US00RE45802E

(19) **United States**

(12) **Reissued Patent**

Abrams

(10) **Patent Number: US RE45,802 E**

(45) **Date of Reissued Patent: Nov. 17, 2015**

(54) **FLOCKED ARTICLES HAVING NONCOMPATIBLE INSERT AND POROUS FILM**

(71) Applicant: **High Voltage Graphics, Inc.**, Fort Collins, CO (US)

(72) Inventor: **Louis Brown Abrams**, Fort Collins, CO (US)

(73) Assignee: **High Voltage Graphics, Inc.**, Fort Collins, CO (US)

(21) Appl. No.: **13/624,745**

(22) Filed: **Sep. 21, 2012**

Related U.S. Patent Documents

Reissue of:

(64) Patent No.: **7,799,164**
Issued: **Sep. 21, 2010**
Appl. No.: **11/460,519**
Filed: **Jul. 27, 2006**

U.S. Applications:

(60) Provisional application No. 60/703,925, filed on Jul. 28, 2005, provisional application No. 60/704,681, filed on Aug. 1, 2005, provisional application No.

(Continued)

(51) **Int. Cl.**

B32B 37/12 (2006.01)
B32B 38/04 (2006.01)

(Continued)

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

CPC ... ***B32B 3/08*** (2013.01); ***B05D 1/14*** (2013.01); ***B05D 1/16*** (2013.01); ***B32B 7/12*** (2013.01); ***B32B 27/08*** (2013.01); ***B44C 1/1704*** (2013.01); ***B44C 1/1716*** (2013.01); ***D06Q 1/10*** (2013.01); ***D06Q 1/14*** (2013.01); *B32B 2255/205* (2013.01); *B32B 2451/00* (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC B32B 3/08; B32B 7/12; B32B 27/08; B32B 2255/205; B32B 2451/00; B05D 1/14; B05D 1/16; B44C 1/1704; B44C 1/1716; D06Q 1/10; D06Q 1/14; Y10S 428/914; Y10T 156/1056; Y10T 1/1062; Y10T 428/1486; Y10T 428/22; Y10T 428/23943; Y10T 428/24331

USPC 156/62.2, 239, 240, 252, 256, 263; 428/90, 67, 78, 138, 457, 458, 461

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,580,717 A 4/1926 Flick
1,905,989 A 4/1933 Safir et al.

(Continued)

FOREIGN PATENT DOCUMENTS

AU 606651 2/1991
AU 653994 10/1994

(Continued)

OTHER PUBLICATIONS

U.S. Appl. No. 29/058,551, filed Aug. 19, 1996, Abrams.

(Continued)

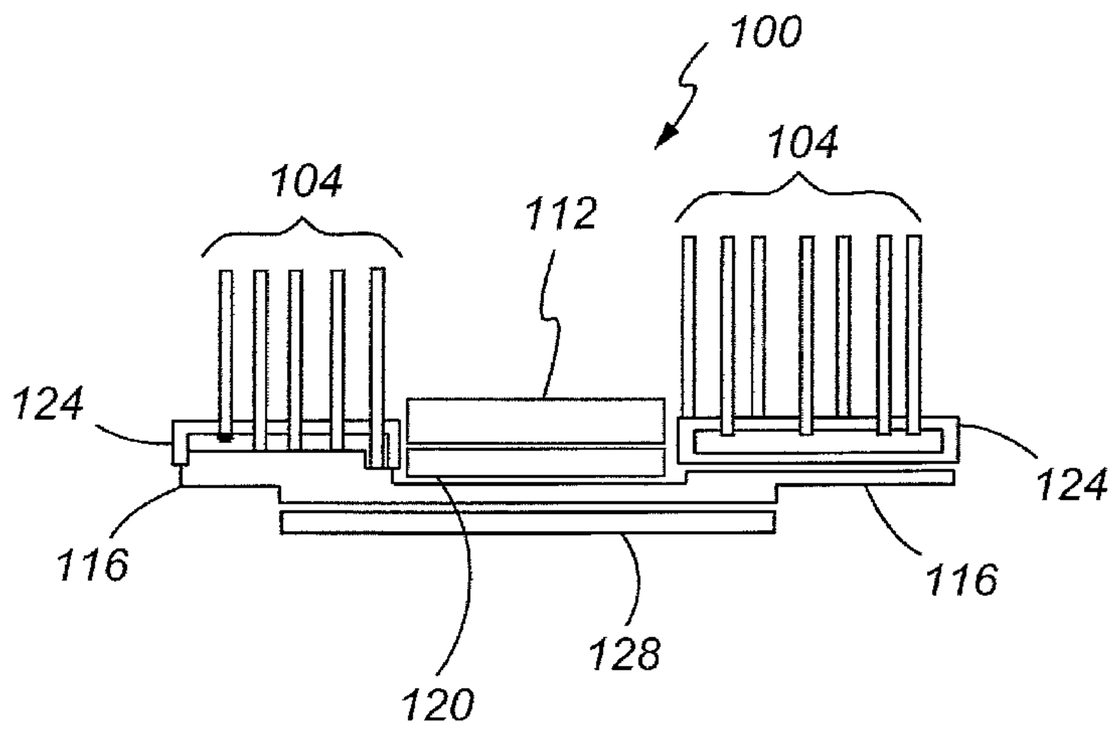
Primary Examiner — Michael Tolin

(74) *Attorney, Agent, or Firm* — Sheridan Ross P.C.

(57) **ABSTRACT**

The present invention is directed to flocked articles comprising a metallized film and methods of manufacturing such articles.

20 Claims, 8 Drawing Sheets



Related U.S. Application Data

60/707,577, filed on Aug. 11, 2005, provisional application No. 60/710,368, filed on Aug. 22, 2005, provisional application No. 60/716,869, filed on Sep. 13, 2005, provisional application No. 60/719,469, filed on Sep. 21, 2005, provisional application No. 60/779,317, filed on Mar. 3, 2006, provisional application No. 60/786,528, filed on Mar. 27, 2006.

(51) **Int. Cl.**

B44C 1/26	(2006.01)
B05D 1/16	(2006.01)
B32B 3/08	(2006.01)
B32B 7/12	(2006.01)
B32B 27/08	(2006.01)
B05D 1/14	(2006.01)
B44C 1/17	(2006.01)
D06Q 1/10	(2006.01)
D06Q 1/14	(2006.01)

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

CPC *Y10S428/914* (2013.01); *Y10T 156/1056* (2015.01); *Y10T 156/1062* (2015.01); *Y10T 428/1486* (2015.01); *Y10T 428/22* (2015.01); *Y10T 428/23943* (2015.04); *Y10T 428/24331* (2015.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,975,542	A		10/1934	Forsdale
1,992,676	A		2/1935	Schwarz
2,011,058	A		8/1935	Krase et al.
2,047,978	A		7/1936	Maclaurin
2,096,750	A		10/1937	Lawrence
2,230,654	A		2/1941	Plunkett
2,275,617	A		3/1942	Duerr et al.
2,278,227	A		3/1942	Thackeray et al.
2,477,912	A		8/1949	Vallandigham
2,592,602	A		4/1952	Saks
2,636,837	A		4/1953	Summers
2,835,576	A		5/1958	Ensink
2,916,403	A		12/1959	Calderwood
2,981,588	A		4/1961	Hyman
2,999,763	A		9/1961	Sommer
3,099,514	A		7/1963	Haber
3,152,950	A	*	10/1964	Palmquist et al. 428/335
3,215,584	A		11/1965	McConnell et al.
3,314,845	A		4/1967	Perri
3,351,479	A		11/1967	Fairchild
3,377,232	A		4/1968	Mencock et al.
3,411,156	A		11/1968	Feher
3,432,446	A		3/1969	Coppeta
3,444,732	A		5/1969	Robbins et al.
3,459,579	A		8/1969	Newman
3,496,054	A		2/1970	Baigas
3,529,986	A		9/1970	Kappas et al.
3,550,945	A		12/1970	Resnick
3,565,742	A		2/1971	Stephens et al.
3,591,401	A		7/1971	Snyder et al.
3,622,434	A		11/1971	Newman
3,630,990	A		12/1971	Neal
3,639,149	A		2/1972	Spalding
3,644,267	A		2/1972	Jackson, Jr. et al.
3,657,060	A		4/1972	Haigh
3,660,200	A		5/1972	Anderson et al.
3,674,611	A		7/1972	Petry et al.
3,734,813	A		5/1973	Pohl
3,772,132	A		11/1973	Dulin, Jr.
3,775,205	A		11/1973	Hermann et al.
3,793,050	A		2/1974	Mumpower, Jr.
3,803,453	A		4/1974	Hull
3,816,211	A		6/1974	Haigh
3,837,893	A		9/1974	Schoots
3,837,946	A		9/1974	Gribbin
3,887,737	A		6/1975	Baxter et al.
3,900,676	A		8/1975	Alderson
3,903,331	A		9/1975	Klein
3,905,863	A		9/1975	Ayers
3,917,883	A		11/1975	Jepson
3,918,895	A		11/1975	Mizuno
3,928,706	A		12/1975	Gibbons
3,936,554	A		2/1976	Squier
3,953,566	A		4/1976	Gore
3,956,552	A		5/1976	Geary
3,961,116	A		6/1976	Klein
3,969,559	A		7/1976	Boe
3,979,538	A		9/1976	Gilman et al.
3,989,869	A		11/1976	Neumaier et al.
4,018,956	A		4/1977	Casey
4,025,678	A		5/1977	Frank
4,031,281	A		6/1977	Keeling
4,034,134	A		7/1977	Gregorian et al.
4,035,532	A		7/1977	Gregorian et al.
4,062,992	A		12/1977	Power et al.
4,088,708	A		5/1978	Riew
4,098,946	A		7/1978	Fuzek
4,102,562	A		7/1978	Harper et al.
4,104,439	A		8/1978	Fuzek
4,110,301	A		8/1978	Zannucci et al.
4,120,713	A		10/1978	Jensen et al.
4,126,500	A		11/1978	Palanos
4,138,945	A		2/1979	Rejto
4,142,929	A		3/1979	Otomine et al.
4,160,851	A		7/1979	Lienert et al.
4,201,810	A		5/1980	Higashiguchi
4,216,281	A		8/1980	O'Rell et al.
4,218,501	A		8/1980	Kameya et al.
4,228,225	A		10/1980	O'Rell et al.
4,238,190	A		12/1980	Rejto
4,251,427	A		2/1981	Recker et al.
4,263,373	A		4/1981	McCaskey et al.
4,264,691	A		4/1981	O'Rell et al.
4,265,985	A		5/1981	O'Rell et al.
4,269,885	A		5/1981	Mahn
4,273,817	A		6/1981	Matsuo et al.
4,282,278	A		8/1981	Higashiguchi
4,288,225	A		9/1981	Roland et al.
4,292,100	A		9/1981	Higashiguchi
4,294,577	A		10/1981	Bernard
4,294,641	A		10/1981	Reed et al.
4,299,015	A		11/1981	Marcus et al.
4,308,296	A		12/1981	Chitouras
4,314,813	A		2/1982	Masaki
4,314,955	A		2/1982	Boden et al.
4,318,946	A		3/1982	Pavone
4,319,942	A		3/1982	Brenner
4,330,602	A		5/1982	O'Rell et al.
4,340,632	A		7/1982	Wells et al.
4,352,924	A		10/1982	Wooten et al.
4,362,773	A		12/1982	Shikinami
4,368,231	A		1/1983	Egert et al.
4,368,243	A		1/1983	O'Rell et al.
4,369,157	A		1/1983	Conner
4,369,236	A		1/1983	O'Rell et al.
4,370,374	A		1/1983	Raabe et al.
4,385,093	A		5/1983	Hubis
4,385,588	A		5/1983	Bennetot
4,387,214	A		6/1983	Passmore et al.
4,388,134	A		6/1983	Long et al.
4,390,387	A		6/1983	Mahn
4,396,662	A		8/1983	Higashiguchi
4,405,401	A		9/1983	Stahl
4,413,019	A		11/1983	Brenner
4,418,106	A		11/1983	Landler et al.
4,423,106	A		12/1983	Mahn
4,425,268	A		1/1984	Cooper
4,430,372	A		2/1984	Knoke et al.
4,436,788	A		3/1984	Cooper
4,438,533	A		3/1984	Hefele
4,446,274	A		5/1984	Okazaki et al.
4,465,723	A		8/1984	Knoke et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,504,434	A		3/1985	Cooper
4,510,274	A		4/1985	Okazaki et al.
4,539,166	A		9/1985	Richartz et al.
4,574,018	A		3/1986	Masuda et al.
4,578,453	A		3/1986	Jackson, Jr. et al.
4,582,658	A		4/1986	Reichmann et al.
4,588,629	A		5/1986	Taylor
4,599,262	A		7/1986	Schulte et al.
4,610,904	A		9/1986	Mahn, Sr. et al.
4,650,533	A		3/1987	Parker et al.
4,652,478	A		3/1987	Maii
4,668,323	A		5/1987	Lenards et al.
4,670,089	A		6/1987	Hanson
4,681,791	A		7/1987	Shibahashi et al.
4,687,527	A		8/1987	Higashiguchi
4,693,771	A		9/1987	Payet et al.
4,741,791	A		5/1988	Howard et al.
4,790,306	A		12/1988	Braun et al.
4,793,884	A		12/1988	Horikiri
4,797,320	A		1/1989	Kopp et al.
4,810,321	A		3/1989	Wank et al.
4,810,549	A		3/1989	Abrams et al.
4,812,247	A		3/1989	Fahner et al.
4,812,357	A		3/1989	O'Rell et al.
4,828,918	A	*	5/1989	Miquel et al. 428/333
4,834,502	A		5/1989	Bristol et al.
RE33,032	E		8/1989	Binsack et al.
4,861,644	A		8/1989	Young et al.
4,895,748	A		1/1990	Squires
4,906,464	A		3/1990	Yamamoto et al.
4,923,848	A		5/1990	Akada et al.
4,931,125	A		6/1990	Volkmann et al.
4,937,115	A		6/1990	Leatherman
4,961,896	A		10/1990	Constantino
4,966,801	A		10/1990	Becker et al.
4,972,015	A		11/1990	Carico et al.
4,980,216	A		12/1990	Rompp
4,981,750	A		1/1991	Murphy et al.
4,985,296	A		1/1991	Mortimer, Jr.
5,008,130	A		4/1991	Lenards
5,009,943	A		4/1991	Stahl
5,009,950	A		4/1991	Wagner et al.
5,021,289	A		6/1991	Light et al.
5,026,591	A		6/1991	Henn et al.
5,041,104	A		8/1991	Seal
5,043,375	A		8/1991	Henning et al.
5,047,103	A		9/1991	Abrams et al.
5,053,179	A		10/1991	Masui et al.
5,059,452	A		10/1991	Squires
5,066,537	A		11/1991	O'Rell et al.
5,077,116	A		12/1991	Lefkowitz
5,104,723	A		4/1992	Freitag et al.
5,108,530	A		4/1992	Niebling, Jr. et al.
5,110,670	A		5/1992	Janocha et al.
5,112,423	A		5/1992	Liebe, Jr.
5,115,104	A		5/1992	Bunyan
5,126,182	A		6/1992	Lumb et al.
5,143,672	A		9/1992	Kuwahara
5,144,334	A		9/1992	Suzuki et al.
5,154,871	A		10/1992	Wagner et al.
5,155,163	A		10/1992	Abeywardena et al.
5,196,262	A		3/1993	Schwarz et al.
5,198,277	A		3/1993	Hamilton et al.
5,207,851	A		5/1993	Abrams
5,217,563	A		6/1993	Niebling et al.
5,217,781	A		6/1993	Kuipers
5,228,655	A		7/1993	Garcia et al.
5,238,737	A		8/1993	Burkhardt et al.
5,248,536	A		9/1993	Du Katz
5,274,039	A		12/1993	Sirinyan et al.
5,298,031	A		3/1994	Gabay et al.
5,302,223	A		4/1994	Hale
5,306,567	A		4/1994	Kuo et al.
5,312,576	A		5/1994	Swei et al.
5,326,391	A		7/1994	Anderson et al.
5,338,603	A		8/1994	Mahn et al.
5,342,892	A		8/1994	Vanderbilt et al.
5,346,746	A		9/1994	Abrams
5,347,927	A		9/1994	Berna et al.
5,348,699	A		9/1994	Meyer et al.
5,350,474	A		9/1994	Yamane
5,350,830	A		9/1994	Kuo et al.
5,352,507	A		10/1994	Bresson et al.
5,358,789	A		10/1994	Kuo et al.
5,382,628	A		1/1995	Stewart et al.
5,383,996	A		1/1995	Dressler
5,385,694	A		1/1995	Wu et al.
5,385,773	A		1/1995	Yau et al.
5,393,609	A		2/1995	Chang et al.
5,403,884	A		4/1995	Perlinski
5,411,783	A		5/1995	Mahn, Jr.
5,413,841	A		5/1995	Mahn et al.
5,431,501	A		7/1995	Hale et al.
5,442,036	A		8/1995	Beavers et al.
5,447,462	A		9/1995	Smith et al.
5,464,909	A		11/1995	Chang et al.
5,480,506	A		1/1996	Mahn, Sr. et al.
5,487,614	A		1/1996	Hale
5,488,907	A		2/1996	Xu et al.
5,489,359	A		2/1996	Yamane
5,508,084	A		4/1996	Reeves et al.
5,511,248	A		4/1996	Widdemer
5,520,988	A		5/1996	Kuwahara
5,522,317	A		6/1996	Hale et al.
5,529,650	A		6/1996	Bowers et al.
5,534,099	A		7/1996	Yamamoto
5,543,195	A		8/1996	Squires et al.
5,555,813	A		9/1996	Hale et al.
5,556,669	A		9/1996	Sasaki et al.
5,564,249	A		10/1996	Borys et al.
5,575,877	A		11/1996	Hale et al.
5,589,022	A		12/1996	Kuwahara
5,590,600	A		1/1997	Hale et al.
5,597,633	A		1/1997	Mecke et al.
5,597,637	A		1/1997	Abrams et al.
5,599,416	A		2/1997	Kuwahara
5,601,023	A		2/1997	Hale et al.
5,622,587	A		4/1997	Barthelman
5,640,180	A		6/1997	Hale et al.
5,642,141	A		6/1997	Hale et al.
5,644,988	A		7/1997	Xu et al.
5,654,395	A		8/1997	Jackson, Jr. et al.
5,658,630	A		8/1997	Shizukuda et al.
5,665,458	A		9/1997	Mahn, Jr.
5,677,037	A		10/1997	Kuwahara
5,681,420	A	*	10/1997	Yamane 156/387
5,685,223	A		11/1997	Vermuelen et al.
5,693,400	A		12/1997	Hamilton et al.
5,696,536	A		12/1997	Murphy
5,734,396	A		3/1998	Hale et al.
5,746,816	A		5/1998	Xu
5,756,180	A		5/1998	Squires et al.
5,762,379	A		6/1998	Salmon et al.
5,766,397	A		6/1998	Jones
5,771,796	A		6/1998	Morrison et al.
5,804,007	A		9/1998	Asano
5,820,968	A		10/1998	Kurani
5,830,263	A		11/1998	Hale et al.
5,837,347	A		11/1998	Marecki
5,851,617	A		12/1998	Keiser
5,858,156	A		1/1999	Abrams et al.
5,863,633	A		1/1999	Squires et al.
5,866,248	A		2/1999	Dressler
5,900,096	A		5/1999	Zemel
5,909,021	A		6/1999	Duffy
5,912,065	A		6/1999	Kukoff
5,914,176	A		6/1999	Myers
5,922,436	A		7/1999	Banfield et al.
5,942,311	A		8/1999	Scianna
5,981,009	A		11/1999	Iacono et al.
5,981,021	A		11/1999	McCulloch
5,997,995	A		12/1999	Scianna
6,010,764	A		1/2000	Abrams
6,025,068	A		2/2000	Pekala

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,083,332	A	7/2000	Abrams	
6,102,686	A	8/2000	Eschenfelder	
6,103,041	A	8/2000	Wagner et al.	
6,105,502	A	8/2000	Wagner et al.	
6,110,560	A	8/2000	Abrams	
6,113,149	A	9/2000	Dukatz	
6,114,023	A	9/2000	Schwarz et al.	
6,146,485	A	11/2000	Iacono et al.	
6,152,038	A	11/2000	Wagner et al.	
6,170,881	B1	1/2001	Salmon et al.	
6,171,678	B1	1/2001	Holeschovsky et al.	
6,178,680	B1	1/2001	Sloot	
6,202,549	B1	3/2001	Mitsam et al.	
6,224,707	B1	5/2001	Lion	
6,247,215	B1	6/2001	Van Alboom et al.	
6,249,297	B1	6/2001	Lion	
6,257,866	B1	7/2001	Fritz et al.	
6,264,775	B1	7/2001	Holeschovsky et al.	
6,265,332	B1	7/2001	Yoshida et al.	
6,277,312	B1	8/2001	Hansen et al.	
6,296,908	B1	10/2001	Reihs et al.	
6,299,715	B1	10/2001	Langsdorf et al.	
6,341,856	B1	1/2002	Thompson et al.	
6,348,939	B1	2/2002	Xu et al.	
6,350,504	B1	2/2002	Alboom et al.	
6,361,855	B2	3/2002	Mahn, Jr. et al.	
6,376,041	B1	4/2002	Morrison et al.	
6,387,472	B1	5/2002	Reck et al.	
6,402,313	B1	6/2002	Xu et al.	
6,418,974	B1	7/2002	King	
6,425,331	B1	7/2002	Xu et al.	
6,428,877	B1	8/2002	Suss et al.	
6,436,506	B1	8/2002	Pinter et al.	
6,439,710	B1	8/2002	Hale et al.	
6,447,629	B1	9/2002	Thompson et al.	
6,450,098	B1	9/2002	Hale et al.	
6,451,148	B1	9/2002	Jenner	
6,481,015	B1	11/2002	Lanier	
6,486,903	B1	11/2002	Wagner et al.	
6,488,370	B2	12/2002	Hale et al.	
6,489,038	B1	12/2002	Sperlich et al.	
6,540,345	B1	4/2003	Wagner et al.	
6,544,634	B1	4/2003	Abrams et al.	
6,555,648	B1	4/2003	Hinds	
6,569,538	B1	5/2003	Kaschel	
6,577,657	B1	6/2003	Elschner et al.	
6,630,216	B2	10/2003	Pophusen et al.	
6,631,984	B2	10/2003	Thompson et al.	
6,646,022	B2	11/2003	Okazaki et al.	
6,648,926	B1	11/2003	Immediato	
6,660,352	B2	12/2003	Hsu et al.	
6,676,796	B2	1/2004	Pinter et al.	
6,770,581	B1	8/2004	DeMott et al.	
6,774,067	B2	8/2004	Demott et al.	
6,783,184	B2	8/2004	DiBattista et al.	
6,787,589	B2	9/2004	Weaver et al.	
6,804,978	B2	10/2004	Kost	
6,818,293	B1	11/2004	Keep et al.	
6,836,915	B2	1/2005	Song et al.	
6,841,240	B2	1/2005	Gorny et al.	
6,875,395	B2	4/2005	Kisha et al.	
6,913,714	B2	7/2005	Liu et al.	
6,924,000	B2	8/2005	Tallmadge	
6,929,771	B1	8/2005	Abrams	
6,939,666	B2	9/2005	Matsumoto	
6,972,305	B1	12/2005	Griessmann et al.	
6,977,023	B2	12/2005	Abrams	
7,021,549	B2	4/2006	O'Rell et al.	
7,036,200	B2	5/2006	Fabrige	
7,073,762	B2	7/2006	Pearson	
7,135,518	B2	11/2006	Bandou et al.	
7,138,359	B2	11/2006	Washizuka	
7,191,720	B2	3/2007	Thomas	
7,214,339	B2	5/2007	Tsunekawa et al.	
7,229,680	B1	6/2007	Crompton	
7,265,258	B2	9/2007	Hamilton et al.	
7,338,697	B2	3/2008	Abrams	
7,344,769	B1	3/2008	Abrams	
7,351,368	B2	4/2008	Abrams	
7,364,782	B2	4/2008	Abrams	
7,378,043	B2	5/2008	Hassan et al.	
7,381,284	B2	6/2008	Abrams	
7,390,552	B2	6/2008	Abrams	
7,393,516	B2 *	7/2008	Seo et al.	423/508
7,393,576	B2	7/2008	Abrams	
7,402,222	B2	7/2008	Abrams	
7,410,682	B2	8/2008	Abrams	
7,410,932	B2	8/2008	Figueroa	
7,413,581	B2	8/2008	Abrams	
7,461,444	B2	12/2008	Deaett et al.	
7,465,485	B2	12/2008	Abrams	
7,632,371	B2	12/2009	Abrams	
7,749,589	B2	7/2010	Abrams	
7,799,164	B2	9/2010	Abrams	
8,007,889	B2	8/2011	Abrams	
8,012,893	B1	9/2011	Liebe	
8,110,059	B2	2/2012	Kuwahara	
8,168,262	B2	5/2012	Abrams	
2001/0008039	A1	7/2001	Alboom et al.	
2001/0008672	A1	7/2001	Norvell et al.	
2002/0009571	A1	1/2002	Abrams	
2002/0098329	A1	7/2002	Abrams	
2002/0197622	A1	12/2002	McDevitt et al.	
2003/0114627	A1	6/2003	Holeschovsky et al.	
2003/0129353	A1	7/2003	Abrams	
2003/0150341	A1	8/2003	Ciaramitaro	
2003/0152779	A1	8/2003	Kondo et al.	
2003/0186019	A1	10/2003	Abrams	
2003/0192109	A1	10/2003	Barthelemy	
2003/0203152	A1	10/2003	Higgins et al.	
2003/0207072	A1	11/2003	Abrams	
2003/0211279	A1	11/2003	Abrams	
2004/0010093	A1	1/2004	Wefringhaus et al.	
2004/0033334	A1	2/2004	Merovitz	
2004/0050482	A1	3/2004	Abrams	
2004/0053001	A1	3/2004	Abrams	
2004/0055692	A1	3/2004	Abrams	
2004/0058120	A1	3/2004	Abrams	
2004/0081791	A1	4/2004	Abrams	
2004/0142176	A1	7/2004	Wang	
2004/0170799	A1	9/2004	Carr et al.	
2004/0180592	A1	9/2004	Ray	
2004/0214493	A1	10/2004	Smith	
2004/0238103	A1	12/2004	Cano	
2005/0000622	A1	1/2005	Cano	
2005/0001419	A1	1/2005	Levy et al.	
2005/0070434	A1	3/2005	Drake	
2005/0081985	A1	4/2005	Abrams	
2005/0124734	A1	6/2005	Hucks et al.	
2005/0136211	A1	6/2005	McGovern et al.	
2005/0158508	A1	7/2005	Abrams	
2005/0158554	A1	7/2005	Wang et al.	
2005/0159575	A1	7/2005	Rische et al.	
2005/0188447	A1	9/2005	Gray	
2005/0193461	A1	9/2005	Caillibotte et al.	
2005/0196594	A1	9/2005	O'Rell et al.	
2005/0223753	A1	10/2005	Nordstrom	
2005/0260378	A1	11/2005	Bernabeu	
2005/0266204	A1	12/2005	Abrams	
2005/0268407	A1	12/2005	Abrams	
2005/0279445	A1	12/2005	Shemanski et al.	
2006/0010562	A1	1/2006	Bevier	
2006/0026778	A1	2/2006	Lion	
2006/0029767	A1	2/2006	Lion	
2006/0080752	A1	4/2006	Darling et al.	
2006/0142405	A1	6/2006	Kijima	
2006/0150300	A1	7/2006	Hassan et al.	
2006/0160943	A1	7/2006	Weir	
2006/0162050	A1	7/2006	Kaufman et al.	
2006/0183851	A1	8/2006	Liu et al.	
2006/0251852	A1	11/2006	Abrams	
2006/0257618	A1	11/2006	Bernabeu	
2007/0003761	A1	1/2007	Miyazono et al.	
2007/0022510	A1	2/2007	Chapuis et al.	

(56) **References Cited**

U.S. PATENT DOCUMENTS

2007/0022548	A1	2/2007	Abrams
2007/0026189	A1	2/2007	Abrams
2007/0110949	A1	5/2007	Abrams
2007/0148397	A1	6/2007	Abrams
2007/0172609	A1	7/2007	Williams
2007/0181241	A1	8/2007	Kramer et al.
2007/0204493	A1	9/2007	Foley et al.
2007/0219073	A1	9/2007	Mannschedel
2007/0251636	A1	11/2007	Herbert
2007/0264462	A1	11/2007	Covelli et al.
2007/0289688	A1	12/2007	Abrams
2007/0298681	A1	12/2007	Liu
2008/0003399	A1	1/2008	Abrams
2008/0006968	A1	1/2008	Abrams
2008/0050548	A1	2/2008	Abrams
2008/0095973	A1	4/2008	Abrams
2008/0102239	A1	5/2008	Abrams
2008/0111047	A1	5/2008	Abrams
2008/0113144	A1	5/2008	Abrams
2008/0118695	A1	5/2008	Jarvis et al.
2008/0124503	A1	5/2008	Abrams
2008/0145585	A1	6/2008	Abrams
2008/0150186	A1	6/2008	Abrams
2008/0153388	A1	6/2008	Liu
2008/0177415	A1	7/2008	Rahimi
2008/0187706	A1	8/2008	Lion et al.
2008/0250668	A1	10/2008	Marvin et al.
2008/0295216	A1	12/2008	Nordstrom et al.
2008/0299397	A1	12/2008	Kenens et al.
2008/0302772	A1	12/2008	Lion
2009/0022929	A1	1/2009	Kramer et al.
2009/0025123	A1	1/2009	Weedlun et al.
2009/0075075	A1	3/2009	Abrams
2009/0093200	A1	4/2009	Iwase et al.
2009/0124150	A1	5/2009	Covelli et al.
2009/0133181	A1	5/2009	Nordstrom et al.
2009/0149589	A1	6/2009	Thompson et al.
2009/0181599	A1	7/2009	Farmer et al.
2009/0197091	A1	8/2009	Kirk, II et al.
2009/0239025	A1	9/2009	Abrams
2009/0259169	A1	10/2009	Loori et al.
2009/0280290	A1	11/2009	Weedlun
2009/0286039	A1	11/2009	Weedlun et al.
2009/0320174	A1	12/2009	Turner
2010/0043114	A1	2/2010	Caillibotte et al.
2010/0051132	A1	3/2010	Glenn
2010/0055358	A1	3/2010	Weaver et al.
2010/0068447	A1	3/2010	Abrams
2010/0068964	A1	3/2010	Baychar
2010/0092719	A1	4/2010	Abrams
2010/0092720	A1	4/2010	Abrams
2010/0095550	A1	4/2010	Sokolowski et al.
2010/0119760	A1	5/2010	Kirk, II et al.
2010/0130085	A1	5/2010	Yu
2010/0143669	A1	6/2010	Abrams
2010/0178445	A1	7/2010	Shen et al.
2010/0209654	A1	8/2010	Abrams
2010/0233410	A1	9/2010	Abrams
2010/0316832	A1	12/2010	Abrams
2011/0008618	A1	1/2011	Weedlun
2011/0052859	A1	3/2011	Abrams
2011/0223373	A1	9/2011	Abrams
2012/0015156	A1	1/2012	Abrams
2012/0028003	A1	2/2012	Abrams
2012/0121869	A1	5/2012	Kuwahara

FOREIGN PATENT DOCUMENTS

CA	757595	4/1967
CA	2010076	8/1990
CA	1306411	8/1992
CA	2064300	9/1992
DE	3004560	8/1981
DE	202835	10/1983
DE	19707381	8/1998
DE	19734316	2/1999
EP	0122656	10/1984
EP	0210304	2/1987
EP	0280296	8/1988
EP	0351079	1/1990
EP	0506601	9/1992
EP	0685014	12/1995
EP	0913271	10/1998
EP	0989227	3/2000
EP	1072712	1/2001
EP	1598463	1/2001
EP	1375733	1/2004
EP	1557206	7/2005
EP	1598463	11/2005
FR	1480860	5/1967
FR	2210149	7/1974
FR	2442721	8/1980
FR	2543984	10/1984
FR	2659094	9/1991
FR	2784619	4/2000
FR	2846202	4/2004
FR	2881149	7/2006
GB	1171296	11/1969
GB	1190883	5/1970
GB	1447049	8/1976
GB	1466271	3/1977
GB	2000200	1/1979
GB	2065031	6/1981
GB	2101932	1/1983
GB	2126951	4/1984
GB	2214869	9/1989
GB	2227715	8/1990
GB	0506601	9/1992
GB	1466271	3/1997
IE	55104	10/1984
JP	71007184	6/1965
JP	52-155270	12/1977
JP	54-163934	12/1979
JP	55079143	6/1980
JP	55-147171	11/1980
JP	56058824	5/1981
JP	56107080	8/1981
JP	56108565	8/1981
JP	56141877	11/1981
JP	58062027	4/1983
JP	59106944	6/1984
JP	59115885	7/1984
JP	60-171138	9/1985
JP	60-236738	11/1985
JP	S61-146368	7/1986
JP	62-033576	2/1987
JP	62-144911	6/1987
JP	63118544	5/1988
JP	64-014021	1/1989
JP	S64-068582	3/1989
JP	01192538	8/1989
JP	01-266284	10/1989
JP	01-310947	12/1989
JP	02048076	2/1990
JP	2-25667	6/1990
JP	AP 491623	7/1991
JP	04-126221	4/1992
JP	04-169297	6/1992
JP	5-201196	8/1993
JP	05-255021	10/1993
JP	06-171048	6/1994
JP	08-267625	10/1996
JP	10059790	3/1998
JP	10-202691	8/1998
JP	11-042749	2/1999
JP	11256484	9/1999
JP	11277662	10/1999
JP	11348159	12/1999
JP	2000084977	3/2000
JP	2000-094563	4/2000
JP	2000-208564	7/2000
JP	3076851	8/2000
JP	2000263673	9/2000

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

JP	2001-226885	8/2001
JP	2001-270019	10/2001
KR	2003063833	7/2003
SE	329767	10/1970
WO	WO 79/01146	12/1979
WO	WO 89/01829	3/1989
WO	WO 02/058854	8/1990
WO	WO 90/09289	8/1990
WO	WO 92/04502	3/1992
WO	WO 93/12283	6/1993
WO	WO 94/19530	9/1994
WO	WO 97/34507	9/1997
WO	WO 01/25524	4/2001
WO	WO 02/07959	1/2002
WO	WO 02/09925	2/2002
WO	WO 03/031083	4/2003
WO	WO 2004/005023	1/2004
WO	WO 2004/005413	1/2004
WO	WO 2004/005600	1/2004
WO	WO 2005/035235	4/2005
WO	WO 2005/118948	12/2005
ZA	88/6259	4/1990
ZA	92/2154	2/1993

OTHER PUBLICATIONS

U.S. Appl. No. 09/548,839, filed Apr. 13, 2000, Abrams.
U.S. Appl. No. 11/972,440, filed Jan. 10, 2008, Abrams.
"A Rug Fit for a Mouse," Time Magazine (Sep. 28, 1998) p. 96.
"Adhesives for Decorative Apparel for High Quality Embroidered Emblems, Patches, and Sports Lettering," Bemis, Feb. 2002, 2 pages.
"Aeroshoes the microporous membrane for absorption and desorption," AeroShoes; available at http://www.aeroshoes.com/flashon/product/default.htm; 1 page; undated.
"AK Coatings—Applications" page; AK Coatings; before Nov. 1, 2002; www.akcoatings.com/applications/default.asp.
"AK Coatings—Growing Demand" page; AK Coatings; before Nov. 1, 2002; www.akcoatings.com/growing_demand/default.asp.
"AK Coatings—Home" page; AK Coatings; before Nov. 1, 2002; www.akcoatings.com.
"AK Coatings—How It Works" page; AK Coatings; before Nov. 1, 2002; www.akcoatings.com/how_it_works/default.asp.
"AK Coatings—Specify and Purchase" page; AK Coatings; before Nov. 1, 2002; www.akcoatings.com/specify_purchase/defaults.asp.
"Bemis—Specialty Films," available at http://www.benisworldwide.com/products/films.html; 2004; 2 pages.
"Celgard Announces New Products and New Customer," May 2, 2005; 1 page.
"Characteristics of Commonly Used Elastomers" avaliable at http://www.deerfieldurethane.com/Deerfield-Urethane_Brochure.pdf, date unknown, 4 pages.
"Corterra Polymers," (printed Mar. 8, 2004) http://www.swicofil.com/ptt.html, 4 pages.
"Disperse Dyes for Textiles," Organic Dyestuffs Corporation (2003), available at http://www.organicdye.com/textiledisperseindex.asp, 4 pages.
"Door Panels Collano overcomes strain forces," Collano AG, Switzerland, Oct. 2004; 1 page.
"E/Barrier Material Safety Data Sheet (MSDS)," Midsun Group, Apr. 4, 2006, pp. 1-5.
"Eckart—Excellence in effect pigments," Eckart GmBH & Co. KG; available at http://www.eckartamerica.com/page.asp?NavigationID=15&MainNavigationID=3&PageID=16; printed Aug. 21, 2006; 2 pages.
"Eckart Inks," Eckart GmBH & Co. KG; available at http://www.deltatecnic.com/eckinken.htm; printed Aug. 21, 2006; 2 pages.
"Engineering of Wool Carpet Yarns: Yarn Bonding Technology," Wools of New Zealand (2002), available at http://www.canesis.com/Documents/Yarn_bonding_technology.pdf, pp. 1-13.
"Ex Tech™ Extruded Technical Film Solutions," Bemis, Sep. 2006, 6 pages.
"Fabric Processing Guidelines and Expected Product Attributes," Wellman, Inc., The Fibers Division (Jul. 25, 2001), 8 pages.
"Flockin' to Precision," Images Magazine; Feb. 1992, 1 page.
"General Guidelines for Using Heat Seal Film Adhesives in Embroidery Applications," Bemis Associates, Shirley, MA, revised Feb. 2000, 8 pages.
"Hettinga: Plastics Technology for the Future, Available Today!" website (circa 2000), 4 pages.
"Library of Knitting Stitches—Knitting Stich Patterns." Barbar Breiter's Knitting on the Net, printed Mar. 23, 2011 from http://www.knittingonthenet.com/stitches.htm, 3 pages.
"Made of makrolon High-tech plastic from Bayer" General Purpose Product Data, Sheffield Plastics Inc., 2003, 2 pages.
"Magic Carpet" Wired Magazine (Nov. 1998), p. 68.
"Makrolon GP Solid polycarbonate sheet," Product Data Sheet, Oct. 2004, 2 pages.
"Makrolon GP Solid polycarbonate sheets," General Purpose Product Data Sheet, Laserlite Australia, date unknown, 2 pages.
"Material Safety Data Sheet," Nationwide Plastics, Inc., Jan. 1, 2007, pp. 1-6.
"Metallic pigment dispersions, pellets and powders for Inks," Eckart, undated, 28 pages.
"Microthin.com Mouse Ads," available at http://www.microthin.com/index_flash.htm; undated, 1 page.
"Neoprene polychloroprene Technical Information," Rev. 5, Oct. 2003, pp. 1-16.
"Opposites Attract," Collano AG, Switzerland, Aug. 2004; 1 page.
"Polymers," Chemistry, Unit 16, date unknown, pp. 313-325.
"PolyOne—OnFlexTM-S EH Economy Grades (High Density)," PolyOne® Corporation 2007, pp. 1-2.
"PolyOne—OnFlexTM-S EL Economy Grades (Low Density)," PolyOne® Corporation 2007, pp. 1-2.
"PolyOne—OnFlexTM-S FG Food Contact Grades," PolyOne® Corporation 2007, pp. 1-2.
"PolyOne—OnFlexTM-S KE Grades for 2K Moulding on Engineered Thermoplastics," PolyOne® Corporation 2007, pp. 1-2.
"PolyOne—OnFlexTM-S Thermoplastic Elastomer Compounds," PolyOne® Corporation 2007, pp. 1-6.
"PolyOne—OnFlex™—S Styrenic Thermoplastic Elastomers," printed Feb. 9, 2010, 2 pages.
"PolyOne—Synprene RT-3750," PolyOne® Corporation Feb. 9, 2010, 1 page.
"PolyOne—Synprene RT-3770," PolyOne® Corporation Feb. 9, 2010, 1 page.
"PolyOne—Synprene RT-3790," PolyOne® Corporation Feb. 9, 2010, 1 page.
"PolyOne—Synprene RT-3850MS," PolyOne® Corporation Feb. 9, 9010, 1 page.
"PolyOne—Synprene RT-3870M," PolyOne® Corporation Feb. 9, 2010, 1 page.
"Product Information" Celgard Inc.; available at http://www.celgard.com/products/product-information.cfm; 1 page; undated.
"RMIUG Meeting Minutes—Colorado in the Information Age," Jan. 14, 1997; 1 page.
"Rugs for Rodents," Newsweek (Nov. 9, 1998), p. 8.
"Schaetti Fix 6005" Technical Data Sheet, Schaetti Fix, Jan. 1, 2006, 1 page.
"Schaetti Fix 6012" Technical Data Sheet, Schaetti Fix, Jan. 1, 2006, 1 page.
"Schaetti Fix 6040" Technical Data Sheet, Schaetti Fix, Jan. 3, 2006, 1 page.
"Schaetti Fix Cross Linking Test Product," Dynamic Coating Technology; Sep. 18, 2006; 4 pages.
"Selector Guide: Thermoplastic Adhesives, Speciality Films & Seam Tape," Bemis, Jan. 2009, 8 pages.
"Sewfree® Adhesive Film & Tape," Bemis, Jul. 2006, 4 pages.
"Sewfree® Adhesive Film & Tape," Bemis, Jul. 2008, 6 pages.
"Sewfree® designed especially for garments," Bemis, Aug. 2008, 6 pages.
"Surfaces: Clean Home Dream Home," AK Coatings; 2002; vol. 1, Issue 1.
"The largest range of plastic powder adhesives," Dynamic Coating Technology Schaetti Fix, date unknown, 8 pages.

(56) **References Cited**

OTHER PUBLICATIONS

"The largest range of thermoplastic powders," Dynamic Coating Technology Schaetti Fix, date unknown, 8 pages.
"Types of Knitting Machines: Warp Knitting, Weft Knitting, Intarsia, Double Knitting, Flat Knitting, Circular Knitting." textilesindepth, printed Apr. 06, 2011 from http://www.textilesindepth.com/index.php?page=types-knitting-machines.
"Versaflex® OM 3060-1—Technical Data Sheet," GLS Corporation, available at http://glscorporation.com/gls2/print.jsp-?productID=182, Feb. 9, 2010, 2 pages.
"Versaflex® OM Series Material Review," TPE Tips, Issue 5, GLS Corporation Rev. Jan. 12, 2007, 2 pages.
"Vestamelt," Degussa AG, date unknown, pp. 1-4.
Advertisement,"Clarense" at www.bemisworldwide.com (undated), 2 pages.
Agion Technologies, LLC., The Most Advanced Antimicrobial Silver Delivery System; (date unknown).
AK Steel Press Release "AK Steel's AgION™ Antimicrobial-Coated Steels Named One of the "Best of What's New" by Popular Science Magazine Bacteria Resistant Steels Win Distinguished Award in Home Technology Category," Dec. 1, 2001, 2 pages.
Artisyn Synthetic Paper Characteristics & Benefits, http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Characteristics, printed Aug. 15, 2005, 2 pages.
Artisyn Synthetic Paper Handling & Storage, http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Handling, printed Aug. 15, 2005, 2 pages.
Artisyn Synthetic Paper Printing Compatibility, http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Printing, printed Aug. 15, 2005, 2 pages.
Artisyn Synthetic Paper Product Line, http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Products, printed Aug. 15, 2005, 1 page.
Artisyn Synthetic Paper Product Overview, http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Overview, printed Aug. 15, 2005, 2 page.
Artisyn® Synthetic Paper—Applications Commercial Printing, http://www.artisynpaper.com/index.cfm?fuseaction=Applications.CommercialPrinting, printed Aug. 15, 2005, 2 pages.
Artisyn® Synthetic Paper—Applications In-Mold Graphics, http://www.artisynpaper.com/index.cfm?fuseaction=Applications.InMoldGraphics, printed Aug. 15, 2005, 1 page.
Artisyn® Synthetic Paper—Applications Laminated Cards, http://www.artisynpaper.com/index.cfm?fuseaction=Applinations.LaminatedCards, printed Aug. 15, 2005, 2 page.
Artisyn® Synthetic Paper—Applications Pressure Sensitive, http://www.artisynpaper.com/index.cfm?fuseaction=Applications.PressureSensitive, printed Aug. 15, 2005, 2 page.
Artisyn® Synthetic Paper—Applications Tags & Labels, http://www.artisynpaper.com/index.cfm?fuseaction=Applications.TagsLabels, printed Aug. 15, 2005, 2 pages.
Artisyn® Synthetic Paper—Typical Properties, http://www.artisynpaper.com/index.cfm?fuseaction=Properties.Typical, printed Aug. 15, 2005, 2 pages.
Artpads; Catalog; Jan. 27, 1999, available at http://www.accelerated.com/artpads/default.htm, 2 pages.
Bayer Films Americas, "Makrofol® DPF 5072 Polycarbonate Film Development Product," Feb. 2004, 2 pages.
Bayer Films Americas, "New Product Release—Unique Polycarbonate-Based Film for Bright Metallic Look Applications," Jul. 26, 2004, 1 page.
Bayer Films Americas, Makrofol® and Bayfol® advertising circular, 2004, 12 pages.
Bayer Plastics Division Press Release, Wheel Covers, Center Caps Become Revolving Art Forms with New Film Insert Molding Technology, Jun. 19, 2000; 4 pages.
Bemis; Sewfree; Adhesive Film for Seamless Apparel Construction; 2002; 1 page.
Bicomponent Fibers, available at http://web.utk.edu/~mse/pages/Textiles/Bicomponent%20fibers.htm, Updated Apr. 2004, 8 pages.
Bostik USA; "Automotive & Industrial Division: Web & Powder Adhesives" (2002), available at http://www.bostik.com/oem/web_adhesives.html, 2 pages.
Bostik, "Technical Data Sheet PE103 Web Adhesives," revised Feb. 7, 2006, 5 pages.
Casa Nostra Designs; New or the Big Apple; 1997, available at http://apropa.se/newyork.html, 1 page.
Cellusuede Products, Inc, "About Flock," Available at http://www.cellusuede.com/navabout.html, KMK Media Group, copyright 2000, 1 pages.
Cellusuede Products, Inc, "FAQ's," Available at http://www.cellusuede.com/faq.html, KMK Media Group, copyright 2000, 2 pages.
Cellusuede Products, Inc, "Fiber Types," Available at http://www.cellusuede.com/about/types.html, KMK Media Group, copyright 2000, 4 pages.
Cellusuede Products, Inc, "Glossary of Terms," Available at http://www.cellusuede.com/glossary/index.html, KMK Media Group, copyright 2000, 2 pages.
Cellusuede Products, Inc, "Uses for Flock, Home Furnishings," Available at http://www.cellusuede.com/home.html, KMK Media Group, copyright 2000, 2 pages.
Changpad Trading Inc.; Heat-Trans Pad; Jan. 27, 1999, available at http://www.changpad.com.tw/heat-trans.htm, 1 page.
Cohn, Larry, "When Is A 'Dye Sublimation' Printer NOT a 'Dye Sublimation' Printer?" Fun Faces Foto Gifts (Oct. 2001), available at http://www.dyesub.org/articles/dyesubprinter.htm, 7 pages.
Defosse; "Systems Approach Gives Blow Molders Big Edge," 2000.
Derrick, Cherie, "Sublimation, what is it?" Encompass Technologies (Oct. 2000), available at http://www.dyesub.org/articles/dyesubwhatisit.htm, 3 pages.
DuPont Thermx PCT Product and Properties Guide brochure dated Aug. 2003.
Eastman News Archive, DuPont Engineering Polymers Acquires High Performance Plastics Business from Eastman, printed Jul. 3, 2003, 2 pages.
Eastman PCT Polyester; New Resins New Services. . (undated) 5 pages.
Everglide; Everglide Mousing Surface & trade; Jan. 27, 1999, available at http://www.everglide.com/mousing_surface.htm, 1 page.
Excerpts from Obsolete Type 200 Series Brochure, undated, 3 pages.
Fake Fur Computer Accessories; Products; Jan. 27, 1999, available at http://workwares.com.au/products.htm, 3 pages.
Feature Story; Spandex can now be made from Thermoplastic Polyurethane using a new breakthrough flexible Process; Aug. 19, 2002.
Fiber Innovation Technology: Bicomponent Fibers, found at http://www.fitfibers.com/bicomponent_fibers.htm, undated (3 pages).
Ford, Don, "Inkjet Transfer Printing (not dye sublimation)," Ford Screen Printing (Oct. 2001), available at http://www.dyesub.org/articles/inkjet.shtm, 2 pages.
GE Structured Products, "Lexan® In-Mold Films: A Guide for Designing, Forming and Molding with Screenprinted Lexan® Films" (Jan. 1999), pp. 1-20.
Griffin, Patrick J., "Film Insert Molding," SGIA Journal, First Quarter 2001, pp. 31-36.
James B. Smith; "Buying New Carpet," Internet printout revised May 11, 2006, from http://www.carpetinspector.com/buying_new_carpet.htm; 6 pages., printed on Aug. 1, 2006.
JC Penney Catalog, Fall & Winter, accent rugs, A-B, p. 1032, (1991).
Juracek "Soft Surfaces," W.W. Norton & Company, Inc., 2000, 3 cover pages and pp. 310-323.
Kelly, "New pads for computer mice now cutting a different rug," USA Today (Oct. 26, 1998).
Krichevskii, G.E., "Textile Materials Made from Polyester Fibres—a Most Difficult Material to Color," Fibre Chemistry, vol. 33, No. 5 (Sep. 2001), pp. 364-367(4).
Lambert et al., "Color and Fiber," Schiffer Publishing Ltd., 1986, Cover, p. IV, p. 90-135, 242-247.
Landwehr, Rebecca, "When is a mouse pad really a rug?" The Denver Business Journal (Nov. 1998), at http://denverbizjournalscom/denver/stories/1998/11/30/story3html.
Lextra® MouseRug®; "MouseRug Components" (Jan. 27, 1999), http://www.mouserug.com/mouserug/mousecomp.html, 1 page.

(56) **References Cited**

OTHER PUBLICATIONS

Lou Reade Reports "Surface Attention" European Plastics News (May 2003), p. 26.
Mark Matsco, Patrick Griffin, Film Insert Molding Technology, 1997.
Mouse Escalator; The only resolution to all your PC mouse problems; Jan. 27, 1999, 3 pages.
Oelsner, A Handbook of Weaves, The MacMillan Company, New York, NY, translated and revised by Samuel S. Dale, 1915, 418 pages.
Orlych, "Silicone-Adhesive Interactions," ASI Adhesives & Sealants Industry; May 2004; 9 pages.
Peterson, Jeff, "New Innovations in 3D Curved Parts Decorating," Plastics Decorating (Oct.-Nov. 2001), available at http://www.petersonpublications.com/plasticsdecorating/articlesdisplay.asp?ID=17, 3 pages.
PPG Industries, Inc., "Chemical Compatibility of Teslin® Sheet," http://www.ppg.com/chm_teslin/whatsteslin/chem.htm, printed Jul. 27, 2005, 3 page.
PPG Industries, Inc., "Finishing Techniques for Teslin® Sheet," http://www.ppg.com/chm_teslin/whatsteslin/fin.htm, printed Jul. 27, 2005, 5 pages.
PPG Industries, Inc., "General Characteristics," http://www.ppg.com/chm_teslin/whatsteslin/gen.htm, printed Jul. 27, 2005, 2 page.
PPG Industries, Inc., "Grades of Teslin® Sheet," http://www.ppg.com/chm_teslin/whatsteslin/grades.htm, printed Jul. 27, 2005, 2 pages.
PPG Industries, Inc., "Handling & Storage," http://www.ppg.com/chm_teslin/whatsteslin/hand.htm, printed Jul. 27, 2005, 2 page.
PPG Industries, Inc., "Laminated Card Production," http://www.ppg.com/chm_teslin/whatsteslin/lam.htm, printed Jul. 27, 2005, 2 pages.
PPG Industries, Inc., "Printing on Teslin® Sheet," http://www.ppg.com/chm_teslin/whatsteslin/print.htm, printed Jul. 27, 2005, 2 pages.
PPG Industries, Inc., "Properties of Teslin®," http://www.ppg.com/chm_teslin/whatsteslin/properties.htm, printed Jul. 27, 2005, 2 page.
PPG Industries, Inc. "Teslin® Product Printing Technology Compatibility," 2000, 1 page.
PPG Industries, Inc. "Teslin® Sheet and the Environment," http://www.ppg.com/chm_teslin/whatsteslin/environ.htm, printed Jul. 27, 2005, 2 pages.
PPG Industries, Inc. "Teslin® Synthetic Printing Sheet Technical Manual," 2000, 31 pages.
PPG Industries, Inc. "Weights and Sizes of Teslin® Sheet," http://www.ppg.com/chm_teslin/whatsteslin/weights.htm, printed Jul. 27, 2005, 2 pages.
PPG Industries, Inc., "What is Teslin® Sheet?," http://www.ppg.com/chm_teslin/whatsteslin/whatis.htm, printed Jul. 27, 2005, 2 pages.
Progressive Plastics, Inc.; Stretch Blow Guide; "Polymers," 8 page information sheet.
Progressive Plastics; "PET Information Guide—PET:=Polyethylene Terephthalate," Internet printout from http://www.welshproducts.com/sub/sub_inst.htm; 4 pages, printed Aug. 1, 2006.
Protect-All Print Media, Inc., "Technical Information Artisyn® Synthetic Paper—Universal Grade," 5 pages. (undated).
Robinson et al., Woven Cloth Construction, the Textile Institute, Manchester, 1973, pp. 1-178.
Sawgrass Technologies, Inc. Press Releases, available at http://www.sawgrassink.com/pressreleases/pressreleasearchives.htm, printed Jan. 22, 2004, 18 pages.
Saxon Screens—Products, www.saxon-screens.de/airmboss.html, 5 pages. (Nov. 22, 2004).
Sean O'Leary, "Standard Transfer vs. Dye Sublimation: Requirements and Conditions for the Two Processes," The Big Picture Magazine, available at http://www.signweb.com/digital/tips/digitaltip7.html, 2 pages.
Sears Catalog, Spring/Summer, bath carpets, (B), fringed oblong, pp. 1290-1291, oriental design rugs, A-B, p. 1146, (1978).
Shaner, Ken, "Advanced Molding Processes: Low Pressure Molding/Low-High Pressure Molding for Interior Trim," Automotive & Transportation Interior Expo Conference 1997, Session 9, pp. 1-2.
Snyder, Merle R., "Fabric Molding Shows Promise in Automotive: Machine Makers Offer Innovative Systems That Boost Productivity and Facilitate Recyclability," Modern Plastics (Oct. 1999), available at http://www.modplas.com/new/month_1099/ms10.htm.
Sondhelm, "Technical fabric structures—1. Woven fabrics," Chapter 4 of Handbook of Technical Textiles, CRC Press/Woodhead Pub, Boca Raton, FL, 2000, pp. 62-94.
Sonics & Materials, Inc., "Chart II Compatability of Thermoplastics" (undated), 1 page.
Stahls', New Product Bulletin; 7 pages.
Studt et al.; "Versatality on a roll: Thermoplastic adhesive films," Collano; Oct. 2002; 8 pages.
Takatori, Hiroyuki, "Dieprest In-mold Laminate Technology," Automotive & Transportation Interiors Expo Conference 1999, Session 12, pp. 1-4.
The Original PentaPad®; The Original PentaPad Specs; Jan. 27, 1999, available at http://pentapad.com/specs.html, 2 pages.
Watson, Advanced Textile Design, Longmans, Green & Co, London, 1913, 485 pages.
Watson, Textile Design and Colour: Elementary Weaves and Figured Fabrics, Longmans, Green & Co, London, 1912, 370 pages.
Website entitled "Frequently Asked Questions (FAQ's)," A1 Custom Mousepad Imaging Inc. (2003), available at http://www.a1imaging.com/faqs.html, 2 pages.
Wikipedia, The free encyclopedia; "Pet film (biaxially oriented)," Internet printout from http://en.wikipedia.org/wiki/PET_film_(biaxially_oriented); 3 pages, printed on Aug. 1, 2006.
Restriction Requirement for U.S. Appl. No. 11/460,519, mailed Feb. 13, 2009.
Restriction Requirement for U.S. Appl. No. 11/460,519, mailed May 15, 2009.
Official Action for U.S. Appl. No. 11/460,519, mailed Sep. 30, 2009.
Official Action for U.S. Appl. No. 11/460,519, mailed May 17, 2010.
Declaration of L. Brown Abrams under 37 CFR § 1.98 for U.S. Appl. No. 10/394,357 dated Jan. 16, 2004, 4 pages. with Appendix A-I.
Declaration of L. Brown Abrams Under 37 CFR 1.98 Executed Nov. 22, 2003 for U.S. Appl. No. 10/614,340, filed Jul. 3, 2003.
Second Supplemental Declaration of L. Brown Abrams under 37 CFR §1.132 for U.S. Appl. No. 09/548,839 executed Jan. 7, 2003.
Background of the Invention for the above-captioned application (previously provided).
U.S. Appl. No. 13/625,797, filed Sep. 24, 2012, Abrams.
U.S. Appl. No. 13/646,381, filed Oct. 5, 2012, Abrams.
U.S. Appl. No. 14/053,399, filed Oct. 14, 2013, Abrams.
International Search Report for International (PCT) Patent Application No. PCT/US2006/029410, mailed Nov. 19, 2007.
Written Opinion for International (PCT) Patent Application No. PCT/US2006/029410, mailed Nov. 19, 2007.
International Preliminary Report on Patentability for International (PCT) Patent Application No. PCT/US2006/029410, mailed Jan. 29, 2008.
Declaration of Louis Brown Abrams under 37 CFR § 1.98, Jan. 11, 2008, for U.S. Appl. No. 11/460,519, 5 pages.
Declaration of Louis Brown Abrams under 37 CFR § 1.98, for U.S. Appl. No. 11/460,493, signed Jan. 11, 2008, 5 pages.
"Aeroshoes the microporous membrane for absorption and desorption"; AeroShoes; available at http://www.aeroshoes.com/flashon/product/default.htm; 1 page; undated.
"Celgard Announces New Product and New Customer"; May 2, 2005; 1 page.
"Flockin'to Precision"; Images Magazine; Feb. 1992, 1 page.
"Product Information"Celgard Inc.; available at http://www.celgard.com/products/product-information.cfm; 1 page; undated.
"RMIUG Meeting Minutes—Colorado in the Information age"; Jan. 14, 1997; 1 page.
"Fabric Processing Guideline and Expected Product Attributes," Wellman, Inc., The Fibers Division (Jul. 25, 2001), 8 pages.
Bostik USA; "Industrial Adhesives" (2001), 3 pages.
Bostik USA; Web & Powder Adhesives; 2000; 2 pgs.

(56) **References Cited**

OTHER PUBLICATIONS

Brown Abrams, "Flocking a Touch of Velour" ScreenPrinting (Apr. 1987).
Brown Abrams, "Part II: Flocking" ScreenPrinting (Jun. 1987).
Lextra® MouseRug®; "About the Product" (Jan. 27, 1999), http://www.mouserug.com/mouserug/aboutmouserugs.html, 2 pages.
Lextra® MouseRug®; "Dimensions" (Jan. 27, 1999), http://www.mouserug.com/mouserug/dimensions.html, 1 page.
Lextra® MouseRug®; "MouseRug Components" (Jan. 27, 1999), http://wwww.mouserug.com/mouserug/mousecomp.html, 1 page.
Studt et al.; "Versatality on a roll: Thermoplastic adhesive films"; Collano; Oct. 2002; 8 pages.
Declaration of L. Brown Abrams Under 37 CFR § 1.98 for U.S. Appl. No. 09/735,721 dated Jan. 16, 2004, 2 pages.
Declaration of L. Brown Abrams under 37 CFR § 1.98 for U.S. Appl. No. 09/621,830 dated Jan. 7, 2003, 2 pages.
Declaration of L. Brown Abrams under 37 CFR § 1.98 for U.S. Appl. No. 10/394,357 dated Jan. 16, 2004, 4 pages with Appendix A-I.
Declaration of L. Brown Abrams under 37 CFR 1.132 for U.S. Appl. No. 09/735,721 dated Jan. 7, 2003.
Declaration of L. Brown Abrams under 37 CFR § 1.98 for U.S. Appl. No. 09/621,830 dated Jan. 16, 2004, 2 pages.
Declaration of L. Brown Abrams under 37 CFR § 1.98 for U.S. Appl. No. 10/394,357 dated Jan. 3, 2007, 4 pages with Appendix A-I.
Second Supplmenetal Declaration of L. Brown Abrams under 37 CFR § 1.132 for U.S. Appl. No. 09/548,839 executed Jan. 7, 2003.
Supplemental Declaration of L. Brown Abrams under 37 CFR § 1.132 for U.S. Appl. No. 09/548,839 executed Oct. 23, 2002.
"Polymers", Chemistry, Unit 16, date unknown, pp. 313-325.
"Bicomponent Fibers", available at http://web.utk.edu/~mse/pages/Textiles/Biocomponent%20fibers.htm, Updated Apr. 2004, 8 pages.
Bright, Larry. "Trouble Shooting Continuous Thermosol Dyeing of Polyester Fiber and Blends". American Dyestuff Reporter, Aug. 1996, pp. 60-61.
Protect-All Print Media, Inc., "Technical Information Artisyn® Synthetic Paper—Universal Grade", 5 pages. (undated).
Artisyn Synthetic Paper 165, Printability Product Specification Sheet, May 1997, 1 page.
Artisyn Synthetic Paper 165, Printability Product Specification Sheet, Mar. 1999, 2 pages.
PPG Industries., "Teslin® Product Printing Technology Compatibility", 2000, 1 page.
Artisyn Synthetic Paper 165, Printability Product Specification Sheet, Dec. 2000, 2 pages.
Artisyn Synthetic Paper 165, Printability Product Specification Sheet, Mar. 2001, 2 pages.
"Artisyn® Synthetic Paper—Applications In-Mold Graphics", http://www.artisynpaper.com/index.cfm?fuseaction=Applications.InMoldGraphics, printed Aug. 15, 2005, 1 page.
U.S. Appl. No. 09/621,830, filed Jul. 24, 2000, Abrams.
Abrams, Louis Brown, "Flocked Articles Having a Woven Graphics Design Insert and Methods of Making the Same" U.S. Appl. No. 12/397,946, filed Mar. 4, 2009.
Abrams, Louis Brown, "Flocked Slurried Thermosetting Adhesive Article" U.S. Appl. No. 11/957,205, filed Dec. 14, 2007.
Abrams, Louis Brown, "Co-Molded Direct Flock and Flock Trasnfer and Methods of Making Same" U.S. Appl. No. 11/972,440, filed Jan. 10, 2008.
Abrams, Louis Brown, "Co-Molded Direct Flock and Flock Transfer Methods of Making Same" U.S. Appl. No. 12/013,996, filed Jan. 14, 2008.
Abrams, Louis, Brown, "Sublimation Dye Printed Textile" U.S. Appl. No. 12/031,445, filed Feb. 14, 2008.
Abrams, Louis Brown, "Computer Mouse Pad Fabricated From Patterned Flock" U.S. Appl. No. 29/058,551, filed Aug. 19, 1996.
Abrams, Louis Brown, "Computer Mouse Pad Fabricated From Patterned Flock or Pile Fibers and method of Fabrication" U.S. Appl. No. 09/548,839, filed Apr. 13, 2000.
Abrams, Louis Brown "Flocked Elastomeric Articles" U.S. Appl. No. 11/533,699, filed Sep. 20, 2006.
Abrams, Louis Brown, "Flocked Adhesive Article" U.S. Appl. No. 11/560,679, filed Nov. 16, 2006.
Abrams, Louis Brown, "Flocked Multi-Colored Adhesive Article With Bright Lustered Flock" U.S. Appl. No. 11/565,974, filed Dec. 1, 2006.
PPG Industries, Inc., "Teslin® Sheet and the Environment", http://www.ppg.com/chm_teslin/whatsteslin/environ.htm, printed Jul. 27, 2005, 2 pages.
"Artisyn Synthetic Paper Product Overview", http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Overview, printed Aug. 15, 2005, 2 pages.
"Artisyn Synthetic Paper Characteristics & Benefits", http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Characteristics, printed Aug. 15, 2005, 2 pages.
"Artisyn Synthetic Paper Product Line", http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Products, printed Aug. 15, 2005, 1 page.
"Artisyn Synthetic Paper Printing Compatibility", http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Printing, printed Aug. 15, 2005, 2 pages.
"Artisyn Synthetic Paper Handling & Storage", http://www.artisynpaper.com/index.cfm?fuseaction=Artisyn.Handling, printed Aug. 15, 2005, 2 pages.
"Artisyn® Synthetic Paper—Applications Laminated Cards", http://www.artisynpaper.com/index.cfm? fuseaction=Applications.LaminatedCards, printed Aug. 15, 2005, 2 pages.
"Artisyn® Synthetic Paper—Applications Commericla Printing", http://www.artisynpaper.com/index.cfm? fuseaction=Applications.CommercialPrinting, printed Aug. 15, 2005, 2 pages.
"Artisyn® Synthetic Paper—Applications Tags & Labels", http://www.artisynpaper.com/index.cfm? fuseaction=Applications.TagsLabels, printed Aug. 15, 2005, 2 pages.
"Artisyn® Synthetic Paper—Applications Pressure Sensitive", http://www.artisynpaper.com/index.cfm? fuseaction=Applications.PressureSensitive, printed Aug. 15, 2005, 2 pages.
U.S. Appl. No. 12/580,120, filed Oct. 15, 2009, Abrams.
U.S. Appl. No. 12/624,254, filed Nov. 23, 2009, Abrams.
U.S. Appl. No. 12/636,421, filed Dec. 11, 2009, Abrams.
U.S. Appl. No. 12/612,524, filed Nov. 4, 2009, Abrams.
U.S. Appl. No. 12/706,622, filed Feb. 16, 2010, Abrams.
"Versaflex® OM Series Material Review", TPE Tips, Issue 5, GLS Corporation Rev. Jan. 12, 2007, 2 pages.
"Versaflex® OM 3060-1—Technical Data Sheet", GLS Corporation, available at http://glscorporation.com/gls2/print.jsp-?productID=182, Feb. 9, 2010, 2 pages.

* cited by examiner

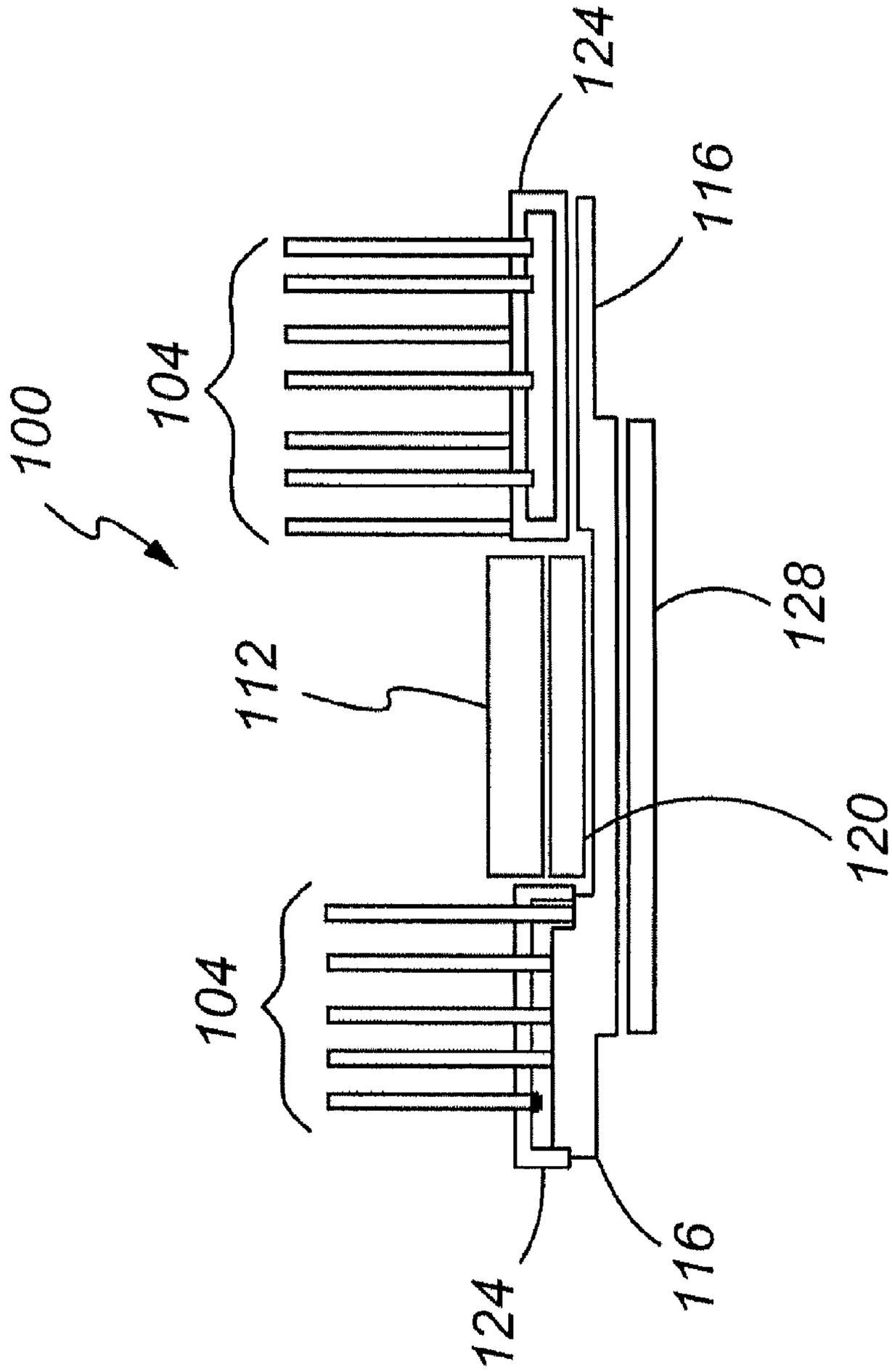


Fig. 1

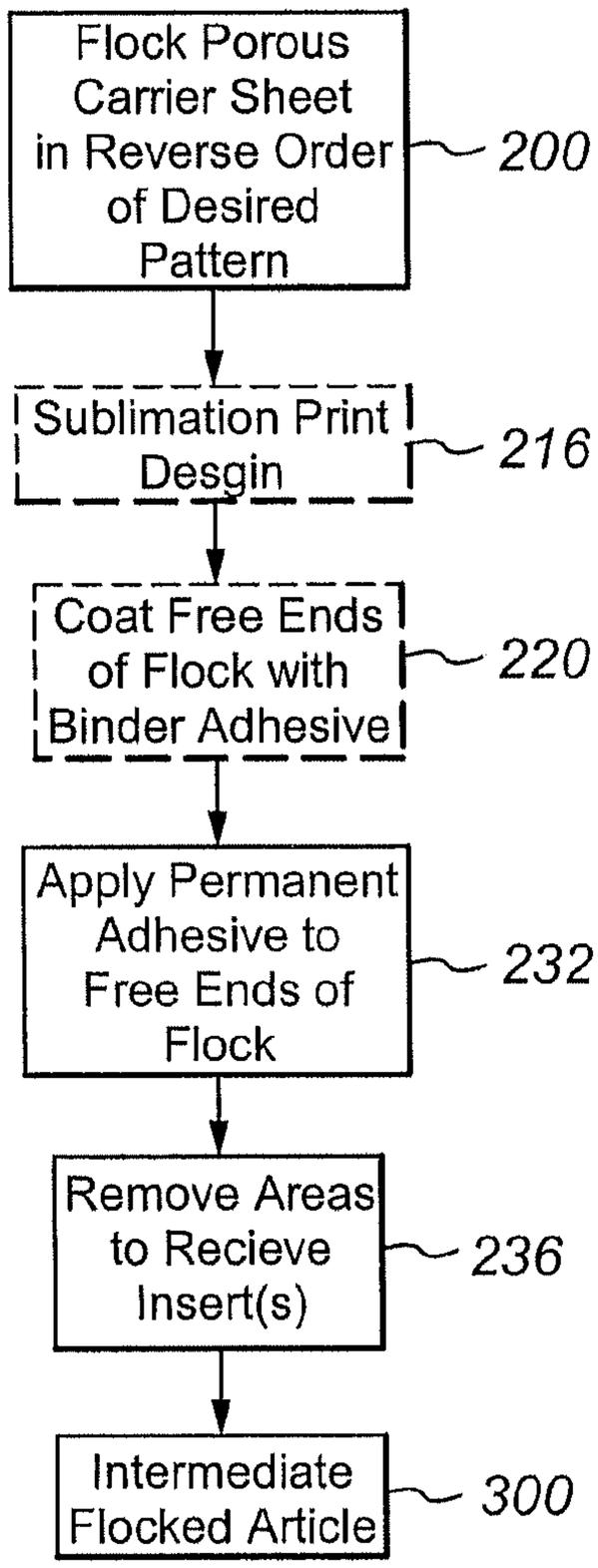

Flock Porous Carrier Sheet in Reverse Order of Desired Pattern
200
Sublimation Print Desgin
216
Coat Free Ends of Flock with Binder Adhesive
220
Apply Permanent Adhesive to Free Ends of Flock
232
Remove Areas to Recieve Insert(s)
236
Intermediate Flocked Article
300

Fig. 2

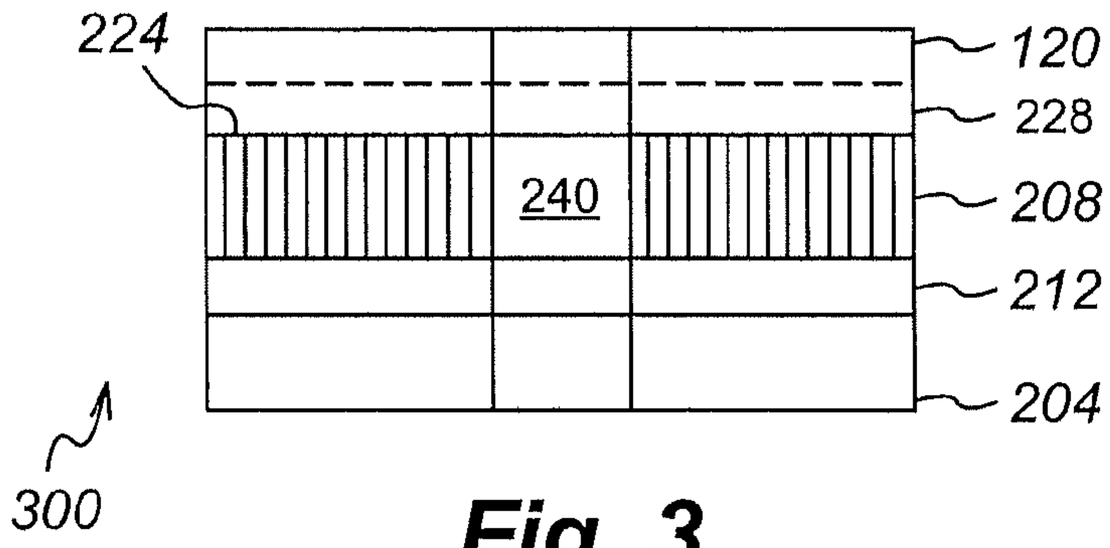

224
120
228
240
208
212
204
300

Fig. 3

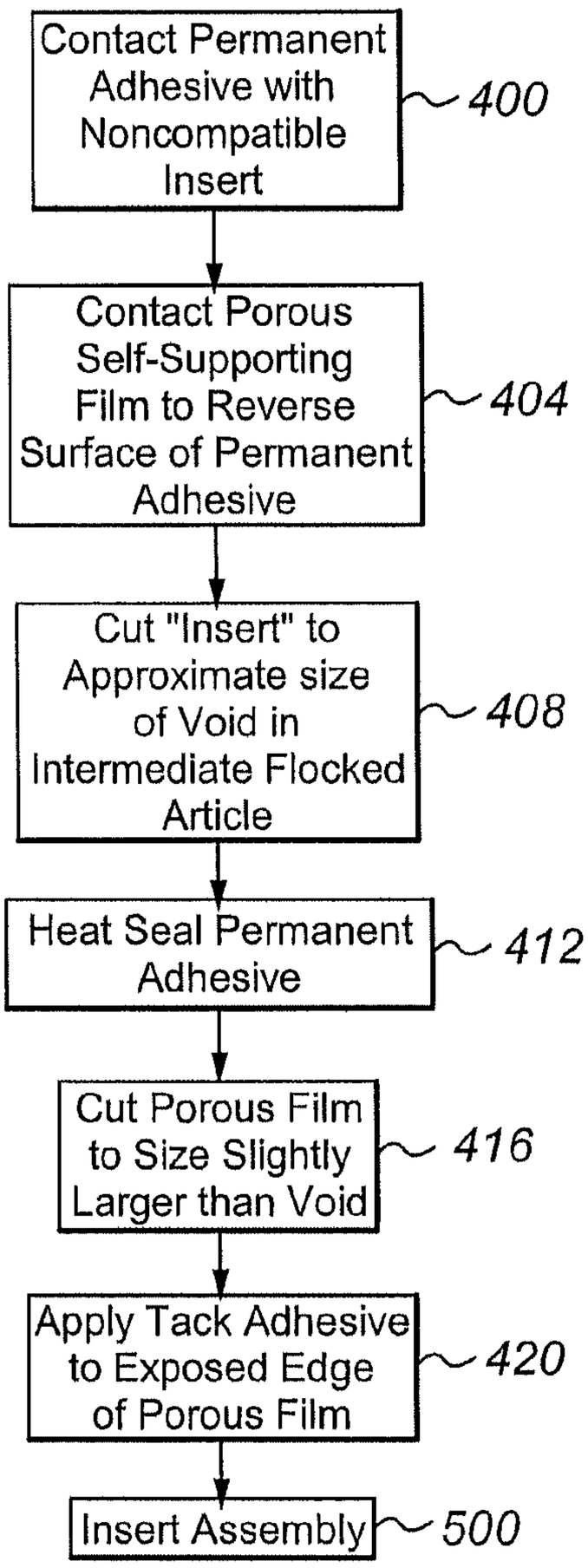

Contact Permanent Adhesive with Noncompatible Insert
400
Contact Porous Self-Supporting Film to Reverse Surface of Permanent Adhesive
404
Cut "Insert" to Approximate size of Void in Intermediate Flocked Article
408
Heat Seal Permanent Adhesive
412
Cut Porous Film to Size Slightly Larger than Void
416
Apply Tack Adhesive to Exposed Edge of Porous Film
420
Insert Assembly
500

Fig. 4

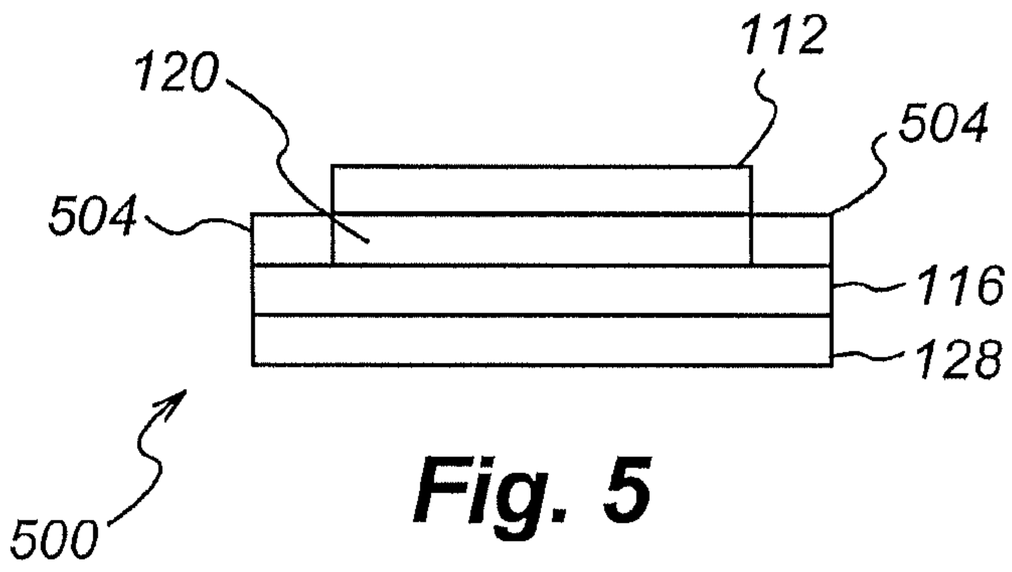

120
112
504
504
116
128
500

Fig. 5

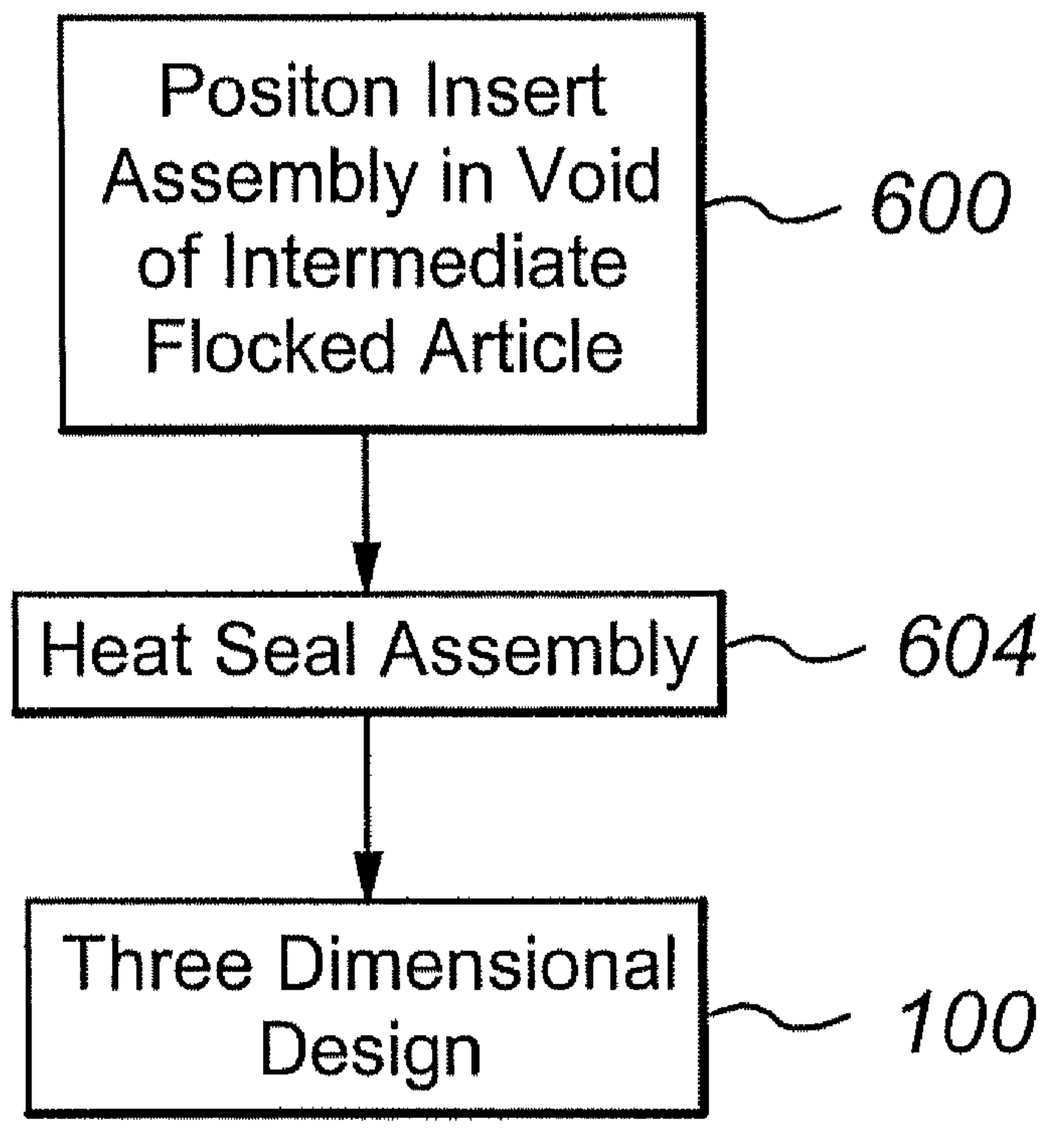

Positon Insert Assembly in Void of Intermediate Flocked Article
600
Heat Seal Assembly
604
Three Dimensional Design
100

Fig. 6

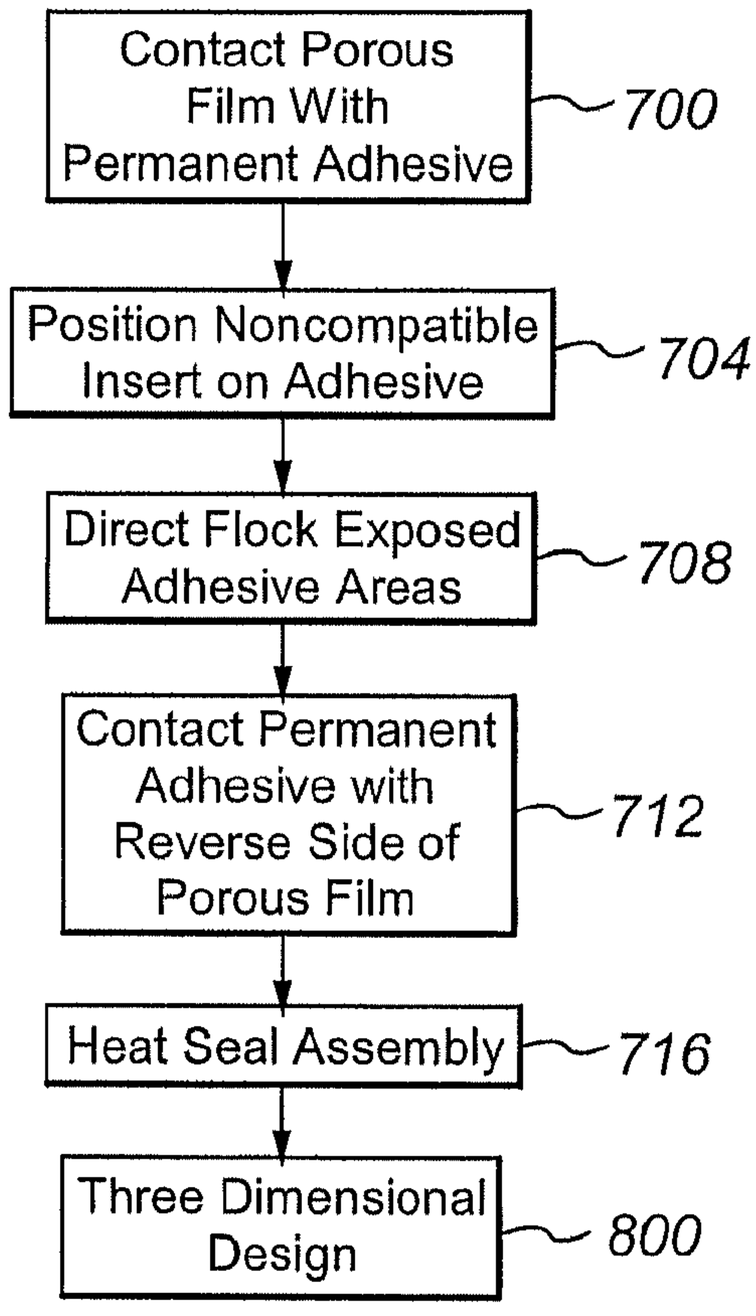

Contact Porous Film With Permanent Adhesive
700
Position Noncompatible Insert on Adhesive
704
Direct Flock Exposed Adhesive Areas
708
Contact Permanent Adhesive with Reverse Side of Porous Film
712
Heat Seal Assembly
716
Three Dimensional Design
800

Fig. 7

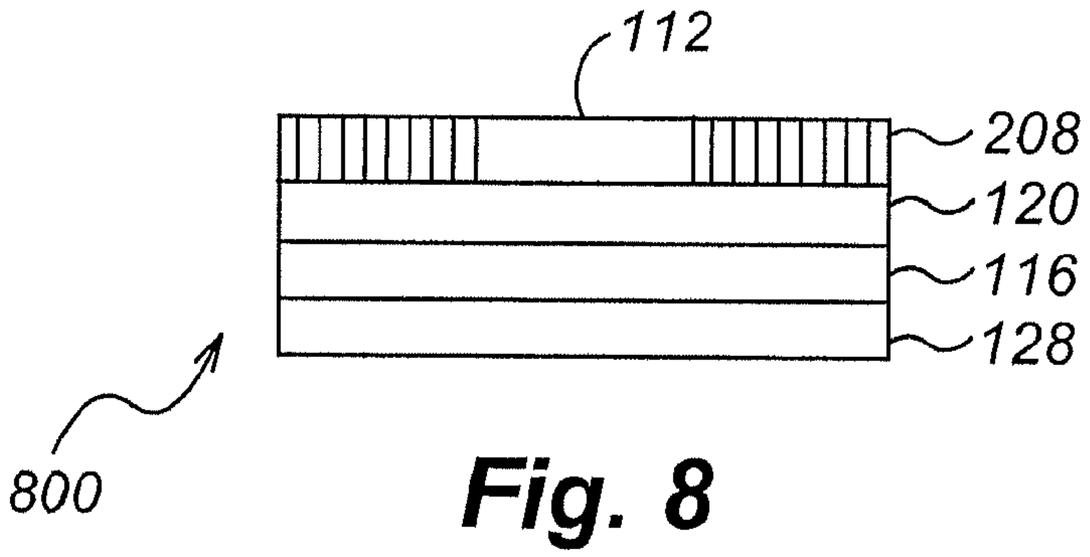

112
208
120
116
128
800

Fig. 8

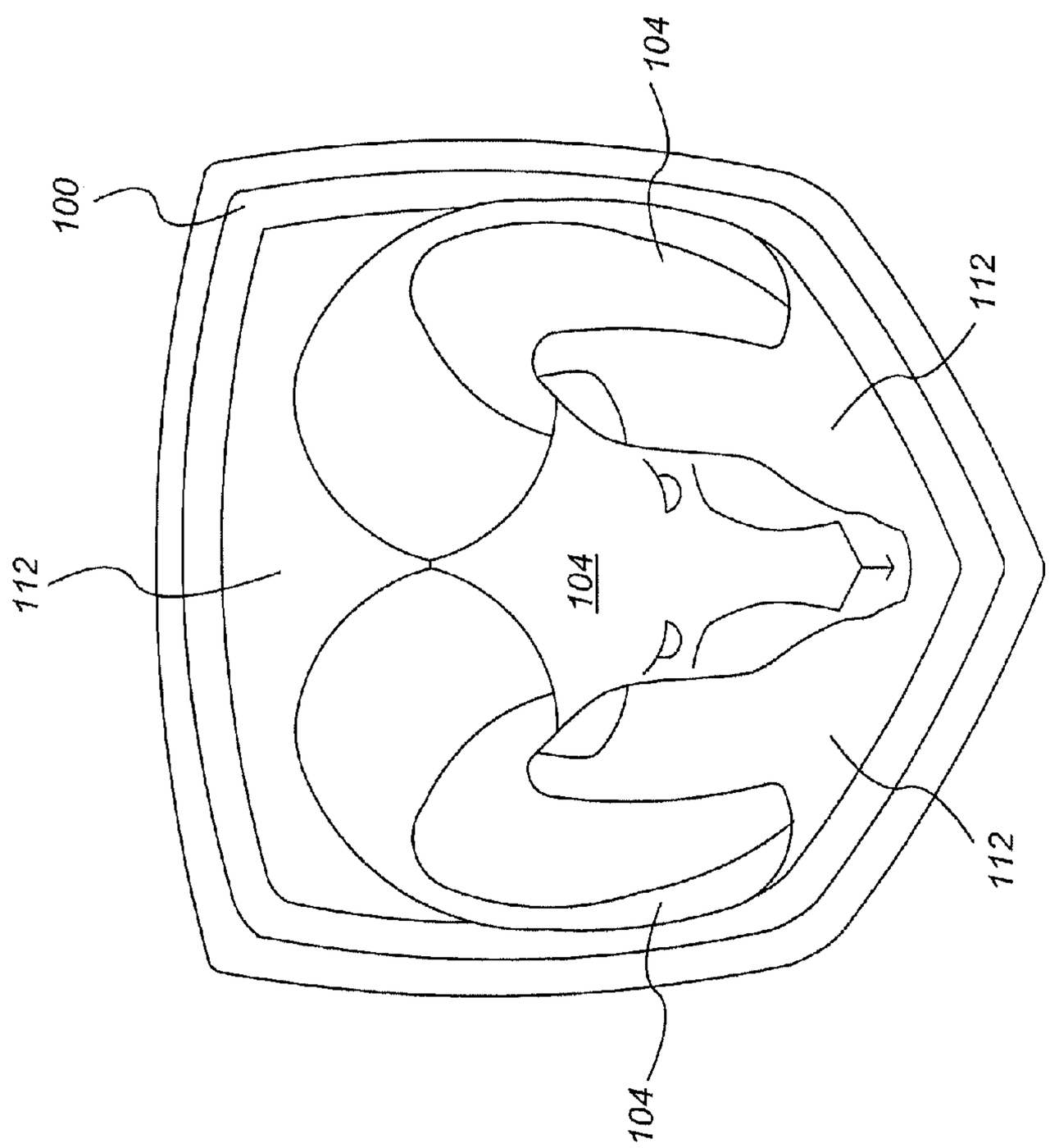


Fig. 9

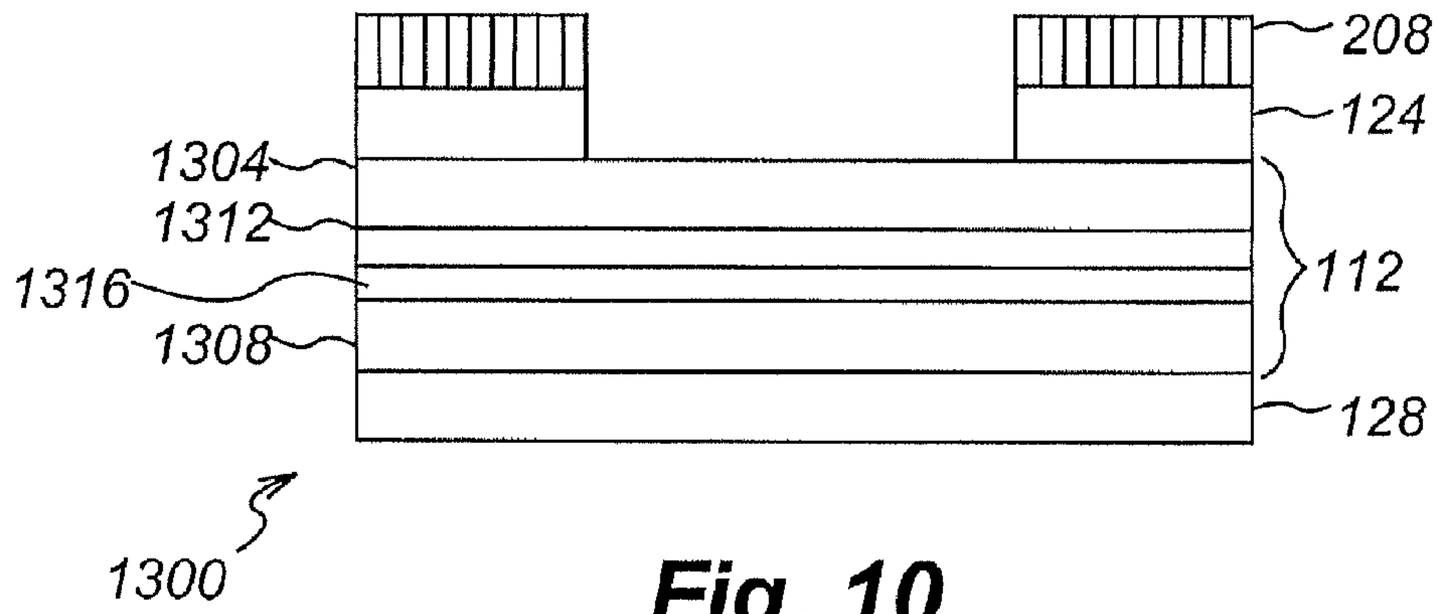

208
124
1304
1312
1316
1308
112
128
1300

Fig. 10

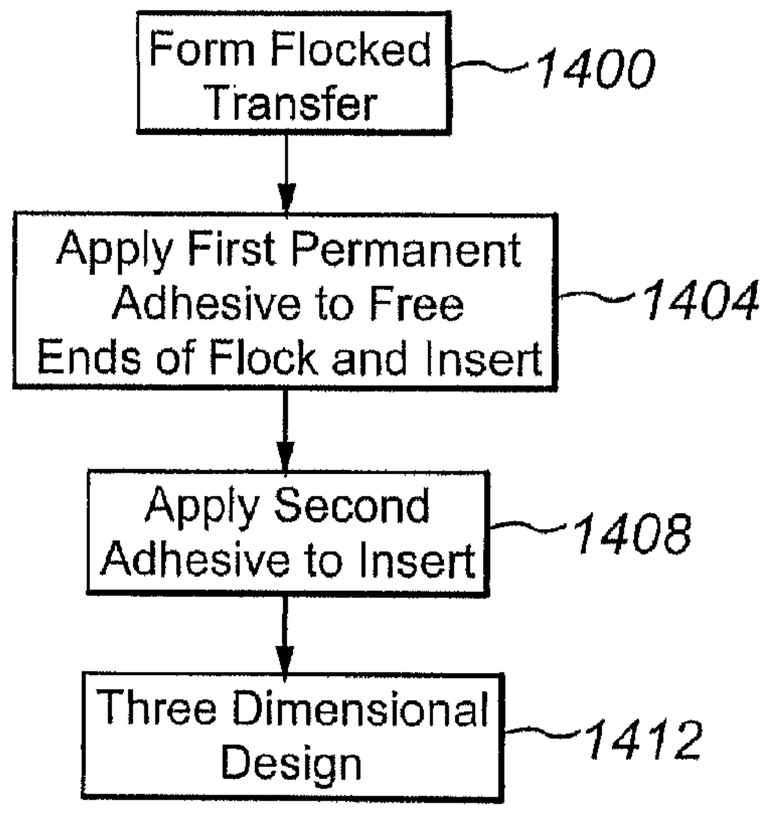

Form Flocked Transfer
1400
Apply First Permanent Adhesive to Free Ends of Flock and Insert
1404
Apply Second Adhesive to Insert
1408
Three Dimensional Design
1412

Fig. 11

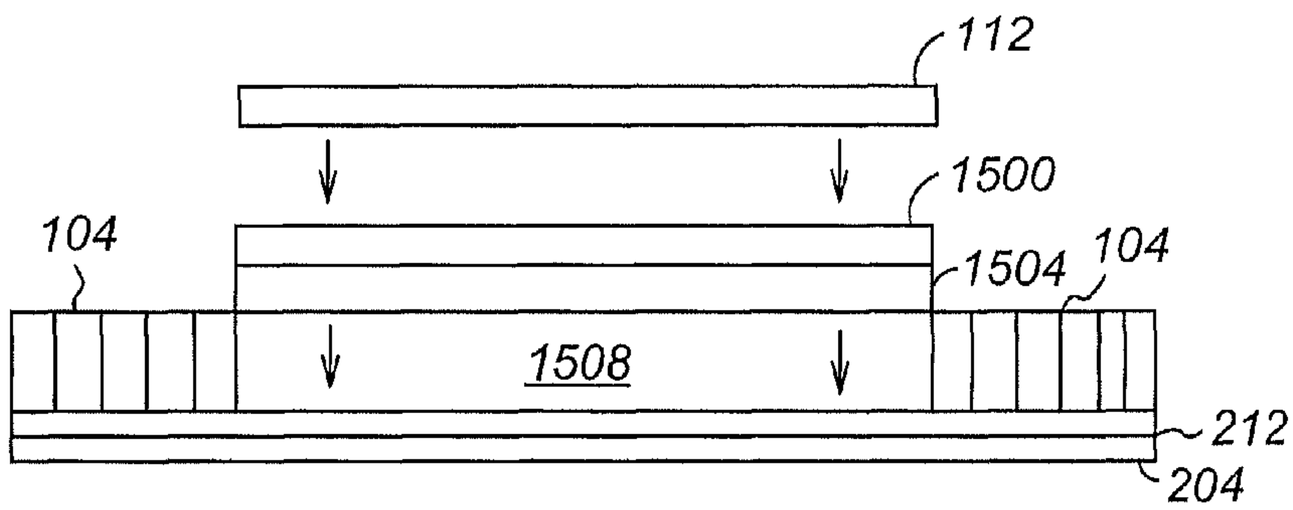


Fig. 12

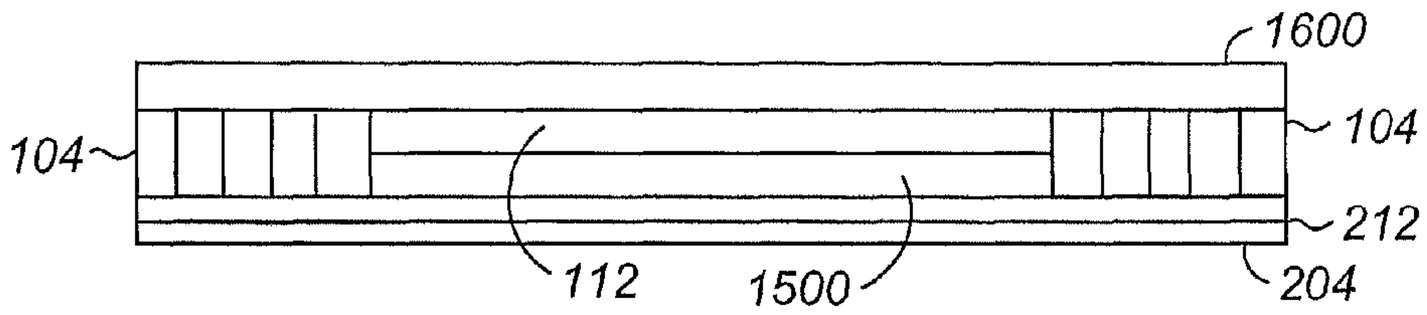


Fig. 13

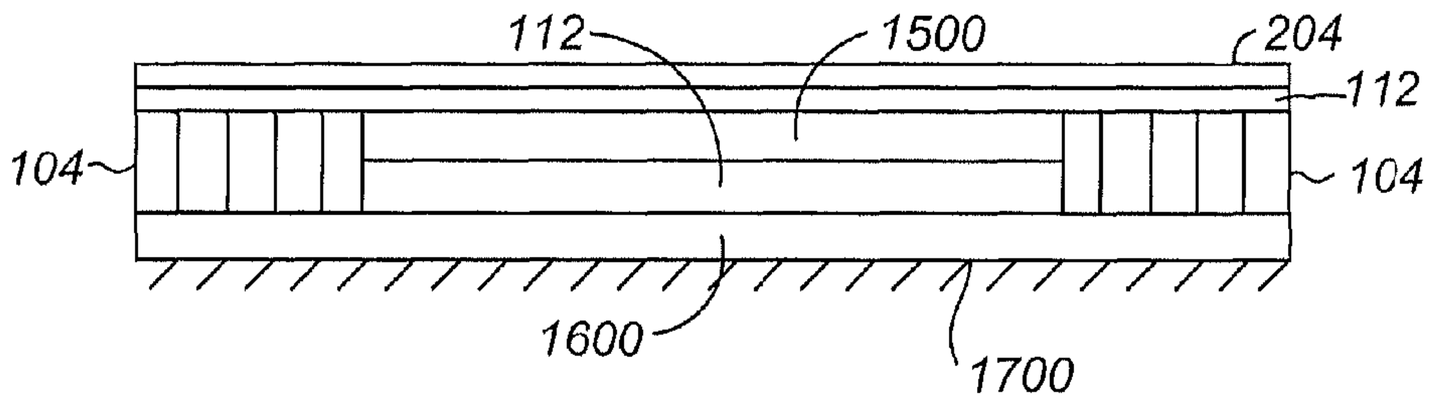


Fig. 14

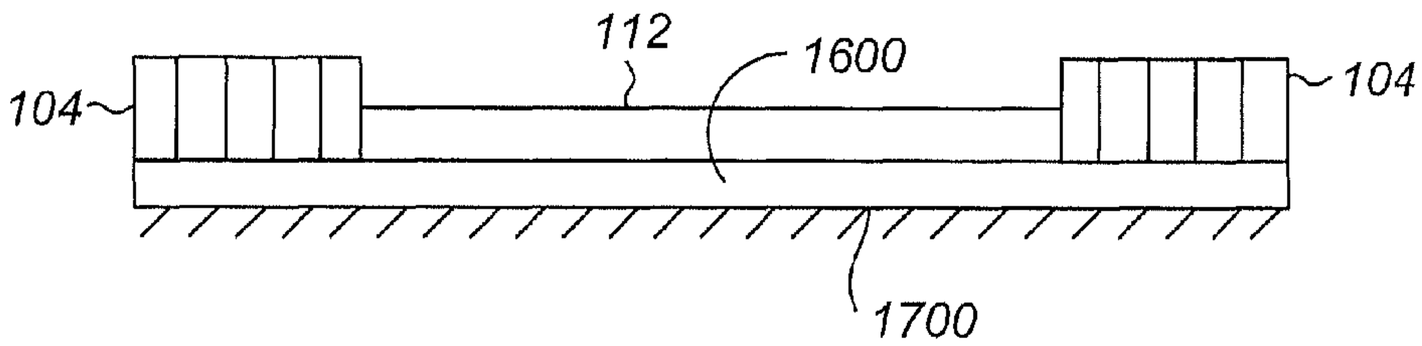


Fig. 15

FLOCKED ARTICLES HAVING NONCOMPATIBLE INSERT AND POROUS FILM

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

CROSS REFERENCE TO RELATED APPLICATION

The present application claims the benefits, under 35 U.S.C. §119(e), of U.S. Provisional Application Ser. Nos. 60/703,925, filed Jul. 28, 2005, entitled "Flocked Design with Three Dimensional Metallic Insert"; 60/704,681, filed Aug. 1, 2005, of the same title; 60/707,577, filed Aug. 11, 2005, of the same title; 60/710,368, filed Aug. 22, 2005, of the same title; 60/716,869, filed Sep. 13, 2005, of the same title; 60/719,469, filed Sep. 21, 2005, of the same title; 60/779,317, filed Mar. 3, 2006, of the same title; and 60/786,528, filed Mar. 27, 2006, of the same title; each of which is incorporated herein by this reference.

FIELD

The invention relates generally to flocked articles and particularly to flocked graphics.

BACKGROUND

Flocked articles are used in a wide variety of applications. Flocked articles are being used for textile decoration as well as molded articles. Flock is a short precision cut or pulverized natural or synthetic fiber used to produce a velvet like coating on cloth, rubber, film, or paper. Flock generally has a length between about 0.010 to 0.250 inches (0.25 mm to 6.25 mm).

In these applications, it has been highly desired to have multi-media flocked articles including a material having a metallic sheen or luster. Metal noncompatible inserts have been used in the prior art but the metal inserts have rapidly faded due to ultraviolet light exposure, wear, and/or the effects of repeated washings. It is therefore desirable to have a multi-media flocked article having a noncompatible insert that resists fading.

SUMMARY

These and other needs are addressed by the various embodiments and configurations of the present invention. The present invention is directed to flocked articles and graphics comprising a compatible and/or noncompatible (or incompatible) material, such as a metallized film. As used herein, a "metallized film" refers to any material, whether metal or a nonmetal, having a metal-like appearance (e.g., metal-like sheen or luster).

In one embodiment of the present invention, a metallized film is used to provide a number of highly attractive colors, sheens and matte finishes. In one configuration, the metallized film is metallic in appearance. In one configuration, it contains a metal layer vapor deposited on a first polymeric film with a second polymeric film being located on the opposing side of the metal layer. The metal layer is sandwiched between the first and second polymeric layers by means of a laminate adhesive. The polymeric layers can be UV-resistant, water resistant, thermally stable, and otherwise designed to resist wear and deterioration. Preferably, the polymeric layers are a polycarbonate. Thus, unlike conventional metal-containing noncompatible inserts water discoloration of the insert is typically not a problem. This can obviate the need to apply additional protective layers to the insert to protect any metal from oxidation.

The metallized film can have a highly desirable mirror-like metallic look from the metallized layer, a high abrasion resistance of the sandwiching polymeric films to protect the metal and laminate adhesive from fading, discoloration, and/or corrosion, and a high ability to accept and adhere to a wide variety of hot melt thermoplastic or thermoset adhesives, whether in the form of a liquid, power, or preformed film.

The flocked article can include a porous film to act as a binder or tie material for the otherwise incompatible or weakly compatible materials, namely the flock and the metallized film. The porous film can bond well to a number of otherwise compatible and noncompatible materials on opposite sides, thus serving well as a so-called "tie coat" layer. For example, the film bonds to a variety of adhesives as noted above. The adhesives can be applied as a thermoplastic powder, a self-supporting heat-activated film, or as a liquid coating. In particular, the film may be readily laminated to preformed, self-supporting films of thermoset and/or thermoplastic adhesive(s)s, including hot melt adhesive(s).

The porous film, though having modest tensile strength when taken alone, can experience substantial improvements in tensile strength when combined with one or more other materials. For example, the film, by itself, lacks the strength of conventional paper carriers and therefore would at first blush appear to be a poor candidate for use in a machine (web) based-process and in products that need to be durable. However, when coated with water or solvent-based release adhesives the release adhesives not only provide an adhesive surface to capture and hold flock fibers but also provides a substantial improvement in film strength after the adhesive is dried and cured. While not wishing to be bound by any theory, it is believed that the release adhesive is carried into the film matrix by the combined effects of the film's porosity and permeability and, after drying, substantially fills the pores in the film to provide the desired strength enhancement. The synergistic effect of the release adhesive and the porosity/permeability of the film makes the porous film strong enough to withstand the forces applied during subsequent processing stages, such as web-type tensile forces, vacuum cleaning, mechanical brushing, baking, and heat transfer application processes (e.g., heat pressing, cooling, pulling the carrier, and releasing the fibers). Additional support film(s) may nonetheless be added to the side of the porous film opposite the side containing the flock to provide further support.

These and other advantages will be apparent from the disclosure of the invention(s) contained herein.

The above-described embodiments and configurations are neither complete nor exhaustive. As will be appreciated, other embodiments of the invention are possible utilizing, alone or in combination, one or more of the features set forth above or described in detail below.

As used herein, "at least one", "one or more", and "and/or" are open-ended expressions that are both conjunctive and disjunctive in operation. For example, each of the expressions "at least one of A, B and C", "at least one of A, B, or C", "one or more of A, B, and C", "one or more of A, B, or C" and "A, B, and/or C" means A alone, B alone, C alone, A and B together, A and C together, B and C together, or A, B and C together.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross section of a three dimensional design according to an embodiment of the present invention;

FIG. **2** is a block diagram of a process embodiment to make an intermediate flocked article for use in the three dimensional design;

FIG. **3** is a cross section of an intermediate flocked article;

FIG. **4** is a block diagram of a process embodiment to make an insert assembly for use in the three dimensional design;

FIG. **5** is a cross section of an insert assembly;

FIG. **6** is a block diagram of a process embodiment to make the three dimensional design;

FIG. **7** is a block diagram of a process embodiment to make a three dimensional design according to another embodiment;

FIG. **8** is a cross section of the three dimensional design;

FIG. **9** is an exemplary decorative media according to an embodiment of the present invention;

FIG. **10** is a cross section of another embodiment of a three dimensional design in accordance with the present invention;

FIG. **11** is a block diagram of a process to make the three dimensional design of FIG. **10**;

FIG. **12** is a side view of a decorative media in a first step of a production process according to an embodiment of the present invention;

FIG. **13** is a side view of the decorative media in a second step of the production process;

FIG. **14** is a side view of the decorative media in a third step of the production process; and

FIG. **15** is a side view of the decorative media after application to a substrate.

DETAILED DESCRIPTION

FIGS. **1** and **9** show a three-dimensional design according to an embodiment of the present invention. The design **100** includes (multi-colored or sublimation printed) flocked areas **104** surrounding a plurality of compatible or noncompatible inserts **112**. The inserts **112** are adhered to a porous film **116** by a first adhesive **120**. Additionally, the porous film **116** is adhered to the flock areas **104** by a flock (second) adhesive **124**. Finally, the design **100** is adhered to a desired substrate, such as a textile, by a permanent (third) adhesive **128**.

The inserts **112** can be any design media, such as glass beads. In a preferred embodiment, the inserts **112** are formed from one or more polymeric light diffusing films, such as polycarbonate and/or polyester light diffusion films sold under the tradenames Makrofol™ and/or Bayfol™. The films are preferably metal-containing and have a first and/or second surface gloss (60° angle with black inked second surface) of at least about 50 gloss units, more preferably of at least about 75 gloss units, and even more preferably of at least about 75 gloss units, first and/or second surface roughnesses (R3Z) of no more than about 20 microns, more preferably of no more than about 3 microns, and even more preferably of no more than about 1 micron, and a luminous transmittance of no more than about 50%, more preferably no more than about 5%, and even more preferably no more than about 1%. The insert **112** preferably has a metallic or nonmetallic sheen and a gloss/fine matte and a thickness of no more than about 0.5 inches, more preferably of no more than about 0.25 inches, and even more preferably of no more than about 0.20 inches. A particularly preferred insert is Makrofol™ DPF 5072™.

The porous film **116** is preferably a microporous material that includes a matrix of substantially water insoluble thermoplastic organic polymer, finely divided substantially water-insoluble filler particles and a network of interconnected pores communicating substantially throughout the microporous material. The filler particles are distributed throughout the matrix and constitute from about 40 to about 90 percent by weight of the microporous material. The filler particles are a metal oxide, such as alumina, silica, and titania with silica being preferred. Preferably, at least 50 percent by weight of the particles are amorphous precipitated silica particles. The particles have a preferred maximum dimension of less than about 5 micrometers, more preferably no more than about 1 micrometer, even more preferably no more than about 0.1 micrometers, and even more preferably no more than about 0.05 micrometers and a preferred average pore size of less than 1 micrometer and more preferably of no more than about 0.1 micrometer. The pores preferably constitute from about 35 to about 95 percent by volume of the microporous material. The matrix of the microporous material includes a water-insoluble thermoplastic organic polymer. Examples of suitable polymers include polyolefins, poly(halo-substituted olefins), polyesters, polyethylenes, polyamides, polyurethanes, polyureas, poly(vinyl halides), poly(vinylidene halides), polystyrenes, poly(vinyl esters), polycarbonates, polyethers, polysulfides, polyimides, polysilanes, polysiloxanes, polycaprolactones, polyacrylates, and polymethylacrylates, with poly(vinyl chloride), copolymers of vinyl chloride, and mixtures thereof being preferred. The material may further include plasticizers, lubricants, and antioxidants.

The microporous material is preferably coated with a substantially nonporous coating composition including a volatile liquid medium (e.g., water and/or a nonaqueous solvent) and binder dissolved or dispersed in the medium. The binder includes a film-forming organic polymer, preferably including (a) water-soluble poly(ethylene oxide) having a preferred weight average molecular weight in the range of from about 100,000 to 3,000,000 and (b) water-soluble or water-dispersible crosslinkable urethane-acrylate hybrid polymer. In addition to or in lieu of poly (ethylene oxide), the organic polymer may further include additional organic polymers such as water-soluble cellulosic organic polymers, water-soluble noncellulosic organic polymers, and/or water dispersible polymers such as poly(ethylene-co-acrylic acid), poly(ethylene), and poly(ethylene oxide). The poly(ethylene oxide) includes copolymers of ethylene oxide with lower alkylene oxide and homopolymers of ethylene oxide. Preferably, the organic polymer component of the coating includes from about 20 to about 80% by weight of the urethane-acrylate hybrid polymer. The coating may further include surfactants and adjuvant materials. After drying and crosslinking, the peel strength between the coating and microporous material substrate is high.

The film has a preferred puncture strength of greater than about 300 g/25.4 μm, a preferred tensile strength of less than about 2% at 1000 psi, and a preferred thermal ability of less than about 5% shrinkage after 160 minutes at 90° C.

A preferred porous film is further discussed in U.S. Pat. No. 6,025,068, which is incorporated herein by this reference. A particularly preferred porous film is sold by PPG Industries Inc. under the tradename Teslin™. Battery separator membranes can also be used. Examples include Daramic Industrial CL™ sold by Daramic, Inc., and the battery separator membranes sold by Celgard, or by Daramic, Inc. under the tradename Artisyn™. Artisyn™ is an uncoated, mono-layer, highly filled polyolefin sheet.

The flock fibers in the flock layer **1104** can be any desirable material, whether natural or synthetic. Preferably, the flock is composed of polyester (such as poly(ethylene terephthalate) and poly(cyclohexylene-dimethylene terephthalate)), vinyl, nylon, rayon, and the like.

The various permanent adhesives **1108**, **1116**, and **1120** can be any suitable adhesive, with water- and solvent-based adhesives and preformed film adhesives being preferred. Preferred permanent adhesives include thermoset and hot melt thermoplastic adhesives, whether as a liquid, powder, or (preformed) self-supporting film. As will be appreciated, thermoset adhesives solidify, activate and/or set irreversibly when heated above a certain temperature. This property is usually associated with a cross-linking reaction of the molecular constituents induced by heat or radiation. Thermoset adhesives can include curing agents such as organic peroxides, isocyanates, or sulfur. Examples of thermoplastic and thermosetting adhesives include polyethylene, phenolics, alkyds, acrylics, amino resins, polyesters, epoxides, polyurethanes, polyamides, and silicones.

The adhesives **1108**, **1116**, and **1200** may contain additives, such as fillers, catalysts, colorants (dyes or pigments) and optical blocking/reflective/absorbtive materials. The preferred porous film, namely Teslin™ and Artisyn™, can be highly sensitive to Ultraviolet (UV) radiation and can degrade rapidly when exposed to direct sunlight. Accordingly, the adhesives may contain light blocking, absorbing, and/or reflecting materials to decrease substantially the optical transmissivity of the adhesive. Preferably, the adhesive, when on the light contacting side of the porous film, blocks at least about 75%, more preferably at least about 85%, and even more preferably at least about 95% of the UV radiation spectrum. Such optical blocking/reflecting/absorbing materials are known to those of skill in the art.

Referring to FIGS. **1-6** and **9**, a first process embodiment to manufacture the three dimensional design **100** will now be described. It is to be appreciated that those of ordinary skill in the art will envision other methods of manufacturing the design **100**. Such other methods are considered to be a part of the present invention.

With reference to FIG. **2**, the steps to produce an intermediate flocked article **300** will now be described.

In step **200** a carrier sheet **204** is flocked with flock fibers **208** in the reverse order of the desired pattern. The carrier sheet can be any substrate that is dimensionally stable under the conditions of temperature and pressure encountered during the process. The carrier sheet **204** is preferably a porous film, such as the porous film **116** described above, coated with a release adhesive **212**, which is preferably water-based. Typically (but not always), the carrier is a discontinuous sheet as opposed to a continuous sheet on a running web line.

The release adhesive **212** can be any adhesive that adheres more strongly to the carrier sheet than the flock fibers but adheres to both enough to hold them together. For example, the release adhesive **212** can be any temporary adhesive, such as a resin or a copolymer, e.g., a polyvinyl acetate, polyvinyl alcohol, polyvinyl chloride, polyvinyl butyral, acrylic resin, polyurethane, polyester, polyamides, cellulose derivatives, rubber derivatives, starch, casein, dextrin, gum arabic, carboxymethyl cellulose, rosin, silicone, or compositions containing two or more of these ingredients.

It is desired that, when the flock fibers are removed from the release adhesive, the fibers are substantially free of release adhesive. The release adhesive may be applied in the form of a solution or emulsion. The release adhesive may be applied on the carrier in the perimeter shape of the desired design or without regard to the overall design desired. The release adhesive may be applied by any suitable technique such as, for example, by applying the release adhesive with rollers or spraying the release adhesive.

In optional step **216**, the exposed ends **224** of the flocked surface are sublimation printed to provide the desired design on the flock. Sublimation printing is described in copending U.S. applications Ser. Nos. 10/614,340, filed Jul. 3, 2003; Ser. No. 11/139,439, filed May 26, 2005; and Ser. No. 11/036,887, filed Jan. 14, 2005, to Abrams, each of which is incorporated herein by this reference. As will be appreciated, common ways of performing sublimation ink direct printing include inkjet or screen sublimation ink printing and sublimation transfer printing using devices such as an inkjet dye sub printer, a ribbon-based dye sub printer, a hybrid sublimation printer, and a small dye sub ribbon-based printer. In inkjet (direct) sublimation ink printing, a special heat sensitive dye is used in a computer-controlled printer, such as an HP 550™, or Mimaki JV4™ to sublimation print the ink onto the flock fibers through vapor phase transportation of the ink from the printer to the flock fibers. The transferred dye is then heat and pressure thermofixed and thereby enters the amorphous areas of the fiber matrix. As noted, vacuuming of the flock can be conducted preferably before or after sublimation ink printing. Commonly, the color must go all the way down the fiber.

In optional step **220**, the free ends **224** of the flock are coated with a binder adhesive **228**. This process is discussed in U.S. Pat. Nos. 4,810,549; 5,207,851; 5,597,637; 5,858,156; 6,010,764; 6,083,332; and 6,110,560, which are incorporated herein by this reference. A suitable binder adhesive is a water based acrylic which binds the flock together as a unit. The binder adhesive **228** adhesive may contain a hot melt adhesive.

In step **232**, the permanent (second) adhesive **124** is contacted with the free ends **224** of the flock **208** (or with the binder adhesive **228** depending on the process configuration employed). In one configuration, the second adhesive **124** is a thermoplastic or thermoset adhesive and is heated to a temperature sufficient to adhere the adhesive **124** to the flock **208**. For a thermoset adhesive, the temperature is below the temperature at which the adhesive cross-links and is no longer reversible.

In step **236**, areas of the assembly are removed to form voids **240** to receive the inserts **112** will be appreciated, the sizes of the areas removed are approximately the same size as the size of the corresponding insert **112**. The void **240** passes completely through the assembly. In other words, the void **240** is free of adhesives **120**, **224**, and **212**, the carrier sheet **204**, and flock **208**.

The process yields the intermediate flocked article **300** shown in FIG. **3**.

With reference to FIG. **4**, the steps to produce the insert **112** will now be described.

In step **400**, the first permanent adhesive **120** is contacted with the noncompatible insert **112**.

In step **404**, the upper surface of the porous film **116** (of which the lower surface has previously been contacted with the third permanent adhesive **128**) is contacted with the first permanent adhesive **120**.

In step **408**, the insert **112** and first permanent adhesive **120** are cut to the size and shape of the void **240** in the intermediate flocked article **300**. Cutting may be made by known techniques, such as a laser or a mechanical cutting device.

In step **412**, the first (and third) permanent adhesives **120** and **128** are heat sealed. Heat sealing preferably occurs at a temperature within the thermoplastic behavior regime. Thus, when the permanent adhesive is a thermoset adhesive, the adhesive following step **412** is not thermoset

As will be appreciated, steps **404**, **408**, and **412** may be performed in any order. For example, step **408** may be performed before step **404**. Steps **400**, **404**, and **412** can be performed simultaneously, such as by lamination.

In step **416**, the porous film, which was not cut in step **408**, is cut to a size slightly larger than the void **240**. This oversize relative to the void size is shown in FIG. **1**. The overlapping edge of the porous film is used to secure the insert to the intermediate flocked article.

In step **420**, a tack adhesive **504** is applied to the overlapping edge of the porous film to provide the insert assembly **500** depicted in FIG. **5**.

FIG. **6** depicts the final steps of the process to form the three dimensional design **100**.

In step **600**, the insert **112** is positioned in the void **240** as shown in FIG. **1**. The tack adhesive **504** temporarily holds the insert assembly **500** in position.

In step **604**, the consolidated assembly formed from the insert assembly **500** and intermediate flocked article **300** is heat sealed to thermoplastically (and reversibly) set the second adhesive **124** and permanently adhere the porous film **116** to the flocked article **300**.

The final three dimensional design **100** is shown in FIG. **1**.

Another process embodiment to form a three dimensional design is depicted in FIGS. **7** and **8**. The design **800** includes the flock **208**, insert **112**, porous film **116**, and first and third adhesives **120** and **128**.

In step **700**, the porous film **116** is contacted with the first (and optionally third) permanent adhesives **120** and **128**.

In step **704**, the incompatible insert **112** is positioned on the first permanent adhesive **120**.

In step **708**, the exposed portions of the first permanent adhesive **120** are direct flocked by known techniques. Preferably, direct flocking is performed electrostatically by imparting a charge to the flock fibers and using an electric field to deposit the flock fibers on the oppositely charged substrate. The insert **112** acts as a mask and prevents flock fibers from being deposited in the area(s) to be occupied by inserts **112**.

In optional step **712**, the third permanent adhesive **128**, if not already applied to the reverse side of the porous film **116**, is now contacted with that side.

In step **716**, the assembly is heated sealed to thermoplastically set the first and third adhesives. Following heat sealing or curing of the adhesive layers, which is typically performed using radiation (e.g., heat or light), the flocked surface can be vacuumed to remove loose flock fibers.

The final three dimensional design **800** is depicted in FIG. **8**.

Another process embodiment to form a three dimensional design is depicted in FIGS. **10** and **11**. The design **1300** includes the flock **208**, insert **112**, and first and second permanent adhesives **124** and **128**. The first permanent adhesive **124** is preferably a thermoset adhesive, and the second permanent adhesive **128** is a thermoplastic hot melt adhesive.

The insert **112** components are also shown in FIG. **10**. The insert **112** comprises first and second polymer films **1304** and **1308** (which are preferably polycarbonate films) sandwiching a metal film **1312** and laminate adhesive **1316**. The insert **112** is formed by depositing the metal film **1312**, such as by vapor deposition techniques, on the first polymer film **1304**, followed by contacting the metal film or second polymer film **1308** with the laminate adhesive **1316**, and finally laminating the first and second polymer films, metal film, and laminate adhesive together. To created desired metal appearances, the first or second polymer film can be colored, using suitable dyes or pigments or other colorants. Metal shades can be thus produced, such as brass, copper, and the like.

As a result of the properties of the adhesive, the insert is able to withstand exposure to temperature extremes and water, including washing and heat pressing. Other metallized films and/or laminates will let the metal layer begin to corrode (e.g., from the combined effects of water and detergent) from the outside edges where it is exposed and the corrosion progresses into the laminate, which delaminates the two films at the metal layer.

In other configurations, the first permanent adhesive is a composite of a thermoset adhesive contacting the flock and a thermoplastic adhesive contacting the insert. The thermoplastic adhesive is preferably a hot melt adhesive

FIG. **11** shows the process to manufacture the product of FIG. **10**.

In step **1400**, a flocked transfer, comprising a porous film, water-based release adhesive, and flock, is formed by electrostatic flocking techniques.

In step **1404**, the free ends of the flock in the flock transfer are contacted with the first permanent adhesive and insert. The first permanent adhesive is heated to adhere to the flock. Preferably, the first permanent adhesive is thermoset in this step. This step may be performed by any technique, with lamination techniques being preferred. A preferred technique is discussed in copending U.S. application Ser. Nos. 09/621,830, filed Jul. 24, 2000; Ser. No. 10/455,541, filed Jun. 4, 2003; and Ser. No. 10/670,091, filed Sep. 23, 2003.

In step **1408**, the flock transfer/first permanent adhesive/insert assembly is contacted with the second permanent adhesive to form the three dimensional design **1412**. This step may be performed using any technique, with lamination techniques being preferred. A preferred technique is discussed in copending U.S. application Ser. No. 09/735,721, filed Dec. 13, 2000, and Ser. No. 10/455,575, filed Jun. 4, 2003.

Yet another embodiment of the composite media will be described with reference to FIGS. **12-15**. The media is based on the processes described in U.S. Pat. Nos. 6,010,764 and 6,110,560, each of which is incorporated herein by this reference.

With reference to FIG. **12**, the process to produce the media commences by bringing together, such as by lamination techniques, a flocked release sheet, pressure sensitive adhesive **1500**, and the insert **112**. The flocked release sheet includes flocked areas **104** embedded in the release adhesive **212**, which is applied to the carrier sheet **204**. The pressure sensitive adhesive **1500** is backed by a paper backing **1504**. The flocked areas **104** are discontinuous being separated by a space **1508** sized to receive the insert **112**. The pressure sensitive adhesive **1500** is applied to a surface of the insert **112**. The paper backing **1504** is then removed and the pressure sensitive adhesive **1500** adhered to the release adhesive **212**. For better adhesion, the release adhesive **212** may be omitted from the space **1508**, which is to be free of flock. The omission of the release adhesive from this area may be done using screen printing techniques. In another configuration, the tack adhesive **1500** is omitted and the release adhesive **212** included in the space **1508** to adhere the insert temporarily to the carrier sheet **204**.

With reference to FIG. **13**, a layer of a hot melt adhesive **1600**, whether applied as a preformed self-supporting layer, powder, or liquid, is applied to the free surfaces of the flock and the insert **112**. Preferably, the hot melt adhesive **1600** is applied as a compatible hot melt powder having a grind size of preferably no more than about 250 microns, even more preferably of no more than about 225 microns and even more preferably ranging from about 40 to about 200 microns. The hot melt powder is preferably in the form of a polyester. In one configuration, the free surfaces of the flock and insert **112** are screen printed with a permanent latex fiber adhesive, which is coated with the hot melt powder. The coated hot melt powder

is then dried, vacuum brushed, and cured to prepare it for application to a substrate, such as a textile.

FIG. **14** shows the assembly being applied to a substrate **1700**. The adhesive layer **1600** is applied to the substrate in the presence of heat, such as applied by an iron, to soften the hot melt adhesive and cause it to adhere to the substrate. The hot melt adhesive readily adheres the flock and insert **112** to the substrate **1700**.

Referring to FIG. **14**, after adherence to the substrate **1700** the carrier sheet **204**, release adhesive **112**, and pressure sensitive adhesive **1500** are peeled away from the media. Thus, only the flocked areas **104** and insert **112** remain permanently affixed to the substrate **1700**.

A number of variations and modifications of the invention can be used. It would be possible to provide for some features of the invention without providing others.

For example, the insert can include other design media in addition to or in lieu of the metal film. The design media include, for example, glass particles (e.g., sequins), ceramic particles, textiles, and the like.

By way of further illustration, the insert **112** can be bonded directly to the porous film **116** in the absence of an intervening adhesive. The porous film **116** can be formulated to have adhesive properties.

The present invention, in various embodiments, includes components, methods, processes, systems and/or apparatus substantially as depicted and described herein, including various embodiments, subcombinations, and subsets thereof. Those of skill in the art will understand how to make and use the present invention after understanding the present disclosure. The present invention, in various embodiments, includes providing devices and processes in the absence of items not depicted and/or described herein or in various embodiments hereof, including in the absence of such items as may have been used in previous devices or processes, e.g., for improving performance, achieving ease and or reducing cost of implementation.

The foregoing discussion of the invention has been presented for purposes of illustration and description. The foregoing is not intended to limit the invention to the form or forms disclosed herein. In the foregoing Detailed Description for example, various features of the invention are grouped together in one or more embodiments for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the following claims are hereby incorporated into this Detailed Description, with each claim standing on its own as a separate preferred embodiment of the invention.

Moreover, though the description of the invention has included description of one or more embodiments and certain variations and modifications, other variations and modifications are within the scope of the invention, e.g., as may be within the skill and knowledge of those in the art, after understanding the present disclosure. It is intended to obtain rights which include alternative embodiments to the extent permitted, including alternate, interchangeable and/or equivalent structures, functions, ranges or steps to those claimed, whether or not such alternate, interchangeable and/or equivalent structures, functions, ranges or steps are disclosed herein, and without intending to publicly dedicate any patentable subject matter.

What is claimed is:

1. A method, comprising:

(a) providing a flock transfer, the flock transfer comprising a carrier sheet, a release adhesive, and a flock layer, a first surface of the flock layer being adhered to the carrier sheet by the release adhesive;

(b) applying a first permanent adhesive to a second surface of the flock layer to form a transfer assembly, the first and second surfaces being in an opposing relationship with one another;

(c) thereafter, removing a selected portion of the flock layer from at least one of the flock transfer and transfer assembly to form a void;

(d) positioning an insert substantially in the void of the transfer assembly, wherein the insert and the transfer assembly are positioned on a first substrate surface of a common substrate; and

(e) adhering the transfer assembly and insert to the first substrate surface.

2. The method of claim **1**, wherein the insert comprises a design and a lamination adhesive positioned between first and second polymeric films.

3. The method of claim **1**, wherein the insert is adhered to the common substrate before the transfer assembly is adhered to the common substrate and wherein the insert and transfer assembly are not adhered to one another before step (e).

4. The method of claim **1**, wherein the common substrate is larger than the insert, the common substrate provides an overlapping edge and wherein step (d) comprises the sub-step of applying a tack adhesive to the overlapping edge, and wherein the overlapping edge contacts the second surface of the flock.

5. The method of claim **1**, wherein a second permanent adhesive is positioned between the insert **[**an**]** *and* a first surface of the common substrate, and further comprising:

(f) applying a third permanent adhesive to a second surface of the common substrate, the first and second surfaces of the common substrate being in an opposing relationship.

6. The method of claim **4**, wherein the tack adhesive applied is a thermosetting adhesive.

7. A method, comprising:

(a) providing a flock transfer, the flock transfer comprising a carrier sheet, a release adhesive, and a flock layer, a first surface of the flock layer being adhered to the carrier sheet by the release adhesive;

(b) applying a first permanent adhesive to a second surface of the flock layer to form a transfer assembly, the first and second surfaces being in an opposing relationship with one another;

(c) thereafter, removing a selected portion of the flock layer from at least one of the flock transfer and transfer assembly to form a void;

(d) positioning an insert substantially in the void of the transfer assembly, wherein the insert and the transfer assembly are positioned on a first surface of a common porous film substrate; and

(e) adhering the transfer assembly and insert to the first porous film common substrate surface.

8. The method of claim **7**, wherein the insert comprises a design and a lamination adhesive positioned between first and second polymeric films.

9. The method of claim **7**, wherein the insert is adhered to the porous film common substrate before the transfer assembly is adhered to the porous film common substrate and wherein the insert and transfer assembly are not adhered to one another before step (e).

10. The method of claim **7**, wherein the porous film common substrate is larger than the insert, the porous film com-

mon substrate provides an overlapping edge and wherein step (d) comprises the sub-step of applying a tack adhesive to the overlapping edge, and wherein the overlapping edge contacts the second surface of the flock.

11. The method of claim **7**, wherein a second permanent adhesive is positioned between the insert **[**an**]** *and* a first surface of the porous film common substrate, and further comprising:

(f) applying a third permanent adhesive to a second surface of the porous film common substrate, the first and second surfaces of the porous film common substrate being in an opposing relationship.

12. The method of claim **10**, wherein the tack adhesive applied is a thermosetting adhesive.

13. The method of claim 1, wherein the first permanent adhesive is a thermosetting adhesive.

14. The method of claim 1, wherein a thermoplastic hot melt adhesive is positioned between the insert and a first surface of the common substrate.

15. The method of claim 1, wherein flock layer and the insert are positioned side-by-side.

16. The method of claim 1, wherein the first surface of the flock is positioned above the insert and wherein the insert and flock layer are adhered to the first substrate surface.

17. The method of claim 7, wherein the first permanent adhesive is a thermosetting adhesive.

18. The method of claim 7, wherein a thermoplastic hot melt adhesive is positioned between the insert and a first surface of the common substrate.

19. The method of claim 7, wherein flock layer and the insert are positioned side-by-side.

20. The method of claim 7, wherein the first surface of the flock is positioned above the insert and wherein the insert and flock layer are adhered to the first substrate surface.

* * * * *