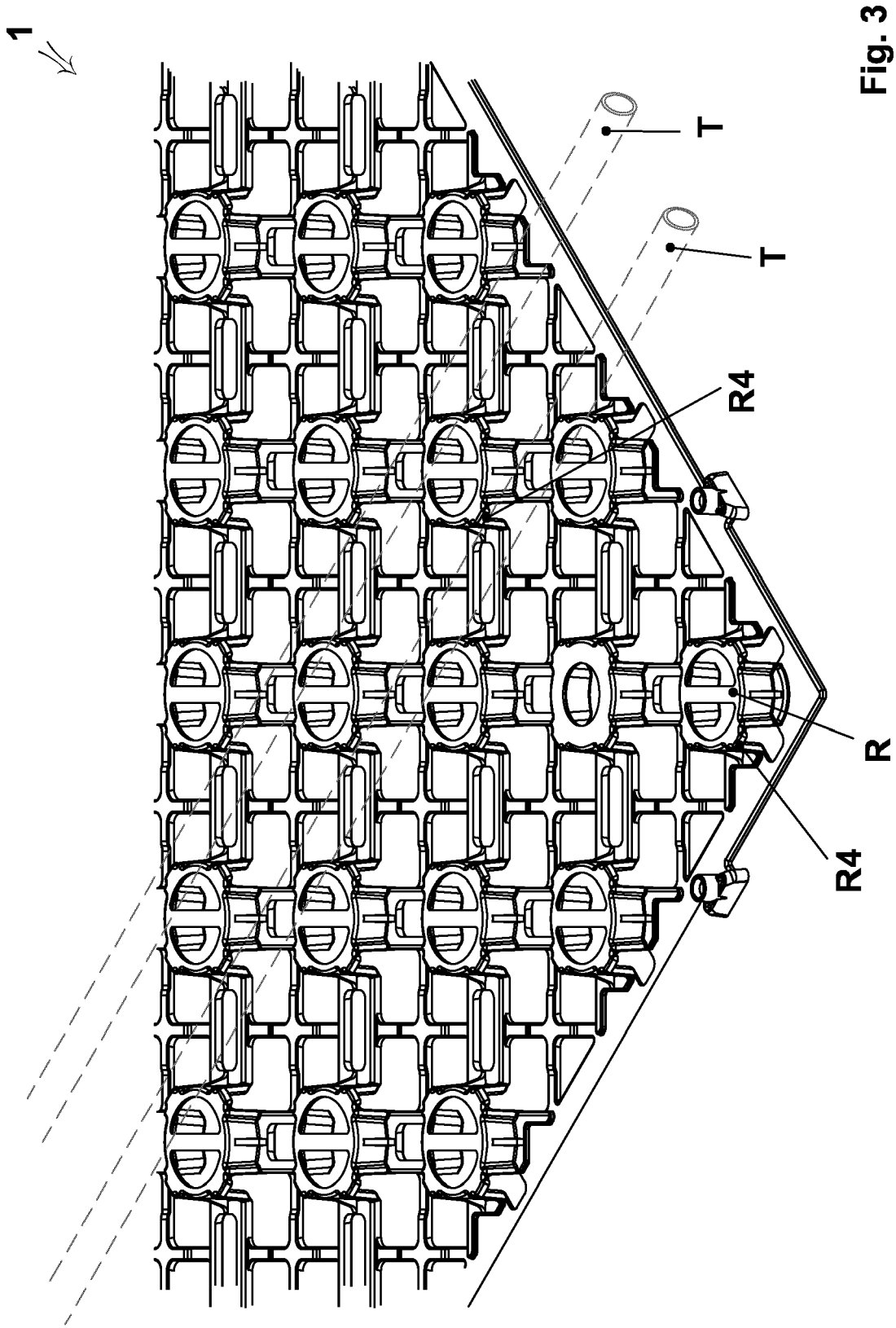


Fig. 3

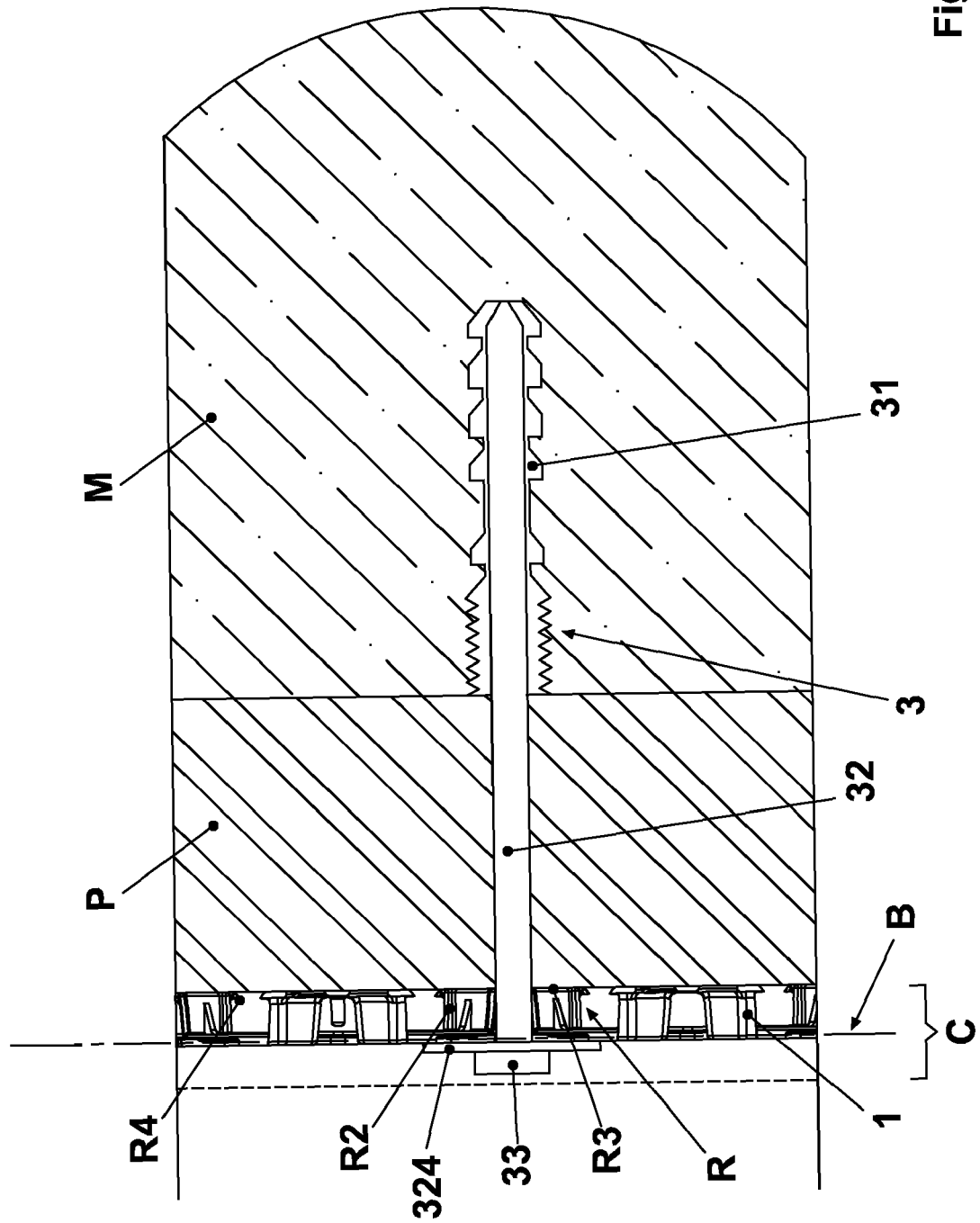


Fig. 4

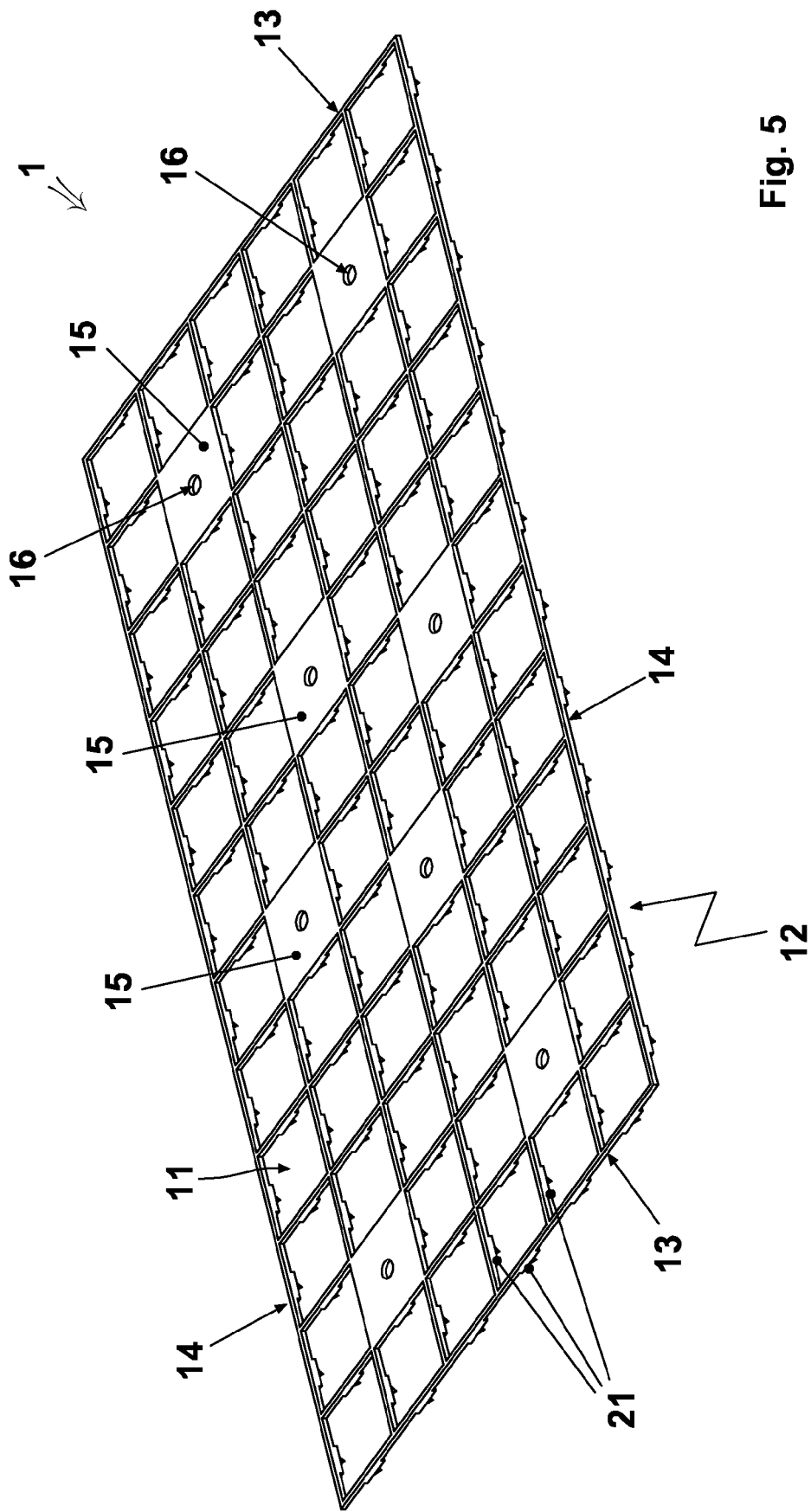
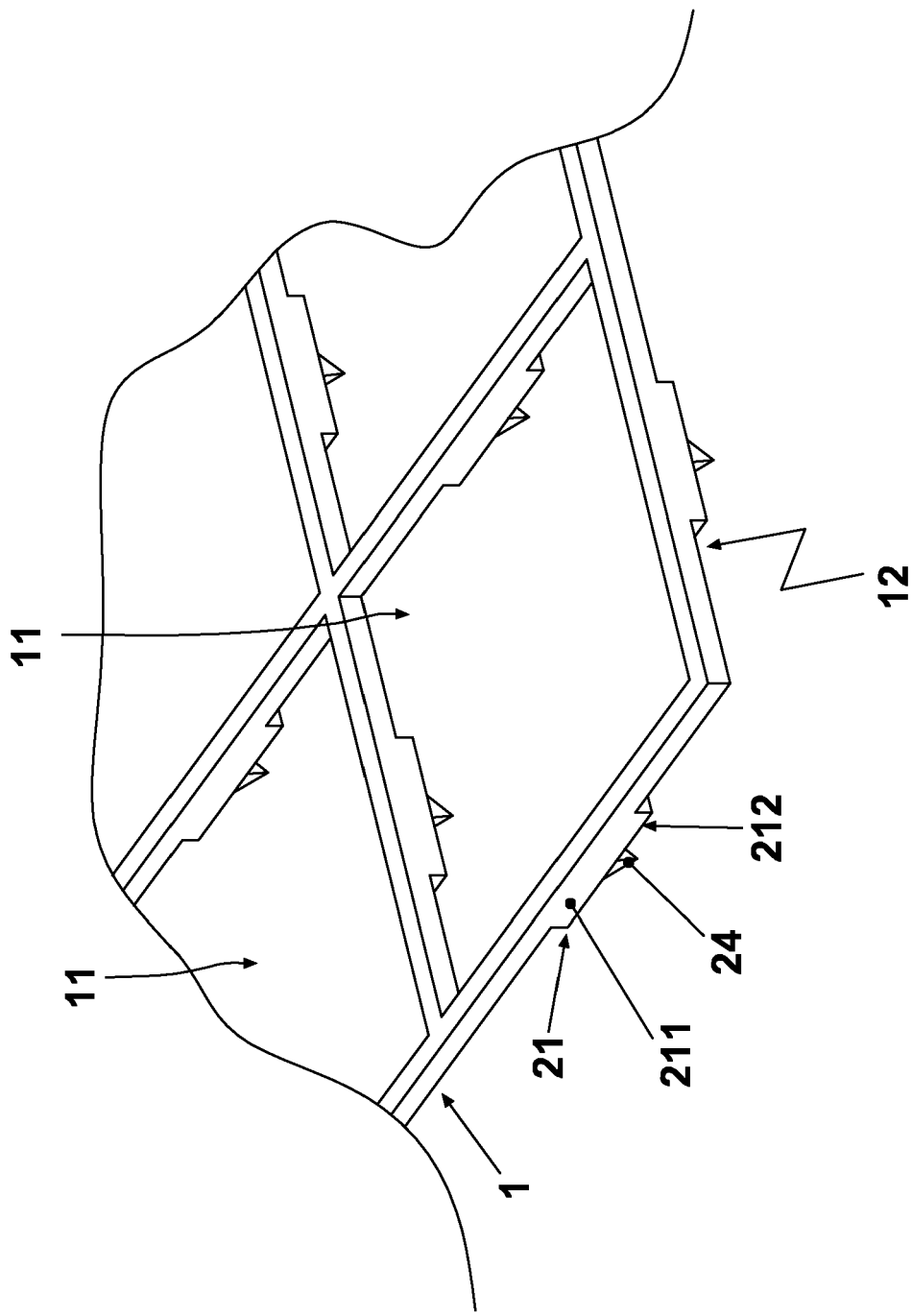


Fig. 5

Fig. 6



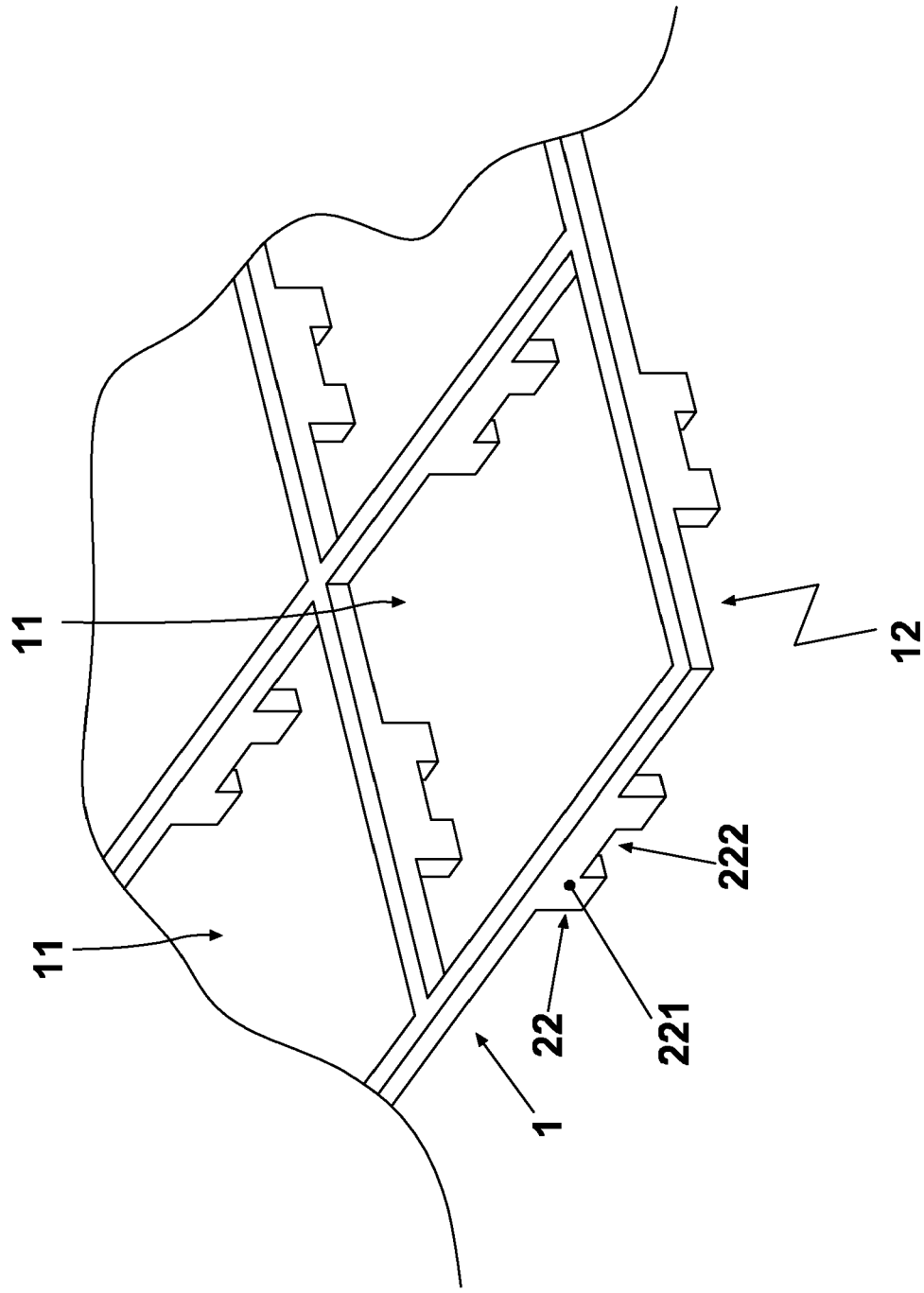


Fig. 7

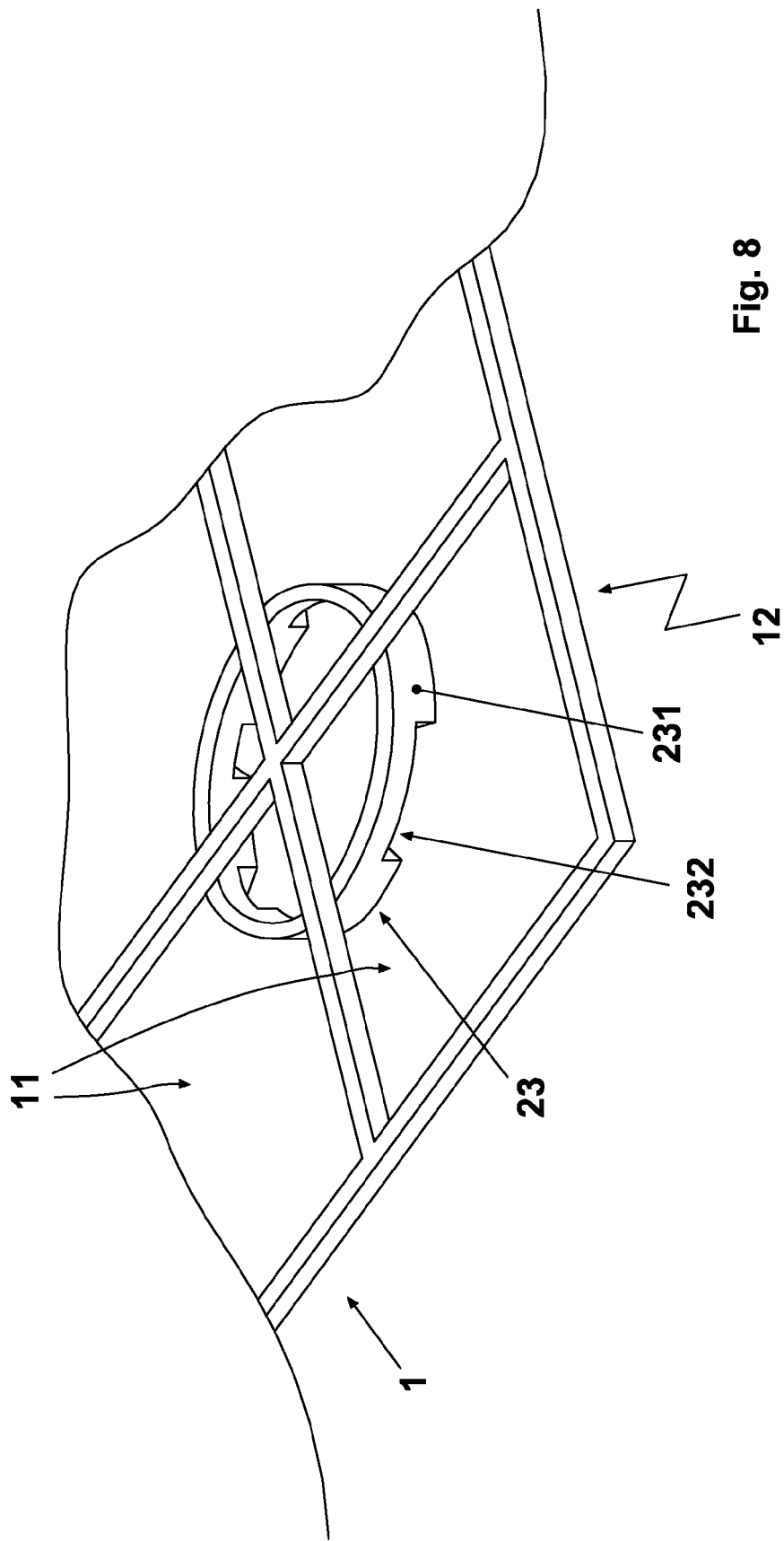


Fig. 8

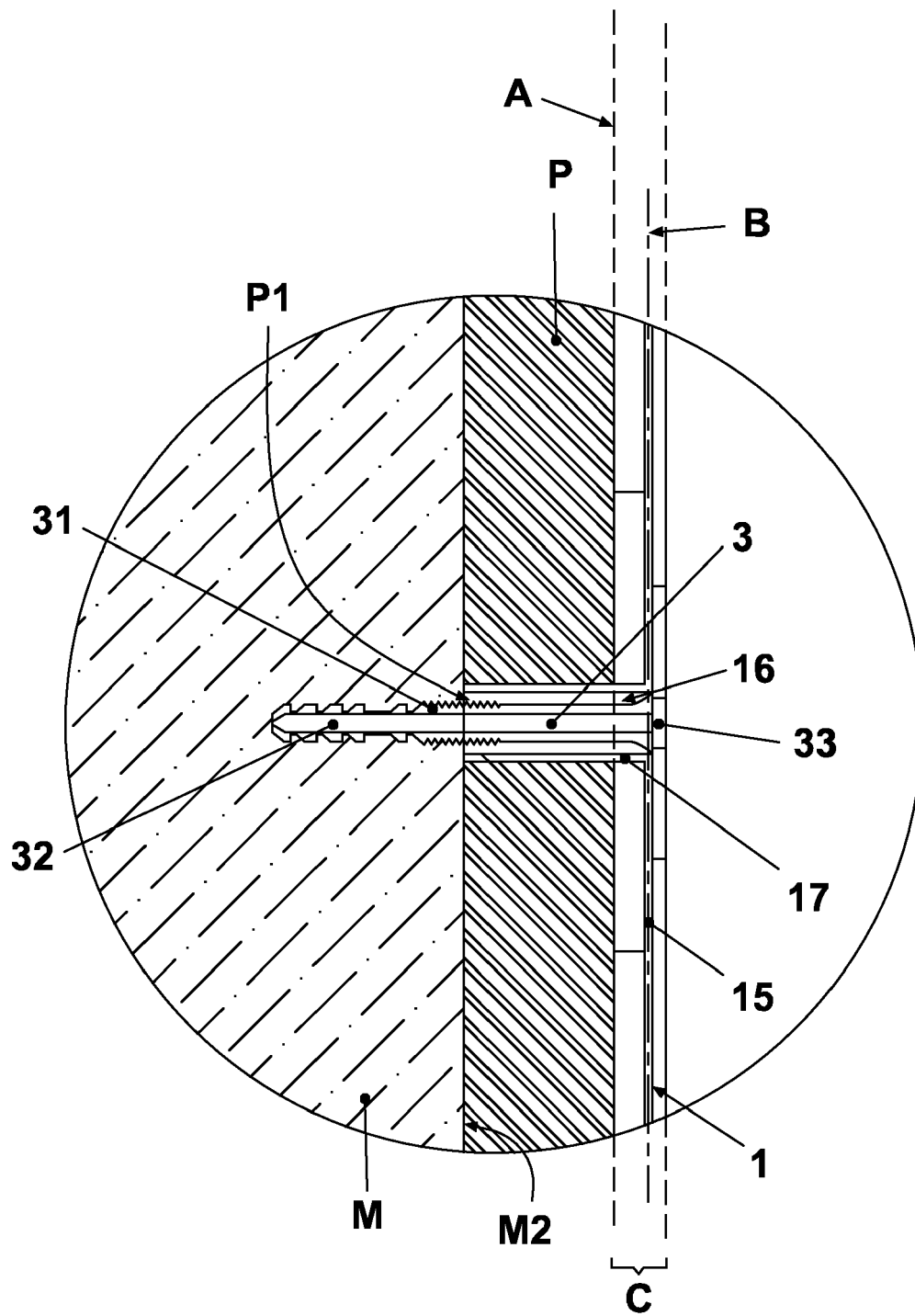


Fig. 9

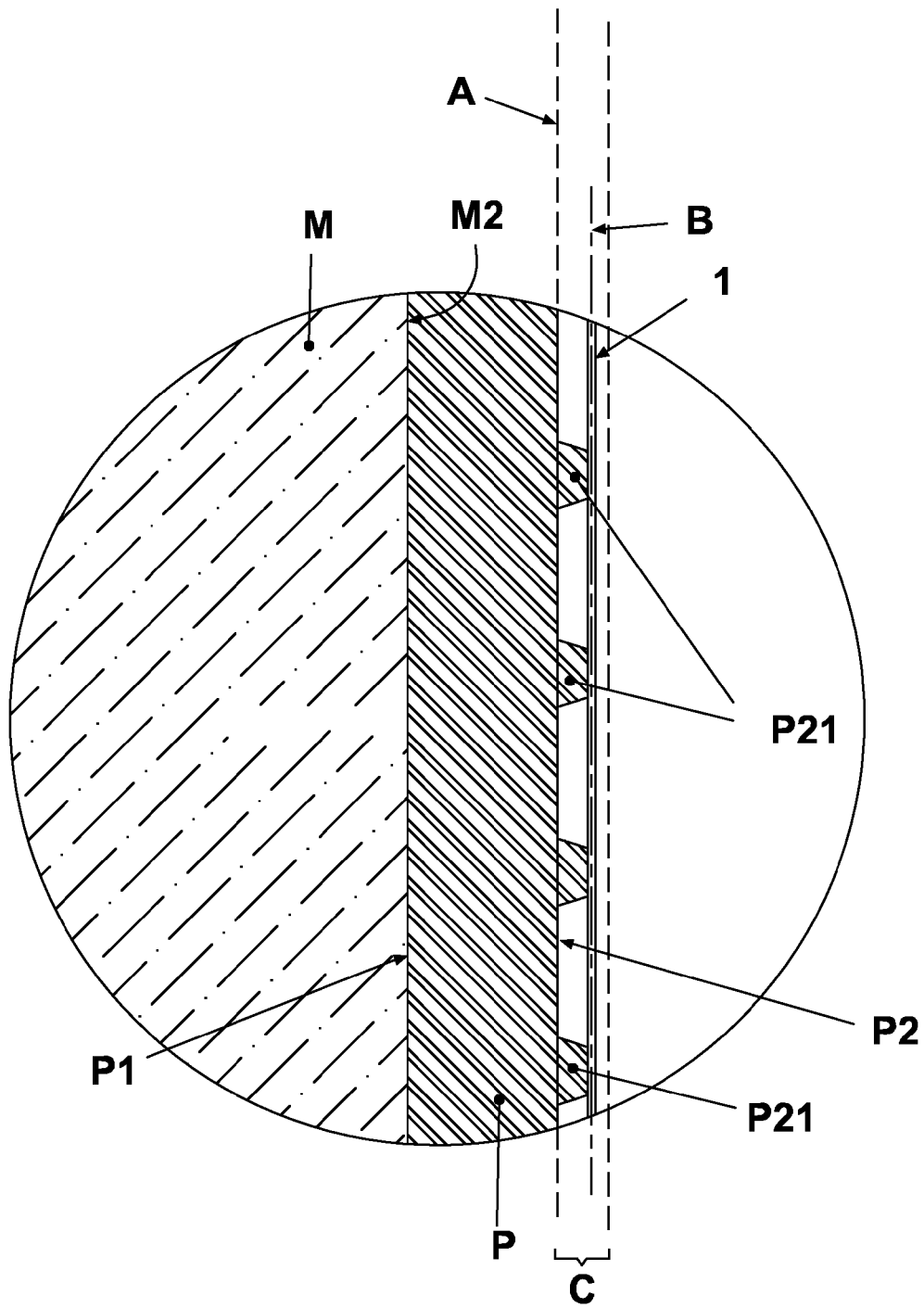
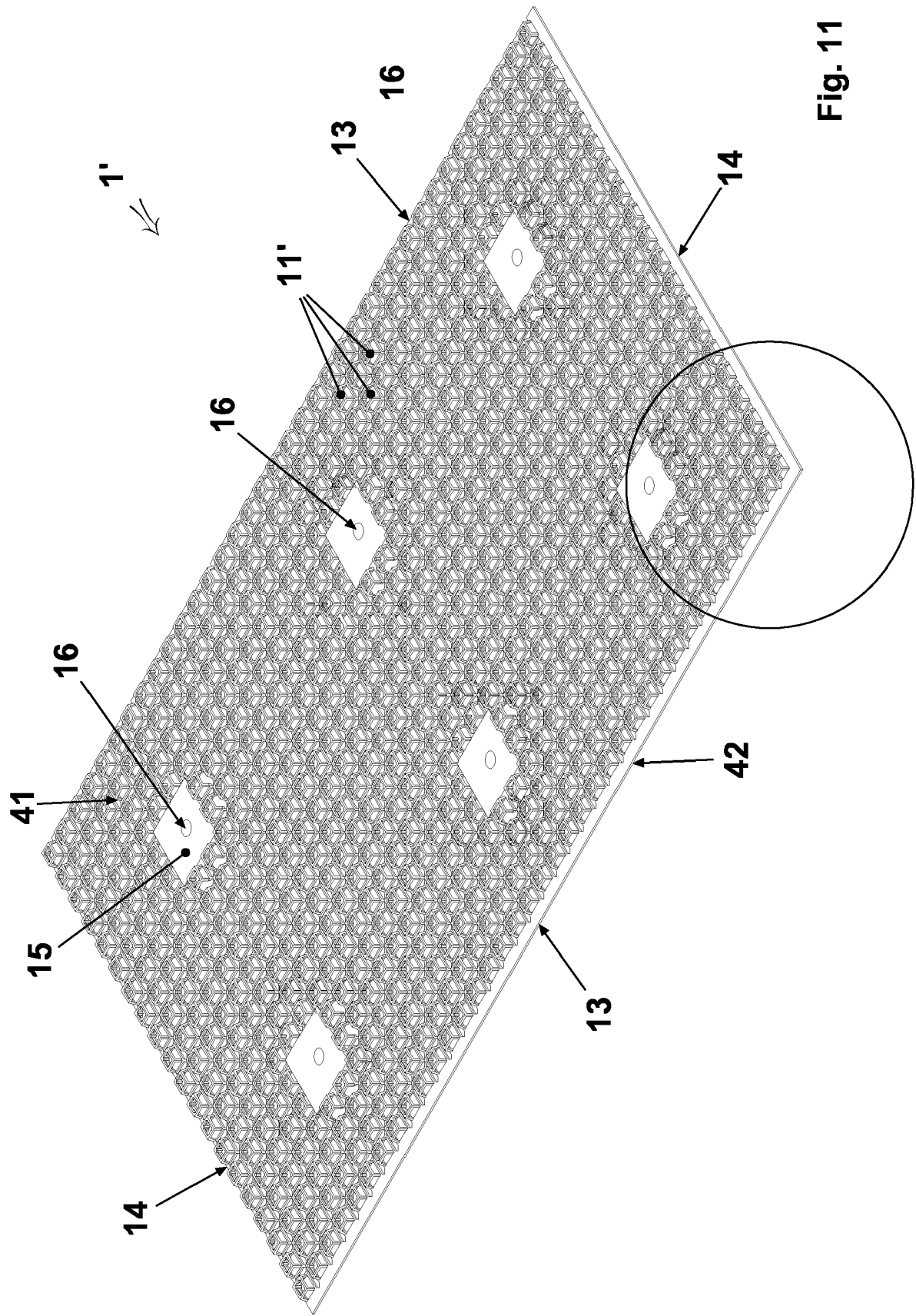


Fig. 10



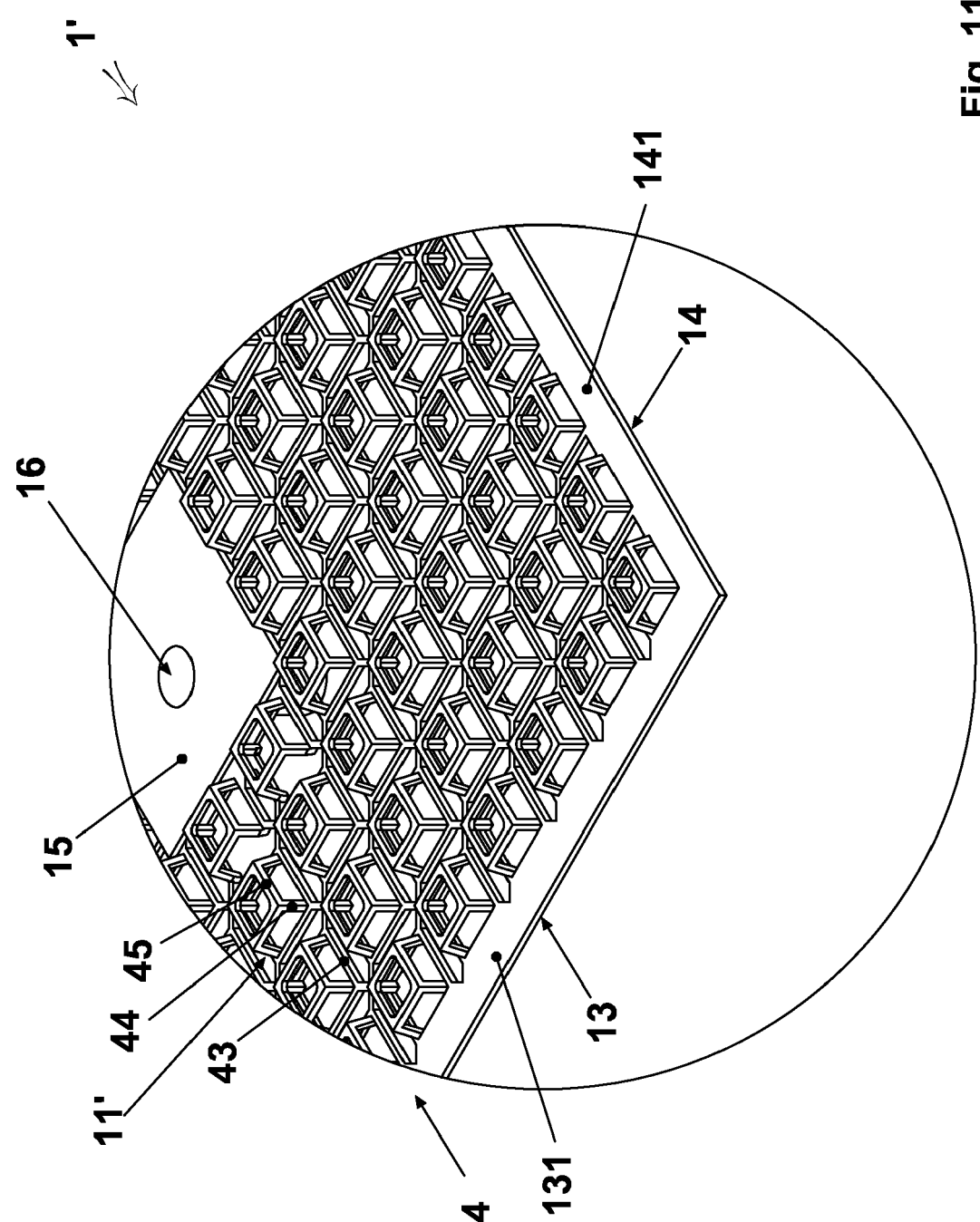


Fig. 11a

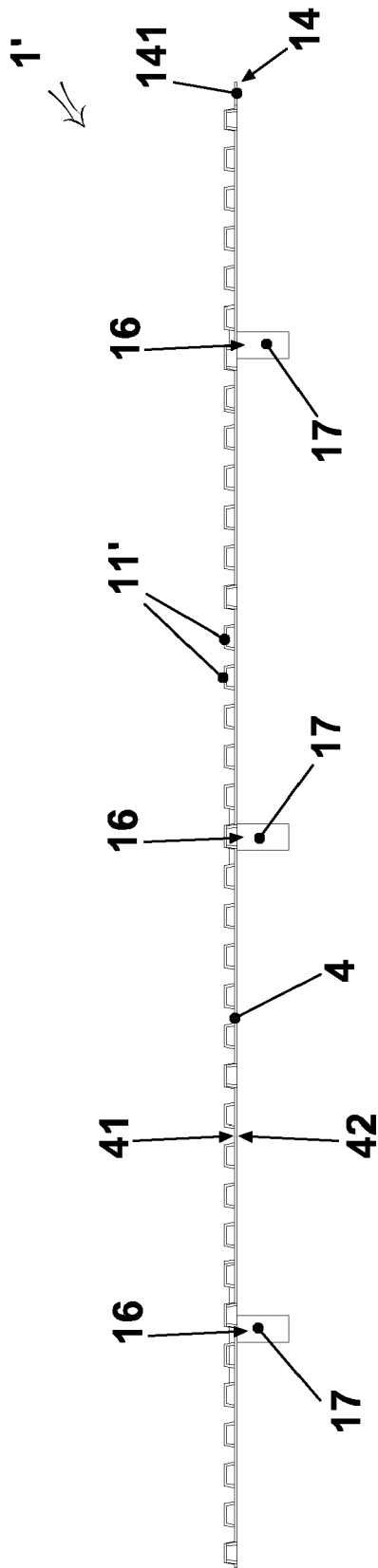


Fig. 12

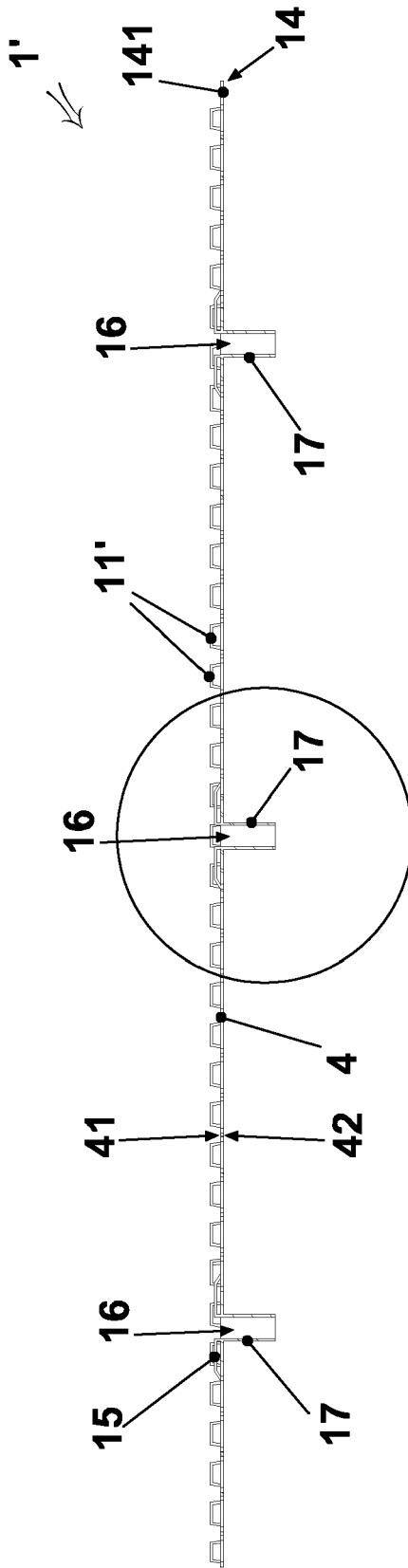


Fig. 13

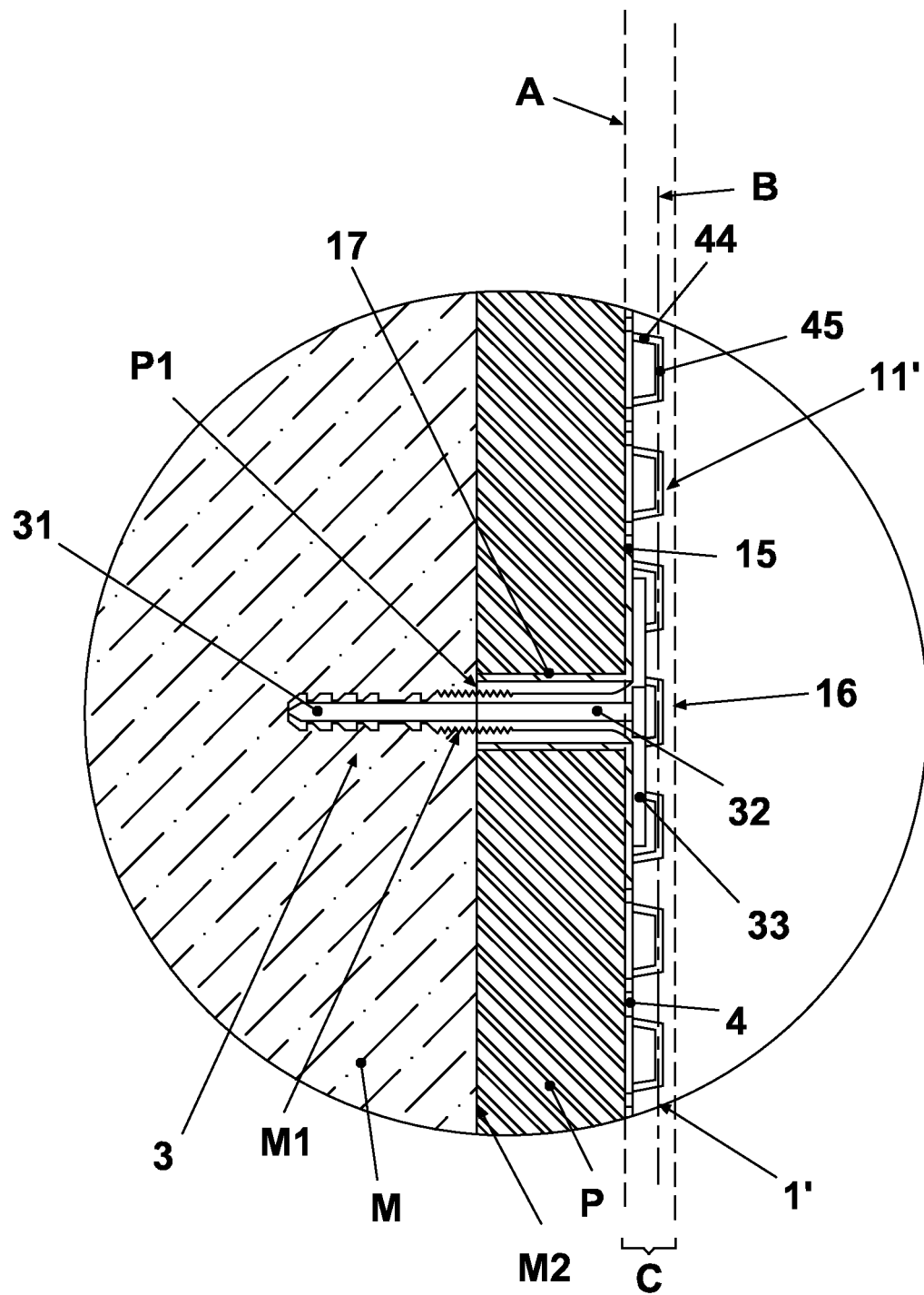


Fig. 14

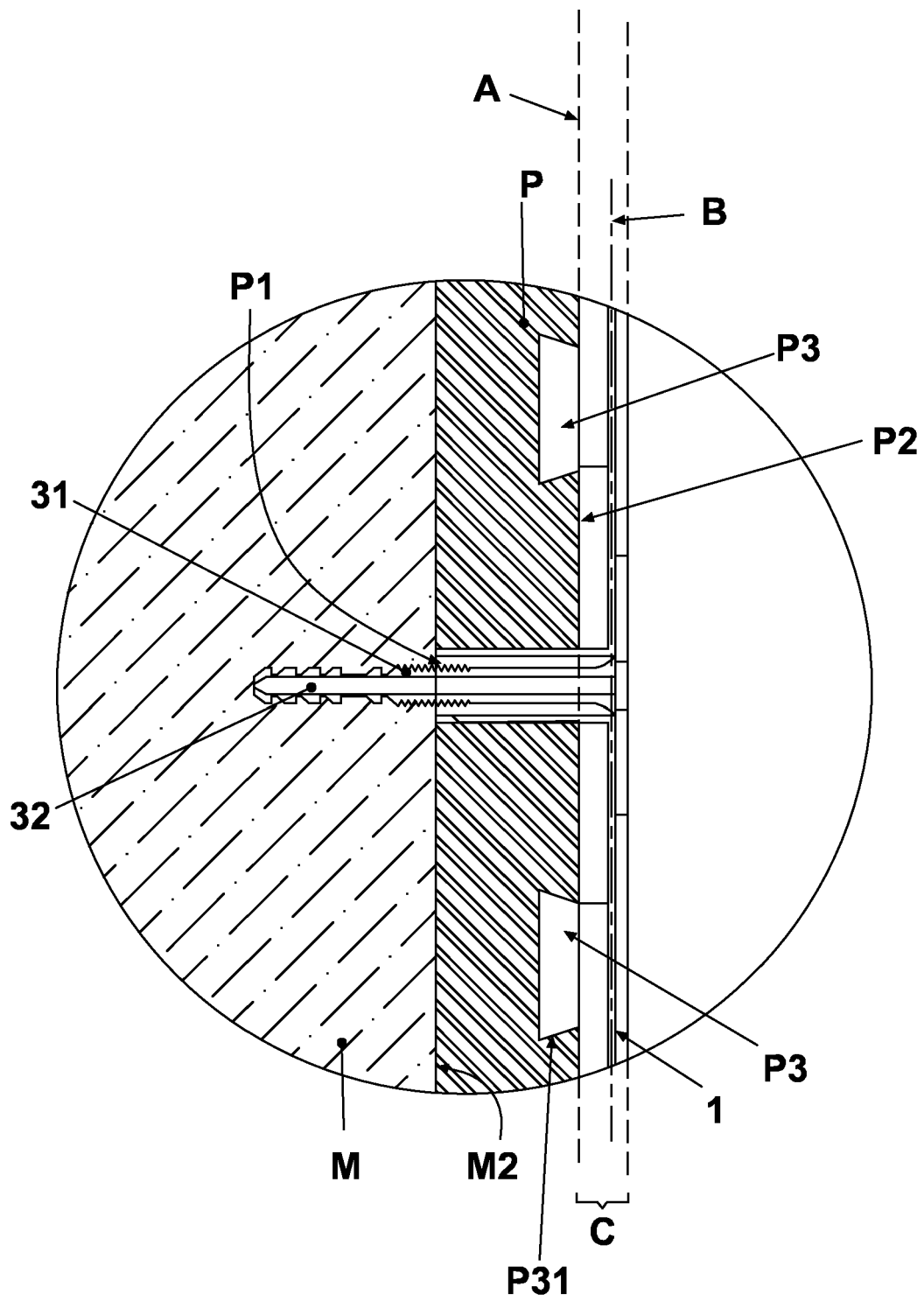


Fig. 15



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Application Number
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A	* page 8, line 1 - page 10, line 11; figures 1-6 *	3-18	E04F13/08
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Place of search Munich		Date of completion of the search 30 November 2016	Examiner Khera, Daljit
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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