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(54) **WARP KNITTED FABRIC AND A MEMBRANE COMPRISING SUCH WARP KNITTED FABRIC**

(57) The patent application relates to a warp knitted fabric (1) for roofing membrane and a membrane comprising such fabric. The warp knitted fabric comprises parallel warp threads (3) extending in a first direction (X), parallel weft threads (2) extending in a second perpendicular direction (Y) relative the first direction (X) and parallel wales (4) extending in the first direction (X). Each wale (4) comprises one of the warp threads (3) and a first and a second stitch yarn (5a, 5b) which each is parallelly arranged at opposite sides of the one warp thread (3), The warp knitted fabric (1) further comprises an inlay thread (7) per wale (4), which is lead in a meandering pattern between the first and second stitch yarns (5a, 5b), from the first stitch yarn (5a) to the second stitch yarn (5b) and back again in a repeating pattern through the wale (4).

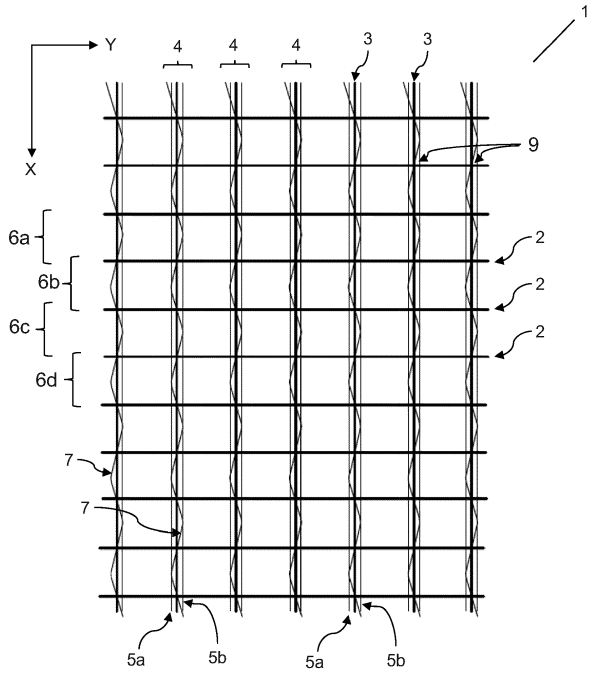


Fig. 1

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## Description

### Technical field

**[0001]** Present invention relates to a warp knitted fabric suitable for different kinds of membranes and a membrane comprising such warp knitted fabric. Particularly, the inventive warp knitted fabric is suitable for roofing membranes.

### Background art

**[0002]** It is well known to use different kinds of membranes for use within roofing and other types of applications like sun protection screens, tents, air ducts, ventilation ducts, tunnel lining, suspended ceilings, advertisement mesh, pool linings etc. The invention is first of all directed to a use within roofing but may of course be used also in other applications like the ones presented above.

**[0003]** Membranes of this kind normally comprise a fabric which is embedded as a layer into some kind of polymer or a fabric which comprises a surface finishing, such as chemical binders for PVC coating or other types of coating. There are a number of different known methods of applying the polymer to the fabric, such as calendaring, where the polymer (coating) is applied between heated rollers which are pressed to each other with high pressure such as a foil is formed when pressing polymer between the rollers. This foil is then pressed firmly on the fabric to a desired thickness. Another method is to use a "screen" which is a perforated drum in which the polymer is applied and is pressed out through the perforation. The fabric runs between this drum and a roller and the polymer is by that applied to the fabric. Other similar methods are available, where the polymer is distributed (coated) over the fabric by for example a wiping knife or the like. For open fabrics other methods are available, for example dipping, dip coating, immerse coating etc. Yet an alternative method for open fabrics is where the fabric is laminated between two foils where adhesion may occur by direct contact between the foils or by a third component like an adhesive. The most common alternatives nowadays are for double-sided coated membranes combinations of for example dipping or dip coating and some of the above-described method, where the dipping/dip coating is a pre-impregnation of the fabric which creates high adhesion between the fabric and the coating since the pre-impregnation increases the adhesion to the coating. For more open fabrics, the most common method is to use double-sided coated membranes with a combination of calendaring in a first step followed by coating in a second step, which creates high adhesion due to the liquid polymer adheres to the calendared layer through the open fabric.

**[0004]** The specific demands of a membrane for use within roofing are high demanding properties regarding wind-up lift, tensile strength, non-wicking, tear strength and cold bending. The combination of weft insertion warp knitting fabric formation and designed finishing/coating results in that these high demands may be met.

**[0005]** One problem with known solutions has been to provide a membrane which is thin but still copes with the high demands such as high tensile strength and high tear strength. The design of the warp knitted fabric must be adapted to provide a thin layer of fabric to be used for the membrane, to get a thin membrane. It has been found that having a thinner fabric layer within the membrane gives certain performance benefits.

**[0006]** One example of a knit fabric for use in roofing membranes is presented in EP 3 250 738 B1, which discloses a knit fabric which is advantageous to use in applications where a thinner reinforcement is desired. The knit fabric containing a stitch yarn set containing pairs of stitch yarns, a warp yarn set containing inlay warp yarns, and a weft yarn set containing weft inserted yarns. Each pair of stitch yarns comprises a first stitch yarn and a second stitch yarn, where the first stitch yarn has a two bar first stitch pattern comprising repeating pattern of at least one tricot stitch optionally followed by at least one pillar stitch and the second stitch pattern comprises a mirror image to the first stitch pattern. The first stitch yarn and the second stitch yarn within each pair of stitch yarns are interlinked together, but the first stitch yarn and second stitch yarn of one pair of stitch yarns are not interlinked with first stitch yarn and second stitch yarn of adjacent pairs of stitch yarns. The two stitch yarns together with one warp thread and the inlay thread constitutes one so called wale. A disadvantage is that the first and second stitch yarns in each pair are interlinked together which means that both stitch yarns cross the warp thread and build up a thicker fabric than necessary. Further, the wale in this solution gets by this design a more or less "square" cross-section and by that the polymer which is applied to this open fabric with any of known methods described above, builds up an even thicker membrane. Further, the fabric as well as a complete membrane gets rather "stiff" due to a that each wale of the fabric is rather tight with low flexibility, which is negative for the total tensile strength in the warp direction as well a negative concerning resistance to tear forces. The individual yarns and thread are more easily snapped when exposed to tensile stress. When such a fabric is embedded into a polymer for use as a membrane, for example for roofing, with for example a method of double-layered coating, the polymer of the two layers preferably must attach to each other in the free space in the courses (between the wales). Since this solution causes square-formed and rather wide wales, the polymer gets a smaller contact area between the layers on each side of the fabric. Thus, there is a need of a solution which provides a thinner warp knitted fabric than the prior art and which may be used in one or several layers of a membrane or the like, and which has a high tensile strength and high resistance to tear.

Summary of the invention

**[0007]** An object of the present invention is to provide a warp knitted fabric as well as a membrane which by its design has high tensile and tear strength and still is very thin, compared to prior art.

**[0008]** This object is achieved by a warp knitted fabric according to claim 1 and a membrane comprising such warp knitted fabric according to claim 12.

**[0009]** According to an aspect a warp knitted fabric for roofing membrane is disclosed. The warp knitted fabric has a first side and an opposite second side, and the warp knitted fabric comprises parallel warp threads (yarns), which extend in a first direction and further parallel weft threads (yarns) which extend in a second direction which is perpendicular to the first direction. The warp knitted fabric further comprises parallel so-called wales which extend in the first direction, wherein each wale comprises one of the warp threads and a first stitch yarn and a second stitch yarn. The first and second stitch yarns are parallelly arranged at opposite sides of the one warp thread, wherein the first and the second stitch yarns are stitched into the warp knitted fabric with a repeating pattern of a pillar stitch per course of the warp knitted fabric. The warp knitted fabric further comprises an inlay thread per wale, which inlay thread is lead in a meandering pattern between the first and second stitch yarns, from the first stitch yarn to the second stitch yarn and back again in a repeating pattern through the wale.

**[0010]** By such warp knitted fabric, with parallel stitch yarns on respective sides of one warp thread together with a meandering pattern of the inlay thread, a thin warp knitted with high tensile strength is achieved. This means that the inventive warp knitted fabric is thinner compared to prior art warp knitted fabrics which are used for membranes such as roofing membranes, but still has the same or even higher tensile and tear strength compared to known warp knitted fabrics. This is achieved by that the inlay thread is lead between the first and second stitch yarns, which is not the same as if the inlay thread would be stitched to the first and second stitch yarns in a tight manner which would cause these to not keep their parallel extension along the warp thread and parallel to the same. This allows the individual threads/yarns to stretch more if exposed to tensile stress, compared to prior art fabrics, where the individual threads/yarns easier and earlier will snap compared to the inventive warp knitted fabric with a meandering pattern of the inlay thread and the parallel and straight pillar stitched stitch yarns.

**[0011]** According to an embodiment, the inlay thread is lead in a meandering pattern between the first and second stitch yarns such as the inlay thread engages with the first stitch yarn in every odd course in the first direction of the warp knitted fabric and engages with the second stitch yarn in every even course in the first direction of the warp knitted fabric. In that way the warp knitted fabric disclose a pattern which is especially suitable when a thin fabric is needed, since the inlay thread only engages in every odd course with one inlay thread.

**[0012]** According to an embodiment, the inlay thread is lead in a meandering pattern between the first and second stitch yarns such as passing over the one warp thread of the wale on the first side of the knitted fabric in direction towards the first stitch yarn, followed by being threaded around the first stitch yarn in an odd course, followed by passing over the one warp thread of the wale on the first side of the knitted fabric in direction towards the second stitch yarn, followed by being threaded around the second stitch yarn in an even course which follows after the odd course in the first direction, in a repeating meandering pattern such as the inlay thread is threaded around the first stitch yarn in every odd course and around the second stitch yarn in every even course in the first direction of the warp knitted fabric. By that the inlay thread only is arranged at one side (the first side) of the warp thread, the warp knitted fabric is thinner compared to if the inlay thread were passing through the fabric to the other side. When coating or other processes like double-layered coating which are mentioned in the background, is used to produce a membrane with the fabric, a better adhesion between the double polymer-layers is achieved if the number of threads per course is kept low, to provide open apertures between the wales of the course. Known fabrics stitches the inlay thread into the stitch yarn in every course which means a thicker fabric.

**[0013]** According to an embodiment, the inlay thread passes over the one warp thread substantially at an intersection between the warp thread and the weft thread.

**[0014]** According to an embodiment, the pillar stitch of the first stitch yarn is stitched into the warp knitted fabric such as the first stitch yarn extends on both the first side and the second side of weft thread, and wherein the pillar stitch of the second stitch yarn is stitched into the warp knitted fabric such as the second stitch yarn extends on both the first side and the second side of each weft thread.

**[0015]** According to an embodiment, the pillar stitch of the second stitch yarn of each wale is a mirror copy of the pillar stitch of the first stitch yarn of each wale, wherein the mirror copy of the pillar stitch of the second stitch yarn is offset one course in the first direction relative the pillar stitch of the first stitch yarn. The mirror copy has a reflection plane at the warp thread of the wale and due to the meandering pattern of the inlay thread between the first and second stitch yarns, the mirror copy of the pillar stitches relative each other is offset one course.

**[0016]** According to an embodiment, the inlay thread is threaded around the first and second stitch yarns in such a loose manner such as the first and second stitch yarns remains their parallel extension at opposite sides of the one warp thread, in the first direction. By that the first and second stitch yarns remain their substantially straight extension direction in the warp knitted fabric, due to the loose meandering inlay thread in engaging contact with the first and second stitch yarns, the fabric is kept thin due to that no stitch yarns pass over the warp thread like in known solutions. This also means that the warp

knitted fabric gets higher resistance to tensile stress and tear resistance, since each wale of the inventive warp knitted fabric becomes narrower compared to known solutions. As the wale becomes narrower, less surface will be exposed to the polymer coating and adhesion to same. This mean that the yarn systems become more movable inside the coating. This increased moveability results in higher tensile strength and tear resistance due to the movability of the fabrics thread/yarns systems. As the wales are narrower, the open apertures in the fabric will increase and thus the bonding between the layers of coating also increases. This will lower the risk of delamination between the coating layers.

**[0017]** According to an embodiment, the weft thread (yarn) and the warp thread (yarn) comprise any material of polymer, metallic, inorganic, organic material or any hybrid of the materials (mix of materials). Further, the weft thread and the warp thread could be made of endless multifilament or monofilament type as well as threads (yarns) made in various spinning processes from staple fibers or combinations with endless multifilament or monofilament fibers. The thread/yarn count (linear mass density) ranging from 80 dtex to 6600 dtex.

**[0018]** According to an embodiment, the first and second stitch yarn comprise any material of polymer, metallic, inorganic, organic material or any hybrid of the materials (mix of materials). The first and second stitch thread/yarn could be made as endless multifilament or monofilament type as well as threads/yarns made in various spinning processes from staple fibers or combinations with endless multifilament or monofilament fibers. The thread/yarn count (linear mass density) ranging from 22 dtex to 1100 dtex.

**[0019]** According to an embodiment, the inlay thread comprises any material of polymer, metallic, inorganic, organic material or any hybrid of the materials (mix of materials). The inlay thread could be made as endless multifilament or monofilament type as well as a thread made in various spinning processes from staple fibers or combinations with endless multifilament or monofilament fibers. The thread/yarn count (linear mass density) ranging from 22 dtex to 1100 dtex.

**[0020]** According to an embodiment, the inlay thread, where threaded around the first stitch yarn, is threaded through two loops of the pillar stitch of the first stitch yarn, and wherein the inlay thread, where threaded around the second stitch yarn, is thread through two loops of the pillar stitch of the second stitch yarn. This means that at every engagement between the inlay thread and the respective stitch yarn, the inlay thread is threaded through two loops of the stitch yarn. The pillar stitches of the stitch yarns are mirror copies of each other but due to the inlay thread, the mirror copy is (as explained above) offset one course.

**[0021]** According to an embodiment, the inlay thread is lead in the meandering pattern between the first and second stitch yarns such as it passes over the warp thread of the wale on only one side, the first side of the knitted fabric. Such design of the fabric provides a very thin fabric compared to prior art warp knitted fabrics for membranes, with same or even higher tensile and tear strength compared to known warp knitted fabrics.

**[0022]** According to a second aspect of the invention, a membrane which comprises the warp knitted fabric according to any of the previously described embodiment is disclosed, wherein the membrane further comprises a polymer, and wherein the warp knitted fabric is at least partially embedded into the polymer. By embedding the inventive warp knitted fabric into a polymer, by any of known methods like for example the ones described in the background for producing a membrane, the inventive membrane provides high tensile and tear strength, high flexibility and other key properties due the thin design of the warp knitted fabric and by that the thin design of the roofing membrane.

**[0023]** According to an embodiment, the membrane is a roofing membrane. The warp knitted fabric is especially advantageous for roofing membranes since the roofing membrane including the inventive warp knitted fabric comprises the characteristics described above, which is crucial to roofing membranes.

**[0024]** Of course, other membranes and applications are possible since the warp knitted fabric is advantageous to use in applications where a thinner reinforcement is desired. The knit fabric may be treated with any suitable composition during the process of producing the fabric, but the treatment may also be applied to the yarns before producing the fabric, for example using pre-treated yarns/threads. Some treatments may include adhesion promoters, anti-wicking chemistries, colorants, antimicrobial chemistries, abrasion resistance, UV stabilizers, and similar. The warp knitted fabric may further be calendared to further reduce its thickness and by that the thickness of the membrane in which it is embedded.

## Brief description of drawings

**[0025]** The invention will now be described, by way of example, with reference to the accompanying drawings in which:

Fig. 1 is a schematic top view of a part of a warp knitted fabric according to the invention.

Fig. 2 shows a close-up of a warp knitted fabric of Fig. 1 in a perspective view.

## Description of embodiments

**[0026]** Fig. 1 shows a schematic top view of a part of a warp knitted fabric 1 according to the invention. The warp knitted fabric 1 presented in Fig. 1 and Fig. 2 comprises a first side A, which faces the viewer and an opposite second side B, which faces away from the viewer. The warp knitted fabric 1 comprises a conventional warp and weft design with parallel warp threads 3 (yarns) which

extends in a first direction X and parallel weft threads 2 (yarns) extending in a second direction Y which is perpendicular to the first direction X. The schematic top view is deliberately shown with greater distance between warp and weft threads compared to the real warp knitted fabric to show the design of the fabric more easily. The term "wale" is well- known within the art and the warp knitted fabric 1 comprises parallel wales 4, which extends in the first direction X, wherein each wale 4 comprises one of the warp threads 3 and a first stitch yarn 5a and a second stitch yarn 5b. The first and second stitch yarns 5a, 5b are parallelly arranged at opposite sides of the one warp thread 3 and are stitched into the warp knitted fabric 1 with a repeating pattern of at least one so-called pillar stitch 8a, 8b per course 6a, 6b, 6c, 6d, of the warp knitted fabric 1. A course is also a well-known term within the art and may be described as the repeating pattern of "squares" in the first direction X and disclose the free space between two adjacent weft threads 2, which in Fig. 1 is shown by brackets 6a, 6b, 6c, 6d and so on. The unique design of the inventive warp knitted fabric 1 is that each course 4 further comprises one inlay thread 7 per wale 4, which inlay thread 7 is lead in a meandering pattern between the first and second stitch yarns 5a, 5b, from the first stitch yarn 5a to the second stitch yarn 5b and back again in a repeating pattern throughout the wale 4. It is preferred that the inlay thread 7 passes over the one warp thread 3 substantially at an intersection 9 between the warp thread 3 and the weft thread 2. As can be seen in Fig. 1, the inlay thread 7 is lead between the stich yarns 5a, 5b, which means not stitched in a "normal manner" which would lead to a tighter wale. Instead, the inlay thread is lead in a loose and meandering pattern which by that leads to a looser fabric 1 where the first and second stitch yarns 51, 5b remain their more or less straight extension in the first direction X, which is parallel to the warp thread 3 of the wale 4. This is crucial to achieve the characteristics of the inventive warp knitted fabric 1 such as high tensile strength and high withstand to tear forces and the thin design. Known fabric of similar kind and for similar applications (like roofing membranes) have a tighter design where the inlay thread is stitched to the stitch yarns and the stitch yarns as well as the inlay thread pass repeatedly the warp thread more frequent. When the prior art fabric is subjected to tensile or tear stress, the individual fibers (warp threads and stitch yarns) snaps easier and earlier compared to the inventive warp knitted fabric 1, since the latter, when subjected to tensile or tear stress, the fibers can more easily move inside the coating. This due to that the wale 4 is narrower than prior art fabrics and expose a smaller surface to the coating layers. As the wales 4 are narrower the open apertures in the fabric 1 will increase and thus the bonding between the layers of coating also increases. This will lower the risk of delamination between the coating layers and provide advantages by increasing the key properties in end uses as roofing membranes and like.

**[0027]** Fig. 2, shows a close-up view of the warp knitted fabric 1 seen in a perspective view. The view shows a number of parallel warp threads 3 which extends in the first direction X and number of parallel weft threads 2 extending in the second direction Y, perpendicular to the first direction X. The warp threads 3 and the weft threads 2 are together with the inlay thread 7 arranged in a number of wales 4 and courses 6b, 6c of the inventive warp knitted fabric 1.

**[0028]** The first and second stitch yarns 5a, 5b of each wale 4 are stitched into the warp knitted fabric 1 such as the first stitch yarn 5a is stitched with a so-called pillar stitch 8a into the warp knitted fabric 1 and by that the first stitch yarn 5a extends on both the first side A and the second side B of weft thread 2. In the same way, the second stitch yarn 5b is stitched with a similar pillar stitch 8b into the warp knitted fabric 1 such as the second stitch yarn 5b extends on both the first side A and the second side B of each weft thread 2. The pillar stitches 8a, 8b of the first and second stitch yarns 5a, 5b are mirror copies of each other, but due to the meandering inlay thread 7, which is threaded around the first and second stitch yarns 5a, 5b as illustrated in the figure, the mirror copy of the second stitch yarn 5b is offset one course 6b, 6d in the first direction X relative the first stitch yarn 5a and its courses 6a, 6c in which the inlay thread 7 is threaded around the first stitch yarn 5a. By that, the inlay thread 7 is lead in a meandering pattern between the first and second stitch yarns 5a, 5b, such as the inlay thread 7 engages with the first stitch yarn 5a in every odd course 6a, 6c in the first direction X of the warp knitted fabric 1 and engages with the second stitch yarn 5b in every even course 6b, 6d in the first direction X of the warp knitted fabric 1. Further, the inlay thread 7 is threaded around the first and second stitch yarns 5a, 5b in such a loose manner such as the first and second stitch yarns 5a, 5b remains their parallel extension at opposite sides of the one warp thread 3, in the first direction X, as mentioned above in relation to Fig. 1. In Fig. 2 it can further be seen that the inlay thread 7 is lead in the meandering pattern between the first and second stitch yarns 5a, 5b such as it passes over the warp thread 3 of the wale 4 on only one side, the first side A of the knitted fabric 1. The inlay thread 7 crosses, when directed towards the first stitch yarn 5a, the intersection 9, which is the intersection between the warp thread 3 and the weft thread 2, followed by being threaded around the first stitch yarn 5a in an odd course 6a, 6c by being threaded through two loops 10a of the pillar stitch 8a of the first stitch yarn 5a. After this, the inlay thread 7 passes over the warp thread 3 and over an intersection 9, still on the first side A of the knitted fabric 1, and further in direction towards the second stitch yarn 5b. In the same way, the inlay thread 7 is threaded around the second stitch yarn 5b in an even course 6b, 6d, which follows after the odd course 6a, 6c in the first direction X, by being threaded through two loops 10b of the pillar stitch 8b of the second stitch yarn 5b. This is repeated in a meandering pattern throughout the warp knitted fabric 1.

**[0029]** Although the description above shows various specific embodiments, they should not be construed as limiting the scope of the invention but are essentially there to illustrate various possible ways of practicing the invention falling within its scope. References to an element in singular are not meant to mean "one and only one" unless it is specifically expressed, but rather "one or more". It is an intention that elements mentioned in the described embodiments cover all structural and functional equivalents to the elements known to those skilled in the art.

## Claims

1. A warp knitted fabric (1) for roofing membrane, which warp knitted fabric (1) has a first side (A) and an opposite second side (B), the warp knitted fabric (1) comprising:

   parallel warp threads (3) extending in a first direction (X),
   parallel weft threads (2) extending in a second direction (Y) which is perpendicular to the first direction (X),
   parallel wales (4) extending in the first direction (X), wherein each wale (4) comprises one of the warp threads (3) and a first stitch yarn (5a) and a second stitch yarn (5b), which first and second stitch yarns (5a, 5b) are parallelly arranged at opposite sides of the one warp thread (3), wherein the first and the second stitch yarns (5a, 5b) are stitched into the warp knitted fabric (1) with a repeating pattern of a pillar stitch (8a, 8b) per course (6) of the warp knitted fabric (1), **characterized in that** the warp knitted fabric (1) further comprises an inlay thread (7) per wale (4), which inlay thread (7) is lead in a meandering pattern between the first and second stitch yarns (5a, 5b), from the first stitch yarn (5a) to the second stitch yarn (5b) and back again in a repeating pattern through the wale (4).

2. Warp knitted fabric (1) according to claim 1, wherein the inlay thread (7) is lead in a meandering pattern between the first and second stitch yarns (5a, 5b) such as the inlay thread (7) engages with the first stitch yarn (5a) in every odd course (6a, 6c, ...) in the first direction (X) of the warp knitted fabric (1) and engages with the second stitch yarn (5b) in every even course (6b, 6d, ...) in the first direction (X) of the warp knitted fabric (1).

3. Warp knitted fabric (1) according to claim 1 or 2, wherein the inlay thread (7) is lead in a meandering pattern between the first and second stitch yarns (5a, 5b) such as passing over the one warp thread (3) of the wale (4) on the first side (A) of the knitted fabric (1) in direction towards the first stitch yarn (5a), followed by being threaded around the first stitch yarn (5a) in an odd course (6a), followed by passing over the one warp thread (3) of the wale (4) on the first side (A) of the knitted fabric (1) in direction towards the second stitch yarn (5b), followed by being threaded around the second stitch yarn (5b) in an even course (6b) which follows after the odd course (6a) in the first direction (X), in a repeating meandering pattern such as the inlay thread (7) is threaded around the first stitch yarn (5a) in every odd course (6a, 6c, ...) and around the second stitch yarn (5b) in every even course (6b, 6d, ...) in the first direction (X) of the warp knitted fabric (1).

4. Warp knitted fabric (1) according to any of the previous claims, wherein the inlay thread (7) passes over the one warp thread (3) substantially at an intersection (9) between the warp thread (3) and the weft thread (2).

5. Warp knitted fabric (1) according to any of the previous claims, wherein the pillar stitch (8a) of the first stitch yarn (5a) is stitched into the warp knitted fabric (1) such as the first stitch yarn (5a) extends on both the first side (A) and the second side (B) of weft thread (2), and wherein the pillar stitch (8b) of the second stitch yarn (5b) is stitched into the warp knitted fabric (1) such as the second stitch yarn (5b) extends on both the first side (A) and the second side (B) of each weft thread (2).

6. Warp knitted fabric (1) according to any of the previous claims, wherein the pillar stitch (8b) of the second stitch yarn (5b) of each wale (4) is a mirror copy of the pillar stitch (8a) of the first stitch yarn (5a) of each wale (4), wherein the mirror copy of the pillar stitch (8b) of the second stitch yarn (5b) is offset one course (6b, 6d, ...) in the first direction (X) relative the pillar stitch (8a) of the first stitch yarn (5a).

7. Warp knitted fabric (1) according to any of the previous claims, wherein the inlay thread (7) is threaded around the first and second stitch yarns (5a, 5b) in such a loose manner such as the first and second stitch yarns (5a, 5b) remains their parallel extension at opposite sides of the one warp thread (3), in the first direction (X).

8. Warp knitted fabric (1) according to any of the previous claims, wherein the weft thread (2) and the warp thread (3) comprise any material of polymer, metallic, inorganic, organic material, or any hybrid of the same.

9. Warp knitted fabric (1) according to any of the previous claims, wherein the first and second stitch yarns (5a, 5b) comprise any material of polymer, metallic, inorganic, organic material, or any hybrid of

the same.

**10.** Warp knitted fabric (1) according to any of the previous claims, wherein the inlay thread (7) comprises any material of polymer, metallic, inorganic, organic material, or any hybrid of the same.

**11.** Warp knitted fabric (1) according to any of the previous claims, wherein the inlay thread (7), where threaded around the first stitch yarn (5a), is threaded through two loops (10a) of the pillar stitch (8a) of the first stitch yarn (5a), and wherein the inlay thread (7), where threaded around the second stitch yarn (5b), is thread through two loops (10b) of the pillar stitch (8b) of the second stitch yarn (5b).

**12.** Warp knitted fabric (1) according to any of the previous claims, wherein the inlay thread (7) is lead in the meandering pattern between the first and second stitch yarns (5a, 5b) such as it passes over the warp thread (3) of the wale (4) on only one side, the first side (A) of the knitted fabric (1).

**13.** A membrane comprising the warp knitted fabric (1) according to any of claims 1 to 12 and a polymer, wherein the warp knitted fabric (1) is at least partially embedded into a polymer.

**14.** A membrane according to claim 13, wherein the membrane is a roofing membrane.

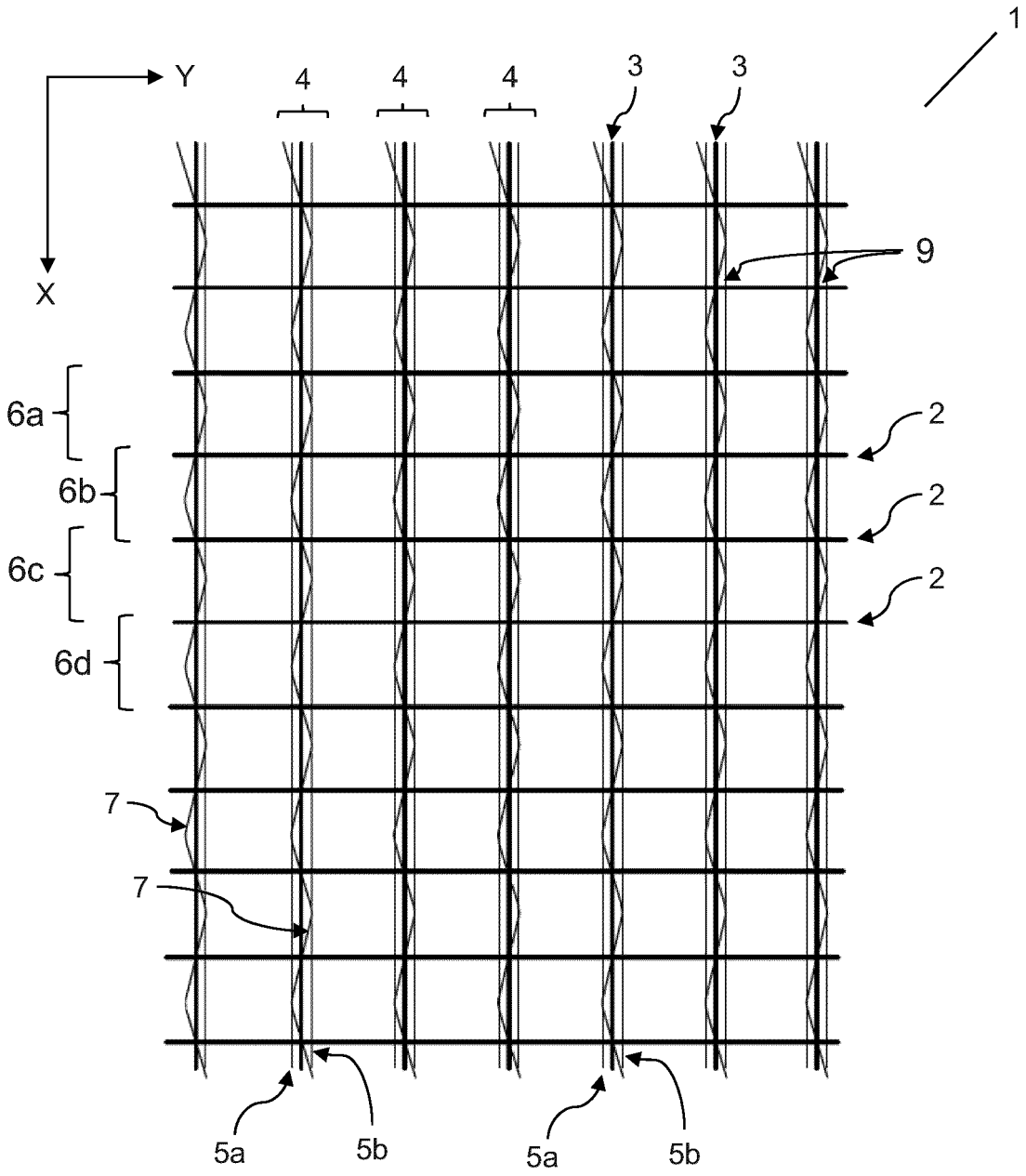


Fig. 1

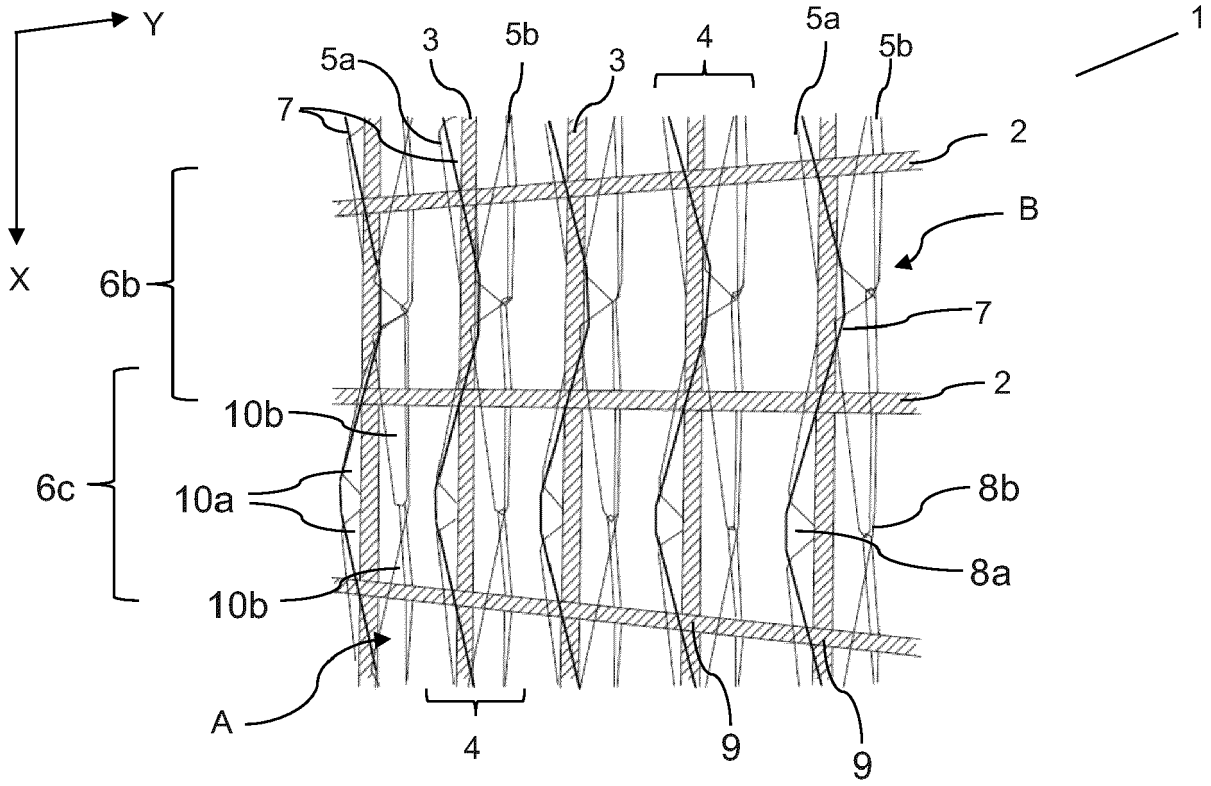


Fig. 2

Europäisches Patentamt
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# EUROPEAN SEARCH REPORT

Application Number
EP 22 16 8296

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
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