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(54) **Ventilated eaves closure**

(57) A ventilating closure for an eave of a roof structure and a method for mounting a closure for an eave of a roof structure. The roof structure comprises an elongated support member positioned at and along the eave and plates or tiles positioned above the elongated support member and the elongated support member has an upper support surface facing the plates or tiles. The plates or tiles define an undulated lower side facing the upper support surface of the elongated support member. The ventilating closure comprises a mesh-type structure for allowing a flow of air to pass through it, and the mesh-type structure is a unitary structure which defines an elongated base portion for positioning along the elongated support member and for contacting its upper support surface. A first number of surface portions are positioned in sequence along the elongated base portion and protrude from said base portion for conforming to the undulated lower side.

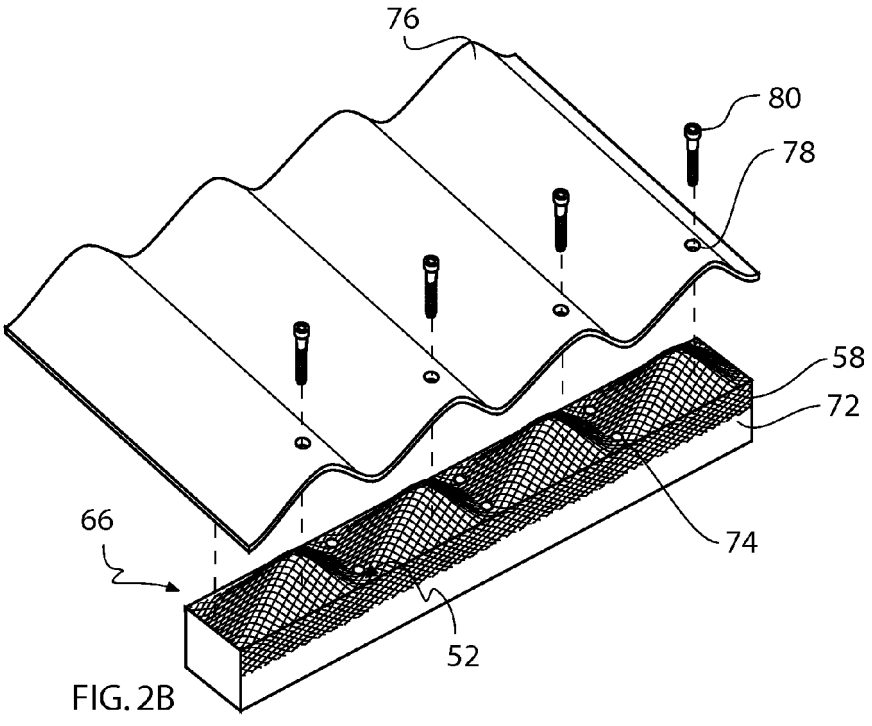

FIG. 2B

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Description

[0001] The present invention relates to a closure for the eave of a roof structure. More specifically, the present invention relates to a ventilation closure for a roof structure allowing a flow of air to pass into or from the roof structure.

[0002] In a conventional roof structure, the pitch defining rafters are commonly used for supporting an under-roof foil, which is usually made from a plastic material and serving the purpose of preventing rain and snow from reaching the loft or any insulating material between the rafters. It is known to have an under-roof foil that is impermeable, or alternatively water impermeable and vapour permeable. The under-roof foil is positioned to cover the rafters and on top of the under-roof foil is a first plurality of laths, where each lath is running parallel to and supported by a rafter. On top of the first plurality of laths is a second plurality of laths that are perpendicular to the first plurality of laths. The first plurality of laths serves the purpose to fix the under-roof foil to the rafters and hold the second plurality of laths distant from the under-roof foil to allow an unobstructed drainage of the under-roof foil. Tiles or plates are positioned on top of and supported by the second plurality of laths to define an outer roof. The tiles may be secured to the second multitude of laths to prevent them from blowing off, For an undulating roof, the securing is commonly achieved by a screw running through a hole located at a ridge of the tile and engaging a lath of the second plurality below.

[0003] With the described roof structure, a space is defined between the outer roof and the under-roof foil. A flow of air is usually allowed to pass in the space and along the rafters, which provides for a ventilation of the space and a drying of wet laths. The ventilating flow of air may enter or leave the space through openings at the eave of the roof structure, which openings are usually defined by the undulation of the tiles or plates. Wind may drive small objects or particles, such as leaves, sand or snow, through the openings at an eave into the space between the outer roof and the under-roof foil. Further, insects or small animals, such as wasps and birds, may enter the space through the openings at the eave, e.g. for building nests in the space between the outer roof and the under-roof foil.

[0004] Known ventilated eaves closures or filler members that are positioned at the eave of the roof structure and below the outer roof for hindering access to the space between the outer roof and the under-roof foil are for example US 6,941,706 B2, US 6,415,559 B1, EP 1705307 A1, and 4,622,789.

[0005] It is an object of the present invention to provide an improved handling and function of an eaves closure. A particular feature of the present invention is a ventilating closure comprising a mesh-type structure defining a first number of surface portions positioned in sequence along an elongated base portion and protruding from the base portion for conforming to an undulated lower side of the plates or tiles of the roof structure. This allows for several ventilating closures to be stacked on top of one another with the surface portions of neighbouring ventilating closures conforming to one another when the surface portions of a lower ventilating closure individually fit into the surface portions of another ventilating closure. This has the advantage that several ventilating closures are packed tightly together, i.e. stored and transported in a smaller space. Additional objects, features, and advantages will be apparent from the specification.

[0006] According to a first aspect of the present invention, the objects are obtained by a ventilating closure for an eave of a roof structure, the roof structure comprising a elongated support member positioned at and along the eave and plates or tiles positioned above the elongated support member, the elongated support member having an upper support surface facing the plates or tiles, the plates or tiles defining an undulated lower side facing the upper support surface of the elongated support member, the ventilating closure comprising a mesh-type structure for allowing a flow of air to pass through it, the mesh-type structure being a unitary structure and defining: an elongated base portion for positioning along the elongated support member and for contacting its upper support surface, and a first number of surface portions positioned in sequence along the elongated base portion and protruding from the base portion for conforming to the undulated lower side.

[0007] For example, the elongated support member may be a lath or a similar narrow strip of wood. The mesh-type structure being a unitary structure has the advantage that the ventilating closure can be handled as a single piece. The mesh-type structure may hinder or prevent small object or particles, such as leaves, sand or snow, to pass. Further, the mesh-type structure may hinder or prevent insects or small animals to pass.

[0008] The plates or tiles may define an upper side on the opposite side from the lower side. The upper side may define the outer surface of the roof structure, i.e. the surface upon which direct sunlight and rain may fall directly. The plates or tiles may have a uniform thickness so as to define an undulation of the upper side corresponding to the undulation of the undulated lower side.

[0009] The wording conforming to the undulated lower side is to be understood as encompassing the meaning corresponding in form or shape to the undulated lower side and being similar in form and shape, and also the meaning compliant or submissive to allow a corresponding in form or shape to the undulated lower side.

[0010] A mesh-type structure is understood to encompass a structure defining a surface having a single circumferential edge and defining a mesh-opening through which a flow of air can pass. The mesh-type structure allows a flow of air to pass through the ventilating closure, and at the same time prevents objects or particles having a dimension larger than the dimension the mesh-openings of the mesh-type structure.

[0011] The first number of surface portions may be a

single surface portion, or it may be a plurality of surface portions. The former has the advantage that it can be used in combination with a plate or tile defining any number of undulations, while the latter allows for a more secure and faster mounting.

[0012] Each surface portion of the first number of surface portions may define a bottom portion connecting to the elongated base portion and a top portion connecting to the bottom portion along a first closed curve. The top portion is positioned above the bottom portion when the elongated base portion is positioned in contact with an upper support surface that is horizontal.

[0013] One effect of these features is that the structural strength or resilience of the top of each surface portion is increased, which has the advantage that the ventilating closure will be less inclined to be deformed when installed, which could cause the closure not to be tight. For example, this allows a screw or nail to be driven through the top portion from above without deforming it. Each surface portion of the first number of surface portions may connect to the elongated base portion along a second closed curve. One effect of this is that the structural strength or resilience of the each surface portion as a whole is increased, which has the advantage that the ventilating closure will be less inclined to be deformed when installed, which could cause the closure not to be tight. For example, it allows a screw or nail to be driven through the surface portion from above without any deformation. It also has the effect that when the ventilating closure is installed, an airflow into the space below the undulated lower side of the plates or tiles must pass the mesh-type structure twice, which improves the ability of the ventilating closure to catch small items or particles.

[0014] Each surface portion of the first number of surface portions may define a contact surface for facially contacting a portion of the undulated lower side. This allows for a better contact between the ventilating closure and the plates or tiles. Each surface portion of the first number of surface portions may define a contact ridge for contacting the undulated lower side along a curve. This also allows for a better contact between the ventilating closure and the plates or tiles.

[0015] The mesh-type structure may be composed of strings that are fused together at each crossing of the strings. The strings may be resilient. The plates or tiles may be secured to the rest of the roof structure by nails or screws engaging the elongated support member, i.e. the screws or nails may be driven through a surface element of the ventilating closure. The fused together strings allow for a screw or a nail to be driven through the mesh-type structure without moving the strings with respect to one another so that no unwanted opening is created.

[0016] The upper support surface may be planar and the elongated support member may further have a side surface adjacent to the upper support surface, the side surface may be planar and oriented to define a right angle to the upper support surface and the mesh-type structure may further define: a flange extending from the elongated base portion for being placed in facial contact with the planar side surface of the elongated support member The flange has several advantages. If the side surface is an outer side surface generally facing away from the roof structure, this allows for the ventilating closure to be secured, e.g. by a nail or a screw, to the elongated support member from a direction normal to the outer side surface of the elongated support member. This allows for a securing of the ventilating closure after it has been positioned between the elongated support member and the plates or tiles. Further, the flange is particularly advantageous if the first number of surface portions is a single surface portion, since then the ventilating closure cannot be secured between surface portions. For example, it allows for a positioning and securing of a ventilating closure in a roof structure where the plates or tiles are already positioned relative to the elongated support member. If the side surface is an inner side surface generally facing towards the roof structure, and if the roof structure defines an inclined or pitched roof, the flange may be held in position relative to the elongated support member by simply placing the flange in facial contact with the inner side surface. Further, if the ventilation closure has a width that is smaller than the width of the elongated support member, then the plate or tiles can be secured to the elongated support member by nails or screws that do not penetrate the ventilation closure.

[0017] The flange may extend from the base portion along the complete length of the base portion. Further, the flange allows for a securing that is distant from the surface portions, thus lowering the risk of deforming them.

[0018] The elongated base portion may comprise a first longitudinal support surface for facially contacting the upper support surface of the elongated support member, the first longitudinal support portion may extend along the complete length of the elongated base portion This allows for the ventilating closure to be secured by nails or screws to the elongated support member from a direction normal to the upper support surface without deforming the surface portions by driving the nail or screw through the first longitudinal support portion. The elongated base portion may comprise a second longitudinal support portion for facially contacting the upper support surface of the elongated support member, the second longitudinal support portion may extend along the complete length of the elongated base portion and be positioned on the opposite side of the first number of surface portions from the first longitudinal support portion. This allows for the ventilating closure to be further secured by nails or screw to the elongated support member from a direction normal to the upper support surface without deforming the surface portions. A securing involving both the first and the second longitudinal support surface prevents the ventilating closure from folding in a direction transversal to the elongated support member.

[0019] The first number of surface portions may be

greater than one and the elongated base portion may comprise a second number of transversal support portions for contacting the upper support surface of the elongated support member, each transversal support portion of the second number of transversal support portions may individually interconnect a pair of neighbouring surface portions. This allows the ventilating closure to be secured to the elongated support member by nails or screws between a pair of neighbouring surface portions, which prevents the ventilating closure from folding in any direction transversal to the elongated support member. Each transversal support portion of the second number of transversal support portions may define a contact plane for facially contacting the upper support surface of the elongated support member. Each transversal support portion of the second number of transversal support portions may connect to the first longitudinal support portion. Each transversal support portion of the second number of transversal support portions may interconnect the first and second longitudinal support portions.

[0020] Each surface portion of the first number of surface portions may define a pyramidal shape with a rounded top and rounded edges.

[0021] The open spaces between the fused strings of the mesh-type structure may have its smallest transversal dimension in one or more of the ranges of approximately 0.5 mm to approximately 5 mm, approximately 1 mm to approximately 3 mm, approximately 1 mm to approximately 2 mm, or approximately 1.5 mm; and/or in one or more of the ranges of approximately 0.5 mm to approximately 1 mm, approximately 1 mm to approximately 1.5 mm, approximately 1.5 mm to approximately 2 mm, approximately 2 mm to approximately 2.5 mm, approximately 2.5 mm to approximately 3 mm, approximately 3 mm to approximately 4 mm and/or approximately 4 mm to approximately 5 mm.

[0022] According to a second aspect of the present invention, the objects are obtained by a ventilated roof structure, the ventilated roof structure comprising an eave, an elongated support member positioned at and along the eave and plates or tiles positioned above the elongated support member, the elongated support member having an upper support surface facing the plates or tiles, the plates or tiles defining an undulated lower side facing the upper support surface of the elongated support member, the ventilated roof structure further comprising a ventilating closure according to the first aspect of the present invention, the elongated base portion being positioning along the elongated support member and contacting its upper support surface, and the first number of surface portions conforming to the undulated lower side. The ventilating closure in the ventilated roof structure according to the second aspect of the present invention may comprise any combination of the features described in relation to the ventilating closure according to the first aspect of the present invention. The effects and advantages presented in relation to the first aspect of the present invention are also applicable for the second aspect of the present invention.

[0023] According to a third aspect of the present invention, the objects are obtained by a method for mounting a closure for an eave of a roof structure comprising the steps of: providing an elongated support member for being positioned at and along the eave of a roof structure, the elongated support member having an upper support surface and a planar side surface adjacent to and at a right angle to the upper support surface, providing a ventilating closure according to the first aspect of the present invention, providing one or more screws or nails, placing the elongated base portion along the elongated support member and in contact with the upper support surface, and placing the flange in facial contact with the planar side surface of the elongated support member, and driving the one or more screws or nails through the flange into the elongated support member for securing the ventilated eave to the elongated support member. The planar side surface may be an outer side surface generally facing away from the roof structure. This allows for a mounting from a position at and below the eave, i.e. it is not necessary to be positioned at level with or above the eave when mounting, which is generally a safer position and also easier to achieve. The planar side surface may be an outer side surface generally facing towards the roof structure. This has the advantage that the ventilation closure will be held in position by the flange alone prior to driving the one or more screws or nails through the flange.

[0024] The method for mounting may further comprise the steps of: providing a plurality of plates defining an undulated lower side, and placing the plates or tiles on top of the ventilating closure with the first number of surface portions conforming to the undulated lower side.

[0025] According to a fourth aspect of the present invention, the objects are obtained by a method for mounting a closure for an eave of a roof structure comprising the steps of: providing an elongated support member for being positioned at and along the eave of a roof structure, the elongated support member having an upper support surface and a planar side surface adjacent to and at a right angle to the upper support surface, providing a ventilating closure according to the first aspect of the present invention, providing one or more screws or nails, placing the elongated base portion along the elongated support member and in contact with the upper support surface and driving the one or more screws or nails through a transversal support portion of the second number of transversal support portions into the elongated support member for securing the ventilated eave to the elongated support member

[0026] According to a fifth aspect of the present invention, the objects are obtained by a method of manufacturing a ventilating closure according to the first aspect of the present invention comprising the steps of: extruding an elongated mesh-type tubular structure, providing a longitudinal cut along the elongated mesh-type tubular structure, and prying open the elongated mesh-type tu-

bular structure along the longitudinal cut and reforming it to define the elongated base portion and the first number of surface portions, the elongated base portion defining a base length. This method allows for a more efficient and cheaper providing of a ventilating closure.

[0027] The step of extruding the elongated mesh-type tubular structure may further comprise: providing a transversal cutting off of the elongated mesh-type tubular structure to define the base length. The step of prying open the elongated mesh-type tubular structure along the longitudinal cut and forming it to define the elongated base portion and the first number of surface portions may further comprise: providing a transversal cutting off of the reformed elongated mesh-type tubular structure to define the base length.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] The above-mentioned objects and features and additional objects and features according to the present invention will be further elaborated in the following detailed description and appended claims in conjunction with the figures:

FIG.1A illustrating a front view of a section of a preferred embodiment of the ventilating closure,

FIG. 1B illustrating a bottom view of the section of the preferred embodiment of the ventilating closure corresponding to a quarter of a full rotation around a horizontal axis of the ventilating closure of FIG.1A with its lower side moving away from the plane of the paper,

FIG. 1C illustrating a top view of the section of the preferred embodiment of the ventilating closure corresponding to a quarter of a full rotation around a horizontal axis of the ventilating closure of FIG.1A with its lower side moving towards the plane of the paper,

FIG.1D illustrating a first side view of the section of the preferred embodiment of the ventilating closure corresponding to a quarter of a full rotation around a vertical axis of the ventilating closure of FIG.1A with its left side moving away from the plane of the paper,

FIG.1E illustrating a second side view of the section of the preferred embodiment of the ventilating closure corresponding to a quarter of a full rotation around a vertical axis of the ventilating closure of FIG.1A with its left side moving towards the plane of the paper,

FIG.1F illustrating a back view of the section of the preferred embodiment of the ventilating closure corresponding to a half full rotation around a vertical axis of the ventilating closure of FIG.1A,

FIG.1G illustrating a perspective view of the section of the preferred embodiment of the ventilating closure shown in FIGS.1A-F,

FIG.2A illustrating a perspective view of a preferred embodiment of the ventilating closure above an elongated support member prior to mounting the ventilating closure to the elongated support member,

FIG.2B illustrating a perspective view of a preferred embodiment of the ventilating closure in FIG.2A mounted to the elongated support member with a tile positioned above the ventilating closure ready for mounting,

FIG.2C illustrating a perspective view of a preferred embodiment of the ventilating closure mounted to the elongated support member in FIG.2A with the tile mounted on top of the ventilating closure,

FIG.3A illustrating a perspective view of a tile mounted onto an elongated support member with a preferred embodiment of the ventilating closure mounted prepared for mounting to the elongated support member,

FIG.3B illustrating a perspective view of the ventilating closure of FIG.3A mounted on the elongated support member,

FIG.4 schematically illustrating an apparatus for producing a mesh-type tubular structure tubular elements,

FIGS.5A1-E2 schematically illustrating a preferred method for reshaping a mesh-type tubular structure of a specific length into a preferred embodiment of a ventilation closure according to the present invention, and

FIG.6 schematically illustrating a method for reshaping a mesh-type tubular structure having an indefinite length into a preferred embodiment of a ventilation closure according to the present invention

DETAILED DESCRIPTION

[0029] The same number index is used for identical or similar elements or features in all of the figures.

[0030] In FIGS.1A-G, different views of a ventilating closure 50 are shown. The ventilating closure 50 is a mesh-type structure 56 composed of strings 54 that are fused together at each crossing 86 of the strings. The strings are manufactured of a resilient plastic. The mesh-type defines an elongated base portion 52 and a single complete surface portion 54 protruding from the elongat-

ed base portion 52. The surface portion 54 defines a pyramidal shape having a rounded top 64 and rounded edges 65.

[0031] A flange 58 extends from the complete length of the elongated base portion 52. The surface portion 54 defines a bottom portion 60 connecting to the elongated base portion 52 and a top portion 62 connecting to the bottom portion 60 along a closed curve. The top 64 of the surface portion is the point at which the surface portion 54 protrudes the most from the elongated base portion 54. The top 54 is located on the top portion 62. This means that where a horizontal plane cutting through the surface portion 54 of FIG.1A, the intersection of the horizontal plane and the surface portion 54 would define a closed curve. Further, the surface portion 54 connects to the elongated base portion 52 along a closed curve, i.e. the connection defines the closed curve. Thus, the elongated base portion 52 encircles the surface portion 54.

[0032] The elongated base portion comprises a first longitudinal support surface 88 and a second longitudinal support surface 90 on opposite sides of the surface portion 54 and extending along the complete length of the elongated base portion 52. The first support surface 88 is planar, the second support surface 90 is planar, and the first 88 and second 90 support surfaces are co-planar with respect to one another. The elongated base portion 52 comprises a transversal support portion 92 defining a contact plane interconnecting and being co-planar with the first 88 and second 90 support surfaces. The flange 58 extends from the first longitudinal support surface 88 and defines a plane perpendicular to the contact plane of the transversal portion 92.

[0033] The ventilating closure in FIGS.2A-C and FIGS. 3A-B differs from the ventilating closure of FIGS.1A-G only in that the elongated base portion 52 and flange 58 are longer and that it defines four surface portions 54 positioned along the elongated base portion 52 with three transversal support portions 92 positioned between and interconnecting the surface portions 54.

[0034] FIGS.2A-C illustrates a mounting of a preferred embodiment of the present invention in a roof structure. The roof structure comprises an elongated support member 68 in the form of a lath. The elongated support member 68 has an upper planar support surface 70 and a planar side surface 72 adjacent to and at a right angle to the upper support surface 70. The elongated support member 68 is positioned at and along the eave 94 of the roof structure.

[0035] The elongated base portion 52 of the ventilating closure 50 is positioned along the elongated support member 68 and in contact with the upper support surface 70, and the flange 58 is positioned in facial contact with the planar side surface 72 of the elongated support member 68. Nails are driven through the transversal support portion through the upper support surface 70, thereby securing the ventilation closure 50 to the underlying elongated support member 68.

[0036] A corrugated tile 76 having an undulated lower side and through-going holes 78 is positioned on top of the ventilation closure 50 so that the protruding surface portions 54 of the ventilated closure 50 conform to the undulated lower side. The through going holes 78 are positioned on top of the bottom portion 60 or the first longitudinal support surface 88 of the surface portions 50. A screw 80 is inserted through each through-going hole 78 and driven through the bottom portion 60 or the first longitudinal support surface 88 into the elongated support member 68 so that the corrugated tile 76 is secured thereto.

[0037] FIGS.3B-C illustrates a preferred mounting of a preferred embodiment of the present invention in a roof structure. The roof structure comprises an elongated support member 68 in the form of a lath. The elongated support member 68 has an upper planar support surface 70 and a planar side surface 72 adjacent to and at a right angle to the upper support surface 70. The elongated support member 68 is positioned at and along the eave 94 of the roof structure.

[0038] The elongated base portion 52 of the ventilating closure 50 is positioned along the elongated support member 68 and in contact with the upper support surface 70, and the flange 58 is positioned in facial contact with the planar side surface 72 of the elongated support member 68. Nails are driven through the flange 58 through the side surface 72, thereby securing the ventilation closure 50 to the underlying elongated support member 68.

[0039] A corrugated tile 76 having an undulated lower side rests on top of the elongated support member 68 prior to mounting the ventilation closure 50. The corrugated tile 76 is lifted a small amount from the elongated support member 68, a step that is not shown, and the ventilation closure 50 is inserted between the corrugated tile 76 and the elongated support member 68 so that the protruding surface portions 54 of the ventilated closure 50 conform to the undulated lower side. This particular method is advantageous when replacing an already existing eaves closure with a ventilation closure.

[0040] FIG.4 is a schematic illustration of an apparatus 10 for producing a mesh-type tubular structure. The apparatus 10 comprises a first section 12 and a second section 14. The first section 12 receives granulate material 16 via an inlet 18 constituted by a funnel. In an alternative embodiment, the inlet 18 may be in contact with a larger reservoir for continuously supplying granulate material 16 to the apparatus 10.

[0041] The first section 12 receives the granulate material which is then fed to a screw conveyor 20 defining an axis or path of travel along which the granulate material is transported. The screw conveyor 20 is positioned in the first section 12. Along the path of travel defined by the screw conveyor 20, a number of heating elements is distributed. The heating elements, not illustrated in Fig. 1a, heats the granulate material 16 while it is conveyed by the screw conveyor from the inlet of the first section 12 to an outlet 22 of the first section. The granulate ma-

terial 16 is heated to a temperature just below the melting point of the granulate material 16. In the preferred embodiment, the screw conveyor 20 compresses the granulate material as it is conveyed along the path of travel.

[0042] The screw conveyor 20 is formed as a simple screw having a substantially constant diameter or height. In an alternative embodiment the screw conveyor 20 is formed as a screw conveyor with a gradually decreasing height so that the granulate material 16 is further compressed due to the gradually reduced size or space. In the embodiment where the screw conveyor 20 has a substantially constant height along the path of travel, the granulate material 16 is compressed by the "new" or cold granulate material pushing the "old" or hot granulate material 16 located nearer the outlet 22 of the first section 12.

[0043] The operation of the heating elements and/or the screw conveyor is controlled by an external unit 24, e.g. a computer or specialised hardware and/or software monitoring the operation of the screw conveyor and/or the heating elements by receiving information regarding the number of revolutions per second of the screw conveyor and temperature information e.g. via sensors located inside the first section 12. The unit 24 may ensure that the temperature of the heating elements and/or the material is within predetermined ranges. The unit 24 is connected to the first section 12 via a cable 26 for transferring information and control signals back and forth between the unit 24 and the first section 12.

[0044] From the outlet 22 of the first section 12, the heated and near-melted granulate material is transferred into an extruder unit 27 including an additional heater unit, not illustrated, for heating the material above its melting point. An example of how the mesh-type tubular structure 34 is produced through extrusion by using counter-rotating extrusion parts is described in EP1704916A1. The spun strings from the counter-rotating extrusion parts are brought together before solidifying, thus creating an elongated mesh-type tubular structure composed 34 of strings that are fused together. The mesh-type tubular structure composed 34 is cooled in the second section 14, causing the structure composed 34 to solidify quickly. The mesh-type tubular structure 34 exits the second section 14 via the outlet 36.

[0045] FIGS.5A1-E2 schematically illustrates a preferred method for reshaping a mesh-type tubular structure 96 of a specific length into a preferred embodiment of a ventilation closure according to the present invention. The mesh-type tubular structure 96 of a specific length is achieved by cutting the cooled mesh-type tubular structure 34 described in relation to FIG.4 into sections of corresponding length.

[0046] In FIG.5A1, a perspective view of the mesh-type tubular structure 96 is shown, while in FIG.5A2, a through-cut of the mesh-type tubular structure 96 is shown. The mesh-type tubular structure 98 is cut along a straight longitudinal cut and pried open to define a single circumferential edge 98 as is FIGS.5B1-2. The open mesh-type tubular structure 96 is placed between a first die 100 and a second die 102, as is shown in FIGS.5C1-2. The first die 100 has a number of protruding portions 104 having a surface corresponding in shape and relative position to the number of surface portion 54 of the ventilation closure 50 in FIGS.2A-C and protruding from a planar base surface 106. The first die 100 further has an outer planar side surface 108 perpendicular to the planar base surface 106 to which it connects along a straight line. The second die 102 has a number of depressions, not shown, corresponding in shape and relative position to the protruding portions 104 and a lip 110 defining an inner planar side surface perpendicular to the outer planar side surface 108.

[0047] The mesh-type tubular structure 96 is heated to a temperature at which the material of the strings of the mesh-type tubular structure 96 becomes soft and malleable. Thus, when the first 100 and second 102 dies are cooperatively pressed together, as is shown in FIGS. 5D1-2, the mesh-type tubular structure 96 is reshaped into a ventilation closure 50 as in FIGS.2A-C. The first 100 and second 102 dies have a temperature that is lower than the temperature of the mesh-type tubular structure 96 prior to reshaping. Thus, the material of the strings of the mesh-type tubular structure 96 hardens and the defined shape of the ventilation closure 50 is maintained, as is shown in FIGS.5E1-2.

[0048] A method of how to obtain an elongated continuous mesh-type tubular structure 34 having unspecified length is described in relation to FIGS.4. FIG.6 schematically illustrates a method for continuously reshaping the continuous mesh-type tubular structure 34 into a preferred embodiment of a ventilation closure according to the present invention.

[0049] The continuous mesh-type tubular structure 34 is advanced towards a resting cutting knife 114 performing a longitudinal cut along the continuous mesh-type tubular structure 34. The continuous mesh-type tubular structure 34 is further advanced towards and between a first die wheel 116 and a second die wheel 118. The first die wheel 116 corresponds in shape to the first die 100, as described in relation to FIGS.5C1-2 that has been reshaped to an annular shape with the protruding portions 104 positioned on its outer side and protruding radially outwards. Similarly, the second die wheel 118 corresponds in shape to the second die 102, as described in relation to FIGS.5C1-2 that has been reshaped to an annular shape with depressions 120 positioned on its inner side. The first 116 and second 118 die wheels have parallel rotational axes and are positioned so that the protruding portions 104 cooperate with the depressions 120 when they rotate at the same rate.

[0050] Prior to contacting the first 116 and second 118 die wheels, the continuous mesh-type tubular structure 34 is heated to a temperature at which the material of the strings of the continuous mesh-type tubular structure 34 becomes soft and malleable. Thus, when the first and second die wheels 118 and 116, respectively, are cooperatively rotated, the continuous mesh-type tubular struc-

ture 34 is reshaped to define the features of the ventilation closure 50 of FIGS.2A-C. The first and second dies wheels 116 and 118, respectively, have a temperature that is lower than the temperature of the continuous mesh-type tubular structure 34 prior to reshaping. Thus, the material of the strings of the mesh-type tubular structure 96 hardens and the defined shape of the ventilation closure 50 is maintained. The continuous mesh-type tubular structure 34 is then cut into the ventilation closure 50 having a specific length or base length.

ITEM LIST

[0051]

10	apparatus for producing mesh-type tubular structure
12	first section
14	second section
16	granulate material
18	inlet
20	screw conveyor
22	outlet
24	external unit
26	cable
27	extruder unit
28	inlet
34	mesh-type tubular structure
36	outlet
38	cutting wheel
40	tower
42	arrow
44	assembly
50	portion of a ventilating closure
52	elongated base portion
54	surface portion
56	mesh-type structure
58	flange
60	bottom portion
62	top portion
64	top
66	ventilating closure
68	elongated support member
70	upper support surface
72	side surface
74	nails
76	tile
78	aperture
80	screw
82	nail
84	string
86	string crossing
88	first longitudinal support surface
90	second longitudinal support surface
92	transversal support portion
94	eave
96	mesh-type tubular structure
98	single circumferential edge
100	first die
102	second die
104	protruding portion
106	planar base surface
108	outer planar side surface
110	lip
112	inner planar side surface
114	knife

116 first die wheel

118 second die wheel

120 depression

Claims

1. A ventilating closure for an eave of a roof structure, said roof structure comprising an elongated support member positioned at and along said eave and plates or tiles positioned above said elongated support member, said elongated support member having an upper support surface facing said plates or tiles, said plates or tiles defining an undulated lower side facing said upper support surface of said elongated support member, said ventilating closure comprising a mesh-type structure for allowing a flow of air to pass through it, said mesh-type structure being a unitary structure and defining:

an elongated base portion for positioning along said elongated support member and for contacting its upper support surface, and
a first number of surface portions positioned in sequence along said elongated base portion and protruding from said base portion for conforming to said undulated lower side.

2. The ventilating closure according claim 1 **characterized by** each surface portion of said first number of surface portions defining a bottom portion connecting to said elongated base portion and a top portion connecting to said bottom portion along a first closed curve.

3. The ventilating closure according to any of the claims 1 to 2 **characterized by** each surface portion of said first number of surface portions connecting to said elongated base portion along a second closed curve

4. The ventilating closure according to any of the claims 1 to 3 **characterised by** said mesh-type structure being composed of strings that are fused together at each crossing of the strings.

5. The ventilating closure according to any of the claims 1 to 4, **characterised by** said upper support surface being planar and said elongated support member further having an side surface adjacent to said upper support surface, said side surface being planar and oriented to define a right angle to said upper support surface, said mesh-type structure further defining:

a flange extending from said elongated base portion for being placed in facial contact with said planar side surface of said elongated support member.

6. The ventilating closure according to any of the claims 1 to 5, **characterised by** said elongated base portion comprising a first longitudinal support surface for facially contacting said upper support surface of said elongated support member, said first longitudinal support portion extending along the complete length of said elongated base portion.

7. The ventilating closure according to any of the claims 1 to 6, **characterised by** said elongated base portion comprising a second longitudinal support portion for facially contacting said upper support surface of said elongated support member, said second longitudinal support portion extending along the complete length of said elongated base portion and being positioned on the opposite side of said first number of surface portions from said first longitudinal support portion.

8. The ventilating closure according to any of the claims 1 to 7, **characterised by** said first number being greater than one and said elongated base portion comprising a second number of transversal support portions for contacting said upper support surface of said elongated support member, each transversal support portion of said second number of transversal support portions individually interconnecting a pair of neighbouring surface portions.

9. The ventilating closure according to claim 8, **characterised by** each transversal support portion of said second number of transversal support portions interconnecting said first and second longitudinal support portions..

10. The ventilating closure according to any of the claims 1 to 9, **characterised by** the opening through said mesh-type structure having its smallest transversal dimension in one or more of the ranges of approximately 0.5 mm to approximately 5 mm, approximately 1 mm to approximately 3 mm, approximately 1 mm to approximately 2 mm, or approximately 1.5 mm, and/or in one or more of the ranges of approximately 0.5 mm to approximately 1 mm, approximately 1 mm to approximately 1.5 mm, approximately 1.5 mm to approximately 2 mm, approximately 2 mm to approximately 2.5 mm, approximately 2.5 mm to approximately 3 mm, approximately 3 mm to approximately 4 mm, and/or approximately 4 mm to approximately 5 mm.

11. A method for mounting a closure for an eave of a roof structure comprising the steps of:

providing an elongated support member for being positioned at and along the eave of a roof structure, said elongated support member hav-

ing an upper support surface and an planar side surface adjacent to and at a right angle to said upper support surface,
providing an ventilating closure according to claims 5,
providing one or more screws or nails,
placing said elongated base portion along said elongated support member and in contact with said upper support surface, and placing said flange in facial contact with said planar side surface of said elongated support member, and
driving said one or more screws or nails through said flange into said elongated support member for securing said ventilated eave to said elongated support member.

12. The method for mounting according to claim 11 further comprise the steps of:

providing a plurality of plates defining an undulated lower side, and
placing said plates or tiles on top of said ventilating closure with said first number of surface portions conforming to said undulated lower side.

13. A method of manufacturing a ventilating closure according to any of the claims 1 to 10 comprising the steps of:

extruding an elongated mesh-type tubular structure,
providing a longitudinal cut along said elongated mesh-type tubular structure, and
prying open said elongated mesh-type tubular structure along said longitudinal cut and reforming it to define said elongated base portion and said first number of surface portions, said elongated base portion defining a base length.

14. The method according to claim 13 **characterized by** the step of extruding said elongated mesh-type tubular structure further comprising: providing a transversal cutting off of said elongated mesh-type tubular structure to define said base length.

15. The method according to 13 **characterized by** the step of prying open said elongated mesh-type tubular structure along said longitudinal cut and forming it to define said elongated base portion and said first number of surface portions further comprising: providing a transversal cutting off of said reformed elongated mesh-type tubular structure to define said base length.

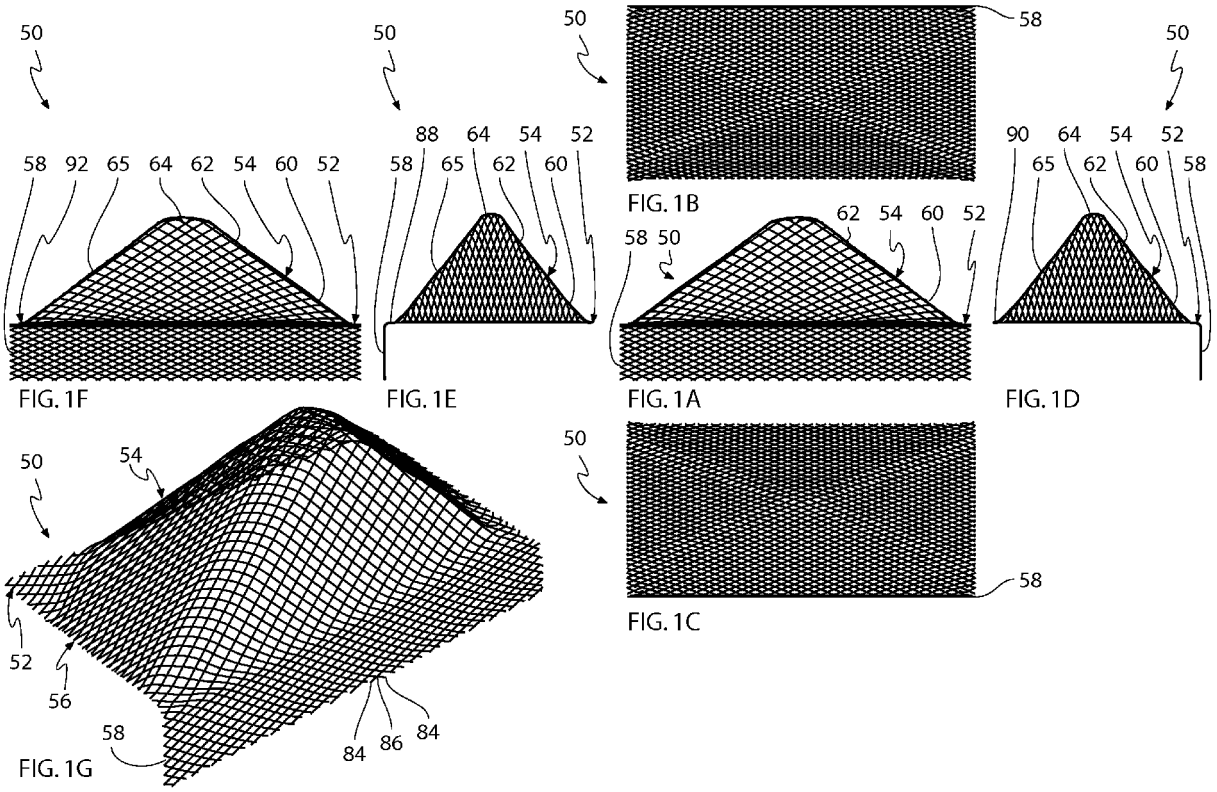

FIG. 1F FIG. 1E FIG. 1B FIG. 1D

FIG. 1A

FIG. 1C

FIG. 1G

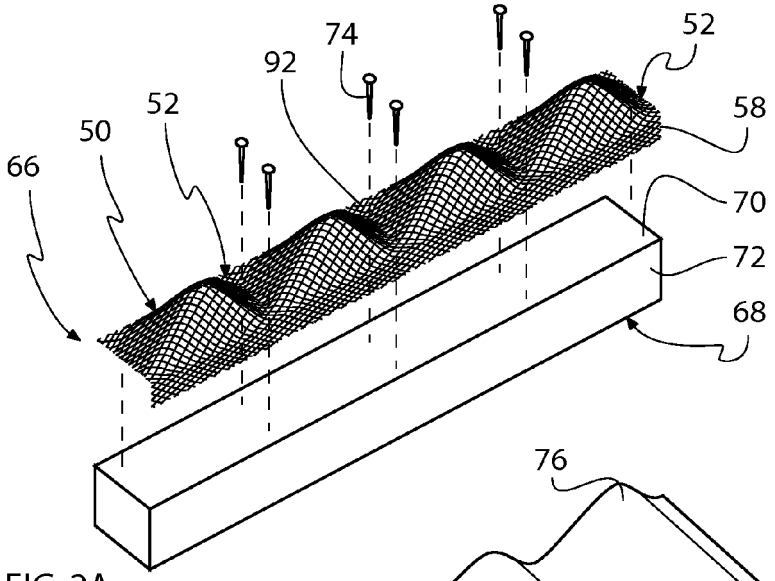

FIG. 2A

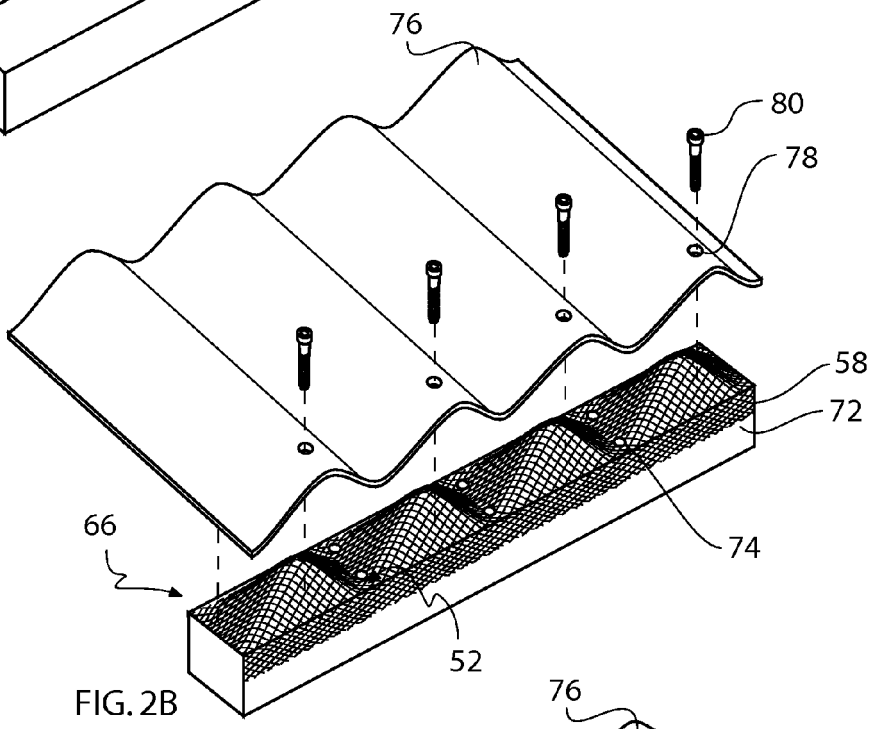

FIG. 2B

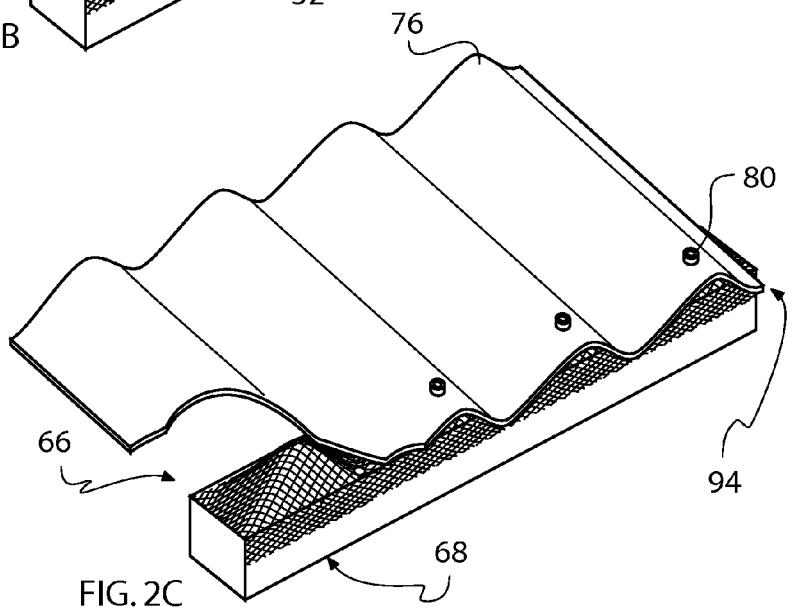

FIG. 2C

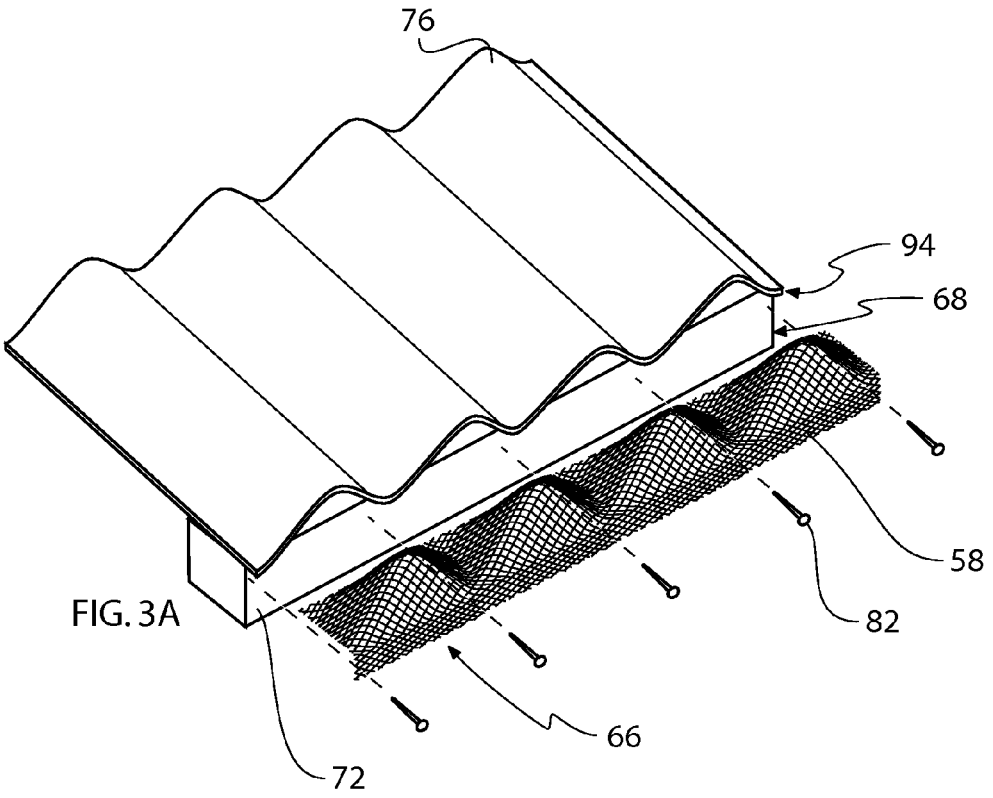

FIG. 3A

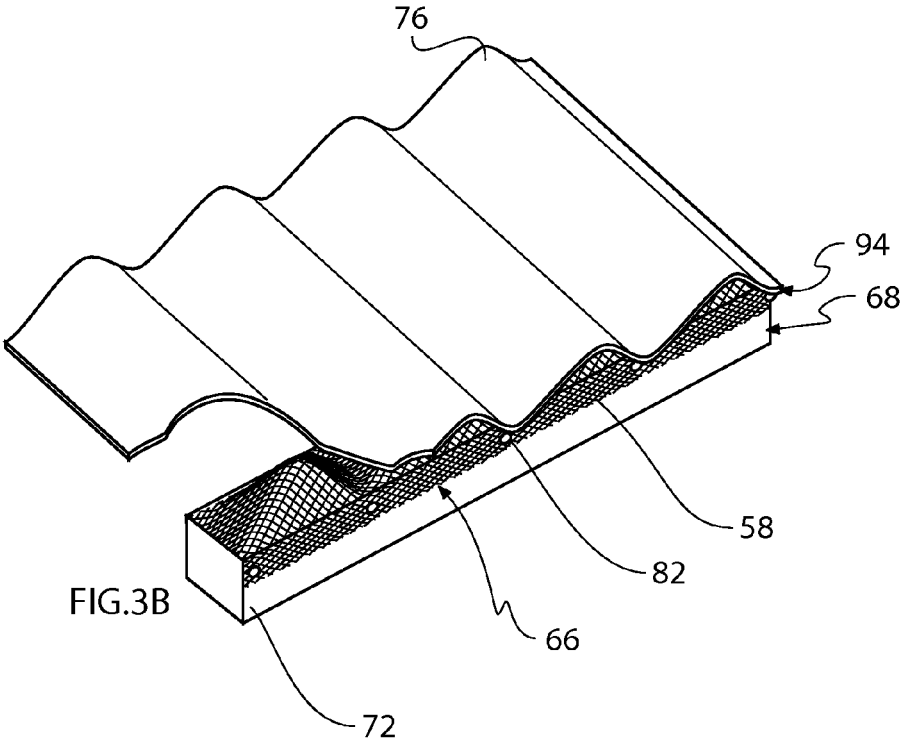

FIG.3B

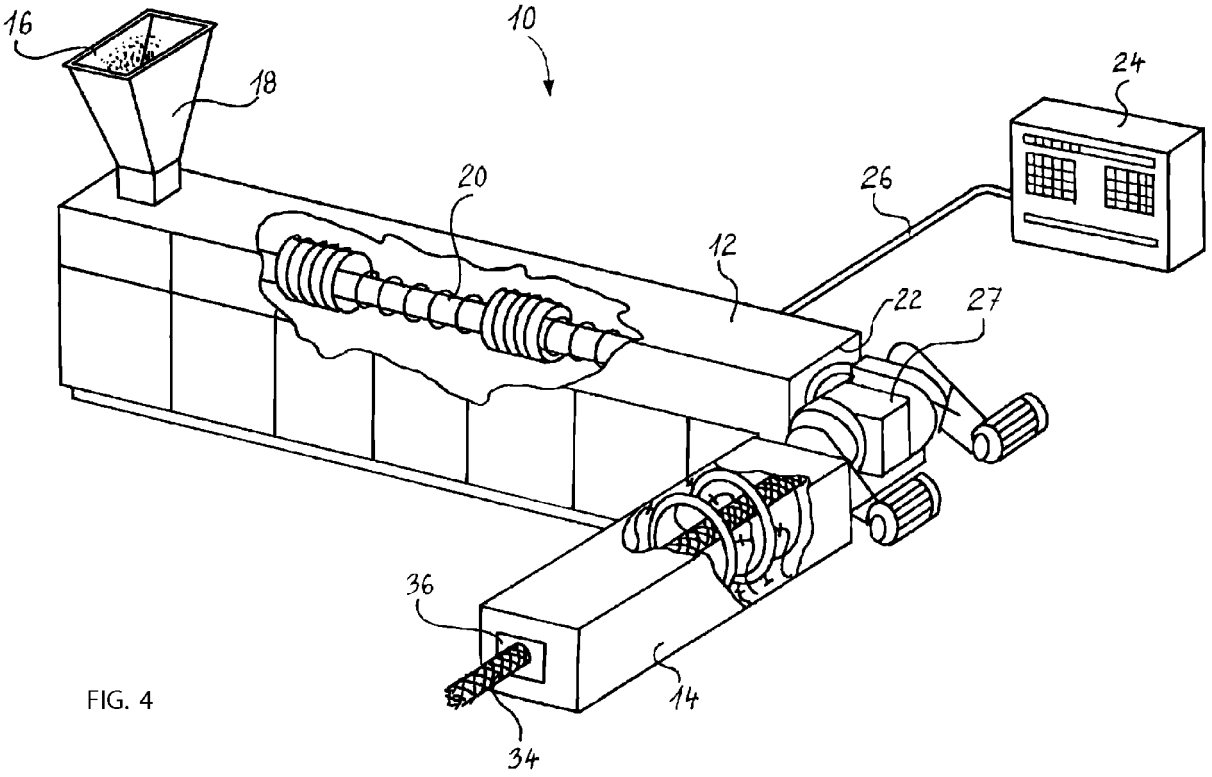

FIG. 4

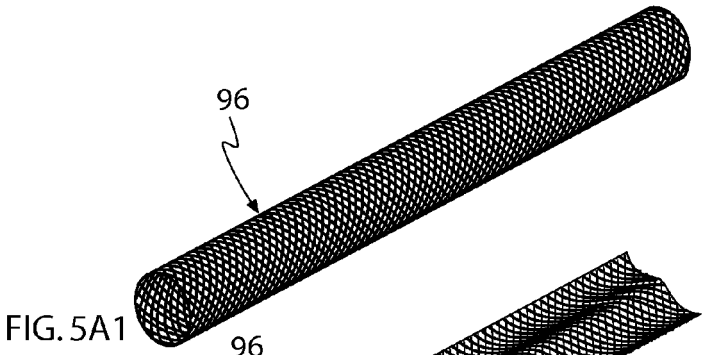

FIG. 5A1

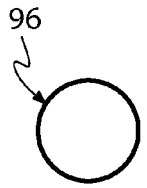

FIG. 5A2

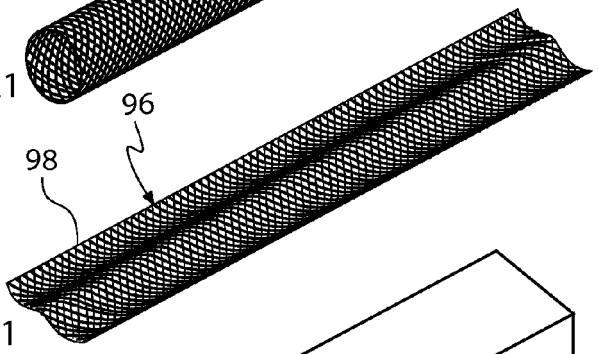

FIG. 5B1

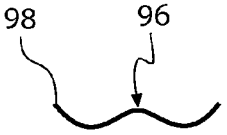

FIG. 5B2

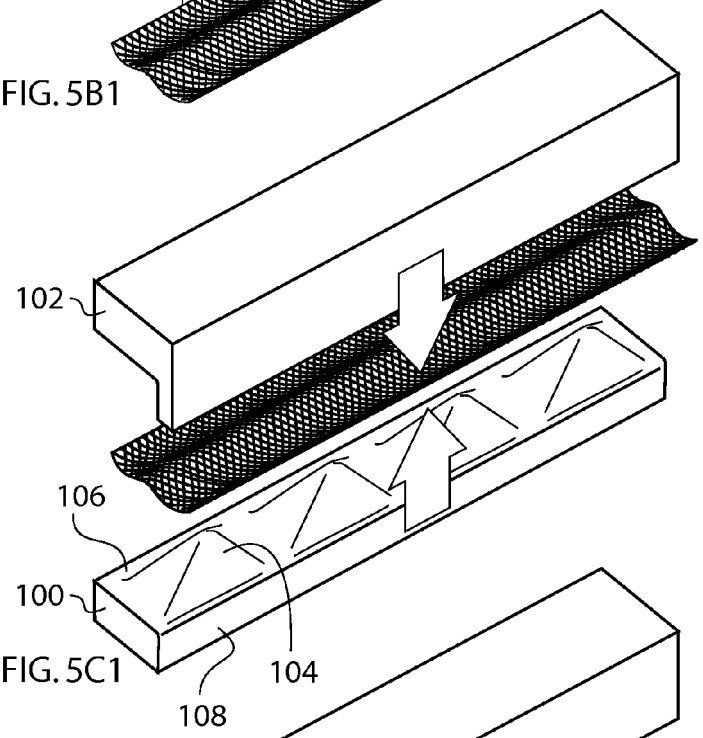

FIG. 5C1

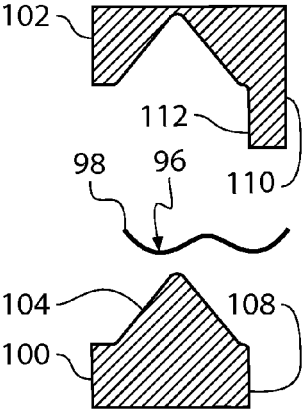

FIG. 5C2

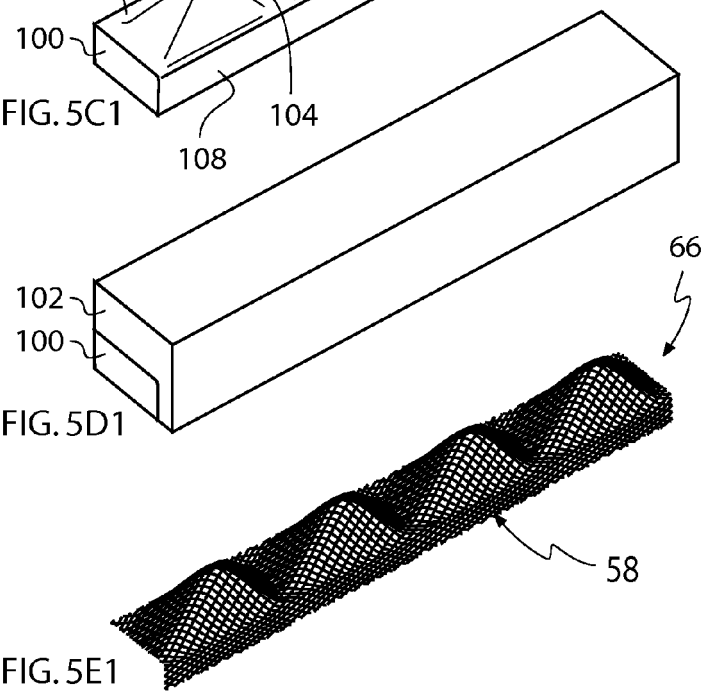

FIG. 5D1

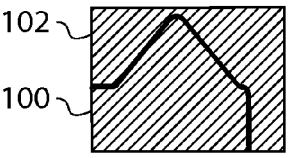

FIG. 5D2

FIG. 5E2

FIG. 5E1

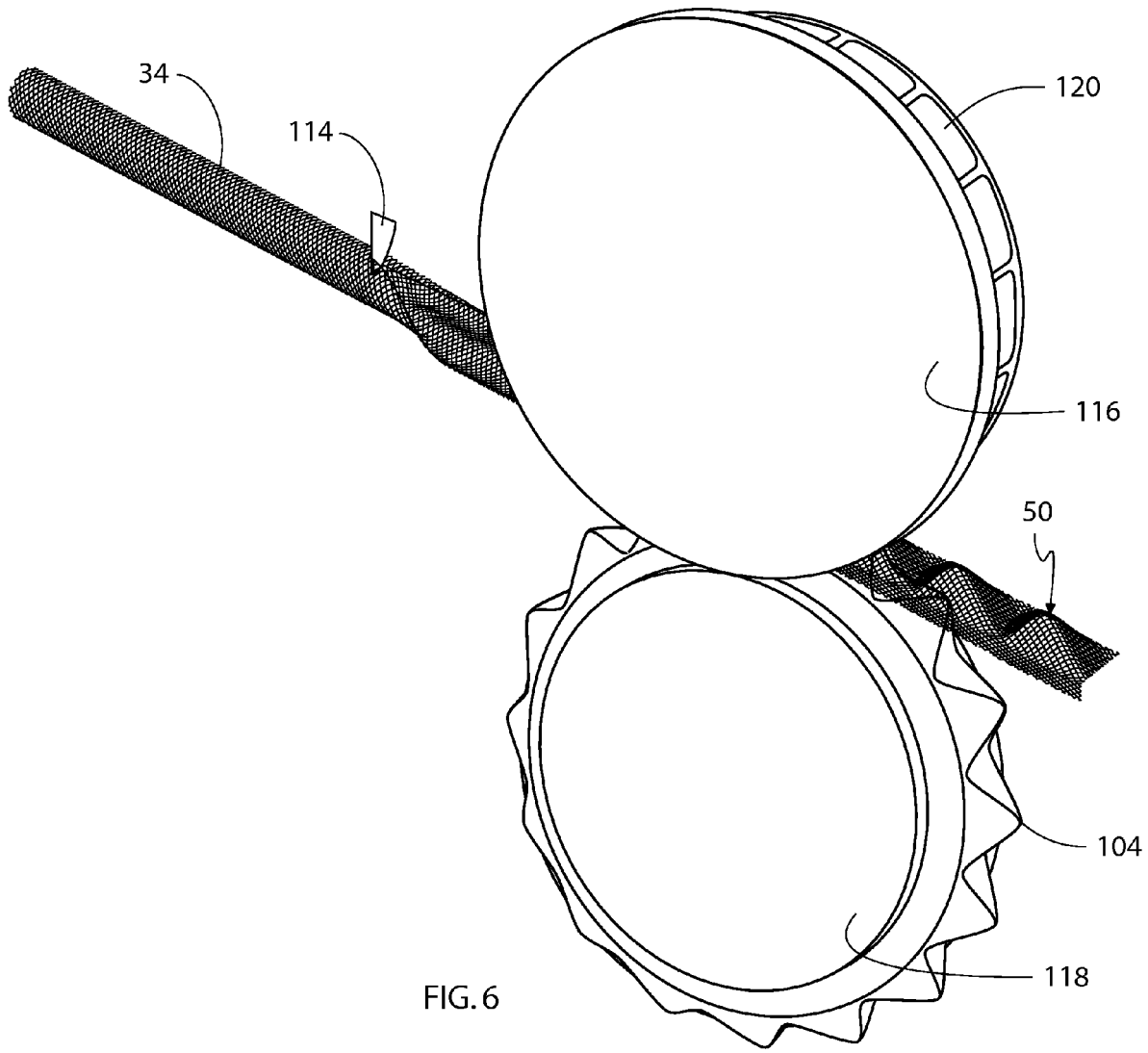

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 10 16 2680

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A,D	EP 1 704 916 A1 (EXPO NET DANMARK AS [DK]) 27 September 2006 (2006-09-27)	13-15	F24F13/08

TECHNICAL FIELDS SEARCHED (IPC)
E04D
F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 September 2010	Bauer, Josef

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10-09-2010

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