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(72) Inventor: Kühl, Jan Johan
2200 Copenhagen N. (DK)

(74) Representative: Nielsen, Henrik Sten et al
BUDDE, SCHOU & OSTENFELD A/S
Bredgade 41
P.O. Box 1183
1011 Copenhagen K (DK)

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(71) Applicant: Monarflex A/S
2730 Herlev (DK)

(54) Building element

(57) A building element (310) is intended for sealing a hole of a foil of an underroof of a roof structure in which hole a rectangular support structure for a window frame structure having a specific configuration and specific dimensions is mounted. Through the hole access is established from the surroundings into the interior space defined below the roof structure. The building element comprises a rim part (322) defining a central rectangular aperture of a configuration and a perimeter substantially corresponding to the configuration and perimeter of the hole, and a collar part (324) integrally connected to and extending substantially perpendicular from the rim part and circumferentially encircling the mentioned central

rectangular aperture. The rim part (322) and the collar part (324) of the building element are made from weather-proof materials, and the rim part (322) is adapted to be arranged in substantially co-planar relationship relative to and in facial contact with the foil of the underroof so as to arrange the central aperture (323) of the rim part in registration with the hole of the foil of the underroof and so as to arrange the collar part (324) extending upwardly from the rim part (323). The building element (310) is made from reversible water vapour transmitting plastic foils comprising a water and water vapour resistant, water impermeable and water vapour permeable barrier layer.

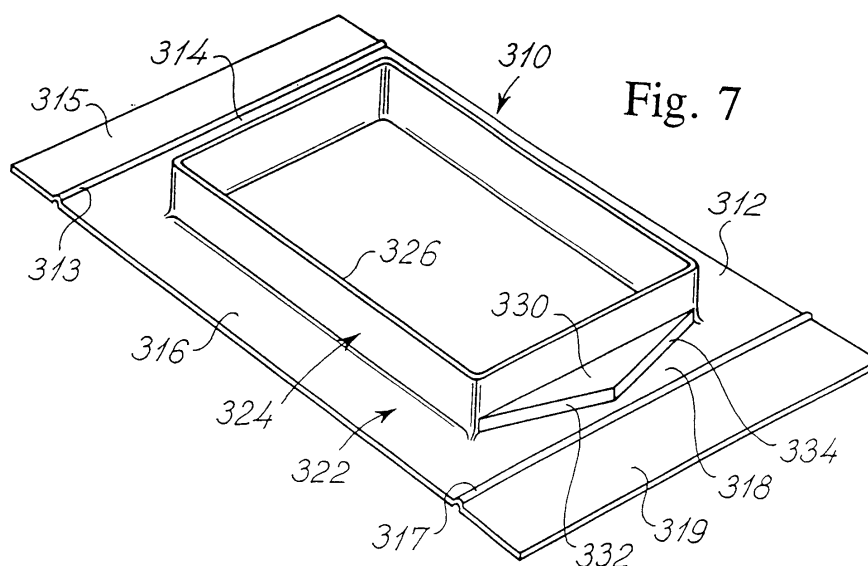
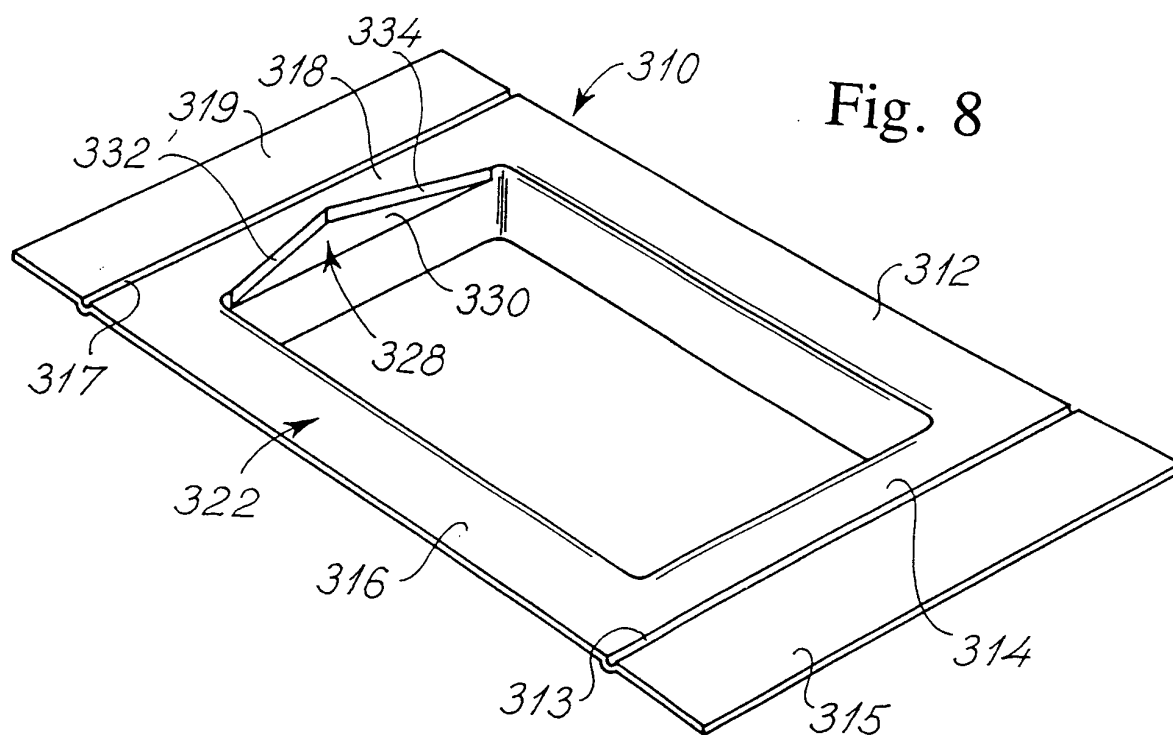


Fig. 7



Description

[0001] The present invention relates to a building element for sealing a hole of a foil of an underroof of a roof structure in which hole a rectangular support structure for a window frame structure having a specific configuration and specific dimensions is mounted and through which hole access is established from the surroundings into the interior space defined below the roof structure, and with a rim part defining a central rectangular aperture of a configuration and a perimeter substantially corresponding to the configuration and perimeter of the hole, and a collar part integrally connected to and extending substantially perpendicular from the rim part and circumferentially encircling the mentioned central rectangular aperture, the rim part and the collar part being made from weather-proof materials, and the rim part being adapted to be arranged in substantially co-planar relationship relative to and in facial contact with the foil of the underroof so as to arrange the central aperture of the rim part in registration with the hole of the foil of the underroof and so as to arrange the collar part extending upwardly from the rim part.

[0002] In a modern building, the roof is most often built from a supporting wooden roof structure including rafters and laths on which tiles or roofing plates are mounted. For providing a hermetic sealing of the interior space defined below the roof structure, i.e. below the tiles or roofing plates, a so-called underroof or undercover produced from a hermetic sealing and water impermeable foil, most often a plastic foil, is used. The tiles may be made from clay or concrete material and may constitute corrugated tiles, and the roofing plates may be made from slate, clay, concrete or metal materials, such as steel, copper or aluminium sheet material. Provided a hermetic sealing is obtained and maintained by the underroof, rain, snow, and moisture is prevented from contacting and deteriorating the supporting wooden roof structure. Serious problems, however, arise in case holes are to be produced in the underroof, such as holes for chimneys, windows, venting channels, plumbing tubings, etc. as a hermetic sealing round the hole in question is in most instances hard to establish and involves skill.

[0003] The problems in connection with establishing holes in underroofs are further aggravated in the case of roof structures which due to considerations regarding energy conservation include a significant insulation, since water and water vapour impermeable and water and water vapour resistant foils so far most often have been used in connection with such underroofs. In some cases such strongly insulated roof structures having water and water vapour-proof underroof foils have functioned satisfactorily. But for some applications a need for providing the possibility of removing water vapour through the underroof foil has emerged. Thus, water and water vapour resistant, water impermeable and water vapour permeable underroof foils are known, i.g. dis-

closed in DE 34 25 795 and EP 0 708 212 relating to a multilayer structure containing two water and water vapour permeable and resistant nonwoven fabric layers and a film-like barrier layer arranged between these nonwoven fabric layers which film-like barrier layer allegedly is water and water vapour resistant and further impermeable to water, but permeable to water vapour during absorption of water and water vapour.

[0004] Furthermore, various building element constructions of the above-mentioned kind for flashing roof windows and solar collectors are known. Thus, examples of such flashing made from impermeable foils are known from German publications DE 34 42 276 and DE 27 28 836 as well as published international patent applications Nos. WO 95/28537 and WO 96/06996.

[0005] The fundamental realization for the present invention is that for the same reasons which underlie the wish for providing water and water vapour resistant, water impermeable and water vapour permeable underroof foils, there is in case of such underroof foils a need for a compatible building element which further advantageously offers the same advantages regarding water impermeability and water vapour permeability as the underroof and, thus, in connection with chimneys, windows, venting channels, plumbing tubings etc. offers the same technical advantages as the underroof foil itself.

[0006] This object is obtained by a building element of the above-mentioned kind which building element is in accordance with the teachings of this invention characterized in that the rim part and the collar part are made from reversible water vapour transmitting plastic foils comprising a water and water vapour resistant, water impermeable and water vapour permeable barrier layer.

[0007] The barrier layers characteristic of the building element according to the present invention demonstrating water and water vapour resistance, water impermeability and water vapour permeability may be realized by using any of the underroof foils described in the two publications mentioned above or alternative suited foil materials. It is preferred, however, that the barrier layer is made from a monolithic, hydrophil and during swelling water vapour absorbing and transmitting plastic material having a water vapour permeability, measured according to DIN 53122 at 38° C and a relative humidity of 90% at a foil thickness of 0.15 mm, of at least 1000 g/ (m² x 24 hours).

[0008] According to a preferred embodiment the monolithic, hydrophil and during swelling water vapour absorbing and transmitting plastic material without additives has a tensile strength according to DIN 53 504 of at least 38 MPa, a breaking elongation according to DIN 53 504 of at least 500% and a tear resistance according to DIN 53 515 of at least 60 kN/m. As examples of this plastic material may be mentioned thermoplastic polyurethane materials, which are also preferred in this connection, since these materials have a high tensile strength and breaking elongation and demonstrate a considerable abrasion strength and resistance to chem-

icals and water as well as resistance to UV. The water vapour permeability may be adjusted or controlled by introducing more or less hydrophil groups in their polymer framework.

[0009] With a view to a further control of the mechanical properties including the UV resistance and the colour as well as the water vapour permeability the used thermoplastic polyurethane material, the first thermoplastic polyurethane material, may be mixed with a smaller amount, preferably 0-10 weight per cent, and more preferably 0.5 weight per cent, of one or several other thermoplastic polyurethanes as a master batch containing additives usual in the field, such as processing means and UV stabilizers and further possibly filling materials and white/coloured pigments. The used additives may also be mixed direct with the used first thermoplastic polyurethane material. All used additives are well-known to those skilled within the art of plastic foils and need not be specified.

[0010] In a particularly preferred embodiment of the building element according to the present invention the plastic material used for the plastic foil according to the invention comprises 90-100 weight per cent, preferably 95-100 weight per cent, of a first thermoplastic polyurethane material and 0-10 weight per cent, preferably 0-5 weight per cent, of one or several other thermoplastic polyurethane materials in combination with additives usual in the field and possibly filling materials, pigments and/or coloured pigments.

[0011] There are certain types of thermoplastic polyurethane materials on the market having a water vapour permeability which is 5 or 6 times higher than for standard thermoplastic polyurethanes. These improved polyurethanes are sold under the commercial names Estane® 58237 and Estane® 58245 (B.F. Goodrich Company, Cleveland, Ohio, USA). According to the manufacturer "58245" has a water vapour permeability about 50% higher than "58237", but is a somewhat softer material. The Estane® materials are extremely resistant to water penetration as, having a thickness of 25 µm, they are able to resist a water pressure of a water column of over 10 m. The materials are according to the sales leaflets of the firm especially suited for application in the textile industry such as for cover on textiles for sports wear. However, nothing has been mentioned or implied regarding their applicability for building purposes.

[0012] Thus, according to a preferred embodiment, the first thermoplastic polyurethane material is Estane® 58237 and/or Estane® 58245.

[0013] Reversible water vapour transmitting plastic foils for building purposes including usage in connection with building elements of the above-mentioned kind in which reversible water vapour transmitting plastic foils the barrier layer is made from other monolithic, hydrophil and during swelling water vapour absorbing and transmitting plastic materials than those specifically mentioned above are also to be considered as included by the present invention.

[0014] Surprisingly, however, experience has shown that not only a reinforcement with a web or a wire mesh embedded in the barrier layer of the plastic foil according to the present invention is possible since the embedded structure even after a large water absorption in the barrier layer is not detached from this, but tests of foils, webs and meshes laminated to such barrier layers seem to show a surprising cohesive stability for such form stabilizing structures.

[0015] According to a further embodiment of the building element according to the present invention, the barrier layer is stabilized by means of a plane stabilizing structure of a water and water vapour resistant and impermeable material.

[0016] In another further embodiment thereof the plane stabilizing structure is in the form of a web or an open wire mesh of mono- or multifilaments or split fibres and of a mesh width of 0.1-5 cm and being embedded in the barrier layer.

[0017] The foil, web or mesh laminated to the barrier layer of the building element according to the invention may be a known nonwoven fabric, such as made from polyethylene, polypropylene or polyester fibres or a mesh as described below.

[0018] The structure embedded in the barrier layer of the building element according to the present invention is preferably a web or an open wire mesh having a mesh width of 0.1-5 cm. The structure may be made from native materials (cellulose, cotton and flax) and is in this case most often multifilamentary, i.e. built by threads of thin filaments. It may, however, also be made from synthetic materials and may be both mono- or multifilamentary or built by split fibres. The choice of material is not particularly critical to the invention as long as the demands as to water and water vapour resistance and impermeability are met. Among preferred synthetic materials for the reinforced structure high-density polyethylene, polypropylene, nylon and polyester materials may, however, be mentioned. A presently preferred plane stabilizing structure is an open wire mesh of polypropylene split fibres and of a mesh width of 0.1-5 cm.

[0019] The thickness of the reversible water vapour transmitting plastic foil of the building element according to the invention may be varied within quite broad limits as demands for mechanical strength, water vapour permeability and the material price of the foil are balanced against each other. The thickness is generally in the area of 0.002-0.5 mm and preferably 0.1-0.2 mm.

[0020] The water vapour permeability of the reversible water vapour transmitting plastic foil, measured according to DIN 53122 at 38° C and a relative humidity of 90% at a foil thickness of 0.15 mm, is as mentioned above at least 1000 g/(m² x 24 hours). It is preferably over 1200 g/(m² x 24 hours) and particularly at least 1400 g/(m² x 24 hours).

[0021] The reversible water vapour transmitting plastic foil of the building element according to the invention is made by means of the known techniques of making

previously known water and water vapour impermeable plastic foils and a detailed description is not essential to the invention and need not be further described.

[0022] When making a plane stabilized plastic foil by lamination as stated above the plastic foil itself is as mentioned above made by means of the known techniques and the lamination thereof to a foil, web or mesh is also a universally known method.

[0023] When making a plane stabilized plastic foil by embedment in the barrier layer of a web or a wire mesh it is possible to arrange the reinforcing structure on a foil of the material used for the barrier layer and either cover this with a layer of the mentioned material or heat-laminate a further such foil on this.

[0024] The reversible water vapour transmitting plastic foil of the building element according to the invention is of a simple construction, is mechanically strong and has a water vapour permeability superior to known water vapour transmitting and water retaining underroof plastic foils. Further, it is transparent except when it is plane stabilized with a non-transparent web or foil laminated to the barrier layer, contrary to double sided nonwoven fabric reinforcing underroof foils, so that for instance an underlying insulation may easily be inspected, and since its surface is far smaller than double sided nonwoven fabric reinforcing foils it is far less exposed to ageing by UV influence than these.

[0025] Further, the building element is preferably made in consideration of the mechanical adaptation of the building element to the application in question and, thus, preferably according to the given application. Thus, the building element according to the present invention is preferably further characterized in that the central rectangular aperture of the rim part and the dimensions of the collar part are adapted to the specific configuration and the specific dimensions of the rectangular support structure of the window frame structure so that the perimeter of the collar part exactly corresponds to the outer perimeter of the support structure or is reduced as compared to the outer perimeter of the support structure in order to establish a hermetic seal between the collar part and the support structure.

[0026] Further, in consideration of the intentional application of the building element and in consideration of a simple handling of the building element both prior to and during the mounting of said building element, it is preferred that the reversible water vapour transmitting plastic foils are pliable and foldable and that the building element is kept as a unit folded and packed prior to the mounting of the building element.

[0027] According to alternative embodiments of the invention the two parts of the building element, the rim part and the collar part, may be a unitary cast element or they may welded together by two separate, identical or different reversible water vapour transmitting plastic foils.

[0028] In order to ensure that the collar part may be mounted in a tight fit encircling the boards extending

through the hole of the underroof, the collar part may according to a further advantageous embodiment of the building element according to the present invention taper from the rim part towards the outer open end of the collar part.

[0029] According to the actual application of the building element, the collar part may in conformity with the structural requirements slope relative to a plane defined by the rim part and consequently e.g. constitute a building element for establishing flashing relative to e.g. a chimney, a vertical venting channel extending through a sloping roof or the like.

[0030] According to the presently preferred embodiment of the building element according to the present invention, the building element is adapted to be used for sealing a hole of an underroof, through which hole wooden boards for supporting a window frame define a rectangular hole as the boards are mounted substantially perpendicularly to the surface defined by the foil of the underroof. Consequently, the collar part of the building element according to the present invention preferably extends perpendicularly from the rim part and is preferably composed of segments of planar elements defining segments to be arranged in facial tight fitting contact with the wooden boards of the roof structure.

[0031] In order to prevent that any rain or snow which moves downwardly on the upper side of the underroof to which the building element according to the present invention is arranged in accordance with the teachings of the present invention, i.e. having the rim part arranged in substantially co-planar relationship relative to and in facial contact with the foil of the underroof, the building element according to the present invention is preferably further in accordance with an advantageous embodiment provided with a substantially triangularly shaped transition part interconnecting the rim part and the collar part at the transition therebetween to be positioned at the upper edge of the building element relative to the underroof and extending upwardly from the rim part providing a rain and snow-guide. The rain and snow-guide consequently guides any rain and snow moving down on the upper side of the underroof to either side of the aperture defined within the building element and prevents the snow or rain from falling through the aperture of the building element which aperture is defined by the rim part of the building element and which aperture is circumferentially encircled by the collar part.

[0032] According to a further alternative embodiment of the building element according to the present invention, which building element constitutes a universally applicable building element which is adaptable to specific predetermined dimensions of the hole of the underroof, the building element is assembled from two halves together defining the building element comprising the rim part and the collar part. Provided the building element according to the above described advantageous embodiment is assembled from two halves, the two halves are to be arranged in overlapping relationship in order

to prevent that rain, snow or moisture may find its way through any leakage between the two halves which are assembled into a unitary structure circumferentially encircling the hole of the underroof.

[0033] The present invention will now be further described with reference to the drawings, in which

Fig. 1 is a perspective and schematic view of a first and preferred embodiment of a unitary collar or flashing element according to the present invention,

Fig. 2 is a perspective and schematic view similar to the view of Fig. 1 of a second embodiment of the element according to the present invention,

Fig. 3 is a perspective, schematic and partly sectional view illustrating a technique of applying the first embodiment of the element according to the present invention shown in Fig. 1 in a roof structure in which the element is fixated and sealed relative to an undercover of the roof structure,

Fig. 4 is a perspective and schematic view similar to the view of Fig. 3 illustrating the technique of applying a third embodiment of the element according to the present invention on a roof structure,

Fig. 5 is a perspective and schematic view similar to the views of Figs. 3 and 4, illustrating a fourth embodiment of the element according to the present invention resembling the first embodiment shown in Figs. 1 and 3 and illustrating a technique of trimming the element relative to an application site,

Fig. 6 is a perspective and schematic view illustrating a technique of applying a fifth embodiment of the unitary collar or flashing element according to the present invention relative to a chimney extending through the roof of a building structure,

Fig. 7 is a perspective and schematic top view of a sixth embodiment of the unitary collar or flashing element according to the present invention constituting a slightly modified embodiment as compared to the first and presently preferred embodiment shown in Fig. 1, and

Fig. 8 is a perspective and schematic bottom view of the sixth embodiment of the unitary collar or flashing element shown in Fig. 7.

[0034] In Fig. 1 a first and a presently preferred embodiment of a unitary collar or flashing element according to the present invention is shown, designated the reference numeral 10 in its entirety. The element 10 is made from reversible water vapour transmitting foil materials comprising a water and water vapour resistant,

water impermeable and water vapour permeable barrier layer, preferably according to the example stated below.

[0035] The element 10 is composed of a total of four foil segments 12, 14, 16 and 18 which constitute two pairs of foil elements, a first pair comprising the foil elements 12 and 16, and a second pair comprising the foil element 14 and 18. The foil elements 12 and 16 of the first pair of foil elements are positioned symmetrically relative to an imaginary central axis 20 of the element 10, and the foil elements 14 and 18 of the second pair of foil elements are similarly positioned symmetrically relative to the imaginary central axis 20. The elements 12 and 14 are welded together through a welded joint 13. Similarly, the foil elements 14 and 16, the foil elements 16 and 18 and the foil elements 12 and 18 are welded together through welded joints 15, 17, and 19, respectively.

[0036] The element 10 is of an overall structure comprising a substantially plane, circumferential rim part which is composed of the major parts of the foil segments 12, 14, 16 and 18 and which defines a single plane relative to which the imaginary central axis is orthogonal. The overall structure of the element 10 further comprises a collar part which is defined by upwardly turned parts of the foil segments 12, 14, 16 and 18, and which defines a central, substantially rectangular aperture through the element 10 within which aperture the imaginary central axis 20 is located centrally. In Fig. 1, the rim part and the collar part of the element 10 are designated the reference numerals 22 and 24, respectively.

[0037] The element 10 shown in Fig. 1 is, as will be described in greater detail below with reference to Fig. 3, used for providing an aperture through an undercover of a roof structure, which aperture may be used for the mounting of e.g. a window frame, a chimney, a venting channel element, etc.

[0038] In Fig. 2, an alternative or second embodiment of the unitary collar or flashing element according to the present invention is shown, designated the reference numeral 30 in its entirety. The second embodiment 30 differs from the above described first embodiment 10 in that the element is produced as a unitary cast element defining an outer rim part 32 and a collar part 34 similar to the rim part 22 and the collar part 24 of the element 10 described above with reference to Fig. 1. The rim part 32, like the rim part 22 described above, defines an outer edge 36 of a substantially rectangular configuration. The rim part 32 is of a basically planar structure from which the collar part 34 extends substantially orthogonally upwardly defining an upper edge 38 of a substantially rectangular configuration. The collar part 34 and the rim part 32 are joined together along a substantially rectangular junction 40 which, apart from a minor deviation allowing the element 30 to be removed from a casting matrix corresponds to the rectangular configuration of the upper edge 32 of the collar part 34. The second embodiment 30 may, like the above described first embodiment

10, be modified by e.g. providing the collar element 34 and similarly the collar element 24 as an inwardly sloping collar element defining a reduced upper edge perimeter as compared to the perimeter of the junction 40. Similarly, the rim part 32 may be produced in any alternative appropriate configuration, such as a quadratic configuration, a circular configuration, a triangular configuration, or even a curved configuration for adapting the element to a specific application necessitating the provision of an element of a particular configuration deviating from the configuration shown in Figs. 1 and 2.

[0039] Various applications of the unitary collar or flashing element are illustrated in Figs. 3-6 which also illustrate alternative embodiments of the element. In Fig. 3, the first embodiment of the unitary collar or flashing element 10 is mounted on a roof structure which comprises two vertically extending or sloping slating and tilting battens 50 and 52 on top of which an undercover, or a so-called underroof, is mounted. The undercover comprises three undercover sheets 54, 56, and 58 which are applied in overlaying relationship extending substantially horizontally relative to the roof structure as the undercover sheet 54 which is positioned above the undercover sheets 56 and 58 has its lowermost edge part arranged in overlaying relationship relative to the adjacent undercover sheet 56 which in a similar arrangement has its lowermost edge part arranged in overlaying relationship relative to the adjacent undercover sheet 58. Between the battens 50 and 52, a wooden frame support structure is arranged comprising four substantially vertically extending boards 60, 62, 64, and 66. The boards 60, 62, 64, and 66 extend through the undercover foil 66 providing an aperture thereof, within which aperture a window frame structure or e.g. a chimney, a venting channel or the like is to be mounted. In the primary intentional application of the first embodiment 10 of the unitary collar or flashing element according to the present invention, a window frame is to be mounted on the wooden frame support structure comprising the boards 60, 62, 64, and 66. The element 10 serves the purpose of establishing a hermetic seal along the wooden frame support structure comprising the boards 60, 62, 64, and 66 relative to the undercover comprising the undercover foils 54, 56, and 58 in order to prevent that rain, snow or moisture may be transported into, or alternatively permeate into the roof structure comprising the battens 50 and 52 along the edges of the boards 60, 62, 64, and 66 which might give origin to rot or fungus deterioration of the wood elements of the roof structure, e.g. the battens 50 and 52.

[0040] As is evident from Fig. 3, the upper part of the element 10, i.e. the foil segment 18, is positioned underlying the undercover foil 54, whereas the foil segment 14 of the element 10 is positioned overlaying the undercover foil 58 in order to establish an overlaying relationship between the element 10 and the undercover which, like the undercover itself, allows rain, moisture or snow to be transported downwardly along the upper

side of the undercover from the uppermost undercover foil 54 to the adjacent undercover foil 56 and further along the undercover without permeating through the undercover. Provided the element 10 is to be used in connection with a window frame, which most often is of a specific predetermined configuration defining specific predetermined dimensions, the element 10 is adapted to the configuration and dimensions of the window frame structure in question. Consequently, the outer perimeter of the upper edge 28 of the collar part 24 of the element 10 corresponds to the outer perimeter of the wooden frame support structure comprising the boards 60, 62, 64, and 66. Alternatively and preferably, the element 10 is of a somewhat reduced dimension as compared to the outer perimeter of the wooden frame support structure in order to establish a hermetic seal between the outer sides of the boards 60, 62, and 64 and the inner side of the collar part 24 of the element 10 as the element 10 has to be mounted in a tight fit enclosing the boards 60, 62, 64, and 66 in which tight fit the foil segments 12, 14, 16, and 18 of the element are caused to be slightly deformed, causing an increase of the perimeter along the upper edge 28 of the collar part 24 of the element 10. The collar part 24 of the element 10 is preferably fixated relative to the boards 60, 62, 64, and 66 by means of nails, seams, bolts, through glueing, etc. Alternatively, the foil material of the element 10 may be heat-shrinkable, in which case the element 10 is fixated relative to the boards 60, 62, 64, and 66 through shrinking or so-called recovering of the collar part 24 of the element 10 by the application of heat which is generated by means of a gas combustion unit, an electric heating fan, etc. as is well-known within the art of heat-insulating tubings, pipes, etc. The outer circumferential rim part 22 of the element 10 may be sealed to the undercover foils 54, 56, and 58 by means of sealing tape, glue, if appropriate.

[0041] In Fig. 3, two frame elements of the window frame structure are shown, one of which is designated the reference numeral 68 and another of which is designated the reference numeral 70. The frame elements 68 and 70 are both of substantially rectangular configuration and made from L-configured profile plate elements, such as extruded aluminum profile elements. The frame element 68 constitutes an inner sealing frame element which is mounted e.g. by means of nails or screws to the outer side of the boards 60, 62, 64, and 66, sandwiching the foil of the collar part 24 of the element 10 between the frame element 68 and the boards. The frame element 70 is mounted, as is illustrated in Fig. 3, in overlapping relationship relative to the frame element 68 as the frame element 70 is fixated to the upper edges of the boards 60, 62, 64, and 66 by means of screws, nails or the like. Alternative frame element structures may, of course, be used in connection with the unitary collar or flashing element according to the present invention for providing a sealing of e.g. a window frame relative to the element 10 and further the un-

dercover of the roof structure.

[0042] In Fig. 4, the battens 50, 52, the undercover foils 54, 56, and 58, and further the boards 60, 62, 64, and 66 are further shown together with a slightly modified or third embodiment of the unitary collar or flashing element according to the present invention, which alternative or third embodiment constitutes a modification of the above described second embodiment 30 shown in Fig. 2. The third embodiment is in its entirety designated the reference numeral 30' and is basically produced by cutting the second embodiment 30 into two parts of substantially identical configuration for allowing the element 30' to be adapted to specific longitudinal requirements determined by the length of the boards 60 and 64. The two parts of the element 30' are designated the reference numerals 31' and 33'. Through the application of the two parts 31' and 33' of the element 30', the part 31' is to be positioned in overlapping relationship relative to the part 33' as the part 33' is, as is evident from Fig. 3, mounted prior to the mounting of the part 31'. The two parts 31' and 33' of the third embodiment 30' may preferably be fixated by means of nails or screws, as discussed above with reference to Fig. 3, for fixating the element 30' relative to the boards 60, 62, 64, and 66 to which e.g. a window frame structure is to be mounted.

[0043] In Fig. 5, a slightly modified embodiment, or fourth embodiment, of the unitary collar or flashing element according to the present invention is shown, which alternative embodiment constitutes a modification of the above described first and presently preferred embodiment 10. The alternative or fourth embodiment shown in Fig. 5 is in its entirety designated the reference numeral 10'. The element 10' is, like the above described first and presently preferred embodiment 10, made from a reversible water vapour transmitting foil material comprising a water and water vapour resistant, water impermeable and water vapour permeable barrier layer, however, differs from the above described first and presently preferred embodiment 10 in that the element 10' is of an overall enlarged configuration. In Fig. 5, elements or components of the embodiment 10' are designated the same reference numerals as applied in Fig. 1, however, added the additional marking '. The alternative embodiment 10' differs from the above described first and presently preferred embodiment 10 in that the rim part 22' and collar part 24' are enlarged relative to the corresponding elements or parts of the first and presently preferred embodiment 10, allowing that the rim part 22' and the collar part 24' may be trimmed through cutting excessive foil material from the rim and collar parts 22' and 24', respectively, as indicated by flaps 21' and 23' which are cut from or separated from the rim part 22' and similarly through flaps 25' and 27' which are cut or separated from the collar part 24' of the element 10'. The somewhat enlarged rim and collar parts 22' and 24' of the element 10' allow that the element 10' may be adapted or trimmed to a specific application. The element 10' is advantageously made from a heat-shrinkable foil allowing

a total adaptation of the element 10 to a specific application through shrinking the element 10' into perfect conformity with the supporting boards 60, 62, 64, and 66 and through cutting excessive material from the rim and collar parts 22' and 24', respectively, as illustrated in Fig. 5.

[0044] In Fig. 6, an alternative application of a further or fifth embodiment of the unitary collar or flashing element according to the present invention is shown. In Fig. 6, the fifth embodiment of the element according to the present invention is designated the reference numeral 80 in its entirety and is used for sealing the junction between a chimney 90 and an underroof of a roof surface 92 comprising a plurality of corrugated tiles which are positioned in a manner conventional per se in overlaying or overlapping relationship. The element 80 is basically of a structure similar to the structure of the second embodiment 30 described above with reference to Fig. 2 and is preferably made as a cast plastic product, e.g. cast from high-density polyethylene and comprises a rim part 82 similar to the rim part 32 of the element 30 described above and a collar part 84 similar to the collar part 34 of the element 30 described above. Whereas the collar part 34 of the element 30 extends substantially vertically or orthogonally from the rim part 32 upwardly, the collar part 84 of the element 80 defines an angle different from 90° relative to the substantially plane rim part 82. The angle defined between the collar part 84 and the rim part 82 is determined by the sloping of the roof surface 92 for establishing a perfect sealing contact between the collar part 84 and the outer side surface of the chimney 90 and similarly a perfect sealing contact between the lower side surface of the rim part 82 and the upper side surface of the underroof of the roof surface 92. For sealing the junction between the upper edge of the collar part 84 and the outer surface of the chimney 90, plate elements 86 and 88 are fixated to the outer surface of the chimney 90 and positioned in overlapping relationship relative to the collar part 84 of the element 80.

[0045] In figs. 7 and 8 a sixth and highly advantageous embodiment of the unitary collar or flashing element according to the present invention is shown, designated the reference numeral 310 in its entirety. Basically, the sixth embodiment 310 constitutes a modified embodiment as compared to the above described first and second embodiments shown in Figs. 1 and 2, respectively. The sixth embodiment 310 constitutes a unitary cast element. The element 310 includes a plurality of foil sections, viz. four foil sections 312, 314, 316 and 318 constituting integrally cast foil sections similar to the four foil segments 12, 14, 16 and 18, respectively, of the element 10 described above with reference to Fig. 1. The foil sections 312 and 316 constitute side sections whereas the foil sections 314 and 318 constitute bottom and top sections, respectively, as the terms bottom, top and sides refer to the intentional orientation of the element 310. The element 310 further includes two end foil sections

315 and 319 which are integrally joined to the adjacent bottom and top foil sections 314 and 318, respectively, through weakend or hinged elements 313 and 317, respectively, which allow the end foil sections 315 and 319 to be bent or alternatively separated from the adjacent bottom and top foil sections 314 and 318, respectively, for adapting the overall length of the element 310' to a specific application. Provided the end foil sections 315 and 319 are bent relative to the bottom and top foil sections 314 and 318, respectively, the end foil sections 315 and 319 may be used for fixating the element 310 relative to laths or battens of a roof by means of e.g. screws, nails or the like.

[0046] The above described foil sections 312, 314, 316 and 318 define an integral rim part 322 of the unitary collar or flashing element 310 from which an integral cast collar part 322 protrudes upwardly defining a rim part to be fixated to a wooden board structure of the roof for sealing round the wooden board structure as described above with reference to Figs. 3 and 4. The collar part 324 defines an upper or outer circumferential edge 326 of an overall rectangular configuration.

[0047] Whereas the above described first and second embodiments 10 and 30 shown in Figs. 1 and 2, respectively, are of overall symmetrical configuration, the sixth embodiment 310 includes as mentioned above bottom and top foil sections 314 and 318, respectively, providing a structure including an inherent intentional orientation. Thus, whereas the bottom foil section 314 is of a basically plane structure, the top foil section 318 includes an elevated section generally defined by upwardly extending plate elements 332, 334 and a plane triangularly shaped top element 330. The elements 330, 332 and 334 basically serve the purpose of providing a rain or snow-guide.

[0048] In Fig. 7, the unitary collar or flashing element 310 is shown from the upper side whereas in Fig. 8, the unitary collar or flashing element 310 is shown from the lower side revealing a recess 328 which defines the above described triangularly shaped rain or snow-guide provided by the plate elements 330, 332 and 334 serving the purpose of preventing that any snow or rain which moves down on the upper side of an underlying undercover or underroof, such as the undercovers 56 and 58 shown in Figs. 3 and 4, falls through the aperture defined by the upwardly protruding collar part 324 of the unitary collar or flashing element 310, but instead be transported round the aperture at either side thereof.

Example 1

[0049] A prototype implementation of the above described sixth embodiment of the unitary collar or flashing element 310 described above with reference to Figs. 7 and 8 may be made in the following way. A foil of a thickness of 0.075 mm is made from 97 weight per cent Estane® and 3 weight per cent of a master batch of a thermoplastic material "T5019" delivered by the firm of

Goodrich and comprising known, but unspecified additives such as processing means and UV stabilizers. On this foil an open wire mesh of split fibres of polypropylene and of a mesh width of 1 cm is arranged as a plane stabilizing structure and subsequently a thin layer of a melt of the same Estane® materials is arranged as a cover, since an area of the former foil corresponding to the collar part 324 is kept uncovered by the open split fibre wire mesh or the open split fibre wire mesh is instead subsequently removed from the said area.

[0050] The element is made from this foil in a configuration as shown in Figs. 7 and 8 defining an outer configuration measuring 1950 mm x 1178 mm and the collar part being made from the above-mentioned area of the foil. The foil sections 315 and 319 each measure 1178 mm x 150 mm, the aperture defined by the outer edge of the collar part 324 measures 1398 mm x 778 mm, the height of snow-guide defined by the plate elements 330, 332 and 334, i.e. the height of the triangularly shaped snow-guide from the upwardly protruding collar part 324 measures 70 mm, and the triangularly shaped plate element 330 measures 20 mm above the plane defined by the top foil section 318 of the rim part 322.

[0051] Although the invention has been described above with reference to numerous and advantageous embodiments, it is obvious to a person having ordinary skill in the art that numerous modifications are to be construed part of the present invention as defined in the appending claims.

Claims

1. A building element for sealing a hole of a foil of an underroof of a roof structure in which hole a rectangular support structure for a window frame structure having a specific configuration and specific dimensions is mounted and through which hole access is established from the surroundings into the interior space defined below the roof structure, and with a rim part defining a central rectangular aperture of a configuration and a perimeter substantially corresponding to the configuration and perimeter of the hole, and a collar part integrally connected to and extending substantially perpendicular from the rim part and circumferentially encircling the mentioned central rectangular aperture, the rim part and the collar part being made from weather-proof materials, and the rim part being adapted to be arranged in substantially co-planar relationship relative to and in facial contact with the foil of the underroof so as to arrange the central aperture of the rim part in registration with the hole of the foil of the underroof and so as to arrange the collar part extending upwardly from the rim part, said rim part and said collar part being made from reversible water vapour transmitting plastic foils comprising a water and water vapour resistant, water impermeable and water va-

pour permeable barrier layer.

2. The building element according to claim 1, said barrier layer being made from a monolithic, hydrophil and during swelling water vapour absorbing and transmitting plastic material having a water vapour permeability, measured according to DIN 53122 at 38° C and a relative humidity of 90% at a foil thickness of 0.15 mm, of at least 1000 g/(m² x 24 hours). 5
3. The building element according to claims 1-2, said monolithic, hydrophil and during swelling water vapour absorbing and transmitting plastic material without additives having a tensile strength according to DIN 53 504 of at least 38 MPa, a breaking elongation according to DIN 53 504 of at least 500% and a tear resistance according to DIN 53 515 of at least 60 kN/m. 10
4. The building element according to any of the claims 1-3, said plastic material comprising 90-100 weight per cent, preferably 95-100 weight per cent, of a first thermoplastic polyurethane material and 0-10 weight per cent, preferably 0-5 weight per cent, of one or several other thermoplastic polyurethane materials in combination with additives usual in the field and possibly filling materials, pigments and/or coloured pigments. 15 20 25
5. The building element according to claim 4, said thermoplastic polyurethane material being Estane® 58237 and/or Estane® 58245. 30
6. The building element according to any of the claims 1-5, said barrier layer being stabilized by means of a plane stabilizing structure of a water and water vapour resistant and impermeable material. 35
7. The building element according to claim 6, said plane stabilizing structure being a foil, web or mesh laminated to the barrier layer. 40
8. The building element according to claim 7, said plane stabilizing structure being in the form of a web or an open wire mesh of mono- or multifilaments or split fibres and of a mesh width of 0.1-5 cm and being embedded in the barrier layer. 45
9. The building element according to claim 8, said plane stabilizing structure being made from native or synthetic materials. 50
10. The building element according to claim 9, said native materials being chosen from cellulose, cotton and flax and said synthetic materials being chosen from high-density polyethylene, polypropylene, nylon and polyester materials. 55

11. The building element according to any of the claims 1-10, said reversible water vapour transmitting plastic foils having a thickness of between 0.02 and 1 mm, preferably between 0.1 and 0.5 mm.
12. The building element according to any of the claims 1-11, said water vapour permeability as defined in claim 1 being over 1200 g/(m² x 24 hours) and preferably at least 1400 g/(m² x 24 hours).
13. The building element according to any of the claims 1-12, said central rectangular aperture of the rim part and the dimensions of the collar part being adapted to the specific configuration and the specific dimensions of the rectangular support structure of the window frame structure so that the perimeter of the collar part exactly corresponds to the outer perimeter of the support structure or is reduced as compared to the outer perimeter of the support structure in order to establish a hermetic seal between the collar part and the support structure.
14. The building element according to any of the claims 1-13, said reversible water vapour transmitting plastic foils being pliable and foldable and said building element being kept as a unit folded and packed prior to the mounting of the building element.
15. The building element according to any of the claims 1-14, said rim part and collar part being a unitary cast element.
16. The building element according to any of the claims 1-14, said rim part and said collar part being welded together by two separate, identical or different reversible water vapour transmitting plastic foils.
17. The building element according to any of the claims 1-16, said collar part tapering from said rim part towards the outer open end of said collar part.
18. The building element according to any of the claims 1-16, said rim part defining a plane and said collar part sloping relative to said plane defined by said rim part.
19. The building element according to any of the claims 1-16, said collar part extending perpendicularly from said rim part.
20. The building element according to any of the claims 1-19, said collar part being composed of segments of planar elements.
21. The building element according to any of the claims 1-20, further comprising a substantially triangularly shaped transition part interconnecting said rim part

and said collar part at the transition therebetween
and extending upwardly from said rim part providing
a rain or snow-guide.

- 22.** The building element according to any of the claims 1-21, said building element being assembled from two halves together defining said building element comprising said rim part and said collar part.

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Fig. 1

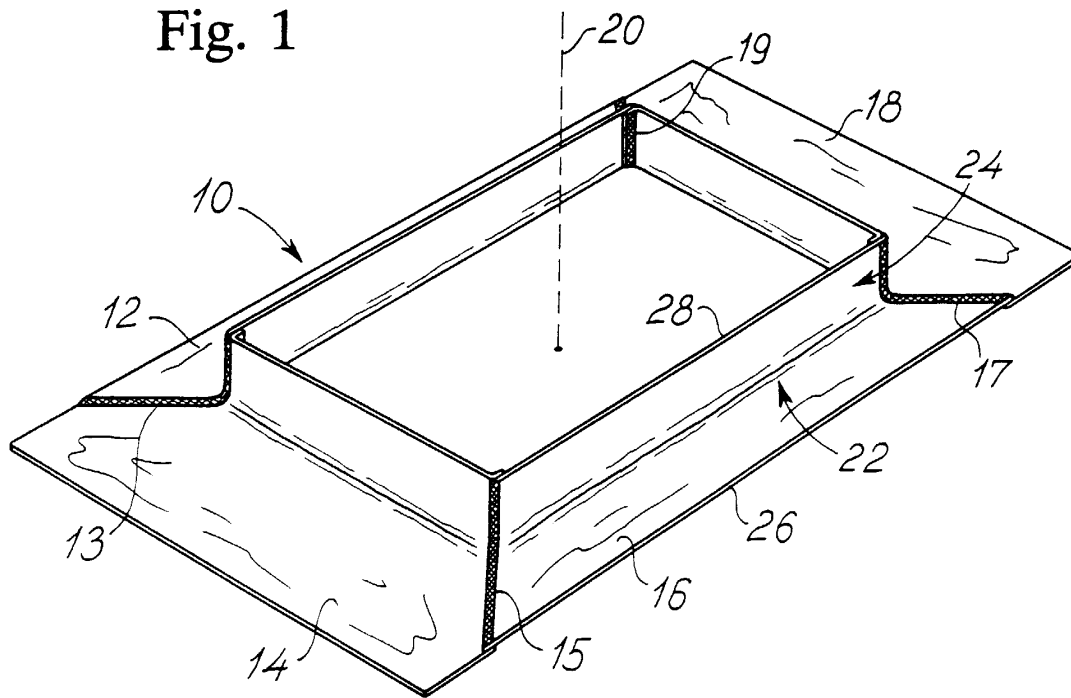


Fig. 2

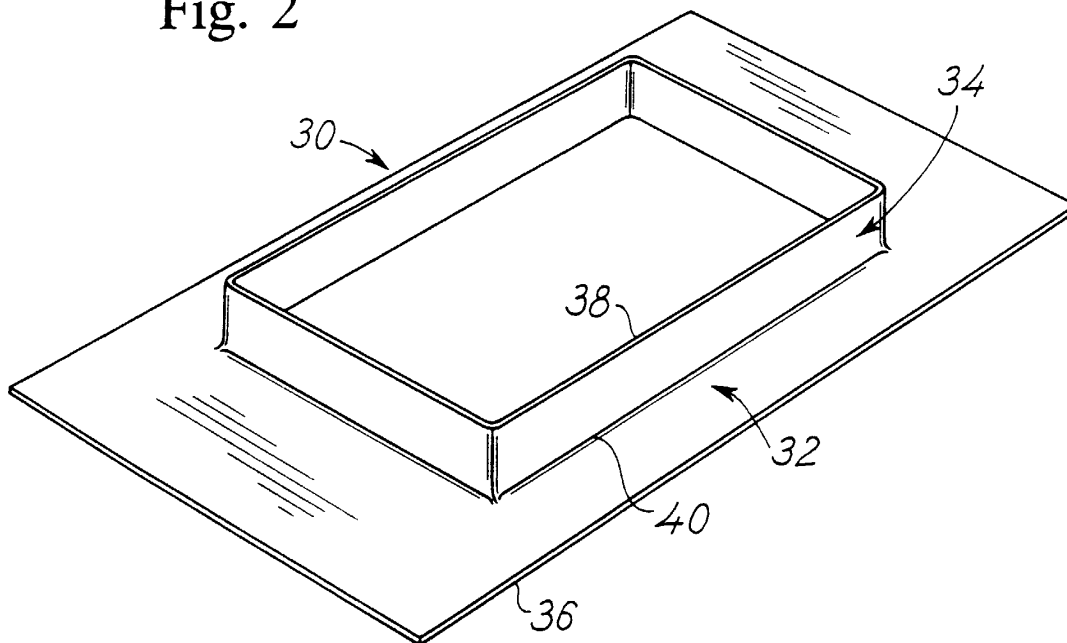


Fig. 3

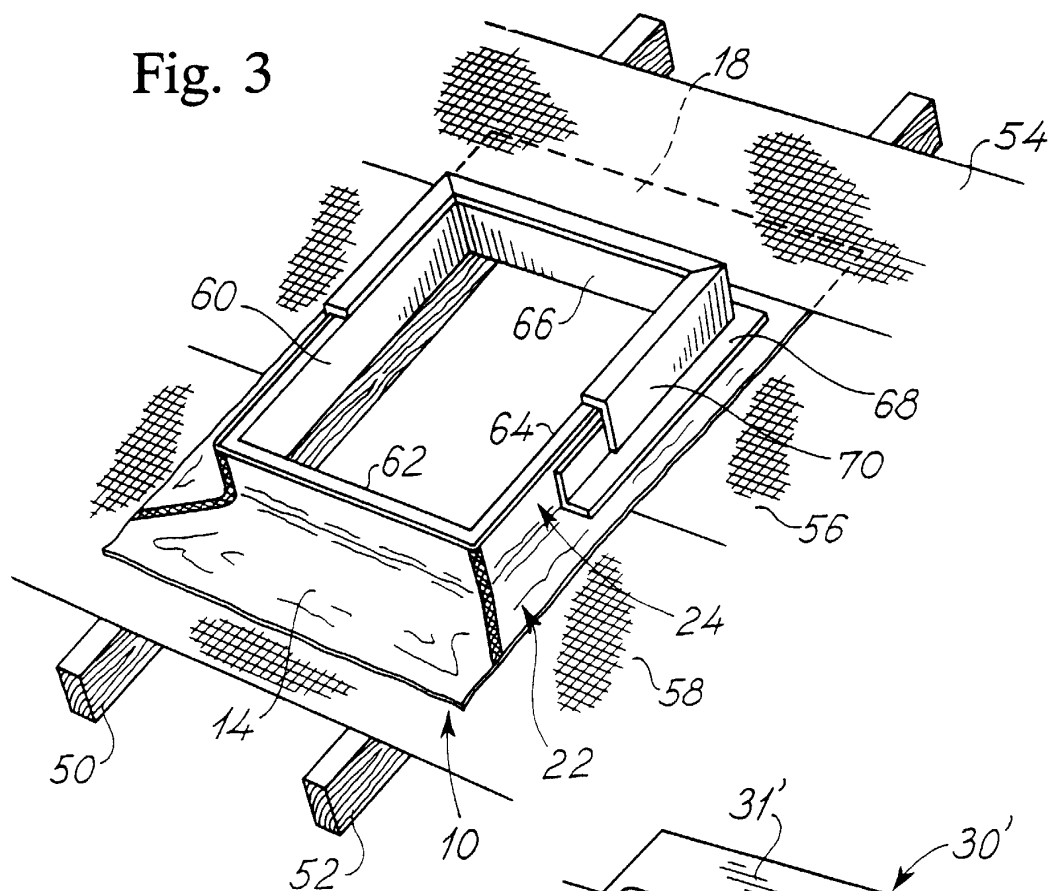


Fig. 4

