



US00D879955S

(12) **United States Design Patent** (10) **Patent No.:** **US D879,955 S**  
**Fitter et al.** (45) **Date of Patent:** **\*\* \*Mar. 31, 2020**

(54) **ABSORBENT CORE**

(71) Applicant: **Medline Industries, Inc.**, Mundelein, IL (US)  
(72) Inventors: **John Fitter**, Greenwood, SC (US); **Daniel B. Love**, Libertyville, IL (US)  
(73) Assignee: **Medline Industries, Inc.**, Mundelein, IL (US)  
(\* ) Notice: This patent is subject to a terminal disclaimer.  
(\*\*) Term: **15 Years**

(21) Appl. No.: **29/609,640**  
(22) Filed: **Jul. 3, 2017**

**Related U.S. Application Data**

(62) Division of application No. 29/503,049, filed on Sep. 23, 2014, now Pat. No. Des. 829,324, which is a division of application No. 29/404,344, filed on Oct. 19, 2011, now Pat. No. Des. 716,938.  
(51) **LOC (12) Cl.** ..... **24-04**  
(52) **U.S. Cl.**  
USPC ..... **D24/125**  
(58) **Field of Classification Search**  
USPC ..... D24/124-126; 604/385.07, 358, 363, 604/364, 368-375, 385.01, 385.03, 604/385.14, 385.23, 387, 390; D5/21, 25, D5/26, 32, 35, 37, 38, 39, 29, 47, 59, 60, D5/61  
CPC ..... A61F 13/47218; A61F 13/4704; A61F 13/476; A61F 13/15203; A61F 13/4756; A61F 13/5616; A61F 13/4758; A61F 13/15; A61F 2013/4706; B32B 3/266; B41M 3/12; B41M 3/18; B44F 1/00; B44F 3/00; B44F 5/00; B44F 9/10; B44F 11/04; B44F 11/06; D03D 1/0047; D03D 25/003; D04H 1/00; D10B 2503/04; D21H 27/02  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

688,143 A 12/1901 Windle  
1,614,239 A 1/1927 Hammond  
RE26,151 E 1/1967 Duncan et al.  
3,338,992 A 8/1967 Kinney  
3,341,394 A 9/1967 Kinney  
3,485,706 A 12/1969 Evans  
3,502,538 A 3/1970 Petersen  
3,502,763 A 3/1970 Hartmann  
3,542,615 A 11/1970 Dobo et al.  
3,612,055 A 10/1971 Mesek et al.  
(Continued)

FOREIGN PATENT DOCUMENTS

DE 102009059886 A1 10/2010  
WO 9619959 A1 7/1996  
(Continued)

OTHER PUBLICATIONS

Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration; International Application No. PCT/US2011/056869, Love, Daniel B, et al; dated Mar. 26, 2012.  
(Continued)

*Primary Examiner* — Michelle E. Wilson  
(74) *Attorney, Agent, or Firm* — Robert D. Spendlove; Gurr Brande & Spendlove, PLLC

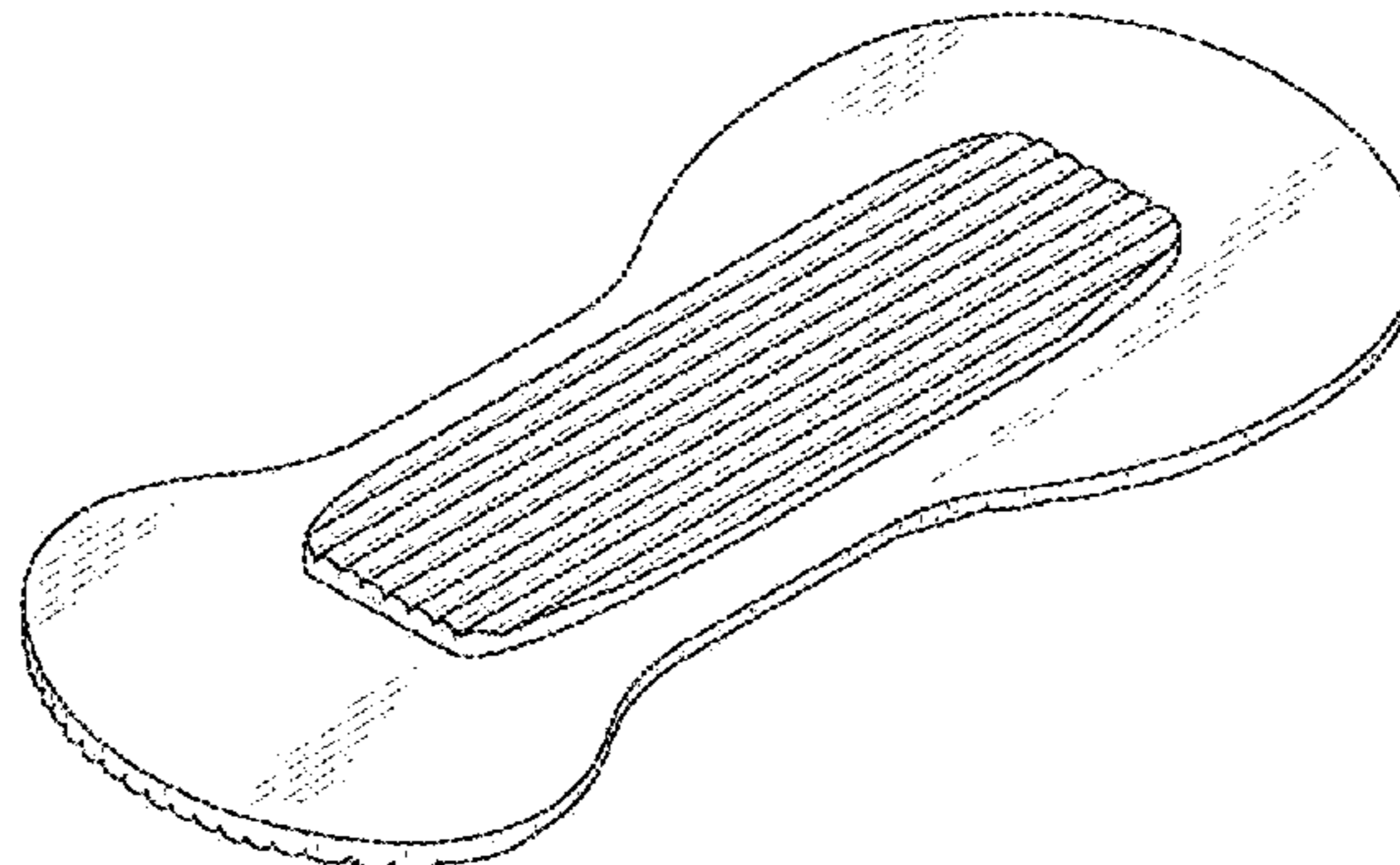
(57) **CLAIM**

The ornamental design for an absorbent core, as shown and described.

**DESCRIPTION**

The FIGURE is a perspective view of an absorbent core.

**1 Claim, 1 Drawing Sheet**



(56)

References Cited

U.S. PATENT DOCUMENTS

3,692,618 A	9/1972	Carduck et al.	5,024,672 A	6/1991	Widlund
3,802,817 A	4/1974	Matsuki et al.	5,026,446 A	6/1991	Johnson et al.
3,849,241 A	11/1974	Harding et al.	5,034,008 A	7/1991	Breitkoph
3,860,003 A	1/1975	Buell	5,046,272 A	9/1991	Vogt et al.
3,955,575 A	5/1976	Okuda	5,047,023 A	9/1991	Berg
3,994,486 A	11/1976	Nystrand	5,055,103 A	10/1991	Nomura et al.
4,050,462 A	9/1977	Woon et al.	5,061,259 A	10/1991	Goldman et al.
4,051,853 A	10/1977	Egan, Jr.	5,061,262 A	10/1991	Chen et al.
4,055,180 A	10/1977	Karami	5,062,838 A	11/1991	Nalowaniec et al.
4,084,592 A	4/1978	Tritsch	5,069,678 A	12/1991	Yamamoto et al.
4,145,763 A	3/1979	Abrams et al.	5,087,253 A	2/1992	Cooper
4,195,634 A	4/1980	Disalvo et al.	5,104,116 A	4/1992	Pohjola
4,205,679 A	6/1980	Repke et al.	5,106,385 A	4/1992	Allen et al.
4,246,900 A	1/1981	Schroder	5,108,384 A	4/1992	Goulait
4,251,643 A	2/1981	Harada et al.	5,128,193 A	7/1992	Anapol et al.
4,253,461 A	3/1981	Strickland et al.	5,133,707 A	7/1992	Rogers et al.
4,296,750 A	10/1981	Woon et al.	5,134,007 A	7/1992	Reising et al.
4,317,449 A	3/1982	Novakoski	5,147,343 A	9/1992	Kellenberger
4,333,466 A	6/1982	Mathews	5,147,347 A	9/1992	Huang
4,340,563 A	7/1982	Appel et al.	5,149,334 A	9/1992	Lahman et al.
4,381,781 A	5/1983	Sciaraffa et al.	5,149,335 A	9/1992	Kellenberger et al.
4,402,690 A	9/1983	Redfern	5,151,092 A	9/1992	Buell et al.
4,410,324 A	10/1983	Sabee	5,156,793 A	10/1992	Buell et al.
4,413,996 A	11/1983	Taylor	5,156,902 A	10/1992	Pieper et al.
D272,190 S	1/1984	Sneider	5,163,932 A	11/1992	Nomura et al.
4,490,147 A	12/1984	Pierce et al.	5,176,668 A	1/1993	Bernardin
4,500,316 A	2/1985	Damico	5,176,670 A	1/1993	Roessler et al.
4,516,976 A	5/1985	Bell	5,176,671 A	1/1993	Roessler et al.
4,560,381 A	12/1985	Southwell	5,188,627 A	1/1993	Igaue et al.
4,596,568 A	6/1986	Flug	5,188,624 A	2/1993	Young, Sr. et al.
4,610,680 A	9/1986	Lafleur	5,192,506 A	3/1993	Kureshy et al.
4,610,682 A	9/1986	Kopp	D336,515 S *	6/1993	Voelker-Ferrier ..... D24/125
4,615,695 A	10/1986	Cooper	5,219,646 A	7/1993	Gallegher et al.
4,639,254 A	1/1987	Legault et al.	5,224,405 A	7/1993	Pohjola
4,643,932 A	2/1987	Daniels	5,226,992 A	7/1993	Morman
4,662,875 A	5/1987	Hirotsu et al.	5,234,422 A	8/1993	Sneller et al.
4,663,220 A	5/1987	Wisneski et al.	5,235,515 A	8/1993	Ungpiyakul et al.
4,699,621 A	5/1987	Wisneski et al.	5,236,429 A	8/1993	Widlund
4,670,012 A	6/1987	Johnson	5,242,436 A	9/1993	Weil et al.
4,673,402 A	6/1987	Weisman et al.	5,246,433 A	9/1993	Hasse et al.
4,680,012 A	7/1987	Morley et al.	5,248,309 A	9/1993	Serbiak et al.
4,695,278 A	9/1987	Lawson	5,263,949 A	11/1993	Karami et al.
4,699,620 A	10/1987	Bernardin	5,272,588 A	12/1993	Motoori
4,699,622 A	10/1987	Toussant et al.	5,275,590 A	1/1994	Huffman et al.
4,704,116 A	11/1987	Enloe	5,279,604 A	1/1994	Robertson et al.
4,705,513 A	11/1987	Sheldon et al.	5,286,543 A	2/1994	Ungpiyakul et al.
4,710,190 A	12/1987	Wood et al.	5,288,546 A	2/1994	Roessler et al.
4,720,415 A	1/1988	Vander Wielen et al.	5,294,478 A	3/1994	Wanek et al.
4,753,649 A	6/1988	Pazdernik	5,295,988 A	3/1994	Muckenfuhs et al.
4,758,241 A	7/1988	Papajohn	5,300,057 A	4/1994	Miller et al.
4,770,656 A	9/1988	Proxmire et al.	5,304,161 A	4/1994	Noel et al.
4,770,657 A	9/1988	Ellis et al.	5,304,162 A	4/1994	Kuen
4,798,603 A	1/1989	Meyer et al.	5,318,555 A	6/1994	Siebers et al.
4,834,735 A	5/1989	Aleman et al.	5,320,531 A	6/1994	Delizo-Madamba
4,843,738 A	5/1989	Kielpikowski et al.	5,326,612 A	7/1994	Goulait
4,838,885 A	6/1989	Bernardin	5,330,458 A	7/1994	Buell et al.
4,842,596 A	6/1989	Kielpikowski et al.	5,344,691 A	9/1994	Hanschen et al.
4,846,815 A	7/1989	Scripps	5,348,547 A	9/1994	Payne et al.
4,869,724 A	9/1989	Scripps	5,350,370 A	9/1994	Jackson et al.
4,883,480 A	11/1989	Huffman et al.	5,358,500 A	10/1994	Lavon
4,884,323 A	12/1989	Provost et al.	5,364,382 A	11/1994	Latimer et al.
4,911,702 A	3/1990	O'Leary et al.	5,370,634 A	12/1994	Ando et al.
4,916,005 A	4/1990	Loppert et al.	5,370,639 A	12/1994	Widlund
4,936,840 A	6/1990	Proxmire	5,383,872 A	1/1995	Roessler et al.
4,938,753 A	7/1990	Van Gompel et al.	5,387,208 A	2/1995	Ashton et al.
4,938,757 A	7/1990	Van Gompel et al.	5,399,219 A	3/1995	Roessier et al.
4,940,464 A	7/1990	Van Gompel et al.	5,403,302 A	4/1995	Roessier et al.
4,963,140 A	10/1990	Robertson et al.	5,411,497 A	5/1995	Tanzer et al.
4,964,860 A	10/1990	Gipson et al.	5,422,172 A	6/1995	Wu
4,988,344 A	1/1991	Reising et al.	5,423,789 A	6/1995	Kuen
4,988,345 A	1/1991	Reising et al.	5,425,377 A	6/1995	Caillouette
5,013,382 A	5/1991	Nalowaniec et al.	5,425,725 A	6/1995	Tanzer et al.
5,019,063 A	5/1991	Marsan et al.	5,433,715 A	7/1995	Tanzer et al.
5,019,072 A	5/1991	Polski	5,439,458 A	8/1995	Noel et al.
5,019,073 A	5/1991	Roessler et al.	5,458,592 A	10/1995	Abuto et al.
			5,460,622 A	10/1995	Dragoo et al.
			5,462,541 A	10/1995	Bruemmer et al.
			5,466,513 A	11/1995	Wanek et al.
			5,468,236 A	11/1995	Everhart et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

5,486,167 A	1/1996	Dragoo et al.	5,843,067 A	12/1998	Trombetta et al.
5,489,282 A	2/1996	Zehner et al.	5,843,575 A	12/1998	Wang et al.
5,490,846 A	2/1996	Ellis et al.	5,849,000 A	12/1998	Anjur et al.
5,496,298 A	3/1996	Kuepper et al.	5,853,402 A	12/1998	Faulks et al.
5,496,428 A	3/1996	Sageser et al.	5,855,574 A	1/1999	Kling et al.
5,501,679 A	3/1996	Krueger et al.	5,858,515 A	1/1999	Stokes et al.
5,507,895 A	4/1996	Suekane	5,858,535 A	1/1999	Wang et al.
5,509,914 A	4/1996	Osborn, III	5,860,964 A	1/1999	Willekens et al.
5,509,915 A	4/1996	Hanson et al.	5,861,074 A	1/1999	Wu
5,527,300 A	6/1996	Sauer	5,865,823 A	2/1999	Curro
5,527,302 A	6/1996	Endres et al.	5,876,392 A	3/1999	Hisada
5,527,304 A	6/1996	Buell et al.	5,876,531 A	3/1999	Jacobs et al.
5,527,305 A	6/1996	Goulait et al.	5,895,379 A	4/1999	Litchholt et al.
5,537,722 A	7/1996	Neiderhofer et al.	5,897,545 A	4/1999	Kline et al.
5,540,796 A	7/1996	Fries	5,897,546 A	4/1999	Kido et al.
5,549,591 A	8/1996	Landvogt	5,902,296 A	5/1999	Fluyeras
5,549,592 A	8/1996	Fries et al.	5,904,793 A	5/1999	Gorman et al.
5,554,243 A	9/1996	Igaue et al.	5,906,604 A	5/1999	Ronnberg et al.
5,556,394 A	9/1996	Roe et al.	5,916,206 A	6/1999	Otsubo et al.
5,560,798 A	10/1996	Brusky	5,919,178 A	7/1999	Widlund
5,562,646 A	10/1996	Goldman et al.	5,926,926 A	7/1999	Kato
5,562,650 A	10/1996	Everett et al.	5,928,212 A	7/1999	Kline et al.
5,569,229 A	10/1996	Rogers	5,940,887 A	8/1999	Rajala et al.
5,571,096 A	11/1996	Dobrin et al.	5,941,865 A	8/1999	Otsubo et al.
5,575,782 A	11/1996	Hasse et al.	5,948,507 A	9/1999	Chen et al.
5,591,151 A	1/1997	Hasse et al.	5,957,906 A	9/1999	Roe et al.
5,593,399 A	1/1997	Tanzer et al.	5,961,506 A	10/1999	Guidotti et al.
5,595,567 A	1/1997	King et al.	5,961,761 A	10/1999	Heindel et al.
5,595,618 A	1/1997	Fries et al.	5,971,970 A	10/1999	Carlbark et al.
5,599,335 A	2/1997	Goldman et al.	5,977,430 A	11/1999	Roe et al.
5,599,620 A	2/1997	Huskey	5,984,911 A	11/1999	Siebers et al.
5,601,542 A	2/1997	Melius et al.	6,007,527 A	12/1999	Kawaguchi et al.
5,603,707 A	2/1997	Trombetta et al.	6,011,196 A	1/2000	Wang et al.
5,605,735 A	2/1997	Zehner et al.	6,017,621 A	1/2000	Hilston et al.
5,624,423 A	4/1997	Anjur et al.	6,020,535 A	2/2000	Blenke et al.
5,624,428 A	4/1997	Sauer	6,030,373 A	2/2000	Van Gompel et al.
5,624,429 A	4/1997	Long et al.	6,036,805 A	3/2000	McNichols
5,628,741 A	5/1997	Buell et al.	6,045,543 A	4/2000	Pozniak et al.
5,629,063 A	5/1997	Gobran	6,049,915 A	4/2000	Malowaniec
5,634,917 A	6/1997	Fujioka et al.	6,049,916 A	4/2000	Rajala et al.
5,647,864 A	7/1997	Allen et al.	6,051,094 A	4/2000	Melbye et al.
5,659,538 A	8/1997	Stuebe et al.	6,063,067 A	5/2000	Takizawa et al.
5,660,666 A	8/1997	Dilnik et al.	6,066,774 A	5/2000	Roe
5,669,894 A	9/1997	Goldman et al.	6,068,620 A	5/2000	Chmielewski
5,669,900 A	9/1997	Bullwinkel et al.	D426,303 S *	6/2000	Weyenberg ..... D24/124
5,674,216 A	10/1997	Buell et al.	6,075,178 A	6/2000	Wilhelm et al.
5,681,300 A	10/1997	Ahr et al.	6,077,379 A	6/2000	Herrin et al.
5,683,533 A	11/1997	Keighley et al.	6,080,909 A	6/2000	Osterdahl et al.
5,683,794 A	11/1997	Wadsworth et al.	6,083,212 A	7/2000	Kumasaka
5,685,873 A	11/1997	Bruemmer et al.	6,093,869 A	7/2000	Roe et al.
5,690,628 A	11/1997	Huskey et al.	6,098,203 A	8/2000	Rajala et al.
5,706,524 A	1/1998	Herrin et al.	6,107,538 A	8/2000	Young et al.
5,718,698 A	2/1998	Dobrin et al.	6,107,539 A	8/2000	Palumbo et al.
5,722,127 A	3/1998	Coates	6,117,121 A	9/2000	Faulks et al.
5,735,839 A	4/1998	Kawaguchi et al.	6,132,411 A	10/2000	Huber et al.
5,738,669 A	4/1998	Suzuki et al.	6,140,551 A	10/2000	Niemeyer et al.
5,741,241 A	4/1998	Guidotti et al.	6,142,986 A	11/2000	Lord et al.
5,745,922 A	5/1998	Rajala et al.	6,149,590 A	11/2000	Smith
5,746,731 A	5/1998	Hisada	6,149,636 A	11/2000	Roe et al.
5,749,865 A	5/1998	Yamamoto et al.	6,156,024 A	12/2000	Schulte et al.
5,749,866 A	5/1998	Roe et al.	6,159,584 A	12/2000	Eaton et al.
5,760,080 A	6/1998	Wada et al.	6,179,820 B1	1/2001	Fernfors
5,769,838 A	6/1998	Buell et al.	6,183,587 B1	2/2001	McFall et al.
5,772,649 A	6/1998	Siudzinski	6,191,055 B1	2/2001	Boyer, III et al.
5,772,649 A	6/1998	Siudzinski	D439,057 S *	3/2001	Bissah ..... D24/125
5,735,840 A	7/1998	Kline et al.	6,197,012 B1	3/2001	Mishima et al.
5,779,831 A	7/1998	Schmitz	6,198,018 B1	3/2001	Curro
5,785,699 A	7/1998	Schmitz	6,203,496 B1	3/2001	Gael et al.
5,795,350 A	8/1998	Schmitz	6,213,991 B1	4/2001	Kling et al.
5,797,893 A	8/1998	Wada et al.	6,213,992 B1	4/2001	Dreier
5,817,400 A	10/1998	Chen et al.	6,218,593 B1	4/2001	Torimae et al.
5,820,617 A	10/1998	Igaue et al.	6,222,091 B1	4/2001	Beihoffer et al.
D401,327 S *	11/1998	Raidel ..... D24/125	6,224,961 B1	5/2001	Hsueh et al.
5,830,206 A	11/1998	Larsson	6,235,011 B1	5/2001	O'Connell
5,843,056 A	12/1998	Good et al.	6,240,569 B1	6/2001	Van Gompel et al.
5,843,066 A	12/1998	Dobrin	6,241,713 B1	6/2001	Gross et al.
			6,255,236 B1	7/2001	Cree et al.
			6,258,077 B1	7/2001	Buell et al.
			6,260,211 B1	7/2001	Rajala et al.

(56)

## References Cited

## U.S. PATENT DOCUMENTS

6,264,643 B1	7/2001	Toyoda	6,570,053 B2	5/2003	Roe et al.
6,266,557 B1	7/2001	Roe et al.	6,570,058 B1	5/2003	Fuchs et al.
6,287,286 B1	9/2001	Akin et al.	6,572,595 B1	6/2003	Klemp et al.
6,287,287 B1	9/2001	Elsberg	6,575,949 B1	6/2003	Waksmundzki et al.
6,307,119 B1	10/2001	Cammarota et al.	6,575,952 B2	6/2003	Kirk et al.
6,307,120 B1	10/2001	Glaug	6,579,275 B1	6/2003	Pozniak et al.
6,312,420 B1	11/2001	Sasaki et al.	6,582,543 B1	6/2003	Nilsson et al.
6,315,765 B1	11/2001	Datta et al.	6,590,136 B1	7/2003	Young et al.
6,316,688 B1	11/2001	Hammons et al.	6,595,976 B2	7/2003	Shimoe et al.
6,328,725 B2	12/2001	Femfors	6,596,113 B2	7/2003	Csida et al.
6,359,192 B1	3/2002	Schmidt et al.	6,602,238 B2	8/2003	Takei et al.
6,364,863 B1	4/2002	Yamamoto et al.	6,605,447 B2	8/2003	Weiss et al.
6,367,089 B2	4/2002	Van Gompel et al.	6,610,904 B1	8/2003	Thomas et al.
6,368,312 B1	4/2002	Otsubo	6,613,032 B2	9/2003	Ronnberg et al.
6,369,292 B1	4/2002	Strack et al.	6,623,576 B2	9/2003	Mitchell et al.
6,371,951 B1	4/2002	Koczab et al.	6,626,881 B2	9/2003	Shingu et al.
6,372,951 B1	4/2002	Ter-Ovanesyan et al.	6,626,882 B2	9/2003	Hjorth
6,375,646 B1	4/2002	Widlund et al.	6,627,394 B2	9/2003	Kritzman et al.
6,383,960 B1	5/2002	Everett et al.	6,630,611 B1	10/2003	Malowaniec
6,392,116 B1	5/2002	Beihoffer et al.	6,632,209 B1	10/2003	Chmielewski
6,394,991 B1	5/2002	Takei et al.	6,635,041 B1	10/2003	Popp et al.
6,395,115 B1	5/2002	Popp et al.	6,635,135 B2	10/2003	Kuen et al.
6,395,955 B1	5/2002	Roe et al.	6,642,431 B1	11/2003	Gellerstedt et al.
6,399,853 B1	6/2002	Roe et al.	6,645,338 B1	11/2003	Sangani et al.
6,402,730 B1	6/2002	Malowaniec	6,646,179 B1	11/2003	Melius et al.
6,407,308 B1	6/2002	Roe et al.	6,646,180 B1	11/2003	Chmielewski
6,409,858 B1	6/2002	Popp et al.	6,648,870 B2	11/2003	Itoh et al.
6,413,249 B1	7/2002	Turi et al.	6,648,871 B2	11/2003	Kusibojoska et al.
6,414,216 B1	7/2002	Malowaniec	6,649,810 B1	11/2003	Minato et al.
6,423,046 B1	7/2002	Fujioka et al.	D483,482 S *	12/2003	Ceman ..... D24/125
6,428,525 B1	8/2002	Malowaniec	6,664,439 B1	12/2003	Arndt et al.
6,428,526 B1	8/2002	Heindel et al.	6,669,678 B2	12/2003	Hermansson et al.
6,429,352 B1	8/2002	Herrlein et al.	6,676,645 B1	1/2004	Bitterhof
6,432,098 B1	8/2002	Kline et al.	6,689,934 B2	2/2004	Dodge, II et al.
6,432,243 B1	8/2002	Popp et al.	6,692,477 B2	2/2004	Gibbs
6,432,248 B1	8/2002	Popp et al.	6,700,036 B2	3/2004	Thomas et al.
6,433,244 B1	8/2002	Roe et al.	6,702,798 B2	3/2004	Christoffel et al.
6,437,213 B1	8/2002	Schmidt et al.	6,709,423 B1	3/2004	Herrlein et al.
6,437,214 B1	8/2002	Everett et al.	6,710,225 B1	3/2004	Everett et al.
6,440,117 B1	8/2002	Itoh et al.	6,713,660 B1	3/2004	Roe et al.
6,447,497 B1	9/2002	Olson	6,719,744 B2	4/2004	Kinnear et al.
6,447,628 B1	9/2002	Couillard et al.	6,723,035 B2	4/2004	Franklin et al.
6,448,202 B1	9/2002	Miyazawa et al.	6,723,892 B1	4/2004	Daley et al.
6,454,751 B1	9/2002	Olson	6,726,669 B2	4/2004	Shimada et al.
6,455,753 B1	9/2002	Glaug et al.	6,726,670 B2	4/2004	Almberg et al.
6,458,115 B1	10/2002	Lindqvist et al.	6,727,403 B1	4/2004	Ehrnsperger et al.
6,461,343 B1	10/2002	Schaefer et al.	6,733,483 B2	5/2004	Raufman et al.
6,461,344 B1	10/2002	Widlund et al.	6,736,804 B1	5/2004	Robertson et al.
6,463,633 B1	10/2002	Sangani et al.	6,740,071 B2	5/2004	Gibbs
6,463,663 B1	10/2002	Sangani et al.	6,749,860 B2	6/2004	Tyrrell et al.
6,464,635 B1	10/2002	Jimenez Cerrato et al.	6,755,808 B2	6/2004	Balogh et al.
6,465,379 B1	10/2002	Cook et al.	6,761,711 B1	7/2004	Fletcher et al.
D465,842 S	11/2002	Magee et al.	6,764,479 B2	7/2004	Kusibojoska et al.
6,475,199 B1	11/2002	Gann et al.	6,770,065 B1	8/2004	Sasaki et al.
6,476,289 B1	11/2002	Buell et al.	6,776,316 B2	8/2004	Van Eperen et al.
6,478,786 B1	11/2002	Glaug et al.	6,780,173 B2	8/2004	Mishima et al.
6,479,727 B1	11/2002	Roe	6,780,272 B2	8/2004	Wood
6,481,362 B2	11/2002	Hietpas et al.	6,790,798 B1	9/2004	Suzuki et al.
6,494,873 B2	12/2002	Karlsson et al.	6,803,496 B2	10/2004	Elder et al.
6,497,032 B2	12/2002	Maxton et al.	6,838,591 B2	1/2005	Waksmundzki et al.
6,498,283 B1	12/2002	Wada et al.	6,840,928 B2	1/2005	Datta et al.
6,498,953 B2	12/2002	Roe et al.	6,846,374 B2	1/2005	Popp et al.
6,500,163 B2	12/2002	Rönnberg et al.	6,849,067 B2	2/2005	Fletcher et al.
6,506,394 B1	1/2003	Yahiaoui et al.	6,878,223 B2	4/2005	Kuen et al.
6,506,959 B2	1/2003	Hamajima et al.	6,878,647 B1	4/2005	Rezzai et al.
6,509,513 B2	1/2003	Glaug et al.	6,884,238 B2	4/2005	Underhill et al.
6,513,221 B2	2/2003	Vogt et al.	6,885,451 B2	4/2005	Vogt et al.
6,514,187 B2	2/2003	Coenen et al.	6,888,043 B2	5/2005	Geiser et al.
6,524,294 B1	2/2003	Hilston et al.	6,888,044 B2	5/2005	Fell et al.
6,533,879 B2	3/2003	Quereshi et al.	6,888,143 B2	5/2005	Vogt et al.
6,540,731 B2	4/2003	Magnusson et al.	6,891,080 B2	5/2005	Minato et al.
6,544,244 B1	4/2003	Glaug et al.	6,904,865 B2	6/2005	Klofta et al.
6,551,295 B1	4/2003	Schmidt et al.	6,911,024 B2	6/2005	Kusibojoska et al.
6,566,578 B1	5/2003	Glaug et al.	6,921,647 B2	7/2005	Kritzman et al.
6,569,139 B1	5/2003	Datta et al.	6,923,798 B2	8/2005	Hedén et al.
			6,936,129 B2	8/2005	Karami et al.
			6,945,968 B2	9/2005	Svensson et al.
			6,946,585 B2	9/2005	Brown
			6,953,452 B2	10/2005	Popp et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

6,955,668 B2	10/2005	Almberg et al.	7,687,680 B2	3/2010	Fell et al.
6,972,011 B2	12/2005	Maeda et al.	7,695,464 B2	4/2010	Fletcher et al.
6,972,012 B1	12/2005	Pozniak et al.	7,699,825 B2	4/2010	Nakagawa et al.
6,981,951 B1	1/2006	Rahe	7,713,371 B2	5/2010	Lohrengel et al.
6,981,968 B2	1/2006	Kusibojoska et al.	7,718,021 B2	5/2010	Venturino et al.
6,991,622 B2	1/2006	Nakaoka et al.	7,722,590 B2	5/2010	Tsuji et al.
6,994,761 B2	2/2006	Klemp et al.	7,737,324 B2	6/2010	Lavon et al.
7,000,260 B2	2/2006	Rajala et al.	7,744,576 B2	6/2010	Busam et al.
7,001,368 B2	2/2006	Otsubo	7,744,713 B2	6/2010	Blessing et al.
7,002,054 B2	2/2006	Allen et al.	7,749,211 B2	7/2010	Van Gompel et al.
7,018,369 B2	3/2006	Van Gompel et al.	7,750,203 B2	7/2010	Becker et al.
7,044,133 B2	5/2006	Lohrengel et al.	7,758,558 B2	7/2010	Otsubo
7,048,725 B2	5/2006	Kling et al.	7,777,094 B2	8/2010	Mori et al.
7,060,058 B2	6/2006	Otsubo et al.	D624,696 S	9/2010	Hsiao
D527,102 S	8/2006	Mills et al.	7,794,442 B2	9/2010	Roehrl et al.
7,087,046 B2	8/2006	Van Gompel et al.	7,794,839 B2	9/2010	Schmidt et al.
7,090,667 B2	8/2006	Fell et al.	7,807,861 B2	10/2010	Molander et al.
D527,818 S	9/2006	Mills et al.	7,819,851 B2	10/2010	Karlsson
7,156,829 B2	1/2007	Minato et al.	7,837,662 B2	11/2010	Nakagawa et al.
7,156,939 B2	1/2007	Vogt et al.	7,838,721 B2	11/2010	Chen
7,163,745 B2	1/2007	Mangold et al.	7,838,722 B2	11/2010	Blessing et al.
7,166,094 B2	1/2007	Glaug et al.	7,846,383 B2	12/2010	Song
7,172,585 B2	2/2007	Sandin et al.	7,851,667 B2	12/2010	Becker et al.
7,175,910 B2	2/2007	Ehrnsperger et al.	7,851,669 B2	12/2010	Nakagawa et al.
7,195,622 B2	3/2007	Lindström	7,857,801 B2	12/2010	Hamall et al.
7,201,743 B2	4/2007	Röhr	7,863,498 B2	1/2011	Roe et al.
7,204,907 B2	4/2007	Cree et al.	7,867,213 B2	1/2011	Bandorf et al.
7,217,261 B2	5/2007	Otsubo et al.	7,906,065 B1	3/2011	Brown et al.
7,241,627 B2	7/2007	Wilhelm et al.	D636,076 S *	4/2011	Hood ..... D24/124
7,270,881 B2	9/2007	Schmidt et al.	7,918,959 B2	4/2011	Hornung et al.
7,285,178 B2	10/2007	Mischler et al.	7,923,597 B2	4/2011	Ponomarenko et al.
7,314,465 B2	1/2008	Van Gompel et al.	7,935,299 B2	5/2011	Walsh et al.
7,314,752 B2	1/2008	Kritzman et al.	7,943,537 B2	5/2011	Vincent et al.
7,322,967 B2	1/2008	Kondo	7,947,467 B2	5/2011	Kritzman et al.
7,331,946 B2	2/2008	Shimada et al.	7,947,865 B2	5/2011	Fossum et al.
7,332,642 B2	2/2008	Liu	7,956,236 B2	6/2011	Ponomarenko et al.
7,344,525 B2	3/2008	Linker, III et al.	D641,867 S *	7/2011	Hood ..... D24/124
7,347,846 B2	3/2008	Hermansson et al.	7,982,088 B2	7/2011	Roe et al.
7,368,027 B2	5/2008	Schneider et al.	7,985,210 B2	7/2011	Ashton et al.
7,373,698 B2	5/2008	Erdman et al.	7,993,320 B2	8/2011	Hornung et al.
7,378,567 B2	5/2008	Mangold	7,994,384 B2	8/2011	Qin et al.
7,378,568 B2	5/2008	Thomas et al.	8,016,806 B2	9/2011	Hornung et al.
7,387,148 B2	6/2008	Vogt et al.	8,017,827 B2	9/2011	Hundorf et al.
7,396,349 B2	7/2008	Van Himbergen et al.	8,025,652 B2	9/2011	Hornung et al.
7,396,585 B2	7/2008	Schmidt et al.	8,038,662 B2	10/2011	Hornung et al.
7,402,339 B2	7/2008	Schmidt et al.	8,043,272 B2	10/2011	Long et al.
7,411,110 B2	8/2008	Sawyer et al.	8,044,257 B2	10/2011	Song
7,425,242 B2	9/2008	Olsson et al.	8,083,724 B2	12/2011	Bittner et al.
7,432,413 B2	10/2008	Roe et al.	8,088,967 B2	1/2012	Underhill et al.
7,435,245 B2	10/2008	Wendelstorf et al.	8,092,440 B2	1/2012	Harmansson et al.
7,438,709 B2	10/2008	Karami et al.	8,100,173 B2	1/2012	Hornung et al.
7,449,014 B2	11/2008	Oba et al.	8,138,388 B2	3/2012	Elder et al.
7,455,665 B2	11/2008	Wendelstorf et al.	8,142,590 B2	3/2012	Rajala et al.
7,462,754 B2	12/2008	Malowaniec	8,147,476 B2	4/2012	Veith et al.
7,462,756 B2	12/2008	Malowaniec	8,148,598 B2	4/2012	Tsang et al.
7,482,505 B2	1/2009	Stupperich et al.	8,152,788 B2	4/2012	Beckert et al.
7,488,535 B2	2/2009	Ehrnsperger et al.	8,158,848 B2	4/2012	Swerev et al.
7,504,235 B2	3/2009	Song	8,162,913 B2	4/2012	Goates et al.
7,524,313 B2	4/2009	Kline et al.	8,180,603 B2	5/2012	Blessing et al.
7,524,449 B2	4/2009	Walsh et al.	8,187,240 B2	5/2012	Busam et al.
7,524,561 B2	4/2009	Schmidt et al.	8,196,809 B2	6/2012	Thorstensson
7,527,618 B2	5/2009	Benning et al.	8,202,390 B2	6/2012	Malowaniec
7,534,237 B2	5/2009	Olson et al.	8,206,365 B2	6/2012	Norrby
7,534,481 B2	6/2009	Stupperich et al.	8,206,533 B2	6/2012	Hundorf et al.
7,541,177 B2	6/2009	Kritzman et al.	8,221,372 B2	7/2012	Kouno et al.
7,544,628 B2	6/2009	Stupperich et al.	8,221,379 B2	7/2012	Lam et al.
7,559,124 B2	7/2009	Poulakis	8,221,672 B2	7/2012	Brown et al.
7,569,039 B2	8/2009	Matsuda et al.	8,231,593 B2	7/2012	Nakagawa et al.
7,569,041 B2	8/2009	Stupperich et al.	8,241,263 B2	8/2012	Mills
D601,245 S *	9/2009	Cauwood ..... D24/124	8,251,967 B2	8/2012	Malowaniec
7,592,020 B2	9/2009	Boga et al.	8,258,366 B2	9/2012	Wendelstorf
7,604,624 B2	10/2009	Veith et al.	8,263,820 B2	9/2012	Carlucci et al.
7,621,901 B2	11/2009	Karami	8,273,067 B2	9/2012	Cohen
7,635,360 B2	12/2009	Van Compel et al.	8,282,617 B2	10/2012	Kaneda
7,682,349 B2	3/2010	Popp et al.	8,292,865 B2	10/2012	Hutson et al.
			8,298,205 B2	10/2012	Norrby et al.
			8,303,562 B2	11/2012	Hornung et al.
			8,319,005 B2	11/2012	Becker et al.
			D672,032 S *	12/2012	Bruzadin ..... D24/125

(56)

## References Cited

## U.S. PATENT DOCUMENTS

D672,033 S *	12/2012	Paques .....	D24/125	2004/0102755 A1	5/2004	Morman et al.
D672,034 S *	12/2012	Bruzadin .....	D24/125	2004/0122410 A1	6/2004	Itch et al.
8,328,780 B2	12/2012	Morman et al.		2004/0133180 A1	7/2004	Mori et al.
D674,483 S *	1/2013	Hood .....	D24/125	2004/0153046 A1	8/2004	Ito et al.
D674,894 S *	1/2013	Hood .....	D24/124	2004/0158212 A1	8/2004	Ponomarenko et al.
8,343,296 B2	1/2013	Blessing et al.		2004/0172000 A1	9/2004	Roe et al.
8,353,891 B2	1/2013	Hornung et al.		2004/0243086 A1	12/2004	Vangompel et al.
D678,518 S *	3/2013	R. Marcelo .....	D24/125	2004/0243089 A1	12/2004	Veith et al.
D678,519 S *	3/2013	Bruzadin .....	D24/125	2005/0003143 A1	1/2005	Ducauchuis et al.
D679,005 S *	3/2013	Bruzadin .....	D24/125	2005/0020992 A1	1/2005	Van Compel et al.
8,454,572 B2	6/2013	Roe et al.		2005/0027279 A1	2/2005	Minato et al.
8,454,782 B2	6/2013	Ostertag		2005/0075618 A1	4/2005	Kenmochi et al.
8,466,336 B2	6/2013	Carlucci et al.		2005/0113778 A1	5/2005	Johansson et al.
8,476,173 B2	7/2013	Dovertie et al.		2005/0131287 A1	6/2005	Kaylor et al.
8,496,637 B2	7/2013	Hundorf et al.		2005/0131378 A1	6/2005	Sasaki et al.
8,512,305 B2	8/2013	Dziedzok et al.		2005/0143709 A1	6/2005	Lindstrom
8,518,010 B2	8/2013	Kuwano et al.		2005/0148960 A1	7/2005	Price
8,518,539 B2	8/2013	Meyer et al.		2005/0175269 A1	8/2005	Ashton et al.
8,552,252 B2	10/2013	Hundorf et al.		2005/0228356 A1	10/2005	Lavon et al.
8,562,580 B2	10/2013	Van Gompel et al.		2005/0256494 A1	11/2005	Datta
8,562,581 B2	10/2013	Karami et al.		2005/0256496 A1	11/2005	Benning et al.
8,585,666 B2	11/2013	Weisman et al.		2005/0273067 A1	12/2005	Malowaniec et al.
8,616,867 B2	12/2013	Brown et al.		2006/0024433 A1	2/2006	Blessing et al.
8,622,983 B2	1/2014	Wilkes et al.		2006/0025733 A1	2/2006	Kikuchi et al.
8,622,984 B2	1/2014	Rajala et al.		2006/0036230 A1	2/2006	Mills et al.
8,663,186 B2	3/2014	Lam et al.		2006/0047259 A1	3/2006	Erdman et al.
8,668,975 B2	3/2014	Westwood		2006/0058772 A1	3/2006	Karami
8,672,915 B2	3/2014	Kuwano et al.		2006/0069379 A1	3/2006	Van Gompel et al.
8,708,990 B2	4/2014	Beckert et al.		2006/0121811 A1	6/2006	Mangold et al.
D704,827 S *	5/2014	Hood .....	D24/125	2006/0135923 A1	6/2006	Boggs et al.
8,747,379 B2	6/2014	Fletcher et al.		2006/0135928 A1	6/2006	Karlsson et al.
8,771,249 B2	7/2014	Beckert et al.		2006/0135932 A1	6/2006	Abuto et al.
8,784,398 B2	7/2014	Beckert et al.		2006/0155254 A1	7/2006	Sanz et al.
8,864,733 B2	10/2014	Koenig et al.		2006/0167424 A1	7/2006	Chang et al.
8,920,399 B2	12/2014	Mills		2006/0184149 A1	8/2006	Kasai et al.
8,946,637 B2	2/2015	Chinn et al.		2006/0195068 A1	8/2006	Lawando
9,271,880 B2	3/2016	Karlson et al.		2006/0212010 A1	9/2006	Roe et al.
9,351,885 B2	5/2016	Yoshioka		2006/0241560 A1	10/2006	Chang et al.
9,439,811 B2	9/2016	Love et al.		2006/0247596 A1	11/2006	Van Dyke
D768,963 S	10/2016	Amrikhas et al.		2006/0258250 A1	11/2006	Mangold et al.
9,483,368 B2	11/2016	Nelson		2006/0276765 A1	12/2006	Swerev et al.
9,486,368 B2	11/2016	Nelson		2006/0282053 A1	12/2006	Rohrl
D774,188 S *	12/2016	Hood .....	D24/125	2007/0000987 A1	1/2007	Karlsson
9,622,922 B2	4/2017	Nelson		2007/0003993 A1	1/2007	Kritzman et al.
2001/0023341 A1	9/2001	Karami		2007/0016155 A1	1/2007	Chang et al.
2001/0025147 A1	9/2001	Roe et al.		2007/0021728 A1	1/2007	Speak
2001/0034512 A1	10/2001	Karlsson et al.		2007/0038199 A1	2/2007	Erdman et al.
2001/0042584 A1	11/2001	Karami et al.		2007/0044903 A1	3/2007	Wisneski et al.
2002/0003024 A1	1/2002	Vogt et al.		2007/0048497 A1	3/2007	Zhou et al.
2002/0019615 A1	2/2002	Roe et al.		2007/0048815 A1	3/2007	Song
2002/0045881 A1	4/2002	Kusibojoska et al.		2007/0049892 A1	3/2007	Lord et al.
2002/0062117 A1	5/2002	Raufman et al.		2007/0049896 A1	3/2007	Mills
2002/0065503 A1	5/2002	Guidotti		2007/0066950 A1	3/2007	Nelson
2002/0111596 A1	8/2002	Fletcher et al.		2007/0073260 A1	3/2007	Roe
2002/0115969 A1	8/2002	Maeda et al.		2007/0073262 A1	3/2007	Babusik et al.
2002/0123733 A1	9/2002	Itch et al.		2007/0128589 A1	6/2007	Sanders et al.
2002/0138056 A1	9/2002	Kuen et al.		2007/0208317 A1	9/2007	Krautkramer et al.
2002/0138062 A1	9/2002	Kuen et al.		2007/0239131 A1	10/2007	Hermansson et al.
2002/0156441 A1	10/2002	Sawyer et al.		2007/0255246 A1	11/2007	Schneider
2002/0164658 A1	11/2002	Weiss et al.		2007/0293833 A1	12/2007	Wennerback
2002/0177829 A1	11/2002	Fell et al.		2007/0293835 A1	12/2007	Roehrl et al.
2003/0004490 A1	1/2003	Larsson et al.		2008/0026178 A1	1/2008	Stupperich et al.
2003/0014025 A1	1/2003	Allen et al.		2008/0051747 A1	2/2008	Cohen
2003/0022581 A1	1/2003	Tsai et al.		2008/0086060 A1	4/2008	Kritzman et al.
2003/0023225 A1	1/2003	Sayama		2008/0103414 A1	5/2008	Song
2003/0055394 A1	3/2003	Gibbs		2008/0108964 A1	5/2008	Edwall
2003/0097113 A1	5/2003	Molee		2008/0125735 A1	5/2008	Busam et al.
2003/0100878 A1	5/2003	Leak et al.		2008/0134487 A1	6/2008	Hartono
2003/0105446 A1	6/2003	Hutson et al.		2008/0147031 A1	6/2008	Long et al.
2003/0113507 A1	6/2003	Niemeyer et al.		2008/0161767 A1	7/2008	Sandin et al.
2003/0114808 A1	6/2003	Underhill et al.		2008/0208152 A1	8/2008	Eckstein et al.
2003/0119404 A1	6/2003	Belau et al.		2008/0249493 A1	10/2008	Kobayashi et al.
2003/0166293 A1	9/2003	Kritzman et al.		2008/0274014 A1	11/2008	Jumonville et al.
2003/0199843 A1	10/2003	Kato et al.		2008/0281286 A1	11/2008	Petersen
2004/0044324 A1	3/2004	Swenson et al.		2008/0287897 A1	11/2008	Guzman Reyes et al.
				2008/0287898 A1	11/2008	Guzman Reyes et al.
				2008/0287899 A1	11/2008	Morrell-Schwartz et al.
				2008/0312618 A1	12/2008	Hundorf et al.
				2008/0312628 A1	12/2008	Hundorf et al.

(56)

**References Cited**

U.S. PATENT DOCUMENTS

2008/0312631 A1 12/2008 Okuda  
 2009/0143757 A1 6/2009 Hornung et al.  
 2009/0177176 A1 7/2009 Saito  
 2009/0198205 A1 8/2009 Malowaniec et al.  
 2009/0275071 A1 11/2009 Brusilovsky et al.  
 2009/0275911 A1 11/2009 Hormung et al.  
 2009/0299322 A1 12/2009 Faulks et al.  
 2009/0312736 A1 12/2009 Schroer, Jr. et al.  
 2009/0326499 A1 12/2009 Veith et al.  
 2009/0326503 A1 12/2009 Lakso et al.  
 2010/0051170 A1 3/2010 Nakakado  
 2010/0063468 A1 3/2010 Lehto et al.  
 2010/0065199 A1 3/2010 Hormung et al.  
 2010/0076390 A1 3/2010 Norrby et al.  
 2010/0108251 A1 5/2010 Malowaniec  
 2010/0136707 A1 6/2010 Kritzman et al.  
 2010/0163161 A1 7/2010 Gilgenbach et al.  
 2010/0168705 A1 7/2010 Stabelfeldt et al.  
 2010/0198178 A1 8/2010 Litvay  
 2010/0234820 A1 9/2010 Tsai  
 2010/0285286 A1 11/2010 Middlesworth  
 2010/0290948 A1 11/2010 Song  
 2010/0292663 A1 11/2010 Lavon et al.  
 2010/0318055 A1 12/2010 Hornung et al.  
 2011/0071488 A1 3/2011 Kuwano et al.  
 2011/0077609 A1 3/2011 Kuwano et al.  
 2011/0098668 A1 4/2011 Thorson et al.  
 2011/0123775 A1 5/2011 Westwood  
 2011/0130275 A1 6/2011 Weisman et al.  
 2011/0144610 A1 6/2011 Karlson et al.  
 2011/0146892 A1 6/2011 Ostertag  
 2011/0160692 A1 6/2011 Wilkes et al.  
 2011/0208140 A1 8/2011 Roe et al.

2011/0208142 A1 8/2011 Roe et al.  
 2012/0028777 A1 2/2012 Knecht  
 2012/0053552 A1 3/2012 Van Gompel et al.  
 2012/0065607 A1 3/2012 Konig et al.  
 2012/0165777 A1 6/2012 Beckert et al.  
 2012/0172828 A1 7/2012 Koenig et al.  
 2012/0310193 A1 12/2012 Ostertag  
 2013/0144245 A1 6/2013 Roe  
 2013/0211365 A1 8/2013 Rajala et al.  
 2013/0261589 A1 10/2013 Fujkawa et al.  
 2013/0277154 A1 10/2013 Fritz et al.  
 2013/0281957 A1 10/2013 Fritz et al.  
 2013/0296739 A1 11/2013 Schultz  
 2013/0345667 A1 12/2013 Nelson et al.  
 2014/0046286 A1 2/2014 Homann et al.  
 2014/0121487 A1 5/2014 Faybishenko et al.  
 2015/0011958 A1 1/2015 Yoshioka  
 2015/0297419 A1 10/2015 Nelson  
 2015/0297421 A1 10/2015 Nelson et al.  
 2015/0297423 A1 10/2015 Nelson et al.

FOREIGN PATENT DOCUMENTS

WO 9843574 A1 10/1998  
 WO 9923985 A1 5/1999  
 WO 9948452 A1 9/1999  
 WO 2006017718 A1 2/2006

OTHER PUBLICATIONS

Supplementary European Search Report; European Patent Application No. EP14770206, Nelson, Christopher J., et al; dated Oct. 6, 2016.

\* cited by examiner

