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(54) **Fire damping ventilation device**

(57) This invention relates to a fire damping ventilation device (1), which can be made with the appearance of existing ventilation devices which aren't fire damping, substantially maintaining the quality of ventilating and avoiding heat bridges, comprising a ventilation duct (2) for air passage and comprising intumescent material (5,

6) which is installed in the ventilation duct (2) such that it is able to close off the ventilation duct (2) after expansion, wherein the ventilation device (1) comprises ceramic structural elements (4) which are installed in the ventilation duct (2) such that under the effect of heat the structure of the ventilation device (1) is at least partially maintained.

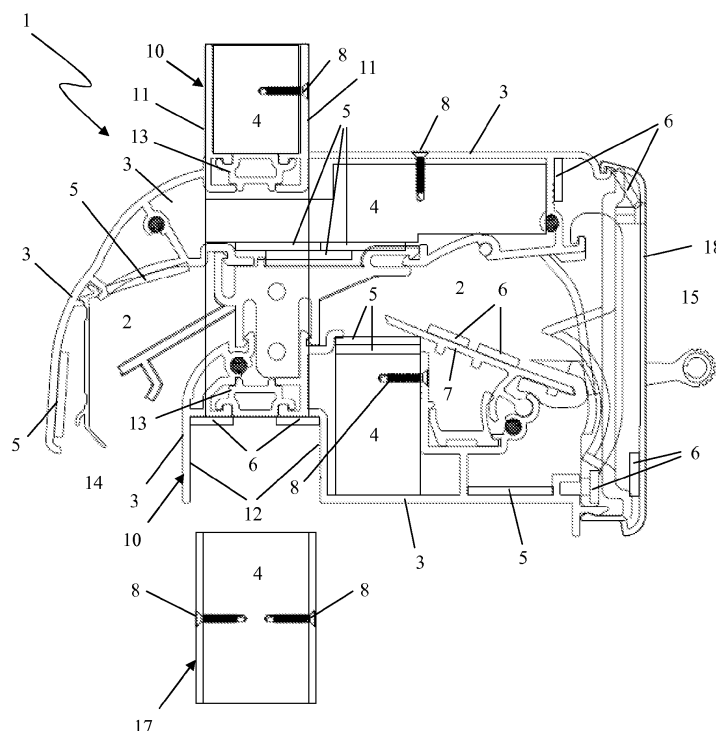


FIG. 1

Description

[0001] This invention relates to a fire damping ventilation device, comprising a ventilation duct for air passage and comprising intumescent material which is installed in the ventilation duct such that it is able to close off the ventilation duct after expansion.

[0002] According to the prior art, fire damping ventilation devices for e.g. installing on top of a glass pane and inside a window frame, are produced by mainly providing a fire resistant louver system in front of an existing ventilation device. In such fire resistant louver system, slats comprising intumescent material are installed in the ventilation duct. Such intumescent material has a relatively high density at room temperature and expands when temperature exceeds a threshold value, such that it obtains a relatively low density. In the event of fire, the intumescent material of the slats of such louver system will expand such that it is able to close off the air passage through this louver system after expansion.

[0003] Such construction of a fire resistant louver system in front of a ventilation device can e.g. be found with the fire damping ventilation device of BUVA rationale bouwproducten B.V. which is currently distributed under the name "BUVA-FireSlide", or with the fire damping ventilation device of Vero Duco NV, which is currently distributed under the name "FireMax". Such construction can also be found with e.g. the ventilation device as described in DE 101 34 839 A1.

[0004] In the "FireMax" ventilation device, a steel frame is moreover provided, in order to be able to at least partially maintain the structure of the ventilation device in the event of fire.

[0005] The appearance of such ventilation devices with fire resistant louver systems however largely deviates from the appearance of other existing ventilation devices. In most buildings it is normally not a requirement that all ventilation devices are fire damping ventilation devices. In such cases, the demand is high for obtaining unity in the appearance of installed ventilation devices.

[0006] Existing ventilation devices however normally comprise several sections in aluminium and/or plastic which define the structure of these ventilation devices. Such aluminium and/or plastic sections are easily shaped by means of e.g. extrusion, allowing e.g. a regulating valve to be easily implemented, allowing to implement intermediate sections with which heat bridges are avoided, etc. In the event of fire, these aluminium and/or plastic sections however melt, such that the structure of the ventilation device is lost and undesirable air passage openings are created.

[0007] It is hard to replace the material of such existing ventilation devices with material which doesn't melt in the event of fire, keeping the appearance of the ventilation device, maintaining the quality of ventilating and avoiding heat bridges. With e.g. steel as alternative, it is hard to implement e.g. a regulating valve in the same accurate way and it is hard to implement intermediate

sections with which heat bridges are avoided.

[0008] The object of the invention is therefore to provide a fire damping ventilation device which can be made with the appearance of existing ventilation devices which aren't fire damping, substantially maintaining the quality of ventilating and avoiding heat bridges.

[0009] This object is achieved by providing a fire damping ventilation device, comprising a ventilation duct for air passage and comprising intumescent material which is installed in the ventilation duct such that it is able to close off the ventilation duct after expansion, wherein the fire damping ventilation device comprises ceramic structural elements which are installed in the ventilation duct such that under the effect of heat the structure of the ventilation device is at least partially maintained by means of these ceramic structural elements.

[0010] Such ventilation device according to the invention can be mainly produced in the same way as existing ventilation devices, using aluminium and/or plastic profiles. Only space for installing the ceramic structural elements needs to be provided. By installing ceramic structural elements in the ventilation duct, these elements will at least partially maintain the structure of the ventilation duct in the event of fire. The profiles used for building up the ventilation device can thus be made of a material which melts under temperatures which occur in the event of fire, as long as the ceramic structural elements are placed in such a way that they prevent creation of undesirable air passage openings in the event of fire. In this way, a ventilation device according to the invention can be constructed having a similar appearance as existing ventilation devices.

[0011] A specific embodiment of a ventilation device according to this invention comprises connecting elements for installing the ventilation device on top of a glass pane and inside a window frame. At least part of the ceramic structural elements are then preferably provided adjacent these connecting elements and adjacent the ventilation duct such that at least the structure of the ventilation device near these connecting elements is at least partially maintained under the effect of heat.

[0012] Where said connecting elements comprise at least one or more profiles delimiting a hole, this hole is preferably at least partially filled with at least part of the ceramic structural elements.

[0013] In existing such connecting elements holes are provided in order to reduce the amount of material used for constructing the elements. In the event of fire, at melting of the profiles delimiting such holes, undesirable air passage openings would be created at these holes. In order to prevent this, ceramic structural elements are according to this invention provided in such holes.

[0014] Where said connecting elements comprise at least one or more profiles forming a groove wherein the glass pane can be fitted, and comprise rubber for installing between the last said profiles and the glass pane, then at least part of the intumescent material is preferably provided in the groove of the profiles.

[0015] This intumescent material is preferably pressureless expandable. Pressureless expandable means that upon expansion, the intumescent material will at least partially fill the available space, without exercising a force upon the surrounding obstacles.

[0016] Rubber (natural or synthetic) which is normally provided in such a groove between the profiles and the glass pane fitted inside the groove cannot withstand the relatively high temperatures which occur during a fire. There is therefore a risk that undesired air passage openings would be created at such rubber sealing. In order to prevent this, intumescent material can be provided, which will fill the space which is created when the rubber withers away in the event of fire.

[0017] In a specific embodiment of a fire damping ventilation device according to this invention, at least part of the intumescent material is centrally provided in the ventilation duct and is installed at the top and/or at the bottom of the ventilation duct, in order to fill the ventilation duct as soon as possible after fire breaks out, without hindering normal air passage in the ventilation duct in normal operation at about room temperature.

[0018] At least part of the intumescent material is furthermore preferably installed at opposed sides of the ventilation duct and at least partially facing each other. The intumescent material can then fill the ventilation duct towards each other, such that the intumescent material at one side only needs to expand to about halfway the ventilation duct.

[0019] When the ventilation device is provided with connecting means for installing the ventilation device on top of a glass pane and inside a window frame, then the intumescent material which is installed at opposed sides of the ventilation duct is preferably installed near the connecting elements.

[0020] A further specific embodiment of a fire damping ventilation device according to this invention comprises a regulating valve which is moveably mounted in the ventilation duct between an open position with maximum air passage through the ventilation duct and a closed position wherein the air passage is blocked. At least part of the intumescent material is then preferably installed in such a way that upon expansion it creates a pressure which closes the regulating valve into its closed position.

[0021] Combining closing the ventilation duct as well by means of the intumescent material, as well as by means of closing the regulating valve, provides a highly reliable closing of the ventilation duct in the event of fire.

[0022] With such embodiment, at least part of the intumescent material is preferably provided on the surface of the regulating valve, creating an extra barrier at closing of the ventilation duct in the event of fire.

[0023] A ventilation device according to the invention furthermore preferably comprises one or more profiles which at least partially delimit the ventilation duct.

[0024] In a preferred embodiment of such ventilation device, at least part of the ceramic structural elements are fixedly connected to one or more of last said profiles.

[0025] For the ease of manufacturing, last said one or more profiles are preferably made of aluminium.

[0026] Last said one or more profiles furthermore preferably comprise one or more holes wherein at least part of the ceramic structural elements are installed.

[0027] A fire damping ventilation device according to this invention furthermore preferably comprises front plates which are made of ceramic structural elements and which form at least part of the ceramic structural elements.

[0028] The present invention is now described in more detail with reference to the following detailed description of a preferred embodiment of a fire damping ventilation device according to the present invention and of a method of mounting such a ventilation device. The purpose of this description is only to provide illustrative examples and to indicate further advantages and particulars of these embodiments of a ventilation device and a method of mounting such a device according to the present invention, and can therefore by no means be interpreted as a limitation of the area of application of the invention or of the patent rights which are requested in the claims.

[0029] In this detailed description, reference numerals are used to refer to the attached drawings, in which

- **Fig. 1** shows an embodiment of a ventilation duct according to this invention in cross section.

[0030] The fire damping ventilation device (1) as illustrated in figure 1 comprises a ventilation duct (2) for air passage from an inlet (14) to an outlet (15).

[0031] The ventilation duct (2) is mainly determined by aluminium profiles (3) and intermediate plastic profiles (13). All profiles (3) could be made of plastics or any other suitable material, but a preferred embodiment comprises the said aluminium profiles (3). The intermediate plastic profiles (13) are made of plastic and more specific of PVC to prevent cold bridges between the inlet (14) and the outlet (15). This plastic is more preferably made fire damping. The ends of the ventilation duct (2) are delimited with front plates which are preferably made of ceramic material.

[0032] The ventilation device (1) is provided with connecting elements (10) for installing the ventilation device (1) on top of a glass pane and inside a window frame.

[0033] The connecting element (10) at the top of the ventilation device (1) comprises several profiles (11, 13) delimiting a hole which is filled with a ceramic structural element (4), in order to prevent the creation of undesired openings above the ventilation device (1) in the event of fire. The ceramic structural element (4) is fixedly connected to the profiles (11) by means of one or more screws (8), such that it hardly shifts away in the event of fire. Such ceramic structural element (4) can e.g. be made of calcium silicate and can e.g. be reinforced by means of fibres and/or mica and/or steam, etc.

[0034] The connecting element (10) at the base of the ventilation device (1) comprises several profiles (12, 13)

forming a groove wherein the glass pane can be fitted. Alternatively a further connecting element (17) can be fitted inside this groove, such that the ventilation device (1) can be mounted on top of a window frame by means of this further connecting element (17). This further connecting element (17) can e.g. be made of aluminium and can be made hollow. A ceramic structural element (4) is then preferably inserted in the hole of this further connecting element (17) in order to prevent the creation of undesired openings below the ventilation device (1) in the event of fire. This ceramic structural element (4) is then preferably fixedly connected to the further connecting element (17), by means of e.g. one or more screws (8) such that it hardly shifts away in the event of fire.

[0035] Between the glass pane or the further connecting element (17) and the connecting element (10), a rubber (natural or synthetic) is inserted. In the said groove, intumescent material (6) is provided, which is pressureless expandable. In the event of fire, this intumescent material (6) fills the space which is created when the rubber withers away. Such pressureless intumescent material (6) can e.g. expand 25 to 40 times in volume, hardly creating any pressure on the adjacent obstacles.

[0036] The aluminium profiles (3) are provided with slots (16) wherein ceramic structural elements (4) are installed. These slots (16) are provided at opposed sides of the ventilation duct (2), at least partially facing each other and such that the ceramic structural elements (4) can be provided adjacent the connecting elements (10), such that at least the structure of the ventilation device (1) near these connecting elements (10) is at least partially maintained under the effect of heat and such that the creation of undesired openings is avoided. The ceramic structural elements (4) are furthermore fixedly connected to the said profiles (3) by means of screws (8), such that they hardly shift away in the event of fire.

[0037] Intumescent material (5) is installed at opposed sides of the ventilation duct (2) on the ceramic structural elements (4) which are installed in the said slots (16). This intumescent material (5) creates a pressure in the event of fire, such that it is able to close off the ventilation duct (2) in the event of fire as soon as possible, without hindering normal air passage in the ventilation duct in normal operation at about room temperature. Such intumescent material (5) preferably creates a pressure between 0, 4 and 0, 85 N/mm² at about 300°C and expands about 18 times in volume (30 min, 55 °C, stressed).

[0038] The ventilation device (1) furthermore comprises a regulating valve (7) which is moveably mounted in the ventilation duct (2) between an open position with maximum air passage through the ventilation duct (2) and a closed position wherein the air passage is blocked. The intumescent material (5) at the bottom of the ventilation duct (2) is furthermore installed in such a way with respect to this regulating valve (7) that upon expansion it creates a pressure which closes the regulating valve (7) into its closed position. On the surface of the regulating valve (7) additional intumescent material (6) is pro-

vided, in order to create an extra barrier in the event of fire. Further strips of intumescent material (5, 6) are installed, in order to fill the ventilation duct (2) as much as possible in the event of fire. The strips of intumescent material (5, 6) near the end flap (18) are preferably pressureless expandable in order not to push the end flap off of the ventilation device (1) in the event of fire. Further away from such parts of the ventilation device (1) which can be pushed off, preferably intumescent material (5) is used in the ventilation duct which creates a pressure upon expansion.

Claims

1. Fire damping ventilation device (1), comprising a ventilation duct (2) for air passage and comprising intumescent material (5, 6) which is installed in the ventilation duct (2) such that it is able to close off the ventilation duct (2) after expansion, **characterised in that** the fire damping ventilation device (1) comprises ceramic structural elements (4) which are installed in the ventilation duct (2) such that under the effect of heat the structure of the ventilation device (1) is at least partially maintained by means of these ceramic structural elements (4).
2. Fire damping ventilation device (1) according to claim 1, **characterised in that** it comprises connecting elements (10) for installing the ventilation device (1) on top of a glass pane and inside a window frame and that at least part of the ceramic structural elements (4) are provided adjacent these connecting elements (10) and adjacent the ventilation duct (2) such that at least the structure of the ventilation device (1) near these connecting elements (10) is at least partially maintained under the effect of heat.
3. Fire damping ventilation device (1) according to claim 2, **characterised in that** the connecting elements (10) comprise at least one or more profiles (11, 13) delimiting a hole which is at least partially filled with at least part of the ceramic structural elements (4).
4. Fire damping ventilation device (1) according to claim 2 or 3, **characterised in that** the connecting elements (10) comprise at least one or more profiles (12) forming a groove wherein the glass pane can be fitted, and comprise rubber for installing between the last said profiles (12, 13) and the glass pane and that at least part of the intumescent material (6) is provided in the groove of the profiles (12, 13).
5. Fire damping ventilation device (1) according to claim 4, **characterised in that** the intumescent material (6) which is provided in the groove is pressureless expandable.

6. Fire damping ventilation device (1) according to any of the preceding claims, **characterised in that** at least part of the intumescent material (5) is centrally provided in the ventilation duct (2) and is installed at the top and/or at the bottom of the ventilation duct (2). 5
7. Fire damping ventilation device (1) according to any of the preceding claims, **characterised in that** at least part of the intumescent material (5) is installed at opposed sides of the ventilation duct (2) and at least partially facing each other. 10
8. Fire damping ventilation device (1) according to claim 2 and 7, **characterised in that** the intumescent material (5) which is installed at opposed sides of the ventilation duct (2) is installed near the connecting elements (10). 15
9. Fire damping ventilation device (1) according to any of the preceding claims, **characterised in that** this ventilation device (1) comprises a regulating valve (7) which is moveably mounted in the ventilation duct (2) between an open position with maximum air passage through the ventilation duct (2) and a closed position wherein the air passage is blocked and **in that** at least part of the intumescent material (5) is installed in such a way that upon expansion it creates a pressure which closes the regulating valve (7) into its closed position. 20
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10. Fire damping ventilation device (1) according to claim 9, **characterised in that** at least part of the intumescent material (6) is provided on the surface of the regulating valve (7). 35
11. Fire damping ventilation device (1) according to any of the preceding claims, **characterised in that** the ventilation device (1) comprises one or more profiles (3) which at least partially delimit the ventilation duct (2). 40
12. Fire damping ventilation device (1) according to claim 11, **characterised in that** at least part of the ceramic structural elements (4) are fixedly connected to the one or more said profiles (3). 45
13. Fire damping ventilation device (1) according to claim 11 of 12, **characterised in that** the last said one or more profiles (3) are made of aluminium. 50
14. Fire damping ventilation device (1) according to any of claims 11 to 13, **characterised in that** the last said one or more profiles (3) comprise one or more holes wherein at least part of the ceramic structural elements (4) are installed. 55
15. Fire damping ventilation device (1) according to any of the preceding claims, **characterised in that** the

ventilation device (1) comprises front plates which are made of ceramic structural elements (4) and form at least part of the ceramic structural elements (4).

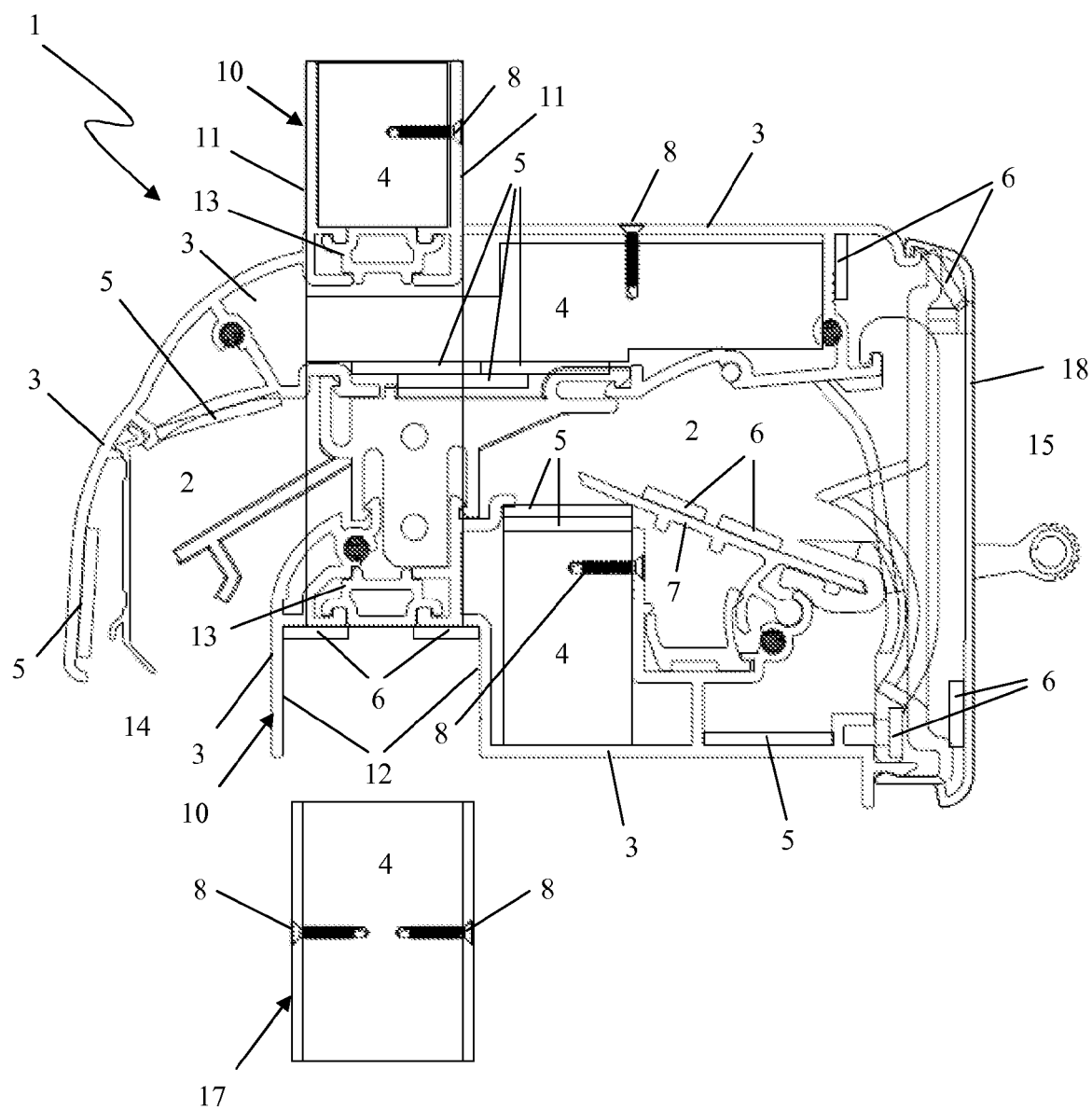


FIG. 1



EUROPEAN SEARCH REPORT

Application Number
EP 10 18 8812

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 03/023267 A1 (TRUSS HOLDINGS PTY LTD) 20 March 2003 (2003-03-20) * abstract; figures * * page 4, line 23 - line 33 * -----	1,2,6-8, 11-15	INV. A62C2/06 A62C2/12
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 April 2011	Examiner Vervenne, Koen
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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