United States Patent [19]

Gelsomino

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[45] **Mar. 11, 1975**

[54] **ASBESTOS-CEMENT PRODUCT AND PROCESS**

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[73] Assignee: **National Gypsum Company**, Buffalo, N.Y.

[22] Filed: **Feb. 12, 1973**

[21] Appl. No.: **331,827**

[52] **U.S. Cl.** ..... **117/72**, 117/123 D, 117/126 AB, 161/133, 161/135, 161/205, 206/451

[51] **Int. Cl.** **B32b 13/12**, B44d 1/14

[58] **Field of Search** ..... 117/123 D, 126 AB, 72; 206/451; 161/205; 156/289

[56] **References Cited**

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3,413,140	11/1968	Heausler et al.	117/123 D X
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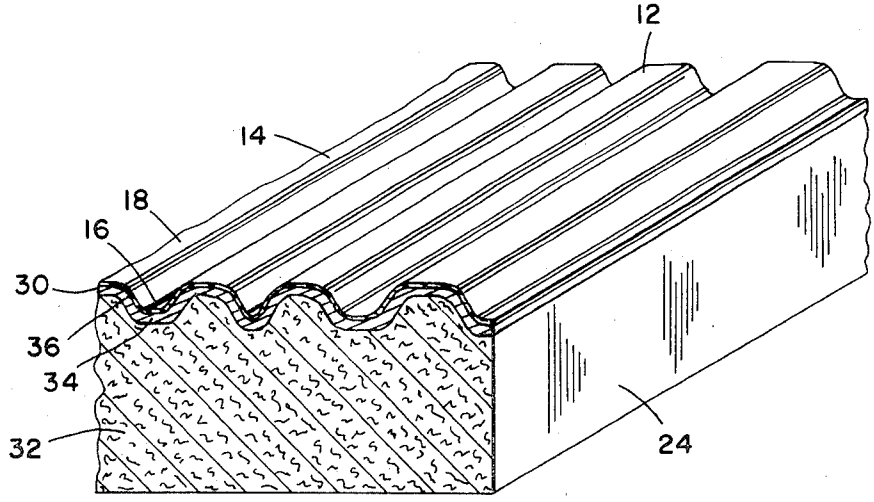
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Primary Examiner—Ralph Husack
Attorney, Agent, or Firm—Robert F. Hause

[57] **ABSTRACT**

Asbestos-cement shingles with improved front surfaces produced by coating an autoclaved sheet, using an aqueous pigmented acrylic polymer which is then dried but not cured, followed by an aqueous unpigmented acrylic polyethylene coating thereover, and then curing both coatings together.

10 Claims, 3 Drawing Figures



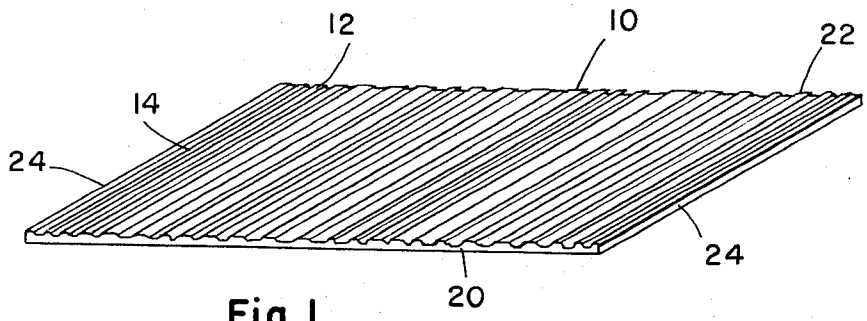


Fig. 1

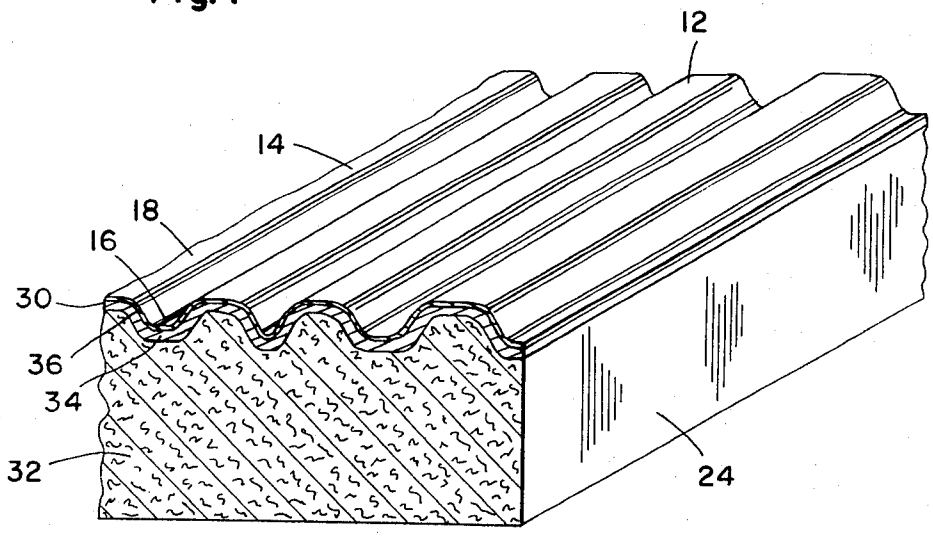


Fig. 2

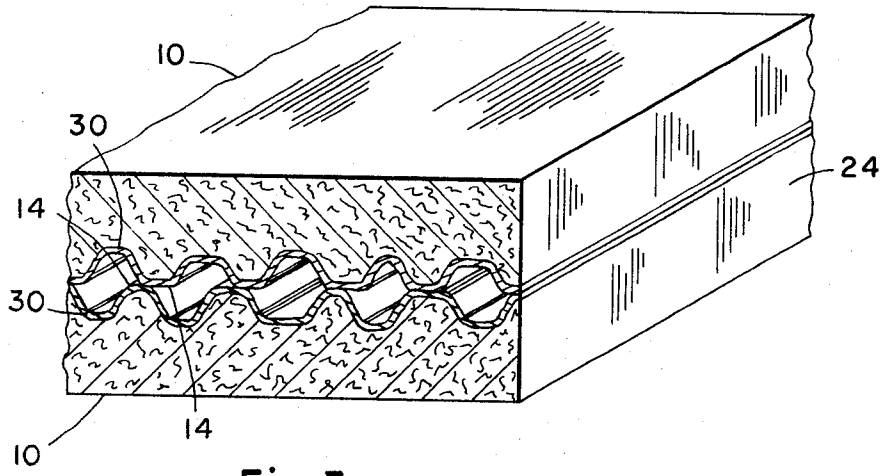


Fig. 3

ASBESTOS-CEMENT PRODUCT AND PROCESS

This invention relates to asbestos-cement sheets and is particularly directed to an improved coating thereon and to the method of forming the improved coating.

It has been known to produce autoclaved asbestos-cement shingles and to apply a protective and decorative coating of a plastic material to the autoclaved shingles, as will be seen in U.S. Pat. Nos. 3,407,086 and 3,413,140. However, there are certain problems encountered in the manufacture of coated asbestos-cement products and this invention provides a novel means of overcoming these problems. Specifically, these problems are sticking of the coated surfaces when the material is packaged without a slip sheet and surface damage that results from scuffing and abrasion of the coating both in processing and in the package. The latter problem is particularly troublesome with products that have a sharply textured surface.

It is an object of the present invention to provide asbestos-cement shingles having acrylic coatings on the front surface with clear acrylic-polyethylene coatings on the front surface of the acrylic coatings.

It is a further object of the invention to provide such coated shingles which have a low relative coefficient of friction when packaged face-to-face.

It is a still further object of the invention to provide asbestos-cement shingles which may be packaged face-to-face, or back-to-back, and handled as in shipping, without the respective face surfaces being damaged.

It is a further object to provide a process for manufacturing durable and weather-resistant asbestos-cement shingles having a coating which is particularly adapted for the condition of shingles being packaged face-to-face.

These and other objects and advantages will become apparent from the following description and drawings of an embodiment of the invention.

FIG. **1** is a perspective view of one complete asbestos-cement shingle, embodying the present invention.

FIG. **2** is an enlarged portion of the shingle of FIG. **1.**

FIG. **3** is a perspective view of portions of two shingles as in FIG. **2,** stored face-to-face.

Referring to FIGS. **1** and **2,** there is shown an asbestos-cement shingle **10,** formed with the well-known striations **12** extending in the direction of the short dimension on the front surface **14.** The shingle **10** may have dimensions of 12 inches by 24 inches and averaging about 3/16 inch in thickness. The striations **12** may include grooves **16** of about 1/32 inch depth, and the grooves **16,** and the lands **18** therebetween, may have varying widths of from about 1/32 to 3/32 inch. The striations **12** extend from the shingle bottom edge **20** to the shingle top edge **22** and are all parallel to the two side edges **24, 24.**

In accordance with the present invention the entire front surface **14** has a novel dual coating **30** firmly adhered to the asbestos-cement body **32** of the shingle **10.** Dual coating **30** consists of an inner coating **34** of acrylic and an outer coating **36** of an acrylic-polyethylene, coating **34** and coating **36** being the resultant products of a simultaneous curing operation whereby the two coatings are essentially unitary in form.

The amount of coating present is best described in terms of weight of solids per square foot of shingle.

Inner coating **34** is formed with about four grams of solid acrylic polymer per square foot of front surface **14** and outer coating **36** consists of about four/tenths gram of solid acrylic-polyethylene per square foot.

In the manufacture of shingles **10,** sheets of asbestos-cement are formed, by the Hatschek process, using a conventional cylinder-type forming machine, pressing in the striations, and precuring the wet, formed flat sheet by storing at room temperature. The 1 by 2 foot shingles are then punched out of the larger precured sheets.

These precured shingles are then autoclaved at a high temperature and pressure with steam, for example about 335° to 355°F at 100 to 125 psi for a period of about 8 to 20 hours. After partial cooling, the autoclaved shingles are arranged for applying a coating of a pigmented acrylic latex emulsion, to form the plastic inner coating **34.** The shingles can be sprayed or flooded with the acrylic latex emulsion. This coating is applied in a manner to form the inner coating **34** with an amount of solids of pigmented polymer about 2 to 10 grams per square foot, preferably about 4 grams per square foot.

This inner coating **34** is then dried, but only dry enough to begin to feel dry to the touch. Preferably the inner coating is applied before the shingles are fully cooled from the autoclave, and the warmth of the shingles plus some additional low heat applied will accelerate the drying of the inner coating.

After the inner coating **34** is at least nearly dry to the touch, and definitely before it has cured, a coating of an unpigmented acrylic-polyethylene latex emulsion is applied over the inner coating **34,** forming outer coating **36.** The acrylic-polyethylene latex emulsion is preferably applied as a sprayed thin mist, in a manner to provide an amount of solids of about 1/10 to about 1 gram per square foot, preferably about four-tenths of a gram per square foot.

The condition of the inner coating **34** is important, at this time, in that the acrylic-polyethylene latex emulsion must be able to essentially unify itself with the coating **34** along the interface therebetween, without the two materials becoming thoroughly combined and admixed. For the acrylic-polyethylene latex emulsion to form a suitable outer coating **36** and thus to function efficiently as intended, it is essential that it remain on the outer surface. If it is permitted to mix substantially into the inner coating **34,** it will cause diluting of the pigment concentration of the acrylic inner coating, resulting in color variation.

Following the application of the acrylic-polyethylene latex emulsion, this coating is dried, and the two coatings **34** and **36** are then cured thus forming a pigmented plastic inner coating **34** and a clear plastic outer coating **36.** The curing of both coatings is carried out simultaneously and may be accomplished by hot air as in a hot air oven. The coated shingles are passed through a hot air oven in about 2 minutes, wherein the air at the inlet of the oven is at about 275°F and at the exit end is at about 600°F. The curing of the coatings can be accomplished at lower temperatures over a longer period of time or vice versa, as is well understood. After curing the shingles are cooled down to about 100°F and then packaged, some being arranged face-to-face, as shown in FIG. **3.**

The acrylic latex emulsion for forming coating **34** can be any of several commercially available products such

as Rohm and Haas emulsions B89A or AC73 or combinations of such emulsions. The B–89A acrylic emulsion is a white, milky liquid having 35 to 36 percent polymer solids content. Its pH, as shipped, is 7.9 to 9.4, and it is nonionic. It has a minimum film-forming temperature of 13°C and a Tukon hardness (KHN) of 15. It has the following good properties: high solids, mechanical stability at alkaline pH, calcium ion stability, water resistance, pigment stability, resistance to mottling and efflorescence over masonry and pigment binding and film-forming properties. The AC–73 acrylic emulsion is a white milky liquid having 46 to 47 percent solids. Its pH, as shipped, is 9 to 10, and it has a weight of 8.9 to 9.0 pounds per gallon. It has a minimum film-formation temperature of 37°C and a Tukon hardness (KHN) of 4.5. It has the following good properties: mechanical stability, calcium ion stability, freeze-thaw stability and heat stability, produces clear, colorless, grease-resistant hard films which exhibit excellent resistance to ultraviolet light, excellent blister-resistance, wet adhesion and resistance to abrasion under wet conditions.

The acrylic-polyethylene emulsion is a mixture of an acrylic latex emulsion preferably identical to the emulsion used in forming coating **34** and a polyethylene emulsion such as Poly Em 12, which is an aqueous emulsion of 46.7 percent polyethylene solids and 8.82 percent emulsifier, and is manufactured by Cosden Oil and Chemical Co. The acrylic-polyethylene emulsion is preferably applied as a 20 percent solids mixture including 15 percent acrylic solids, 5 percent polyethylene solids and the balance being water and a minor amount of commonly known emulsifiers and stabilizers.

Accordingly, it will be understood that outer coating **36** is substantially 25 percent polyethylene and 75 percent acrylic. These proportions can be varied from about 5 percent to 50 percent polyethylene and about 95 percent to 50 percent acrylic. Other modifications that can be made include the substitution of other latex emulsions than acrylic for the inner coating **34** or for the mixture with polyethylene or both, such as polyvinyl acetate, polyvinyl chloride, copolymers thereof or copolymers with acrylic. The latex used with the polyethylene should provide a latex-formed polymer substantially harder than the polyethylene, having the characteristics which balance the softness, the poor adhesion, and the poor resistance to ultra violet degradation that would result from the use of polyethylene alone in coating **36.** In other words, the latex used with the polyethylene is one which will form a polymer of relative hardness substantially greater than the hardness of the polyethylene. The preferred acrylic in coating **34** has a hardness of **21** oscillations when measured by a Sward Hardness Rocker Model C, made by Gardner Laboratory Inc., Bethesda, Md. A coating made of Poly Em 12 polyethylene emulsion has a hardness of 6 oscillations. The preferred outer coating **36,** with an acrylic : polyethylene ratio of 3:1 has a hardness of 12 oscillations.

A novel surface characteristic is provided, as compared to prior acrylic coatings, by the presence of outer coating **36.** Coating **36** gives a very noticeable slip characteristic to the finished surface, which results in excellent resistance to shingles sticking together, commonly referred to as blocking, or abrading each other when packaged face-to-face, or back-to-back, in a typical package of shingles in which shingles are held firmly together.

A still further advantage provided by the addition of outer coating **36** is a marked improvement in water repellency and the consequent increased durability and fade resistance of the total coating. The use of the novel outer coating **36** also makes possible the use of a thicker inner coating **34,** which otherwise would have increased problems of tackiness and scuffing, relative to the increase in thickness.

While the invention has been described as a coating for asbestos-cement substrates, it should be understood that it is also applicable to other board products such as lime-silica substrates or asbestos-wood fiber-cement substrates, and the like.

Having completed a detailed disclosure of the preferred embodiments of my invention so that those skilled in the art may practice the same, I contemplate that variations may be made without departing from the essence of the invention or the scope of the appended claims.

I claim:

1. The process for manufacturing durable, weather-resistant, non-blocking, non-tacky asbestos-cement products which comprises coating the surface of an autoclave steam-cured asbestos-cement sheet with a water-dispersed pigmented acrylic polymer, drying said coating to a degree such that said coating is substantially dry to the touch but not cured, applying thereover an aqueous coating of an unpigmented mixture of acrylic polymer and polyethylene, said polyethylene comprising at least about 5 percent of the total weight of solids of said mixture, and simultaneously curing said acrylic and said acrylic-polyethylene mixture to form a tough coating with a surface which is relatively slippery, non-tacky and non-blocking.

2. The process of claim **1** wherein said unpigmented acrylic-polyethylene coating is applied at a rate of about 0.2 to 1 gram of solids per square foot.

3. The process of claim **1** wherein said unpigmented acrylic-polyethylene aqueous coating is prepared by mixing a polyethylene emulsion and an acrylic emulsion in a ratio to form a mixture wherein the solids consist essentially from about 5 to 50 percent polyethylene and from about 95 to 50 percent acrylic.

4. An asbestos-cement shingle having firmly adhered to the asbestos-cement on one face thereof a cured substantially unitary dual coating consisting essentially of an inner coating of a pigmented polymer of the class consisting of acrylic and vinyl polymers and an outer coating of an unpigmented mixture of about 5 to 50 percent polyethylene and 95 to 50 percent of a polymer substantially harder than said polyethylene and of the class consisting of acrylic and vinyl polymers.

5. An asbestos-cement single as defined in claim **4** wherein said pigmented polymer is a pigmented acrylic.

6. An asbestos-cement shingle as defined in claim **5** wherein said harder polymer is an unpigmented acrylic of a composition substantially the same as the acrylic of said pigmented acrylic.

7. An asbestos-cement shingle as defined in claim **5** wherein said inner coating and said outer coating have been simultaneously cured to form said unitary dual coating.

8. An asbestos-cement shingle as defined in claim **4** wherein said harder polymer is an acrylic.

9. An improved board package comprising at least two boards of the class consisting of asbestos-cement, lime-silica and asbestos-wood fiber-cement held firmly together in face-to-face, non-blocking relationship, said boards each having a dual coating firmly adhered onto a substrate of each said board substantially throughout the face surface of each said substrate, said dual coating of each said board comprising a pigmented plastic inner coating and a clear plastic outer coating, said outer coating of each said board consisting essentially of a mixture of from about 5 to 50 percent polyethylene and about 95 to 50 percent of a latex-formed polymer of relative hardness substantially greater than the hardness of said polyethylene.

10. The improved board package of claim 9 wherein said two boards each consist of a body of asbestos-cement with said dual coating firmly adhered on the front face of said asbestos-cement body.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,870,546

DATED : March 11, 1975

INVENTOR(S) : Fred J. Gelsomino

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, last line, "back-to-back" should be ---back-to-face---

Signed and sealed this 10th day of June 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks