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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

Published:

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— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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23 January 2025 (23.01.2025)

(54) Title: VAPOR PERMEABLE, WATER RESISTIVE, AND FIRE RESISTIVE ARTICLES

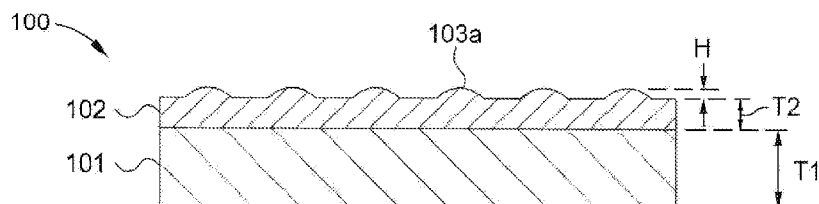


FIG. 1A

(57) Abstract: Embodiments of the present disclosure generally relate to vapor permeable, water resistive, and fire resistive articles for residential and commercial structures and installations. Methods of making such articles are also described herein. In an embodiment, a vapor permeable laminate is provided. The vapor permeable laminate includes a substrate having a first surface and a second surface opposite the first surface, the second surface for facing an interior of a structure. The vapor permeable laminate further includes an intumescent coating disposed over at least a portion of the first surface of the substrate, the intumescent coating having raised features disposed thereon, recessed features formed therein, or combinations thereof, the features for providing a water drainage path. Embodiments described herein also include wrap for a structure or an installation.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 24/31476

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. E04B 1/62, E04B 1/66, E04B 1/94 (2024.01)

ADD. F16J 15/06 (2024.01)

CPC - INV. E04B 1/62, E04B 1/66, E04B 1/94, E04B 1/948

ADD. F16J 15/065

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2022/231942 A1 (Performance Formulation Solutions LLC) 3 November 2022 (03.11.2022) Abstract, Figure 1, claims, para [0005], para [0032], para [0058], para [0067], para [0040], and entire document	1-20
Y	US 2020/0141113 A1 (Schul International Co LLC) 7 May 2020 (07.05.2020) Abstract, claims, Fig 2; para [0056], para [0065], para [0067] and entire document	1-15, 17, 20
Y	US 4,908,260 A (Dodia et al.) 13 March 1990 (13.03.1990) Abstract, claims, col 3 ln 25-30	2, 3, 16-19
Y	US 2019/0085178 A1 (Hexion Inc) 21 March 2019 (21.03.2019) Abstract, claims, para [0007] and entire document	12-14, 16-19
P/Y	US 2023/0357639 A1 (Hexion Inc) 9 November 2023 (09.11.2023) Abstract, claims, figures, and full document	1-20
A	US 2009/0113838 A1 (Paulsen et al.) 7 May 2009 (07.05.2009) Abstract, claims, figures, para [0015]	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 24/31476

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

-----continued in supplemental box-----

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

-----continued from Box III-----

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I: Claims 1-15 are directed to a vapor permeable laminate, comprising: a -substrate having a first surface and a second surface opposite the first surface, the second surface for facing an interior of a structure; and an intumescent coating disposed over at least a portion of the first surface of the substrate; the intumescent coating having raised features disposed thereon, recessed features formed therein, or combinations thereof, the features for providing a water drainage path.

Group II: Claims 16-19 are directed to a wrap for a structure or an installation, comprising: a substrate having a first substrate surface and a second substrate surface opposite the first substrate surface, the second substrate surface for facing an interior of the structure or the installations and an intumescent coating having a first coating surface and a second coating surface opposite the first coating surface, the second coating surface adjacent to the first substrate surface, the intumescent coating comprising a composition, the composition comprising or being derived from: an intumescent compound; a binder comprising a thermoplastic compound and a thermoset compound; a catalyst; and a blowing agent, the wrap having a water vapor permeance (ASTM E96-16) of at least about 500 ng-s-m²-Pa-1.

Group III: Claim 20 is directed to a method for making a vapor permeable laminate, the method comprising: forming a layer comprising an intumescent composition on a surface of a substrate, the intumescent composition configured to expand in the presence of heat; forming features on or in the layer, the features for providing a water drainage path; and drying or curing the intumescent composition with the substrate to form the vapor permeable laminate

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Special Technical Features:

Group I requires the intumescent coating having raised features disposed thereon, recessed features formed therein, or combinations thereof, the features for providing a water drainage path, not required by group II.

Group II requires a wrap for a structure or an installation, and the intumescent coating comprising a composition, the composition comprising or being derived from: an intumescent compound; a binder comprising a thermoplastic compound and a thermoset compound; a catalyst; and a blowing agent, the wrap having a water vapor permeance (ASTM E96-16) of at least about 500 ng-s-m²-Pa-1, not required by group I or III.

Group III requires a method for making a vapor permeable laminate, not required by Groups I and II.

Shared Technical Features:

Groups I-III share the common feature of a vapor permeable, comprising: a -substrate having a first surface and a second surface opposite the first surface, the second surface for facing an interior of a structure; and an intumescent coating disposed over at least a portion of the first surface of the substrate. However, these shared technical features do not represent a contribution over prior art, as the feature is anticipated by US 2004/0103608 A1 to Lionel. Lionel discloses a vapor permeable para [0029], membrane permeable to vapor) laminate(laminate (Fig 2 disclosing a laminate), comprising: a -substrate (para [0025], substrate) having a first surface and a second surface opposite the first surface(Fig 2 disclosing a first surface and a second surface labeled 30 and 40 respectively), the second surface for facing an interior of a structure(Fig 2 part labeled 40 facing the interior of a surface); and an intumescent coating disposed over at least a portion of the first surface of the substrate(Fig 2 part labeled 34 disposed on the first surface labeled 32 and para [0035], vapor permeable barrier sheet disposed within the said structure, and para [0067], vapor permeable barrier sheet).

As the shared technical features were known in the art, they cannot be considered special technical features that would otherwise unify the groups. Therefore, Groups I-II lack unity under PCT Rule 13.