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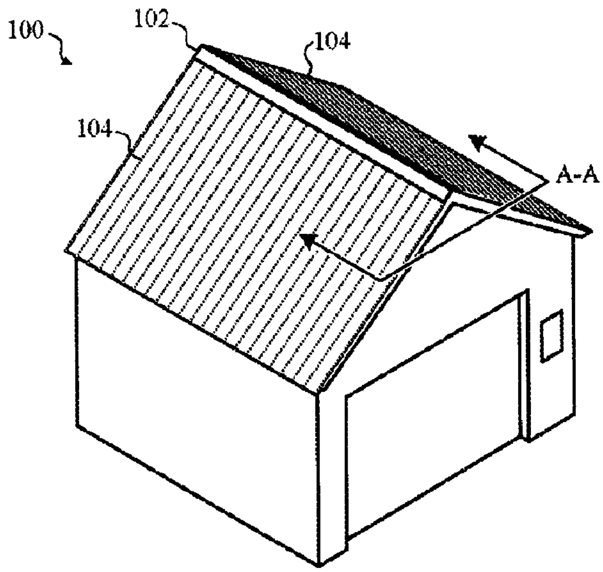
(72) Inventeur/Inventor:
POLUMBUS, CLAY, US
(73) Propriétaire/Owner:
CPTPCO LLC, US
(74) Agent: RICHES, MCKENZIE & HERBERT LLP

(54) Titre : JOINT D'ETANCHEITE D'ARRET PERMEABLE AUX GAZ AYANT UN CONDUIT DE BARBACANE POUR EVENTS DE FAITE
(54) Title: GAS PERMEABLE ARRESTER SEAL WITH INTEGRATED WEEP CONDUIT FOR RIDGE VENTS



(57) Abrégé/Abstract:
A two-layer arrester seal for venting a pitched roof at a ridge termination. The arrester seal includes a foundation layer and a gas permeable layer disposed or formed thereon. The foundation layer can be self-supporting to provide structural definition to the arrester seal and can be formed to contour to a transverse profile of the roof adjacent the ridge termination. The gas permeable layer can be formed from a bonded-fiber matting and the foundation layer can be formed from a liquid-impermeable closed cell foam. The foundation layer can include a weep conduit to provide a liquid egress route below the arrester seal.

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(71) Applicant: **CPTPCO LLC** [US/US]; 4341 E. 56th Place, Tulsa, Oklahoma 74135 (US).

(72) Inventor: **POLUMBUS, Clay**; 4341 E. 56th Place, Tulsa, OK 74135 (US).

(74) Agents: **HEMENWAY, S. Craig** et al.; 410 Seventeenth Street, Suite 2200, Denver, Colorado 80202 (US).

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(54) **Title**: GAS PERMEABLE ARRESTER SEAL WITH INTEGRATED WEEP CONDUIT FOR RIDGE VENTS

(57) **Abstract**: A two-layer arrester seal for venting a pitched roof at a ridge termination. The arrester seal includes a foundation layer and a gas permeable layer disposed or formed thereon. The foundation layer can be self-supporting to provide structural definition to the arrester seal and can be formed to contour to a transverse profile of the roof adjacent the ridge termination. The gas permeable layer can be formed from a bonded-fiber matting and the foundation layer can be formed from a liquid-impermeable closed cell foam. The foundation layer can include a weep conduit to provide a liquid egress route below the arrester seal.

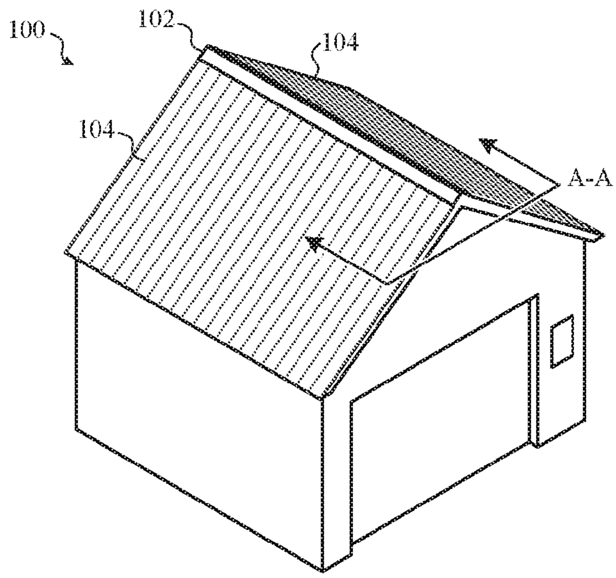

FIG. 1

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GAS PERMEABLE ARRESTER SEAL WITH INTEGRATED WEEP CONDUIT FOR RIDGE VENTS

[0001]

Technical Field

[0002] This disclosure relates generally to roofing systems, and more particularly, to systems and methods for preventing ingress of foreign matter to the interior of a structure through a ridge vent.

Background

[0003] Many residential and commercial structures include a pitched roof. Such roofs often preserve an air path at the apex of the pitch (the "ridge") to encourage the ventilation of air from the interior of the structure to the external environment. In many cases, the air path at the ridge (the "ridge vent") can be ducted to other vents or ventilation systems (such as gable vents, soffit vents, louvers, and so on) to provide additional ventilation to the structure.

[0004] Traditionally, ridge vents are accompanied by a screen assembly at the output of the air path such as a wire mesh, a reticulated matting, a baffle, or a tightly-corrugated or pleated plastic in order to prevent the intrusion of insects, animals, wind-blown precipitation, organic or inorganic debris, or any other foreign matter into the structure or beneath the roof. Ridge vent screen assemblies are typically disposed between the roofing material (*e.g.*, shingles, tiles, metal sheeting, and so on) and a ridge cap positioned over the ridge. However, conventional ridge vent screen assemblies have proven difficult to secure to both the ridge cap and to the roofing material in a manner that both prevents ingress of foreign matter and permits largely unrestricted air flow through the ridge vent, reliably, for an extended period of time and in a cost-effective manner.

[0005] For example, some ridge vent screens are made from high-cost and high weight materials such as injection-molded plastics (*e.g.*, polypropylene). Such ridge vent screens may be expensive to purchase and ship to a building site, may be cumbersome and/or time consuming to hoist to a ridge termination, and/or may be expensive or difficult to repair, clean, or replace.

[0006] Other conventional ridge vent screens may require fixed-height portions of rigid and air-impermeable material in order to fasten to a pitched roof. For example, certain conventional ridge vent screens may require spacers, bridges, or columns of rigid material to support the ridge cap disposed thereon and to maintain the gap introduced between the ridge cap and roofing material that defines the airway associated with the ridge vent. Such spacers can increase the vent screens' air flow resistance and/or decrease the vent screens' maximum airflow volume, thereby decreasing the effectiveness of the ventilation provided to the structure. Further, adjacent spacers may be formed with, or may settle over time to have, slightly different heights (*e.g.*, manufacturing variations), which in turn can introduce structural stresses and/or deformations (especially during thermal expansion or contraction) in the roofing material, ridge cap, or the ridge vent screen itself, necessitating repair or replacement. Additionally, if adjacent spacers are unequal in height, buckling, bending or other deformation of the roofing material, ridge cap, or vent screen can occur, which may introduce a channel or other pathway for foreign matter or liquid to intrude within the structure. Additionally, the relative rigidity of such spacers can increase the likelihood of dimpling or buckling of the roofing material upon fastening the vent screen spacer to the roof (*e.g.*, driving a screw too tightly). Similarly, the relative rigidity of such spaces can also cause dimpling or breaking of the ridge cap upon fastening the ridge cap to the vent screen spacer which, in turn, can increase the time, attention to detail, and cost required to install said vent screen to a pitched roof.

[0007] Furthermore, other conventional ridge vent screens are often caulked to (or otherwise hermetically or semi-hermetically sealed to) a ridge termination. In high humidity climates or climates experiencing both high wind and high levels of precipitation, liquid water can forcibly penetrate the ridge vent screen and/or condense behind the ridge vent screen thereby accumulating (*e.g.*, pooling) behind the conventional ridge vent screen, potentially resulting in damage or premature degradation of the roof, the conventional ridge vent screen, the ridge cap, or the structure itself.

[0008] As a result, there may be a present need for a cost effective, lightweight, and easy-to-install system or apparatus for preventing ingress and accumulation of foreign matter to the interior of a peaked-roof structure through a ridge vent.

<u>Summary</u>

[0009] Many embodiments described herein reference an arrester seal for a ridge vent (*e.g.*, a ventilation pathway introduced by a ridge termination ducting the interior of a structure to the exterior environment). The arrester seal can provide an effective liquid barrier at the surface of the roof to inhibit intrusion of water adhered to the surface of the roof via surface tension and, additionally, the arrester seal can provide a low airflow resistance to facilitate ventilation of air from the interior of the structure to the external environment.

[0010] The arrester seal can include at least a foundation layer with a gas permeable layer disposed thereon. The foundation layer can be formed from a rigid, semi-rigid, or self-supporting material. In many embodiments, the foundation layer can provide structural definition to the arrester seal. As noted above, the arrester seal can also include a gas permeable layer coupled to the top surface of the foundation layer. The gas permeable layer can be formed from a material having a determinable airflow resistance and the foundation layer may be formed from a fluid impermeable material.

[0011] In many embodiments, the bottom surface of the foundation layer of an arrester seal may be formed to substantially contour to a transverse profile (*e.g.*, lateral cross-section) of a roofing material (*e.g.*, tiles, shingles, ribbed metal, and so on). The gas permeable layer may be formed to contour to an underside of a ridge cap that can be positioned over an associated ridge termination. In one example including a substantially planar ridge cap underside, the gas permeable layer can define a substantially planar surface.

[0012] In many examples, the arrester seal can also include a weep conduit in the bottom surface of the foundation layer to facilitate the removal of liquid accumulation via a standard drainage system associated with the structure.

[0013] Some embodiments may provide an adhesive strip on the bottom surface of the foundation layer in order to couple the arrester seal to the roofing material. Other embodiments may provide an adhesive strip on the gas permeable layer in order to couple the arrester seal to the ridge cap.

[0014] Some embodiments reference a gas permeable layer formed from an open cell foam or a bonded-fiber matting, selected at least in part to minimize the airflow resistance. Some embodiments reference a foundation layer formed from a closed-cell foam.

[0015] Further embodiments described herein reference an arrester seal for venting a ribbed metal roof, the arrester seal including at least a foundation layer with a sealing surface formed to substantially contour to a transverse profile of the ribbed metal roof and a gas permeable layer formed from a bonded-fiber matting and including at least a bottom surface coupled to a top surface of the foundation layer. The bottom surface of the gas permeable layer may be formed to contour to the top surface of the foundation layer, and a top surface of the gas permeable layer may be formed to contour to the underside of a ridge cap.

[0016] Some embodiments reference a foundation layer formed from one of a polymeric material, a closed cell foam, an in-filled bonded-fiber matting, or a collapsed bonded-fiber matting. In many cases, a foundation layer also includes a seal-finished edge.

[0017] Some embodiments reference a sealing surface of an arrester seal that includes a major rib pocket to receive and contour to a major rib of the ribbed metal roof, and a minor rib pocket to receive and contour to the minor rib of the ribbed metal roof.

[0018] Further embodiments described herein may relate to, include, or take the form of a method of sealing a ridge vent, the method including at least the operations of removing a backing to expose an adhesive strip coupled to a sealing surface of an arrester seal, positioning the arrester seal adjacent to a ridge termination of a roofing section, orienting the arrester seal parallel to the ridge termination, press-fitting the adhesive strip against an external surface of the roofing section, fastening the arrester seal to the roofing section by driving a fastener (*e.g.*, screw, nail, bolt, clip, and so on) through a gas permeable layer of the arrester seal, through the sealing surface of the arrester seal, and into the roofing section. The method can continue with the operation of positioning a ridge cap over the ridge termination such that the ridge cap at least partially rests on the gas permeable layer.

[0018a] Accordingly, in one aspect, the present invention resides in an arrester seal for venting a ribbed metal roof comprising a stiffening rib, the arrester seal comprising: a foundation layer comprising a sealing surface formed to substantially contour to a transverse profile of the ribbed metal roof across the stiffening rib, the foundation layer defining a weep conduit adjacent to the stiffening rib; an adhesive strip coupled to the sealing surface and formed from an adhesive material configured to interface with and adhere to an external surface of the ribbed metal roof; and a gas permeable layer formed from a compressible bonded-fiber matting and comprising: a bottom surface coupled to and extending across an entirety of an upper surface of the foundation layer and across at least a portion of the stiffening rib, the bottom surface of the gas permeable layer formed to contour to the upper surface of the foundation layer; and a top surface configured to contour to and support an underside of a ridge cap when the gas permeable layer is placed in compression between the ridge cap and the stiffening rib.

[0018b] In another aspect, the present invention resides in an arrester seal for coupling a ridge cap to a ridge vent, the arrester seal comprising: a foundation layer configured to contour to an entirety of a transverse profile of a roofing section that includes at least a first major rib and a second major rib, the foundation layer comprising: a top surface; a bottom surface opposite the top surface; and a weep conduit defined in the bottom surface and positioned

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between the first major rib and the second major rib; and a gas permeable layer extending above, and continuously across an entirety of, the top surface of the foundation layer, the gas permeable layer configured to continuously contour to and support the ridge cap over the ridge vent; wherein: the foundation layer is formed from a self-supporting rigid material that is liquid and gas impermeable; and the gas permeable layer is coupled to the foundation layer and: separates the foundation layer from an underside of the ridge cap; compresses between the first major rib and an underside of the ridge cap to prevent installation damage to the ridge cap; and compresses between the second major rib and the underside of the ridge cap to prevent installation damage to the ridge cap.

Brief Description of the Drawings

[0019] Reference will now be made to representative embodiments illustrated in the accompanying figures. It should be understood that the following figures are not intended to limit the disclosure to one preferred embodiment. To the contrary, each is intended to cover alternatives, modifications, and equivalents as may be included within the spirit and scope of the described embodiments and as defined by the appended claims.

[0020] FIG. 1 depicts an isometric projection view of an example structure incorporating a pitched roof.

[0021] FIG. 2A depicts a cross-section view of the example structure of FIG. 1 taken through section A-A, showing an air path through an arrester seal.

[0022] FIG. 2B depicts a cross-section view of the example structure of FIG. 1 taken through section A-A, showing a weep conduit through an arrester seal.

[0023] FIG. 3A depicts a foundation layer of an arrester seal.

[0024] FIG. 3B depicts a gas permeable layer affixed to the foundation layer of the arrester seal of FIG. 3A.

[0025] FIG. 3C depicts an example interlocking arrester seal.

[0026] FIG. 4A depicts a cross-section view of the example arrester seal of FIG. 3A taken through section B-B.

[0027] FIG. 4B depicts a cross-section view of the example arrester seal of FIG. 3A taken through section B-B, depicting one example embodiment of a gas permeable layer as a bonded-fiber matting.

[0028] FIG. 4C depicts a cross-section view of the example arrester seal of FIG. 3A taken through section B-B, depicting one example embodiment of a gas permeable layer as an in-filled bonded-fiber matting.

[0029] FIG. 4D depicts a cross-section view of the example arrester seal of FIG. 3A taken through section B-B, depicting one example embodiment of a gas permeable layer as a partially collapsed bonded-fiber matting.

[0030] FIG. 5A depicts an isometric projection view of the removal of a backing strip from the foundation layer of an arrester seal, exposing an adhesive strip disposed partially thereon.

[0031] FIG. 5B depicts an isometric projection view of the removal of a backing strip from the foundation layer of an arrester seal, exposing an uninterrupted adhesive strip disposed thereon.

[0032] FIG. 5C depicts an isometric projection view of the removal of a backing strip from the gas permeable layer of an arrester seal, exposing an uninterrupted adhesive strip disposed thereon.

[0033] FIG. 6 depicts an isometric projection view of the fastening of an arrester seal to a metal roofing panel.

[0034] FIG. 7 depicts an isometric projection view of the fastening of an arrester seal to a metal roofing panel and to a ridge cap.

[0035] FIG. 8 depicts example operations of a method of manufacturing an arrester seal formed from a foundation layer and a gas permeable layer.

[0036] FIG. 9 depicts example operations of a method of affixing an arrester seal between roofing surface and a ridge cap.

[0037] The use of the same or similar reference numerals in different drawings indicates similar, related, or identical items.

[0038] The use of cross-hatching or shading in the accompanying figures is generally provided to clarify the boundaries between adjacent elements and also to facilitate legibility of the figures. Accordingly, neither the presence nor the absence of cross-hatching or shading conveys or indicates any preference for particular materials, material properties, element proportions, element dimensions, commonalities of similarly illustrated elements, or any other characteristic, attribute, or property for any element illustrated in the accompanying figures.

Detailed Description

[0039] Many embodiments described herein reference a multi-layer arrester seal for ridge vents of pitched roofs. It should be appreciated that the various embodiments described herein, as well as the functionality, operation, components, and capabilities thereof may be combined with other elements as necessary, and so any physical, functional, or operational discussion of any element or feature is not intended to limit the disclosure solely to a particular embodiment to the exclusion of others, or to favor a particular implementation for all embodiments or related embodiments. Particularly, although many embodiments are described herein with reference to arrester seals having two layers, other embodiments can take other forms.

[0040] A structure (*e.g.*, residential, industrial, or commercial) can include a ventilation system (*e.g.*, passive, forced-air, or mixed) to facilitate the circulation of air within the structure. Additionally, a ventilation system can be ducted to the ambient environment via one or more vent outlets (more generally, "vents") in order to normalize, regulate, or control the quality, temperature, pressure, and/or humidity of air within the structure. A structure can incorporate gable vents, soffit vents, louvers, and so on. In the case that a structure incorporates a pitched roof, the structure may also include a ridge vent.

[0041] Traditionally, a ridge vent is provided to a structure by introducing a gap between a ridge cap and the roofing material adjacent the ridge termination below the ridge cap. The gap can be ducted to another ventilation system and/or to the interior of the structure in order to allow fresh ambient air to replace stale, hot, or humid air within the structure. In one example, air within the structure (*e.g.*, within an attic) can be withdrawn to the external environment via convection. In another example, air within the structure can be withdrawn to the external environment from a leeward ridge vent as a result of a pressure differential caused by wind passing over the pitched roof. (*e.g.*, wind suction). In yet another example, air can be forced out of the structure by an electrical fan or other powered ventilation system (*e.g.*, duct fan).

[0042] Ventilation of air from the interior of a structure to the ambient environment can, among other things, improve air quality, regulate air temperature, balance air pressure, regulate air humidity, and inhibit condensation of vapor within the structure. In this manner, a ventilation system can reduce the likelihood (or delay the onset) of structural damage (*e.g.*, wood rot, mold, expansion, contraction, damage resulting from ice dams and ice expansion, and so on) associated with moisture accumulation or heat retention that might otherwise occur in an unventilated or poorly-ventilated structure. A ventilation system ducted to a ridge vent can additionally afford these benefits to the interior of the pitched roof itself (*e.g.*, air space between rafters, *etc.*). As a result, an intentionally designed ventilation system incorporating or ducted to a ridge vent may reduce the deterioration rate of the pitched roof in addition to the associated structure itself.

[0043] As noted above, ridge vents are conventionally accompanied by a screen assembly disposed at the output of the air path (*e.g.*, the gap between the ridge cap and roof surface) such as a wire mesh, a reticulated matting, a baffle, or a tightly-corrugated, bladed, or pleated plastic in order to prevent the intrusion of foreign matter into the structure or beneath the roof. Conventional ridge vent screen assemblies are typically disposed to cover the gap introduced between the ridge cap and the roofing material at the ridge termination.

[0044] However, also as noted above, conventional ridge vent screens have often proven difficult and/or time consuming to secure to both the ridge cap and to the roofing material in a manner that effectively prevents ingress of foreign matter at the same time permitting largely unrestricted air flow through the ridge vent, reliably, for an extended period of time and in a manner that is cost-effective for both construction and maintenance of the structure.

[0045] Accordingly, embodiments described herein reference multi-layer ridge vent screen assemblies (herein referred to as "arrester seals") configured to seal to a pitched-roof structure in a manner that prevents the ingress of foreign matter (*e.g.*, insects, plant matter, organic or inorganic debris, and the like) and foreign liquid (*e.g.*, precipitation, drainage, other water or liquids, and so on) into the interior of the structure, while also providing a low-resistance and high-volume airflow path for ventilation between the interior of the structure and the ambient environment, while additionally providing an egress path (herein referred to as "weep holes" or "weep conduit") for internally-accumulated moisture to exit the structure and flow onto the roof to be expelled from the structure via a standard drainage system.

[0046] FIG. 1 depicts an isometric projection view of an example structure incorporating a pitched roof. The structure 100 can be any building or structure providing an enclosed or semi-enclosed volume. For example, the structure 100 can be a residential building, a storage building, a commercial building, an industrial building, a scale model of a building, an animal enclosure, or any other suitable building or structure incorporating a roofing section terminating at a ridge. In this manner, it may be appreciated the structure 100 is provided, for simplicity of illustration, only as a simplified single example of a structure that may incorporate embodiments described herein. It may be further appreciated that other structures (or structure types) taking different shapes, sizes, or having different configurations or constructions may incorporate embodiments described herein and, additionally or alternatively, embodiments related thereto.

[0047] The enclosed volume of the structure 100 can be defined, at least in part, by the intersection of several sidewalls and a roof. As illustrated, four sidewalls of approximately equal width cooperate to define the volume enclosed by the structure 100. Two of the four sidewalls of the structure 100 can be topped by a substantially-triangular gable that contours to the pitch of the roof of the structure 100 so as to provide support thereto.

[0048] As noted above, the structure 100 is finished with a pitched roof that takes a substantially triangular shape. For example, as illustrated, two roof sections rise to meet one another at a single apex. This configuration is typically referred to as a simple gable roof. Positioned over the apex of the simple gable roof of the structure 100 can be a ridge cap 102. The ridge cap 102 can serve as flashing to the end portions of the two roof sections (the "ridge termination") of the pitched roof of the structure 100. In other words, the ridge cap 102 can be disposed to cover at least a portion of the roofing material 104 at the ridge termination (not shown) that forms the outermost layer of the two roof sections of the structure 100.

[0049] The roofing material 104 can be any suitable roofing material including, but not limited to, metal sheeting, ribbed metal sheeting, shingles, tiles, tar paper, roll roofing, slate, wood shakes, or any other type of synthetic or organic roofing material.

[0050] The roof of the structure 100 can be constructed using any number of suitable techniques. In one example, the roof of the structure 100 can be constructed with one or more beams, trusses, rafters, joists, decking layers, sheathing, insulation, strapping, battens, vapor/moisture control layers, breathable membranes, fascia boards, rake boards, flashing, underlayment, and so on. For simplicity of illustration, the structure 100 is depicted in FIG. 1 without many of these elements, each of which may be included or enclosed, partially, optionally, or entirely, within the roof of the structure 100. In other embodiments, the structure 100 can be finished with a pitched roof taking another form, such as a gambrel roof, a hipped roof, a shed or lean-to roof, or any other suitable roofing type incorporating at least one roofing section terminating at a ridge. In other embodiments, the structure 100 can include more than one type of pitched roof section.

[0051] For embodiments described herein, a ventilation path may be preserved at the ridge of the pitched roof of the structure 100 to encourage the ventilation of air from the interior of the structure 100 to the external environment. More specifically, an air path can be introduced between the ridge cap 102 and the ridge termination defined at the meeting point of the two illustrated roof sections. As noted above, a ventilation path between a ridge cap and a ridge termination is conventionally referred to as a ridge vent.

[0052] FIG. 2A depicts a cross-section view of the ridge of the example structure of FIG. 1 taken through section A-A, showing a sealed ridge vent incorporating two arrester seals (each identified as an arrester seal 200) disposed on opposite sides of a ridge termination between the ridge cap 102 and the roofing material 104.

[0053] The arrester seal 200 can incorporate a foundation layer 200a and a gas permeable layer 200b. The gas permeable layer 200b can be disposed onto a top surface of the foundation layer 200a. In some examples, the gas permeable layer 200b can be adhered to the top surface of the foundation layer 200a via a weatherproof adhesive (*e.g.*, caulking, silicone, *etc.*). In other embodiments the gas permeable layer 200b can be formed onto or into the top surface of the foundation layer 200a.

[0054] In many embodiments, the foundation layer 200a can be formed from a fluid impermeable material. For example, the foundation layer 200a can be formed from a closed-cell foam such as polyethylene foam, neoprene foam, polystyrene foam, foamed rubber, foamed polymer, foamed elastomer, foamed metal, or any other suitable closed-cell foam. In other embodiments, the foundation layer 200a can be formed from a plastic material that may be injection molded, blow molded, cast, or molded in another manner. In other embodiments, the foundation layer 200a can be milled, machined, or cut from a sheet of source material.

[0055] In other embodiments, the foundation layer 200a can be formed form a non-foam material. For example, the foundation layer 200a can be formed from plastic, rubber, metal, composite, or any other suitable fluid-impermeable material or combination of materials.

[0056] In other embodiments, the foundation layer 200a can be formed to be hollow or substantially hollow, defining an enclosed internal volume. In these cases, the internal volume of the foundation layer 200a can be hermetically sealed from the external environment (*e.g.*, entirely closed) to prevent the ingress of foreign matter or foreign liquid therein.

[0057] In still further embodiments, the foundation layer 200a can be formed from a non-foam material and may be hollow or substantially hollow, defining an enclosed internal volume which may be filled with a filler material. In these cases, the internal volume of the foundation layer 200a can be filled with a closed-cell or an open-cell foam or maybe filled with another non-foamed material. In some cases, the filler material may be a liquid or an inert (or non-volatile) gas.

[0058] In many cases, the foundation layer 200a can provide a structural definition to the arrester seal 200. For example, the foundation layer 200a can be formed into a shape (or from a material) such that the foundation layer 200a is substantially self-supporting. For example, in many embodiments, the foundation layer 200a can be configured to take a shape that contours to the transverse profile of a roofing section. In these embodiments, the foundation layer 200a can be formed to have a sufficient rigidity so as to maintain the shape of the transverse profile of the roofing section.

[0059] In many embodiments, the foundation layer 200a can define a top surface, a bottom surface, a front surface, and a back surface, although rectilinear forms of the foundation 200a may not be required in all embodiments. As noted above and with respect to other embodiments described herein, the bottom surface of the foundation layer 200a can be formed and configured to contour to a transverse profile of a roofing section. Also as noted above, the top surface of the foundation layer 200a can be formed and configured to interface with the bottom portion of the gas permeable layer 200b. In some embodiments, the top surface of the foundation layer 200a and the bottom surface of the foundation layer 200a can take a substantially similar shape. In other words, the top surface of the foundation layer 200a can be formed to take the same shape as the bottom surface of the foundation layer 200a which itself is formed to contour to a transverse profile of a roofing section. However, parity between the top surface of the foundation layer 200a and the bottom surface of the foundation layer 200a may not be required or favored for all embodiments. For example, in some cases, the top surface of the foundation layer 200a can be formed to take a substantially planar shape. In other embodiments, the top surface of the foundation layer 200a can be formed to take a shape that facilitates a permanent or semi-permanent bond with the bottom portion of the gas permeable layer 200b. For example, in some cases, the top surface of the foundation layer 200a can include one or more serrated, grooved, or scalloped indentations or protrusions that cooperate with the gas permeable layer 200b to form a bond therebetween.

[0060] The front surface of the foundation layer 200a can be configured to orient toward the external environment. As illustrated in FIG. 2A, the front surface of the foundation layer 200a is oriented to face toward the left, downwardly, in the direction of the roof. Oppositely, the back surface of the foundation layer 200a can be configured to orient toward the internal environment. As illustrated in FIG. 2A, the back surface of the foundation layer 200a is oriented to face to the right, upwardly in the direction of the inside of the structure 100.

[0061] In some embodiments, the arrester seal 200 can be longitudinally symmetric; the front surface and the back surface can each be configured to orient in the direction of the roof or, alternatively, the direction of the internal environment of the structure.

[0062] In many cases, the front surface and the back surface of the foundation layer 200a can be seal-finished. For example, in the case that the foundation layer is formed from a polymeric foam material, a seal-finished edge may be formed by hot-melting the front surface and back surface to ensure that any of the closed-cell portions of the foam that may have been exposed or opened during manufacture of the arrester seal 200 are fully closed. In this manner, a seal-finished edge can provide a substantially uniform surface and, separately, a more durable and more fluid impermeable surface.

[0063] In other embodiments, the front surface and the back surface of the foundation layer 200a can be seal-finished using another method. For example, in some cases, the front surface and the back surface can be sealed with a cladding such as a sealing paint or other a fluid-impermeable layer. For example, in some cases, the front and back surface of the foundation layer 200a can be painted with a silicone-based paint.

[0064] In many cases, the font surface and the back surface of the foundation layer 200a can be seal finished at least partially in order to prevent water from intruding into the interior of the structure 100. For example, given certain weather conditions, wind may cause precipitation to enter below the ridge cap 102. In these cases, the precipitation may take one of three paths. First, precipitation may be caused to be wetted to the surface of the roofing material 104, blown up the slope of the pitched roof toward the arrester seal 200. Additionally, precipitation may be caused to be wetted to the underside of the ridge cap 102, also blown upward the slope of the ridge cap 102 toward the arrester seal 200. Lastly, precipitation may be blown directly toward the arrester seal 200, without wetting to either the underside of the ridge cap 102 or to the top surface of the roofing material 104.

[0065] Sustained gusts of wind sufficiently angled to maintain precipitation to directly impact the arrester seal 200 without becoming wetted to either the underside of the ridge cap 102 or to the top surface of the roofing material 104 may be mitigated, in many embodiments, by intentional relatively placement of the arrester seal 200 and the ridge cap 102. For example, as illustrated in FIG. 2A, the arrester seal 200 is positioned closer toward the ridge termination than the toward the end portions of the ridge cap 102. In other words, the ridge cap 102 is disposed over the arrester seal 200 in such a manner so as to discourage wind-blown precipitation that does not wet to either the underside of the ridge cap 102 or to the top surface of the roofing material 104 from impacting the arrester seal 200. As a result of the intentional (and relative) placement of the arrester seal 200 and the ridge cap 102, the volume of precipitation blown toward the arrester seal 200 may be sufficiently minimal such that the gas permeable layer 200b can provide a sufficient intrusion barrier thereto.

[0066] The relatively placement of the arrester seal 200 and the ridge cap 102 depicted in FIG. 2A may not be required or favored for all embodiments. For example, in many embodiments, (such as the embodiment depicted in FIG. 2B) the arrester seal 200 can be positioned closer toward the end portion of the ridge cap 102. In other embodiments, other placements and relative proportions may be favored. For example, in some embodiments implemented for structures constructed in environments unlikely to receive wind-blown precipitation, an arrester seal 200 can be positioned flush with the end portion of the ridge cap 102. Alternatively in some embodiments implemented for structures constructed in environments likely to receive wind-blown precipitation, an arrester seal 200 can be positioned a greater distance from the end portion of the ridge cap 102. In this manner, the ridge cap 102 can serve as flashing to the arrester seal 200 itself, improving the performance thereof.

[0067] Sustained gusts of wind sufficiently angled to maintain precipitation wetting to the underside of the ridge cap 102 may be unlikely for many environments. In certain cases, vortices may be formed below the ridge cap 102 that encourage precipitation wetting to the underside thereof to flow downwardly, away from the arrester seal 200. Accordingly, the volume of precipitation likely to be wetted to the underside of the ridge cap and additionally forced toward the arrester seal 200 may be sufficiently minimal such that the gas permeable layer 200b can provide a sufficient intrusion barrier thereto.

[0068] Additionally, sustained gusts of wind sufficiently angled to maintain precipitation wetting to the top surface of the roofing material 104 may be, in some cases, more likely or more common for some environments. In these cases, and as noted above, the fluid impermeability of the material selected for the foundation layer 200a or the seal-finished front (or back) surface of the foundation layer 200a can provide an effective liquid barrier preventing the further intrusion of said wetted liquid into the interior of the structure. In this manner, the arrester seal 200 can provide an effective foreign liquid barrier to the structure 100.

[0069] As noted with respect to other embodiments described herein, the arrester seal 200 can also include a gas permeable layer 200b that may be adhered, coupled, or formed onto or into the top surface of the foundation layer 200a. In many embodiments, the gas permeable layer 200b can be formed from a material that is substantially air permeable. For example, in some embodiments, the gas permeable layer 200b can be formed from a substantially open-cell foam. The average size of the cells within the open-cell foam selected for the gas permeable layer 200b can be selected, at least in part, an airflow resistance provided thereby. For example, the larger the average size of cells within an open-cell foam, the lower the effective airflow resistance. Similarly, the smaller the average size of cells within an open-cell foam, the higher the effective airflow resistance.

[0070] In many cases, other manufacturing or structural parameters of the gas permeable layer 200b may affect (either positively or negatively) the airflow resistance provided by the gas permeable layer 200b. For example, for certain open-cell foam materials, the connections between adjacent cells may be small, resulting in a small number of air paths through the foam, which, in turn, can increase the airflow resistance provided by the foam. Similarly, certain open-cell foam materials having small average cell size can include a high number of air paths between adjacent cells which, in turn, can decrease the airflow resistance provided by the foam.

[0071] Furthermore, as may be appreciated, certain embodiments can favor different air flow rates for different structures. For example, certain structures may favor rapid pressure normalization over gradual pressure normalization. For these embodiments, the gas permeable layer 200b may be selected to provide a high rate of air flow or, in another non-limiting phrasing, may be selected to provide a low airflow resistance. Alternatively, certain structures may favor gradual pressure normalization over rapid pressure normalization. For these embodiments, the gas permeable layer 200b may be selected to provide a low rate of air flow or, in another non-limiting phrasing, may be selected to provide a high airflow resistance.

[0072] Accordingly, in many embodiments, the gas permeable layer 200b may be selected or manufactured, at least in part, based on an expected, desired, or determinable airflow resistance that may be favored for a selected embodiment.

[0073] In other embodiments, the gas permeable layer 200b can be formed from another gas permeable material such as a bonded-fiber matting, matrix, or mass. The bonded-fiber matting can be formed from any number of suitable fiber or stranded materials such as plastics, nylons, elastomers, glass or metal fibers, and so on. In many embodiments, the bonded-fiber matting can be formed from a weatherproof and/or waterproof material.

[0074] Upon selection of a favorable fiber or stranded material for a particular embodiment, the selected fiber material can be bonded and/or cross-linked together at random, semi-random, or patterned locations in order to form a three dimensional structure defining the matting. In some cases, the bonds between individual fibers can be formed by entangling a number of fibers together and, thereafter, exposing the entanglement to pressure or heat so as to fuse individual fibers together. In many cases, the open space providing gas permeability can be defined by, or controlled by, the manufacturing parameters selected for a particular bonded-fiber matting. For example, in some embodiments, the average open space within a particular bonded-fiber matting can be less than 1 mm^3.

[0075] In other embodiments, the average open space defined by a particular bonded-fiber matting can be larger. One may appreciate that the average open space defined by a particular bonded-fiber matting can affect the airflow resistance. For example, the smaller the average open space defined by a particular bonded-fiber matting is, the larger the airflow resistance provided by said bonded-fiber matting may be. Conversely, the larger the average open space defined by a particular bonded-fiber matting is, the smaller the airflow resistance provided by said bonded-fiber matting may be.

[0076] Similarly, the average open space defined by a particular bonded-fiber matting can impact that matting's ability to impede or mitigate the intrusion of foreign matter to the interior of the structure 100. For example, the smaller the average open space defined by a particular bonded-fiber matting is, the more ingress protection against foreign matter (*e.g.*, insects, animals, wind-blown precipitation, organic or inorganic debris, or any other foreign matter) said bonded-fiber matting may provide. Conversely, the larger the average open space defined by a particular bonded-fiber matting is, the less ingress protection against foreign matter said bonded-fiber matting may provide.

[0077] In some embodiments, the properties (including average open space) of a particular gas permeable layer may be selected based, at least in part, on expected conditions of the environment in which the structure 100 is constructed. For example, certain environments may host a wide variety of small-size insects. For such environments, the gas permeable layer 200b may be selected or manufactured to have an average open space sufficient to prevent such small-sized insects from invading the structure 100. Other environments may not necessarily host a wide variety of insects, but may, instead be subject to high-speed winds. For such environments, the gas permeable layer 200b may be selected or manufactured to have an average open space sufficiently large so as to provide gradual pressure normalization between the external environment and the structure 100 (*e.g.*, to mitigate wind noise and drafts).

[0078] Returning to FIG. 2A, the arrester seal 200 can be positioned between the ridge cap 102 and the roofing material 104. As illustrated, the roofing material 104 may include a protruding geometry, such as the protrusion 202. In some embodiments the protrusion 202 can be a stiffening rib of a metal roof. In other embodiments, the protrusion 202 can be a protruding tile of a tiled roof. In still further embodiments, the protrusion 202 can be a shingle. Accordingly, one may appreciate that the protrusion 202 can take any number of forms appropriate, required, or favored for a selected roofing material.

[0079] As noted above, the bottom surface of the foundation layer 200a of the arrester seal 200 may be formed to substantially contour to a transverse profile (*e.g.*, lateral cross-section, not shown in FIG. 2A) of a roofing material 104 (*e.g.*, tiles, shingles, ribbed metal, and so on). More specifically, the bottom surface of the foundation layer 200a can be formed to substantially contour to the protrusion 202 and to the non-protruding portions of the roofing material 104. For example, in certain embodiments, the roofing material 104 can be a ribbed metal and the protrusion 202 can be a major rib thereof. In this example, the bottom surface of the foundation layer 200a can have a portion or pocket (not shown) that rises to accept and engage the protrusion 202 (*e.g.*, major rib). The bottom surface of the foundation layer 200a can also have a substantially flat portion that engages with the non-protruding portions of the roofing material 104. In this manner, the bottom surface of the foundation layer 200a can contour (and seal) to the entire transverse profile of the roofing material 104.

[0080] Additionally as noted above, the gas permeable layer 200b may be formed to contour to the underside of the ridge cap 102. As illustrated, the underside of the ridge cap 102 may be substantially flat. In these embodiments, the top surface of the gas permeable layer 200b may also be substantially flat or otherwise planar. In other embodiments, the underside of the ridge cap 102 can take other forms to which the gas permeable layer 200b can contour. For example, in cases where a ridge cap 102 is formed to aesthetically match a roofing material 104, the ridge cap 102 may include protrusions (or cavities). In these examples, the gas permeable layer 200b may also include protrusions or cavities which complement the protrusions or cavities of the ridge cap 102. In this manner, the gas permeable layer 200b of the arrester seal 200 can contour (and seal) to the entire transverse profile of the ridge cap 102.

[0081] As noted above, the roof of the structure 100 can be constructed using any number of suitable techniques. In one example, the roof of the structure 100 can be constructed with one or more beams, trusses, joists, decking layers, sheathing, insulation, strapping, battens, vapor/moisture control layers, breathable membranes, underlayment, and so on that are collectively shown in FIG. 2A, for simplicity of illustration, as the roof substructure 204.

[0082] The roof substructure 204 can be supported by the rafters 206 or other internal beams or trusses extending from the eaves of the structure 100 to the ridge of the structure 100. The rafters 206 can be supported at the peak of the ridge by a longitudinal support beam that runs the length of the ridge. In other embodiments, the rafters 206 associated with one roof section can directly engage the rafters associated with an opposite roof section.

[0083] As noted above, a ridge vent such as the ridge vent illustrated in FIG. 2A can be ducted to one or more ventilation systems or enclosed volumes within the structure 100. For example, in many embodiments, an air path (illustrated as a dotted line) can be introduced between the rafters 206 and a gable-shaped space 208, such as an attic, so that air can flow between the gable-shaped space 208 and the external environment through the arrester seal 200.More particularly, as illustrated, an air path can be introduced such that air can flow from the gable-shaped space 208 into a volume adjacent to the ridge termination and below the ridge cap 102, generally referred to herein as a ridge termination opening 210. From the ridge termination opening 210, air can flow to the external environment through the arrester seal 200.

[0084] Additionally, an air path can be introduced between the roofing material 104 and the roof substructure 204. For example, in some cases, the protrusion 202 can define an air path from a soffit vent (not shown) adjacent the eaves of the structure 100 to the ridge termination open 210.

[0085] Also as noted above, the ventilation of air from the interior of the structure 100 to the ambient environment can, among other things, improve air quality, regulate air temperature, balance air pressure, regulate air humidity, and inhibit condensation of vapor within the structure.

[0086] Accordingly, certain embodiments can select various properties of the ridge termination opening 210 (*e.g.*, height, width, total volume, *etc.*), the arrester seal 200, the rafters 206, the roof substructure 204, or any other aspect of the roof structure or substructure in order to effect a particular or favorable rate at which ventilation may occur. For example, if rapid ventilation is favored for a particular embodiment or structure, the ridge termination opening 210 may introduce a smaller air path that ducts the arrester seal 200 to other ventilation systems or enclosed volumes of the structure 100. In other examples, if gradual ventilation is favored for a particular embodiment or structure, the arrester seal 200 may implement a gas permeable layer 200b with higher airflow resistance.

[0087] In certain limited cases, however, moisture may still accumulate behind the arrester seal 200. For example, internal humidity of the structure 100 may condense behind the arrester seal 200 if there is insufficient ventilation between the structure and the ambient environment (*e.g.*, no pressure differential). As noted above, conventional ridge vent screens are often caulked to (or otherwise hermetically or semi-hermetically sealed to) to the ridge termination. In these conventional examples, accumulated moisture will pool, potentially causing damage to the structure 100, the roof substructure 204, or the roofing material 104. In extreme examples, the accumulated water may spill into (*e.g.*, drip) into the structure 100 itself.

[0088] In high humidity climates or climates experiencing both high wind and high levels of precipitation, liquid water can forcibly penetrate the ridge vent screen and/or condense behind the ridge vent screen thereby accumulating (*e.g.*, pooling) behind the conventional ridge vent screen, potentially resulting in damage or premature degradation of the roof, the conventional ridge vent screen, the ridge cap, or the structure itself.

[0089] Accordingly, many embodiments described herein introduce a weep conduit within the bottom surface of the foundation layer 200a, such as depicted in FIG. 2B. The weep conduit (not shown) can be a straight, curved or other thin path within the bottom surface of the foundation layer 200a. As a result of the weep conduit, the water 212 that may pool behind the arrester seal 200 can exit the structure and flow onto the roofing material 104 to be expelled from the structure via a standard drainage system (*e.g.*, gutters). In many embodiments the depth and geometry of the weep conduit can be selected, at least in part, to minimize backflow of liquid resulting from wind-blown precipitation wetted to the top surface of the roofing material 104. Similarly, in many embodiments the depth and geometry of the outlet of the the weep conduit can be selected, at least in part, to minimize the likelihood of an insect or other foreign matter from invading the structure 100 through the weep hole. For example, in some embodiments, the weep conduit may be a triangularly-shaped channel approximately 0.5 cm in width at its base. In other embodiments, differently-shaped weep conduits may be used.

[0090] FIGS. 3A – 3B depicts an arrester seal 300 that may be used to seal ridge vents of structures incorporating a pitched roof finished with ribbed metal sheeting (not shown). As may be known, metal sheeting for roofing purposes may typically include one or more ribs to increase the stiffness of the metal sheet. In some cases, a single section of ribbed metal roof can include a major rib and a minor rib. The major rib may protrude a greater distance from the main surface of the metal sheeting than the minor rip.

[0091] As noted with respect to other embodiments described herein, the foundation layer 302 can define a top surface 302a, a bottom surface 302b, a front surface 302c, and a back surface 302d. The bottom surface 302b of the foundation layer 302 can be formed and configured to contour to a transverse profile of a ribbed metal roofing section. As used herein, the term "transverse" may refer to the horizontal dimension extending from a first gable to a second gable of a pitched roof structure, or, in other words, the horizontal dimension that is perpendicular to the direction and orientation of the ribs of a conventional metal roof.

[0092] As depicted in FIGS. 3A – 3B, the foundation layer 302 may be configured to contour to a ribbed metal roofing section that includes two prominently protruding major rips, two minor ribs protruding between each pair of major ribs, and two minor ribs protruding at locations adjacent to each of the two major ribs. To contour to such geometry, the foundation layer 302 can be formed to include two major rib pockets 304 and six minor rib pockets 306. Each of the two major rib pockets 304 can be configured and sized to contour to the major ribs of the ribbed metal roofing section. Similarly, each of the six minor rib pockets 306 can be configured and sized to contour to the minor ribs of the ribbed metal roofing section.

[0093] In addition to contouring to the transverse profile of an example metal roofing section (not shown), the foundation layer 302 can also contour to a bottom surface of a gas permeable layer. More particularly, the top surface 302a of the foundation layer 302 can be formed and configured to interface with the bottom portion of a gas permeable layer, such as the gas permeable layer 310 depicted in FIG. 3B. In some embodiments, the top surface 302a and the bottom surface 302b can take a substantially similar shape, such as depicted. In other words, the top surface 302a can be formed to take the same shape as the bottom surface 302b which itself is formed to contour to the transverse profile of the ribbed metal roofing section.

[0094] However, parity between the geometry of the top surface 302a and the bottom surface 302b may not be required or favored for all embodiments. For example, in some cases, the top surface 302a can be formed to take a substantially planar shape. In other embodiments, the top surface 302a can be formed to take a shape that facilitates a permanent or semi-permanent bond with the bottom portion of the gas permeable layer 310. For example, in some cases, the top surface 302a of the foundation layer 302 can include one or more serrated, grooved, or scalloped indentations or protrusions that cooperate with the gas permeable layer 310 to form a bond therebetween.

[0095] As noted with respect to other embodiments described herein, the front surface 302c and the back surface 302d of the foundation layer 302 can be seal-finished. For example, in the case that the foundation layer 302 is formed from a polymeric closed-cell foam material, a seal-finished edge may be formed by hot-melting the front surface 302c and back surface 302d to ensure that any of the closed-cell portions of the foam that may have been exposed or opened during manufacture of the arrester seal 300 are fully closed. In this manner, a seal-finished edge can provide a substantially uniform surface and, separately, a more durable and more fluid impermeable surface.

[0096] Additionally, disposed between each of the rib pockets can be weep conduits 308. As illustrated, nine independent weep conduits are shown, although such a configuration is not required. Similarly, although each weep conduit 308 is shown as a linear channel defined from the front surface 302c to the back surface 302d of the foundation layer 302 taking a substantially triangular cross section, such a configuration may not be required for all embodiments. For example, in some embodiments, the weep conduits 308 can be formed to take a substantially semicircular shape in cross section. In other examples, the weep conduit 308 can take a serrated shape along the channel so as to prevent insects or other matter from intruding into the structure while maintaining an egress path for liquid accumulated behind the arrester seal 300. In other embodiments, a fewer number or a greater number of weep conduits may be include (*see, e.g.,* FIG. 3C).

[0097] As noted with respect to the embodiment depicted in FIG. 2A, the gas permeable layer 310 can be formed from a material that is substantially air permeable. For example, in some embodiments, the gas permeable layer 310 can be formed from a substantially open-cell foam. In other embodiments, the gas permeable layer 310 can be formed from another gas permeable material such as a bonded-fiber matting, matrix, or mass. The bonded-fiber matting can be formed from any number of suitable fiber or stranded materials such as plastics, nylons, elastomers, glass or metal fibers, and so on. In many embodiments, the bonded-fiber matting can be formed from a weatherproof and/or waterproof material.

[0098] In some embodiments the arrester seal 300 can be manufactured in sections, such as shown in FIGS. 3A – 3B. For example, in some cases the arrester seal 300 can be manufactured in approximately meter-long sections. In other embodiments, other the arrester seal 300 can be manufactured in different lengths (*e.g.,* longer or shorter lengths). In further embodiments, the arrester seal 300 can be manufactured in a roll. In such embodiments, the material selected for the foundation layer 302 and the gas permeable layer 310 may be at least partially flexible.

[0099] In other embodiments, the arrester seal 300 can be manufactured to form a repeating pattern when coupled to or positioned adjacent to a second arrester seal of the same variety. For example, as depicted in FIG. 3C, adjacent arrester seal can be dovetailed to one another by inserting a tail 312 into a socket of an adjacently-positioned arrester seal. In other embodiments, other means can be used to secure adjacent arrester seals. For example, in some cases, adjacent arrester seals can be adhered to one another with simple weatherproof and/or waterproof adhesive. In other embodiments, adjacent arrester seals can be snap-fit to one another.

[0100] FIG. 4A depicts a cross-section view of the example arrester seal of FIG. 3A taken through section B-B. The arrester seal 400 is depicted with a foundation layer 402 including a major rib pocket 404, a minor rib pocket 406, and a weep conduit 408. A gas permeable layer 410 is disposed above to top surface of the foundation layer 402.

[0101] As noted with respect to other embodiments described herein, the foundation layer 402 can be formed from a fluid impermeable material and the gas permeable layer 410 can be formed from a gas permeable layer. The permeability of the gas permeable layer 410 can be selected, at least in part, based on the environment and intended use of the structure onto which the arrester seal 400 may be disposed. In many examples, the permeability of the gas permeable layer 410 can be selected to reduce the airflow resistance thereof while providing an effectively tight barrier to prevent the ingress of insects and other foreign matter.

[0102] As illustrated, the gas permeable layer 410 may extend above the foundation layer 402, forming a contiguous secondary layer of the arrester seal 400. As a result of this configuration, a much larger airflow volume may pass through the arrester seal than may pass through a more conventional ridge vent screen assembly. More particularly, because a greater portion of the arrester seal 400 is gas permeable, a greater volume of air can move therethrough. In turn, this configuration allows for a greater airflow resistance (*e.g.*, tighter gas permeable layer) while permitting the same net airflow resistance as an arrester seal permitting a smaller volume of air to flow therethrough. In this manner, the gas permeable layer 410 can be manufactured with smaller average openings, thereby increasing the resistance of the gas permeable layer 410 to ingress of foreign matter and foreign liquid.

[0103] Further resulting from the depicted configuration, when the arrester seal 400 is fastened to either or both of a ridge cap or roofing material adjacent a ridge termination, the gas permeable layer 410 may at least partially compress, placing the gas permeable layer 410 into a compressed state. As a result of the compressed state, the gas permeable layer 410 provide an effective seal against the underside of a ridge cap, independent of the force with which the ridge cap is secured to the arrester seal and independent of any movement or settling of the ridge cap, the roofing material, or the arrester seal itself over time. In some embodiments, the gas permeable layer 410 may be sufficiently locally compressed during installation as to be locally liquid and/or gas impermeable. For example, the gas permeable layer 410 can be so compressed between a ridge cap and a major rib of a ribbed metal roof. Any such compressed region may be localized; as one example, only the portion (or a portion) of the gas permeable layer overlying a major rib may be gas and/or liquid impermeable. Section of the gas permeable layer to either side may remain gas and/or liquid permeable, thereby creating separate pockets or regions that may permit liquid and/or gas flow therethrough. It should also be appreciated that, in some embodiments, the gas permeable layer 410 is not compressed to this extent or may not be capable of compressing to such an extent.

[0104] In many cases, the permeability of the gas permeable layer 410 once installed (*e.g.*, under compression) may be used as selection criteria for the material properties of the gas permeable layer 410.

[0105] Accordingly, many embodiments described herein reference a gas permeable layer 410 that is both compressible and permeable to air (and other gasses), such as a bonded-fiber matting formed from a material such as polyester or nylon.

[0106] FIG. 4B depicts a cross-section view of the example arrester seal of FIG. 3A taken through section B-B, depicting one example embodiment of a gas permeable layer as a bonded-fiber matting. As noted with respect to the embodiment depicted in FIG. 2A and embodiments related thereto, the gas permeable layer 410 can be formed from a bonded-fiber matting, matrix, or mass, such as depicted in FIG. 4B. The bonded-fiber matting 410a can be formed from any number of suitable fiber or stranded materials such as plastics, nylons, elastomers, glass or metal fibers, and so on. In many embodiments, the bonded-fiber matting 410a can be formed from a waterproof material.

[0107] As noted above, upon selection of a favorable fiber for a particular embodiment of the bonded-fiber matting 410a, the selected fiber material can be bonded and/or cross-linked together at random, semi-random, patterned or specific locations in order to form a three-dimensional structure defining the bonded-fiber matting 410a. In some cases, the bonds between individual fibers can be formed by entangling a number of fibers together and, thereafter, exposing the entanglement to pressure or heat so as to fuse individual fibers together.

[0108] In some embodiments, such as the embodiment depicted in FIG. 4B, the bonded-fiber matting 410a can be adhered to the top surface of the foundation layer 402 via a weatherproof adhesive (*e.g.*, caulking, silicone, *etc.*). In other embodiments the bonded-fiber matting 410a can be formed onto or into the top surface of the foundation layer 402. For example, if the foundation layer is formed from a foam material, the bonded-fiber matting 410a can be pressed onto the foundation layer 402 prior to final solidification, curing, or drying of the foundation layer 402.

[0109] In other cases, the foundation layer 402 can be formed as a portion or layer of the bonded-fiber matting 410a. For example, as depicted in FIG. 4C, the foundation layer can be formed as an in-filled portion 402a of the bonded-fiber matting 410a. In this embodiment, the in-filled portion can be formed from a rubber material, a foam material, a silicone material, or any other suitable material that can provide a substantially fluid-impermeable characteristic to the volume of the bonded-fiber matting 410a in which the in-filled portion 402a is filled. In another embodiment such as depicted in FIG. 4D, the foundation layer can be formed as a collapsed portion 402b of the bonded-fiber matting 410a. In this embodiment, the collapsed portion 402b can be formed by melting a portion of the bonded-fiber matting 410a into the shape configured to contour to the transverse profile of a roofing section. In this embodiment, the depth of the collapsed portion 402b can be selected to be different for different embodiments.

[0110] FIG. 5A depicts an isometric projection view of the removal of a backing strip from the foundation layer of an arrester seal, exposing an adhesive strip disposed partially thereon. The arrester seal 500 can be manufactured with an adhesive disposed on a bottom surface of the foundation layer 502 in order to adhere to the top portion of a roofing material. In the illustrated embodiment, a backing strip 504 made from waxed or otherwise non-adherent paper can be withdrawn in order to expose an adhesive strip 506. Although the adhesive strip 506 is illustrated as covering only a portion of the bottom surface of the foundation layer 502, one may appreciate that such a deposition of adhesive is not required and may not be favored for all embodiments. For example, in some embodiments more than one adhesive strip can be exposed by the withdrawal of the backing strip 504.

[0111] In other examples, a backing strip 504 may not be required. For example, the adhesive strip 506 may be formed from a pressure sensitive adhesive that bonds to a roofing material upon the application of pressure thereto. In other embodiments, the adhesive strip 506 may be formed from an adhesive that cures and adheres given specific conditions. For example, the adhesive strip 506 may be formed from an ultraviolet-cured adhesive. In other cases, the adhesive strip 506 can be formed from a heat-cured adhesive.

[0112] In the illustrated embodiment, the adhesive strip 506 is disposed only over the flattened portions of the arrester seal 500. More specifically, in the illustrated embodiment, the adhesive strip 506 does not cover the inner surface of the weep conduits, minor rib pockets, or major rib pockets of the arrester seal 500. In some cases, this deposition pattern of the adhesive strip 506 may be employed to reduce the full amount of adhesive used to secure the arrester seal 500 to the top surface of a roofing material. However, this configuration is not required of all embodiments. For example, as shown in FIG. 5B, certain embodiments can include an adhesive strip 508 that covers the inner surface of the weep conduits, the minor ribs pockets, and the major rib pockets of the arrester seal 500.

[0113] FIG. 5C depicts an isometric projection view of the removal of a backing strip from the gas permeable layer of an arrester seal, exposing an uninterrupted adhesive strip disposed thereon. The arrester seal 500 can be manufactured with an adhesive disposed on a top surface of the gas permeable layer 510 in order to adhere to the underside of a ridge cap (*see, e.g.*, FIG. 2A). In the illustrated embodiment, a backing strip 512 made from waxed or otherwise non-adherent paper can be withdrawn in order to expose an adhesive strip 514. Although the adhesive strip 514 is illustrated as covering only a portion of the top surface of the gas permeable layer 510, one may appreciate that such a deposition of adhesive is not required and may not be favored for all embodiments. For example, in some embodiments more than one adhesive strip can be exposed by the withdrawal of the backing strip 512.

[0114] In other examples, a backing strip 512 may not be required. For example, as with the adhesive strip 514 depicted in FIGS. 5A – 5B, the adhesive strip 514 may be formed from a pressure sensitive adhesive that bonds to a roofing material upon the application of pressure thereto. In other embodiments, the adhesive strip 514 may be formed from an adhesive that cures and adheres given specific conditions.

[0115] FIG. 6 depicts an isometric projection view of the fastening of an arrester seal to a metal roofing panel. As noted with respect to other embodiments described herein, an arrester seal can be formed to contour to the transverse profile of a particular roofing material, such as the ribbed metal roof 602 depicted in FIG. 6. As with other arrester seal embodiments, the arrester seal depicted can include a foundation layer 604 and a gas permeable layer 606. The foundation layer 604 can include a major rib pocket 608 that is sized and configured to contour to a major rib of the ribbed metal roof 602. Additionally, the foundation layer 604 can include a minor rib pocket 610 that is sized and configured to contour to a minor rib of the ribbed metal roof 602. Additionally, the foundation layer 604 can include one or more weep conduits 612.

[0116] The arrester seal can be affixed to the ribbed metal roof 602, in one embodiment, via the adhesive strips shown in FIG. 5A – 5B. Additionally or alternatively, the arrester seal can be affixed to the ribbed metal roof 602 by driving the fasteners 614 through the gas permeable layer 606, through the foundation layer 604 and into the ribbed metal roof 602. In many cases, and as illustrated, the fasteners 614 may be driven into the major ribs of the ribbed metal roof 602 (or alternatively the portion of the ribbed metal roof 602 that protrudes the farthest), although this is not required. For example, in some embodiments, the fasteners 614 can be driven into other portions of the ribbed metal roof 602.

[0117] In some embodiments, the fasteners can be nails, screws, bolts, clips, or any other suitable mechanical fastener.

[0118] FIG. 7 depicts an isometric projection view of the fastening of an arrester seal to a metal roofing panel and to a ridge cap. As noted with respect to the embodiment depicted in FIG. 6 and described in relation thereto, an arrester seal can be formed to contour to the underside of a ridge cap in addition to the top surface of a roofing material, such as the ridge cap 700 (partially shown) and the ribbed metal roof 702 as depicted in FIG. 7. As with other arrester seal embodiments described herein, the arrester seal depicted in FIG. 7 can include a foundation layer 704 and a gas permeable layer 706. The foundation layer 704 can include a major rib pocket 708 that is sized and configured to contour to a major rib of the ribbed metal roof 702. Additionally, the foundation layer 704 can include a minor rib pocket 710 that is sized and configured to contour to a minor rib of the ribbed metal roof 702. Additionally, the foundation layer 704 can include one or more weep conduits 712.

[0119] The arrester seal can be affixed to the ridge cap 700, in one embodiment, via the adhesive strips shown in FIG. 5C. Additionally or alternatively, the arrester seal can be affixed to the ridge cap 700 by driving the fasteners 714 through the ridge cap 700, through the gas permeable layer 706, through the foundation layer 704, and into the ribbed metal roof 702. In many cases, and as illustrated, the fasteners 714 may be driven into the major ribs of the ridge cap 700 (or alternatively the portion of the ridge cap 700 that protrudes the farthest), although this is not required. For example, in some embodiments, the fasteners 714 can be driven into other portions of the ribbed metal roof 702.

[0120] FIG. 8 depicts example operations of a method of manufacturing an arrester seal formed from a foundation layer and a gas permeable layer. The method can begin at operation 802 in which a foundation layer for an arrester seal can be formed. As noted above, in many examples, the foundation layer may be formed to have a bottom surface configured to contour to a top surface of a particular roofing material. At operation 804, a gas permeable layer can be attached, adhered, or otherwise coupled to the foundation layer.

Although described as separate steps, one may appreciated that the operations 802 and 804 can be performed in an alternate order or, in some cases, at the same time. For example, as noted above, certain foundation layer embodiments may be integrated portions of certain gas permeable layer embodiments (*e.g.*, in-filled bonded-fiber matting, collapsed bonded-fiber matting, *etc.*). At operation 806, an adhesive material can be attached to the arrester seal. The adhesive material can be disposed onto a bottom surface of the foundation layer or, in additional or alternative embodiments, the adhesive material can be disposed onto a top surface of the gas permeable layer.

[0121] FIG. 9 depicts example operations of a method of affixing an arrester seal between roofing surface and a ridge cap. The method can begin at operation 902 in which a bottom surface of an arrester seal may be positioned adjacent a ridge termination of a roof and oriented transverse thereto. At operation 904, a ridge cap can be disposed over the gas permeable layer of the arrester seal.

[0122] One may appreciate that although many embodiments are describe herein with reference to multi-layered (*e.g.*, two) arrester seals for ridge vents, other layer configurations are possible. For example, in some embodiments, additional layers can be disposed upon the gas permeable layer.

[0123] Furthermore, although many embodiments are described herein with reference to ridges having the same or similar arrester seals disposed on opposite sides of the ridge termination, such parity is not required of all embodiments. For example, in certain embodiments, one arrester seal with certain properties can be positioned on one side of a ridge termination and a second arrester seal with different properties can be positioned on a second side of a ridge termination. For example, for certain structures, the most common direction of prevailing wind may be determinable. Accordingly, the windward arrester seal may be configured to have a different airflow resistance than the leeward arrester seal.

[0124] Many embodiments of the foregoing disclosure may include or may be described in relation to various methods of operation, use, manufacture, and so on. Notably, the operations of methods presented herein are meant only to be exemplary and, accordingly, are not necessarily exhaustive. For example an alternate operation order, or fewer or additional steps may be required or desired for particular embodiments.

[0125] The foregoing description, for purposes of explanation, used specific nomenclature to provide a thorough understanding of the described embodiments. However, it will be apparent to one skilled in the art that the specific details are not required in order to practice the described embodiments. Thus, the foregoing descriptions of the specific embodiments described herein are presented for purposes of illustration and description. They are not meant to be exhaustive or to limit the embodiments to the precise forms disclosed. It will be apparent to one of ordinary skill in the art that many modifications and variations are possible in view of the above teachings. In particular, any features described with respect to one embodiment may also be used in other embodiments, where compatible. Likewise, the features of the different embodiments may be exchanged, substituted, or omitted where compatible and appropriate.

CLAIMS

I claim:

1. An arrester seal for venting a ribbed metal roof comprising a stiffening rib, the arrester seal comprising:

a foundation layer comprising a sealing surface formed to substantially contour to a transverse profile of the ribbed metal roof across the stiffening rib, the foundation layer defining a weep conduit adjacent to the stiffening rib;

an adhesive strip coupled to the sealing surface and formed from an adhesive material configured to interface with and adhere to an external surface of the ribbed metal roof; and

a gas permeable layer formed from a compressible bonded-fiber matting and comprising:

a bottom surface coupled to and extending across an entirety of an upper surface of the foundation layer and across at least a portion of the stiffening rib, the bottom surface of the gas permeable layer formed to contour to the upper surface of the foundation layer; and

a top surface configured to contour to and support an underside of a ridge cap when the gas permeable layer is placed in compression between the ridge cap and the stiffening rib.

2. The arrester seal of claim 1, wherein the foundation layer is formed from at least one of a polymeric material, a closed cell foam, an in-filled bonded-fiber matting, and a collapsed bonded-fiber matting.

3. The arrester seal of claim 1, wherein the foundation layer further comprises a seal-finished edge.

4. The arrester seal of claim 1, wherein the compressible bonded-fiber matting is formed from polyester.

5. The arrester seal of claim 1, wherein:

the stiffening rib is a first major rib;

the ribbed metal roof comprises a second major rib and a minor rib between the first major rib and the second major rib; and

the sealing surface comprises:

a major rib pocket configured to receive and contour to the second major rib; and a minor rib pocket configured to receive and contour to the minor rib.

6. A method of sealing a ridge vent, the method comprising:
removing a backing to expose an adhesive strip coupled to a sealing surface of an arrester seal;
positioning the arrester seal adjacent to a ridge termination of a roofing section;
orienting the arrester seal parallel to the ridge termination;
press-fitting the adhesive strip against an external surface of the roofing section;
fastening the arrester seal to the roofing section by driving a fastener through a gas permeable layer of the arrester seal, through the sealing surface of the arrester seal, and into the roofing section; and
positioning a ridge cap over the ridge termination such that the ridge cap at least partially rests on the gas permeable layer.

7. The method of claim 6, wherein the fastener is a first fastener and the method further comprises fastening the ridge cap to the roofing section by driving a second fastener through the ridge cap and through the gas permeable layer, through the sealing surface, and into the roofing section.

8. The method of claim 6, wherein the backing is a first backing and the adhesive strip is a first adhesive strip and the method further comprises, prior to positioning the ridge cap over the ridge termination, removing a second backing to expose a second adhesive strip coupled to the gas permeable layer.

9. The method of claim 6, further comprising unspooling a portion of the arrester seal from a spool of arrester seal.

10. The method of claim 6, further comprising selecting a fastening point by locating a portion of the sealing surface that locally protrudes the farthest into the gas permeable layer, and thereafter, driving the fastener therethrough.

11. An arrester seal for coupling a ridge cap to a ridge vent, the arrester seal comprising:
a foundation layer configured to contour to an entirety of a transverse profile of a roofing section that includes at least a first major rib and a second major rib, the foundation layer comprising:
a top surface;
a bottom surface opposite the top surface; and

a weep conduit defined in the bottom surface and positioned between the first major rib and the second major rib; and

a gas permeable layer extending above, and continuously across an entirety of, the top surface of the foundation layer, the gas permeable layer configured to continuously contour to and support the ridge cap over the ridge vent;

wherein:

the foundation layer is formed from a self-supporting rigid material that is liquid and gas impermeable; and

the gas permeable layer is coupled to the foundation layer and:

separates the foundation layer from an underside of the ridge cap;

compresses between the first major rib and an underside of the ridge cap to prevent installation damage to the ridge cap; and

compresses between the second major rib and the underside of the ridge cap to prevent installation damage to the ridge cap.

12. The arrester seal of claim 11, further comprising an adhesive strip coupled to the bottom surface of the foundation layer.

13. The arrester seal of claim 12, wherein the adhesive strip is a first adhesive strip and the arrester seal further comprises a second adhesive strip coupled to an upper surface of the gas permeable layer.

14. The arrester seal of claim 11, wherein the gas permeable layer defines a substantially planar top surface of the arrester seal that contours to a substantially planar bottom surface of the ridge cap.

15. The arrester seal of claim 11, wherein the gas permeable layer is formed from one of an open cell foam and a bonded-fiber matting.

16. The arrester seal of claim 11, wherein the foundation layer is formed from a liquid-impermeable foam.

17. The arrester seal of claim 11, wherein the foundation layer is formed from a closed cell foam.

18. The arrester seal of claim 11, wherein a material of the gas permeable layer is selected, at least in part, to minimize airflow resistance.

19. The arrester seal of claim 11, wherein the roofing section comprises one of:
one or more tiles; and
a metal sheet.

20. The arrester seal of claim 11, wherein:
the roofing section comprises a first roofing section; and
the bottom surface is further formed to substantially contour to a transverse profile of an overlap between the first roofing section and a second roofing section.

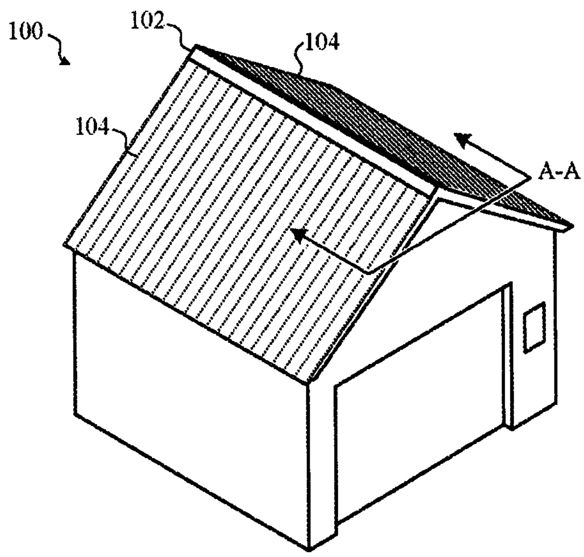


FIG. 1

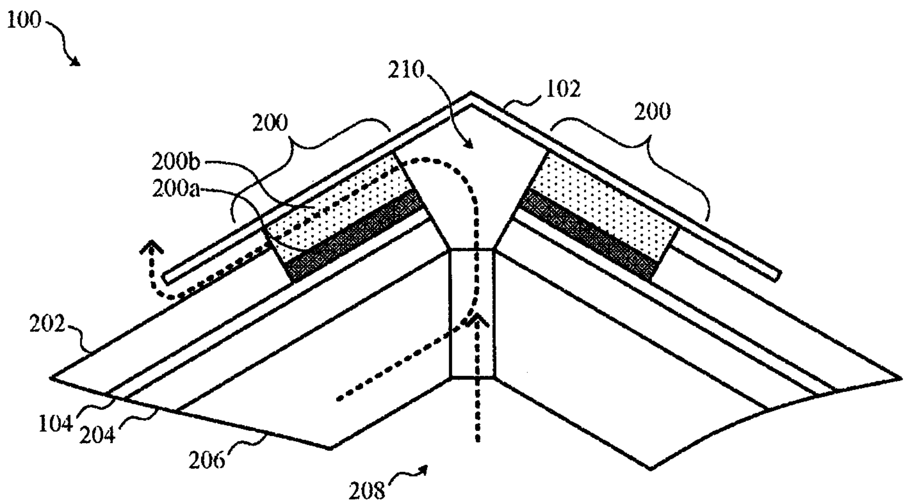


FIG. 2A

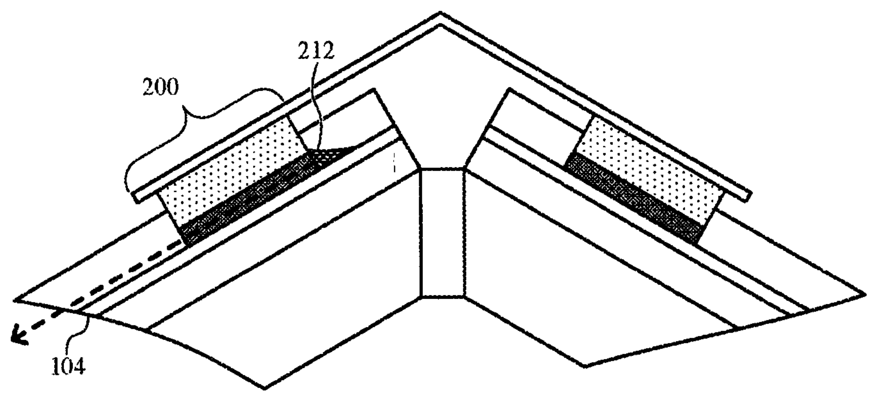


FIG. 2B

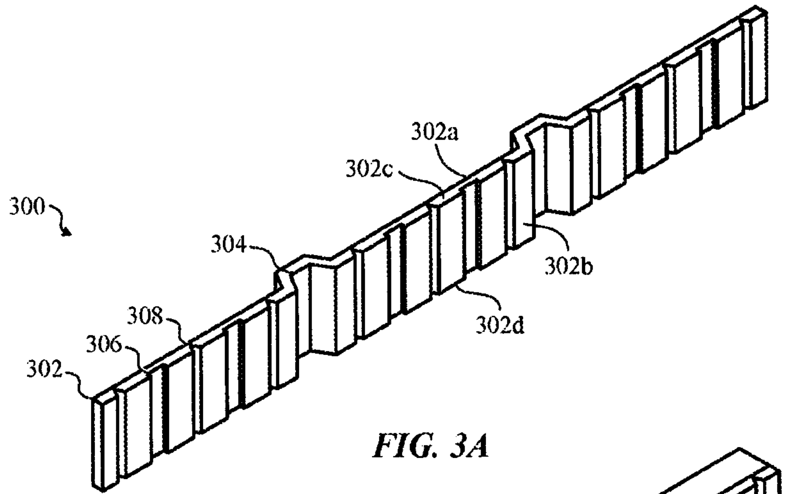


FIG. 3A

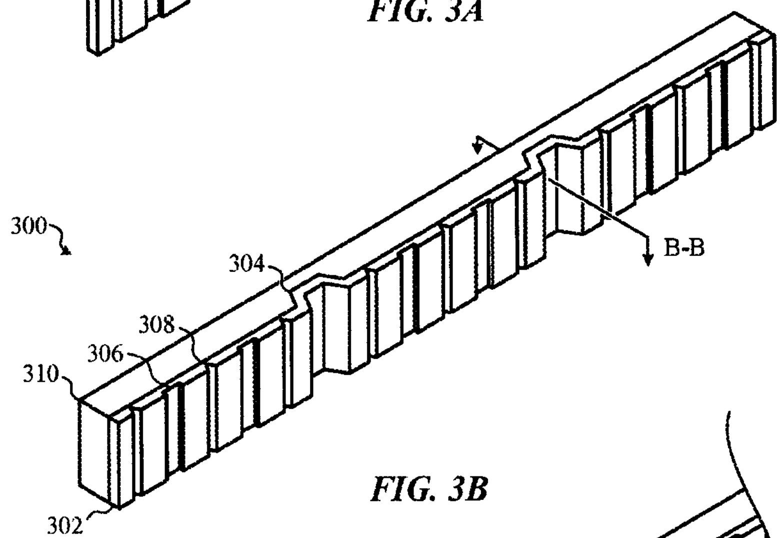


FIG. 3B

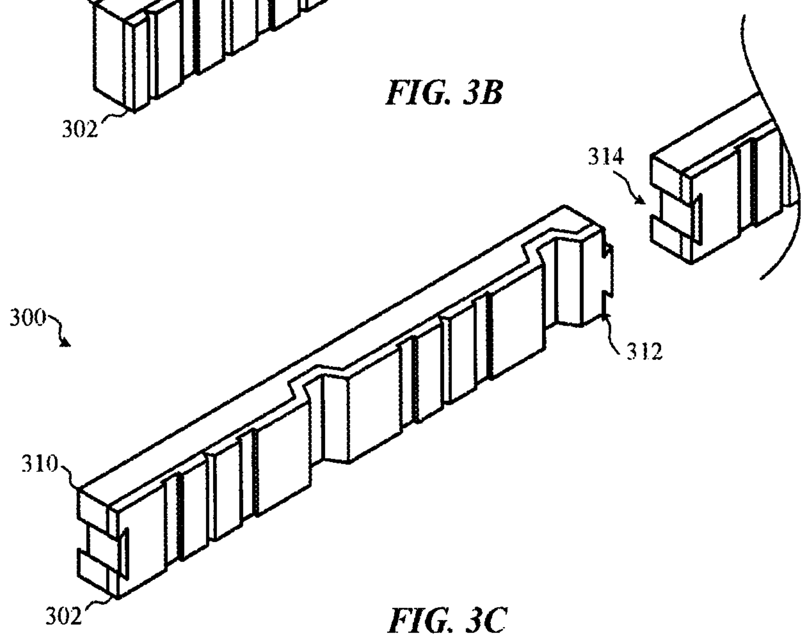


FIG. 3C

4/10

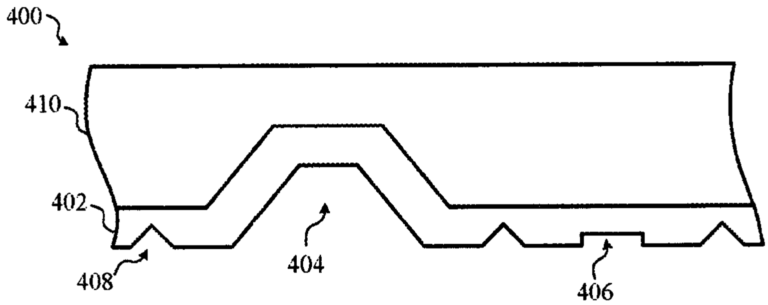


FIG. 4A

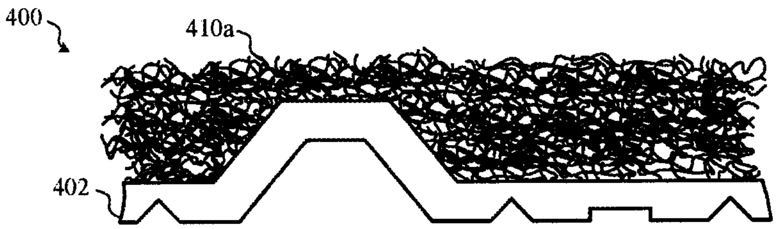


FIG. 4B

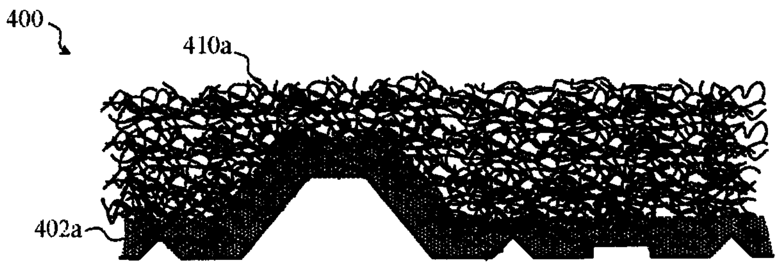


FIG. 4C

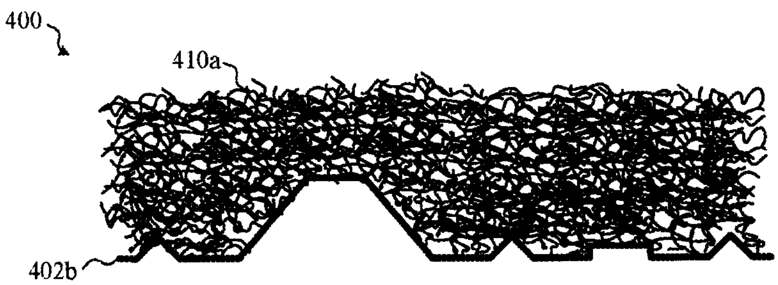


FIG. 4D

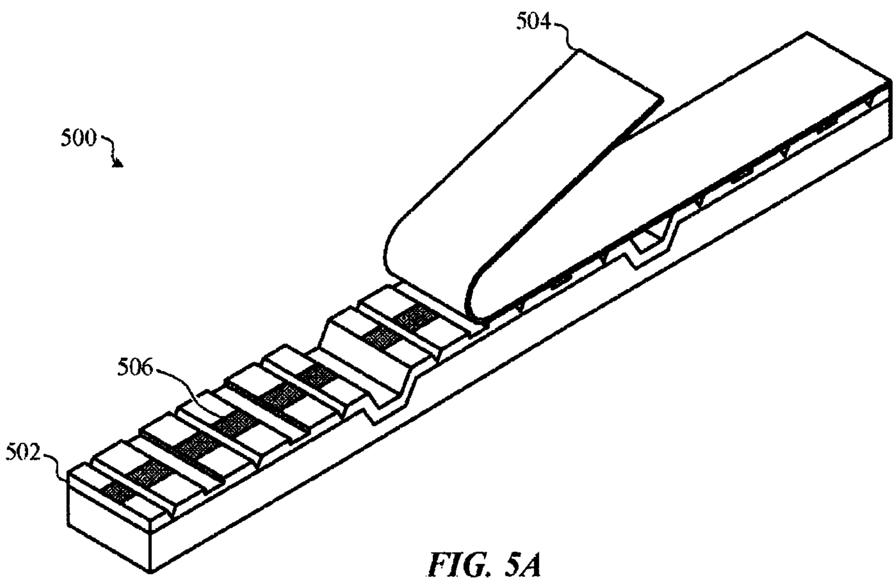


FIG. 5A

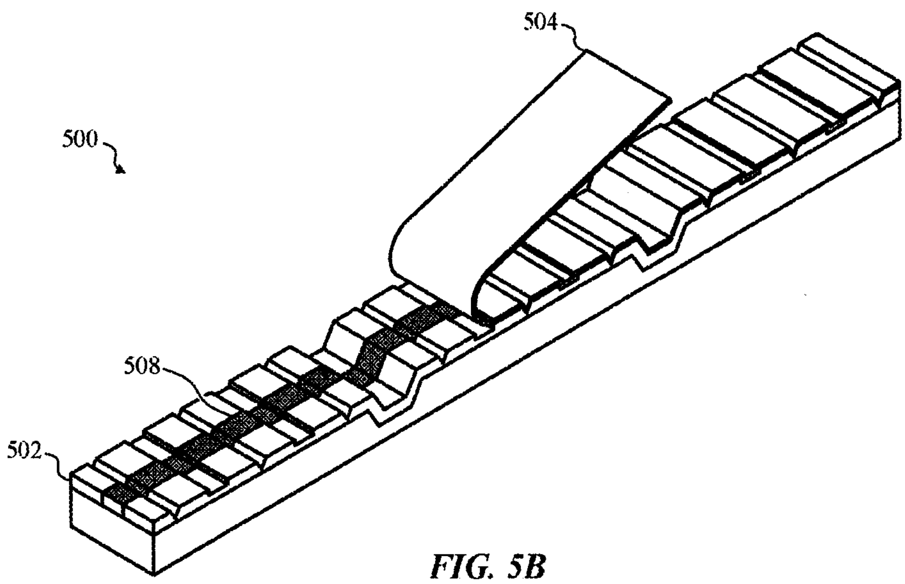


FIG. 5B

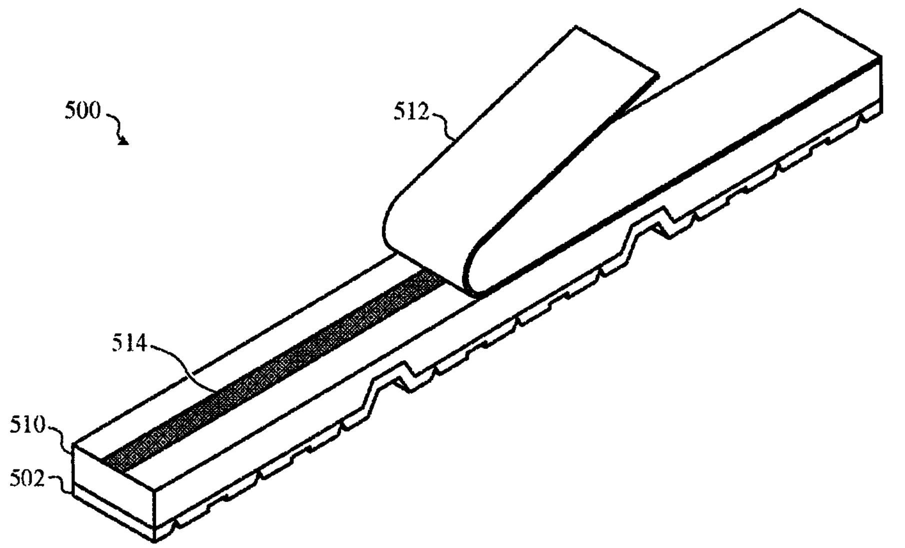


FIG. 5C

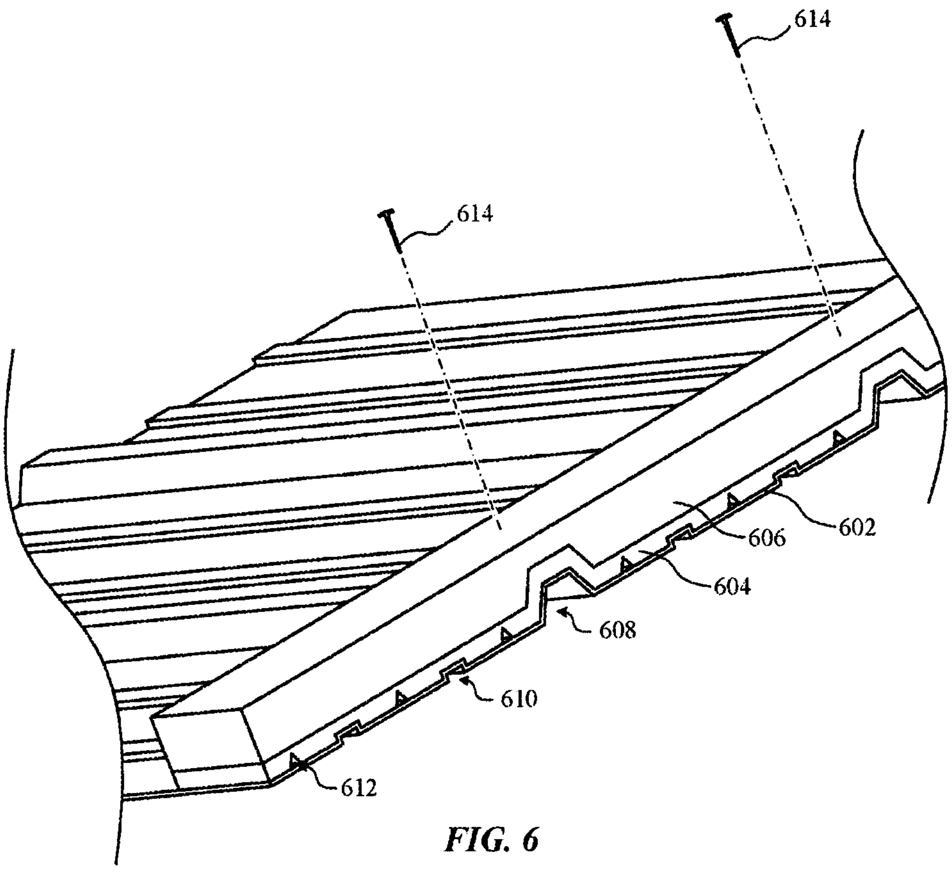


FIG. 6

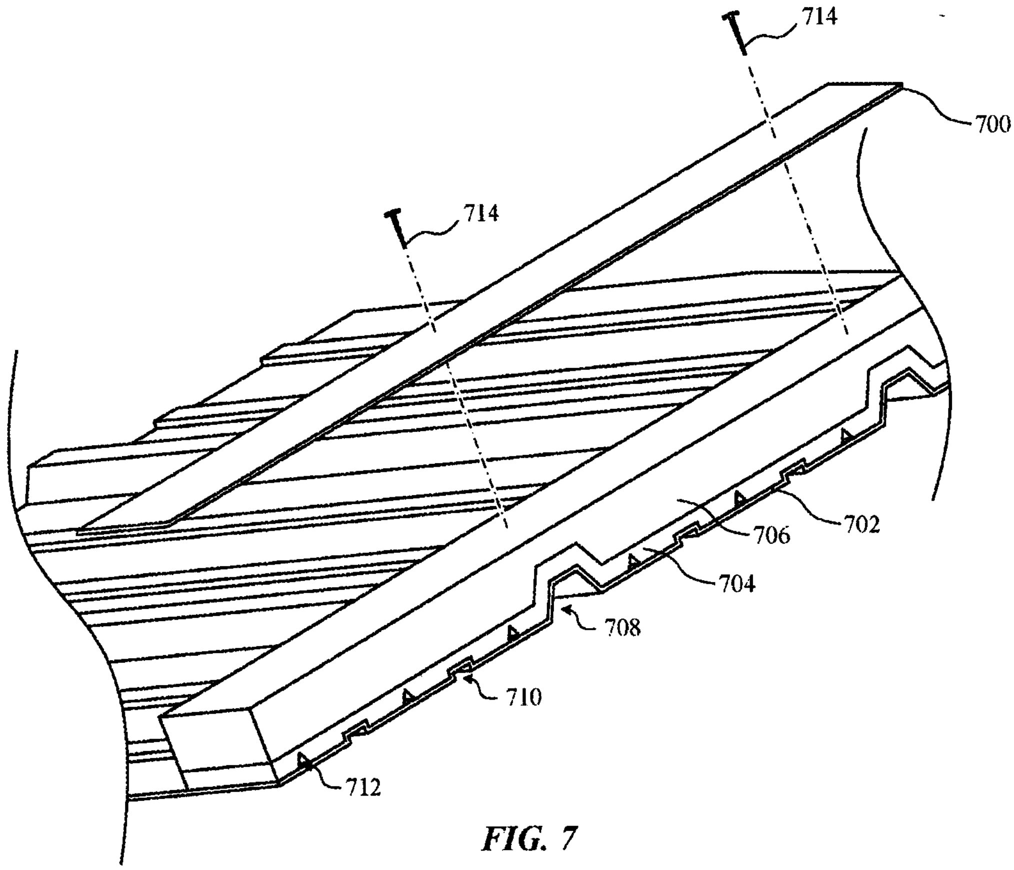


FIG. 7

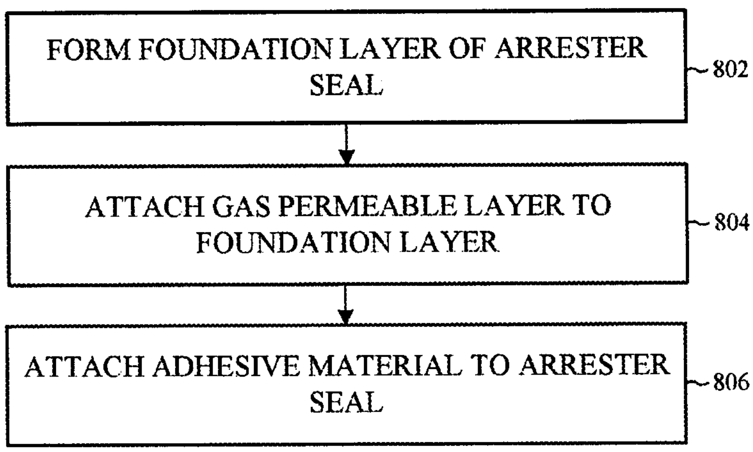

FORM FOUNDATION LAYER OF ARRESTER SEAL
802
ATTACH GAS PERMEABLE LAYER TO FOUNDATION LAYER
804
ATTACH ADHESIVE MATERIAL TO ARRESTER SEAL
806

FIG. 8

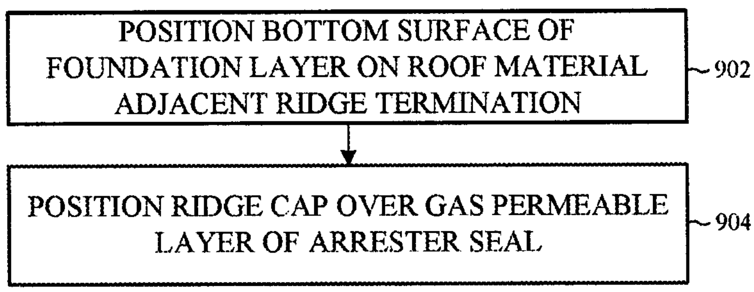
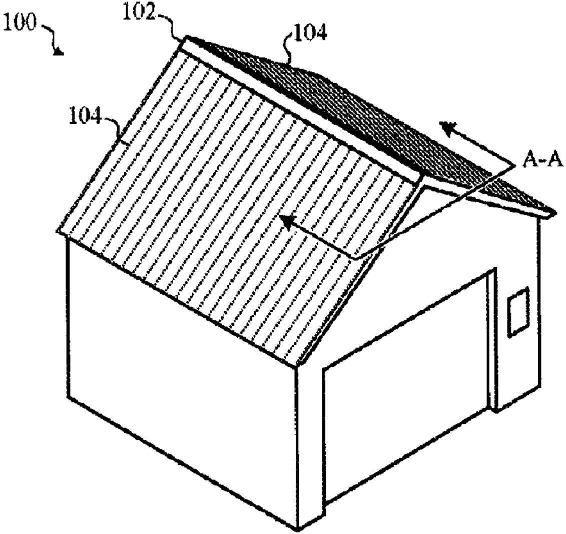

POSITION BOTTOM SURFACE OF FOUNDATION LAYER ON ROOF MATERIAL ADJACENT RIDGE TERMINATION
902
POSITION RIDGE CAP OVER GAS PERMEABLE LAYER OF ARRESTER SEAL
904

FIG. 9


100
102
104
104
A-A