United States Patent

Alert et al.

[15] **3,637,408**

[45] **Jan. 25, 1972**

[54] DECORATIVE LAMINATES CARRYING REMOVABLE PROTECTIVE COATING

[72] Inventors: **Jerry George Alert**, Mount Carmel; **Robert Daniel Mauldin**, Cincinnati, both of Ohio

[73] Assignee: **Formica Corporation**, Cincinnati, Ohio

[22] Filed: **May 26, 1969**

[21] Appl. No.: **827,969**

[52] **U.S. Cl.** **117/6**, 117/167

[51] **Int. Cl.** **B44d 5/00**, C11d 9/46

[58] **Field of Search** ..... 117/6, 167, 139.5 F; 161/413, 161/223; 106/243; 252/91

[56] **References Cited**

UNITED STATES PATENTS

2,053,270	9/1936	Dreyfus et al.	117/139.5 X
2,079,108	5/1937	Dreyfus et al.	117/139.5 X
2,127,586	8/1938	Dreyfus et al.	117/139.5 X
2,226,075	12/1940	Rowe	252/122
2,288,714	7/1942	Jones	117/139.5 UX
3,075,228	1/1963	Elias	252/91 X
3,288,666	11/1966	Dacey	161/413

Primary Examiner—William D. Martin
Assistant Examiner—Theodore G. Davis
Attorney—James T. Dunn

[57] **ABSTRACT**

A decorative laminate carrying on its decorative surface a removable film of a mixture of a preponderant amount of a fatty acid soap a minor amount of a nonionic detergent and a coupling agent.

3 Claims, No Drawings

DECORATIVE LAMINATES CARRYING REMOVABLE PROTECTIVE COATING

BACKGROUND OF THE INVENTION

Decorative laminates have been manufactured throughout the world for a substantial plurality of years. These decorative laminates are prepared by heat and pressure consolidating a plurality of resin impregnated fibrous laminae into a unitary structure. Generally, there are a plurality of core sheets numbering between about three and nine; depending on the desired thickness of the laminate and these core sheets are generally composed of kraft paper which has been impregnated with a thermosetting phenolic resin. These core sheets, in addition to providing thickness for the laminate, also provide a measure of rigidity. On the surface of the core sheet there is generally positioned a decorative sheet which may be a solid color sheet of α-cellulose paper or it may be an α-cellulose sheet on which there has been printed some decorative design such as a floral pattern, a wood print or a geometrical design or the like. The decorative sheet is generally impregnated with one of the noble resins such as the melamine-formaldehyde resins, the urea-formaldehyde resins, the epoxy resins, the polyester resins, and the like. If desired and particularly when the decorative sheet is a printed design, one may superimpose over the decorative sheet an overlay sheet which is generally a fine quality α-cellulose paper sheet impregnated with a noble thermosetting resin preferably of the same class as that used to impregnate the decorative sheet; and after the heat and pressure consolidation step is completed, the overlay sheet becomes transparentized so that the decorative sheet can readily be seen through the overlay sheet. Other protective overlay sheets have also been used, such as thermoplastic nonporous films. The term "noble" resins is an expression conventionally used in the trade to indicate that the resin does not undergo any significant darkening during the heat and pressure consolidation steps as contrasted with the base resins such as the phenolics which have a tendency to turn dark brown and sometimes black during the pressure consolidation steps. When these decorative laminates are removed from the press and during subsequent fabrication, such as trimming of the edges, sanding of the back and surface finishing operations, it has been conventional to arrange them in stacks and it has further been conventional to superimpose one laminate on the other in a face-to-face relationship followed by a back-to-back rela,ionship with an interleaving sheet of tissue paper at least between the face-to-face relationship in order to avoid the detrimental effect of scuffing. This stacking operation is time consuming and expensive and requires generally at least two and sometimes as many as four workmen in order to stack the laminates and position the tissue between the contacting faces of the laminates in the stack.

FIELD OF THE INVENTION

This invention is in the field of providing a protective removable coating on the surface of decorative laminates so as to facilitate their handling, especially in a stacked relationship so as to eliminate the danger of scuffing of the decorative surface.

DESCRIPTION OF THE PRIOR ART

The instant applicants are not aware of any pertinent prior art that relates to their invention.

SUMMARY OF THE INVENTION

A decorative laminate carrying on its decorative surface a removable film of a mixture of a preponderant amount of a fatty acid soap and a minor amount of a nonionic detergent and a coupling agent. The coating composition used in surfacing the decorative laminate of the present invention is an aqueous dispersion of a mixture of a preponderant amount of a soap and a minor amount of a nonionic detergent. The fatty acids used in the manufacture of soap are exceedingly well known in the art and have been used for years in such production. For instance, it is conventional to prepare soap from fatty acids having from 16 to 18 carbon atoms such as palmitic, stearic; and some of the unsaturated acids such as palmitoleic, oleic, linoleic and linolenic. The soaps are prepared by saponifying the acid by use of a selected base which is either sodium hydroxide or potassium hydroxide. The amount of the soap in the total composition of soap, detergent and a coupling agent considered on a solids base, may be varied between about 50 and 92 percent by weight based on the total weight of the solids composition. Preferably, one would use between about 60 and 88 percent by weight of the soap based on the total weight of the soap, the detergent and coupling agent. Correspondingly, the detergent would be present in an amount varying between about 4 and 48 percent; and preferably, between about 10 and 38 percent by weight based on the total weight of the detergent, coupling agent and the soap solids.

The third essential component in the mixture is a relatively small amount of a polyhydric alcohol such as ethylene glycol or diethylene glycol which functions as a coupling agent to maintain a homogeneous solution and as a leveling agent to prevent fisheyes or other surface discontinuities in the ultimate coating. Correspondingly, the coupling agent would be present in an amount varying between about 1 to 4 percent and preferably between about 2 to 3 percent based on the total weight of the soap, detergent and coupling agent. The total amount of the three components are additively 100 percent. As used, the aqueous solution of this coating composition will contain between about 2 and 10 percent by weight of the solids, the remainder being water. The solids content of the solution is varied so as to provide varying thicknesses of the ultimate film deposited on the decorative surface of the laminate. One can, for instance, deposit a film varying between about 0.20 and 1 mil in thickness; and preferably, between 0.20 and 0.50.

A wide variety of nonionic detergents suitable for use in the present invention are available under the trade name "Tergitol" of which the following members are representative:

"Tergitol non-ionic"

NPX NP NP–27 NP–35 NP–40	alkylphenyl ethers of polyethylene glycol

Other commercial materials of a similar nature available under the trademark "Triton" may be used.

The method of applying the film to the decorative laminate surface lends itself to a continuous production. The preferred method is, while the laminate is still hot and the surface is dry following a dulling or postfinishing operation, to spray the aqueous solution of the film forming material upon the surface; whereupon the water and other volatiles are flashed off leaving a uniformly deposited protective film. The laminates may be stacked in a face-to-back relationship without the surface being scuffed. This film following the subsequent handling, shipping, storage and ultimate fabrication can readily be removed from the surface by washing with water. Another method of applying the aqueous solution of the film forming material, as the laminates are removed from the hot press and while still in a hot condition, is to spray immediately with the aqueous solution whereupon the water and other volatiles are flashed off leaving a uniformly deposited protective film. Although spraying is a preferred method of applying the aqueous solution of the film forming material to the surface, other methods of application may be used such as roll kiss coating, air knife and the like. The lubricant coating level must be a balance between the film thickness needed for scuff resistance and potentially transferable amount which would adversely effect gluability and skid-load stability from a friction standpoint. Scuffability is evaluated by a number of techniques including visual marks, segmented rotating test

wheel abrasion evaluation, laminate to laminate rubbing effects and other frictional tests. The following describes the equipment and test method used in evaluating scuffability and consist of a horizontal rotating 36-inch diameter turntable carrying on its uppermost surface coated and uncoated laminates. A horizontal, 36-inch diameter wheel rotating in the opposite direction, slightly above the turntable, drags abrading blocks across the surface of the samples under test. The axes of the turntable and wheel are approximately 20 inches apart. The wheel has a metal rim with four spokes. The turntable and wheel are mechanically engaged, driven by an electric motor so that one rotates at 12 revolutions per minute in one direction while the wheel rotates in the opposite direction at a slightly faster speed. Three rectangular wooden blocks each weighing one pound and carrying on the bottommost side a plurality of laminate strips mounted edgewise. The blocks are placed on the surfaces to be tested and within the area bounded by the wheel. The motor is turned on activating the table and wheel. The turning wheel drags the blocks across the surface of the test samples, they continue in a circular path across a stationary table which abuts the turntable and are once again returned by the wheel and dragged across the surface of the samples under test. The turntable and wheel are stopped, the surface of the laminates are examined for any discernible scuffing or marring after **1**, **2**, **5**, **10**, **15** or even more revolutions. In addition to conducting these scuffability tests, other tests are conducted on these coated laminates such as load stability, bondability, printability, coating removability, and the like. Ease of removability, even after prolonged storage of the sheets, is a product requirement. Product cost is also a major limitation in order to effect the entire packaging cost saving. Printability without smearing of the suede surfaces, for instance, is also a projected advantage of the present invention.

In order that the concept of the present invention may be more completely understood, the following examples are set forth.

EXAMPLE 1

A conventional decorative laminate, immediately after passing through a surface dulling machine and while the surface is still in a hot condition, is sprayed with a 3.2 percent aqueous solution of the coating. Upon striking the hot decorative laminate, the water is flashed off leaving deposited on the face of the laminate a 0.25 mil film of the mixture of 83 percent of a tall oil fatty acid soap, 14 percent of a "Tergitol" NP–35 nonionic detergent and 3 percent of diethylene glycol.

Samples of the coated laminate are compared to uncoated laminates using the scuffing test previously described hereinabove. After 1 revolution of the turntable, the uncoated laminate showed discernible scratches or scuff marks. At the same time, portions of the coated surface are removed with water and the surface examined. No scuffing is visible after one revolution. The test is continued and the surface of the coated laminate examined after 5, 10 and 15 revolutions. At 15 revolutions, the first slight scuffing is observed. A 1,500 percent improvement in scuffability is obtained by the use of the protective coating. Printing of a logotype identification on the coated decorative face was easily removed with water. Whereas, when an uncoated laminate surface which is dulled or semidulled is printed upon, the trademark removal is difficult to remove because the ink tends to penetrate the laminate surface.

EXAMPLE 2

Example 1 is repeated in all essential details except that a film thickness of 0.50 mil is deposited on the surface of the laminate. Scuffability, printability and load stability are evaluated and are comparable to Example 1.

EXAMPLE 3

Example 1 is repeated in all essential details except that the concentration of the aqueous solution is 5 percent solids; whereupon the water in the coating composition upon striking the hot decorative surface is flashed off leaving a uniformly thick film of about 0.25 mil of the mixture of 64 percent tall oil fatty acid soap, 33 percent of "Tergitol" NP–35 nonionic detergent and 3 percent of ethylene glycol. Laminates are evaluated for scuffability, printability and bonding and are comparable to the results obtained in Example 1.

EXAMPLE 4

Example 1 is repeated except that the laminates as removed from the press and while in a hot condition are sprayed with the aqueous solution of the film forming material. Test results on the coated laminate are equivalent to those produced under Example 1.

EXAMPLE 5

Example 1 is repeated in all details except that the temperature of the laminate prior to spraying with the aqueous solution is at room temperature, 25° C. The sprayed laminate should be passed through a heating operation to eliminate volatile content of the protective coating film, allowing for additional processing in the dried state.

We claim:

1. A decorative laminate having on its decorative surface a removable film of a mixture of from about 50 to 92 percent of a fatty acid soap, from about 4 to 48 percent of a nonionic detergent and from about 1 to 4 percent of a polyhydric alcohol coupling agent wherein all percentages are by weight and total 100 percent wherein said film is between 0.2 and 1 mil in thickness.

2. A decorative laminate according to claim **1** in which the fatty acids in said soap are derived from tall oil.

3. A decorative laminate according to claim **1** in which said film is about 0.2 to about 0.5 mil thick.

* * * * *