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(54) **Curved tile**

(57) The invention relates to a method for manufacturing a ceramic tile (1), wherein the upper surface of the tile comprises at least two zones (2,3), which two zones are each flat and wherein the normal vectors of the two

surfaces form an angle greater than 0° with each other.

The invention further comprises a combination of a tile according to the invention and a drain (4), wherein at least one edge of the tile lies against the drain (5).

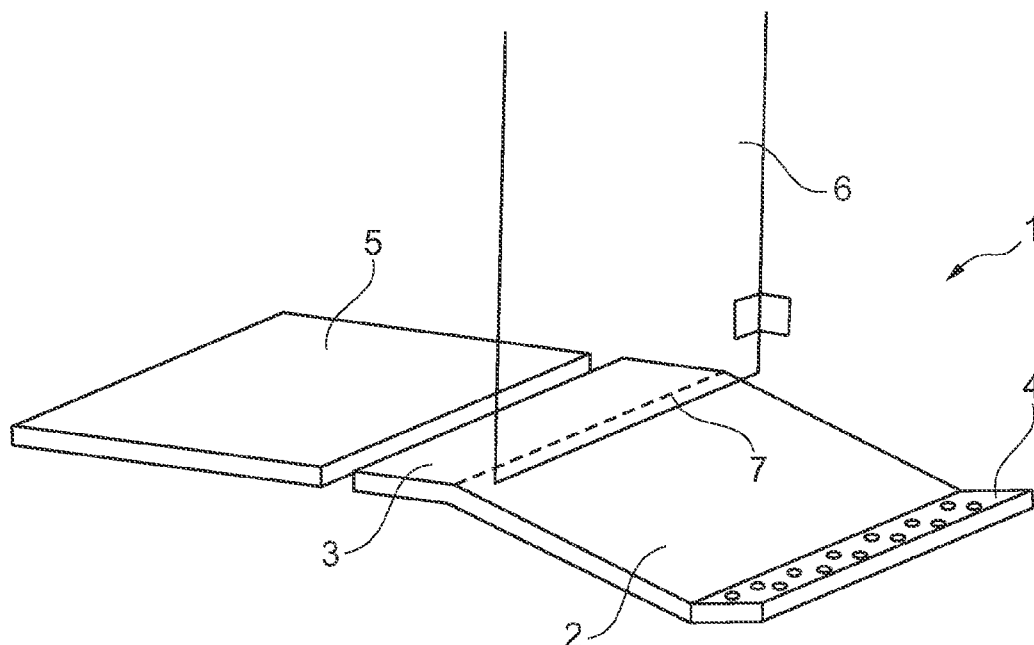


Fig. 1

Description

[0001] The invention relates to a method for manufacturing a ceramic tile, such as for instance a ceramic, glass or gres porcellanato tile.

[0002] Tiles are used as wall covering and as floor covering. Tiles are used, among other purposes, for bathrooms and shower spaces. In such a sanitary application it is usually the case that a drain is arranged in the floor, for instance to allow draining of shower water. In order to allow the water to run to the drain a slope must be arranged in the tile floor.

[0003] The tiles according to the preamble are thus wall and floor tiles normally complying with European standard number 14411. Such tiles are usually pressed from clay and are not provided with glazing. Due to their high density the water absorption of these tiles is less than 1%. The invention does not include so-called ceramic sanitary ware. This is understood to mean ceramic parts such as a toilet bowl, washbasin or shower tray. Such ceramic sanitary ware is usually manufactured by being cast in a mould. After curing the cast article is provided with a glazing.

[0004] It is known to provide shower floors with an elongate drain. The advantage is that the floor needs a slope in only one direction because the water can be collected over the full length of the drain. The length of such an elongate drain is often the same as the width of the shower floor.

[0005] There is a further trend toward the use of ceramic tiles of large dimensions. Tiles with dimensions of 50 centimetres by 50 centimetres are already usual, while tiles with dimensions of 1 metre by 1 metre are also becoming more common. During tiling of a floor it is desirable in the case of such large tiles that the fewest possible tiles are cut.

[0006] When arranging a slope in a tile floor for a shower space it is usual to have the slope begin just behind a shower door. Shower water will hereby always flow into the shower space. In the case of the above stated large tiles this may mean that a tile will have to be cut to allow the slope to begin directly behind the shower door, or the slope will extend beyond the shower door for substantially a tile length, which can amount to 1 metre or more. This is also undesirable.

[0007] FI 87824 describes a tile cast from concrete, with different surfaces lying at an angle. Tiles cast from concrete must have a certain thickness in order to have sufficient strength, so that the tiles can also be handled without problem. The thickness required in the case of larger dimensions will however be several centimetres, whereby the weight of such concrete tiles becomes prohibitive.

[0008] DE 102007056472 describes the manufacture of a shower plate with inclining surfaces, wherein the shower tray is manufactured from a solid plate of material, into which the desired profile is then milled. This is a time-consuming and expensive method.

[0009] It is now an object of the invention to provide a method for manufacturing a tile wherein the above stated drawbacks are reduced or even obviated.

[0010] This object is achieved with a method for manufacturing a ceramic tile, the method comprising the steps of:

- forming a tile from clay, wherein the upper surface of the tile comprises at least two zones, which two zones are each flat and wherein the normal vectors of the two surfaces form an angle greater than 0° with each other;
- subsequently firing the tile formed from clay.

[0011] The tile formed from clay is preferably fired at a temperature above 1000°C.

[0012] By manufacturing the tiles from clay and then firing them at high temperature, a ceramic tile is obtained which is strong, while the thickness of the tile can remain limited.

[0013] In contrast to prior art tiles, the thus manufactured ceramic tiles according to the invention hereby have a curvature. With this curvature it is possible to have the slope begin for instance halfway along a tile, without the tile having to be cut. This avoids an additional joint, preventing the risk of possible leakage. In addition, a smaller number of joints is more hygienic since there is less joint surface area to which dirt, soap residues and the like can adhere.

[0014] The use of a shaped tile as slope toward a drain has the further advantage that the structure and colour of the shaped tile can be the same as the tiles of the surrounding floor, since the shaped tile can be made with the same raw materials and the same process. Because the structure is the same, the same R-value or roughness is further obtained. An embodiment of the tile according to the invention comprises an opening, wherein at least one of the two zones of the upper surface has a slope in the direction of the opening. The opening in the tile can be used to arrange a drain. Because the dimensions of tiles are becoming increasingly large, it is increasingly the case that the dimensions of the drain are smaller than the dimensions of the tile. In prior art tiles this would mean that a tile would have to be cut into a number of parts in order to fit properly against the drain. With a tile according to the invention the drain can now be easily mounted and a slope is nevertheless present in the tile due to the difference in inclination of the two zones.

[0015] In addition, a better finish is obtained in this manner because the edges of the opening in the tile no longer depend on the skill of the tiler.

[0016] The invention further relates to a ceramic tile manufactured according to the invention, wherein the upper surface of the tile comprises at least two zones, which two zones are each flat and wherein the normal vectors of the two surfaces form an angle greater than 0° with each other.

[0017] In a preferred embodiment of the tile according

to the invention the opening is rectangular and the upper surface comprises at least four zones, wherein each zone connects to a side of the rectangular opening. Using such a tile a good slope can very easily be obtained around a rectangular drain. With prior art tiles it is often not possible to obtain a good connection without unsightly edges around a rectangular drain. With a tile according to the invention the zones are formed such that a good connection to the drain is obtained, and moreover a slope from four directions to the drain.

[0018] A transition zone is preferably provided between the at least two zones, which transition zone has a suitable curvature. A gradual progression between the two zones is obtained by means of the transition zone.

[0019] The tile according to the invention can have a uniform thickness, although the thickness of the tile can also be modified such that a flat underside is obtained while the upper side has the desired curvature. The advantage hereof is that the tile according to the invention can be easily arranged on a flat substrate.

[0020] In another preferred embodiment the ceramic tile is an unglazed tile.

[0021] The invention further relates to a combination of a tile according to the invention and a drain, wherein at least one edge of the tile lies against the drain. When for instance an elongate drain is used, the length of which is equal to or greater than the dimensions of the tile, a slope as well as a good connection to a flat surrounding floor can be obtained with this combination according to the invention. Tiles are thus already commercially available with dimensions of 1 metre by 3 metres. One such tile can cover the whole surface area of the shower floor. It is then desirable here that only a part of the full length of the tile has a slope. This is possible with a tile according to the invention.

[0022] In a preferred embodiment of the combination according to the invention the drain is arranged in the opening in the tile. This embodiment is advantageous when the dimensions of the drain are smaller than those of the tile. Because the different zones have a slope in the direction of the drain, a smooth fit to the drain can hereby be obtained while a suitable slope is also provided.

[0023] Another preferred embodiment of the combination according to the invention comprises a foam plate arranged under the tile. The foam plate provides for sound damping and insulation, but also provides extra strength. It is hereby possible to apply a thinner tile on the foam plate without the tile floor losing strength. An additional advantage is that the weight of the combination is hereby reduced, so that despite the sometimes large dimensions the combination can still be easily handled during installation.

[0024] A thin tile can further be readily shortened so that a combination of tile and foam plate can be modified in simple manner by for instance cutting the tile and the foam plate to size.

[0025] The foam plate is preferably provided with a

tongue and groove connection for coupling to surrounding combinations according to the invention. The tongue and groove connection ensures that two adjacent foam plates can be coupled to each other at the correct height and that there is therefore no height difference between the tiles on the foam plates.

[0026] The tile with foam plate can optionally also be applied without drain. The weight advantage is hereby in any case retained. In addition, factory manufacture of such a tile with foam plate is advantageous in order to minimize the risk of an substandard adhesion of the tile to the substrate.

[0027] In a highly preferred embodiment of the combination according to the invention the side walls of the foam plate are flush with the edges of the tile. A construction element is thus obtained which can be mounted in one operation. It is thus possible for instance to arrange a complete shower floor in one operation. Owing to the foam plate such a large construction element is nevertheless still easy to handle.

[0028] A cover profile is preferably arranged on at least one side wall of the foam plate. The side part can thus be neatly finished when the surrounding floor cannot be placed at the same level as the combination according to the invention.

[0029] In yet another embodiment of the combination according to the invention a recess is arranged in the underside of the foam plate to accommodate at least a part of the drain. The siphon part of the drain can for instance thus be arranged closer against the upper surface, this reducing the overall height of the combination according to the invention.

[0030] In a highly preferred embodiment of the combination according to the invention the combination has a length and width of at least one metre by one metre and the thickness of the tile is less than five millimetres.

[0031] With such thin tiles the arranging of a curve in the tile has the advantage that the tile is thereby strengthened.

[0032] Only one tile is preferably further arranged on the foam plate. It is further possible to provide the tile according to the invention with an anti-slip layer, which is often formed as a structure in the upper surface of the tile.

[0033] With a tile according to the invention it is thus possible to create a completely flat floor with a slope toward a drain. Both the sloping part of the floor and the surrounding part can have the same colour and structure, whereby the floor has the appearance of being one whole.

[0034] The invention further relates to a shower tray comprising only one tile according to the invention, wherein the peripheral edge of the tile lies in one plane.

[0035] The advantage of a shower tray according to the invention, in contrast to prior art shower trays, is that no use need be made of a silicone seal to seal the shower tray relative to a surrounding floor. Prior art shower trays are for instance of steel or plastic and thereby have a

coefficient of expansion different from that of a surrounding stone floor. In the invention the shower tray is formed by a tile which can be made of the same material and have the same appearance as the surrounding floor. A usual adhesion of the tiles and the shower tray and a usual filling of the joints can hereby suffice to obtain a good seal.

[0036] In addition, it is not necessary to cut wall tiles connecting to the shower tray since the peripheral edge lies in one plane and can thus be set horizontally.

[0037] A shower tray according to the invention can further be adhered or placed in wet cement in a usual manner. In the prior art a shower tray must be set in position and such a shower tray lies largely unsupported in the floor. Adhesion of the whole shower tray according to the invention makes the unit more robust.

[0038] Because the shower tray comprises a shaped tile, it is easy to make the thickness of the tile of the shower tray the same as that of the tiles of a surrounding floor. This simplifies placing of the surrounding floor as no height differences have to be spanned.

[0039] The use of a shaped tile as shower tray has the further advantage that the dimensioning is precise and that the shower tray can be provided with right angles. In prior art shower trays the corners are rounded as a result of the production process. It is moreover necessary in such prior art not to have any right angles so as to enable a reliable seal to be made using silicone mastic.

[0040] The use of a shaped tile as shower tray has the further advantage that the structure and colour of the shaped tile can be the same as the tiles of the surrounding floor, since the shaped tile can be made with the same raw materials and the same process. Because the structure is the same, the same R-value or roughness is further obtained.

[0041] An embodiment of the shower tray according to the invention comprises a drain arranged within the peripheral edge.

[0042] In another embodiment of the shower tray according to the invention an upright flange is arranged along a part of the peripheral edge.

[0043] The upright flange connects to the wall tiles of a connecting wall. Because the transition to the wall is placed higher using the upright flange, the chance of problems at this transition is reduced.

[0044] Yet another embodiment of the shower tray according to the invention comprises a foam plate arranged under the tile.

[0045] A protruding membrane can here be arranged between the tile and foam plate.

[0046] Foam plates are for instance used to bring about noise reduction. By now arranging a protruding membrane between the tile and the foam plate a good connection can be obtained to the surrounding floor, on which tiles are preferably also arranged. The foam plate, tile and membrane are preferably attached to each other in the factory in order to ensure a good quality.

[0047] The technique of a shaped tile according to the

invention can for instance also be used to form a wash-basin.

[0048] These and other features of the invention are further elucidated with reference to the accompanying drawings.

Figure 1 shows a perspective view of a first embodiment of a combination according to the invention.

Figure 2 shows a perspective view of a second embodiment of a combination according to the invention.

Figure 3 shows a cross-sectional view of a third embodiment of a combination according to the invention.

Figure 4 shows a perspective view of a fourth embodiment of a combination according to the invention.

Figure 5 shows a perspective view of a fifth embodiment of a tile according to the invention.

[0049] Figure 1 shows a combination 1. Combination 1 has a tile 2, 3 and an elongate drain 4. The upper surface of the tile is divided into two zones 2, 3. First zone 2 has a slope directed toward elongate drain 4. Second zone 3 is horizontal and connects to a surrounding tile floor 5.

[0050] A transparent shower door 6 is placed just past the transition 7 between first zone 2 and second zone 3. Water running off shower door 6 will hereby fall onto first zone 2 and run toward drain 4.

[0051] Figure 2 shows a second embodiment 10 which can serve as shower tray according to the invention. This is a tile with a central opening 11 and four zones 12, 13, 14, 15 sloping toward central opening 11. A drain 16 is arranged in central opening 11. With this embodiment 10 it is possible to arrange a relatively small drain 16 in a relatively large tile 10 and to moreover ensure a smooth transition between zones 12, 13, 14, 15 and drain 16.

[0052] Figure 3 shows a cross-sectional view of a combination 20. The combination consists of a foam plate 21 with a single tile 22 thereon. Tile 22 is thin, but sufficient strength is obtained due to the support of foam plate 21.

[0053] Tile 22 is subdivided into three zones 23, 24, 25 and a transition zone 26. It will be apparent from this figure that the normal vector 27 of zone 24 forms an angle greater than 0° with normal vector 28 of zone 25.

[0054] An opening in which a drain 29 is arranged is further provided in tile 22. The siphon part 30 of drain 29 is partially embedded in foam plate 21 such that outlet pipe 31 can lie closely against the underside of foam plate 21. This limits the overall depth of the combination.

[0055] The combination 20 according to the invention can for instance be manufactured by providing a foam plate 21 provided with the desired slopes and with an opening for drain 29. A very thin but large tile 22 is then provided. Typical dimensions are 1 by 3 metres, with a thickness of less than 5 millimetres. This tile 22 is provided with an opening for drain 29 and subsequently adhered to the upper surface of foam plate 21. Because

the tile is relatively thin, tile 22 is flexible and can follow the slopes that have been arranged. Tile 22 is then pressed onto foam plate 21 and held fast until the adhesive has dried. Finally, a drain 29 can be arranged in plate 21.

[0056] By using a thin tile with a thickness of for instance less than 3 millimetres it is possible to use the tile as heat collector. The shower water falling onto the tile heats the tile. By now arranging a cold water supply conduit under the tile, the tile can preheat the cold water in the supply conduit, whereby less hot water is necessary and whereby an energy-saving is achieved.

[0057] Another option for a tile with a curvature is to arrange a recessed part in the tile, in which a doormat can for instance be arranged. The advantage is that the tile does not have to be cut.

[0058] Figure 4 shows a combination 40 according to the invention which can also serve as shower tray. The combination 40 has a shaped tile 41 and a foam plate 42 arranged thereunder. Tile 41 is provided with a circular, dish-like recess 43 with an opening in the centre in which a drain 44 is arranged.

[0059] An upright edge 45 connecting to the surrounding flat part of tile 41 is formed around circular recess 43.

[0060] Combination 40 thus forms a shower tray in which no joints are present. Tile 41 is formed integrally.

[0061] Figure 5 shows a shower tray according to the invention consisting of one tile 50. This tile 50 has a flat edge 51 which runs around an inclining central part 52. This central part 52 has a slope running toward an elongate drain 53. The height difference between edge 51 and the inclining central part 52 is spanned by edge 54.

[0062] The thus shaped tile 50 forms a shower tray, this shape also being referred to in the prior art as valley gutter. Tile 50 is here however also formed integrally, whereby the usual sealing problems in valley gutters do not occur in a tile 50 according to the invention.

[0063] In this embodiment flat edge 51 is provided on all four sides of the shower tray. It is also possible to omit the flat edge on one side if this side connects to a wall.

Claims

1. Method for manufacturing a ceramic tile, the method comprising the steps of:

- forming a tile from clay, wherein the upper surface of the tile comprises at least two zones, which two zones are each flat and wherein the normal vectors of the two surfaces form an angle greater than 0° with each other;
- subsequently firing the tile formed from clay.

2. Method as claimed in claim 1, wherein the tile formed from clay is fired at a temperature above 1000°C.

3. Ceramic tile manufactured according to the method

as claimed in claim 1 or 2, wherein the upper surface of the tile comprises at least two zones, which two zones are each flat and wherein the normal vectors of the two surfaces form an angle greater than 0° with each other.

4. Ceramic tile as claimed in claim 3, comprising an opening, wherein at least one of the two zones of the upper surface has a slope in the direction of the opening.

5. Ceramic tile as claimed in claim 4, wherein the opening is rectangular and wherein the upper surface comprises at least four zones, wherein each zone connects to a side of the rectangular opening.

6. Ceramic tile as claimed in any of the foregoing claims 3-5, wherein a transition zone is provided between the at least two zones, which transition zone has a suitable curvature.

7. Ceramic tile as claimed in any of the foregoing claims 3-6, wherein the ceramic tile is an unglazed tile.

8. Combination of a ceramic tile as claimed in any of the foregoing claims 3-7 and a drain, wherein at least one edge of the tile lies against the drain.

9. Combination as claimed in claim 8 and any of the claims 4-7, wherein the drain is arranged in the opening in the tile.

10. Shower tray comprising only one ceramic tile as claimed in any of the claims 3-7, wherein the peripheral edge of the tile lies in one plane.

11. Shower tray as claimed in claim 10, comprising a drain arranged within the peripheral edge.

12. Shower tray as claimed in claim 10 or 11, wherein an upright flange is arranged along a part of the peripheral edge.

13. Shower tray as claimed in any of the foregoing claims 10-12, comprising a foam plate arranged under the tile.

14. Shower tray as claimed in claim 13, wherein a protruding membrane is arranged between the tile and foam plate.

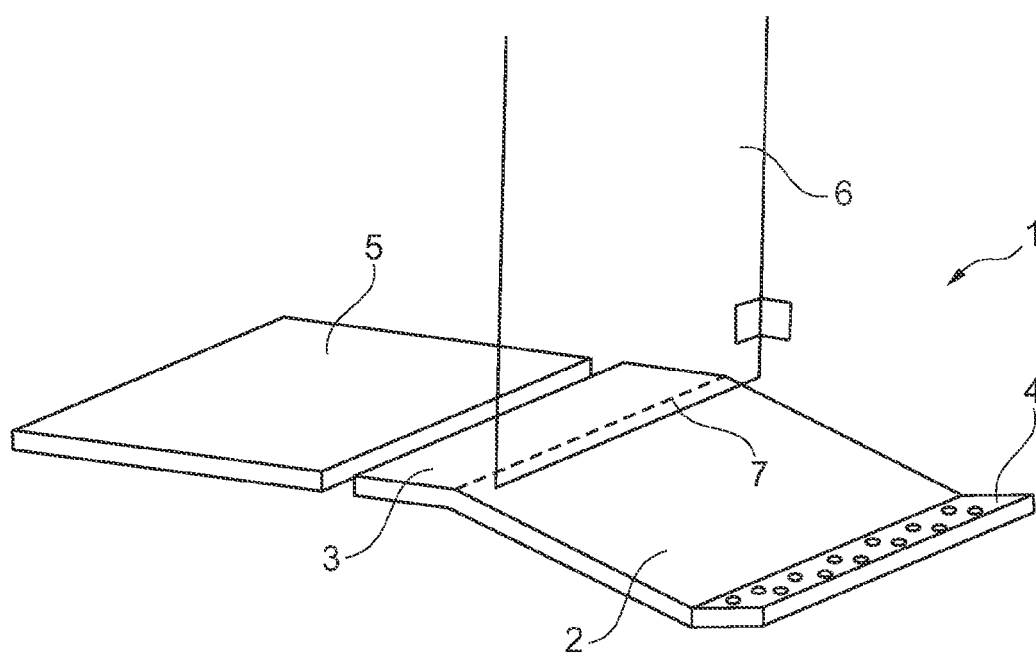


Fig. 1

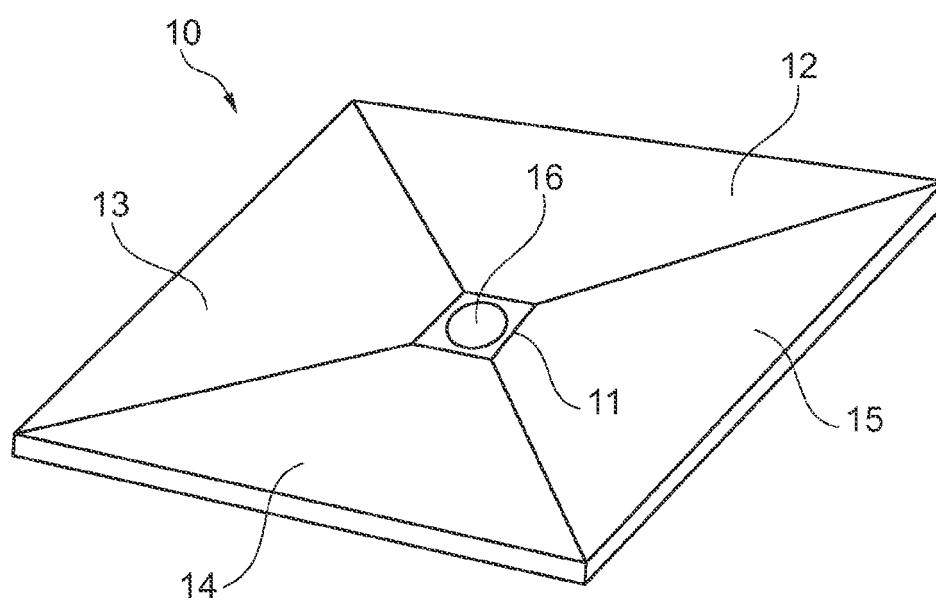


Fig. 2

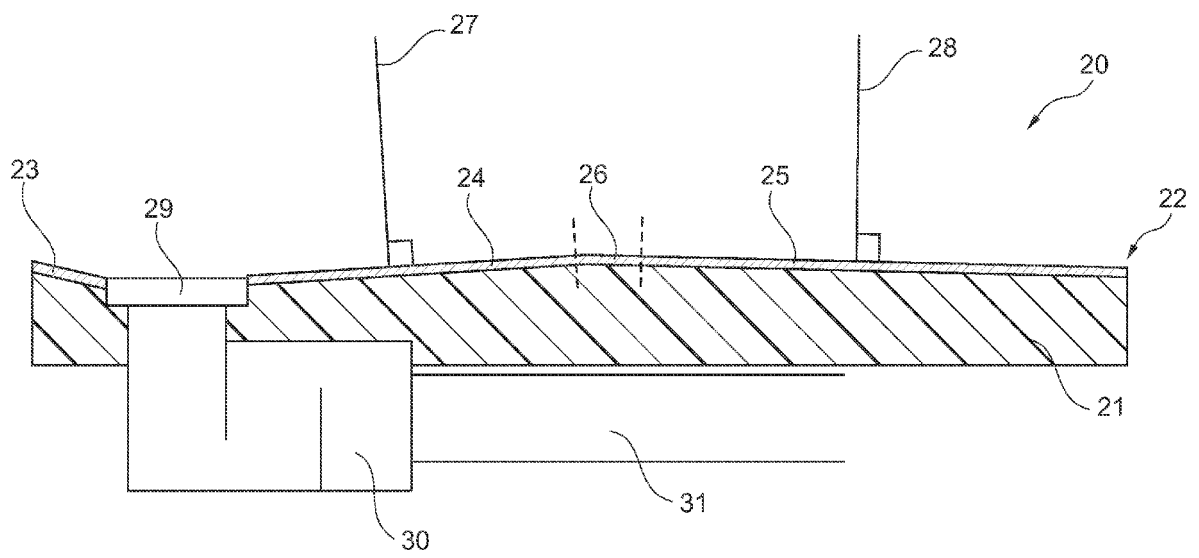


Fig. 3

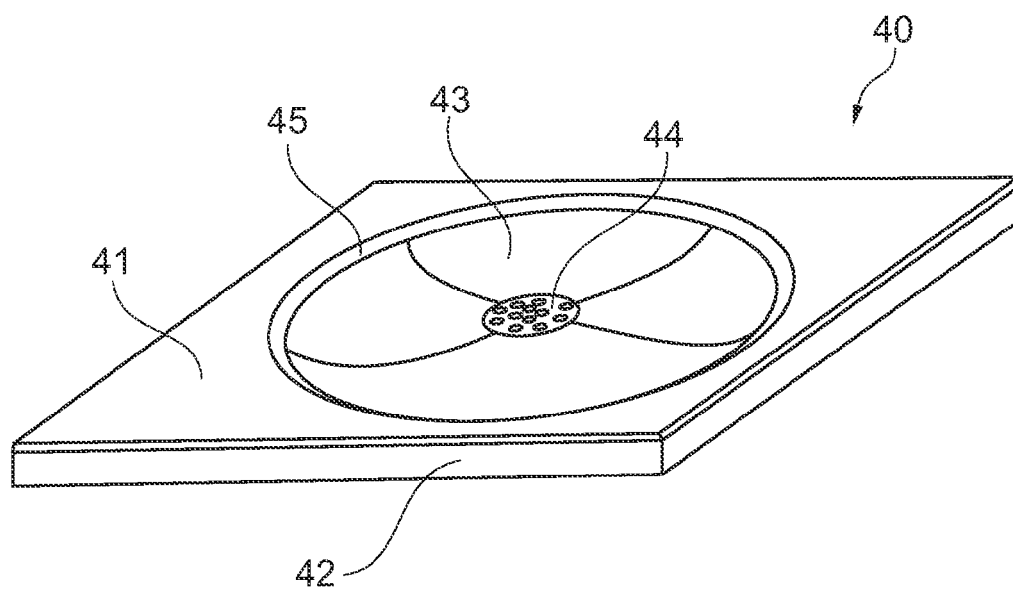


Fig. 4

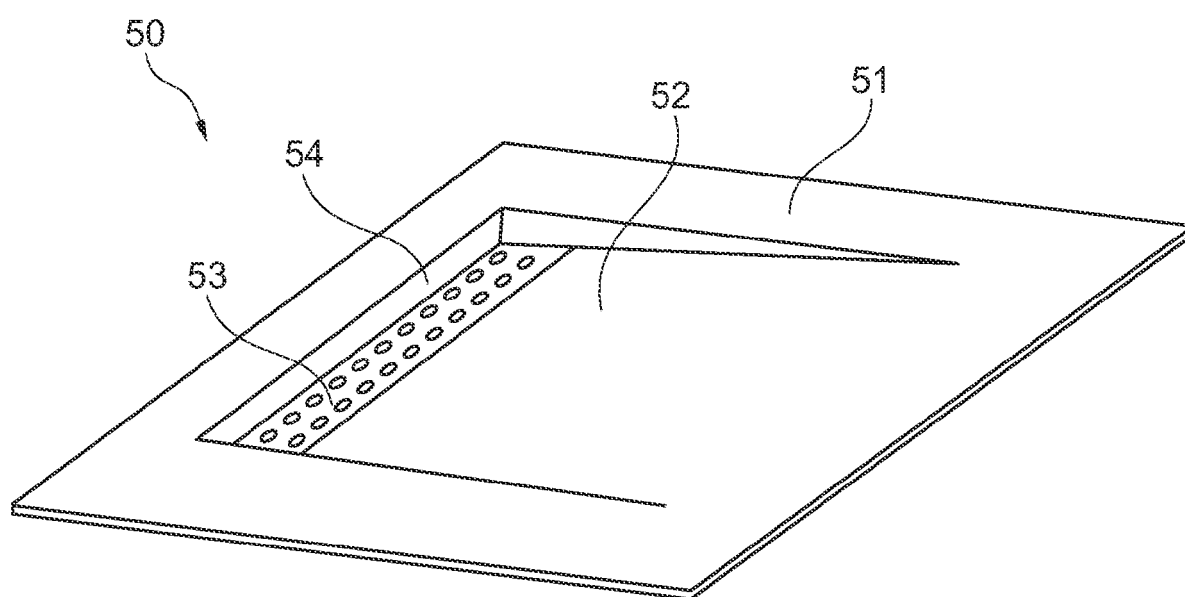


Fig. 5



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Application Number
EP 11 15 0278

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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