EMBER AND FIRE-RESISTANT VENT

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Abstract
An air intake or exhaust vent for an external roof or wall of a building. The vent is made of an elongate strip of ventilation material providing a plurality of ventilation passageways therethrough permitting air flow therethrough. In addition, an ember-resistant, fireproof material or coating is located on portions of the ventilation material that communicate with ambient atmosphere. Accordingly, wind blown embers are prevented from igniting and passing into and/or through the vent.
EMBER AND FIRE-RESISTANT VENT

CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

[0002] The present invention relates to a vent, such as a ridge, soffit, gable, or like vent, that enables air exchange between an area within a building and ambient atmosphere, and more particularly, the present invention relates to an external vent of a building that prevents the ingress of embers or the like into a vented area of the building.

[0003] It is useful, and in many locales a building code requirement, that certain interior areas of a building, such as an area underneath a roof, be provided with a means to permit air exchange. The ventilation prevents undue heat build-up that can render the living quarters of the building uncomfortable and that can impose unreasonable energy requirements for cooling. Proper ventilation also preserves the structural integrity of the building structure, such as the roof and roof coverings.

[0004] A combination of ridge and soffit vents provides an example of a means for providing attic ventilation. The ridge vent permits hot and/or humid air to rise up through the peak of the roof, and the soffit vent enables ambient air to be drawn into a lower part of the attic area to replace the hot and/or humid air escaping through the ridge vent. Of course, other vents can also be utilized, such as gable, eave, rooflop, wall, and crawl space vents.


[0006] Another example of a vent for use on an external wall or eave of a building is provided by U.S. Patent Application Publication No. 2004/0069056 A1 of Loar. The Loar vent is a so-called fire-rated, self-closing vent and addresses a problem related to wildfires, such as brush fires and forest fires, from spreading into a building via a building vent which communicates with ambient atmosphere. The Loar vent has a coating of an intumescent material that automatically expands to close the vent openings when subjected to elevated temperatures of external fires. Intumescent coatings are also disclosed by U.S. Pat. No. 4,093,818 issued to Thwaites et al., U.S. Pat. No. 2,279,791 issued to Lamb, U.S. Pat. Nos. 5,495,894 and 4,935,544 of Spach, U.S. Pat. No. 5,957,211 issued to Geukjen et al., U.S. Pat. No. 6,752,714 B1 issued to Mann, and U.S. Pat. No. 6,256,948 B1 issued to Van Dreumel, and by GB 2,107,183 A of Dixon and GB 1,500,913 of Thwaites et al.


[0009] While the fire protection systems and vents disclosed by the above referenced patents may function in an acceptable manner, there continues to be a need for alternatives with respect to the design, manufacture and installation of vents that provide protection from external fires. For example, the vent should prevent embers emanating from wildfires entering a nearby building structure via a vent on an external wall or roof of the building. The vent should also be fire resistant. A desired vent should also permit a sufficient amount of ventilating air flow without compromising ember infiltration resistance and should be capable of being properly installed in a manner requiring labor skills possessed by the average roof installer. In addition, the vent should be capable of efficient manufacture from inexpensive materials.

BRIEF SUMMARY OF THE INVENTION

[0010] The present invention provides an intake or exhaust vent for an external roof or wall of a building. The vent is made of an elongate strip of ventilation material providing a ventilation passageway therethrough to permit air flow therethrough. An air permeable, ember-resistant, fireproof material covers the portions of the ventilation material that communicate with ambient atmosphere. Accordingly, wind blown embers are prevented from passing into or through the vent and from igniting the vent. As an alternative to a fireproof covering, the ventilation material can be applied with a fireproof coating. The fireproof coating can include an intumescent material that expands when heated. Yet another alternative is to include both a fireproof covering and a fireproof coating on the vent.
According to some contemplated embodiments of the vent of the present invention, the fireproof material is a layer of Class A fireproof material, a fiberglass fabric, or a mat of fiberglass. As stated above, an alternative is to use a fireproof coating, such as a coating of intumescent material. The vent can also include an air permeable filter material that is located on one or both sides of the fireproof material and/or coated with a fireproof coating. In some embodiments, the elongate strip of ventilation material can be rollable into a spiral roll for efficient storage and shipment. Other embodiments include sectional or non-rollable vents.

One particular vent contemplated by the present invention is a roof ridge vent having a pair of longitudinally-extending outer peripheral side edge portions that provide paths of ventilation therethrough. In such a vent, the air permeable, ember-resistant, fireproof filter material and/or coating is located on the side edge portions of the ventilation material. Another contemplated embodiment of a vent is a soffit or eave vent in which the fireproof material and/or coating is located across a face thereof. Yet another contemplated embodiment includes a ventilation material with a fireproof material and/or coating provided in a bulk roll for being cut to size.

Another aspect of the present invention relates to a vent installation including a building having an intake or exhaust opening through which ambient air enters the building or through which air in the building is exhausted to ambient atmosphere. A strip of ventilation material is positioned within or over the opening and provides a ventilation passageway therethrough. An air permeable, ember-resistant, fireproof material covers portions of the ventilation material that communicate with ambient atmosphere or the ventilation material is applied with a fireproof coating.

A further aspect of the present invention is related to a method of preventing embers from forest fires and the like from entering a building opening which permits air exchange between an area within the building and ambient atmosphere. A vent is installed within or over the opening. The vent is made of a strip of ventilation material providing a ventilation passageway therethrough. An air permeable, ember-resistant, fireproof material covers portions of the ventilation material communicating with ambient atmosphere. Alternatively, or in addition thereto, a fireproof coating, such as an intumescent coating, is applied to the ventilation material.

The foregoing and other objects, features and advantages of the present invention should become apparent from the following description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a partially-cutaway perspective view of a roof ridge vent according to the present invention;
FIG. 2 is a cross-sectional view in elevation of a roof ridge vent assembly according to the present invention;
FIG. 3 is an enlarged view of a lateral side edge of the vent illustrated in FIG. 2;
FIG. 4 is an enlarged view of a lateral side edge of an alternate vent according to the present invention;
FIG. 5 is a partially-cutaway perspective view of a soffit vent according to the present invention;
FIG. 6 is a cross-sectional view in elevation of a soffit ventilation assembly according to the present invention;
FIGS. 7 and 8 are cross-sectional views of alternate ventilation material according to the present invention;
FIG. 9 is an elevational view of a spiral roll of the vent illustrated in FIGS. 7 and 8.

The present invention is directed to vents for use in a ventilation system of a building. The vents are particularly useful as intake or exhaust vents which permit ambient air to pass into the building and/or which permit air from the building to be exhausted directly into ambient atmosphere. All the vents of the present invention include a means for preventing embers or the like emanating from external forest fires, brush fires, or the like from passing through or into the vent. Such vents are particularly useful on houses or like structures located nearby sites that are prone to fire, such as forests or fields. Accordingly, the vents of the present application prevent such fires from spreading into structures due to embers or the like entering the ventilation system.

By way of example, the vents of the present invention include roof ridge vents, soffit vents, gable vents, and any other vents that communicate with ambient atmosphere and that permit the passage of ambient air into or out of the building. The means for preventing the passage of embers into the vent can include a layer of fireproof material, such as a layer of Class A rated fireproof material. For instance, the fireproof material can be a woven or non-woven fiberglass fabric or cloth. Such fabric or cloth is breathable, durable and economical and has high tensile strength, heat resistance, fire resistance, thermal conductivity and chemical resistance. Alternatively, the layer of fireproof material can be a mat of fiberglass or a flame-resistant, fire-retardant coating. A coating of intumescent material may also be utilized as the fireproof material or in addition to one of the above referenced fireproof materials.

One contemplated embodiment of the present invention is a roof ridge vent. For example, FIG. 1 illustrates a roof ridge vent having an openwork structure made of randomly convoluted polymeric filaments formed to provide a plurality of hollow, openwork spacer elements projecting from a face thereof. As further examples, see the openwork structures disclosed in U.S. Pat. No. 5,960,595 issued to McCorsely, II et al., U.S. Pat. No. 6,298,613 issued to Coulton et al., U.S. Pat. No. 6,981,916 issued to Coulton, and U.S. Pat. No. 4,235,524 issued to Spinelli, the disclosures of which are incorporated herein by reference. Alternate openwork structures can also be utilized, such as foam, reticulated foam, screening, corrugated material, perforated material, material having a plurality of baffles, or any other type of material providing ventilation passageways extending therethrough. For example, see the non-rollable and rollable vents made of thermoformed or injection molded plastic disclosed by U.S. Pat. Nos. 5,673,521, 5,902,432, and 6,308,472 issued to Coulton et al. and U.S. Pat. No. 6,277,024 issued to Coulton, the disclosures of which are incorporated herein by reference.

A roof ridge vent assembly including vent 10 is illustrated in FIG. 2. The assembly 16 includes roof 18 on which ridge vent 10 is installed. The roof 18 is constructed from a plurality of rafters 20 to which a roof deck 22 is secured. In the illustrated embodiment, the roof deck 22 is sloped and forms a ridge, or peak. Shingles 26 or other exterior roofing materials are secured to the roof deck 22 to finish the sloping portions of the roof 18 in accordance with conventional construction practices. Cap shingles 28, or other exterior roofing materials, are installed overlying the ridge vent 10 to cover the roof ridge 24 and provide a desired finished appearance.
Air exchange between ambient atmosphere and an attic area 30 underlying the roof 18 is provided via an open elongate slot 32 provided continuously or continually along a length of the roof ridge 24. As best illustrated by arrows 34 in FIG. 2, hot and/or moist air in the attic 30 is permitted to escape through the slot 32 and then through lateral side 36 and/or 38 of the vent 10 to ambient atmosphere.

Under certain conditions, such as windy conditions, air from ambient atmosphere can be blown into the lateral side 36 and/or 38 of the vent 10. Vents have traditionally been provided with a filter material layer to prevent the passage of insects and blowing snow and rain into the vent. According to the present invention, this layer of material is enhanced to further prevent embers from passing into the vent and to prevent the vent from igniting due to the presence of the embers on a face of the filter material.

By way of example, a fireproof material 40 can be applied to the vent 10 such that material 40 extends over both lateral sides 36 and 38 of the vent 10. The purpose of fireproof material 40 is to catch embers, block passage of the embers into the vent 10, and prevent ignition of the vent 10. The fireproof material 40 can be a fiberglass cloth or fabric. For instance, see FIG. 3.

Alternatively, material 40 in FIG. 3 can be a standard filter material, such as a non-woven nylon-polyester fabric, on which a fireproof coating is applied, for instance, by way of spray or dip treatment. The coating can include an intumescent material or the like that expands upon heating. Yet another alternative is to apply the fireproof coating to the ventilation material itself, such as the randomly convoluted polymeric filaments 14. In this case, the entire openwork structure 12 of the vent can be sprayed or dipped so that the coating extends throughout the vent. Finally, an additional alternative is for a coating of intumescent material to be provided on the vent 10 in addition to the covering of fireproof material 40.

A still further alternative is illustrated in FIG. 4, in which openwork structure 12 includes a layer of filter material 42 which secures a fiberglass mat 44 or like fireproof material to the lateral side 46 of the vent.

Soffit vents are typically located in eaves of the roof and draw ambient air into the attic space to replace the hot and/or moist air vented via the roof vent. An example of a soffit vent 50 is provided in FIG. 5. It includes a ventilation material 52 which permits passage of ambient air therethrough and a layer of fireproof material 54 covering a face 56 of the ventilation material 52 to prevent the passage of embers.

The ventilation material 52 can be made of filaments, perforated plastic sheets or any of those materials disclosed above with respect to the roof ridge vent 10, and the fireproof material 54 can be any of those discussed above with respect to ridge vent 10. Alternatively, the material 54 can be a filter material treated with a fire-resistant coating, or the fire-resistant coating can be applied to the ventilation material itself, such as tanged filaments of the ventilation material. Preferably, the soffit vent 50 includes lateral side edges 58 and 60 enabling securement of the vent to the structure of the eave, and preferably, the soffit vent 50 is provided in an elongate form that can be transported and stored in a spiral roll.

As best illustrated in FIG. 6, the roof deck 22 extends to and overhangs an exterior wall 62 of the building and provides an eave 64 that includes a soffit vent opening 66 enabling ambient air to be drawn into the attic area to replace the hot humid air escaping through the roof vent. The eave 64 includes a fascia board 68 that extends substantially parallel to the wall 62 a spaced distance therefrom. By definition, the soffit 70 is the underside of the eave 64 that extends between wall 62 and fascia board 68. The opening 66 is formed in the soffit 70 and provides a path of ventilation therethrough.

The soffit vent 50 is installed within the mouth of the soffit opening 66. The vent 50 prevents debris, birds and other animals, insects, rain, snow and the like from infiltrating into the attic space. In addition, the fireproof material 54 and/or a fireproof coating, such as an intumescent coating, prevents embers and other burning material from entering the attic space via the soffit vent 50 and prevents ignition of the soffit vent 50 from embers or the like coming into contact and/or resting against the vent 50. Preferably, the ventilation system utilizes a combination of fireproof ridge and soffit vents.

In addition, to ridge and soffit vents, a ventilation material 80 can be provided as illustrated in FIGS. 7-9. For example, the ventilation material 80 can include a strip of openwork material 82 to which a fireproof material 84 is laminated or secured. Alternatively, the openwork material 82 can be applied with a fireproof coating as discussed above. These materials can be of any of those discussed above with respect to the ridge and soffit vents. The ventilation material 80 can be provided in precut sizes and used as gable vents or the like. Alternatively, the ventilation material 80 can be provided in elongate bulk rolls 86 as illustrated in FIG. 9 and can be cut to any desired size by the end user. In this case, the ventilation material 80 can be unrolled and cut to a size of an existing screen or mesh vent and be secured to the existing vent to provide the fireproofing.

The above-described vents, vent installations, and assemblies according to the present invention provide a uniquely constructed vent that is easy to install, is inexpensive to manufacture, provides a desired amount of air flow therethrough, and prevents ember infiltration.

While preferred vents, assemblies, and methods have been described in detail, various modifications, alterations, and changes may be made without departing from the spirit and scope of the present invention as defined in the appended claims.

1. An intake or exhaust vent for a building, comprising: a strip of ventilation material providing a plurality of ventilation passageways therethrough; and an ember-resistant, fireproof material or coating located on portions of said ventilation material that communicate with ambient atmosphere.

2. A vent according to claim 1, wherein said fireproof material or coating is at least one of an air permeable layer of a Class A fireproof material, a fiberglass fabric, a fiberglass mat, and a coating of intumescent material.

3. A vent according to claim 1, further comprising an air permeable filter material covering said portions of said ventilation material that communicate with ambient atmosphere.

4. A vent according to claim 3, wherein said filter material is a nylon-polyester non-woven fabric.

5. A vent according to claim 3, wherein said fireproof material or coating is a fireproof coating or a coating of intumescent material applied to said filter material.

6. A vent according to claim 1, wherein said strip of ventilation material is selected from a group consisting of an openwork mat of filaments, a corrugated material, and a molded plastic material.
7. A vent according to claim 6, wherein said ventilation material is an elongate openwork mat of randomly convoluted polymeric filaments, and wherein said fireproof material or coating is a fireproof coating or a coating of intumescent material applied on said randomly convoluted polymeric filaments.

8. A vent according to claim 7, wherein said openwork mat has a plurality of hollow, openwork spacer elements projecting from a face thereof.

9. A vent according to claim 7, wherein said strip of ventilation material is rollable into a spiral roll for efficient storage and shipment.

10. A vent according to claim 1, wherein said vent is a roof ridge vent, said strip of ventilation material has a pair of longitudinally-extending outer peripheral side edge portions that provide paths of ventilation therethrough, and said ember-resistant, fireproof material or coating is located on said side edge portions of said ventilation material.

11. A vent according to claim 1, wherein said vent is a soffit vent, and said fireproof material or coating is located on a face of said ventilation material.

12. A vent according to claim 1, wherein said vent is provided in a bulk roll for being cut to size.

13. A vent installation comprising:
   a building having an intake or exhaust opening through which ambient air enters the building or through which air in the building is exhausted to ambient atmosphere;
   a strip of ventilation material positioned within or adjacent said opening and providing a plurality of ventilation passageways therethrough; and
   an ember-resistant, fireproof material or coating on portions of said ventilation material that communicate with ambient atmosphere.

14. A vent installation according to claim 13, wherein said fireproof material or coating is at least one of an air permeable layer of a Class A fireproof material, a fiberglass fabric, a mat of fiberglass, and a coating of intumescent material.

15. A vent installation according to claim 13, further comprising an air permeable filter material covering said portions of said ventilation material that communicate with ambient atmosphere.

16. A vent installation according to claim 15, wherein said filter material is a nylon-polyester non-woven fabric.

17. A vent installation according to claim 15, wherein said strip of ventilation material is selected from a group consisting of an openwork mat of filaments, a corrugated material, and a molded plastic material.

18. A vent installation according to claim 17, wherein said ventilation material is an elongate openwork mat of randomly convoluted polymeric filaments and wherein said fireproof material or coating is a fireproof coating or a coating of intumescent material applied on said randomly convoluted polymeric filaments.

19. A vent installation according to claim 18, wherein said openwork mat has a plurality of hollow, openwork spacer elements projecting from a face thereof.

20. A vent installation according to claim 13, wherein said opening permits air exchange between an area directly below a roof of the building and ambient atmosphere.

21. A vent installation according to claim 20, wherein said opening is an open slot extending on a roof ridge of the building, said vent is a roof ridge vent secured to said roof overlying said ridge and open slot, and cap shingles are secured to said roof overlying said ridge vent, and wherein said ventilation material has a pair of longitudinally-extending side edges that provide paths of ventilation therethrough.

22. A vent installation according to claim 21, wherein said ember-resistant, fireproof material or coating is located on said side edge portions of said ventilation material.

23. A vent installation according to claim 20, wherein said opening is an open slot extending in a soffit structure of the roof of the building, said vent is an elongate soffit vent, and said fireproof material is located on a face of said ventilation material.

24. A vent installation according to claim 13, wherein said fireproof material is laminated to said ventilation material, and said vent is cut to size and installed behind a pre-existing screen or mesh vent.

25. A method of preventing embers from forest fires and the like from entering a building opening that permits air exchange between an area within the building and ambient atmosphere, comprising a step of installing a vent within or over said opening, said vent including a strip of ventilation material providing a plurality of ventilation passageways therethrough and an ember-resistant, fireproof material or coating on portions of said ventilation material that communicate with ambient atmosphere.

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