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(54) **Roofing tile**

Dachziegel

Tuile de toiture

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(56) References cited:
DE-A1- 3 343 568
DE-U1- 8 911 684
DE-U1-202005 018 755
GB-A- 1 066 332
GB-A- 1 583 141
US-A- 5 899 026
US-A1- 2004 244 315

EP 1 967 667 B1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to an improved roofing tile, which has better resistance to water penetration when installed on roofs. The invention applies particularly to interlocking clay or concrete tiles for roofs.

[0002] Tiled roofs, especially those with interlocking day or concrete tiles, have a tendency to leak during heavy rain and storms. This problem often occurs because rain water penetrates through the joins between adjacent tiles in as course of tiles that has been laid on a roof The problem is particularly severe with modern flat profile tiles, where the interlocked joins between tiles in a course are usually on about the same level as the body of the tile, but this can also be a problem with more traditional curved or pantiled tiles where the overlapping join overlap area on the sides of the tiles are elevated with respect to the body of the tile.

[0003] Tiled roofs normally must meet a building standard for resistance to rain water penetration Often sarking, which is a waterproof membrane or sheeting, will be installed beneath the tiles to catch any water and carry it away from the interior roof space However sarking adds considerably to the cost, and is most effective on more steeply pitched roofs. With roofs having a shallow pitch, the water leakage problem is generally more severe, and the sarking itself can leak if rainwater penetrates the tiles and builds up on it.

[0004] Document DE 3343568 proposes a solution to increase the resistance to rain water penetration by using a gasket made with a flocking texture. This flocking texture is applied on surfaces of neighbouring tiles which are in contact to seal the junction between these tiles. However, if the use of such texture is permeable to air and allows respiration of the roof surface, this texture is usually water absorbent, which is an important disadvantage when the junction between tiles is not perfectly done.

[0005] Similarly, document DE 20200518755 proposes a solution based on the use of a physical seal positioned on surfaces making the junction between tiles to prevent the penetration from rains and snow. But, this solution does not allow the respiration of the roof surface

[0006] Document EP 0 137 423 proposes a solution that allows a protection from rain and a respiration of the roof surface thanks to proofing strip that permits the passage of air and water from the inside of a loft and blocks the passage of water and dust from the outside. But, the proofing strip prevents or al least greatly reduces the efficiency of water drainage into the join between two adjacent tiles,

[0007] It would therefore be advantageous to provide an improved roof tile that can reduce the amount of water penetration. It would also be advantageous to provide a roof tile that can be used without sarking but still meet building standards for rain water penetration. It would also be useful to provide an alternative tile with good water penetration resistance. Improved water resistance would also be advantageous for flat profile tiles, and with tiled roofs having a shallow pitch.

SUMMARY OF THE INVENTION

[0008] The present invention in one broad form concerns a roofing tile having opposed sides, wherein at least one of said sides has a side portion that is adapted to overlap with a side portion of a like tile, but also to maintain an air gap between said portions, when positioned as a course of tiles on a roof, characterised in that the surface of said tile portion that would be juxtaposed to a surface of said like tile when in said course of tiles, is composed of material that reduces the surface tension of water when compared to the normal or untreated tile surface.

[0009] As one alternative, said surface of said tile portion is able to reduce the surface tension of water by being at least partly coated with a surface sealant. Preferably, a portion of one of said sides is an underhang, and a portion on the other side is an overhang, wherein said underhang portion is adapted to overlap and engage with an overhang portion of a like tile, and wherein said underhang has at least one channel along at least part of said side portion able to carry away water; wherein at least part of said underhang portion or said overhang portion is coated with a sealant.

[0010] Optionally, at least part of said overhang portion is coated with a sealant, or at least part of said underhang portion is coated with a sealant, or at least part of both said overhang portion and said underhang portion is coated with a sealant.

[0011] Preferably, the sealant is a silicone sealant, which may be substantially polydimethylsiloxane. The sealant may be applied as a solution or dispersion in a solvent. The solvent may be a hydrocarbon based solvent, preferably white spirits. The tile may be a concrete tile, or a clay or terracotta tile, for example.

[0012] The invention also concerns a method of reducing water penetration of a tiled roof, which comprises tiling said roof with roof tiles as described above. Also the invention concerns a method of reducing water penetration of a tiled roof, where the tiles are as described above.

BRIEF DESCRIPTION OF DRAWINGS

[0013] The invention is now discussed with reference to drawings, where:

Figure 1 shows an end view of a tile according to the present invention;
Figure 2 shows a top view and two section views of the same tile;
Figure 3 shows portions of two tiles in an interlocked position; and
Figure 4 shows a top view and two section views of

an alternate tile.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0014] The invention relates to roofing tiles, and in particular, to concrete tiles and clay or terracotta tiles.

[0015] A typical concrete tile is shown in the drawings. Figure 1 shows an end view of a roof tile (1) that is made from concrete in the normal manner. This tile is of the interlocking type, so that the tiles can be positioned in a row or course along battens on a roof, and the sides of the tiles engage with each other to provide a waterproof joint and lateral stability. Normally this occurs by having a portion along one side of each tile, called a "lap", to overlap with a cooperating portion on its adjacent tile, along the course of tiles. As shown in Figures 1 and 2, one side forms an overhang portion (2) or lap, and the opposing side of the tile forms a corresponding underhang portion (3) or lap.

[0016] While the arrangement shown in the Figures is a preferred arrangement, other forms of interlocking and fixing the tiles may also be utilised in accordance with this invention.

[0017] The body of the tile (4) can be of any suitable shape; while the example shown in Figure 1 to 3 is of a basically flat tile. The example shown in Figure 4 is a tile with a more ornate and curved body section. The identifying features in Figure 4 generally match those used in Figure 2. On the underside of the body (4) of the tile are weather bars (5), locating lugs (5a), and strengthening ribs (5b), plus batten lugs (6) that position the tiles on the roofing battens. The batten lugs (6) may have nail holes (not shown) formed in them, for fixing the tiles to the battens.

[0018] The underhang (3) portion commonly has two channels (8) along which water that penetrates into the join between adjacent tiles can run away, down the slope at which the tiles are fixed to the roof. The channels may extend the entire length of the side of tile, or may commence a short distance from the upper edge of the tile. One or especially two channels are most common.

[0019] In general, such interlocking tiles like those shown in the drawings, are usually constructed from coloured concrete, or from fired clay, and have interlocking edges and hooked tops. Plain tiles are now much less commonly used, and they are generally flat tiles, which are laid with a greater amount of lap, without specific interlocking means being present. Interlocking type tiles are now much more popular for roofs. The interlocking sides on interlocking tiles provide weather resistance without the great overlap of plain tiles, so the weight over an area is less. Interlocking tiles are much cheaper than plain tiles, and interlocking tiles work better at low pitch angles and in exposed areas.

[0020] Sarking, also known as roofing underlay (and in some places as roofing felt), is a waterproof membrane or underlay that is lain immediately under the roof tile battens to keep out wind driven rain and dust, also acts as a second waterproofing layer for a roof. It may also comprise boarding with roofing underlay above. The underlay or other impermeable membrane is normally laid over the rafters before the battens are fixed in place.

[0021] In Figure 3 of the drawings, the two tiles (1a) and (1b) have an overhang portion (2a) and an underhang portion (3b) that cooperate and engage with each other, but leave a small gap (7) in between. When laid, the two tiles have good lateral resistance, by having ridges (9) on the underside of the overhang (2a) that cooperate with the channels (8) on the top of the underhang (3b).

[0022] Generally there is a small air gap (7) permitted between the two tiles (1 a) and (1 b); generally from 1.4 to 3 mm wide. Adjacent tiles should have a relatively loose fit, so that preferably no part directly touches another tile. This helps prevent tile breakage, by allowing tiles room to expand in the heat of the sun. This also allows air to circulate and dry the surfaces of the underhang and overhang after rain. The gap reduces any capillary action of the rain water that would otherwise allow water to flow though to the overhang surface. Water that penetrates the join between tiles during rain can then run out again along the channels (8).

[0023] According to the present invention, it is the underhang and overhang surfaces within this gap area that can be coated with a sealer that reduces the surface tension of water, so as to cause an improvement in the water resistance of roofs constructed from these tiles.

[0024] Alternatively, when the tiles are being manufactured, they can be made so that the underhang and overhang regions have surfaces that reduces the surface tension for water.

[0025] In one embodiment, preferably at least a portion of the surface of the overhang (2a) and/or underhang (3b) is coated with a sealant. Either, the surface of the overhang can be coated, or else the surface of the underhang can be coated, or else the surfaces of both the overhang and underhang can be so coated. Most preferably the surface of the underside of the overhang is coated. Such coatings may also include or be replaced by other surface treatments, or constructions, that reduce the surface tension for water.

[0026] Any suitable sealant may be used for the coating, but one that has good water resistant properties, or good chemical resistant properties, is preferred. Sealants that are highly water resistant, chemical resistant, oxidation resistant, stable at relatively high temperatures such at that caused by hot weather, or that do not conduct electricity are very suitable for use in coating tiles. It is highly desirable that the coating be one that is compatible with the concrete or terracotta material, and that is retained on the surface for a considerable period of time without degrading or evaporating away, and that will not damage the tile.

[0027] By "sealant" is meant in this specification any substance or composition that reduces the surface tension of water. This can most easily be done by providing

a sealing layer to the surface of the tiles that presents a smooth surface to water, helping to prevent or reduce a meniscus forming, by reducing the surface tension of the water within the gap between the tiles.

[0028] A particularly suitable coating is a silicone type sealant. Other possible sealants include any of those compounds and compositions that can form a smooth coating on the tile surface, or that is able to reduce the surface tension of any water that is in contact with a surface having that coating. Other possible sealants are waxes and oils, plastics, smoothing agents or treatments, metal coatings, and hydrophobic agents and water repellents, and the like. Sealants that remain on the treated surface for a long period, particularly of several years, without losing their efficacy, are especially preferred.

[0029] The particularly preferred silicone sealants of the invention are compositions that are made up of a major portion of polysiloxane (or polysilane) compounds. Another preferred sealant is a water based potassium siliconate composition, for instance.

[0030] A preferred example of a suitable polysiloxane is polydimethylsiloxane ("PDMS"). The polysiloxane polymeric compound may be used alone, or with other commonly utilised fillers, diluents or other additives, such as shelf-life preserving agents, such as hygroscopic agents, plasticisers, and a catalyst for setting the compound. Often the PDMS sealants are made commercially available in the form of a paste that is provided in a tube or cartridge. This product can be used for metal to metal sealing, with steel and aluminium roofing or guttering, for instance.

[0031] A example of a preferred sealant is a PDMS sealant obtained from "Selleys Pty Ltd" of 1 Gow St, Padstow NSW 2211, Australia. Its' composition is:-

Polydimethylsiloxane compounds:	>60%
Amorphous silica:	<10%
Pigments:	<10%
Fillers and plasticisers:	<10%
Oxime silane [2224-33-1]:	<10%
Oxime silane [22984-54-9]:	<10%
Organotin catalysts:	<10%

The product description is "Metal to metal sealant for steel and aluminium roofing, flashings, guttering, etc. Coloured paste with a mild odour."

[0032] The PDMS sealant is preferable diluted or dispersed in a solvent for application to the surface portions of the tiles. Any suitable solvent may be used. Ideally it is best to use an effective solvent that dissolves the product fully and dries relatively quickly, and which does not chemically interact with the sealant or with the tile surface. Preferably a hydrocarbon based solvent may be used for this purpose with PDMS. Some examples are: White Spirits, hexane, toluene, xylene, turpentine, hydrocarbon oils or waxes, plant based oils or waxes, and the like. The solvent may be chosen according to the sealant being used, and tested to see that it works as desired. A solvent that evaporates quickly once the coating is applied is particularly advantageous.

[0033] The most preferred solvent is "White Spirits" when the sealant is the "Selleys" sealant described above. White spirit (CAS 64742-82-1) is a mixture of paraffins, cycloparaffins and low aromatic hydrocarbons which generally have boiling ranges between 150°C and 220°C. It is a clear water-white liquid, chemically stable and non-corrosive and has a mild odour.

[0034] When the "Selleys™" silicone sealant, as described above, is mixed with White Spirits the major part dissolves, but the filler component tends to remain in suspension. This can be allowed to settle out, or can be stirred and kept in suspension, when applying the coating; the results are not noticeably altered in either approach.

[0035] The sealant is dissolved in a quantity of solvent, and applied to the surfaces of the tiles, in the areas of the overhang and underhang that will be juxtaposed within the join area when the tiles are assembled in a course. It is possible to apply the sealant to other areas of the tiles, but this may not be desirable in many situations. If the sealant is applied to the top (ie, exterior) surface of the body of the tile, it may interfere with the tile's glazing, colour, and normal performance.

[0036] The sealant may also be applied to the underside of the body of the tile, particularly if there is a need to reduce or rectify any water penetration through the body of the tile that may be due to manufacturing flaws. It is often preferable not to coat the underside area of the tile that is part of the head lap when laid onto a roof. This is the area of the underside that overlaps with the courses immediately below, as this can have a negative effect on the water resistance of the tiled roof, depending on the circumstances. It is thought that this may be because any such coating will reduce the surface tension of any water that penetrates, allowing it to blow back up to, and over, the top of the tile, rather than adhere to the lower regions.

[0037] The coating may be applied by brush, or by spraying, or by any other suitable means such as using a roller, or by dipping the section of the tile to be coated into a bath. The tiles are then allowed to dry.

[0038] In addition, it is possible to add other ingredients to the formulation of sealant and a solvent. For example, a colouring agent may be added. A colour may be chosen to blend in with the tile colour or to contrast with it, for example. With the example of the formulation with the "Selleys" product in White Spirits, there are pigments present, and so when dry the coated portion looks slightly darker than the treated areas of a concrete tile. It is possible to blend the colour so that the coating is close in colour to the untreated areas, if desired. Otherwise, a colouring agent may be added to the formulation so that the treated areas are clearly visible, which may function as a marketing aid for the tiles or as an indicator to easily discover if areas are missed in the coating process.

[0039] Other additives may be pesticides or herbicides, especially long lasting ones. The narrow crevices between the tiles on a roof attract dust and dirt, and also small insects. Adding a pesticide, particularly a long lasting one to the formulation, can reduce insect infestations. Also, the crevices retain water from rain, and so mosses, lichens, small plants may grow in the crevices as well, so adding a herbicide, particularly a long acting one, can prevent this occurring. The plants will tend to damage the tiles, so any reduction in their growth, will assist in maintaining the tiles in their optimum state. Some suitable herbicides or pesticides include organotin compounds, copper compounds, and so on.

[0040] It is preferred to mix the sealant with sufficient solvent to provide a solution or suspension having a viscosity so that it is easy to apply. The application method will affect the quantities of solvent used; a viscous mixture may be able to be applied by brush, but for a spray application the mixture should be more freely flowing, like that of water.

[0041] When a silicone sealant is used, then it is preferred that a mixture of from about 1% to 75%, more preferably from about 2% to 50% of silicone to solvent may be used. Most preferably a mixture is used of from about 10% to 15% (by weight) of the sealant to solvent. These quantities are for the preferred composition of the silicone/ white spirits; the amounts of components should be adjusted appropriately if other ingredients are used instead.

[0042] Some tiles were coated with the mixture of PDMS in White Spirits and allowed to dry. Tests were conducted using different variations of coatings, either on the underhang alone, the overhang alone, and on both the overhang and underhang. As well as demonstrating the efficacy of the coating of the present invention in preventing or reducing water penetration through roofs without sarking, it was discovered that surprisingly that the major effect came from the coating on the overhang, especially on the undersurface of the overhang. Tests showed that about 85% of the improvement in water resistance arose from the coating being on the overhang, and only about 15% of the improvement arose from the coating being on the underhang and in the water channels.

[0043] As an alternative, the tiles may be manufactured so that the surface area of the underhang or overhang regions have reduced surface tension for water. For example with terracotta tiles, the surface of the overhang section of the tile may be glazed, which will reduce the surface tension of any water that is on that surface. Otherwise the surface of the overhang and underhang may be coated with a sealant substance in the manufacturing process. Or the surface may be polished, or subject to other physical treatments, such that a similar result is achieved. With clay/terracotta tiles the sealant substance may be one that melts in the kiln to form a smooth surface that reduces the surface tension of water. Combinations of such coatings or treatments may also be used.

[0044] The tiles may be treated to reduce surface tension in their overhang and underhang regions as part of the manufacture process; either in the manufacture of the tiles, or as a separate coating step immediately after production of the tiles. For example, the tiles may travel on a conveyor belt past a spray that applies the coating, or the like. The treated tiles are then sold.

[0045] Alternatively, the coatings may be applied in situ. Workmen may treat tiles already laid on a roof, by removing each tile, applying the coating to each tile, and then replacing the tiles on to the roof. At the same time, the tiles can be checked for damage, and cleaned.

EXAMPLES

Example 1 - Tests to determine effect of treated tiles under a variety of wind and rain conditions.

[0046] A solution of silicone in white spirits was prepared, by mixing 19 gm of the "Selleys" silicone sealant described above in 30.6 gm of white spirits, to give an 18 % w/w solution.

[0047] A brush or spray gun was used to apply this solution to the juxtaposed surfaces of the underhang and overhang of a number of concrete roof tiles.

[0048] The tiles were assembled on to a test frame, and sprayed with water, within a wind tunnel to simulate storm conditions. By progressively increasing the simulated wind speed and/or amount of water spraying on the roof, the effect on water proofing could be measured. The effect on differing roof pitches was also measured, as there is a tendency for more water penetration at lower roof pitches than at higher. Tests were conducted at pitches of 15, 20, 22.5, 25, 27 and 30 degrees.

[0049] The test frame allowed a 6 metre rafter length, with 400 ml per sec of water being introduced from the top and 450 ml per sec of water introduced into the wind stream at a lower level, at speeds of 57, 64, 76, 85, 90, 95, and 100 kph.

[0050] The tests were repeated with untreated tiles. The tests were repeated with variations of the coatings on the overhangs and underhangs; namely of tiles with only the overhang treated, only the underhang treated, and with both treated.

[0051] The results of these tests showed a strong effect in reducing water penetration of a tile roof using the treated tiles in accordance with the invention.

[0052] There was demonstrated in these dynamic wind tunnel tests that the sealant coating as described above did produce a major enhancement in performance of the water proofing ability. The tiles with the sealant coating in accordance with the invention withstood much higher wind and rain speeds, before significant water penetration was observed through the tile joints.

Example 2 - Additional tests to determine effect of treated tiles under a variety of wind and rain conditions.

[0053] Another solution of silicone in white spirits was prepared, by mixing 19.4 gm of the "Selleys" silicone sealant described above in 58.2 gm of white spirits, to give an 27.5 % w/w solution.

[0054] A brush or spray gun was used to apply this solution to the juxtaposed surfaces of the underhang and overhang of a number of concrete roof tiles.

[0055] The tiles were assembled on to a test frame, and sprayed with water, within a wind tunnel to simulate storm conditions, in a similar manner as with Example 1. The tests were also repeated with untreated tiles. The tests were repeated with different variations, of tiles with only the overhang treated, only the underhang treated, and both treated. Again the effect of different roof pitches were tested and measured. Consistent results with those of Example 1 were achieved.

Example 3 - Different concentration

[0056] The tests in Examples 1 and 2 were repeated with a solution of silicone in white spirits having a concentration of 10 % w/w. The results were also excellent.

Results

[0057] The results of all these tests showed a remarkably strong effect in reducing water penetration of a tile roof using the treated tiles in accordance with the invention. The concentration of sealant in the ranges tested (from 10% to 27.5%) gave similar results, so the effects do not correlate to the amount of sealant applied, once an effective amount is applied; the amount that is effective occurring at around a concentration of as little as 10%.

[0058] Overall the performance of the treated tiles according to the invention demonstrated clearly their advantages over traditional tiles, in that in high wind and rain conditions that causes leakage with traditional tiles, the rood with the tiles of the invention did not leak.

[0059] It will be apparent that obvious variations or modifications may be made in accordance with the invention that are intended to be part of the invention, and any such obvious variations or modification are therefore within the scope of the invention as defined by the appended claims.

Claims

1. A roofing tile (1) having opposed sides, wherein at least one of said sides has a side portion that is adapted to overlap with a side portion of a like tile, but maintain an air gap (7) between said portions, when positioned as a course of tiles on a roof, **characterised in that** the surface of said tile portion that would be juxtaposed to a surface of said like tile when in said course of tiles, is at least partly coated with a surface sealant, reducing the surface tension for water of said surface within said gap between the tiles when compared to a normal tile surface.

2. The roofing tile (1) of claim 1 having opposed sides, wherein a portion of one of said sides is an underhang (3), and a portion on the other side is an overhang (2), wherein said underhang portion (3) has a surface that is adapted to overlap and cooperate with a surface of an overhang portion (2) of a like tile, and wherein said underhand (3) has at least one channel (8) along at least part of said side portion able to carry away water; wherein at least part of said underhang portion (3) and/or said overhang portion (2) is coated with sealant.

3. The roofing tile (1) of claim 2, wherein at least part of said surface of the overhang portion (2) is coated with sealant.

4. The roofing tile (1) of claim 3, wherein the under-surface of said overhang portion (2) is coated with sealant.

5. The roofing tile (1) of claim 2, wherein at least part of said surface of the underhang portion (3) is coated with sealant.

6. The roofing tile (1) of claim 5, wherein the top surface of said underhang portion (3) is coated with sealant.

7. The roofing tile (1) of claim 2, wherein at least part of both said surfaces of the overhang (2) and underhang (3) portions are coated with sealant.

8. The roofing tile (1) of claim 7, wherein under-surface of said overhang portion (2) and the top surface of said underhang portion (3) are coated with sealant.

9. The roofing tile (1) on any one of claims 1 to 8, wherein said sealant is a silicone sealant

10. The roofing tile (1) of claim 9, wherein said silicone sealant is substantially polydimethylsiloxane

11. The roofing tile (1) of any one on claims 1 to 10, wherein said sealant is applied as a solution or dispersion in a solvent.

12. The roofing tile (1) of claim 11, wherein said solvent is a hydrocarbon based solvent

13. The roofing tile (1) of claim 12, wherein said solvent is white spirit

14. The roofing tile (1) of any one of claims 1 to 13,

wherein said tile is a concrete tile

15. The roofing tile (1) of any one of claims 1 to 13, wherein said tile is a clay or terracotta tile

16. A method of reducing water penetration of a tiled roof, where the tiles (1) comprising said tiled roof each have opposed sides, wherein at least one of said sides has a side portion that is adapted to overlap and cooperate with a side portion of a like tile, but maintain an air gap (7) between said portions, when positioned as a course of tiles (1) on a roof, and wherein the surface of said tile portion that is juxtaposed to a surface of said like tile when in said course of tiles, is at least partly coated with surface sealant reducing the surface tension for water of said surface within said gap between the tiles when compared to a normal tile surface, wherein the method compnses tiling said roof with said tiles (1).

17. The method of claim 16, which comprises removing untreated tiles from said roof, then at least partly coating said surface with said sealant, and then replacing said tiles.

18. The method of any one of claims 16 to 17, wherein said tiles are according to any one of claims,1 to 15.

Patentansprüche

1. Ein Dachziegel (1) mit gegenüberliegenden Seiten, wobei wenigstens eine dieser Seiten einen Seitenbereich hat, der vorgesehen ist, um mit einem Seitenteil eines entsprechenden Dachziegels zu überlappen, jedoch einen Luftspalt (7) zwischen diesen Bereichen zulassen, wenn er in einem Verlauf von Dachziegeln auf einem Dach positioniert ist,
dadurch gekennzeichnet, dass
die Oberfläche dieses Ziegelbereiches, die neben einer Oberfläche des besagten gleichen Ziegels in dem Verlauf von Ziegeln liegen würde, wenigstens teilweise mit einer Dichtfläche beschichtet ist, welche die Oberflächenspannung für Wasser dieser Oberfläche innerhalb des Spaltes zwischen den Ziegeln verglichen mit einer normalen Ziegeloberfläche reduziert.

2. Der Dachziegel (1) gemäß Anspruch 1 mit gegenüberliegenden Seiten, wobei ein Bereich einer dieser Seiten ein Unterhang (3) ist und ein Bereich der anderen Seite ein Überhang (2) ist, wobei dieser Unterhangbereich (3) eine Oberfläche aufweist, die geeignet ist, um mit einer Oberfläche eines Überhangbereiches (2) eines entsprechenden Ziegels zu überlappen und mit dieser zusammenzuarbeiten, und wobei dieser Unterhang (3) wenigstens einen Kanal (8) aufweist, entlang dessen wenigstens ein Teil dieses Seitenbereiches Wasser abführen kann; wobei wenigstens ein Teil dieses Unterhangbereiches (3) und/oder dieses Überhangbereiches (2) mit einem Dichtmittel beschichtet ist.

3. Der Dachziegel (1) gemäß Anspruch 2, wobei wenigstens ein Teil der Oberfläche des Überhangbereiches (2) mit einem Dichtmittel beschichtet ist.

4. Der Dachziegel (1) gemäß Anspruch 3, wobei die Unteroberfläche dieses Überhangbereiches (2) mit einem Dichtmittel beschichtet ist.

5. Der Dachziegel (1) gemaß Anspruch 2, wobei wenigstens ein Teil der Oberfläche des Unterhangbereiches (3) mit einem Dichtmittel beschichtet ist.

6. Der Dachziegel (1) gemäß Anspruch 5, wobei die obere Oberfläche dieses Unterhangbereiches (3) mit einem Dichtmittel beschichtet ist.

7. Der Dachziegel (1) gemäß Anspruch 2, wobei wenigstens ein Teil beider Oberflächen der Überhang- (2) und Unterhangbereiche (3) mit einem Dichtmittel beschichtet sind.

8. Der Dachziegel (1) gemäß Anspruch 7, wobei die Unteroberfläche dieses Überhangbereiches (2) und die obere Oberfläche des Unterhangbereiches (3) mit einem Dichtmittel beschichtet sind.

9. Der Dachziegel (1) nach einem der Ansprüche 1 - 8, wobei dieses Dichtmittel ein Silikondichtmittel ist.

10. Der Dachziegel (1) nach Anspruch 9, wobei dieses Silikondichtmittel im Wesentlichen Polydimethylsiloxan ist.

11. Der Dachziegel (1) nach einem der Ansprüche 1 - 10, wobei dieses Dichtmittel als Lösung oder Dispersion in einem Lösungsmittel angewandt wird.

12. Der Dachziegel (1) gemäß Anspruch 11, wobei dieses Lösungsmittel ein auf Kohlenwasserstoff basiertes Lösungsmittel ist.

13. Der Dachziegel (1) nach Anspruch 12, wobei das Lösungsmittel Lackbenzin ist.

14. Der Dachziegel nach einem der Ansprüche 1 -13, wobei dieser Dachziegel ein Betonziegel ist.

15. Der Dachziegel (1) nach einem der Ansprüche 1 -13, wobei der Dachziegel ein Ton- oder Terrakottaziegel ist.

16. Ein Verfahren zum Reduzieren des Eindringens von Wasser in ein Ziegeldach, wobei die Ziegel (1), wel-

che dieses Ziegeldach aufweist, jeweils gegenüberliegende Seiten aufweisen, wobei wenigstens eine dieser Seiten einen Seitenbereich hat, der geeignet ist, um mit einem Seitenbereich des entsprechenden Ziegels zu überlappen und zusammenzuwirken, jedoch einen Luftspalt (7) zwischen diesen Bereichen beizubehalten, wenn der Ziegel in einem Verlauf von Ziegeln auf einem Dach angeordnet ist und wobei die Oberfläche dieses Ziegelbereiches neben einer Oberfläche des entsprechenden Ziegels liegt, wenn dieser in dem Verlauf von Ziegeln angeordnet ist und wobei dieser wenigstens teilweise mit einer Dichtoberfläche beschichtet ist, welche die Oberflächenspannung von Wasser auf dieser Oberfläche innerhalb dieses Spaltes zwischen den Ziegeln verglichen mit einer normalen Ziegeloberfläche reduziert, wobei das Verfahren das Dachdecken dieses Daches mit diesen Ziegeln (1) umfasst.

17. Das Verfahren gemäß Anspruch 16, bei dem unbehandelte Ziegel aus von dem Dach entfernt werden, dann wenigstens teilweise diese Oberfläche mit dem Dichtmittel beschichtet wird und dann die Dachziegel ersetzt werden.

18. Das Verfahren nach wenigstens einem der Ansprüche 16 -17, wobei die Dachziegel nach einem der Ansprüche 1 - 5 ausgebildet sind.

Revendications

1. Tuile de toiture (1) ayant des côtés opposés, dans laquelle au moins l'un desdits côtés a une partie latérale qui est adaptée pour recouvrir une partie latérale d'une tuile similaire, mais maintenir un espace d'air (7) entre lesdites parties, lorsqu'elle est positionnée sous la forme d'une rangée de tuiles sur un toit,
caractérisée en ce que la surface de ladite partie de tuile qui serait juxtaposée à une surface de ladite tuile similaire lorsqu'elle serait dans ladite rangée de tuiles, est au moins partiellement recouverte avec un agent d'étanchéité de surface, réduisant la tension superficielle pour l'eau de la dite surface dans ledit espace entre les tuiles par rapport à une surface de tuile normale.

2. Tuile de toiture (1) selon la revendication 1, ayant des côtés opposés, dans laquelle une partie de l'un desdits côtés est une saillie inférieure (3), et une partie de l'autre côté est une saillie supérieure (2), dans laquelle ladite partie de saillie inférieure (3) a une surface qui est adaptée pour recouvrir et coopérer avec une surface d'une partie de saillie supérieure (2) d'une tuile similaire, et dans laquelle ladite saillie inférieure (3) a au moins un canal le long d'au moins une partie de ladite partie latérale pouvant éloigner l'eau ; dans laquelle au moins une partie de ladite partie de saillie inférieure (3) et/ou ladite partie de saillie supérieure (2) est recouverte avec un agent d'étanchéité.

3. Tuile de toiture (1) selon la revendication 2, dans laquelle au moins une partie de ladite surface de la partie de saillie supérieure (2) est recouverte avec un agent d'étanchéité.

4. Tuile de toiture (1) selon la revendication 3, dans laquelle la surface inférieure de ladite partie de saillie supérieure (2) est recouverte avec un agent d'étanchéité.

5. Tuile de toiture (1) selon la revendication 2, dans laquelle au moins une partie de ladite surface de la partie de saillie inférieure (3) est recouverte avec un agent d'étanchéité.

6. Tuile de toiture (1) selon la revendication 5, dans laquelle la surface supérieure de ladite partie de saillie inférieure (3) est recouverte avec un agent d'étanchéité.

7. Tuile de toiture (1) selon la revendication 2, dans laquelle au moins une partie desdites surfaces de la saillie supérieure (2) et une partie des parties de saillie inférieure (3) sont recouvertes avec un agent d'étanchéité.

8. Tuile de toiture (1) selon la revendication 7, dans laquelle la surface inférieure de ladite partie de saillie supérieure (2) et la surface supérieure de ladite partie de saillie inférieure (3) sont recouvertes avec un agent d'étanchéité.

9. Tuile de toiture (1) selon l'une quelconque des revendications 1 à 8, dans laquelle ledit agent d'étanchéité est un agent d'étanchéité à base de silicone.

10. Tuile de toiture (1) selon la revendication 9, dans laquelle ledit agent d'étanchéité à base de silicone est sensiblement du polydiméthylsiloxane.

11. Tuile de toiture (1) selon l'une quelconque des revendications 1 à 10, dans laquelle ledit agent d'étanchéité est appliqué sous la forme d'une solution ou d'une dispersion dans un solvant.

12. Tuile de toiture (1) selon la revendication 11, dans laquelle ledit solvant est un solvant à base d'hydrocarbure.

13. Tuile de toiture (1) selon la revendication 12, dans laquelle ledit solvant est du white spirit.

14. Tuile de toiture (1) selon l'une quelconque des re-

vendications 1 à 13, dans laquelle ladite tuile est une tuile de ciment.

15. Tuile de toiture (1) selon l'une quelconque des revendications 1 à 13, dans laquelle ladite tuile est une tuile d'argile ou de terre cuite.

16. Procédé pour réduire la pénétration de l'eau d'un toit en tuiles, dans lequel les tuiles (1) composant ledit toit en tuiles, ont chacune des côtés opposés, dans lequel au moins l'un desdits côtés a une partie latérale qui est adaptée pour recouvrir et coopérer avec une partie latérale d'une tuile similaire, mais maintenir un espace d'air (7) entre lesdites parties, lorsqu'elles sont positionnées sous la forme d'une rangée de tuiles (1) sur un toit, et dans lequel la surface de ladite partie de tuile est juxtaposée à une surface de ladite tuile similaire lorsqu'elle est dans ladite rangée de tuiles, est au moins partiellement recouverte avec un agent d'étanchéité de surface, réduisant la tension superficielle pour l'eau de la dite surface dans ledit espace entre les tuiles par rapport à une surface de tuile normale, lequel procédé comprenant l'étape consistant à couvrir ledit toit avec lesdites tuiles (1).

17. Procédé selon la revendication 16, qui comprend l'étape consistant à retirer les tuiles non traitées dudit toit, recouvrir ensuite au moins partiellement ladite surface avec ledit agent d'étanchéité, et remplacer ensuite lesdites tuiles.

18. Procédé selon l'une quelconque des revendications 16 à 17, dans lequel lesdites tuiles sont selon l'une quelconque des revendications 1 à 15.

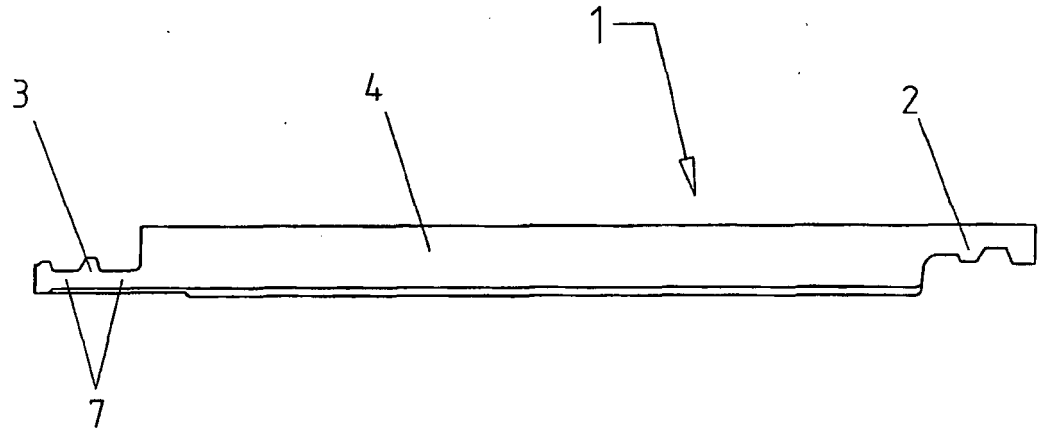

FIGURE 1

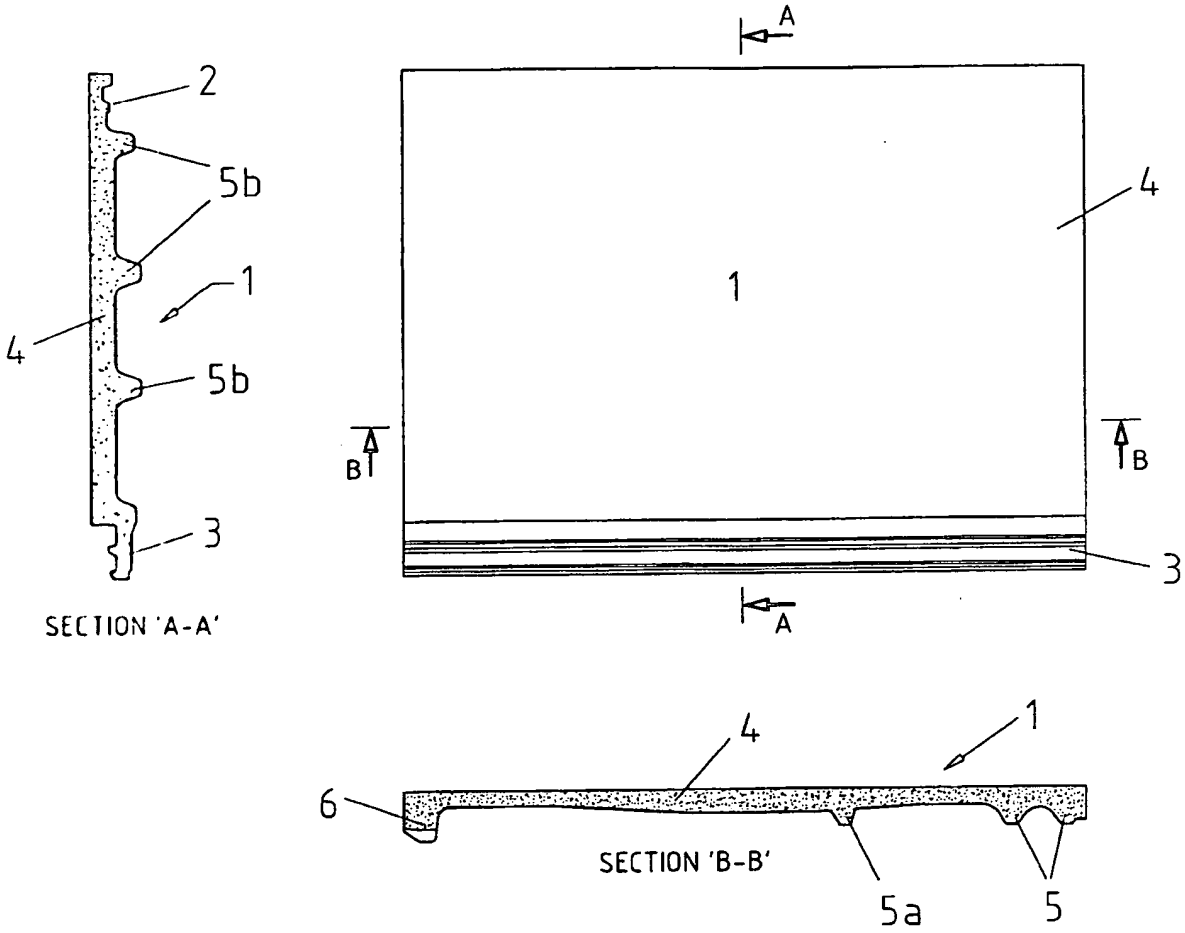

FIGURE 2

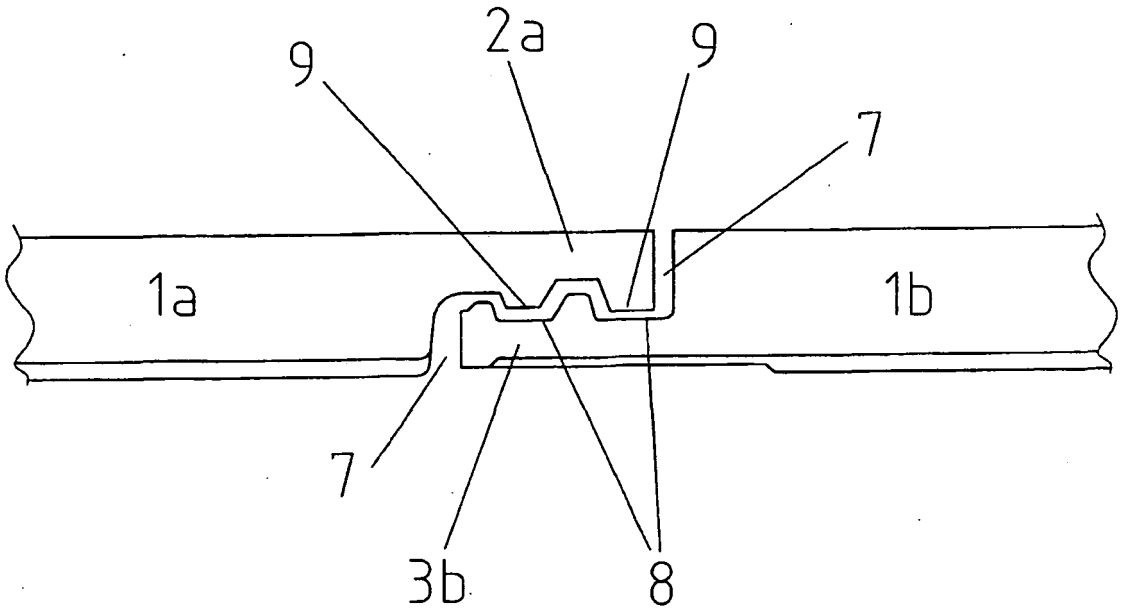

FIGURE 3

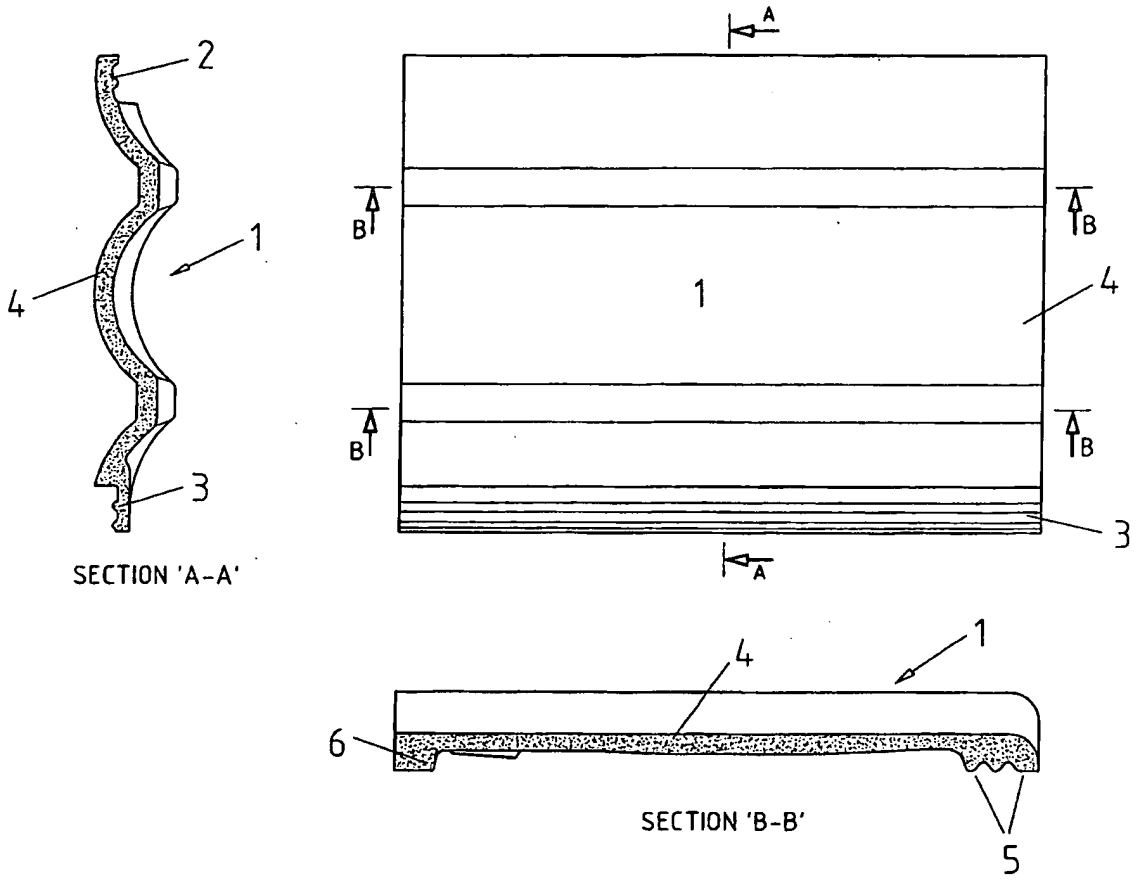

FIGURE 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 3343568 **[0004]**
- DE 20200518755 **[0005]**
- EP 0137423 A **[0006]**