



(11) **EP 1 689 952 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
28.02.2007 Bulletin 2007/09

(21) Application number: **04797419.1**

(22) Date of filing: **02.11.2004**

(51) Int Cl.:
E04D 3/30 (2006.01)

(86) International application number:
PCT/DK2004/000757

(87) International publication number:
WO 2005/042871 (12.05.2005 Gazette 2005/19)

(54) **A ROOF COVERING ELEMENT**
DACHEINDECKUNGSELEMENT
ELEMENT DE COUVERTURE DE TOIT

(84) Designated Contracting States:
DK FI SE

(30) Priority: **03.11.2003 DK 200301634**

(43) Date of publication of application:
16.08.2006 Bulletin 2006/33

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02, 30 January 1998 (1998-01-30) & JP 09 268713
A (TAKIRON CO LTD), 14 October 1997
(1997-10-14)

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Description

[0001] The present invention relates to a roof covering element according to the preamble to claim 1.

[0002] A wave-shaped roof covering element of shaped metal plate is often configured with a shape and a finish that are very close to the shape and finish of a conventional tiles of ceramic material. Such a roof covering element is known from EP 1 253 260.

[0003] A wave-shaped roof covering element according to the preamble of claim 1 is disclosed in GB-A-2194265.

[0004] Often, the roof covering element is configured with an upwardly bent side of the metal plate transversally to the hollows in relation to the top face and a downwardly bent side transversally to the hollows in relation to the underside.

[0005] When the roof of a house is fitted by use of roof covering elements, the first step is to mount a lowermost row of roof covering elements most proximate the eaves/eaves gutter. Subsequent rows of roof covering elements are mounted with an overlap in relation to the roof covering elements already mounted. The overlap is provided by an upwardly bent edge of the roof covering elements in a row being overlapped by a downwardly bent edge of the roof covering elements in a subsequent row. The upwardly bent edge having a smaller expanse than the downwardly bent edge, it is taken into consideration that inaccuracies/tolerances, if any, in the fitted rows of roof covering elements will not appear in an obvious manner in the finished roof of the house. Moreover, a small air passage is provided between the upwardly bent and the downwardly bent edges. Hereby some sort of air supply to the subjacent roof void is ensured. In many cases, particular ventilation caps will also be mounted on the roof of the house to ensure further supply of air to the roof void. The supply of air to the roof is important precisely to keep the humidity in the roof void at a low level.

[0006] In connection with roof covering elements manufactured from relatively thin metal plates, one of the drawbacks of this type of roof covering elements is accentuated in connection with the changing weather conditions of spring and autumn. The relatively moist climate and the drastic temperature changes result in the thin metal plates being cooled quickly and assume the temperature of the ambient atmosphere. Due to the drastic temperature changes (the temperature drop) the water vapour (moisture) contained in the air in the roof void cannot be equalised to the humidity of the ambient atmosphere; rather it will condense to liquid drops on the cold underside of the roof covering element. The liquid drops will collect to increasingly large drops of liquid on the underside of the roof covering element, and as they accumulate to a certain size, they will tend to seek towards lower parts of the roof covering element and merge with other drops and then they may drip down into the subjacent roof structure. This is the cause of humidity-related problems in the subjacent roof structure.

[0007] It is therefore known to manufacture roof covering elements comprising a band of absorbing material mounted on the underside of the roof covering element transversally to the wave hollows. This band of an absorbing material thus serves to capture drops of condensed water vapour and prevent liquid drops from dripping down into the subjacent roof structure.

[0008] In particular cases the band of absorbing material is not sufficient for absorbing the amount of liquid condensing to the underside of the roof covering element. Therefore, despite the absorbing material, it is possible that liquid may drop into the subjacent roof structure. In particular during periods with high humidity and when frequent temperature changes occur, this problem is pronounced.

[0009] It is an object of the invention to provide a roof covering element, whereby the drawbacks of the prior art are obviated. This is accomplished by means of a roof covering element according to the invention and as featured in the characterising part of claim 1.

[0010] Hereby a wave-shaped roof covering element of a metal plate is provided, whereby it is ensured that the water vapour condensing on the underside of the roof covering element in the form of water drops is collected and conveyed down along the underside. Configuration of an elongate plate part on the underside of the roof covering element in the area centrally of the hollow of the roof covering element, a "channel" is formed at the transition between the underside of the roof covering element and the plate part for conveying the liquid (condensed water) down along the underside.

[0011] When the water droplets reach a certain size they will merge and seek towards lower areas of the underside. The water drop will thus travel downwards to the "channel" and be conveyed down along the channel to a lower region of the underside where the channel ceases. Here the water drop will have gained a certain speed and will be able to travel the final distance downwards to the downwardly bent edge of the roof covering element. Here the water drop will leave via the narrow air passage that was established between the upwardly bent edge of the subjacent roof covering element and the downwardly bent edge on the superposed roof covering element and out on the top face of the subjacent roof covering element.

[0012] According to a preferred embodiment of the invention, the plate part comprises side edges that are in parallel with or essentially in parallel with the longitudinal axis. Hereby an advantageous embodiment of the channel is provided at the transition between the underside of the roof covering element and the plate part.

[0013] According to an alternative preferred embodiment of the invention, the plate part comprises side edges in the expanse of the longitudinally extending axis that converge towards a lower portion of the roof covering element. Hereby an alternative advantageous configuration of the channel is accomplished at the transition between the underside of the roof covering element and the plate part.

[0014] According to yet a further advantageous embodiment of the invention the plate part is plane. Hereby a channel is provided that has a large expanse. Between the underside of the roof covering element and a side of the plate part that faces towards said underside, a slotted configuration of the channel is hereby provided that may be advantageous in particular cases.

[0015] According to yet a further advantageous embodiment of the invention the plate part is provided with a curved shape that follows the underside of the roof covering element or essentially follows the underside of the roof covering element. Hereby a channel is provided with a well defined configuration that is, in other particular cases, advantageous. Thus, the channel is configured between a side edge of the plate portion that extends essentially in parallel with the roof covering element with a longitudinal axis in parallel with the width of the roof covering element and the underside of the roof covering element.

[0016] According to yet a further advantageous embodiment of the invention, the plate part comprises short side edges and long side edges, wherein said short side edge, most proximate a downwardly bent edge on the roof covering element, comprises a rounded edge towards the surface of the plate element. Hereby a rounded edge is accomplished on the plate part most proximate to the downwardly bent edge of the roof covering element, which is advantageous in that the rounded part readily permits the water to be conveyed down across the lower part of the roof covering element.

[0017] According to yet an advantageous embodiment of the invention, the plate part is attached to the roof covering element by means of an adhesive. Hereby an advantageous attachment of the plate part to the roof covering element is provided. The adhesive may be eg a bitumen, a setting glue or the like.

[0018] According to yet an advantageous embodiment of the invention, the roof covering element and the plate part are both manufactured from a metal. Hereby a material is suggested that is particularly useful for the manufacture of a roof covering element having a plate part on its underside.

[0019] According to yet a preferred embodiment of the invention, the plate part has a size that constitutes between 20% and 50% of the size of the hollow. Hereby relative dimensions on the plate part are suggested that are particularly useful for the manufacture of the plate part.

[0020] Now, in the following the invention will be described with reference to the drawing; wherein

Figure 1 shows a plane view of a first preferred embodiment of a wave-shaped roof covering element, seen from above; and

Figure 2 shows a plane view of a second preferred embodiment of a roof covering element, seen from above; and

Figure 3 shows the roof covering element shown in Figures 1 and 2, in a side view in parallel with the axis X; and

Figure 4A shows a sectional view of the roof covering element, in a side view, featuring a preferred embodiment of the plate part, seen from the axis Y; and

Figure 4B shows an alternative sectional view of the roof covering element, in a side view, with a preferred embodiment of the plate part, seen from the axis Y; and

Figure 5A shows a sectional view of the roof covering element, in a side view, and featuring an alternative preferred embodiment of the plate part, seen from the axis Y; and

Figure 5B shows an alternative sectional view of the roof covering element, in a side view, with a second preferred embodiment of the plate part, seen from the axis Y.

[0021] In the following, reference is made to Figures 1, 2 and 3.

[0022] As shown in Figures 1 and 2, the wave-shaped roof covering element 1 comprises a metal plate having a width 2 in parallel with an axis X and a length 3 in parallel with an axis Y. Moreover, the roof covering element 1 has a top face 4 and an underside 5 and comprises a plurality of parallel curved hollows 6 along the width 2 of the roof covering element 1. The curved hollows 6 are advantageously formed by pressing of the metal plate in a pressing tool.

[0023] Also, the roof covering element 1 comprises an upwardly bent edge 14 along the Y axis at an upper end 1B of the roof covering element 1, and a downwardly bent edge 15 along the Y axis at a lower area of the roof covering element 1. The upwardly bent edge 14 has a smaller expanse than the downwardly bent edge, whereby a narrow air passage is provided between the upwardly bent edge 14 and the downwardly bent edge 15 when several roof covering element are fitted side-by-side and/or in overlapping relationship.

[0024] Reference is made in the following to Figure 1, wherein an elongate plate part resp. portion 10 is arranged on the underside 5 of the roof covering element 1 which is manufactured from a metal plate. The plate part 10 has a longitudinal axis in parallel with or essentially in parallel with the axis X corresponding to the width 2 of the roof covering element 1, and a lateral axis in parallel with or essentially in parallel with the axis Y corresponding to the length 3 of the roof covering element 1. The plate part 10 comprises long side edges 13A, 13B that are in parallel with or essentially in parallel with the axis X, and short side edges 12A, 12B that are in parallel with or essentially in parallel with the axis Y. A plate part 10 is arranged centrally in each hollow 6 or centrally in

preferably each hollow 6.

[0025] Reference is now being made to Figure 2 for a description of an alternative embodiment of an elongate plate part 30 that is arranged on the underside 5 of the roof covering element 1. The roof covering element 30 is made of a metal plate and has a longitudinal axis in parallel with or essentially in parallel with the axis X corresponding to the width 2 of the roof covering element 1, and a lateral axis in parallel with or essentially in parallel with the axis Y corresponding to the length 3 of the roof covering element 1. The plate part 30 comprises long side edges 33A, 33B in the expanse of the axis X that converge towards a lower region 1A of the roof covering element 1 shown in Figure 3. A plate part 30 is arranged centrally in each hollow 6 or centrally in preferably each hollow 6.

[0026] Side edges 13A, 13B; 33A, 33B combine with the underside of the roof covering element 1 to define a channel 9 (see Figures 4 and 5) for conveying condensed water (water drops) that travel down the underside of the roof covering element 1. At the side edge 12A, 32A the channels 9 cease and along the underside 5 the condensed water travels the remaining distance down to the edge 15 where it is conveyed outwards to the top face of a roof covering element in a row situated lower.

[0027] The plate part 10, 30 has a relative width B compared to the dimension A of the roof covering element 1, where B is between 10% and 60% of the dimension A. As regards the width B of the plate part 30 of Figure 2, it is measured centrally on the long side edge 33A, 33B.

[0028] It will be understood that the angle formed by the side edges 33A, 33B on the roof covering element in relation to the axis X can advantageously be adapted to the typical pitches of the roof of a house. Thus, an increased angle of the side edges 33A, 33B will yield a larger relative slope on the channel 9 compared to side edges that are in parallel with the axis X.

[0029] Reference now being made to Figure 3, the roof covering element 1 is shown in an angle that represents an angle with which the roof covering element 1 is fitted on the roof of a house. Most often, the angle will be between 20 and 60° degrees (360°), but they may just as well assume other values.

[0030] The lower edge 12A, 32A of the plate portion 10, 30 may advantageously be configured with a rounded portion (not shown) at the transition between the face 10B and the edge 12A, 32A, since this rounded portion involves that water drops will, in particular cases, more easily "let go" of the edge 12A, 32A.

[0031] Figure 4A shows a section of the roof covering element 1 in a lateral view along the axis Y, wherein a plane and elongate plate portion 10 is arranged on the underside 5 of the metal plate (the roof covering element) in the area centrally of each hollow 6. The plate portion 10 is secured to the underside 5 of the roof covering element 1 by means of an adhesive or a glue at a contact face that extends throughout the entire width of the plate portion. At the side edges 13A, 13B the channel 9 is thus

delimited between the expanse 40 of the contact face, the edges 13A, 13B and the underside 5 of the roof covering element.

[0032] Figure 4B shows a further section of the roof covering element in a side view, along the axis Y, wherein a plane and elongate plate portion 10 is arranged on the underside 5 of the metal plate (the roof covering element) in the area centrally of each hollow 6. The plate part 10 is secured to the underside 5 of the roof covering element 1 by means of an adhesive or a glue at a contact face that extends only throughout a portion of the width of the plate part and is delimited by an edge/face 41 that is configured at a distance from the side edges 13A, 13B. Thus, the channel 9 is delimited by the underside 5 of the roof covering element 1, the edge 41, a top face 42 of the plate part and the edges 13A, 13B.

[0033] Figure 5A shows a section of a roof covering element in a lateral view, wherein a curved and elongate plate part 30 is arranged on the underside 5 of the metal plate (the roof covering element) in the area centrally of each hollow 6. The plate part 30 is formed with a curved shape that follows the underside 5 of the roof covering element 1 or essentially follows the underside 5 of the roof covering element 1. The plate part 30 is secured to the underside 5 by means of an adhesive or a glue at a contact face that extends throughout the entire width of the plate part 30 and is delimited at an edge/face 51A configured at the side edges 33A, 33B. The channel 9 is thus delimited by the underside 5 of the roof covering element 1, the edge/face 51 and the edge 33A, 33B.

[0034] Figure 5B shows a section of another roof covering element in a lateral view, wherein a curved and elongate plate part 30 is arranged on the underside 5 of the metal plate (the roof covering element) in the area centrally of each hollow 6. The plate part 30 is formed with a curved shape that follows the underside 5 of the roof covering element 1 or essentially follows the underside 5 of the roof covering element 1. The plate part 30 is secured to the underside 5 by means of an adhesive or a glue at a contact face that extends only throughout a part of the width of the plate portion and is delimited by an edge/face 51A that is configured at a distance from the side edges 33A, 33B. Thus, the channel is delimited by the underside 5 of the roof covering element 1, the edge 51A, a top face 52 of the plate part and the edges 33A, 33B.

[0035] It will be understood that figures 4A, 4B, 5A, 5B are explanatory sketches and that other distances and dimensions are not drawn to scale.

[0036] Advantageously, the plate part 10, 30 can be secured to the roof covering element 1 at a contact face on the underside 5 of the roof covering element 1 by means of an adhesive or a glue. At least one plate part 10, 30 will be arranged on the underside of a roof covering element 1 for every one roof covering element. Alternatively the plate part 10, 30 can be secured to the roof covering element 1 by means of e.g. point welding. Advantageously the plate part 10, 30 is made of metal, and

further advantageously the plate part 10, 30 and the roof covering element 1 are made of a plate material of the same type of metal. The roof covering element 1 and the plate part 10, 30 may thus be made of the same plate material and may moreover have the same thickness. In particular cases the plate material of the plate part 10, 30 may have a thickness exceeding the plate thickness of the roof covering element 1. It has further been found that a sound-deadening effect is accomplished when a plate part 10, 30 is arranged on the underside 5 of the metal plate in the area centrally of each hollow 6 of the roof covering element 1.

[0037] In the figures the plate part 10, 30 is shown formed with a plane shape and a shape that follows a curved shape. However, the plate part may also assume other shapes, including a V-shape, wherein the plate part comprises a bending at a bending edge (not shown) which is in parallel with or essentially in parallel with the axis X and is formed centrally of or at least essentially centrally of the short side edge 12A, 12B; 32A, 32B.

Claims

1. A wave-shaped roof covering element (1) of a metal plate having a width (2) in parallel with an axis (X) and a length (3) in parallel with an axis (Y), a top face (4) and an underside (5), which metal plate comprises a number of parallel curved hollows (6) along the width (2) of the roof covering element (1), **characterised in that** in the area centrally of each hollow (6) or centrally of preferably each hollow (6), a respective elongate plate part (10, 30) is attached to the underside (5) of the metal plate, which plate part (10, 30) has a longitudinal axis in parallel with or essentially in parallel with the axis (X) corresponding to the width (2).
2. A roof covering element (1) according to claim 1, **characterised in that** the plate part (10) comprises long side edges (13A, 13B) that are in parallel with or essentially parallel with the axis (X).
3. A roof covering element (1) according to claim 1, **characterised in that** the plate part (30) comprises long side edges (33A, 33B) in the expanse of the axis (X) that converge towards a lower area (1A) of the roof covering element (1).
4. A roof covering element (1) according to any one of claims 1-3, **characterised in that** the plate part (10, 30) is plane.
5. A roof covering element (1) according to any one of claims 1-3, **characterised in that** the plate part (10, 30) is formed in a curved shape that follows the underside (5) of the roof covering element (1) or essentially follows the underside (5) of the roof covering

element (1).

6. A roof covering element (1) according to any one of the preceding claims, **characterised in that** the plate part (10, 30) further comprises short side edges (12A, 12B, 32A, 32B) and long side edges (13A, 13B, 33A, 33B) and that the short side edge (12A, 32A) most proximate a downwardly bent edge (15) on the roof covering element (1) comprises a rounded edge towards the surface of the plate part.
7. A roof covering element (1) according to any one of claims 1-6, **characterised in that** the plate part (10, 30) is secured to the roof covering element by means of an adhesive.
8. A roof covering element (1) according to any one of claims 1-6, **characterised in that** the roof covering element (1) and the plate part (10, 30) are both made of a metal.
9. A roof covering element (1) according to any one of claims 1-6, **characterised in that** the plate part (10, 30) has an area that constitutes between 20% and 50% of the area of the roof covering element.

Patentansprüche

1. Wellenförmiges Dacheindeckungselement (1) mit einer Metallplatte, die eine Breite (2) parallel zu einer Achse (X) und eine Länge (3) parallel zu einer Achse (Y), eine Oberseite (4) und eine Unterseite (5) hat, welche Metallplatte eine Anzahl von parallelen gekrümmten Senken (6) entlang der Breite (2) des Dacheindeckungselementes (1) aufweist, **dadurch gekennzeichnet, dass** in dem mittigen Bereich jeder Senke (6) oder mittig von vorzugsweise jeder Senke (6) ein jeweiliger länglicher Plattenteil (10, 30) an der Unterseite (5) der Metallplatte befestigt ist, welcher Plattenteil (10, 30) eine longitudinale Achse parallel mit oder im wesentlichen parallel mit der Achse (X) entsprechend der Breite (2) hat.
2. Dacheindeckungselement (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Plattenteil (10) längsseitige Kanten (13A, 13B) umfasst, die parallel mit oder im Wesentlichen parallel mit der Achse (X) sind.
3. Dacheindeckungselement (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Plattenteil (30) längsseitige Kanten (33A, 33B) in der Ausdehnung der Achse (X) aufweist, die zu einem hinteren Bereich (1A) des Dacheindeckungselementes (1) zusammenlaufen.
4. Dacheindeckungselement (1) nach einem der An-

sprüche 1-3, **dadurch gekennzeichnet, dass** der Plattenteil (10, 30) eben ist.

5. Dacheindeckungselement (1) nach einem der Ansprüche 1-3, **dadurch gekennzeichnet, dass** der Plattenteil (10,30) in einer gekrümmten Form ausgebildet ist, die der Unterseite (5) des Dacheindeckungselementes (1) folgt oder der Unterseite (5) des Dacheindeckungselementes (1) im Wesentlichen folgt.
6. Dacheindeckungselement (1) nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Plattenteil (10, 30) weiterhin kurzseitige Kanten, (12A, 12B, 32A, 32B) und langseitige Kanten (13A, 13B, 33A, 33B) umfasst, und dass die kurzseitige Kante (12A, 32A) die am nächsten zu einer nach unten gekrümmten Kante (15) auf dem Dacheindeckungselement (1) ist, eine abgerundete Kante zu der Oberfläche des Plattenteiles aufweist.
7. Dacheindeckungselement (1) nach einem der Ansprüche 1-6, **dadurch gekennzeichnet, dass** der Plattenteil (10, 30) an dem Dacheindeckungselement durch das Mittel eines Klebstoffes befestigt ist.
8. Dacheindeckungselement (1) nach einem der Ansprüche 1-6, **dadurch gekennzeichnet, dass** das Dacheindeckungselement (1) und der Plattenteil (10, 30) beide aus Metall hergestellt sind.
9. Dacheindeckungselement (1) nach einem der Ansprüche 1-6, **dadurch gekennzeichnet, dass** der Plattenteil (10, 30) einen Bereich hat, der zwischen 20% und 50% des Bereiches des Dacheindeckungselementes umfasst.

Revendications

1. Élément de couverture de toit (1) ondulatoire avec une plaque métallique, qui possède une largeur (2) parallèle à un axe (X) et une longueur (3) parallèle à un axe (Y), une face supérieure (4) et une face inférieure (5), laquelle plaque métallique possède un nombre de concavités (6), parallèles et incurvés, selon la largeur (2) de l'élément de couverture de toit (1), **caractérisé en ce que**, dans la zone centrale de chaque concavité (6) ou centrale de préférentiellement chaque concavité (6), une partie de la plaque (10, 30) respective oblongue est attachée à la face inférieure (5) de la plaque métallique, laquelle partie de la plaque (10, 30) a un axe longitudinal qui est parallèle ou essentiellement parallèle à l'axe (X) correspondant à la largeur (2).
2. Élément de couverture de toit (1) selon la revendication 1, **caractérisé en ce que** la partie de plaque

(10) comprend des bords (13A, 13B) de sa face longue, qui sont parallèles ou essentiellement parallèles à l'axe (X).

3. Élément de couverture de toit (1) selon la revendication 1, **caractérisé en ce que** la partie de plaque (30) comprend des bords (33A, 33B) de sa face longue, dans l'expansion de l'axe (X) qui converge vers une zone (1A) inférieure de l'élément de couverture de toit (1).
4. Élément de couverture de toit (1) selon une quelconque des revendications 1-3, **caractérisé en ce que** la partie de plaque (10, 30) est plane.
5. Élément de couverture de toit (1) selon une quelconque des revendications 1-3, **caractérisé en ce que** la partie de plaque (10, 30) est formée dans une forme incurvée, qui suit la face inférieure (5) de l'élément de couverture de toit (1) ou qui suit essentiellement cette face inférieure (5) de l'élément de couverture de toit (1).
6. Élément de couverture de toit (1) selon une quelconque des revendications précédentes, **caractérisé en ce que** la partie de plaque (10, 30) comprend par ailleurs des bords (12A, 12B, 32A, 32B) de la face courte et des bords (13A, 13B, 33A, 33B) de la face longue et **en ce que** le bord (12A, 32A) de la face courte le plus proche au bord (15) qui est arqué vers le bas sur l'élément de couverture de toit (1) comprend un bord arrondi tourné vers la surface de la partie de plaque.
7. Élément de couverture de toit (1) selon une quelconque des revendications 1-6, **caractérisé en ce que** la partie de plaque (10, 30) est attachée à l'élément de couverture de toit par le moyen d'un adhésif.

8. Élément de couverture (1) selon une quelconque des revendications 1-6, **caractérisé en ce que** l'élément de couverture de toit (1) et la partie de plaque (10, 30) sont tous les deux fait en métal.
9. Élément de couverture de toit (1) selon une quelconque des revendications 1-6, **caractérisé en ce que** la partie de plaque (10, 30) possède une surface qui constitue entre 20% et 50% de la surface de l'élément de couverture du toit.





