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NAIL-PROOF ROOF UNDERLAY OR ROOF LINING SHEET FOR AN INCLINED ROOF

TECHNICAL FIELD

The present invention relates to a plastics-based roof underlay sheet or roof lining sheet for an inclined roof comprising a surface that is impervious to water for draining water, to an underlay or subroof of an inclined roof and to a method for creating an underlay or subroof of an inclined roof.

BACKGROUND

Roof underlay sheets and roof lining sheets of various qualities and materials are known from the prior art. In general, a roof underlay sheet or roof lining sheet is understood to mean a sheet that is used as an underlayer below a roof covering (e.g. roof tiles) of an inclined roof, in order to drain off any water that strikes or penetrates the roof before as well as after the roofing has been applied. In the context of the present invention, a roof underlay sheet is also understood to mean a sheet that is laid on a substrate, e.g. made of wood or on thermal insulation material, whereas a roof lining sheet is tensioned or is laid with an intentional sag. The present invention relates to both systems.

In many cases, microperforated, microporous and monolithic sheets that are diffusion-open or not diffusion-open, single-layered or multi-layered are used for roof underlay and roof lining sheets. In general, known roof underlay and roof lining sheets today are smooth, roughened or structured,

wherein known structures are in some cases technically required by the manufacturing process, in other cases are intended to provide increased slip resistance for when persons walk on a wet sheet or in other cases are provided for aesthetic reasons. In this regard, Wienerberger Koratec Premium 2S or Dörken Delta Maxx, which feature a raised lattice structure, are known, for example.

A roof underlay or roof lining sheet is laid on rafters typically transversely to the course of the rafters, i.e. in parallel with the ridge from verge to verge, and are fastened to the rafters by means of counter battens that are nailed to the rafters. In the process, the roof underlay or roof lining sheet is clamped between the rafters and counter battens and thus reliably secured. When the nail shafts penetrate through the roof underlay or roof lining sheet, holes that allow water to penetrate are formed. As a result, the roof underlay or lining sheet loses its rainproofness. This problem is represented in Fig. 1. In order to counter this problem, nail sealing tapes may for example be used, which serve to seal the holes created by the nails. This solution is shown in Fig. 2.

DE 10 2010 000 377 A1 discloses a roof lining sheet having integrated nail strips, wherein a plurality of material strips that extend in the direction of travel in parallel with one another and spaced apart from one another are formed with the lining sheet in order to prevent moisture from penetrating through the roof lining sheet via the nail openings. For this purpose, the material strips are made from a self-sealing, resilient material.

The roof lining sheet known from DE 10 2010 000 377 A1 is a combination of a conventional roof lining sheet and nail sealing tape.

In both cases, additional material strips are required, which is disadvantageous from a manufacturing point of view, especially if said material strips are made of a different material to the underlay or lining sheet, as is proposed in the prior art. However, if both materials are the same, the sealing effect is not optimal. Furthermore, the sealable material region for the nail sealing function must be precisely aligned with the holes made by the nails, which is very difficult to achieve under construction site conditions and, in any case, is associated with considerable additional effort.

Other documents from the prior art are JP H08-218566 A, JP 5 618121 B2, EP 1 288 389 A1, DE 10 2017 101969 A1, EP 2 592 196 A1 and DE 296 23 295 U1.

PRESENTATION OF THE INVENTION

An object of the present invention is to provide a roof underlay or lining sheet, an underlay or subroof, and a method for creating an underlay or subroof, in each case of the above-mentioned technical field and which allow a rainproof subroof to be laid efficiently and safely and produced efficiently.

This object is achieved by a roof underlay sheet or roof lining sheet according to claim 1, an underlay or subroof according to claim 12 and a method according to claim 13.

Advantageous embodiments and developments of the invention can be found in the dependent claims.

A "rainproof subroof", a "rainproof underlay" and a "rainproof underlining" are to be understood as a subroof, underlay or underlining that meet the requirements for roof coverings as specified by the Central Association of the German Roofing Trade (Zentralverband des Deutschen Dachdeckerhandwerks e.V. ("ZvDH" for short)) – a trade association for roof, wall and waterproofing technology. In this regard, the ZvDH has published a comprehensive rulebook with the title "Deutsches Dachdeckerhandwerk Regeln für Dachdeckungen" ("German Roofing Trade Rules for Roof Coverings"), which includes i.a. the "Merkblatt für Unterdächer, Unterdeckungen, Unterspannungen" ("Leaflet for Subroofs, Underlays, Underlinings"), in which the requirements for a subroof, underlay and underlining are set out which, if met, allows said structures to be designated as rainproof. The present application is based on the specifications of the ZvDH Rulebook, dated October 2018, with regard to a rainproof subroof, a rainproof underlay and a rainproof underlining as well as rain-tight contact.

A roof underlay sheet or roof lining sheet according to the invention for an inclined roof comprises a surface that is impervious to water for draining water. The surface comprises a plurality of elongated projections that are arranged in parallel with one another at least in portions. Said projections are designed to be so soft that they are adaptable to a contour of a rough surface of a counter batten or other comparable object that contacts the projections in order to produce rain-tight contact with the surface. This applies in particular to a situation in which the counter

batten is fastened to the substructure by means of a nail gun, a hand-held hammer or screws and exerts a corresponding force on the projections. Furthermore, said projections form a plurality of channels that extend in a straight line parallel to one another and that are separated from one another end-to-end by means of the projections for receiving water and draining same in a directed manner along the slope of the inclined roof.

The roof underlay or lining sheet may comprise one layer or multiple layers and comprises at least one one layer that is impervious to water, i.e. waterproof. At least one surface of the layer that is impervious to water comprises a kind of rib structure consisting of projections and channels formed therebetween, as described above. On account of said rib structure, water striking the underlay or lining sheet cannot get in under the counter battens at the side and thus get near to the holes in the underlay or lining sheet. This is because the projections and channels are arranged and designed such that they drain the water in the region free from counter battens and as such do not allow said water to get in under the counter battens.

As another advantage that works in synergy with the above-mentioned effect, the projections serve as seals under the counter battens, and therefore they additionally perform the function of nail sealing tape in that they only allow water in under the counter batten by a small distance at the most and in any case keep the holes in the underlay sheet water-free. In the present case, the projections do not serve as spacers or the like, because no defined gap can be set thereby on account of their deformability, but rather serve to drain the water in a directed manner and to prevent the

water from penetrating into the region where the nails penetrate through under the counter battens. For this purpose, said projections are designed to be so soft that they are adaptable to a contour of a rough surface of a counter batten or other comparable object that contacts the projections. This applies in particular to the situation in which the counter batten is fastened to the substructure by means of a nail gun, a hand-held hammer or screws and exerts a corresponding force on the projections. In order to achieve this effect, the projections must be more deformable than the rough surface of the counter batten or object. Said deformability may preferably be elastic, but also inelastic. PP, PE, copolymers, polyester, TPU and mixtures of said substances have been found to be particularly suitable materials for the projections, in particular for the outer regions thereof. They are sufficiently soft to follow, for example, the contour of a rough surface of a counter batten made of wood. In the event of particularly high contact pressure, the contour of the rough surface is impressed particularly precisely into the projection, which results in particularly good rainproofness or waterproofness. In addition, materials that have a foam structure and that, for this reason or also for this reason, can adapt to the contour of the rough surface are also suitable. An adhesive surface for the projections additionally contributes to the sealing effect. In a realistic application scenario, the counter batten is fastened to the substructure by means of a nail gun, a hand-held hammer or screws. The forces or contact pressures on the projections in the resulting value range of forces and contact pressures are sufficient for deforming the projections such that they follow the structure of the surface of the counter batten or of the other object.

Preferably, the roof underlay sheet or roof lining sheet is suitable for creating a rainproof subroof or rainproof underlay or rainproof underlining in line with the above-mentioned specifications of the ZvDH rulebook. In other words, the roof underlay sheet is suitable for creating a rainproof subroof, rainproof underlay or rainproof underlining without additional measures being required if laid correctly.

Preferably, the roof underlay sheet or roof lining sheet is based on plastics material. Preferably, it is made from PP, PE, copolymers, polyester, TPU or mixtures of said substances. A roof underlay sheet or roof lining sheet made of plastics material should be understood to mean a sheet made of material that at least partially contains plastics material. In particular, pure bitumen sheets do not fall under this definition. However, the roof underlay sheet or roof lining sheet may also be made from other plastics materials that are suitable for its manufacture or from mixtures of said plastics materials.

In a preferred embodiment, the surface is exposed or is covered by a layer that is preferably permeable to water and that particularly preferably exhibits no capillary effect, and said surface faces the weather side when laid. In other words, although it is possible, in principle, for the surface having the projections to not be the exposed uppermost surface of the underlay or lining sheet, the surface provided with the projections is preferably an exposed surface. In an alternative preferred embodiment, a layer that is permeable to water may be provided on the surface, for example consisting of nonwoven fabric. This can further improve slip resistance.

Preferably, the projections extend transversely to or in parallel with a longitudinal direction of the underlay or lining sheet. In the present context, the longitudinal direction refers to the production direction of the underlay or lining sheet. The underlay or lining sheet is generally much longer in said longitudinal direction than transversely thereto. Depending on the orientation of the projections relative to the longitudinal direction, the direction in which the underlay or lining sheet is laid should either be transversely to or in parallel with the rafters. If the projections and channels extend transversely to the longitudinal direction of the underlay or lining sheet, the underlay or lining sheet can be handled in the typical manner, i.e. it can be laid from verge to verge transversely to the rafters. Therefore, in the case of conventional laying, the projection and channel extend in parallel with the rafters and counter battens. In principle, it is also possible according to the invention for the projections and channels to not extend transversely to or along the longitudinal direction. However, when laying the underlay or lining sheet, it must be ensured that no channels lead from a region exposed to the rain or to other types of moisture under the counter battens and to the holes in the underlay or lining sheet. In other words, the projections and channels are arranged and designed such that they can be laid for a subroof or underlay in such a way that rainwater is kept in a region that is exposed to the rain and drained in said region on account of said projections and channels. Orienting the projections and channels in parallel with the rafters and counter battens allows for particularly fast drainage of the water along a direct route without the danger of the water getting in under the counter battens. However, meandering

projections and channels that keep the water away from the holes in the underlay or lining sheet are also possible.

The projections extend in a direction over substantially the entire roof underlay sheet or roof lining sheet. As a result, the water is drained in a particularly reliable manner. However, projections and channels that only extend over part of the underlay or lining sheet and that keep the water away from the holes in the underlay or lining sheet are also possible.

An edge region of the roof underlay sheet or roof lining sheet is designed to be free from projections in order to make it easier to lay and glue and/or weld the roof underlay sheet or roof lining sheet in an imbricated and overlapping manner in order to create a rainproof underlay or underlining or a rainproof subroof. Said edge region is broader than the distance between adjacent projections on the remaining surface of the roof underlay sheet or roof lining sheet and at least differs from one of the channels in this respect.

A preferred underlay or lining sheet can be fastened to the roof in particular by means of one or more counter battens having a counter batten width. In this context, "counter batten width" means the minimum expected width of a counter batten. This is typically 48 mm. A distance between adjacent projections is at most one half, preferably at most one quarter, more preferably at most one sixth of the counter batten width, or less. For example, the distance is therefore less than 24 mm, less than 22 mm, less than 20 mm, less than 18 mm, less than 16 mm, less than 14 mm, less than 12 m, less than 10 mm, less than 8 mm, less than 6 mm or less than 4 mm, wherein the specific value depends on the expected counter

batten width and on the desired number of projections under a single counter batten. With this ratio between the distance between adjacent projections and the counter batten width, at least two, preferably four, more preferably six different projections can always be arranged in parallel with and under a counter batten that is nailed to the roof underlay sheet or roof lining sheet. The greater the number of projections that are arranged under a counter batten, the more resistant the underlay or lining sheet is to water entering to the side of the holes.

Preferably, the width of the projections is substantially smaller than the width of the channels produced thereby, but the projections may also be wider than the channels. Preferably, the width of the projections is less than one half of the width of the channels, more preferably less than one quarter of the width of the channels. Thin projections have the advantage that they allow for a higher contact pressure between the counter batten, the underlay or lining sheet and the rafters and therefore exhibit more reliable protection against penetrating water.

Preferably, the projections project by 0.05 mm to 2 mm, preferably by 0.2 mm to 0.5 mm with respect to the channels. This height relative to the adjoining surface, in particular to the channels formed by means of the projections, has been shown to be particularly suitable for draining the water in a directed manner, because the water is reliably directed on the inclined roof by means of the projections dimensioned in this manner even in the event of a strong wind that blows sideways with respect to the direction in which the water is drained. In addition, the sealing effect can be reliably achieved by means of this sizing for the projections. Larger

designs for the projections can be dispensed with, which not only reduces manufacturing effort but also reduces laying effort. However, other sizes may also be used for the projections.

Preferably, the projections can be produced by means of embossing, by incorporating rod-shaped materials or threads into the roof underlay sheet or roof lining sheet, by printing, coating or spraying the surface. As such, the underlay or lining sheet with the projections can be produced in a particularly efficient manner. In the case of embossing, it has been found to be preferable to deform the underlay or lining sheet during or after production using embossing rollers and to impose the projections and channels on the sheet in this manner. In the case of, or more specifically, before incorporating rod-shaped materials or threads, which may for example be supplied in the form of a web, said materials or threads form ridges on the surface preferably after extrusion. Alternatively, it is also possible, for example, to bring together layers that surround the rod-shaped materials or threads by means of thermal bonding or adhesive bonding. In this way, a composite layer consisting of 1. a nonwoven fabric, 2. a sealing layer, 3. (if applicable a web of) rod-shaped materials or threads and 4. another nonwoven fabric can be bonded to one another thermally, i.e. by means of thermobonding, or using adhesive, for example. In the case of printing, coating or spraying projections on the surface of the underlay or lining sheet, this is preferably done after production, wherein the material forming the projections may be the same as or different to the backing material. For efficiency reasons, embossing is fundamentally preferred. However, other production methods for the projections are fundamentally

possible. For example, material can be removed or moved from a surface layer by means of a comb or a similar tool, even proceeding from a smooth surface layer, in order to form the channels in the surface layer. In this case, the projections result from what remains of the originally smooth layer in which the channels were made.

Preferably, the projections are elastically deformable. This should be understood to mean that the projections can be pressed down to at least one half of their height (perpendicularly to the main extension of the roof underlay sheet or roof lining sheet), preferably to one fifth of their height, without being permanently inelastically deformed. This applies in particular to a situation in which the counter batten is fastened to the substructure by means of a nail gun, a hand-held hammer or screws and exerts a corresponding force on the projections. As such, a preload pressure between a counter batten nailed or otherwise attached in the region of a projection on the one hand and the roof underlay sheet or roof lining sheet on the other is possible, which makes it even more difficult for the water get in between the projection and the counter batten.

A preferred roof underlay sheet or roof lining sheet comprises a backing layer consisting of a fibrous material that exhibits substantially no capillary ascension with respect to water. The property of the fibrous material of exhibiting substantially no capillary ascension with respect to water is determined by a method in which a test strip measuring 10 to 30 mm wide and 20 cm long of the fibrous material to be tested for its suitability is produced and laid in a water bath of 20°C filled to a height of 10 cm such that at least 5 cm of the strip is in the water, the fibrous

material strip for this purpose being laid in the water bath on an inclined plane at an angle of inclination of approximately 30 degrees with respect to the horizontal, and the capillary-induced height of ascent is measured along the length of the fibrous material strip after the test strip has been stored in the water bath for 24 hours. In the present context, the fibrous material is defined as exhibiting no capillary ascension with respect to water if, during this investigation, a capillary-induced height of ascension of the water in the fibrous material, measured from the surface of the water, is less than 1 cm.

As an alternative or in addition to the above-described preferred fibrous material, a backing layer may also be provided from a different material in order to increase the resistant strength of the roof underlay sheet or roof lining sheet. If the backing layer uses the preferred fibrous material, this has the additional advantage that the nail sealing of the roof underlay sheet or roof lining sheet is improved further, because water penetrating into the backing layer substantially cannot spread out in the backing layer. The lack of capillary ascension in the fibrous material of the backing layer prevents this spreading action, as described for example in EP 2 592 196 A1. The synergy between the surface described herein that is impervious to water for draining water and comprising the plurality of elongated projections that are arranged in parallel with one another at least in portions and that form channels that extend in a straight line parallel to one another and that are separated from one another by means of the projections for receiving water and draining same in a directed manner, on the one hand, and the preferably "hydrophobic" property (i.e. the lack of capillary ascension) of the fibrous material forming

the backing layer, on the other hand, allows for particularly reliable protection against water penetrating through a nail opening or the like and thus allows for superior nail sealing.

The description of the fibrous material from EP 2 592 196 A1, including its preferred embodiments and advantages, is hereby made the subject matter of the present disclosure by reference.

An underlay according to the invention or a subroof according to the invention of an inclined roof comprises a roof underlay sheet or roof lining sheet, in particular according to the description given above, which is also fastened to a rafter at least by means of a counter batten by means of at least one nail, wherein the roof underlay sheet or roof lining sheet, the counter batten and the nail are positioned such that the nail penetrates the roof underlay sheet or roof lining sheet between two projections extending between the counter batten and the rafter. An underlay or subroof of this kind achieves the effects and advantages outlined above in connection with the roof underlay or lining sheet. The underlay according to the invention or the subroof according to the invention is preferably a rainproof underlay or a rainproof subroof within the meaning of the above-mentioned specifications of the ZvDH rulebook.

In a method according to the invention for creating an underlay or subroof of an inclined roof having a ridge, a roof underlay sheet or roof lining sheet, in particular according to the description given above, is laid over rafters. In the process, counter battens are positioned on the roof underlay sheet or roof lining sheet such that the

roof underlay sheet or roof lining sheet is between the rafters and the counter battens and at least two projections of the roof underlay sheet or roof lining sheet extend in parallel with the counter battens under the counter battens, such that nails that fasten the counter battens to the rafters penetrate the roof underlay sheet or roof lining sheet between the at least two projections. The projections therefore rest tightly against the counter batten in order to prevent water striking the roof underlay sheet or roof lining sheet from reaching the nail and the point at which same penetrates through the roof underlay sheet or roof lining sheet. The underlay or subroof thus created is preferably a rainproof underlay or a rainproof subroof or a rainproof underlining within the meaning of the above-mentioned specifications of the ZvDH rulebook.

The present invention can be applied to underlay and lining sheets that are diffusion-open and those that are note diffusion-open within the meaning of DIN 4108-3:2014-11 (Thermal protection and energy economy in buildings - Protection against moisture subject to climate conditions). The roof underlay or lining sheet may be microperforated, microporous, monolithic or of another type. Preferably, it is made from PP, PE, copolymers, polyester, TPU or mixtures of said substances as well as other substances (in particular in the case of multi-layered sheets). In the present context, the roof underlay and lining sheets comply with the general definitions of DIN EN 13859-1:2014-07 (Flexible sheets for waterproofing - Definitions and characteristics of underlays - Part 1: Underlays for discontinuous roofing). The trade rules of the ZvDH apply for application, i.e. when laying the roof underlay or lining sheet.

On account of the present invention, it is possible to guide water in parallel with the counter battens in the event of long-lasting steady rain. Not only does less water reach the counter battens, the projections also create a region of increased contact pressure between the counter batten, underlay or lining sheet and rafters, said region following the course and extent of the projections. This effect leads to increased sealing of the points at which the nails penetrate through. If water still manages to get in between the underlay or lining sheet and the counter batten (on account of the capillary forces), said water can be safely drained by means of a channel preferably formed in this region without reaching the holes in the underlay or lining sheet (i.e. the points at which the nails penetrate therethrough).

On account of the present invention, the sealing of the nails is significantly improved for the underlay or lining sheet without additional nail sealing tape being required or without having to produce a costly lining sheet provided with integrated nail sealing tape.

Advantageous developments and embodiments of the invention are apparent from the entirety of the claims and the following description of the figures.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 shows an underlay from the prior art, in which rainwater gets in through the underlay via nail holes.

Fig. 2 shows a solution known from the prior art to the problem illustrated in Fig. 1, which involves sealing the nail holes with nail sealing tape.

Fig. 3 is a schematic representation of an underlay comprising a preferred roof underlay sheet.

Fig. 4 schematically shows a preferred roof underlay sheet as an enlargement of a section of Fig. 3.

Fig. 5 schematically shows three exemplary roof underlay or lining sheets comprising projections and channels according to the present invention.

WAYS OF IMPLEMENTING THE INVENTION

Fig. 3 schematically shows an underlay comprising a preferred roof underlay sheet 100. The roof underlay sheet 100 is laid over a plurality of parallel rafters 10 such that it is inserted between the rafters 10 and counter battens 12 and fastened by means of nails 14 that penetrate through the counter battens 12 and roof underlay sheet 100 and into the rafters 10. The surface of the roof lining sheet 100 that is impervious to water comprises a plurality of elongated, parallel projections 16, of which only a small portion is shown in Fig. 3 in order to improve clarity. Said projections extend over the entire roof underlay sheet 100 and in particular also below the counter battens 12. Channels 18 that receive rainwater and drain same in a directed manner in parallel with the counter battens 12 are formed by means of the projections between the projections 16.

Fig. 3 clearly shows the first above-described effect of the present invention, namely that the rainwater (or condensed moisture of another origin, for example) is prevented from reaching the counter battens 12 and thus towards the nail

holes by means of the channels 18 and projections 16, which can occur in the case of conventional roof underlay sheets shown by way of example in Fig. 1 and 2.

Fig. 4 schematically shows a preferred roof underlay sheet 100 as an enlargement of a section of Fig. 3. Here, the counter batten 12, the rafter 10 and the nail 14 as well as the preferred roof underlay sheet 100 can be seen in a cross-sectional view. In the representation in Fig. 4, a greater density of projections 16, i.e. projections 16 that are closer together, can be seen. When the projections 16 are close together, the second above-mentioned advantage achieved synergistically with the first described effect is clearly produced. Water that reaches the counter batten 12 in spite of the projections 16 is prevented from reaching the nail holes. Firstly, the relatively narrow projections 16 create a high contact pressure between the counter batten 12 and the roof underlay sheet 100 (and the rafter 10), such that water can barely get in between the counter batten 12 and the roof underlay sheet 100. Secondly, channels 18 within the outermost projections 16 under the counter batten 12 prevent the water from making its way further towards the nail hole. This is because these channels 18 drain the water away in a directed manner without said water reaching the nail hole.

Fig. 5 schematically shows three exemplary roof underlay or lining sheets 100 comprising projections 16 and channels 18 according to the present invention. The embodiment set out above relates to a roof underlay or lining sheet 100 of which projections 16 are produced by means of threads or rod-shaped inserts 24. The roof underlay or lining sheet 100 has two layers, as is conventional, and in addition to a sealing layer 20 forming the surface that is impervious to water also

comprises a nonwoven backing fabric 22, wherein the threads or rod-shaped inserts 24 are inserted between the nonwoven backing fabric 22 and the sealing layer 20.

The embodiment shown in the centre shows an embossed sealing layer 20 on a nonwoven backing fabric 22, wherein the embossment of the sealing layer 20 creates the projections 16 and channels 18.

The embodiment shown at the bottom shows a roof underlay or lining sheet 100 comprising a plurality of backing layers 26, a sealing layer 20 and projections 16 that are printed or glued thereon and that may be made from the same or a different material to the sealing layer 20.

Patentkrav

1. Underlagsbane (100) eller tagforingsbane (100) til et skråt tag med en vanduigennemtrængelig overflade til bortledning af vand,
hvori overfladen har flere langstrakte i det mindste i afsnit indbyrdes parallelt forløbende forhøjninger (16),
der er udformet så bløde, at de er egnede til at tilpasses til en kontur af en ru overflade på en kontralægte (12) i kontakt med forhøjningerne (16) eller en anden genstand for at etablere en regntæt kontakt til overfladen, og
som mellem hinanden danner flere retlinede, indbyrdes parallelt forløbende og af forhøjningerne (16) gennemgående fra hinanden adskilte kanaler (18) til optagelse og rettet bortledning af vandet langs det skrå tags hældning,
idet forhøjningerne (16) strækker sig over i det væsentlige hele underlagsbanen (100) eller tagforingsbanen (100) langs en retning,
kendetegnet ved, at
et randområde af underlagsbanen (100) eller tagforingsbanen (100) er udformet uden forhøjninger, idet randområdet er bredere end en afstand mellem nabostillede forhøjninger (16) på den resterende overflade af underlagsbanen (100) eller tagforingsbanen (100).

2. Underlagsbane (100) eller tagforingsbane (100) ifølge krav 1, der er egnet til at etablere et regnsikkert undertag eller et regnsikkert underlag eller en regnsikker tagforing.

3. Underlagsbane (100) eller tagforingsbane (100) ifølge krav 1 eller 2, der er baseret på kunststof.

4. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, hvori overfladen ligger frit eller er dækket af et fortrinsvis vandpermeabelt lag.

5. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, der har en længderetning, og hvori forhøjningerne (16) forløber på tværs af eller parallelt med længderetningen.

6. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, der kan fastgøres på taget, især ved hjælp af en eller flere kontralægter (12) med en kontralægtebredde, idet en afstand mellem nabostillede forhøjninger (16) højst udgør halvdelen, fortrinsvis højst en fjerdedel, mere foretrukket højst en sjettedel af kontralægtebredden eller mindre, således at mindst to, fortrinsvis fire, mere foretrukket seks forskellige forhøjninger (16) kan anbringes parallelt med og under en på underlagsbanen (100) eller tagforingsbanen (100) sømmet kontralægte (12).

7. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, hvori en bredde af forhøjningerne (16) er mindre end en bredde af kanalerne (18), fortrinsvis mindre end halvdelen af kanalernes (18) bredde, mere foretrukket mindre end en fjerdedel af kanalernes (18) bredde.

8. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, hvori forhøjningerne (16) stikker 0,05 mm til 2 mm, fortrinsvis 0,2 mm til 0,5 mm frem i forhold til kanalerne (18).

9. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, hvori forhøjningerne (16) kan fremstilles ved prægning, ved indarbejdning af stavformige materialer eller tråde i underlagsbanen (100) eller tagforingsbanen (100), ved påtrykning, belægning eller forstøvning på overfladen.

10. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, hvori forhøjningerne (16) er elastisk deformerbare.

11. Underlagsbane (100) eller tagforingsbane (100) ifølge et af de foregående krav, der har et bærelag af et fibermateriale, der i det væsentlige ikke har nogen hårrørsstigning over for vand,
idet fibermaterialets egenskab i det væsentlige ikke at have nogen hårrørsstigning over for vand bestemmes ved en fremgangsmåde, ved hvilken
en 10 til 30 mm bred og 20 cm lang prøvestrimmel af det fibermateriale, der skal undersøges med hensyn til sin egnethed, fremstilles og lægges således i et til en højde på 10 cm fyldt vandbad ved 20°C, at mindst 5 cm af strimlen ligger i vand,
fibermaterialestrimlen derpå lægges i vandbadet i et skråplan med en

hældningsvinkel på ca. 30 grader i forhold til vandret, og den kapillarbetingede stighøjde langs fibermaterialestrimlens længde måles efter 24 timers lagring af prøvestrimlen i vandbad,
idet fibermaterialet defineres som havende i det væsentlige ingen hårrørsstigning over for vand, når der ved denne undersøgelse fås en kapillarbetinget stighøjde af vandet i fibermaterialet, målt ud fra vandstanden, på mindre end 1 cm.

12. Underlag eller undertag til et skråt tag, hvori underlaget eller undertaget omfatter en underlagsbane (100) eller en tagforingsbane (100) ifølge et af de foregående krav, som i det mindste også med en kontralægte (12) er fastgjort til et tagspær (10) ved hjælp af i det mindste et søm (14), idet underlagsbanen (100) eller tagforingsbanen (100), kontralægten (12) og sømmet (14) er placeret således, at sømmet (14) gennemtrænger underlagsbanen (100) eller tagforingsbanen (100) mellem to mellem kontralægten (12) og tagspæret (10) forløbende forhøjninger (16), således at forhøjningerne (16) ligger tætnende an mod kontralægten (12) for at hindre vand, der rammer på underlagsbanen (100) eller tagforingsbanen (100), i at nå sømmet (14) og den af det bevirkede gennemtrængning ved underlagsbanen (100) eller tagforingsbanen (100).

13. Fremgangsmåde til etablering af et underlag eller et undertag til et skråt tag med en tagryg,
ved hvilken en underlagsbane (100) eller en tagforingsbane (100) ifølge et af kravene 1-11 lægges over tagspærene (10),
idet kontralægter (12) placeres således på underlagsbanen (100) eller tagforingsbanen (100), at underlagsbanen (100) eller tagforingsbanen (100) befinder sig mellem tagspærene (10) og kontralægterne (12), og mindst to forhøjninger (16) af underlagsbanen (100) eller tagforingsbanen (100) forløber under kontralægten (12) parallelt med kontralægten (12),
således at søm (14), som fastgør kontralægterne (12) til tagspærene (10), gennemtrænger underlagsbanen (100) eller tagforingsbanen (100) mellem de mindst to forhøjninger (16).

14. Anvendelse af en underlagsbane (100) eller en tagforingsbane (100) ifølge et af kravene 1-11 til etablering af et underlag eller et undertag til et skråt tag med en tagryg ifølge krav 12,

ved hvilken forhøjningerne (16) anvendes til at beskytte en gennemtrængning gennem underlagsbanen (100) eller tagforingsbanen (100) mod kontakt med vand, der befinder sig på underlagsbanen (100) eller tagforingsbanen (100).

Fig. 1

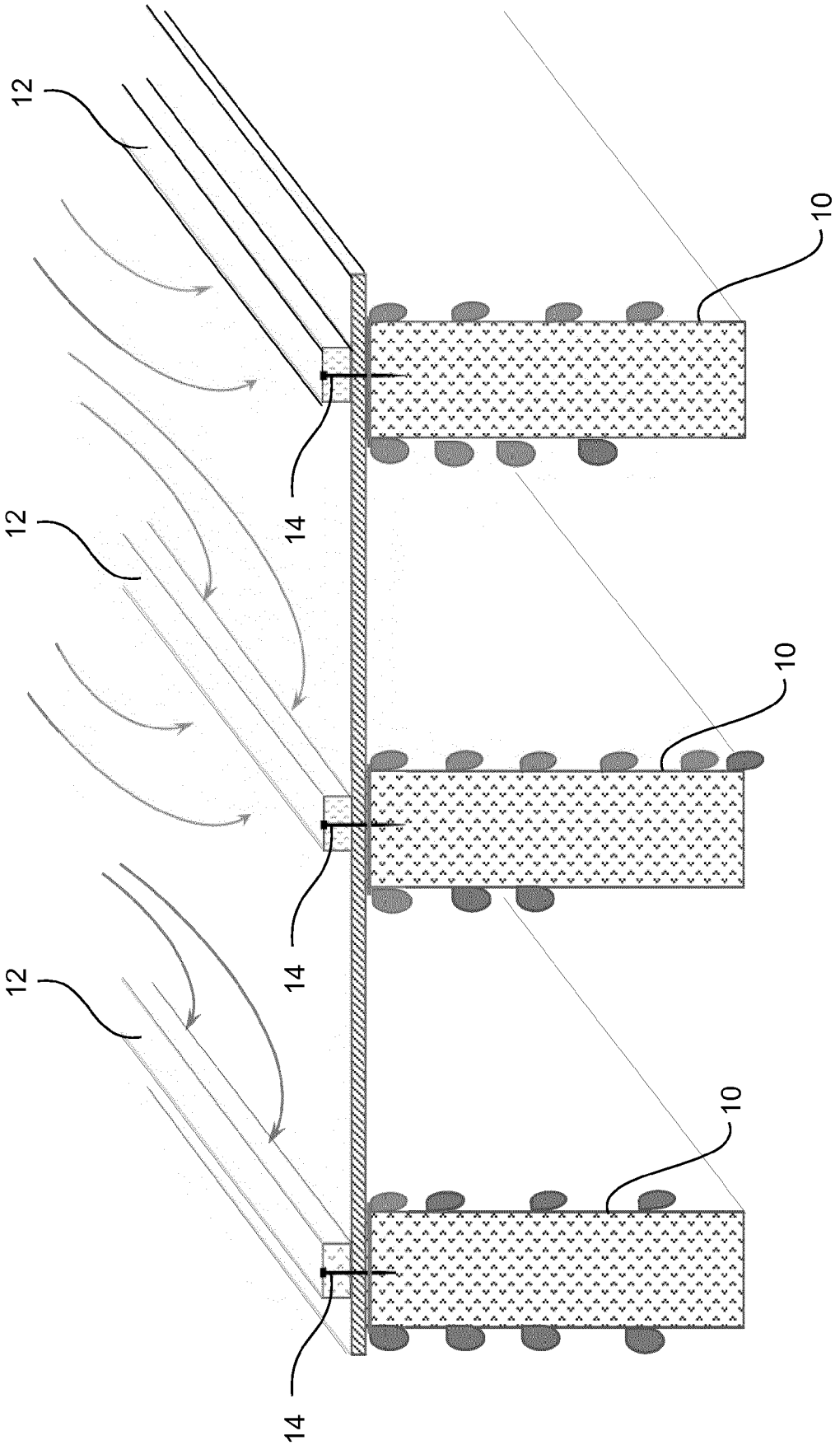
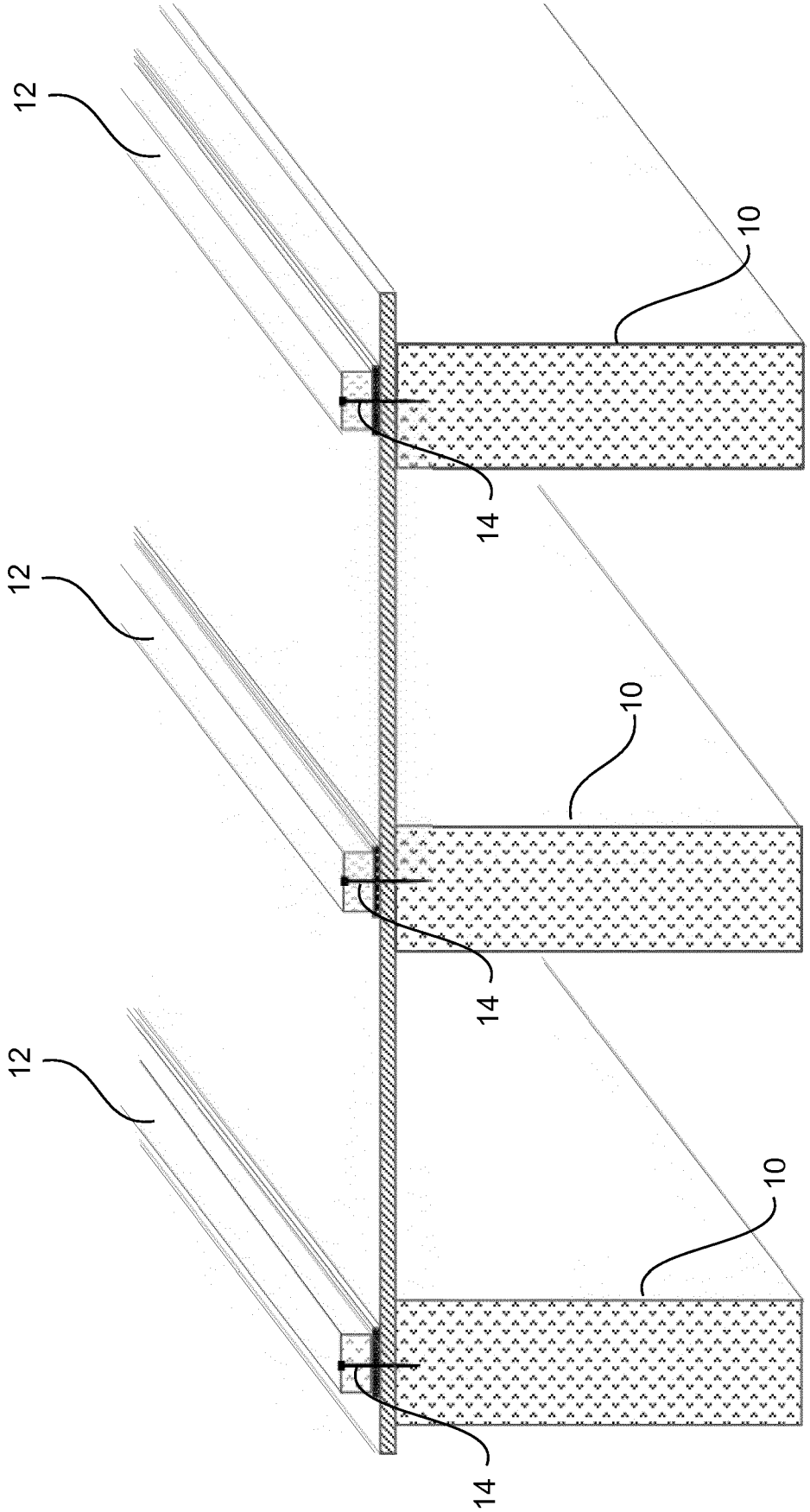


Fig. 2



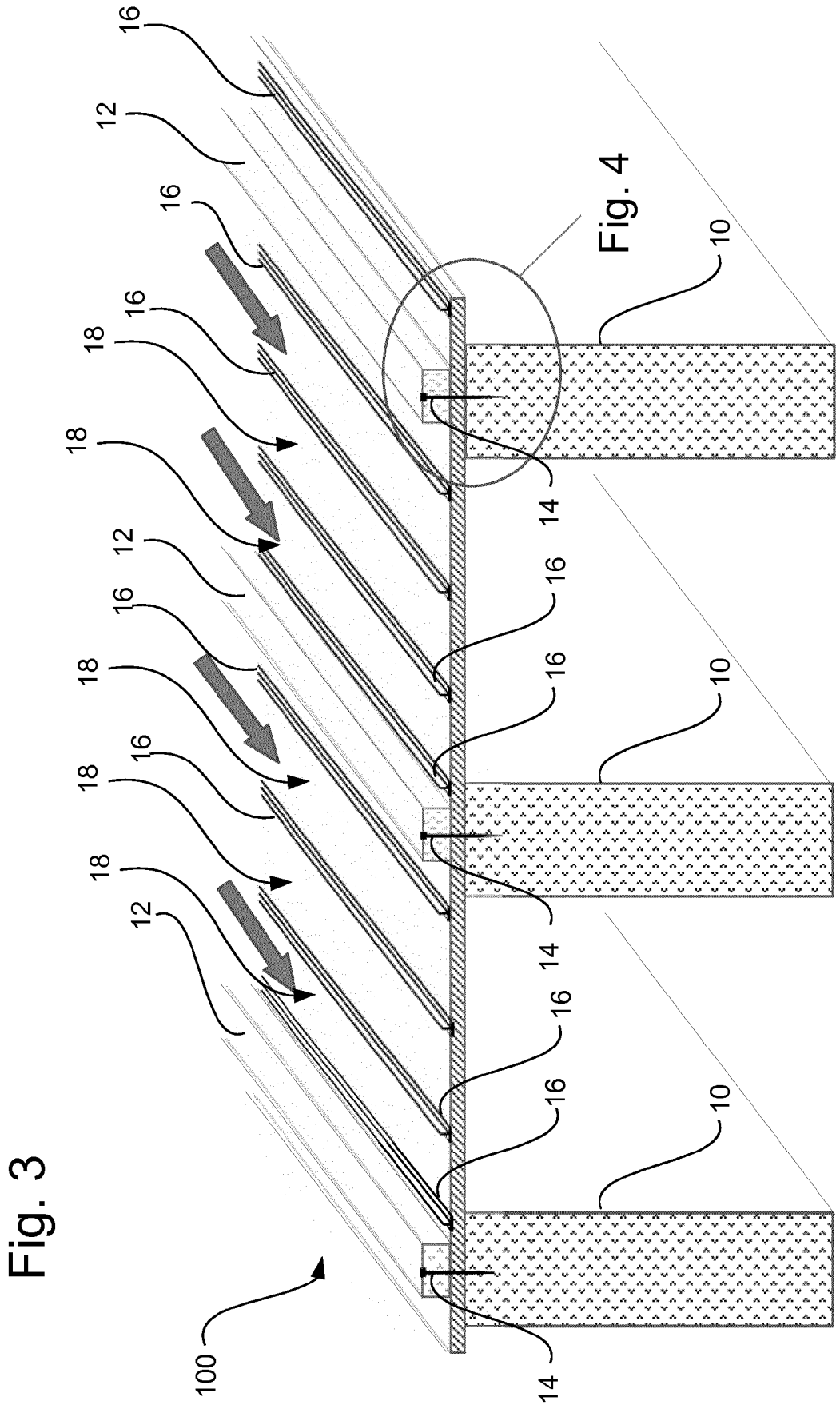


Fig. 3

Fig. 4

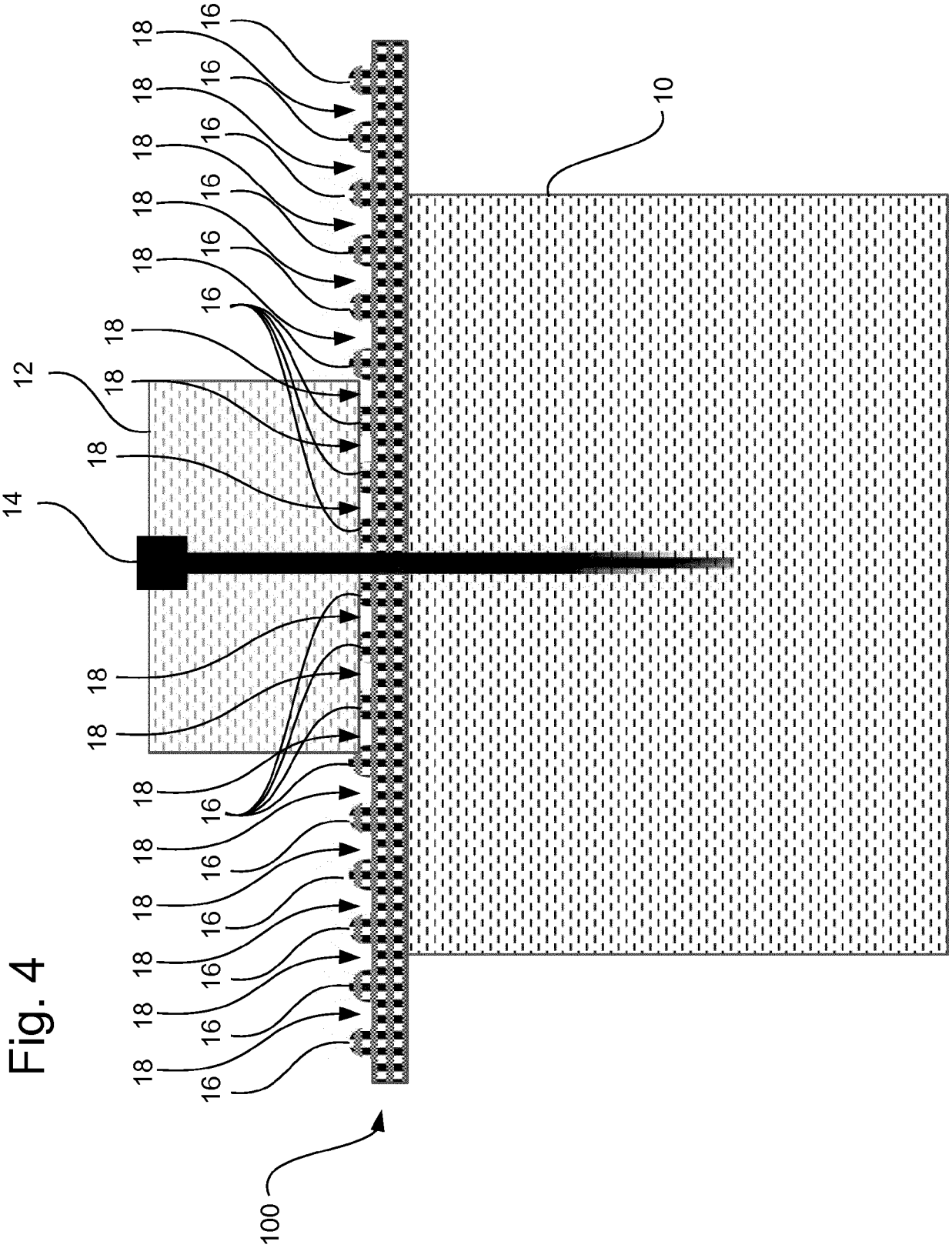
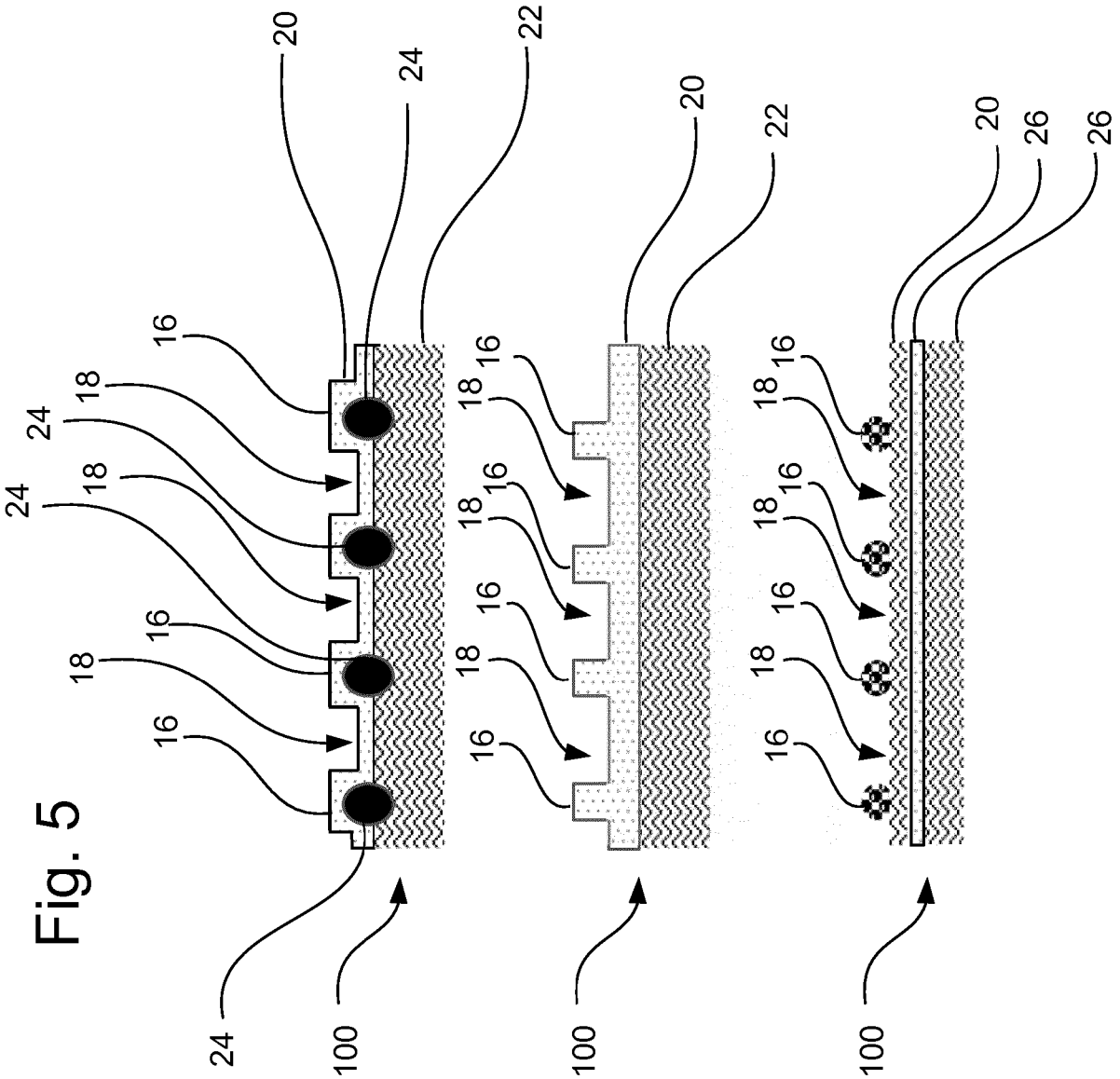


Fig. 4

Fig. 5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