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(54) Method for manufacturing a frame profile for a fire resistant door

(57) A method for manufacturing a frame profile for a fire resistant door, said m
ethod comprising:
(a) Providing a solid beam;
(b) Providing at least one longitudinal groove in a side of said solid beam;
(c) Introducing an intumescent material in said groove, characterized in that said intumescent material is introduced in said groove in a liquid state and is subsequently cured.

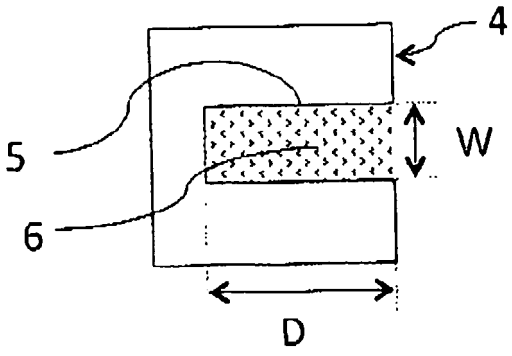

Fig. 2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a profile for the manufacturing of a frame of fire resistant doors.

BACKGROUND OF THE INVENTION

[0002] It is generally known to provide a fire resistant door with a frame that at its outer periphery is provided with an strip of intumescent material. US 6,115,976 A and BE 1,011,525 A3 for example describe a frame profile comprising a groove wherein a strip of solid intumescent material is provided. Both US '976 and BE '525 mention covering the groove with a decorative strip of wood veneer or plastic.

[0003] GB 1,377,059 wherein the frame profile is manufactured by laminating fire-resistant plywood alternated with strips of intumescent material ("foaming strips").

[0004] Given the above, there remains a need for cost efficient alternatives for manufacturing frame profiles for fire resistant doors.

SUMMARY OF THE INVENTION

[0005] The present invention concerns a method for manufacturing a frame profile for a fire resistant door, said method comprising:

(a) Providing a solid beam;
(b) Providing at least one longitudinal groove in a side of said solid beam;
(c) Introducing an intumescent material in said groove,

whereby the intumescent material is introduced in said groove in a liquid state and is subsequently hardened.

[0006] The present invention further concerns frame profile for a fire resistant door, said profile comprising:

(a) A solid beam;
(b) A groove extending longitudinally in said beam wherein an intumescent material is provided;

wherein said groove has a depth/width ratio of 1,5 or more, preferably 2 or more.

[0007] Finally the present invention concerns a door comprising a frame profile as identified above, whereby the groove with the intumescent material provided therein is situated at the outer periphery of the door frame.

DESCRIPTION OF THE INVENTION

[0008] In a preferred method of the present invention the solid beam is manufactured out of a solid body, preferably of a composite comprising wood.

[0009] According to a preferred method of the invention, the groove provided in the solid beam has a depth/width ratio of 1 or more, preferably 1,5 or more, most preferably 2 or more. The width of the groove is preferably 7mm broad or less.

[0010] A preferred intumescent material used with a method according to the present invention comprises graphite.

[0011] The frame profile of the present invention preferably lacks a decorative strip or masking strip covering the groove comprising the intumescent material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

FIG 1: represents a door according to the present invention;
FIG 2: represents a cross section according to line II-II in figure 1;
FIGs 3-5: represent alternative cross sections of figure 2.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Figure 1 represents a fire resistant door 1 comprising a frame 2 surrounding a core 3 fixed in said frame 2. The frame comprises vertical styles and horizontal beams further referred to as frame profiles 4.

[0014] As represented in figure 2, the frame profiles 4 are provided with a groove 5 at the outer periphery of the frame, which grooves 5 extend in the longitudinal direction of the frame profiles 4 and preferably over the entire length of each profile 4.

[0015] According to a preferred embodiment of the frame profiles according to the present invention, the groove 5 has a depth (D)/width (W) ratio of 1 or more, more preferably 1,5 or more and most preferably 2 or more. The width (W) of each groove 5 - measured at the outer peripheral surface of the frame profile- is preferably less than 7 mm broad. Clearly, each profile can be provided with a plurality of grooves 5 as represented in figures 3 to 5.

[0016] In the groove 5 an intumescent material 6 is provided.

[0017] In the context of the present invention, intumescent material is defined as one that undergoes a chemical change when exposed to heat or flames, becoming viscous then forming expanding bubbles that harden into a dense, heat insulating multicellular char.

[0018] Intumescent material that can be applied is for example a composition comprising (expandable) graphite and a polymeric binder.

[0019] A method for manufacturing the above frame profile comprises the steps of:

(a) Providing a solid beam;
(b) Providing at least one longitudinal groove in a side of said solid beam;

(c) Introducing an intumescent material in said groove,

whereby the intumescent material is introduced in said groove in a liquid state and is subsequently hardened.

[0020] The intumescent material may be made by preparing a mixture of the expandable graphite, the polymeric binder and a liquid and causing or allowing the mixture to harden. The binder may either be a flexible or elastomeric binder or a thermosetting formaldehyde resin.

In case the binder is a flexible or elastomeric binder he graphite is preferably present in an amount of 15 to 60% by weight based on the combined weight of the binder and graphite, while the binder and the graphite are present in a total amount of at least 70% by weight based on the weight of the intumescent material. The intumescent material may comprise a plasticizer in an amount that preferably does not exceed 15% by weight based on the weight of the intumescent material. A suitable plasticizer is dibutyl phthalate.

The intumescent material may be made by preparing a mixture of the expandable graphite, the polymeric binder and water and causing or allowing the mixture to harden. Hardening may occur at least in part due to evaporation of water. The flexible binder may be or comprise a polymer selected from vinyl acetate polymers, styrene polymers, vinyl chloride polymers, acrylic polymers, vinyl butyral polymers, melamine/urea/phenol formaldehyde resins, polyesters and phenolic resins.

The intumescent material may be made by preparing a mixture of the expandable graphite and a liquid emulsion or dispersion of the elastomeric binder and causing or allowing the mixture to cure by coagulation or cross-linking of the elastomeric binder. Suitable emulsions or dispersions of the elastomeric binder may comprise Neoprene latex 115 and Neoprene latex 671. These latices are marketed by Du Pont. Neoprene latex 115 is described as a chloroprene copolymer with carboxyl functionality of pH 7. Neoprene latex 671 is described as polychloroprene in anionic colloidal system, pH 12.5. It may be advantageous to add one or more organic accelarators such as thiocarbanilide, diphenylguanidine or hexamethylenediamine to the emulsion or dispersion of the elastomer,

[0021] In case the binder is a thermosetting formaldehyde resin, the thermosetting binder may be, for example, melamine formaldehyde resin, urea formaldehyde resin, phenol formaldehyde resin, resorcinol formaldehyde resin or a mixture of two or more of these resins. Melamine formaldehyde resin is particularly preferred as the thermosetting binder because it provides an intumescent material which can intumesce smoothly and free of sputtering of graphite particles. The thermosetting binder may incorporate a minor proportion of one or more of the flexible polymers referred to above in order to improve the flexural properties and to reduce shrinkage of the binder. The intumescent material may comprise 20 to 60% by weight of melamine formaldehyde resin as the binder (calculated as uncross-linked resin) and 10 to 50%, more preferably 10 to 40%, by weight of the expandable graphite. Preferably the amount of the expandable graphite is in the range of 20 to 60% by weight based on the total weight of the binder and graphite. The intumescent material may be made by preparing a mixture of the expandable graphite and the binder and causing or allowing the mixture to harden by curing or cross-linking of the binder.

[0022] In general the intumescent material may expand, forming a solid foam or puff, to 8 to 25 times its original volume on heating to elevated temperature.

[0023] The intumescent material may further comprise one or more reinforcing agents and/or fillers. Such reinforcing agents and fillers may be selected from glass fibre, cellulose-based fibre, chopped tissue, rockwool, china clay, chalk, gypsum, silicas and mineral silicates e.g. calcium silicate.

[0024] Hardening or curing may be effected at ambient temperature However, it may often be preferable to effect curing at elevated temperature, such as 50 DEG to 60 DEG C., such temperature obviously having to be kept below a temperature at which intumescence of the graphite or rapid dissolution of dissolved air (which would cause bubbles to form in the liquid mixture) would occur. In case the binder is a flexible or elastomeric binder it is believed that curing is effected generally mainly by evaporation of water (or other liquid). However, curing may occur additionally or alternatively by cross-linking of the polymeric binder. Where the binder is a rubber, one or more compounds selected from oxides and salts of metals, such as zinc, may be used to accelerate hardening of the rubber. Zinc borate is a suitable zinc salt for this purpose.

[0025] In cast the binder is a thermosetting formaldehyde resin, the mixture may further comprise a catalyst to improve and/or accelerate hardening of the intumescent material. Examples of suitable catalysts include hydrochloric acid, sulphuric acid, phosphoric acid, organic acids such as formic acid, acetic acid, maleic acid, malic acid, tartaric acid and citric acid, ammonium phosphates and alkali metal phosphates.

1	Door
2	Frame
3	Core
4	Frame profiles
5	Groove
6	Intumescent material
D	Groove depth
W	Groove width

Claims

1. A method for manufacturing a frame profile for a fire resistant door, said method comprising

a. Providing a solid beam;
b. Providing at least one longitudinal groove in a side of said solid beam;
c. Introducing an intumescent material in said groove,
characterized in that said intumescent material is introduced in said groove in a liquid state and is subsequently hardened.

2. The method according to claim 1, wherein said solid beam is manufactured out of a solid body, preferably of a composite comprising wood.

3. The method according to claim 1, wherein said groove has a depth/width ratio of 1 or more, preferably 1,5 or more most preferably 2 or more.

4. The method according to claim 1, wherein said groove has a width of 7 mm or less.

5. The method according to claim 1, wherein said intumescent material contains graphite.

6. A frame profile for a fire resistant door, said profile comprising:

a. A solid beam;
b. A groove extending longitudinally in said beam wherein an intumescent material is provided;
characterized in that said groove has a depth/width ratio of 1,5 or more, preferably 2 or more.

7. The frame profile according to claim 6, wherein said groove has a width of 7 mm or less.

8. The frame profile according to claim 6, wherein no adhesive or mechanical connection means are provided between the intumescent material and the inner surface of the groove.

9. The frame profile according to claim 6, wherein said groove comprising the intumescent material is not covered by a decorative strip or masking strip.

10. A door comprising a frame profile as identified in any of claims 6 to 9, whereby the groove with the intumescent material provided therein is situated at the outer periphery of the door frame.

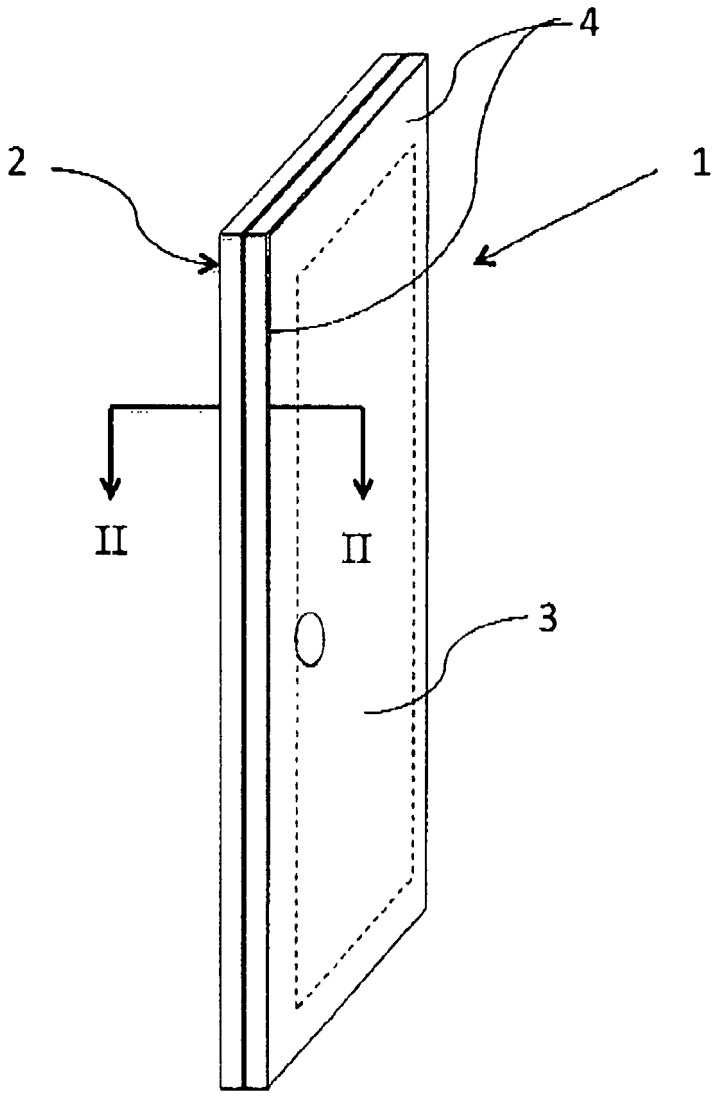

Fig. 1

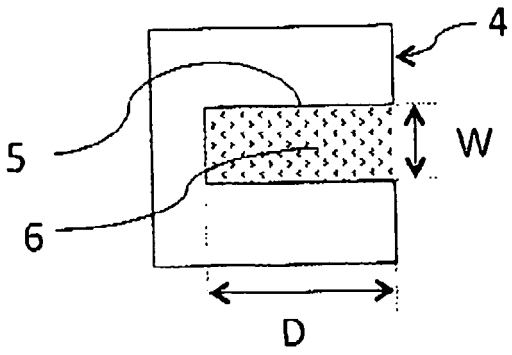

Fig. 2

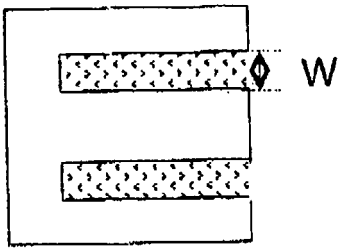

Fig. 3

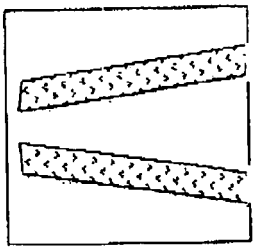

Fig. 4

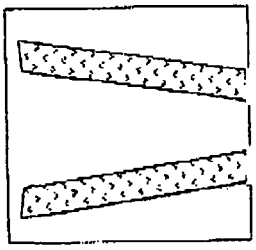

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 12 00 0128

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 2008/030087 A1 (WIJNVELD B V [NL]; WIJNVELD HENDRIK JAN [NL]) 13 March 2008 (2008-03-13)	1-4,6-10	INV. E06B5/16
Y	* the whole document *	5	

Y	GB 2 450 728 A (JELD WEN UK LTD [GB]; JELD WEN INC [US]) 7 January 2009 (2009-01-07) * page 9 - paragraph 3; claim 25; figure 1 *	5	

TECHNICAL FIELDS SEARCHED (IPC)
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 July 2012	Merz, Wolfgang

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 00 0128

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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05-07-2012

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- US 6115976 A **[0002]**
- BE 1011525 A3 **[0002]**
- GB 1377059 A **[0003]**