



US006872278B2

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

(10) **Patent No.: US 6,872,278 B2**
(45) **Date of Patent: Mar. 29, 2005**

(54) **ONE PART WOODWORKING ADHESIVE COMPOSITION**

(75) Inventors: **Nicholas C. Lehman**, Maple Grove, MN (US); **Scott W. Rhein**, Forest Lake, MN (US); **John T. Anderson**, Mahtomedi, MN (US)

(73) Assignee: **H.B. Fuller Licensing & Financing, Inc.**, St. Paul, MN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 17 days.

(21) Appl. No.: **10/259,114**

(22) Filed: **Sep. 26, 2002**

(65) **Prior Publication Data**

US 2004/0003893 A1 Jan. 8, 2004

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/191,768, filed on Jul. 8, 2002, now abandoned.

(51) **Int. Cl.**⁷ **C09J 131/02**; C09J 131/04; B32B 27/28; C08G 63/00

(52) **U.S. Cl.** **156/327**; 156/332; 156/330.9; 428/500; 428/507; 428/511; 428/514; 428/515; 523/201; 525/64; 525/66; 525/70; 525/78; 525/80; 525/242; 525/243; 525/244; 525/300; 525/302; 525/902

(58) **Field of Search** 525/64, 66, 70, 525/78, 80, 242, 243, 244, 300, 302, 902; 428/500, 507, 511, 514, 515; 523/201; 156/327, 332, 330.9

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 3,562,235 A 2/1971 Ryan
- 3,787,522 A 1/1974 Dickie
- 4,107,120 A 8/1978 Plamondon et al.
- 4,351,875 A 9/1982 Arkens
- 4,942,086 A 7/1990 Mudge et al.
- 4,948,822 A 8/1990 Iovine et al.
- 5,190,997 A 3/1993 Lindemann et al.
- 5,225,278 A 7/1993 Kielbania, Jr. et al.
- 5,360,826 A 11/1994 Egolf et al.

- 5,439,960 A 8/1995 Mudge et al.
- 5,461,125 A 10/1995 Lu et al.
- 5,545,684 A 8/1996 Jakob et al.
- 5,777,015 A 7/1998 Jakob et al.
- 5,889,107 A 3/1999 Jakob et al.
- 5,907,011 A 5/1999 Jakob et al.
- 5,932,647 A * 8/1999 Schilling et al. 524/503
- 6,093,766 A 7/2000 Jakob et al.
- 6,262,169 B1 7/2001 Helmer et al.
- 6,284,321 B1 9/2001 Brindoepe et al.
- 6,294,249 B1 9/2001 Hamer et al.
- 6,337,131 B1 1/2002 Rupaner et al.
- 6,489,391 B1 * 12/2002 Schilling et al. 524/503
- 6,552,115 B1 * 4/2003 Zecha et al. 524/457
- 2001/0034308 A1 10/2001 Krull et al.
- 2001/0034400 A1 10/2001 Mestach
- 2001/0034410 A1 10/2001 Krull et al.

FOREIGN PATENT DOCUMENTS

EP 1 170 311 1/2002

OTHER PUBLICATIONS

Machine Translation of JP 10-121017, Kimata et al. May 1998, obtained from JPO website.*

DIN EN-204, "Classification of Non-Structural Adhesives for Joining Wood and Wood-Based Panel Products," (Oct. 1991) (4 pages).

European Standard EN 205 (1991) (7 pages).

WATT 91 (Wood Adhesives Temperature Test) Test Method for Wood Adhesives for Non-Structural Applications, Determination of the Hot Tensile Strength of Lap Joints Test Method (5 pages).

* cited by examiner

Primary Examiner—Jeffrey B. Robertson

(57) **ABSTRACT**

An adhesive composition that includes a) an emulsion that includes a multi-stage polymer that includes a first stage polymer having a Tg from -20° C. to 90° C. and including from about 0.5% by weight to about 3% by weight latent crosslinking monomer based on the first stage monomer weight, and a second stage polymer having a Tg from 40° C. to 140° C., the second stage polymer being different from the first stage polymer, b) formaldehyde-based crosslinking agent, and c) catalyst, the composition being capable of passing the DIN EN 204 Test Method.

44 Claims, No Drawings