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(54) **AN ACOUSTIC PANEL, A SHEET ELEMENT AND A METHOD FOR ASSEMBLING AN ACOUSTIC PANEL**

(57) The present invention relates to an acoustic panel, a sheet element and a method for assembling an acoustic panel. The acoustic panel comprises a sheet element and a plurality of elongated acoustic elements, where the sheet element functioning as a backing plate comprises a plurality of grooves having a shape being

complementary with a shape of said elongated acoustic elements. The sheet element is flexible, such that when bending the sheet element, the width of the openings of the grooves increases, such that the elongated acoustic elements can be inserted into said grooves.

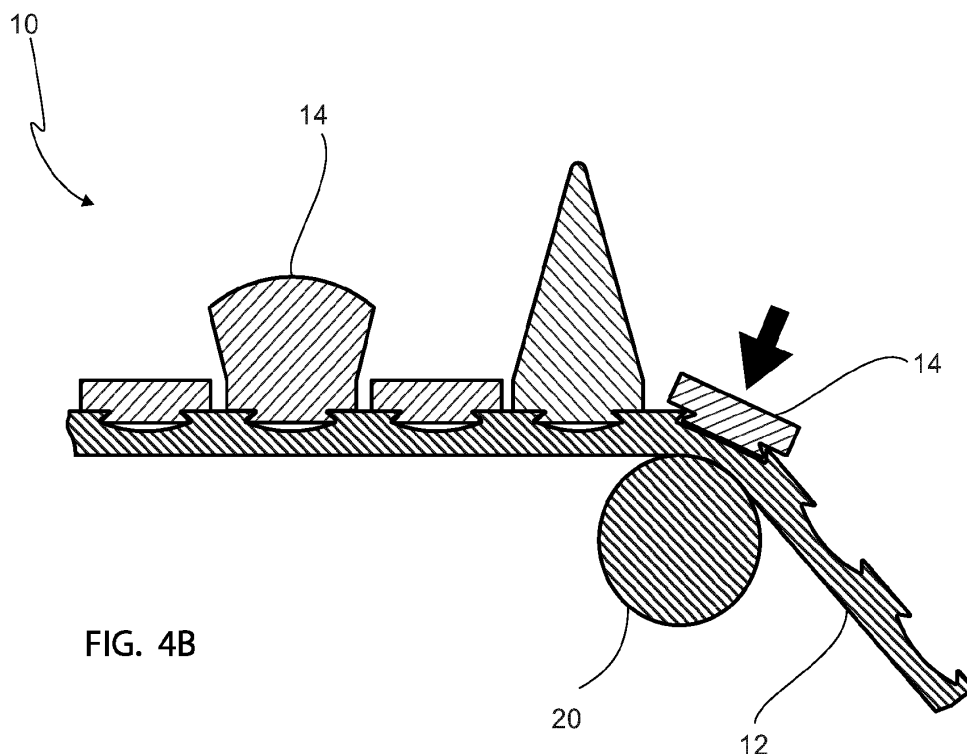


FIG. 4B

Description

TECHNICAL FIELD

[0001] The present invention relates to an acoustic panel, a sheet element and a method for assembling an acoustic panel.

BACKGROUND OF THE INVENTION

[0002] Within the technical field of acoustic panelling, it is known to manufacture acoustic panels from a backing panel of a hard material, such as wood and a number of elongated acoustic elements connected to the wooden panel. The elongated acoustic elements are typically connected to the hard wooden panel via fastening means, such as adhesive or nails/screws, in order to secure the acoustic elements to the backing panel.

[0003] However, one major factor in manufacturing acoustic panels is the process of connecting and fastening the elongated acoustic elements to the wooden backing plate. Such process is time-consuming and hereby costly in human labour, which influences the overall cost of the acoustic panels. Further, the wooden panels are stiff and heavy and hereby difficult and time consuming to install and due to the stiffness of the panels, the installation is difficult if the surface for installation is not substantially planar.

[0004] It is an object of the present invention to provide an acoustic panel, a sheet element and a method for assembling an acoustic panel, which overcomes the above-defined problems. It is thus an object to provide an acoustic panel, a sheet element and a method for assembling an acoustic panel, where the assembly of the panel is easy and fast, the panel being lightweight and easy to install, and which acoustic panel may adapt to the mounting surface, such as a curvature of the mounting surface.

[0005] The above object and advantages, together with numerous other objects and advantages, which will be evident from the following description of the present invention, are according to a first aspect of the present invention obtained by:

An acoustic panel for installation on a wall or ceiling surface, the acoustic panel comprising a sheet element having a first side for facing the wall or ceiling and a second side for facing away from the wall or ceiling, and a plurality of individual elongated acoustic elements connected to the sheet element on the second surface, the sheet element functioning as a backing plate and comprising a plurality of longitudinal grooves having a shape being complementary with a shape of the elongated acoustic elements, such that when the elongated acoustic elements are connected to the sheet element on the second side, the acoustic elements are locked to the sheet element in a direction

substantially perpendicular to the second side, the sheet element being flexible, such that when bending the sheet element around an axis facing the first side, the axis being parallel with the longitudinally grooves and facing the first side in the area of the sheet element behind the grooves respectively, the width of the openings of the grooves on the second side increases, such that the elongated acoustic elements can be inserted into the grooves in a direction substantially perpendicular to the second side, and where a bending of the sheet element back to an initial substantially planar shape decreases the width of the openings, whereby the elongated acoustic elements are locked to the sheet element in a direction perpendicular to the second side.

[0006] The acoustic panel comprises a sheet element serving as a backing panel, and which is suitable to be fastened to a surface of a building where the acoustic panel is to be installed. The panel thus comprises a first side for facing the building surface, such as a wall or ceiling surface, and a second side which comprises a number of longitudinal grooves, into which a number of individual elongated acoustic elements is installed.

[0007] The shape of a part of the grooves corresponds substantially to the shape of a part of the elongated acoustic elements, which part preferably comprises fastening/locking means, which engage corresponding fastening/locking means arranged in the longitudinally grooves, such that the elongated acoustic elements are connected to the sheet element.

[0008] The sheet element is arranged flexibly, and preferably arranged from a flexible material such as polyester or a similar material. By the term flexible is meant that the sheet element may be bent around an axis below one of the grooves and in the direction thereof, to such a degree that the openings of the grooves on the second side of the sheet element increase without the integrity of the sheet element being compromised.

[0009] When comparing the flexible sheet to e.g., a wooden backing panel, the wooden panel is not flexible to such an extent that the wooden panel may be bent to the same extent without the result of cracking.

[0010] The sheet element is further arranged elastic, such that after the sheet element has been bent around a longitudinal axis parallel and below one elongated groove, and after an elongated acoustic element has been inserted into the groove, the sheet element is able to resume its original planar shape without external forces, whereby the width of the opening of the longitudinal groove decreases and the elongated acoustic element interconnects therewith.

[0011] In order to insert the individual acoustic elements, preferably one at a time, the sheet is bent around an axis being parallel with the longitudinal direction of the grooves, the axis being arranged towards the first side of the sheet, at a location parallel to and "below" the groove, such that when the sheet is being bent, the

groove opens up. When the groove is open, an acoustic element is inserted into the groove in a direction substantial perpendicular to the second surface, and in a direction substantial toward the axis which the sheet is bent around.

[0012] The elongated acoustic elements may be arranged from hard material such as wood, aluminum, etc., or a combination thereof.

[0013] Alternatively, the elongated acoustic elements may be arranged from a foamed material, such as polyurethane foam.

[0014] In a further alternative embodiment, the elongated acoustic elements may be arranged from both a hard material and a foamed material. In such an embodiment, the parts of the elongated acoustic elements, which connects with the sheet elements, are preferably arranged from the hard material, and the remaining part of the elongated acoustic elements, which contributes to the acoustic properties of the acoustic panel, is arranged from the foamed material.

[0015] According to a further embodiment of the first aspect of the invention, the walls of the grooves comprise first locking means arranged as one or more projections and/or recesses for cooperating with one or more second locking means formed as projections and/or recesses arranged on the elongated acoustic elements.

[0016] In order to interconnect the sheet element and elongated acoustic elements, the groove is arranged with projections and/or recesses which, when the elongated acoustic elements are arranged in the grooves, cooperate with corresponding projections or recesses.

[0017] According to a further embodiment of the first aspect of the invention, the grooves comprise a bottom surface having a downwards sloping surface, such that when said sheet element being bent around an axis below a specific elongated groove, said bottom surface of said groove assumes a second shape having a less sloping surface.

[0018] The sheet element, which is arranged flexibly, such that it may be bent in order to enlarge the opening of the elongated grooves, is arranged with grooves having downwards sloping bottoms. A groove having a substantially plane bottom surface and which is bent such that the opening of the groove increases, will in the bent configuration have a bottom surface assuming a substantially convex shape, which results in that the bottom surface of the groove projects towards the opening of the groove, i.e., the distance from the bottom of the groove to the opening of the groove decreases, whereby the elongated acoustic element is prevented from being correctly inserted into the groove. Therefore, arranging the grooves with a bottom surface, which has a downwards sloping shape, has the effect that even though the distance from the bottom of the groove to the opening of the groove decreases when the sheet element is being bent, the distance is still sufficient for the elongated acoustic elements to be inserted in the grooves.

[0019] According to a further embodiment of the first

aspect of the invention, the downwards sloping surface has a concave shape or a V shape, the concave shape having a first radius of curvature, such that when the sheet element being bent around an axis below a specific elongated groove, the bottom surface of the groove assumes a second shape different from the concave shape with the first radius of curvature, said V-shape defining a first angle, such that when the sheet element being bent around an axis below a specific elongated groove, the V-shaped bottom surface of the groove assumes a second shape different from the first V-shape.

[0020] The downwards sloping bottom surface of the grooves preferably has a concave shape or V-shape, such that when the sheet element is bent, the opening of the grooves increases and the concave or V-shaped bottom surface assumes a shape which has a less downwards sloping surface, e.g., substantially planar. The elongated acoustic elements are thus inserted into the grooves until the lower surface of the elongated acoustic elements abuts the e.g., substantially planar "bent" bottom surface. The bent sheet element is brought back to its original substantially planar configuration, and the elongated acoustic elements are locked in the grooves.

[0021] According to a further embodiment of the first aspect of the invention, the second shaping has a concave shape with a larger radius of curvature compared to the first radius of curvature.

[0022] The concave bottom surface of the elongated grooves may be arranged such that the bottom surface of the groove, when the sheet element is bent, is concave but with a larger radius of curvature compared to the non-bent configuration. Hereby, it is possible to arrange e.g., wires or smaller conduits running within the channels before inserting the elongated acoustic elements.

[0023] According to a further embodiment of the first aspect of the invention, the distance/gap between opposing projections and/or recesses of the grooves, respectively, and the thickness of the elongated acoustic elements at a level through the cooperating projections and/or recesses, is arranged such that when the sheet element has a substantially planar shape and the elongated acoustic elements are locked in the grooves, the projections and/or recesses of the grooves exert a force on the cooperating projections and/or recesses of the elongated acoustic elements.

[0024] By arranging the distance/gap between opposing projections and/or recesses of the grooves slightly smaller than the thickness of the elongated acoustic elements at a level through the cooperating projections and/or recesses, has the technical effect, that the opposing projections and/or recesses in the grooves bias against the elongated acoustic elements, which hereby are held tightly in place.

[0025] According to a further embodiment of the first aspect of the invention, the grooves comprise at least one second projection and/or recess cooperating with a second projection and/or recess on the elongated acoustic elements for preventing movement of the elongated

acoustic elements in relation to the sheet element in a direction parallel with the longitudinal direction of the elongated acoustic elements.

[0026] In order to prevent the elongated acoustic elements to slide within the grooves, e.g., during installation, the grooves and the elongated acoustic elements are arranged with at least one cooperating second projection and/or recess, respectively.

[0027] According to a further embodiment of the first aspect of the invention, the sheet element comprises a polymer, such as a polyester, preferably a polyethylene.

[0028] The sheet element comprises a polyester material, such as polyethylene. The part of the sheet element which constitutes the sheet material of the bottom of the grooves comprises the polyester material. Arranging the sheet material of the bottom of the grooves from a polyester results in the sufficient flexibility and elasticity of the sheet element in the area of the grooves.

[0029] According to a further embodiment of the first aspect of the invention, the majority of the sheet element is made from a polymer, such as a polyester, preferably a polyethylene

[0030] Preferably, not only the sheet material defining the bottom of the grooves are arranged from a polyester material, but the major part and even the main part, preferably substantially the entire sheet element, are arranged from polyester.

[0031] Arranging the major part of the sheet element from polyester provides the necessary flexibility and elasticity, but also has the technical effect that the sheet element, and hereby the acoustic panel, can easily be adapted to the mounting surface, such as a mounting surface which is not planar.

[0032] According to a second aspect of the present invention, the above objects and advantages are obtained by:

A sheet element for use as a backing plate in an acoustic panel for installation on a ceiling or wall surface, the sheet element having a first side for facing the wall or ceiling and a second side for facing away from the wall or ceiling,

the sheet element comprising a plurality of longitudinal grooves on the second side and having a shape suitable for being complementary with a shape of a plurality of elongated acoustic elements, such that when the elongated acoustic elements are connected to the sheet element on the second side, the acoustic elements are locked to the sheet element in a direction substantially perpendicular to the second side,

the sheet element being flexible, such that when bending the sheet element around a axis facing the first side, the axis being parallel with the longitudinally grooves and facing the first side in the area of the sheet element below the grooves respectively, the width of the openings of the grooves on the second side increases, such that the elongated acoustic

elements can be inserted into the grooves in a direction substantially perpendicular to the second side and where a bending of the sheet element back to an initial substantially planar shape decreases the width of the openings, whereby the elongated acoustic elements are locked to the sheet element in a direction perpendicular to the second side.

[0033] The above defined sheet element has the technical effect that it may be used as a backing panel in an acoustic panel as defined according to the first embodiment of the invention.

[0034] According to a further embodiment of the second aspect of the invention, the grooves comprise a bottom surface having a downwards sloping surface, such as a concave shape or V-shape, such that when said sheet element being bent around an axis below a specific elongated groove, said bottom surface of said groove assumes a second shape having a less slopping surface.

[0035] As disclosed earlier, the downwards sloping bottom surface of the grooves preferably has a concave shape or V-shape, such the when the sheet element is bent, the opening of the grooves increases and the concave or V-shaped bottom surface assumes a shape, which has a less down sloping surface, e.g., substantially planar. The elongated acoustic elements are thus inserted into the grooves until the lower surface of the elongated acoustic elements abuts the e.g., substantially planar "bent" bottom surface. The bent sheet element is brought back to its original substantially planar configuration, and the elongated acoustic elements are locked in the grooves.

[0036] According to a third aspect of the present invention, the above objects and advantages are obtained by:

A method for assembling an acoustic panel according to any of the embodiments of the first aspect of the invention, the method comprising the following steps:

- arranging a sheet element having a first side for facing the wall or ceiling and a second side for facing away from the wall or ceiling, and having a number of longitudinally grooves on the second side,
- arranging a number of elongated acoustic elements, the grooves having a shape being complementary with a shape of the elongated acoustic elements, such that when the elongated acoustic elements are connected to the sheet element on the second side, the acoustic elements are locked to the sheet element in a direction substantially perpendicular to the second side,
- bending the sheet element around an axis facing the first side, the axis being parallel with the longitudinal grooves and facing the first side in the area of the sheet element behind a groove, such

that the width of the opening of the groove on the second side increases,

- arranging an elongated acoustic panel in the groove in a direction substantially perpendicular to the second surface,
- bending of the sheet element back to an initial substantially planar shape, decreasing the width of the openings, whereby the elongated acoustic elements are locked to the sheet element in a direction perpendicular to the second side.

[0037] The above defined method provides the possibility to manufacture an acoustic panel in an easy and fast manner with minimal manual labor.

[0038] The sheet element may be arranged according to any of the embodiments of the first aspect of the invention.

[0039] The elongated acoustic elements are preferably arranged from a hard material, such as wood, aluminum, etc., or a combination thereof.

[0040] The elongated acoustic elements may alternatively be arranged from a foamed material, such as polyurethane foam. In an even further alternative embodiment, the elongated acoustic elements be arranged from both a hard material and a foamed material. In such embodiment, the parts of the elongated acoustic elements which connects with the sheet elements, are preferably arranged from the hard material, and the remaining part of the elongated acoustic elements, which contributes to the acoustic properties of the acoustic panel are arranged from the foamed material.

[0041] The flexible sheet element is bent around an axis below the panel and substantially below at groove, the axis being parallel with the longitudinal direction of the groove. Any suitable equipment may be used for bending the sheet, and preferably for automatically bending the sheet. One example of such equipment may be a roller, where the sheet element is conveyed over the roller, with the longitudinal direction of the grooves being substantial parallel with the rotational axis of the roller. The part of the sheet which passes the roller is bent by the roller, such that the sheet is bent in the region of contact with the roller.

[0042] When a part of the sheet having a groove passes over the roller, that part of the flexible sheet is bent by the roller, whereby the opening of the groove increases.

[0043] When the opening of the grooves has sufficiently increased, an elongated acoustic element is inserted into the "opened" groove. Thereafter, the bended part of the flexible sheet is brought back to its original configuration, whereby the opening of the groove decreases and the elongated acoustic element interconnects with the groove. The process continues for the remaining grooves of the sheet element.

[0044] In another embodiment covered by the third aspect of the present invention, the sheet element is bent over the whole surface of the sheet, such that all grooves

"open up". In such a situation, the sheet is not necessarily "rolled" over a roller, where the elongated acoustic elements are inserted one at the time but may be inserted into the grooves at the same time.

Fig. 1A is perspective view of an acoustic panel.

Fig. 1B is a cross-sectional view of a part of two interconnected acoustic panels.

Fig. 2 is a perspective view of a sheet element having concave-shaped grooves.

Fig. 3 is a perspective view of a sheet element having V-shaped grooves.

Fig. 4A is a first cross-sectional view of a panel assembly.

Fig. 4B is a second cross-sectional view of a panel assembly.

[0045] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments of the invention are shown. The invention may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like reference numerals refer to like elements throughout. Like elements will thus not be described in detail with respect to the description of each figure.

[0046] Fig. 1A is perspective view of an acoustic panel 10. The acoustic panel 10 comprises a flexible sheet 12 functioning as a backing plate and is illustrated with a number of acoustic elements 14.

[0047] The sheet element 12 is arranged flexibly and is preferably flexibly elastic, such that the sheet element 12 may be bent and automatically resume its original configuration once the bending force is terminated. The sheet element 12 is thus preferably arranged from a flexible material such as polyester or similar material.

[0048] The elongated acoustic elements 14 may have any desired shape, which provides the desired acoustic and visual properties and is preferably arranged from a hard material such as wood, aluminum, etc., or a combination thereof.

[0049] The elongated acoustic elements 14 may in an alternative be arranged from a foamed material, such as polyurethane foam or in an even further alternative embodiment, be arranged from both a hard material and a foamed material. Arranging the elongated acoustic elements 14 from a foam material increases the acoustic properties and arranging the part of the elongated acoustic elements 14, which interconnects with the grooves 16 from a hard material, such as wood, ensures that the

elongated acoustic elements 14 and the sheet element 12 are properly interconnected.

[0050] The elongated acoustic elements 14 are shown having two different shapes, it is however evident that the claimed invention is not limited to such shapes, and the elongated acoustic elements 14 may thus have any desired shape. The elongated acoustic elements 14 may be arranged being massive, such as made entirely from a wooden material or may be arranged being hollow, such as hollow aluminum profiles.

[0051] Fig. 1B is a cross-sectional view of a part of two interconnected acoustic panels 10. The acoustic panels 10 shown in fig. 1B are similar to the one shown in figure 1A with the exception of having a number of square elongated acoustic elements 14.

[0052] The figure shows a junction between two substantially similar acoustic elements 10. The edge of the sheet element 12 is shown with an angle, such that one side of an acoustic panel 10 is supported and kept in place by the side of the abutting acoustic panels. Hereby, fewer fastening means, such as screws, may be used when installing the acoustic panels 10. The angled side edge has the further technical advantage that the junction between the two acoustic panels 10 is visually hidden by an elongated acoustic element 14 when installed.

[0053] Fig. 2 is a perspective view of a sheet element 12 having concave-shaped grooves 16. The grooves 16 have a downwards sloping bottom surface which are concave-shaped, such that when the sheet element 12 is bent, the opening of the grooves 16 increases and the concave-shaped bottom surface assumes a shape, which has a less downwards sloping surface, e.g., substantially planar or a concave shape having a larger radius of curvature. A number of elongated acoustic elements 14 may thus be inserted into the grooves 16 until the lower surface of the elongated acoustic elements 14 abuts the e.g., substantially planar "bent" bottom surface. The bent sheet element 12 may thereafter be brought back to its original substantially planar configuration, and the elongated acoustic elements 14 are locked in the grooves 16.

[0054] Fig. 3 is a perspective view of a sheet element 12 having V-shaped grooves 16'. The grooves 16' shown in figure 3 have the same technical function as disclosed in relation to figure 2, but illustrates an alternative configuration than an concave-shaped bottom surface.

[0055] Fig. 4A is a first cross-sectional view of a panel assembly. The sheet element 12 corresponds to the sheet element shown in figure 2. The figure shows bending means 20, illustrated as a roller, which is used for bending the sheet 12. The sheet element 12 is conveyed over the roller 20 with the longitudinal direction of the grooves 16 being substantial parallel with the rotational axis of the roller 16. The part of the sheet element 12 which passes the roller 20 is then bent by the roller 20, such that the sheet 12 is bent in the region of contact with the roller 20. The sheet element 12 is conveyed over the roller towards the left side, where a number of elongated acoustic elements 14 has been installed, and a new elongated acoustic element 14 is brought in position for installation in the bended region of the sheet element 12.

gated acoustic elements 14 has been installed, and a new elongated acoustic element 14 is brought in position for installation in the bended region of the sheet element 12.

[0056] The shape of a part the grooves 16 substantially corresponds to the shape of a part of the elongated acoustic elements 14. The grooves are shown with first locking means 22 means, which engage corresponding second locking means 24 arranged on the elongated acoustic elements 14. It is hereby ensured that once the sheet element 14 is bent back to its original substantially planar shape, the elongated acoustic elements 14 are held in place by the first and second locking means.

[0057] Fig. 4B is a second cross-sectional view of a panel assembly. The position of the sheet element 12 shown in figure 4B corresponds to the position of the sheet element 12 shown in fig. 4A. The opening of the groove 16 in the bended region of the sheet element 12 has increased sufficiently, and the elongated acoustic element 14 is inserted into the "opened" groove 16. Thereafter, the bended part of the flexible sheet 12 is conveyed further over the roller 20 and the bended region is brought back to its original configuration, whereby the opening of the groove 16 decreases and the elongated acoustic element 14 interconnects with the groove 16. The process continues for the remaining grooves of the sheet element.

List of reference numbers

[0058]

10	Acoustic panel
12	Sheet element
14	Elongated acoustic element
16, 16'	Groove
18	Bend groove
20	Bending means
22	First locking means
24	Second locking means

Claims

1. An acoustic panel (10) for installation on a wall or ceiling surface, said acoustic panel (10) comprising a sheet (12) element having a first side for facing said wall or ceiling and a second side for facing away from said wall or ceiling, and a plurality of individual elongated acoustic elements (14) connected to said sheet element (12) on said second surface,

said sheet element (12) functioning as a backing plate and comprising a plurality of longitudinal grooves (16, 16') having a shape being complementary with a shape of said elongated acoustic elements (14), such that when said elongated acoustic elements (14) are connected to said

- sheet element (12) on said second side, said acoustic elements are locked to said sheet (12) element in a direction substantially perpendicular to said second side, said sheet element (12) being flexible, such that when bending said sheet element (12) around a axis facing said first side, said axis being parallel with said longitudinally grooves (16,16') and facing said first side in the area of the sheet element (12) behind the grooves respectively, the width of the openings of said grooves (16,16') on said second side increases, such that said elongated acoustic elements (14) can be inserted into said grooves (16,16') in a direction substantially perpendicular to said second side and where a bending of said sheet element (12) back to an initial substantially planar shape decreases said width of said openings, whereby said elongated acoustic elements (14) are locked to said sheet element (12) in a direction perpendicular to said second side.
2. An acoustic panel (10) according to claim 1, wherein the walls of said grooves (16,16') comprise first locking means arranged as one or more projections and/or recesses for cooperating with one or more second locking means formed as projections and/or recesses arranged on said elongated acoustic elements (14).
 3. An acoustic panel (10) according to any of claims 1 and 2, wherein said grooves (16,16') comprise a bottom surface having a downwards sloping surface, such that when said sheet element (12) being bent around an axis below a specific elongated groove (16,16'), said bottom surface of said groove (16,16') assumes a second shape having a less slopping surface.
 4. An acoustic panel according to claim 3, said downwards sloping surface having a concave shape or a V-shape, said concave shape having a first radius of curvature, such that when said sheet element (12) being bent around an axis below a specific elongated groove (16), the bottom surface of the groove (16) assumes a second shape different from said concave shape with said first radius of curvature, said V-shape defining a first angle, such that when said sheet element (12) being bent around an axis below a specific elongated groove, said V-shaped bottom surface of the groove (16') assumes a second shape different from said first V-shape.
 5. An acoustic panel (10) according to any of claim 1-4, wherein said second shaping has a concave shape with a larger radius of curvature compared to said first radius of curvature.
 6. An acoustic panel (10) according to any of claims 2-5, wherein the distance/gap between opposing projections and/or recesses of said grooves (16,16') respectively, and the thickness of said elongated acoustic elements (14) at a level through said cooperating projections and/or recesses, is arranged such that when said sheet element (12) has a substantially planer shape and said elongated acoustic elements (14) being locked in said grooves (16,16'), said projections and/or recesses of said grooves (16,16') exert a force on said cooperating projections and/or recesses of said elongated acoustic elements (14).
 7. An acoustic panel (10) according to any of the previous claims, wherein said grooves (16,16') comprise at least one second projection and/or recess cooperating with a second projection and/or recess on said elongated acoustic elements (14) for preventing movement of said elongated acoustic elements (14) in relation to said sheet element (12) in a direction parallel with the longitudinal direction of said elongated acoustic elements (14).
 8. An acoustic panel (10) according to any of the previous claims, wherein said sheet element (12) comprises a polymer, such as a polyester, preferably a polyethylene.
 9. An acoustic panel (10) according to claim 8, wherein the majority of the sheet element (12) is made from a polymer, such as a polyester, preferably a polyethylene.
 10. A sheet element (12) for use as a backing plate in an acoustic panel (10) for installation on a ceiling or wall surface, said sheet element (12) having a first side for facing said wall or ceiling and a second side for facing away from said wall or ceiling, said sheet element (12) comprising a plurality of longitudinal grooves (16,16') on said second side and having a shape suitable for being complementary with a shape of a plurality of elongated acoustic elements (14), such that when said elongated acoustic elements (14) are connected to said sheet element (12) on said second side, said acoustic elements are locked to said sheet element (12) in a direction substantially perpendicular to said second side, said sheet element (12) being flexible, such that when bending said sheet element (12) around a axis facing said first side, said axis being parallel with said longitudinally grooves (16,16') and facing said first side in the area of the sheet element (12) below the grooves (16,16') respectively, the width of the openings of said grooves (16,16') on said second side increases, such that said elongated acoustic elements (14) can be inserted into said grooves (16,16') in a direction substantially perpendicular to

said second side and where a bending of said sheet element (12) back to an initial substantially planar shape decreases said width of said openings, whereby said elongated acoustic elements (14) are locked to said sheet element (12) in a direction perpendicular to said second side. 5

11. A sheet element (12) according to claim 10, wherein said grooves (16,16') comprise a bottom surface having a concave shape with a radius of curvature, such that when said sheet element (12) being bent around an axis below a specific elongated groove (16,16'), said bottom surface of said groove (16,16') assumes a second shape different from said concave shape with said radius of curvature. 10 15

12. A method for assembling an acoustic panel (10) according to any of claims 1-9, said method comprising the following steps: 20

- arranging a sheet element (12) having a first side for facing said wall or ceiling and a second side for facing away from said wall or ceiling, and having a number of longitudinal grooves (16,16') on said second side, 25
- arranging a number of elongated acoustic elements (14), said grooves (16,16') having a shape being complementary with a shape of said elongated acoustic elements (14), such that when said elongated acoustic elements (14) are connected to said sheet element (12) on said second side, said acoustic elements are locked to said sheet element (12) in a direction substantially perpendicular to said second side, 30 35
- bending said sheet element (12) around an axis facing said first side, said axis being parallel with said longitudinally grooves (16,16') and facing said first side in the area of the sheet element (12) behind a groove (16,16'), such that the width of the opening of said groove on said second side increases, 40
- arranging an elongated acoustic panel (10) in said groove (16,16') in a direction substantially perpendicular to said second surface, 45
- bending of said sheet element (12) back to an initial substantially planar shape decreasing said width of said openings, whereby said elongated acoustic elements (14) are locked to said sheet element (12) in a direction perpendicular to said second side. 50

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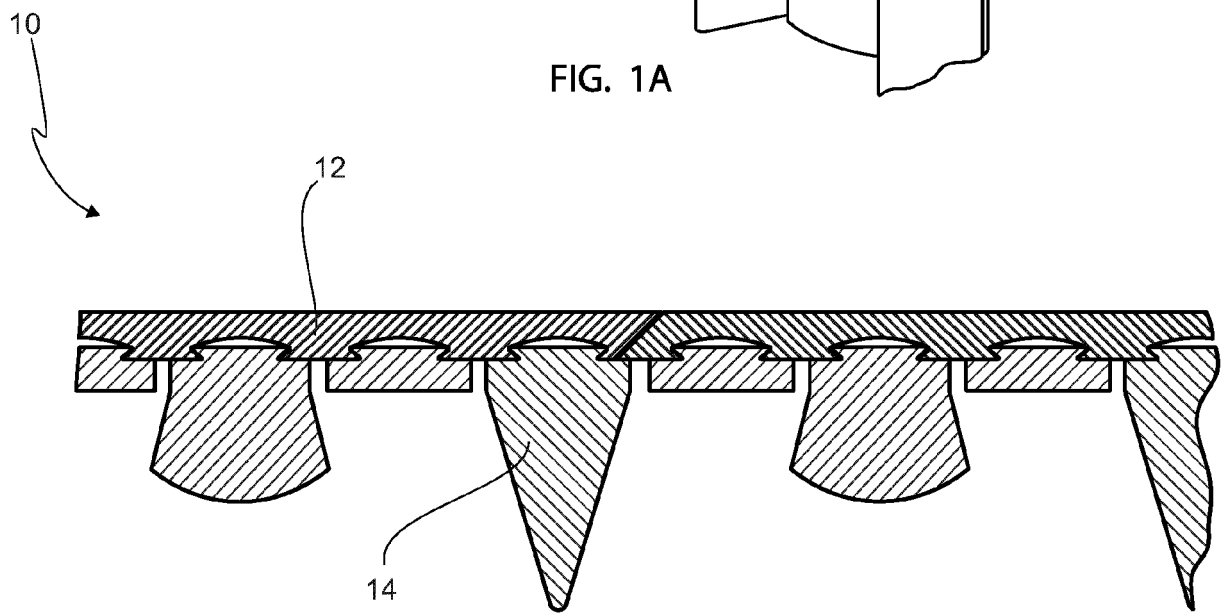
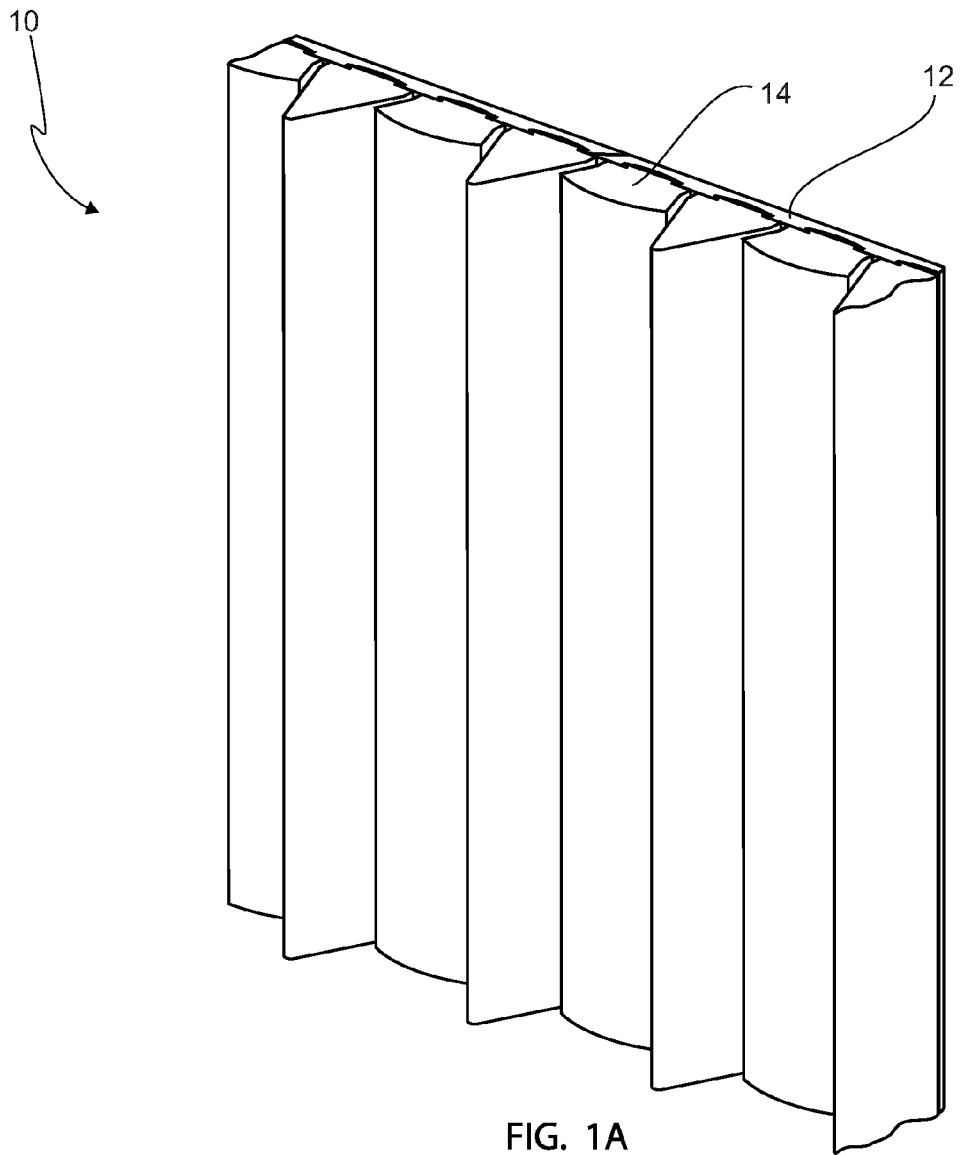


FIG. 1B

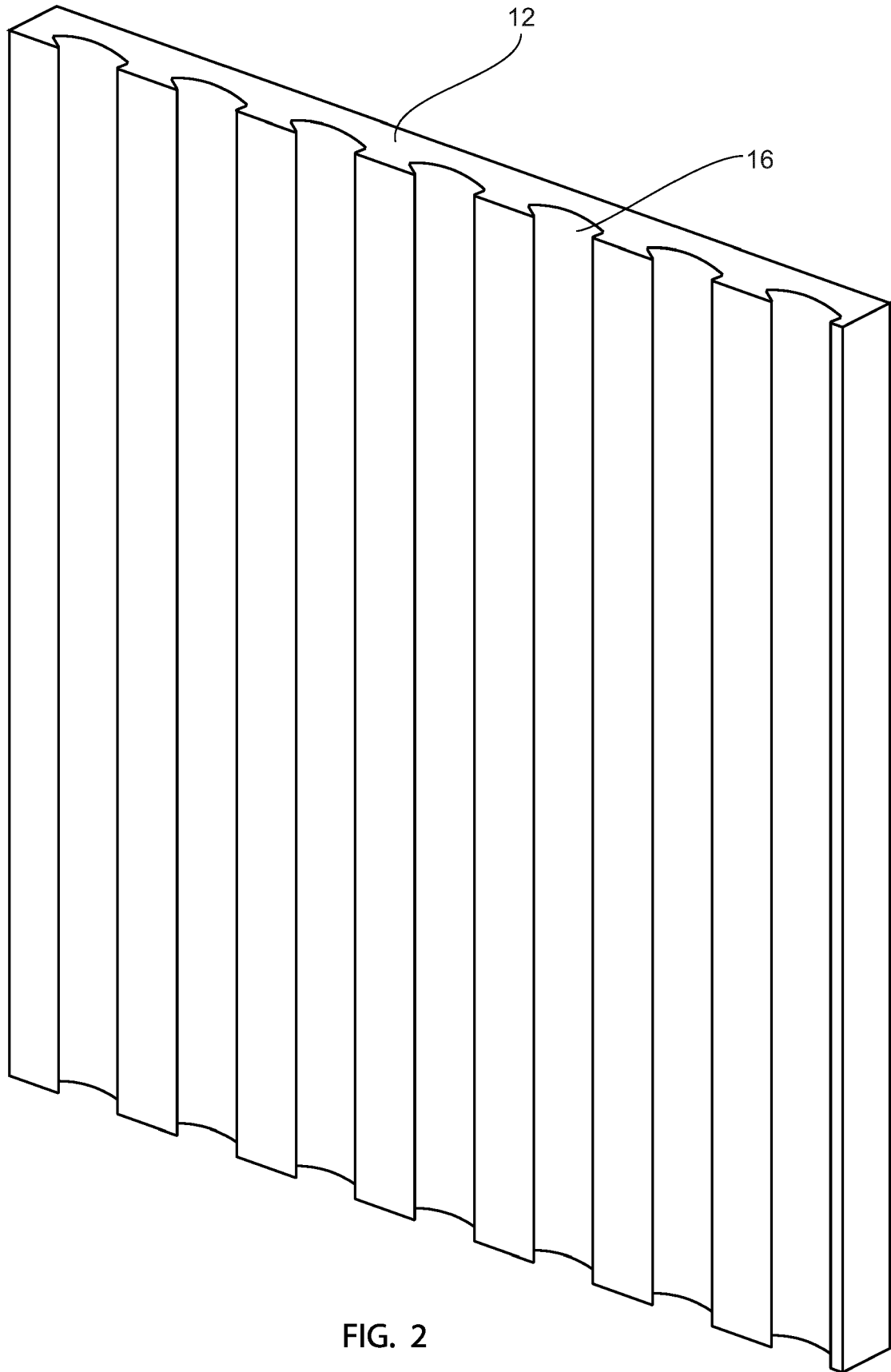


FIG. 2

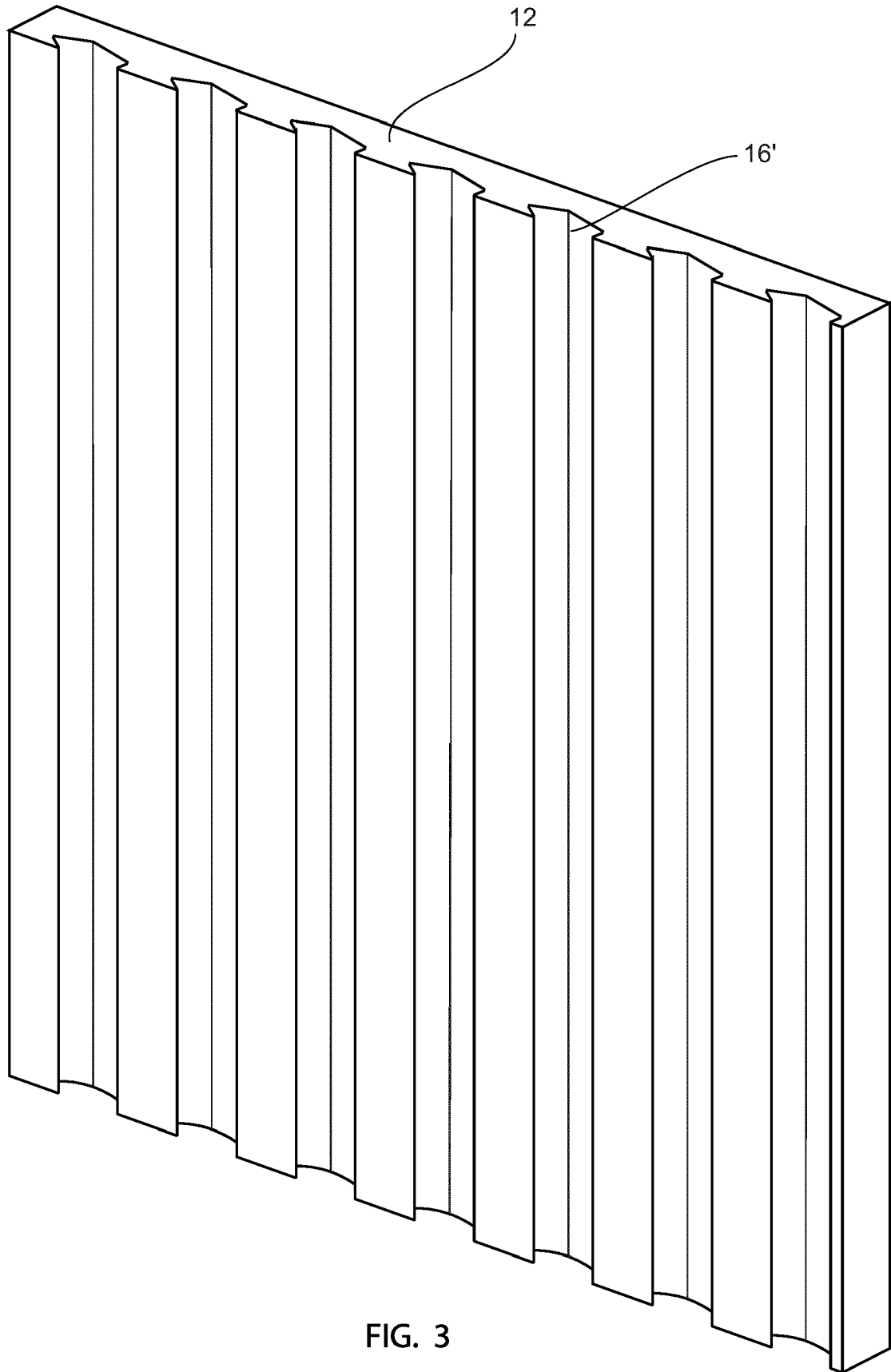
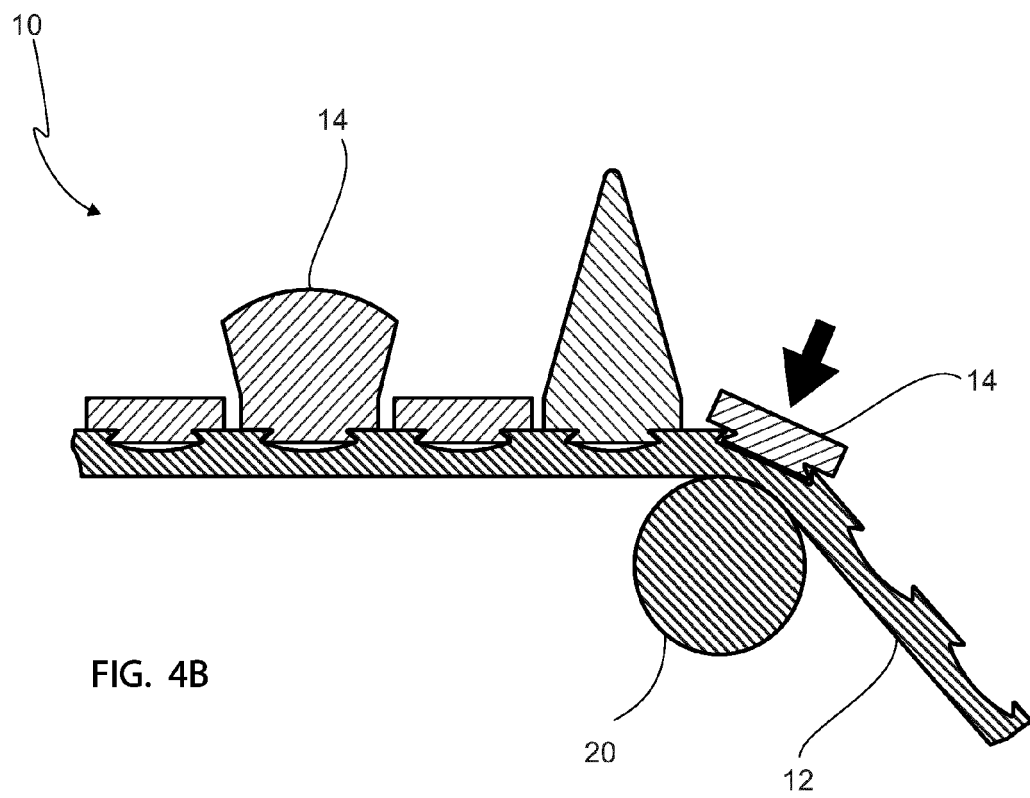
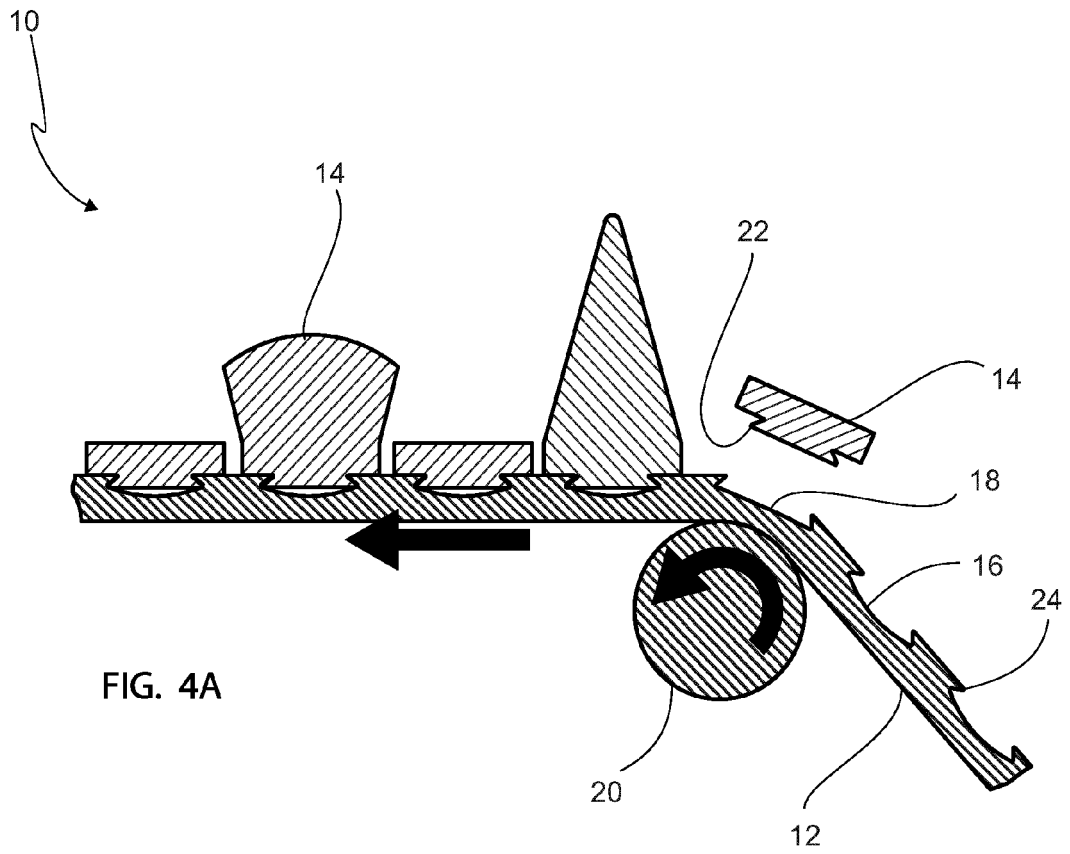


FIG. 3





EUROPEAN SEARCH REPORT

Application Number

EP 23 16 9664

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 3 138 976 A1 (DESIGN BY GOSA APS [DK]) 8 March 2017 (2017-03-08)	1-11	INV. E04B1/84
A	* abstract * * paragraph [0023] - paragraph [0031] * * paragraph [0048] - paragraph [0051]; figures 1, 2A, 2B, 3A, 3B *	12	
X	US 2 386 502 A (PEIK PAUL G) 9 October 1945 (1945-10-09)	10, 11	
A	* the whole document *	12	TECHNICAL FIELDS SEARCHED (IPC)
X	US 2 573 482 A (PEIK PAUL G) 30 October 1951 (1951-10-30)	10, 11	
			E04B

The present search report has been drawn up for all claims

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EPO FORM 1503 03.82 (P04C01)

Place of search

The Hague

Date of completion of the search

7 September 2023

Examiner

Galanti, Flavio

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

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 23 16 9664

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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07-09-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	EP 3138976	A1	08-03-2017	NONE

15	US 2386502	A	09-10-1945	NONE

	US 2573482	A	30-10-1951	NONE

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82