US012392136B2

(12) **United States Patent**
Kiik et al.

(10) **Patent No.: US 12,392,136 B2**
(45) **Date of Patent: *Aug. 19, 2025**

(54) **ROOFING MATERIAL**

(71) Applicant: **BMIC LLC**, Dallas, TX (US)

(72) Inventors: **Matti Kiik**, Richardson, TX (US); **Michael L. Bryson**, Independence, MO (US); **Paul G. Wilson**, Waxahachie, TX (US); **Margie A. Beerer**, Ennie, TX (US); **Olan Leitch**, Bakersfield, CA (US)

(73) Assignee: **BMIC LLC**, Dallas, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **18/764,897**

(22) Filed: **Jul. 5, 2024**

(65) **Prior Publication Data**

US 2025/0043574 A1 Feb. 6, 2025

Related U.S. Application Data

(63) Continuation of application No. 18/473,977, filed on Sep. 25, 2023, now Pat. No. 12,060,714, which is a (Continued)

(51) **Int. Cl.**
B32B 3/10 (2006.01)
B32B 5/02 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***E04D 1/28*** (2013.01); ***B32B 5/022*** (2013.01); ***C09D 195/00*** (2013.01); ***E04D 1/12*** (2013.01);
(Continued)

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

RE16,621 E 5/1927 Busha
RE16,832 E 12/1927 O'Dell
(Continued)

FOREIGN PATENT DOCUMENTS

EP 3115524 A1 1/2017

OTHER PUBLICATIONS

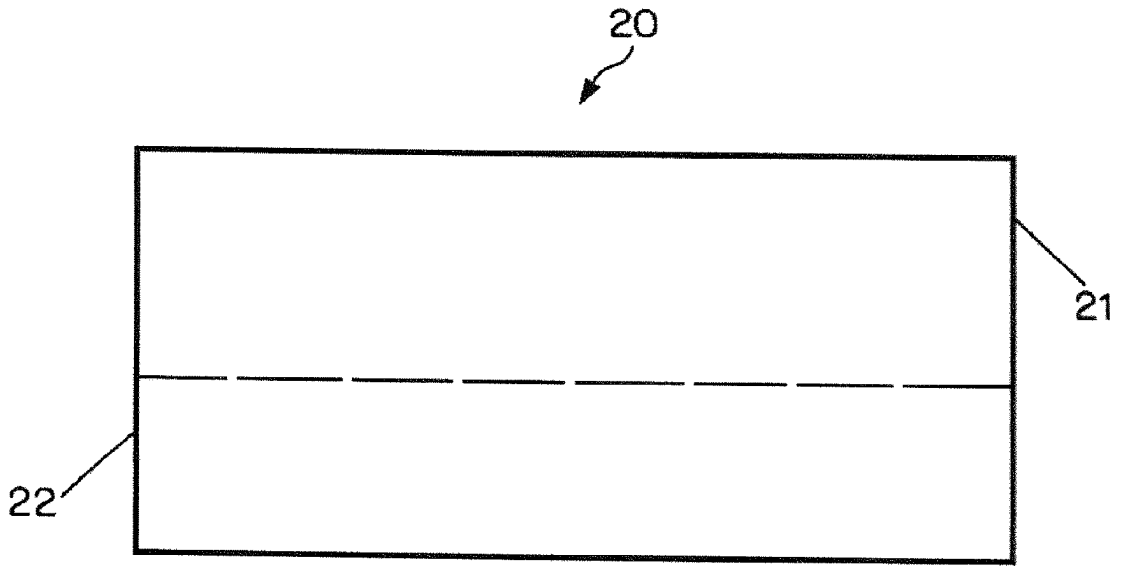
Houston Restoration Services: Experienced Roofers Houston TX—Houston Roofing | "Roofing That Beats The Weather" | http://www.qualityroofertx.com/houston-roofing/roofing-thal-beats-lhe-weather.hlml, downloaded Mar. 16, 2020.
(Continued)

Primary Examiner — Christopher M Polley
(74) *Attorney, Agent, or Firm* — GREENBERG TRAURIG, LLP

(57) **ABSTRACT**

A roofing material is provided having an asphalt-coated mat or felt made up of or in combinations of fiberglass, polyester, nylon, cotton, cellulosic fibers or materials, polyethylene, polypropylene, co-polymers, melamine, phenolic, acrylics, polycarbonate, carbon fiber, clay, metallic in woven, non-woven, strands or sheets, styrene compounds, rubber, silk, leather, or wool in a woven, non-woven, or solid form. The surfacing materials can be made up of or in combination minerals, plastic particles or film, metal particles or film, cement particles, clay particles, paints, coatings, glass, ceramics, wood, wood fiber, or composite materials.

14 Claims, 2 Drawing Sheets



Related U.S. Application Data

continuation of application No. 17/314,788, filed on May 7, 2021, now Pat. No. 11,802,408, which is a continuation of application No. 16/680,263, filed on Nov. 11, 2019, now Pat. No. 11,002,015, which is a continuation of application No. 16/546,464, filed on Aug. 21, 2019, now Pat. No. 10,995,495, which is a continuation of application No. 15/811,988, filed on Nov. 14, 2017, now Pat. No. 10,415,247, which is a continuation of application No. 14/606,666, filed on Jan. 27, 2015, now Pat. No. 9,845,602.

(60) Provisional application No. 61/931,828, filed on Jan. 27, 2014.

(51) **Int. Cl.**

C09D 195/00	(2006.01)
E04D 1/12	(2006.01)
E04D 1/28	(2006.01)
B32B 17/02	(2006.01)
E04D 1/00	(2006.01)
E04D 5/02	(2006.01)

(52) **U.S. Cl.**

CPC *B32B 17/02* (2013.01); *B32B 2262/101* (2013.01); *B32B 2419/06* (2013.01); *E04D 2001/005* (2013.01); *E04D 5/02* (2013.01); *Y10T 428/24802* (2015.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,129,833	A	9/1938	Fradette
2,161,440	A	6/1939	Venrick
3,138,897	A	6/1964	McCorkle
3,190,040	A	6/1965	Theobald
3,252,257	A	5/1966	Price et al.
4,738,884	A	4/1988	Algrim
H000788	H	6/1990	Schneider, Jr.
5,000,826	A	3/1991	Kitano
5,394,672	A	3/1995	Seem
5,822,943	A	10/1998	Frankoski et al.
5,950,387	A	9/1999	Stahl et al.
D417,513	S	12/1999	Blanpied
6,471,812	B1	10/2002	Thompson et al.
6,516,572	B1	2/2003	Nowacek et al.
6,804,919	B2	10/2004	Railkar
6,813,866	B2	11/2004	Naipawer, III
6,851,240	B2	2/2005	Peng et al.
6,936,239	B2	8/2005	Kiik et al.
6,968,662	B2	11/2005	Rodrigues
7,082,724	B2	8/2006	Railkar et al.
7,172,678	B2	2/2007	Canfield et al.
7,219,476	B2	5/2007	Akins et al.
7,272,915	B2	9/2007	Peng
D554,275	S	10/2007	Sieling et al.
7,320,767	B2	1/2008	Edge et al.
7,442,658	B2	10/2008	Rodrigues et al.
7,448,177	B2	11/2008	McClintick
7,454,873	B2	11/2008	McClintick
7,582,155	B2	9/2009	Mehta et al.
D611,620	S	3/2010	Kalkanoglu et al.
7,805,905	B2	10/2010	Rodrigues et al.
7,833,371	B2	11/2010	Binkley et al.
7,836,654	B2	11/2010	Belt et al.
7,851,051	B2	12/2010	DeJarnette et al.
7,861,631	B2	1/2011	Freshwater et al.
7,900,266	B1	3/2011	Longcor, IV
7,928,023	B2	4/2011	Canfield et al.
8,006,457	B2	8/2011	Binkley et al.
8,033,072	B2	10/2011	Mcclintick
8,127,514	B2	3/2012	Binkley et al.
8,156,704	B2	4/2012	Belt et al.
8,181,413	B2	5/2012	Belt et al.
8,226,790	B2	7/2012	Rodrigues et al.
D665,103	S	8/2012	Rodrigues et al.
D665,104	S	8/2012	Rodrigues et al.
8,240,100	B2	8/2012	Kalkanoglu et al.
8,240,102	B2	8/2012	Belt et al.
D666,744	S	9/2012	Rodrigues et al.
D666,745	S	9/2012	Rodrigues et al.
D666,746	S	9/2012	Rodrigues et al.
D666,747	S	9/2012	Rodrigues et al.
8,297,020	B1	10/2012	Swanson
D670,407	S	11/2012	Leitch
D670,408	S	11/2012	Leitch
D670,409	S	11/2012	Leitch
D670,825	S	11/2012	Leitch
D670,826	S	11/2012	Leitch
D670,827	S	11/2012	Leitch
8,302,358	B2	11/2012	Kalkanoglu
8,316,608	B2	11/2012	Binkley et al.
8,381,489	B2	2/2013	Freshwater et al.
8,389,103	B2	3/2013	Kiik et al.
8,397,460	B2	3/2013	Rodrigues et al.
8,430,983	B2	4/2013	Vermilion et al.
8,535,786	B2	9/2013	Schroer
8,607,521	B2	12/2013	Belt et al.
8,623,164	B2	1/2014	Belt et al.
8,752,351	B2	6/2014	Belt et al.
8,763,339	B2	7/2014	Bryson et al.
8,813,453	B2	8/2014	Kalkanoglu et al.
8,863,388	B2	10/2014	Aschoff et al.
8,978,332	B2	3/2015	Leitch
8,984,835	B2	3/2015	Kalkanoglu
8,991,130	B2	3/2015	Belt et al.
9,010,058	B2	4/2015	Dejarnette et al.
9,021,760	B2	5/2015	Kiik et al.
9,057,194	B2	6/2015	Jenkins et al.
9,121,178	B2	9/2015	Belt et al.
9,140,012	B1	9/2015	Leitch et al.
9,157,236	B2	10/2015	Jenkins
9,187,903	B1	11/2015	Buzza
9,212,487	B2	12/2015	Kiik et al.
D747,007	S	1/2016	Leitch
D747,501	S	1/2016	Leitch
D749,240	S	2/2016	Rodrigues et al.
D750,810	S	3/2016	Buzza
9,279,255	B2	3/2016	Bryson et al.
9,290,945	B2	3/2016	Beerer et al.
9,340,371	B2	5/2016	Mishler
D760,924	S	7/2016	Rodrigues et al.
D760,925	S	7/2016	Rodrigues et al.
D761,445	S	7/2016	Rodrigues et al.
D761,446	S	7/2016	Rodrigues et al.
D761,447	S	7/2016	Anderson et al.
9,399,870	B2	7/2016	Leitch et al.
9,399,871	B2	7/2016	Leitch et al.
D762,879	S	8/2016	Leitch
D762,880	S	8/2016	Leitch
D762,881	S	8/2016	Leitch
D763,468	S	8/2016	Leitch et al.
D763,470	S	8/2016	Leitch
D763,471	S	8/2016	Leitch
D764,076	S	8/2016	Leitch
D764,687	S	8/2016	Anderson et al.
D765,271	S	8/2016	Anderson et al.
D765,273	S	8/2016	Leitch et al.
D765,274	S	8/2016	Leitch et al.
9,404,260	B2	8/2016	Leitch
9,410,323	B1	8/2016	Leitch
9,416,539	B2	8/2016	Duque et al.
D765,885	S	9/2016	Leitch et al.
D765,886	S	9/2016	Leitch et al.
D765,887	S	9/2016	Leitch et al.
D765,888	S	9/2016	Leitch et al.
D766,466	S	9/2016	Leitch
D766,467	S	9/2016	Leitch
D766,468	S	9/2016	Leitch
D766,469	S	9/2016	Leitch et al.
D767,172	S	9/2016	Leitch
D767,272	S	9/2016	Gibson

(56) **References Cited**

U.S. PATENT DOCUMENTS

D769,472	S	10/2016	Leitch
D769,473	S	10/2016	Rodrigues et al.
9,458,633	B2	10/2016	McGraw et al.
9,464,439	B2	10/2016	Buzza
D774,215	S	12/2016	Duque et al.
D774,664	S	12/2016	Rodrigues et al.
9,523,202	B2	12/2016	Anderson et al.
D776,303	S	1/2017	Duque et al.
9,540,821	B2	1/2017	Houchin et al.
9,605,434	B2	3/2017	Belt et al.
9,624,670	B2	4/2017	Belt et al.
9,657,478	B2	5/2017	Belt et al.
D793,584	S	8/2017	Leitch
9,739,062	B2	8/2017	Leitch
9,752,324	B2	9/2017	Leitch
9,758,970	B2	9/2017	Grubka et al.
D799,271	S	10/2017	Pogue et al.
D804,687	S	12/2017	Duque et al.
D805,221	S	12/2017	Leitch
9,845,602	B2	12/2017	Kiik et al.
9,856,649	B1	1/2018	Selway
9,890,540	B2	2/2018	Weitzer
10,009,929	B1	6/2018	Zhou et al.
D825,081	S	8/2018	Rodrigues et al.
D827,158	S	8/2018	Duque et al.
D827,159	S	8/2018	Anderson et al.
10,060,132	B2	8/2018	Beerer et al.
D827,864	S	9/2018	Rodrigues et al.
D827,865	S	9/2018	Rodrigues et al.
D827,866	S	9/2018	Rodrigues et al.
D827,867	S	9/2018	Rodrigues et al.
D827,868	S	9/2018	Rodrigues et al.
D829,935	S	10/2018	Duque et al.
D831,233	S	10/2018	Anderson et al.
D834,220	S	11/2018	Duque et al.
10,180,001	B2	1/2019	Leitch
10,189,656	B2	1/2019	Belt et al.
10,195,640	B2	2/2019	Svec
10,196,821	B2	2/2019	Anderson et al.
10,308,448	B2	6/2019	Belt et al.
10,315,863	B2	6/2019	Belt et al.
10,322,889	B2	6/2019	Belt et al.
D856,538	S	8/2019	Duque et al.
D856,539	S	8/2019	Duque et al.
D857,931	S	8/2019	Leitch
D857,932	S	8/2019	Leitch
10,415,247	B2	9/2019	Kilk et al.
10,428,525	B2	10/2019	Belt et al.
10,995,495	B2	5/2021	Kiik et al.
11,002,015	B2	5/2021	Kilk et al.
D943,642	S	2/2022	Svec et al.
11,352,792	B2	6/2022	Boss et al.
11,377,731	B2	7/2022	Chikaishi et al.
D973,583	S	12/2022	Horikoshi et al.
2001/0055680	A1	12/2001	Kiik et al.
2003/0124292	A1	7/2003	Unterreiter
2004/0083674	A1	5/2004	Kalkanoglu et al.
2004/0123932	A1	7/2004	Sanger
2004/0258883	A1	12/2004	Weaver
2005/0130519	A1	6/2005	Rodrigues et al.
2005/0178428	A1	8/2005	Laaly et al.
2005/0202197	A1	9/2005	Mohseen et al.
2005/0252141	A1	11/2005	Kerkar et al.
2006/0269713	A1	11/2006	Zuege et al.
2008/0134612	A1	6/2008	Koschitzky
2009/0139175	A1	6/2009	Todd et al.
2009/0220720	A1	9/2009	Mohseen et al.
2010/0170169	A1	7/2010	Railkar et al.
2010/0173110	A1	7/2010	Wiercinski et al.
2011/0041446	A1	2/2011	Stephens et al.
2011/0086214	A1	4/2011	Rockwell
2011/0223384	A1*	9/2011	Whitaker C04B 18/02 427/221
2012/0047838	A1	3/2012	Kalkanoglu et al.
2013/0025225	A1	1/2013	Vermilion et al.
2013/0068279	A1	3/2013	Buller et al.
2013/0095293	A1	4/2013	Boss et al.
2014/0147611	A1	5/2014	Ackerman, Jr.
2014/0283468	A1	9/2014	Weitzer
2015/0089895	A1	4/2015	Leitch
2015/0176282	A1	6/2015	Baker
2016/0369509	A1	12/2016	Leitch et al.
2017/0314271	A1	11/2017	Sutton et al.
2018/0038108	A1	2/2018	Aschenbeck et al.
2018/0363302	A1	12/2018	Beerer et al.
2019/0256304	A1	8/2019	Belt et al.
2020/0040582	A1	2/2020	Boss et al.
2021/0108416	A1	4/2021	Aschenbeck et al.

OTHER PUBLICATIONS

Trudefinition™ Duration® shingles with Surenail® technology | https:/lwww2.owenscorning.com/lilerature/pdfs/10013980.pdf.

Installation instructions east asphalt shingles | https://bpcan.com/wp-conlenl/uploads/2017/05/d-6013bpmode-de-pose-bardeauxeneasl.pdf, downloaded Mar. 18, 2020.

RegencyTM CRC Roofing Excellence | Regency Brochure | hllps://www.weblrack-cgs.ca/produclfiles/12824/CRC-Regency-Brochure.pdf.

Landmark™ Series and Landmark™ TL; CertainTeed Website; https://www.certainteed.com/residential-roofing/products/landmark-tl, downloaded Mar. 19, 2020.

What Makes the Windsor® a Designer Shingle! Malarkey Roofing Products | http://malarkeyroofing.com/blog/delail/whal-makes-the-windsor-a-designer-shingle, downloaded Mar. 18, 2020.

GAF Timberline; Lifetime High Definition Shingles brochure; 2011, 13 pgs.

"CertainTeed; Landmark Woodscape Series Designer Shingles" brochure, 22 pgs., Code No. 20-20-1833; Nov. 2009 CertainTeed Corporation.

"Highlander—CS; Laminated Architectural Shingle" brochure, 2 pgs., Malarkey Roofing Products; Sep. 2013.

"Owens Corning: Oakridge Shingles featuring Artisan Colors" brochure, 10 pgs., Owens Corning Roofing and Asphalt, LLC, Pub. No. 10017748, Nov. 2012.

"Tamko Building Products: Heritage Premium Laminated Asphalt Shingles, Heritage Laminated Asphalt Shingles" brochure, Tamko Building Products, Inc. 2014.

"IKO Setting the Standard: IKO Sales International: Bitumen Shingles", application guide, 22/02-E/RU/RO/H-02/05.

"CRC Roofing Excellence: Regency—Limited Lifetime Architectural Shingles", brochure, 4 pgs., MC3L044—Oct. 2015.

Roofing Excellence | Regency Brochure | https://www.weblrack-cgs.ca/produclfiles/12824/CRC-Regency-Brochure.pdf.

"Owens Corning Roofing Introduces Its Next Generation of Shingles: High Performance TruDefinition Duration Series Shingles with Enhanced SureNail Technology", Feb. 1, 2012 <<https://newsroom.owenscorning.com/all-news-releases/news-details/2012/Owens-Corning-Roofing-Introduces-Its-Next-Generation-of-Shingles-High-Performance-TruDefinition-Duration-Series-Shingles-with-Enhanced-SureNail-Technology/default.aspx>>.

"Timberline High Definition", brochure, GAF Mar. 2013 #027.

* cited by examiner

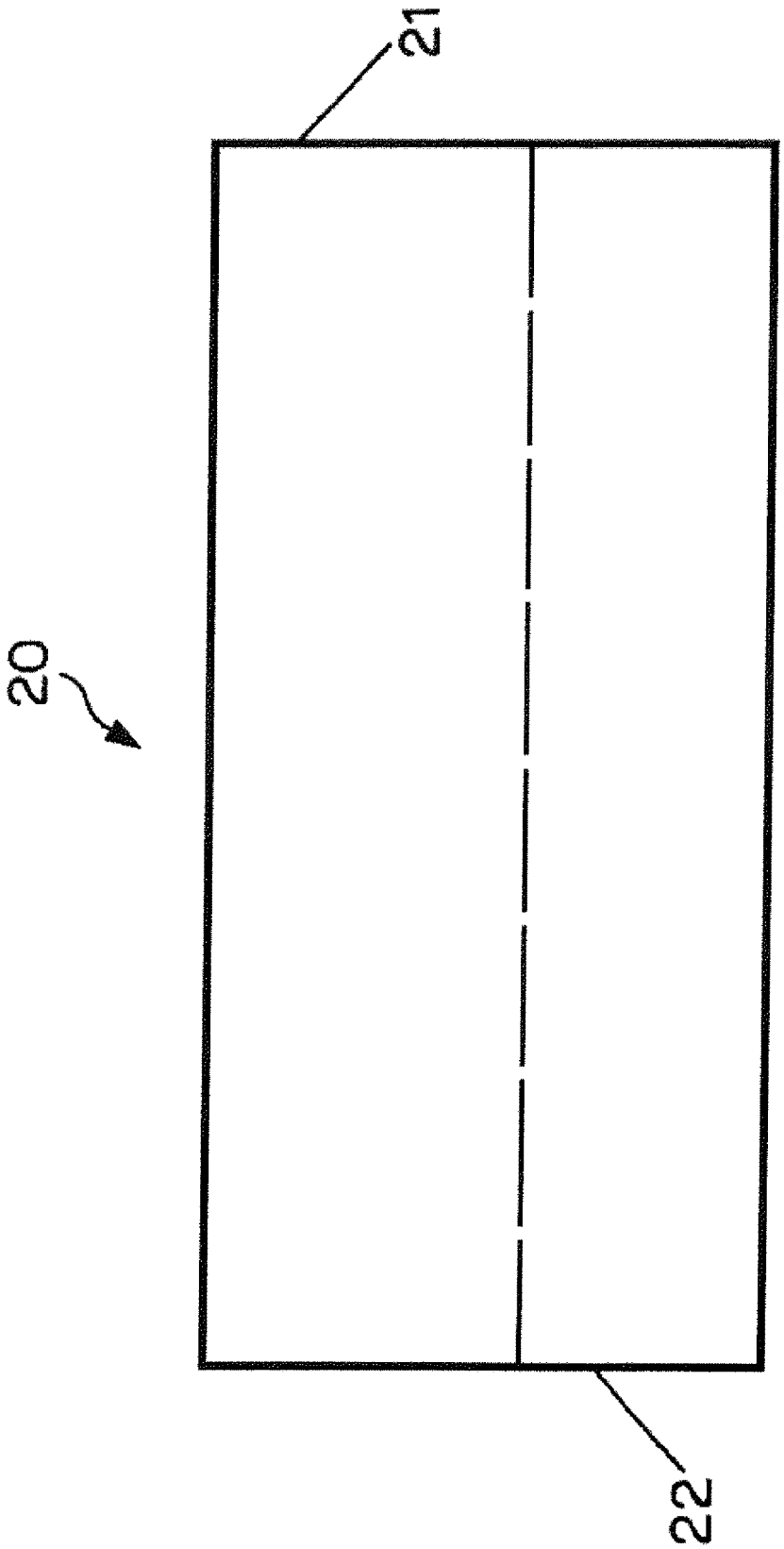


FIG. 1

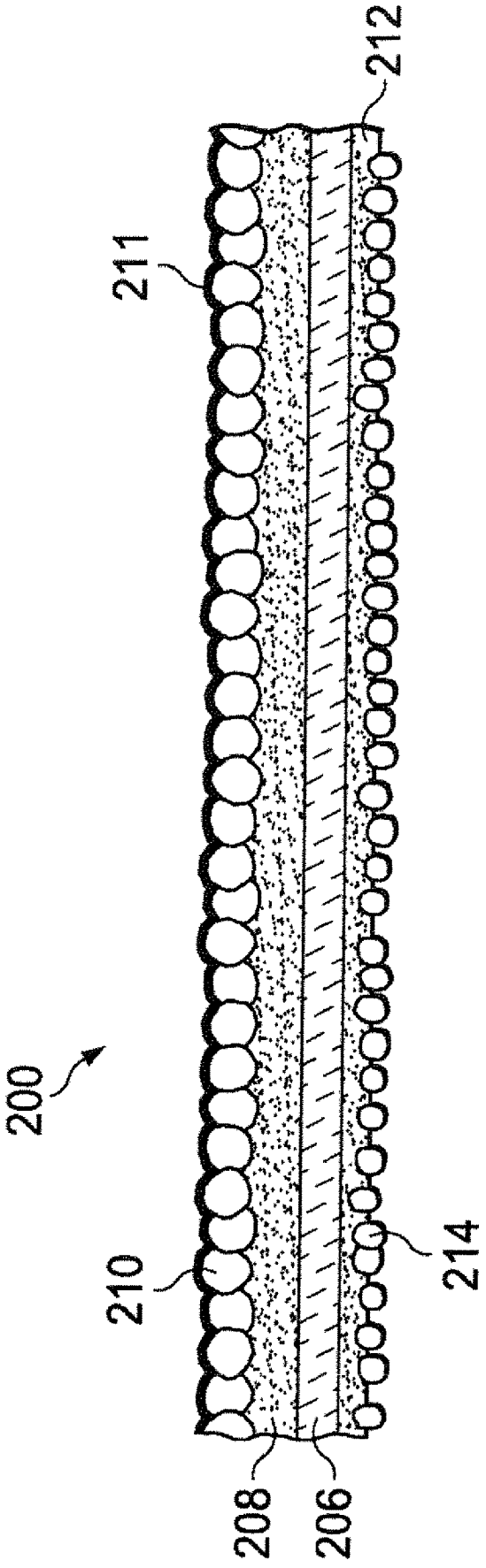


FIG. 2

ROOFING MATERIAL

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 18/473,977, filed on Sep. 25, 2023, which is a continuation of U.S. patent application Ser. No. 17/314,788, filed May 7, 2021, which is a continuation of U.S. patent application Ser. No. 16/680,263, filed on Nov. 11, 2019, which is a continuation of U.S. patent application Ser. No. 16/546,464, filed on Aug. 21, 2019, now U.S. Pat. No. 10,995,495, which is a continuation of U.S. patent application Ser. No. 15/811,988, filed on Nov. 14, 2017, now, U.S. Pat. No. 10,415,247, which is a continuation of U.S. patent application Ser. No. 14/606,666, filed on Jan. 27, 2015, now U.S. Pat. No. 9,845,602, which claims priority to U.S. Provisional Application No. 61/931,828, filed on Jan. 27, 2014, the contents of all of which are incorporated herein by reference in their entireties.

FIELD OF THE DISCLOSED SUBJECT MATTER

The disclosed subject matter relates to roofing material, including roofing shingles and roll roofing, having a novel construction.

BACKGROUND

Asphalt shingles and asphalt roll roofing for decades have been limited by building codes mandating compliance with certain industry specifications. For example, the ASTM D3462 specification, "Standard Specification for Asphalt Shingles made from Glass Felt and Surfaced with Mineral Granules," is one such industry standard for asphalt shingles and asphalt roll roofing.

The D3462 specification is quite limited, however, in the acceptable materials and construction parameters for producing roofing material. D3462 requires a fiberglass mat with a minimum weight, asphalt content, mineral surfacing, and mineral fillers mixed in the asphalt with a maximum percentage. For example, the exposed surface material and the headlap surface material must be composed of mineral granules, and the back surface covering material must be composed of a suitable material such as sand, talc, or mica. Additionally, the overall shingle under D3462 has a minimum shingle mass requirement. The entirety of the D3462 specification is hereby incorporated by reference. Flexibility in shingle design and manufacture has thus been somewhat limited.

Recently, however, the International Code Compliance Evaluation Service has approved an alternative shingle specification (ICC-ES AC438). The primary material requirement of ICC-ES AC438 is that shingles contain asphalt. AC438 focuses on shingle performance, rather than materials, and contains a number of shingle performance requirements, including those of the ASTM standards.

There is therefore a need for asphalt shingles constructed of alternative materials other than those required by the D3462 specification. The presently disclosed subject matter satisfies these and other needs.

SUMMARY

The purpose and advantages of the disclosed subject matter will be set forth in and are apparent from the description that follows, and will be learned by practice of the disclosed subject matter. Additional advantages of the disclosed subject matter will be realized and attained by the devices particularly pointed out in the written description and claims hereof, as well as from the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the disclosed subject matter, as embodied and broadly described, the disclosed subject matter includes a roofing material using felts or mats of different compositions and alternatives to mineral surfacing materials. This roofing material meets the ICC-ES AC438 standard, including the physical and performance requirements. The disclosed roofing material can be made from lighter-weight and lower-cost materials, and will perform as well or better than existing shingles and roll roofing.

In accordance with another aspect of the disclosed subject matter, a roofing material is provided comprising a mat, comprising top and back surfaces, at least one asphalt layer, disposed on the mat, comprising asphalt and an asphalt filler, an exposed surface covering material disposed on an exposed area of the top surface, and a headlap surface covering material disposed on a headlap area of the top surface, wherein the roofing material satisfies the performance requirements of the AC438 standard, including, wind resistance, fire rating, weather resistance, temperature cycling, wind-driven rain resistance, and breaking strength after weathering.

In further embodiments of the disclosed subject matter, the roofing material mat comprises one or more of fiberglass, polyester, nylon, cotton, cellulosic fibers or materials, polyethylene, polypropylene, co-polymers, melamine, phenolic, acrylics, polycarbonate, carbon fiber, clay, metallic in woven, non-woven, strands or sheets, styrene compounds, rubber, silk, leather, and wool in a woven, non-woven, or solid form.

In further embodiments of the disclosed subject matter, the roofing material exposed surface covering material comprises one or more of minerals, plastic particles or film, metal particles or film, cement particles, clay particles, paints, coatings, glass, ceramics, wood, wood fiber, and composite materials.

In further embodiments of the disclosed subject matter, the roofing material headlap surface covering material comprises one or more of minerals, plastic particles or film, metal particles or film, cement particles, clay particles, paints, coatings, glass, ceramics, wood, wood fiber, and composite materials.

In further embodiments of the disclosed subject matter, the roofing material back surface covering material comprises one or more of sand, coal slag, and polymer film.

It is to be understood that the foregoing general description and the following detailed description and drawings are only examples and are provided for purpose of illustration and not intended to limit the scope of the disclosed subject matter in any way.

The accompanying drawings, which are incorporated in and constitute part of this specification, are included to illustrate and provide a further understanding of the devices of the disclosed subject matter. Together with the description, the drawings serve to explain the principles of the disclosed subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter of the application will be more readily understood from the following detailed description when read in conjunction with the accompanying drawings, in which:

FIG. **1** is a perspective view of a roofing material in accordance with the present disclosure.

FIG. **2** is a cross-sectional view of a roofing material in accordance with the present disclosure.

DETAILED DESCRIPTION

Reference will now be made in detail to embodiments of the disclosed subject matter, an example of which is illustrated in the accompanying drawings. The disclosed subject matter will be described in conjunction with the detailed description of the system.

In accordance with the disclosed subject matter, the use of different felts to make an asphalt shingle can be made up of or in combinations of: fiberglass, polyester, nylon, cotton, cellulosic fibers or materials, polyethylene, polypropylene, co-polymers, melamine, phenolic, acrylics, polycarbonate, carbon fiber, clay, metallic in woven, non-woven, strands or sheets, styrene compounds, rubber, silk, leather, or wool in a woven, non-woven, or solid form. The surfacing materials can be made up of or in combination minerals, plastic particles or film, metal particles or film, cement particles, clay particles, paints, coatings, glass, ceramics, wood, wood fiber, or composite materials.

The various embodiments of the disclosed subject matter, described in detail below, are constructed with one common raw material, asphalt. Other materials, however, can vary. For example, the felt that is the base of an asphalt shingle can be a polypropylene woven material coated on the top and back surface with an asphaltic compound containing finely ground mineral stabilizer. The back of the shingle can be coated with a crushed waste cement product that keeps the shingles from sticking together in the bundle before being applied to the roof On the top portion of the single the exposure area of the shingle can be covered with a colored crushed brick material and the non-exposure area of the shingle can be covered with a mineral surfacing material such as limestone.

In further embodiments of the disclosed subject matter, the felt can be a fiberglass non-woven mat coated on both the top and bottom surface with the filled asphalt coating. The back surface and the non-exposure area of the top of the shingles can be covered with a crushed expanded clay material. The exposed portion of the shingle can be covered with a ceramic coated aluminum flake material.

In further embodiments of the disclosed subject matter the felt can be made with a combination of fiberglass and aluminum strands and can be coated on both top and back surfaces with a filled asphalt coating. The back surface may be covered with a mineral surfacing material. The top of the shingle's exposed surface may be coated with a reduced size colored ceramic coated mineral surfacing granule mixed with a antimicrobial polypropylene granule. The non-exposed portion of the top side of the shingle may be covered with a mineral surfacing material.

In further embodiments of the disclosed subject matter the felt can be made with a fiberglass and can be coated on both top and back surfaces with a filled asphalt coating. The back side of the felt can be covered with a polyethylene film. The top surface can be coated with a filled asphalt coating. In some embodiments, the back surface covering material can be omitted. The top of the shingle's surface can be covered with a crushed waste concrete and the exposure can be painted.

Solely for the purpose of illustration, FIG. **1** depicts an embodiment of a roofing shingle in accordance with the present disclosure. Particularly, and as illustrated, the roofing shingle **20** can comprise a headlap section **21** and a buttlap (or exposed) section **22**. The headlap section **21** is the portion of the shingle that is covered by an overlaid shingle after installation. The buttlap section is the portion of the shingle that is exposed after installation. In FIG. **1**, the dashed line indicates the demarcation between these two sections.

FIG. **2** depicts an embodiment of a roofing material **200** in accordance with the present disclosure. The roofing material **200** can comprise a mat or felt **206**, an asphalt filled coating **208**, which can be disposed on top of the mat **206**, a second asphalt filled coating **212**, which can be disposed beneath the mat **206**. A layer of top surface material **210** can be disposed over the first asphalt filled coating **208**. A layer of back surface material **214** can be disposed over the second asphalt filled coating **212**. The top surface layer **210** can be subdivided into headlap and buttlap sections as depicted in FIG. **1**. The headlap and buttlap sections of the top surface layer **210** can be comprised of the same or different materials, as described in more detail below. Optionally, a layer of color coating **211** (e.g., paint) can be disposed on top of the top surface layer **210**.

The examples herein are not intended to limit the scope of the disclosed subject matter. It will be understood that the configuration depicted in FIG. **1**, known as a "no cut-out" or strip shingle, is just one of many well-known asphalt-based roofing products, such as three-tab shingles, laminated or architectural shingles, hip and ridge shingles, and roll roofing. These and other such products are all compatible with the disclosed subject matter. Similarly, the configuration depicted in FIG. **2** is an exemplary layout, but not intended to be limiting or exhaustive. A variety of well-known roofing material configurations can be used with the disclosed subject matter.

Although some of the materials described herein are previously known for use in shingles, such as in the D3462 specification, the combinations as described herein are unique and offer improvements over known combinations. For example, many of the materials used in embodiments of the disclosed subject matter are lower-cost and/or lighter-weight than existing materials, and therefore offer previously unrealized advantages such as lower costs of production and shipping, improved ease of manufacture and installation and/or improved performance.

Example Shingles

Specific exemplary embodiments of the disclosed subject matter are provided in the tables below. The data provided in these tables are based on construction of a 36 inch by 12 inch no cut-out shingle with a 5-inch exposure, such as depicted in FIG. **1**. A "square" containing 80 shingles is made up of 240 square feet of shingles and covers 100 square feet of roof at the recommended exposure. The term "wt./100 sq. ft." represents the weight of the material per 100 square feet of shingle. The term "Wt./Sq." represents the weight of the material per square. As a benchmark, an exemplary prior-art shingle constructed according to the D3462 specification is also provided.

Although the examples are provided for a no cut-out shingle for simplicity, the scope of the invention is not limited to any specific shingle configuration or other roof covering product. Moreover, the values given below are not intended to be limiting or exclusive. A person of ordinary skill in the art would understand that weights and compositions of certain materials can be varied or adjusted without a substantial change in shingle performance or quality.

TABLE 1

Prior Art Shingle (D3462)	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.35 lbs. (min.)
Wt./Sq.	3.24 lbs.
Asphalt	
wt./100 sq. ft.	15.00 lbs. (min.)
Wt./Sq.	36.00 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	70% (max.)
Wt./Sq.	84.00 lbs.
Exposed Surface Covering Material	
Material	grade 11 mineral granules
wt./100 sq. ft.	25.00 lbs. (min.)
Wt./Sq.	25.00 lbs.
Headlap surface covering material	
Material	grade 11 mineral granules
wt./100 sq. ft.	25.00 lbs. (min.)
Wt./Sq.	35.00 lbs.
Back Surface covering material	
Material	sand
wt./100 sq. ft.	no requirement
Wt./Sq.	12.00 lbs.
Total lbs./Sq.	195.24 lbs.

TABLE 2

Example 1	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.55 lbs.
Wt./Sq.	3.72 lbs.
Asphalt	
wt./100 sq. ft.	10.50 lbs.
Wt./Sq.	25.20 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	46.80 lbs.
Exposed Surface Covering Material	
Material	grade 18 mineral granules
wt./100 sq. ft.	18.00 lbs.
Wt./Sq.	18.00 lbs.
Headlap surface covering material	
Material	grade 18 mineral granules
wt./100 sq. ft.	18.00 lbs.
Wt./Sq.	25.20 lbs.
Back Surface covering material	
Material	sand
wt./100 sq. ft.	no requirement
Wt./Sq.	12.00 lbs.
Total lbs./Sq.	130.92 lbs.

TABLE 3

Example 2	
Mat (felt)	
Material	spunglass polypropylene
wt./100 sq. ft.	1.00 lbs.
Wt./Sq.	2.40 lbs.
Asphalt	
wt./100 sq. ft.	10.50 lbs.
Wt./Sq.	25.20 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	46.80 lbs.
Exposed Surface Covering Material	
Material	grade 18 mineral granules
wt./100 sq. ft.	18.00 lbs.
Wt./Sq.	18.00 lbs.
Headlap surface covering material	
Material	grade 18 mineral granules
wt./100 sq. ft.	18.00 lbs.
Wt./Sq.	25.20 lbs.
Back Surface covering material	
Material	sand
wt./100 sq. ft.	no requirement
Wt./Sq.	12.00 lbs.
Total lbs./Sq.	129.60 lbs.

TABLE 4

Example 3	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.55 lbs.
Wt./Sq.	3.72 lbs.
Asphalt	
wt./100 sq. ft.	10.50 lbs.
Wt./Sq.	25.20 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	46.80 lbs.
Exposed Surface Covering Material	
Material	aluminum flakes
wt./100 sq. ft.	3.00 lbs.
Wt./Sq.	3.00 lbs.
Headlap surface covering material	
Material	fine mineral surfacing
wt./100 sq. ft.	12.00 lbs.
Wt./Sq.	16.80 lbs.
Back Surface covering material	
Material	fine coal slag
wt./100 sq. ft.	no requirement
Wt./Sq.	8.00 lbs.
Total lbs./Sq.	103.52 lbs.

TABLE 5

Example 4	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.55 lbs.
Wt./Sq.	3.72 lbs.
Asphalt	
wt./100 sq. ft.	15.00 lbs.
Wt./Sq.	36.00 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	66.86 lbs.
Exposed Surface Covering Material	
Material	plastic granules
wt./100 sq. ft.	10.00 lbs.
Wt./Sq.	10.00 lbs.
Headlap surface covering material	
Material	plastic granules
wt./100 sq. ft.	10.00 lbs.
Wt./Sq.	14.00 lbs.
Back Surface covering material	
Material	sand
wt./100 sq. ft.	no requirement
Wt./Sq.	12.00 lbs.
Total lbs./Sq.	142.58 lbs.

TABLE 6

Example 5	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.55 lbs.
Wt./Sq.	3.72 lbs.
Asphalt	
wt./100 sq. ft.	15.00 lbs.
Wt./Sq.	36.00 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	66.86 lbs.
Exposed Surface Covering Material	
Material	plastic & mineral granule blend
wt./100 sq. ft.	20.00 lbs.
Wt./Sq.	20.00 lbs.
Headlap surface covering material	
Material	plastic & mineral granule blend
wt./100 sq. ft.	20.00 lbs.
Wt./Sq.	28.00 lbs.
Back Surface covering material	
Material	sand
wt./100 sq. ft.	no requirement
Wt./Sq.	12.00 lbs.
Total lbs./Sq.	166.58 lbs.

TABLE 7

Example 6	
Mat (felt)	
Material	non-woven polyester
wt./100 sq. ft.	1.05 lbs.
Wt./Sq.	2.52 lbs.
Asphalt	
wt./100 sq. ft.	10.50 lbs.
Wt./Sq.	25.20 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	46.80 lbs.
Exposed Surface Covering Material	
Material	grade 18 mineral granules
wt./100 sq. ft.	18.00 lbs.
Wt./Sq.	18.00 lbs.
Headlap surface covering material	
Material	expanded clay granules
wt./100 sq. ft.	12.00 lbs.
Wt./Sq.	16.80 lbs.
Back Surface covering material	
Material	fine coal slag
wt./100 sq. ft.	no requirement
Wt./Sq.	8.00 lbs.
Total lbs./Sq.	117.32 lbs.

TABLE 8

Example 7	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.55 lbs.
Wt./Sq.	3.72 lbs.
Asphalt	
wt./100 sq. ft.	12.00 lbs.
Wt./Sq.	28.80 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	53.50 lbs.
Exposed Surface Covering Material	
Material	grade 11 mineral granules
wt./100 sq. ft.	25.00 lbs.
Wt./Sq.	25.00 lbs.
Headlap surface covering material	
Material	grade 11 mineral granules
wt./100 sq. ft.	25.00 lbs. (min.)
Wt./Sq.	35.00 lbs.
Back Surface covering material	
Material	sand
wt./100 sq. ft.	no requirement
Wt./Sq.	12.00 lbs.
Total lbs./Sq.	158.02 lbs.

TABLE 9

Example 8	
Mat (felt)	
Material	mineral & acrylic coated fiberglass mat, one side
wt./100 sq. ft.	12.00 lbs.
Wt./Sq.	28.80 lbs.
Asphalt	
wt./100 sq. ft.	9.00 lbs.
Wt./Sq.	21.60 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	40.11 lbs.
Exposed Surface Covering Material	
Material	grade 11 mineral granules
wt./100 sq. ft.	25.00 lbs.
Wt./Sq.	25.00 lbs.
Headlap surface covering material	
Material	grade 11 mineral granules
wt./100 sq. ft.	25.00 lbs. (min.)
Wt./Sq.	35.00 lbs.
Back Surface covering material	
Material	n/a
wt./100 sq. ft.	no requirement
Wt./Sq.	0.00 lbs.
Total lbs./Sq.	150.51 lbs.

TABLE 10

Example 9	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.55 lbs.
Wt./Sq.	3.72 lbs.
Asphalt	
wt./100 sq. ft.	10.50 lbs.
Wt./Sq.	25.20 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	65%
Wt./Sq.	46.80 lbs.
Exposed Surface Covering Material	
Material	aluminum flakes
wt./100 sq. ft.	3.00 lbs.
Wt./Sq.	3.00 lbs.
Headlap surface covering material	
Material	polymer film
wt./100 sq. ft.	1.50 lbs.
Wt./Sq.	2.10 lbs.
Back Surface covering material	
Material	polymer film
wt./100 sq. ft.	1.50 lbs.
Wt./Sq.	3.60 lbs.
Total lbs./Sq.	84.42 lbs.

TABLE 11

Example 10	
Mat (felt)	
Material	non-woven fiberglass
wt./100 sq. ft.	1.55 lbs.
Wt./Sq.	3.72 lbs.
Asphalt	
wt./100 sq. ft.	7.50 lbs.
Wt./Sq.	18.00 lbs.
Asphalt Filler	
Material	limestone
Filler Percentage	60%
Wt./Sq.	27.00 lbs.
Exposed Surface Covering Material	
Material	textured & painted polymer film
wt./100 sq. ft.	3.50 lbs.
Wt./Sq.	3.50 lbs.
Headlap surface covering material	
Material	polymer film
wt./100 sq. ft.	1.50 lbs.
Wt./Sq.	2.10 lbs.
Back Surface covering material	
Material	polymer film
wt./100 sq. ft.	1.50 lbs.
Wt./Sq.	3.60 lbs.
Total lbs./Sq.	57.92 lbs.

All of the above examples have a lighter total weight than the prior art D3462 shingle (57.92 to 166.85 pounds per square compared to 195.24). This is a result of the lighter-weight materials used in their construction.

Furthermore, roofing material of the disclosed subject matter conform to the AC438 standard, which includes some of the physical requirements of the D3462 specification such as dimensions and pliability, but replaces several of the D3462's physical requirements with performance requirements. The performance requirements of the AC438 standard include, for example: wind resistance, which are a minimum of either ASTM D 7158 Class D or, alternatively, ASTM D 3161 Class A; fire rating of at least ASTM E 108 or UL790, Class C; weather resistance, after testing of which, according to ASTM G 155, the weathered specimens show no visual signs of surfacing material loss, cracks, erosion or exposed felt substrate; temperature cycling, after testing of which the specimens do not show signs of tearing or cracking of the filled asphalt coating that exposes the reinforcing felt of the shingle, or separation greater than ¼ inch (6.4 mm) at the joints between the specimens, and there are no signs of tearing of the shingle at the fastener locations or pull-through of the fasteners, and no portion of the asphalt-coated reinforcing felt breaks or separates from the specimens; wind-driven rain resistance, which is tested according to Florida Building Code Test Protocol TAS-100, after which any test specimen which exhibits water infiltration through the sheathing is considered as failing the wind-driven rain test, and any test specimen which has the prepared roof covering or any portion thereof "blow off," tear or blow upward without reseating during the test is considered as failing the wind driven rain test; and breaking strength after weathering, according to which the average breaking strength of weathered specimens is not less than 80 percent of the average breaking strength of unweathered specimens. A more detailed description of the AC438

requirements are found in the AC438 specification, which is hereby incorporated by reference in its entirety.

While the disclosed subject matter is described herein in terms of certain preferred and exemplary embodiments, those skilled in the art will recognize that various modifications and improvements can be made to the disclosed subject matter without departing from the scope thereof. Moreover, although individual features of one embodiment of the disclosed subject matter can be discussed herein or shown in the drawings of the one embodiment and not in other embodiments, it should be apparent that individual features of one embodiment can be combined with one or more features of another embodiment or features from a plurality of embodiments.

In addition to the various embodiments depicted and claimed, the disclosed subject matter is also directed to other embodiments having other possible combinations of the features disclosed and claimed herein. As such, the particular features presented herein can be combined with each other in other manners within the scope of the disclosed subject matter such that the disclosed subject matter includes any suitable combination of the features disclosed herein. Thus, the foregoing description of specific embodiments of the disclosed subject matter has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosed subject matter to those embodiments disclosed.

It will be apparent to those skilled in the art that various modifications and variations can be made in the system and method of the disclosed subject matter without departing from the spirit or scope of the disclosed subject matter. Thus, it is intended that the disclosed subject matter include modifications and variations that are within the scope of the appended claims and their equivalents.

The invention claimed is:

1. A roofing material, comprising:
a mat
at least one asphalt layer,
  wherein the asphalt layer is disposed on the mat,
  wherein the asphalt layer comprises an asphalt and an asphalt filler,
    wherein the wt./100 sq. ft. of the asphalt is approximately 10.50 lbs.;
an exposed surface covering material,
  wherein the exposed surface consists essentially of grade 18 mineral
  granules, disposed on the exposed surface,
  wherein the wt./100 sq. ft. of the exposed surface covering material is approximately 18.00 lbs.; and
a headlap surface covering material,
  wherein the headlap surface covering material consists essentially of grade 18 mineral granules, disposed on the headlap surface,
  wherein the wt./100 sq. ft. of the headlap surface covering material is approximately 18.00 lbs, and
a back surface covering material,
  wherein the back surface covering material consists essentially of sand.

2. The roofing material of claim **1**,
wherein the mat consists essentially of non-woven fiberglass,
wherein the mat comprises a top and a back surfaces,
  wherein the top surface comprises an exposed surface and a headlap surface,
  wherein the wt./100 sq. ft. of the mat is approximately 1.55 lbs.

3. The roofing material of claim **1**,
wherein the mat consists essentially of spunglass polypropylene,
wherein the mat comprises a top and a back surfaces,
  wherein the top surface comprises an exposed surface and a headlap surface,
  wherein the wt./100 sq. ft. of the mat is approximately 1.0 lbs.

4. The roofing material of claim **1**,
wherein the roofing material is an asphalt shingle.

5. The roofing material of claim **1**,
wherein the roofing material is roll roofing.

6. A roofing material, comprising:
a mat
  wherein the mat consists essentially of non-woven fiberglass,
  wherein the mat comprises a top and a back surfaces,
    wherein the top surface comprises an exposed surface and a headlap surface,
    wherein the wt./100 sq. ft. of the mat is approximately 1.55 lbs.;
at least one asphalt layer,
  wherein the asphalt layer is disposed on the mat,
  wherein the asphalt layer comprises an asphalt and an asphalt filler,
  wherein the wt./100 sq. ft. of the asphalt is approximately 10.50 lbs.;
an exposed surface covering material,
  wherein the exposed surface consists essentially of aluminum flakes, disposed on the exposed surface,
  wherein the wt./100 sq. ft. of the exposed surface covering material is approximately 3.00 lbs.; and
a headlap surface covering material,
  wherein the headlap surface covering material consists essentially of fine mineral surfacing, disposed on the headlap surface,
  wherein the wt./100 sq. ft. of the headlap surface covering material is approximately 12.00 lbs, and
a back surface covering material,
  wherein the back surface covering material consists essentially of fine coal slag.

7. A roofing material, comprising:
a mat
  wherein the mat consists essentially of non-woven fiberglass,
  wherein the mat comprises a top and a back surfaces,
    wherein the top surface comprises an exposed surface and a headlap surface,
    wherein the wt./100 sq. ft. of the mat is approximately 1.55 lbs.;
at least one asphalt layer,
  wherein the asphalt layer is disposed on the mat,
  wherein the asphalt layer comprises an asphalt and an asphalt filler,
  wherein the wt./100 sq. ft. of the asphalt is approximately **15.00** lbs.;
an exposed surface covering material,
a headlap surface covering material,
a back surface covering material,
  wherein the back surface covering material consists essentially of sand.

8. The roofing material of claim **7**,
wherein the exposed surface consists essentially of plastic granules, disposed on the exposed surface,
wherein the wt./100 sq. ft. of the exposed surface covering material is approximately 10.00 lbs.; and

wherein the headlap surface covering material consists essentially of plastic granules, disposed on the headlap surface, and

wherein the wt./100 sq. ft. of the headlap surface covering material is approximately 10.00 lbs.

9. The roofing material of claim **8**,

wherein the exposed surface consists essentially of plastic and mineral granule blend, disposed on the exposed surface,

wherein the wt./100 sq. ft. of the exposed surface covering material is approximately 20.00 lbs.; and

wherein the headlap surface covering material consists essentially of plastic and mineral granule blend, disposed on the headlap surface,

wherein the wt./100 sq. ft. of the headlap surface covering material is approximately 20.00 lbs.

10. The roofing material of claim **7**,

wherein the roofing material is an asphalt shingle.

11. The roofing material of claim **7**,

wherein the roofing material is roll roofing.

12. A roofing material, comprising:

a mat

wherein the mat consists essentially of non-woven fiberglass,

wherein the mat comprises a top and a back surfaces,

wherein the top surface comprises an exposed surface and a headlap surface,

wherein the wt./100 sq. ft. of the mat is approximately 1.05 lbs.;

at least one asphalt layer,

wherein the asphalt layer is disposed on the mat,

wherein the asphalt layer comprises an asphalt and an asphalt filler,

wherein the wt./100 sq. ft. of the asphalt is approximately 10.50 lbs.;

an exposed surface covering material,

wherein the exposed surface consists essentially of grade 18 mineral granules, disposed on the exposed surface,

wherein the wt./100 sq. ft. of the exposed surface covering material is approximately 18.00 lbs.; and

a headlap surface covering material,

wherein the headlap surface covering material consists essentially of expanded clay granules, disposed on the headlap surface,

wherein the wt./100 sq. ft. of the headlap surface covering material is approximately 12.00 lbs, and

a back surface covering material,

wherein the back surface covering material consists essentially of fine coal slag.

13. The roofing material of claim **12**,

wherein the roofing material is an asphalt shingle.

14. The roofing material of claim **12**,

wherein the roofing material is roll roofing.

* * * * *