US00D894389S

(12) United States Design Patent

Shelton, IV et al.

(10) Patent No.: US D894,389 S
(45) Date of Patent: ** Aug. 25, 2020

(54) **SURGICAL FASTENER**

(71) Applicant: **Ethicon LLC**, Guaynabo, PR (US)

(72) Inventors: **Frederick E. Shelton, IV**, Hillsboro, OH (US); **Jason L. Harris**, Lebanon, OH (US); **Gregory J. Bakos**, Mason, OH (US); **Chester O. Baxter, III**, Loveland, OH (US)

(73) Assignee: **Ethicon LLC**, Guaynabo, PR (US)

(**) Term: **15 Years**

(21) Appl. No.: **29/660,275**

(22) Filed: **Aug. 20, 2018**

Related U.S. Application Data

(62) Division of application No. 29/569,218, filed on Jun. 24, 2016, now Pat. No. Des. 826,405.

(51) **LOC (12) Cl.** **24-02**

(52) **U.S. Cl.**
USPC **D24/145**

(58) **Field of Classification Search**
USPC D24/145

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

66,052 A 6/1867 Smith
662,587 A 11/1900 Blake

(Continued)

FOREIGN PATENT DOCUMENTS

AU 2011218702 B2 6/2013
AU 2012200178 B2 7/2013

(Continued)

OTHER PUBLICATIONS

Biomedical Coatings, Fort Wayne Metals, Research Products Corporation, obtained online at www.fwmetals.com on Jun. 21, 2010 (1 page).

(Continued)

Primary Examiner — Wan Laymon

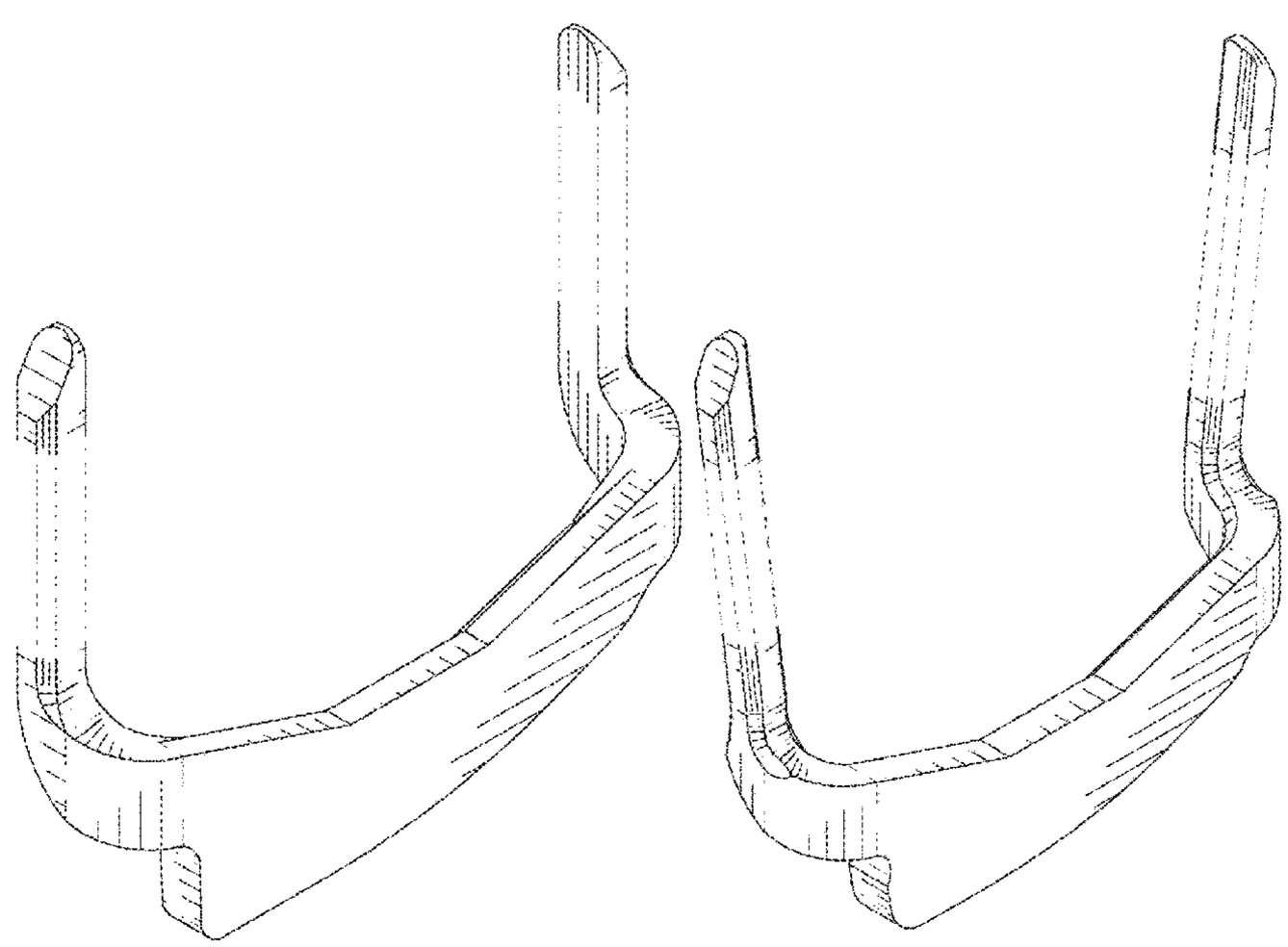
(57) **CLAIM**

The ornamental design for a surgical fastener, as shown and described.

DESCRIPTION

FIG. **1** is a perspective view of a surgical fastener.
FIG. **2** is a front elevation view of the surgical fastener of FIG. **1**.
FIG. **3** is a rear elevation view of the surgical fastener of FIG. **1**.
FIG. **4** is a top plan view of the surgical fastener of FIG. **1**.
FIG. **5** is a bottom plan view of the surgical fastener of FIG. **1**.
FIG. **6** is a left elevation view of the surgical fastener of FIG. **1**.
FIG. **7** is a right elevation view of the surgical fastener of FIG. **1**.
FIG. **8** is a perspective view of a surgical fastener.
FIG. **9** is a front elevation view of the surgical fastener of FIG. **8**.
FIG. **10** is a rear elevation view of the surgical fastener of FIG. **8**.
FIG. **11** is a top plan view of the surgical fastener of FIG. **8**.
FIG. **12** is a bottom plan view of the surgical fastener of FIG. **8**.
FIG. **13** is a left elevation view of the surgical fastener of FIG. **8**; and,
FIG. **14** is a right elevation view of the surgical fastener of FIG. **8**.

1 Claim, 10 Drawing Sheets



(58) **Field of Classification Search**
CPC A61F 17/064; A61F 17/0643; A61F 17/0644; A61F 17/068; A61F 17/122; A61B 2017/0417
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

670,748	A	3/1901	Weddeler
951,393	A	3/1910	Hahn
1,306,107	A	6/1919	Elliott
1,314,601	A	9/1919	McCaskey
1,677,337	A	7/1928	Grove
1,794,907	A	3/1931	Kelly
2,037,727	A	4/1936	La Chapelle
2,132,295	A	10/1938	Hawkins
2,161,632	A	6/1939	Nattenheimer
2,211,117	A	8/1940	Hess
2,214,870	A	9/1940	West
2,318,379	A	5/1943	Davis et al.
2,441,096	A	5/1948	Happe
2,475,322	A	7/1949	Horton et al.
2,526,902	A	10/1950	Rublee
2,578,686	A	12/1951	Fish
2,674,149	A	4/1954	Benson
2,711,461	A	6/1955	Happe
2,804,848	A	9/1957	O'Farrell et al.
2,808,482	A	10/1957	Zanichkowsky et al.
2,853,074	A	9/1958	Olson
2,886,358	A	5/1959	Munchbach
2,959,974	A	11/1960	Emrick
3,032,769	A	5/1962	Palmer
3,060,972	A	10/1962	Sheldon
3,075,062	A	1/1963	Iaccarino
3,078,465	A	2/1963	Bobrov
3,079,606	A	3/1963	Bobrov et al.
3,166,072	A	1/1965	Sullivan, Jr.
3,196,869	A	7/1965	Scholl
3,204,731	A	9/1965	Bent et al.
3,266,494	A	8/1966	Brownrigg et al.
3,269,630	A	8/1966	Fleischer
3,275,211	A	9/1966	Hirsch et al.
3,317,103	A	5/1967	Cullen et al.
3,499,591	A	3/1970	Green
3,551,987	A	1/1971	Wilkinson
3,583,393	A	6/1971	Takahashi
3,662,939	A	5/1972	Bryan
3,717,294	A	2/1973	Green
3,799,151	A	3/1974	Fukaumi et al.
3,940,844	A	3/1976	Colby et al.
RE28,932	E	8/1976	Noiles et al.
4,014,244	A	3/1977	Larson
4,060,089	A	11/1977	Noiles
4,106,446	A	8/1978	Yamada et al.
4,108,211	A	8/1978	Tanaka
4,111,206	A	9/1978	Vishnevsky et al.
4,129,059	A	12/1978	Van Eck
4,169,990	A	10/1979	Lerdman
4,180,285	A	12/1979	Reneau
4,198,734	A	4/1980	Brumlik
4,198,982	A	4/1980	Fortner et al.
4,207,898	A	6/1980	Becht
4,213,562	A	7/1980	Garrett et al.
4,226,242	A	10/1980	Jarvik
4,241,861	A	12/1980	Fleischer
4,244,372	A	1/1981	Kapitanov et al.
4,250,436	A	2/1981	Weissman
4,261,244	A	4/1981	Becht et al.
4,272,002	A	6/1981	Moshofsky
4,272,662	A	6/1981	Simpson
4,274,304	A	6/1981	Curtiss
4,275,813	A	6/1981	Noiles
4,289,133	A	9/1981	Rothfuss
4,296,654	A	10/1981	Mercer
4,304,236	A	12/1981	Conta et al.
4,305,539	A	12/1981	Korolkov et al.
4,312,685	A	1/1982	Riedl
4,317,451	A	3/1982	Cerwin et al.
4,319,576	A	3/1982	Rothfuss
4,321,002	A	3/1982	Froehlich
4,328,839	A	5/1982	Lyons et al.
4,331,277	A	5/1982	Green
4,340,331	A	7/1982	Savino
4,347,450	A	8/1982	Colligan
4,349,028	A	9/1982	Green
4,353,371	A	10/1982	Cosman
4,379,457	A	4/1983	Gravener et al.
4,380,312	A	4/1983	Landrus
4,382,326	A	5/1983	Rabuse
4,383,634	A	5/1983	Green
4,393,728	A	7/1983	Larson et al.
4,396,139	A	8/1983	Hall et al.
4,397,311	A	8/1983	Kanshin et al.
4,402,445	A	9/1983	Green
4,408,692	A	10/1983	Sigel et al.
4,409,057	A	10/1983	Molenda et al.
4,415,112	A	11/1983	Green
4,416,276	A	11/1983	Newton et al.
4,428,376	A	1/1984	Mericle
4,429,695	A	2/1984	Green
4,434,796	A	3/1984	Karapetian et al.
4,438,659	A	3/1984	Desplats
4,442,964	A	4/1984	Becht
4,448,194	A	5/1984	DiGiovanni et al.
4,451,743	A	5/1984	Suzuki et al.
4,454,887	A	6/1984	Kruger
4,467,805	A	8/1984	Fukuda
4,473,077	A	9/1984	Noiles et al.
4,475,679	A	10/1984	Fleury, Jr.
4,485,816	A	12/1984	Krumme
4,486,928	A	12/1984	Tucker et al.
4,488,523	A	12/1984	Shichman
4,489,875	A	12/1984	Crawford et al.
4,499,895	A	2/1985	Takayama
4,500,024	A	2/1985	DiGiovanni et al.
4,505,272	A	3/1985	Utyamyshev et al.
4,505,273	A	3/1985	Braun et al.
4,505,414	A	3/1985	Filipi
4,506,671	A	3/1985	Green
4,520,817	A	6/1985	Green
4,522,327	A	6/1985	Korthoff et al.
4,526,174	A	7/1985	Froehlich
4,527,724	A	7/1985	Chow et al.
4,530,453	A	7/1985	Green
4,531,522	A	7/1985	Bedi et al.
4,532,927	A	8/1985	Miksza, Jr.
4,548,202	A	10/1985	Duncan
4,565,109	A	1/1986	Tsay
4,565,189	A	1/1986	Mabuchi
4,566,620	A	1/1986	Green et al.
4,569,469	A	2/1986	Mongeon et al.
4,571,213	A	2/1986	Ishimoto
4,573,468	A	3/1986	Conta et al.
4,573,469	A	3/1986	Golden et al.
4,573,622	A	3/1986	Green et al.
4,576,167	A	3/1986	Noiles
4,580,712	A	4/1986	Green
4,585,153	A	4/1986	Failla et al.
4,589,416	A	5/1986	Green
4,591,085	A	5/1986	Di Giovanni
4,597,753	A	7/1986	Turley
4,600,037	A	7/1986	Hatten
4,604,786	A	8/1986	Howie, Jr.
4,605,001	A	8/1986	Rothfuss et al.
4,605,004	A	8/1986	Di Giovanni et al.
4,606,343	A	8/1986	Conta et al.
4,607,638	A	8/1986	Crainich
4,608,981	A	9/1986	Rothfuss et al.
4,610,250	A	9/1986	Green
4,610,383	A	9/1986	Rothfuss et al.
4,612,933	A	9/1986	Brinkerhoff et al.
D286,180	S	10/1986	Korthoff
D286,441	S	10/1986	Korthoff et al.
D286,442	S	10/1986	Korthoff et al.
4,619,262	A	10/1986	Taylor

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,619,391 A 10/1986 Sharkany et al.
4,628,459 A 12/1986 Shinohara et al.
4,629,107 A 12/1986 Fedotov et al.
4,632,290 A 12/1986 Green et al.
4,633,874 A 1/1987 Chow et al.
4,634,419 A 1/1987 Kreizman et al.
4,641,076 A 2/1987 Linden
4,643,731 A 2/1987 Eckenhoff
4,646,722 A 3/1987 Silverstein et al.
4,652,820 A 3/1987 Maresca
4,655,222 A 4/1987 Florez et al.
4,662,555 A 5/1987 Thornton
4,663,874 A 5/1987 Sano et al.
4,664,305 A 5/1987 Blake, III et al.
4,665,916 A 5/1987 Green
4,667,674 A 5/1987 Korthoff et al.
4,669,647 A 6/1987 Storace
4,671,445 A 6/1987 Barker et al.
4,676,245 A 6/1987 Fukuda
4,684,051 A 8/1987 Akopov et al.
4,693,248 A 9/1987 Failla
4,700,703 A 10/1987 Resnick et al.
4,708,141 A 11/1987 Inoue et al.
4,709,120 A 11/1987 Pearson
4,715,520 A 12/1987 Roehr, Jr. et al.
4,719,917 A 1/1988 Barrows et al.
4,727,308 A 2/1988 Huljak et al.
4,728,020 A 3/1988 Green et al.
4,728,876 A 3/1988 Mongeon et al.
4,729,260 A 3/1988 Dudden
4,730,726 A 3/1988 Holzwarth
4,741,336 A 5/1988 Failla et al.
4,743,214 A 5/1988 Tai-Cheng
4,747,820 A 5/1988 Hornlein et al.
4,750,902 A 6/1988 Wuchinich et al.
4,752,024 A 6/1988 Green et al.
4,754,909 A 7/1988 Barker et al.
4,767,044 A 8/1988 Green
D297,764 S 9/1988 Hunt et al.
4,773,420 A 9/1988 Green
4,777,780 A 10/1988 Holzwarth
4,781,186 A 11/1988 Simpson et al.
4,787,387 A 11/1988 Burbank, III et al.
4,790,225 A 12/1988 Moody et al.
4,802,478 A 2/1989 Powell
4,805,617 A 2/1989 Bedi et al.
4,805,823 A 2/1989 Rothfuss
4,809,695 A 3/1989 Gwathmey et al.
4,815,460 A 3/1989 Porat et al.
4,817,847 A 4/1989 Redtenbacher et al.
4,819,853 A 4/1989 Green
4,821,939 A 4/1989 Green
4,827,911 A 5/1989 Broadwin et al.
4,830,855 A 5/1989 Stewart
4,834,720 A 5/1989 Blinkhorn
4,844,068 A 7/1989 Arata et al.
4,848,637 A 7/1989 Pruitt
4,865,030 A 9/1989 Polyak
4,869,414 A 9/1989 Green et al.
4,869,415 A 9/1989 Fox
4,873,977 A 10/1989 Avant et al.
4,874,122 A 10/1989 Froelich et al.
4,880,015 A 11/1989 Nierman
4,887,601 A 12/1989 Richards
4,890,613 A 1/1990 Golden et al.
4,892,244 A 1/1990 Fox et al.
4,893,622 A 1/1990 Green et al.
4,894,051 A 1/1990 Shiber
4,896,678 A 1/1990 Ogawa
4,900,303 A 2/1990 Lemelson
4,903,697 A 2/1990 Resnick et al.
4,915,100 A 4/1990 Green
4,930,503 A 6/1990 Pruitt
4,930,674 A 6/1990 Barak
4,931,047 A 6/1990 Broadwin et al.
4,932,960 A 6/1990 Green et al.
4,938,408 A 7/1990 Bedi et al.
4,941,623 A 7/1990 Pruitt
4,944,443 A 7/1990 Oddsen et al.
4,951,860 A 8/1990 Peters et al.
4,955,898 A 9/1990 Matsutani et al.
4,955,959 A 9/1990 Tompkins et al.
4,965,709 A 10/1990 Ngo
4,973,274 A 11/1990 Hirukawa
4,978,049 A 12/1990 Green
4,978,333 A 12/1990 Broadwin et al.
4,986,808 A 1/1991 Broadwin et al.
4,988,334 A 1/1991 Hornlein et al.
5,002,543 A 3/1991 Bradshaw et al.
5,002,553 A 3/1991 Shiber
5,005,754 A 4/1991 Van Overloop
5,009,661 A 4/1991 Michelson
5,014,899 A 5/1991 Presty et al.
5,015,227 A 5/1991 Broadwin et al.
5,018,515 A 5/1991 Gilman
5,018,657 A 5/1991 Pedlick et al.
5,024,671 A 6/1991 Tu et al.
5,027,834 A 7/1991 Pruitt
5,031,814 A 7/1991 Tompkins et al.
5,035,040 A 7/1991 Kerrigan et al.
5,038,109 A 8/1991 Goble et al.
5,040,715 A 8/1991 Green et al.
5,042,707 A 8/1991 Taheri
5,053,047 A 10/1991 Yoon
5,061,269 A 10/1991 Muller
5,062,563 A 11/1991 Green et al.
5,065,929 A 11/1991 Schulze et al.
5,071,052 A 12/1991 Rodak et al.
5,071,430 A 12/1991 de Salis et al.
5,074,454 A 12/1991 Peters
5,079,006 A 1/1992 Urquhart
5,080,556 A 1/1992 Carreno
5,083,695 A 1/1992 Foslien et al.
5,084,057 A 1/1992 Green et al.
5,088,979 A 2/1992 Filipi et al.
5,088,997 A 2/1992 Delahuerga et al.
5,089,009 A 2/1992 Green
5,094,247 A 3/1992 Hernandez et al.
5,100,420 A 3/1992 Green et al.
5,104,025 A 4/1992 Main et al.
5,104,397 A 4/1992 Vasconcelos et al.
5,106,008 A 4/1992 Tompkins et al.
5,108,368 A 4/1992 Hammerslag et al.
5,111,987 A 5/1992 Moeinzadeh et al.
5,116,349 A 5/1992 Aranyi
D327,323 S 6/1992 Hunt
5,122,156 A 6/1992 Granger et al.
5,125,876 A 6/1992 Hirota
5,129,570 A 7/1992 Schulze et al.
5,137,198 A 8/1992 Nobis et al.
5,139,513 A 8/1992 Segato
5,141,144 A 8/1992 Foslien et al.
5,142,932 A 9/1992 Moya et al.
5,155,941 A 10/1992 Takahashi et al.
5,156,315 A 10/1992 Green et al.
5,156,609 A 10/1992 Nakao et al.
5,156,614 A 10/1992 Green et al.
5,158,567 A 10/1992 Green
D330,699 S 11/1992 Gill
5,163,598 A 11/1992 Peters et al.
5,170,925 A 12/1992 Madden et al.
5,171,247 A 12/1992 Hughett et al.
5,171,249 A 12/1992 Stefanchik et al.
5,171,253 A 12/1992 Klieman
5,188,111 A 2/1993 Yates et al.
5,190,517 A 3/1993 Zieve et al.
5,190,544 A 3/1993 Chapman et al.
5,190,560 A 3/1993 Woods et al.
5,192,288 A 3/1993 Thompson et al.
5,195,968 A 3/1993 Lundquist et al.
5,197,648 A 3/1993 Gingold
5,197,649 A 3/1993 Bessler et al.
5,197,966 A 3/1993 Sommerkamp
5,200,280 A 4/1993 Karasa

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,201,746 A 4/1993 Shichman
5,205,459 A 4/1993 Brinkerhoff et al.
5,207,697 A 5/1993 Carusillo et al.
5,209,747 A 5/1993 Knoepfler
5,211,649 A 5/1993 Kohler et al.
5,211,655 A 5/1993 Hasson
5,217,457 A 6/1993 Delahuerga et al.
5,217,478 A 6/1993 Rexroth
5,219,111 A 6/1993 Bilotti et al.
5,221,036 A 6/1993 Takase
5,221,281 A 6/1993 Klicek
5,222,963 A 6/1993 Brinkerhoff et al.
5,222,975 A 6/1993 Crainich
5,222,976 A 6/1993 Yoon
5,223,675 A 6/1993 Taft
D338,729 S 8/1993 Sprecklemeier et al.
5,234,447 A 8/1993 Kaster et al.
5,236,440 A 8/1993 Hlavacek
5,239,981 A 8/1993 Anapliotis
5,240,163 A 8/1993 Stein et al.
5,242,457 A 9/1993 Akopov et al.
5,244,462 A 9/1993 Delahuerga et al.
5,246,156 A 9/1993 Rothfuss et al.
5,246,443 A 9/1993 Mai
5,253,793 A 10/1993 Green et al.
5,258,009 A 11/1993 Conners
5,258,012 A 11/1993 Luscombe et al.
5,259,366 A 11/1993 Reydel et al.
5,260,637 A 11/1993 Pizzi
5,263,629 A 11/1993 Trumbull et al.
5,263,973 A 11/1993 Cook
5,264,218 A 11/1993 Rogozinski
5,268,622 A 12/1993 Philipp
5,271,543 A 12/1993 Grant et al.
5,271,544 A 12/1993 Fox et al.
RE34,519 E 1/1994 Fox et al.
5,275,323 A 1/1994 Schulze et al.
5,275,608 A 1/1994 Forman et al.
5,279,416 A 1/1994 Malec et al.
5,281,216 A 1/1994 Klicek
5,282,806 A 2/1994 Haber et al.
5,282,829 A 2/1994 Hermes
5,284,128 A 2/1994 Hart
5,285,945 A 2/1994 Brinkerhoff et al.
5,289,963 A 3/1994 McGarry et al.
5,290,271 A 3/1994 Jernberg
5,292,053 A 3/1994 Bilotti et al.
5,297,714 A 3/1994 Kramer
5,303,539 A 4/1994 Neamtu
5,304,204 A 4/1994 Bregen
D347,474 S 5/1994 Olson
5,307,976 A 5/1994 Olson et al.
5,308,576 A 5/1994 Green et al.
5,309,927 A 5/1994 Welch
5,312,023 A 5/1994 Green et al.
5,312,024 A 5/1994 Grant et al.
5,312,329 A 5/1994 Beaty et al.
5,314,424 A 5/1994 Nicholas
5,314,445 A 5/1994 Heidmueller nee Degwitz et al.
5,314,466 A 5/1994 Stern et al.
5,318,221 A 6/1994 Green et al.
D348,930 S 7/1994 Olson
5,329,923 A 7/1994 Lundquist
5,330,487 A 7/1994 Thornton et al.
5,330,502 A 7/1994 Hassler et al.
5,332,142 A 7/1994 Robinson et al.
5,333,422 A 8/1994 Warren et al.
5,333,772 A 8/1994 Rothfuss et al.
5,333,773 A 8/1994 Main et al.
5,334,183 A 8/1994 Wuchinich
5,336,229 A 8/1994 Noda
5,336,232 A 8/1994 Green et al.
5,339,799 A 8/1994 Kami et al.
5,341,724 A 8/1994 Vatel
5,341,810 A 8/1994 Dardel
5,342,381 A 8/1994 Tidemand
5,342,395 A 8/1994 Jarrett et al.
5,342,396 A 8/1994 Cook
5,344,060 A 9/1994 Gravener et al.
5,344,454 A 9/1994 Clarke et al.
5,346,504 A 9/1994 Ortiz et al.
5,348,259 A 9/1994 Blanco et al.
5,350,388 A 9/1994 Epstein
5,350,391 A 9/1994 Iacovelli
5,350,400 A 9/1994 Esposito et al.
5,352,229 A 10/1994 Goble et al.
5,352,235 A 10/1994 Koros et al.
5,352,238 A 10/1994 Green et al.
5,354,303 A 10/1994 Spaeth et al.
5,356,006 A 10/1994 Alpern et al.
5,358,506 A 10/1994 Green et al.
5,358,510 A 10/1994 Luscombe et al.
5,359,231 A 10/1994 Flowers et al.
D352,780 S 11/1994 Glaeser et al.
5,360,305 A 11/1994 Kerrigan
5,360,428 A 11/1994 Hutchinson, Jr.
5,364,001 A 11/1994 Bryan
5,364,003 A 11/1994 Williamson, IV
5,366,133 A 11/1994 Geiste
5,366,134 A 11/1994 Green et al.
5,366,479 A 11/1994 McGarry et al.
5,368,015 A 11/1994 Wilk
5,368,592 A 11/1994 Stern et al.
5,370,645 A 12/1994 Klicek et al.
5,372,124 A 12/1994 Takayama et al.
5,372,596 A 12/1994 Klicek et al.
5,372,602 A 12/1994 Burke
5,374,277 A 12/1994 Hassler
5,376,095 A 12/1994 Ortiz
5,379,933 A 1/1995 Green et al.
5,381,649 A 1/1995 Webb
5,381,782 A 1/1995 DeLaRama et al.
5,381,943 A 1/1995 Allen et al.
5,382,247 A 1/1995 Cimino et al.
5,383,880 A 1/1995 Hooven
5,383,881 A 1/1995 Green et al.
5,383,882 A 1/1995 Buess et al.
5,383,888 A 1/1995 Zvenyatsky et al.
5,383,895 A 1/1995 Holmes et al.
5,389,098 A 2/1995 Tsuruta et al.
5,389,104 A 2/1995 Hahnen et al.
5,391,180 A 2/1995 Tovey et al.
5,392,978 A 2/1995 Velez et al.
5,392,979 A 2/1995 Green et al.
5,395,030 A 3/1995 Kuramoto et al.
5,395,033 A 3/1995 Byrne et al.
5,395,034 A 3/1995 Allen et al.
5,395,312 A 3/1995 Desai
5,395,384 A 3/1995 Duthoit et al.
5,397,046 A 3/1995 Savage et al.
5,397,324 A 3/1995 Carroll et al.
5,403,043 A 4/1995 Smet
5,403,312 A 4/1995 Yates et al.
5,405,072 A 4/1995 Zlock et al.
5,405,073 A 4/1995 Porter
5,405,344 A 4/1995 Williamson et al.
5,405,360 A 4/1995 Tovey
5,407,293 A 4/1995 Crainich
5,409,498 A 4/1995 Braddock et al.
D357,981 S 5/1995 Green et al.
5,411,481 A 5/1995 Allen et al.
5,411,508 A 5/1995 Bessler et al.
5,413,107 A 5/1995 Oakley et al.
5,413,267 A 5/1995 Solyntjes et al.
5,413,268 A 5/1995 Green et al.
5,413,272 A 5/1995 Green et al.
5,413,573 A 5/1995 Koivukangas
5,415,334 A 5/1995 Williamson et al.
5,415,335 A 5/1995 Knodell, Jr.
5,417,203 A 5/1995 Tovey et al.
5,417,361 A 5/1995 Williamson, IV
5,421,829 A 6/1995 Olichney et al.
5,422,567 A 6/1995 Matsunaga
5,423,471 A 6/1995 Mastri et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,423,809 A 6/1995 Klicek
5,425,745 A 6/1995 Green et al.
5,431,322 A 7/1995 Green et al.
5,431,654 A 7/1995 Nic
5,431,668 A 7/1995 Burbank, III et al.
5,433,721 A 7/1995 Hooven et al.
5,437,681 A 8/1995 Meade et al.
5,438,302 A 8/1995 Goble
5,439,155 A 8/1995 Viola
5,439,156 A 8/1995 Grant et al.
5,439,479 A 8/1995 Shichman et al.
5,441,191 A 8/1995 Linden
5,441,193 A 8/1995 Gravener
5,441,483 A 8/1995 Avitall
5,441,494 A 8/1995 Ortiz
5,444,113 A 8/1995 Sinclair et al.
5,445,155 A 8/1995 Sieben
5,445,304 A 8/1995 Plyley et al.
5,445,644 A 8/1995 Pietrafitta et al.
5,447,265 A 9/1995 Vidal et al.
5,447,417 A 9/1995 Kuhl et al.
5,447,513 A 9/1995 Davison et al.
5,449,355 A 9/1995 Rhum et al.
5,449,365 A 9/1995 Green et al.
5,449,370 A 9/1995 Vaitekunas
5,452,836 A 9/1995 Huitema et al.
5,452,837 A 9/1995 Williamson, IV et al.
5,454,378 A 10/1995 Palmer et al.
5,454,822 A 10/1995 Schob et al.
5,454,827 A 10/1995 Aust et al.
5,456,401 A 10/1995 Green et al.
5,458,579 A 10/1995 Chodorow et al.
5,462,215 A 10/1995 Viola et al.
5,464,013 A 11/1995 Lemelson
5,464,144 A 11/1995 Guy et al.
5,464,300 A 11/1995 Crainich
5,465,819 A 11/1995 Weilant et al.
5,465,894 A 11/1995 Clark et al.
5,465,895 A 11/1995 Knodel et al.
5,465,896 A 11/1995 Allen et al.
5,466,020 A 11/1995 Page et al.
5,467,911 A 11/1995 Tsuruta et al.
5,468,253 A 11/1995 Bezwada et al.
5,470,006 A 11/1995 Rodak
5,470,007 A 11/1995 Plyley et al.
5,470,009 A 11/1995 Rodak
5,470,010 A 11/1995 Rothfuss et al.
5,472,132 A 12/1995 Savage et al.
5,472,442 A 12/1995 Klicek
5,473,204 A 12/1995 Temple
5,474,057 A 12/1995 Makower et al.
5,474,223 A 12/1995 Viola et al.
5,474,566 A 12/1995 Alesi et al.
5,476,206 A 12/1995 Green et al.
5,476,479 A 12/1995 Green et al.
5,478,003 A 12/1995 Green et al.
5,478,354 A 12/1995 Tovey et al.
5,480,089 A 1/1996 Blewett
5,480,409 A 1/1996 Riza
5,482,197 A 1/1996 Green et al.
5,484,095 A 1/1996 Green et al.
5,484,398 A 1/1996 Stoddard
5,484,451 A 1/1996 Akopov et al.
5,485,947 A 1/1996 Olson et al.
5,485,952 A 1/1996 Fontayne
5,487,499 A 1/1996 Sorrentino et al.
5,487,500 A 1/1996 Knodel et al.
5,489,058 A 2/1996 Plyley et al.
5,489,256 A 2/1996 Adair
5,496,312 A 3/1996 Klicek
5,496,317 A 3/1996 Goble et al.
5,497,933 A 3/1996 DeFonzo et al.
5,501,654 A 3/1996 Failla et al.
5,503,320 A 4/1996 Webster et al.
5,503,635 A 4/1996 Sauer et al.
5,503,638 A 4/1996 Cooper et al.
5,505,363 A 4/1996 Green et al.
5,507,425 A 4/1996 Ziglioli
5,507,426 A 4/1996 Young et al.
5,509,596 A 4/1996 Green et al.
5,509,916 A 4/1996 Taylor
5,511,564 A 4/1996 Wilk
5,514,129 A 5/1996 Smith
5,514,157 A 5/1996 Nicholas et al.
5,518,163 A 5/1996 Hooven
5,518,164 A 5/1996 Hooven
5,520,678 A 5/1996 Heckele et al.
5,520,700 A 5/1996 Beyar et al.
5,522,817 A 6/1996 Sander et al.
5,522,831 A 6/1996 Sleister et al.
5,527,320 A 6/1996 Carruthers et al.
5,529,235 A 6/1996 Boiarski et al.
D372,086 S 7/1996 Grasso et al.
5,531,305 A 7/1996 Roberts et al.
5,531,744 A 7/1996 Nardella et al.
5,533,521 A 7/1996 Granger
5,533,581 A 7/1996 Barth et al.
5,533,661 A 7/1996 Main et al.
5,535,934 A 7/1996 Boiarski et al.
5,535,935 A 7/1996 Vidal et al.
5,535,937 A 7/1996 Boiarski et al.
5,540,375 A 7/1996 Bolanos et al.
5,541,376 A 7/1996 Ladtkow et al.
5,542,594 A 8/1996 McKean et al.
5,542,949 A 8/1996 Yoon
5,543,119 A 8/1996 Sutter et al.
5,547,117 A 8/1996 Hamblin et al.
5,549,621 A 8/1996 Bessler et al.
5,549,627 A 8/1996 Kieturakis
5,549,628 A 8/1996 Cooper et al.
5,549,637 A 8/1996 Crainich
5,551,622 A 9/1996 Yoon
5,553,675 A 9/1996 Pitzen et al.
5,553,765 A 9/1996 Knodel et al.
5,554,148 A 9/1996 Aebischer et al.
5,554,169 A 9/1996 Green et al.
5,556,416 A 9/1996 Clark et al.
5,558,665 A 9/1996 Kieturakis
5,558,671 A 9/1996 Yates
5,560,530 A 10/1996 Bolanos et al.
5,560,532 A 10/1996 DeFonzo et al.
5,562,239 A 10/1996 Boiarski et al.
5,562,241 A 10/1996 Knodel et al.
5,562,682 A 10/1996 Oberlin et al.
5,562,690 A 10/1996 Green et al.
5,562,701 A 10/1996 Huitema et al.
5,562,702 A 10/1996 Huitema et al.
5,564,615 A 10/1996 Bishop et al.
5,569,161 A 10/1996 Ebling et al.
5,569,270 A 10/1996 Weng
5,569,284 A 10/1996 Young et al.
5,571,090 A 11/1996 Sherts
5,571,100 A 11/1996 Goble et al.
5,571,116 A 11/1996 Bolanos et al.
5,571,285 A 11/1996 Chow et al.
5,573,541 A 11/1996 Green et al.
5,573,543 A 11/1996 Akopov et al.
5,574,431 A 11/1996 McKeown et al.
5,575,054 A 11/1996 Klinzing et al.
5,575,789 A 11/1996 Bell et al.
5,575,799 A 11/1996 Bolanos et al.
5,575,803 A 11/1996 Cooper et al.
5,575,805 A 11/1996 Li
5,577,654 A 11/1996 Bishop
5,579,978 A 12/1996 Green et al.
5,580,067 A 12/1996 Hamblin et al.
5,582,611 A 12/1996 Tsuruta et al.
5,582,617 A 12/1996 Klieman et al.
5,584,425 A 12/1996 Savage et al.
5,586,711 A 12/1996 Plyley et al.
5,588,579 A 12/1996 Schnut et al.
5,588,580 A 12/1996 Paul et al.
5,588,581 A 12/1996 Conlon et al.
5,591,170 A 1/1997 Spievack et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,591,187 A 1/1997 Dekel
5,597,107 A 1/1997 Knodel et al.
5,599,151 A 2/1997 Daum et al.
5,599,279 A 2/1997 Slotman et al.
5,599,344 A 2/1997 Paterson
5,599,350 A 2/1997 Schulze et al.
5,599,852 A 2/1997 Scopelianos et al.
5,601,224 A 2/1997 Bishop et al.
5,603,443 A 2/1997 Clark et al.
5,605,272 A 2/1997 Witt et al.
5,605,273 A 2/1997 Hamblin et al.
5,607,094 A 3/1997 Clark et al.
5,607,095 A 3/1997 Smith et al.
5,607,433 A 3/1997 Polla et al.
5,607,450 A 3/1997 Zvenyatsky et al.
5,609,285 A 3/1997 Grant et al.
5,609,601 A 3/1997 Kolesa et al.
5,611,709 A 3/1997 McAnulty
5,613,966 A 3/1997 Makower et al.
5,615,820 A 4/1997 Viola
5,618,294 A 4/1997 Aust et al.
5,618,303 A 4/1997 Marlow et al.
5,618,307 A 4/1997 Donlon et al.
5,619,992 A 4/1997 Guthrie et al.
5,620,289 A 4/1997 Curry
5,620,452 A 4/1997 Yoon
5,624,398 A 4/1997 Smith et al.
5,624,452 A 4/1997 Yates
5,626,587 A 5/1997 Bishop et al.
5,626,595 A 5/1997 Sklar et al.
5,628,446 A 5/1997 Geiste et al.
5,628,743 A 5/1997 Cimino
5,628,745 A 5/1997 Bek
5,630,539 A 5/1997 Plyley et al.
5,630,540 A 5/1997 Blewett
5,630,541 A 5/1997 Williamson, IV et al.
5,630,782 A 5/1997 Adair
5,632,432 A 5/1997 Schulze et al.
5,632,433 A 5/1997 Grant et al.
5,634,584 A 6/1997 Okorocha et al.
5,636,779 A 6/1997 Palmer
5,636,780 A 6/1997 Green et al.
5,639,008 A 6/1997 Gallagher et al.
D381,077 S 7/1997 Hunt
5,643,291 A 7/1997 Pier et al.
5,645,209 A 7/1997 Green et al.
5,647,526 A 7/1997 Green et al.
5,647,869 A 7/1997 Goble et al.
5,649,937 A 7/1997 Bito et al.
5,649,956 A 7/1997 Jensen et al.
5,651,491 A 7/1997 Heaton et al.
5,653,373 A 8/1997 Green et al.
5,653,374 A 8/1997 Young et al.
5,653,677 A 8/1997 Okada et al.
5,653,721 A 8/1997 Knodel et al.
5,655,698 A 8/1997 Yoon
5,657,921 A 8/1997 Young et al.
5,658,238 A 8/1997 Suzuki et al.
5,658,281 A 8/1997 Heard
5,658,300 A 8/1997 Bito et al.
5,658,307 A 8/1997 Exconde
5,662,258 A 9/1997 Knodel et al.
5,662,260 A 9/1997 Yoon
5,662,662 A 9/1997 Bishop et al.
5,665,085 A 9/1997 Nardella
5,665,100 A 9/1997 Yoon
5,667,517 A 9/1997 Hooven
5,667,526 A 9/1997 Levin
5,667,527 A 9/1997 Cook
5,669,544 A 9/1997 Schulze et al.
5,669,904 A 9/1997 Platt, Jr. et al.
5,669,907 A 9/1997 Platt, Jr. et al.
5,669,918 A 9/1997 Balazs et al.
5,673,840 A 10/1997 Schulze et al.
5,673,841 A 10/1997 Schulze et al.
5,673,842 A 10/1997 Bittner et al.
5,674,286 A 10/1997 D'Alessio et al.
5,678,748 A 10/1997 Plyley et al.
5,680,981 A 10/1997 Mililli et al.
5,680,982 A 10/1997 Schulze et al.
5,680,983 A 10/1997 Plyley et al.
5,683,349 A 11/1997 Makower et al.
5,685,474 A 11/1997 Seeber
5,686,090 A 11/1997 Schilder et al.
5,688,270 A 11/1997 Yates et al.
5,690,269 A 11/1997 Bolanos et al.
5,692,668 A 12/1997 Schulze et al.
5,693,020 A 12/1997 Rauh
5,693,042 A 12/1997 Boiarski et al.
5,693,051 A 12/1997 Schulze et al.
5,695,494 A 12/1997 Becker
5,695,502 A 12/1997 Pier et al.
5,695,504 A 12/1997 Gifford, III et al.
5,695,524 A 12/1997 Kelley et al.
5,697,542 A 12/1997 Knodel et al.
5,697,543 A 12/1997 Burdorff
5,697,909 A 12/1997 Eggers et al.
5,697,943 A 12/1997 Sauer et al.
5,700,270 A 12/1997 Peyser et al.
5,702,387 A 12/1997 Arts et al.
5,702,408 A 12/1997 Wales et al.
5,702,409 A 12/1997 Rayburn et al.
5,704,087 A 1/1998 Strub
5,704,534 A 1/1998 Huitema et al.
5,706,997 A 1/1998 Green et al.
5,706,998 A 1/1998 Plyley et al.
5,707,392 A 1/1998 Kortenbach
5,709,334 A 1/1998 Sorrentino et al.
5,709,335 A 1/1998 Heck
5,709,680 A 1/1998 Yates et al.
5,709,706 A 1/1998 Kienzle et al.
5,711,472 A 1/1998 Bryan
5,713,128 A 2/1998 Schrenk et al.
5,713,505 A 2/1998 Huitema
5,713,895 A 2/1998 Lontine et al.
5,713,896 A 2/1998 Nardella
5,713,920 A 2/1998 Bezwada et al.
5,715,604 A 2/1998 Lanzoni
5,715,987 A 2/1998 Kelley et al.
5,715,988 A 2/1998 Palmer
5,716,366 A 2/1998 Yates
5,718,359 A 2/1998 Palmer et al.
5,718,360 A 2/1998 Green et al.
5,718,548 A 2/1998 Cotellessa
5,718,706 A 2/1998 Roger
5,720,744 A 2/1998 Eggleston et al.
D393,067 S 3/1998 Geary et al.
5,725,536 A 3/1998 Oberlin et al.
5,725,554 A 3/1998 Simon et al.
5,728,110 A 3/1998 Vidal et al.
5,728,121 A 3/1998 Bimbo et al.
5,730,758 A 3/1998 Allgeyer
5,732,821 A 3/1998 Stone et al.
5,732,871 A 3/1998 Clark et al.
5,732,872 A 3/1998 Bolduc et al.
5,733,308 A 3/1998 Daugherty et al.
5,735,445 A 4/1998 Vidal et al.
5,735,848 A 4/1998 Yates et al.
5,735,874 A 4/1998 Measamer et al.
5,738,474 A 4/1998 Blewett
5,738,648 A 4/1998 Lands et al.
5,743,456 A 4/1998 Jones et al.
5,747,953 A 5/1998 Philipp
5,749,889 A 5/1998 Bacich et al.
5,749,893 A 5/1998 Vidal et al.
5,752,644 A 5/1998 Bolanos et al.
5,752,965 A 5/1998 Francis et al.
5,755,717 A 5/1998 Yates et al.
5,758,814 A 6/1998 Gallagher et al.
5,762,255 A 6/1998 Chrisman et al.
5,762,256 A 6/1998 Mastri et al.
5,766,188 A 6/1998 Igaki
5,766,205 A 6/1998 Zvenyatsky et al.
5,769,892 A 6/1998 Kingwell

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,772,379 A 6/1998 Evensen
5,772,578 A 6/1998 Heimberger et al.
5,772,659 A 6/1998 Becker et al.
5,776,130 A 7/1998 Buysse et al.
5,778,939 A 7/1998 Hok-Yin
5,779,130 A 7/1998 Alesi et al.
5,779,131 A 7/1998 Knodel et al.
5,779,132 A 7/1998 Knodel et al.
5,782,396 A 7/1998 Mastri et al.
5,782,397 A 7/1998 Koukline
5,782,748 A 7/1998 Palmer et al.
5,782,749 A 7/1998 Riza
5,782,859 A 7/1998 Nicholas et al.
5,784,934 A 7/1998 Izumisawa
5,785,232 A 7/1998 Vidal et al.
5,785,647 A 7/1998 Tompkins et al.
5,787,897 A 8/1998 Kieturakis
5,792,135 A 8/1998 Madhani et al.
5,792,165 A 8/1998 Klieman et al.
5,794,834 A 8/1998 Hamblin et al.
5,796,188 A 8/1998 Bays
5,797,536 A 8/1998 Smith et al.
5,797,537 A 8/1998 Oberlin et al.
5,797,538 A 8/1998 Heaton et al.
5,797,906 A 8/1998 Rhum et al.
5,797,958 A 8/1998 Yoon
5,797,959 A 8/1998 Castro et al.
5,799,857 A 9/1998 Robertson et al.
5,800,379 A 9/1998 Edwards
5,800,423 A 9/1998 Jensen
5,806,676 A 9/1998 Wasgien
5,807,376 A 9/1998 Viola et al.
5,807,378 A 9/1998 Jensen et al.
5,807,393 A 9/1998 Williamson, IV et al.
5,809,441 A 9/1998 McKee
5,810,721 A 9/1998 Mueller et al.
5,810,811 A 9/1998 Yates et al.
5,810,846 A 9/1998 Virnich et al.
5,810,855 A 9/1998 Rayburn et al.
5,813,813 A 9/1998 Daum et al.
5,814,055 A 9/1998 Knodel et al.
5,814,057 A 9/1998 Oi et al.
5,816,471 A 10/1998 Plyley et al.
5,817,084 A 10/1998 Jensen
5,817,091 A 10/1998 Nardella et al.
5,817,093 A 10/1998 Williamson, IV et al.
5,817,109 A 10/1998 McGarry et al.
5,817,119 A 10/1998 Klieman et al.
5,820,009 A 10/1998 Melling et al.
5,823,066 A 10/1998 Huitema et al.
5,826,776 A 10/1998 Schulze et al.
5,827,271 A 10/1998 Buysse et al.
5,827,298 A 10/1998 Hart et al.
5,829,662 A 11/1998 Allen et al.
5,830,598 A 11/1998 Patterson
5,833,690 A 11/1998 Yates et al.
5,833,695 A 11/1998 Yoon
5,833,696 A 11/1998 Whitfield et al.
5,836,503 A 11/1998 Ehrenfels et al.
5,836,960 A 11/1998 Kolesa et al.
5,839,639 A 11/1998 Sauer et al.
5,843,021 A 12/1998 Edwards et al.
5,843,096 A 12/1998 Igaki et al.
5,843,097 A 12/1998 Mayenberger et al.
5,843,122 A 12/1998 Riza
5,843,132 A 12/1998 Ilvento
5,843,169 A 12/1998 Taheri
5,846,254 A 12/1998 Schulze et al.
5,849,011 A 12/1998 Jones et al.
5,849,023 A 12/1998 Mericle
5,855,311 A 1/1999 Hamblin et al.
5,855,583 A 1/1999 Wang et al.
5,860,581 A 1/1999 Robertson et al.
5,860,975 A 1/1999 Goble et al.
5,865,361 A 2/1999 Milliman et al.
5,868,760 A 2/1999 McGuckin, Jr.
5,868,790 A 2/1999 Vincent et al.
5,871,135 A 2/1999 Williamson, IV et al.
5,873,885 A 2/1999 Weidenbenner
5,876,401 A 3/1999 Schulze et al.
5,878,193 A 3/1999 Wang et al.
5,878,937 A 3/1999 Green et al.
5,878,938 A 3/1999 Bittner et al.
5,891,160 A 4/1999 Williamson, IV et al.
5,893,506 A 4/1999 Powell
5,893,835 A 4/1999 Witt et al.
5,893,863 A 4/1999 Yoon
5,893,878 A 4/1999 Pierce
5,894,979 A 4/1999 Powell
5,897,552 A 4/1999 Edwards et al.
5,897,562 A 4/1999 Bolanos et al.
5,899,914 A 5/1999 Zirps et al.
5,901,895 A 5/1999 Heaton et al.
5,902,312 A 5/1999 Frater et al.
5,904,647 A 5/1999 Ouchi
5,904,693 A 5/1999 Dicesare et al.
5,904,702 A 5/1999 Ek et al.
5,906,625 A 5/1999 Bito et al.
5,908,402 A 6/1999 Blythe
5,908,427 A 6/1999 McKean et al.
5,911,353 A 6/1999 Bolanos et al.
5,915,616 A 6/1999 Viola et al.
5,916,225 A 6/1999 Kugel
5,918,791 A 7/1999 Sorrentino et al.
5,919,198 A 7/1999 Graves, Jr. et al.
5,919,202 A 7/1999 Yoon
5,921,956 A 7/1999 Grinberg et al.
5,928,256 A 7/1999 Riza
5,931,847 A 8/1999 Bittner et al.
5,931,853 A 8/1999 McEwen et al.
5,937,951 A 8/1999 Izuchukwu et al.
5,938,667 A 8/1999 Peyser et al.
5,941,442 A 8/1999 Geiste et al.
5,941,890 A 8/1999 Voegele et al.
5,944,172 A 8/1999 Hannula
5,944,715 A 8/1999 Goble et al.
5,947,984 A 9/1999 Whipple
5,947,996 A 9/1999 Logeman
5,948,030 A 9/1999 Miller et al.
5,951,516 A 9/1999 Bunyan
5,951,552 A 9/1999 Long et al.
5,951,574 A 9/1999 Stefanchik et al.
5,951,581 A 9/1999 Saadat et al.
5,954,259 A 9/1999 Viola et al.
5,964,394 A 10/1999 Robertson
5,964,774 A 10/1999 McKean et al.
5,971,916 A 10/1999 Koren
5,973,221 A 10/1999 Collyer et al.
D416,089 S 11/1999 Barton et al.
5,984,949 A 11/1999 Levin
5,988,479 A 11/1999 Palmer
5,997,528 A 12/1999 Bisch et al.
5,997,552 A 12/1999 Person et al.
6,003,517 A 12/1999 Sheffield et al.
6,004,319 A 12/1999 Goble et al.
6,004,335 A 12/1999 Vaitekunas et al.
6,010,054 A 1/2000 Johnson et al.
6,010,513 A 1/2000 Tormala et al.
6,012,494 A 1/2000 Balazs
6,013,076 A 1/2000 Goble et al.
6,015,406 A 1/2000 Goble et al.
6,015,417 A 1/2000 Reynolds, Jr.
6,017,322 A 1/2000 Snoke et al.
6,017,354 A 1/2000 Culp et al.
6,017,356 A 1/2000 Frederick et al.
6,022,352 A 2/2000 Vandewalle
6,024,741 A 2/2000 Williamson, IV et al.
6,024,748 A 2/2000 Manzo et al.
6,027,501 A 2/2000 Goble et al.
6,032,849 A 3/2000 Mastri et al.
6,033,378 A 3/2000 Lundquist et al.
6,033,399 A 3/2000 Gines
6,033,427 A 3/2000 Lee
6,037,724 A 3/2000 Buss et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,039,733 A 3/2000 Buysse et al.
6,039,734 A 3/2000 Goble
6,042,601 A 3/2000 Smith
6,045,560 A 4/2000 McKean et al.
6,047,861 A 4/2000 Vidal et al.
6,050,172 A 4/2000 Corves et al.
6,050,472 A 4/2000 Shibata
6,050,990 A 4/2000 Tankovich et al.
6,050,996 A 4/2000 Schmaltz et al.
6,053,390 A 4/2000 Green et al.
6,053,922 A 4/2000 Krause et al.
RE36,720 E 5/2000 Green et al.
6,056,735 A 5/2000 Okada et al.
6,056,746 A 5/2000 Goble et al.
6,062,360 A 5/2000 Shields
6,063,097 A 5/2000 Oi et al.
6,063,098 A 5/2000 Houser et al.
6,065,919 A 5/2000 Peck
6,066,132 A 5/2000 Chen et al.
6,068,627 A 5/2000 Orszulak et al.
6,071,233 A 6/2000 Ishikawa et al.
6,074,386 A 6/2000 Goble et al.
6,074,401 A 6/2000 Gardiner et al.
6,077,286 A 6/2000 Cuschieri et al.
6,079,606 A 6/2000 Milliman et al.
6,080,181 A 6/2000 Jensen et al.
6,082,577 A 7/2000 Coates et al.
6,083,191 A 7/2000 Rose
6,083,234 A 7/2000 Nicholas et al.
6,083,242 A 7/2000 Cook
6,086,544 A 7/2000 Hibner et al.
6,086,600 A 7/2000 Kortenbach
6,090,106 A 7/2000 Goble et al.
6,093,186 A 7/2000 Goble
6,099,537 A 8/2000 Sugai et al.
6,099,551 A 8/2000 Gabbay
6,102,271 A 8/2000 Longo et al.
6,109,500 A 8/2000 Alli et al.
6,117,148 A 9/2000 Ravo et al.
6,117,158 A 9/2000 Measamer et al.
6,119,913 A 9/2000 Adams et al.
6,120,433 A 9/2000 Mizuno et al.
6,123,241 A 9/2000 Walter et al.
H001904 H 10/2000 Yates et al.
6,126,058 A 10/2000 Adams et al.
6,126,359 A 10/2000 Dittrich et al.
6,126,670 A 10/2000 Walker et al.
6,131,789 A 10/2000 Schulze et al.
6,131,790 A 10/2000 Piraka
6,132,368 A 10/2000 Cooper
6,139,546 A 10/2000 Koenig et al.
6,149,660 A 11/2000 Laufer et al.
6,152,935 A 11/2000 Kammerer et al.
6,153,292 A 11/2000 Bell et al.
6,155,473 A 12/2000 Tompkins et al.
6,156,056 A 12/2000 Kearns et al.
6,159,146 A 12/2000 El Gazayerli
6,159,200 A 12/2000 Verdura et al.
6,159,224 A 12/2000 Yoon
6,162,208 A 12/2000 Hipps
6,165,175 A 12/2000 Wampler et al.
6,165,184 A 12/2000 Verdura et al.
6,165,188 A 12/2000 Saadat et al.
6,168,605 B1 1/2001 Measamer et al.
6,171,305 B1 1/2001 Sherman
6,171,316 B1 1/2001 Kovac et al.
6,171,330 B1 1/2001 Benchetrit
6,174,308 B1 1/2001 Goble et al.
6,174,309 B1 1/2001 Wrublewski et al.
6,179,194 B1 1/2001 Morton
6,179,195 B1 1/2001 Adams et al.
6,179,776 B1 1/2001 Adams et al.
6,179,849 B1 1/2001 Yencho et al.
6,181,105 B1 1/2001 Cutolo et al.
6,182,673 B1 2/2001 Kindermann et al.
6,187,003 B1 2/2001 Buysse et al.
6,190,386 B1 2/2001 Rydell
6,193,129 B1 2/2001 Bittner et al.
6,197,042 B1 3/2001 Ginn et al.
6,200,330 B1 3/2001 Benderev et al.
6,202,914 B1 3/2001 Geiste et al.
6,206,897 B1 3/2001 Jamiolkowski et al.
6,206,904 B1 3/2001 Ouchi
6,210,403 B1 4/2001 Klicek
6,213,999 B1 4/2001 Platt, Jr. et al.
6,214,028 B1 4/2001 Yoon et al.
6,220,368 B1 4/2001 Ark et al.
6,223,100 B1 4/2001 Green
6,223,835 B1 5/2001 Habedank et al.
6,224,617 B1 5/2001 Saadat et al.
6,228,081 B1 5/2001 Goble
6,228,083 B1 5/2001 Lands et al.
6,228,084 B1 5/2001 Kirwan, Jr.
6,231,565 B1 5/2001 Tovey et al.
6,234,178 B1 5/2001 Goble et al.
6,241,139 B1 6/2001 Milliman et al.
6,241,140 B1 6/2001 Adams et al.
6,241,723 B1 6/2001 Heim et al.
6,245,084 B1 6/2001 Mark et al.
6,248,117 B1 6/2001 Blatter
6,249,076 B1 6/2001 Madden et al.
6,250,532 B1 6/2001 Green et al.
6,258,107 B1 7/2001 Balazs et al.
6,261,286 B1 7/2001 Goble et al.
6,264,086 B1 7/2001 McGuckin, Jr.
6,264,087 B1 7/2001 Whitman
6,270,508 B1 8/2001 Klieman et al.
6,273,876 B1 8/2001 Klima et al.
6,273,897 B1 8/2001 Dalessandro et al.
6,277,114 B1 8/2001 Bullivant et al.
6,293,942 B1 9/2001 Goble et al.
6,296,640 B1 10/2001 Wampler et al.
6,302,311 B1 10/2001 Adams et al.
6,305,891 B1 10/2001 Burlingame
6,306,134 B1 10/2001 Goble et al.
6,306,149 B1 10/2001 Meade
6,309,403 B1 10/2001 Minor et al.
6,315,184 B1 11/2001 Whitman
6,320,123 B1 11/2001 Reimers
6,322,494 B1 11/2001 Bullivant et al.
6,324,339 B1 11/2001 Hudson et al.
6,325,799 B1 12/2001 Goble
6,325,810 B1 12/2001 Hamilton et al.
6,330,965 B1 12/2001 Milliman et al.
6,331,181 B1 12/2001 Tierney et al.
6,331,761 B1 12/2001 Kumar et al.
6,333,029 B1 12/2001 Vyakarnam et al.
6,334,860 B1 1/2002 Dorn
6,334,861 B1 1/2002 Chandler et al.
6,336,926 B1 1/2002 Goble
6,338,737 B1 1/2002 Toledano
6,343,731 B1 2/2002 Adams et al.
6,346,077 B1 2/2002 Taylor et al.
6,348,061 B1 2/2002 Whitman
6,352,503 B1 3/2002 Matsui et al.
6,352,532 B1 3/2002 Kramer et al.
6,355,699 B1 3/2002 Vyakarnam et al.
6,356,072 B1 3/2002 Chass
6,358,224 B1 3/2002 Tims et al.
6,364,877 B1 4/2002 Goble et al.
6,364,888 B1 4/2002 Niemeyer et al.
6,370,981 B2 4/2002 Watarai
6,373,152 B1 4/2002 Wang et al.
6,383,201 B1 5/2002 Dong
6,383,958 B1 5/2002 Swanson et al.
6,387,113 B1 5/2002 Hawkins et al.
6,387,114 B2 5/2002 Adams
6,391,038 B2 5/2002 Vargas et al.
6,398,781 B1 6/2002 Goble et al.
6,398,797 B2 6/2002 Bombard et al.
6,402,766 B2 6/2002 Bowman et al.
6,406,440 B1 6/2002 Stefanchik
6,406,472 B1 6/2002 Jensen
6,409,724 B1 6/2002 Penny et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

H002037	H	7/2002	Yates et al.
6,413,274	B1	7/2002	Pedros
6,416,486	B1	7/2002	Wampler
6,416,509	B1	7/2002	Goble et al.
6,419,695	B1	7/2002	Gabbay
6,423,079	B1	7/2002	Blake, III
RE37,814	E	8/2002	Allgeyer
6,428,070	B1	8/2002	Takanashi et al.
6,429,611	B1	8/2002	Li
6,436,097	B1	8/2002	Nardella
6,436,107	B1	8/2002	Wang et al.
6,436,110	B2	8/2002	Bowman et al.
6,436,122	B1	8/2002	Frank et al.
6,439,439	B1	8/2002	Rickard et al.
6,439,446	B1	8/2002	Perry et al.
6,440,146	B2	8/2002	Nicholas et al.
6,443,973	B1	9/2002	Whitman
6,447,518	B1	9/2002	Krause et al.
6,447,864	B2	9/2002	Johnson et al.
6,450,391	B1	9/2002	Kayan et al.
6,450,989	B2	9/2002	Dubrul et al.
6,454,781	B1	9/2002	Witt et al.
6,468,275	B1	10/2002	Wampler et al.
6,471,106	B1	10/2002	Reining
6,478,210	B2	11/2002	Adams et al.
6,482,200	B2	11/2002	Shippert
6,485,490	B2	11/2002	Wampler et al.
6,485,503	B2	11/2002	Jacobs et al.
6,485,667	B1	11/2002	Tan
6,488,196	B1	12/2002	Fenton, Jr.
6,488,197	B1	12/2002	Whitman
6,491,201	B1	12/2002	Whitman
6,491,690	B1	12/2002	Goble et al.
6,491,701	B2	12/2002	Tierney et al.
6,492,785	B1	12/2002	Kasten et al.
6,494,896	B1	12/2002	D'Alessio et al.
6,500,176	B1	12/2002	Truckai et al.
6,500,194	B2	12/2002	Benderev et al.
6,503,257	B2	1/2003	Grant et al.
6,503,259	B2	1/2003	Huxel et al.
6,505,768	B2	1/2003	Whitman
6,510,854	B2	1/2003	Goble
6,511,468	B1	1/2003	Cragg et al.
6,512,360	B1	1/2003	Goto et al.
6,517,528	B1	2/2003	Pantages et al.
6,517,535	B2	2/2003	Edwards
6,517,565	B1	2/2003	Whitman et al.
6,517,566	B1	2/2003	Hovland et al.
6,522,101	B2	2/2003	Malackowski
6,527,782	B2	3/2003	Hogg et al.
6,527,785	B2	3/2003	Sancoff et al.
6,533,157	B1	3/2003	Whitman
6,533,784	B2	3/2003	Truckai et al.
6,535,764	B2	3/2003	Imran et al.
6,543,456	B1	4/2003	Freeman
6,545,384	B1	4/2003	Pelrine et al.
6,547,786	B1	4/2003	Goble
6,550,546	B2	4/2003	Thurler et al.
6,551,333	B2	4/2003	Kuhns et al.
6,554,861	B2	4/2003	Knox et al.
6,555,770	B2	4/2003	Kawase
6,558,378	B2	5/2003	Sherman et al.
6,558,379	B1	5/2003	Batchelor et al.
6,565,560	B1	5/2003	Goble et al.
6,569,085	B2	5/2003	Kortenbach et al.
6,569,171	B2	5/2003	DeGuillebon et al.
6,578,751	B2	6/2003	Hartwick
6,582,427	B1	6/2003	Goble et al.
6,582,441	B1	6/2003	He et al.
6,583,533	B2	6/2003	Pelrine et al.
6,585,144	B2	7/2003	Adams et al.
6,588,643	B2	7/2003	Bolduc et al.
6,589,118	B1	7/2003	Soma et al.
6,589,164	B1	7/2003	Flaherty
6,592,538	B1	7/2003	Hotchkiss et al.
6,592,597	B2	7/2003	Grant et al.
6,596,296	B1	7/2003	Nelson et al.
6,596,304	B1	7/2003	Bayon et al.
6,596,432	B2	7/2003	Kawakami et al.
D478,665	S	8/2003	Isaacs et al.
D478,986	S	8/2003	Johnston et al.
6,601,749	B2	8/2003	Sullivan et al.
6,602,252	B2	8/2003	Mollenauer
6,602,262	B2	8/2003	Griego et al.
6,605,078	B2	8/2003	Adams
6,605,669	B2	8/2003	Awokola et al.
6,607,475	B2	8/2003	Doyle et al.
6,613,069	B2	9/2003	Boyd et al.
6,616,686	B2	9/2003	Coleman et al.
6,619,529	B2	9/2003	Green et al.
6,620,166	B1	9/2003	Wenstrom, Jr. et al.
6,626,834	B2	9/2003	Dunne et al.
6,629,630	B2	10/2003	Adams
6,629,974	B2	10/2003	Penny et al.
6,629,988	B2	10/2003	Weadock
6,636,412	B2	10/2003	Smith
6,638,108	B2	10/2003	Tachi
6,638,285	B2	10/2003	Gabbay
6,638,297	B1	10/2003	Huitema
RE38,335	E	11/2003	Aust et al.
6,641,528	B2	11/2003	Torii
6,644,532	B2	11/2003	Green et al.
6,645,201	B1	11/2003	Utley et al.
6,646,307	B1	11/2003	Yu et al.
6,648,816	B2	11/2003	Ilion et al.
6,652,595	B1	11/2003	Nicolo
D484,243	S	12/2003	Ryan et al.
D484,595	S	12/2003	Ryan et al.
D484,596	S	12/2003	Ryan et al.
6,656,177	B2	12/2003	Truckai et al.
6,656,193	B2	12/2003	Grant et al.
6,663,623	B1	12/2003	Oyama et al.
6,663,641	B1	12/2003	Kovac et al.
6,666,854	B1	12/2003	Lange
6,666,875	B1	12/2003	Sakurai et al.
6,667,825	B2	12/2003	Lu et al.
6,669,073	B2	12/2003	Milliman et al.
6,670,806	B2	12/2003	Wendt et al.
6,671,185	B2	12/2003	Duval
D484,977	S	1/2004	Ryan et al.
6,676,660	B2	1/2004	Wampler et al.
6,679,269	B2	1/2004	Swanson
6,679,410	B2	1/2004	Wursch et al.
6,681,978	B2	1/2004	Geiste et al.
6,681,979	B2	1/2004	Whitman
6,682,527	B2	1/2004	Strul
6,682,528	B2	1/2004	Frazier et al.
6,685,727	B2	2/2004	Fisher et al.
6,689,153	B1	2/2004	Skiba
6,692,507	B2	2/2004	Pugsley et al.
6,695,198	B2	2/2004	Adams et al.
6,695,199	B2	2/2004	Whitman
6,698,643	B2	3/2004	Whitman
6,699,235	B2	3/2004	Wallace et al.
6,704,210	B1	3/2004	Myers
6,705,503	B1	3/2004	Pedicini et al.
6,709,445	B2	3/2004	Boebel et al.
6,712,773	B1	3/2004	Viola
6,716,223	B2	4/2004	Leopold et al.
6,716,232	B1	4/2004	Vidal et al.
6,716,233	B1	4/2004	Whitman
6,722,552	B2	4/2004	Fenton, Jr.
6,723,087	B2	4/2004	O'Neill et al.
6,723,091	B2	4/2004	Goble et al.
6,723,109	B2	4/2004	Solingen
6,726,697	B2	4/2004	Nicholas et al.
6,729,119	B2	5/2004	Schnipke et al.
6,736,825	B2	5/2004	Blatter et al.
6,736,854	B2	5/2004	Vadurro et al.
6,740,030	B2	5/2004	Martone et al.
6,747,121	B2	6/2004	Gogolewski
6,749,560	B1	6/2004	Konstorum et al.
6,752,768	B2	6/2004	Burdorff et al.
6,752,816	B2	6/2004	Culp et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,755,195 B1 6/2004 Lemke et al.
6,755,338 B2 6/2004 Hahnen et al.
6,758,846 B2 7/2004 Goble et al.
6,761,685 B2 7/2004 Adams et al.
6,762,339 B1 7/2004 Klun et al.
6,767,352 B2 7/2004 Field et al.
6,767,356 B2 7/2004 Kanner et al.
6,769,590 B2 8/2004 Vresh et al.
6,769,594 B2 8/2004 Orban, III
6,770,027 B2 8/2004 Banik et al.
6,770,072 B1 8/2004 Truckai et al.
6,773,409 B2 8/2004 Truckai et al.
6,773,437 B2 8/2004 Ogilvie et al.
6,773,438 B1 8/2004 Knodel et al.
6,777,838 B2 8/2004 Miekka et al.
6,780,151 B2 8/2004 Grabover et al.
6,780,180 B1 8/2004 Goble et al.
6,783,524 B2 8/2004 Anderson et al.
6,786,382 B1 9/2004 Hoffman
6,786,864 B2 9/2004 Matsuura et al.
6,786,896 B1 9/2004 Madhani et al.
6,790,173 B2 9/2004 Saadat et al.
6,793,652 B1 9/2004 Whitman et al.
6,793,661 B2 9/2004 Hamilton et al.
6,793,663 B2 9/2004 Kneifel et al.
6,802,843 B2 10/2004 Truckai et al.
6,805,273 B2 10/2004 Bilotti et al.
6,806,808 B1 10/2004 Watters et al.
6,808,525 B2 10/2004 Latterell et al.
6,814,741 B2 11/2004 Bowman et al.
6,817,508 B1 11/2004 Racenet et al.
6,817,509 B2 11/2004 Geiste et al.
6,817,974 B2 11/2004 Cooper et al.
6,818,018 B1 11/2004 Sawhney
6,820,791 B2 11/2004 Adams
6,821,273 B2 11/2004 Mollenauer
6,821,282 B2 11/2004 Perry et al.
6,821,284 B2 11/2004 Sturtz et al.
6,827,246 B2 12/2004 Sullivan et al.
6,827,712 B2 12/2004 Tovey et al.
6,827,725 B2 12/2004 Batchelor et al.
6,828,902 B2 12/2004 Casden
6,830,174 B2 12/2004 Hillstead et al.
6,831,629 B2 12/2004 Nishino et al.
6,832,998 B2 12/2004 Goble
6,834,001 B2 12/2004 Myono
6,835,173 B2 12/2004 Couvillon, Jr.
6,835,199 B2 12/2004 McGuckin, Jr. et al.
6,835,336 B2 12/2004 Watt
6,837,846 B2 1/2005 Jaffe et al.
6,838,493 B2 1/2005 Williams et al.
6,840,423 B2 1/2005 Adams et al.
6,843,403 B2 1/2005 Whitman
6,843,789 B2 1/2005 Goble
6,843,793 B2 1/2005 Brock et al.
6,846,307 B2 1/2005 Whitman et al.
6,846,308 B2 1/2005 Whitman et al.
6,846,309 B2 1/2005 Whitman et al.
6,849,071 B2 2/2005 Whitman et al.
6,850,817 B1 2/2005 Green
6,858,005 B2 2/2005 Ohline et al.
RE38,708 E 3/2005 Bolanos et al.
D502,994 S 3/2005 Blake, III
6,861,142 B1 3/2005 Wilkie et al.
6,863,668 B2 3/2005 Gillespie et al.
6,863,694 B1 3/2005 Boyce et al.
6,866,178 B2 3/2005 Adams et al.
6,866,671 B2 3/2005 Tierney et al.
6,867,248 B1 3/2005 Martin et al.
6,869,435 B2 3/2005 Blake, III
6,872,214 B2 3/2005 Sonnenschein et al.
6,874,669 B2 4/2005 Adams et al.
6,877,647 B2 4/2005 Green et al.
6,878,106 B1 4/2005 Herrmann
6,889,116 B2 5/2005 Jinno
6,893,435 B2 5/2005 Goble
6,899,538 B2 5/2005 Matoba
6,905,057 B2 6/2005 Swayze et al.
6,905,497 B2 6/2005 Truckai et al.
6,908,472 B2 6/2005 Wiener et al.
6,911,033 B2 6/2005 de Guillebon et al.
6,913,579 B2 7/2005 Truckai et al.
6,913,608 B2 7/2005 Liddicoat et al.
6,913,613 B2 7/2005 Schwarz et al.
6,921,397 B2 7/2005 Corcoran et al.
6,921,412 B1 7/2005 Black et al.
6,923,093 B2 8/2005 Ullah
6,923,803 B2 8/2005 Goble
6,926,716 B2 8/2005 Baker et al.
6,929,641 B2 8/2005 Goble et al.
6,929,644 B2 8/2005 Truckai et al.
6,931,830 B2 8/2005 Liao
6,932,218 B2 8/2005 Kosann et al.
6,932,810 B2 8/2005 Ryan
6,936,042 B2 8/2005 Wallace et al.
D509,297 S 9/2005 Wells
D509,589 S 9/2005 Wells
6,939,358 B2 9/2005 Palacios et al.
6,942,662 B2 9/2005 Goble et al.
6,942,674 B2 9/2005 Belef et al.
6,945,444 B2 9/2005 Gresham et al.
6,945,981 B2 9/2005 Donofrio et al.
6,953,138 B1 10/2005 Dworak et al.
6,953,139 B2 10/2005 Milliman et al.
6,958,035 B2 10/2005 Friedman et al.
6,959,851 B2 11/2005 Heinrich
6,959,852 B2 11/2005 Shelton, IV et al.
6,960,107 B1 11/2005 Schaub et al.
6,960,163 B2 11/2005 Ewers et al.
6,960,220 B2 11/2005 Marino et al.
6,964,363 B2 11/2005 Wales et al.
6,966,907 B2 11/2005 Goble
6,966,909 B2 11/2005 Marshall et al.
6,971,988 B2 12/2005 Orban, III
6,972,199 B2 12/2005 Lebouitz et al.
6,974,462 B2 12/2005 Sater
6,978,921 B2 12/2005 Shelton, IV et al.
6,978,922 B2 12/2005 Bilotti et al.
6,981,628 B2 1/2006 Wales
6,981,941 B2 1/2006 Whitman et al.
6,981,978 B2 1/2006 Gannoe
6,981,983 B1 1/2006 Rosenblatt et al.
6,984,203 B2 1/2006 Tartaglia et al.
6,984,231 B2 1/2006 Goble et al.
6,986,451 B1 1/2006 Mastri et al.
6,988,649 B2 1/2006 Shelton, IV et al.
6,988,650 B2 1/2006 Schwemberger et al.
6,990,731 B2 1/2006 Haytayan
6,990,796 B2 1/2006 Schnipke et al.
6,994,708 B2 2/2006 Manzo
6,995,729 B2 2/2006 Govari et al.
6,997,931 B2 2/2006 Sauer et al.
7,000,818 B2 2/2006 Shelton, IV et al.
7,000,819 B2 2/2006 Swayze et al.
7,001,380 B2 2/2006 Goble
7,001,408 B2 2/2006 Knodel et al.
7,008,435 B2 3/2006 Cummins
7,009,039 B2 3/2006 Yayon et al.
7,011,657 B2 3/2006 Truckai et al.
7,018,357 B2 3/2006 Emmons
7,018,390 B2 3/2006 Turovskiy et al.
7,023,159 B2 4/2006 Gorti et al.
7,025,743 B2 4/2006 Mann et al.
7,029,435 B2 4/2006 Nakao
7,032,798 B2 4/2006 Whitman et al.
7,032,799 B2 4/2006 Viola et al.
7,033,356 B2 4/2006 Latterell et al.
7,036,680 B1 5/2006 Flannery
7,037,344 B2 5/2006 Kagan et al.
7,041,102 B2 5/2006 Truckai et al.
7,041,868 B2 5/2006 Greene et al.
7,043,852 B2 5/2006 Hayashida et al.
7,044,352 B2 5/2006 Shelton, IV et al.
7,044,353 B2 5/2006 Mastri et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,048,687 B1 5/2006 Reuss et al.
7,048,745 B2 5/2006 Tierney et al.
7,052,494 B2 5/2006 Goble et al.
7,052,499 B2 5/2006 Steger et al.
7,055,730 B2 6/2006 Ehrenfels et al.
7,055,731 B2 6/2006 Shelton, IV et al.
7,056,284 B2 6/2006 Martone et al.
7,056,330 B2 6/2006 Gayton
7,059,331 B2 6/2006 Adams et al.
7,059,508 B2 6/2006 Shelton, IV et al.
7,063,671 B2 6/2006 Couvillon, Jr.
7,063,712 B2 6/2006 Vargas et al.
7,066,879 B2 6/2006 Fowler et al.
7,066,944 B2 6/2006 Laufer et al.
7,067,038 B2 6/2006 Trokhan et al.
7,070,083 B2 7/2006 Jankowski
7,070,559 B2 7/2006 Adams et al.
7,070,597 B2 7/2006 Truckai et al.
7,071,287 B2 7/2006 Rhine et al.
7,075,770 B1 7/2006 Smith
7,077,856 B2 7/2006 Whitman
7,080,769 B2 7/2006 Vresh et al.
7,081,114 B2 7/2006 Rashidi
7,083,073 B2 8/2006 Yoshie et al.
7,083,075 B2 8/2006 Swayze et al.
7,083,571 B2 8/2006 Wang et al.
7,083,615 B2 8/2006 Peterson et al.
7,083,619 B2 8/2006 Truckai et al.
7,083,620 B2 8/2006 Jahns et al.
7,087,049 B2 8/2006 Nowlin et al.
7,087,054 B2 8/2006 Truckai et al.
7,087,071 B2 8/2006 Nicholas et al.
7,090,637 B2 8/2006 Danitz et al.
7,090,673 B2 8/2006 Dycus et al.
7,090,683 B2 8/2006 Brock et al.
7,090,684 B2 8/2006 McGuckin, Jr. et al.
7,094,202 B2 8/2006 Nobis et al.
7,094,247 B2 8/2006 Monassevitch et al.
7,097,089 B2 8/2006 Marczyk
7,097,644 B2 8/2006 Long
7,097,650 B2 8/2006 Weller et al.
7,098,794 B2 8/2006 Lindsay et al.
7,100,949 B2 9/2006 Williams et al.
7,104,741 B2 9/2006 Krohn
7,108,695 B2 9/2006 Witt et al.
7,108,701 B2 9/2006 Evens et al.
7,108,709 B2 9/2006 Cummins
7,111,768 B2 9/2006 Cummins et al.
7,111,769 B2 9/2006 Wales et al.
7,112,214 B2 9/2006 Peterson et al.
RE39,358 E 10/2006 Goble
7,114,642 B2 10/2006 Whitman
7,118,582 B1 10/2006 Wang et al.
7,119,534 B2 10/2006 Butzmann
7,121,446 B2 10/2006 Arad et al.
7,122,028 B2 10/2006 Looper et al.
7,125,409 B2 10/2006 Truckai et al.
7,126,303 B2 10/2006 Farritor et al.
7,128,253 B2 10/2006 Mastri et al.
7,128,254 B2 10/2006 Shelton, IV et al.
7,128,748 B2 10/2006 Mooradian et al.
7,131,445 B2 11/2006 Amoah
7,133,601 B2 11/2006 Phillips et al.
7,134,587 B2 11/2006 Schwemberger et al.
7,137,981 B2 11/2006 Long
7,140,527 B2 11/2006 Ehrenfels et al.
7,140,528 B2 11/2006 Shelton, IV
7,143,923 B2 12/2006 Shelton, IV et al.
7,143,924 B2 12/2006 Scirica et al.
7,143,925 B2 12/2006 Shelton, IV et al.
7,143,926 B2 12/2006 Shelton, IV et al.
7,147,138 B2 12/2006 Shelton, IV
7,147,139 B2 12/2006 Schwemberger et al.
7,147,140 B2 12/2006 Wukusick et al.
7,147,637 B2 12/2006 Goble
7,147,650 B2 12/2006 Lee
7,150,748 B2 12/2006 Ebbutt et al.
7,153,300 B2 12/2006 Goble
7,156,824 B2 1/2007 Rosenman
7,156,863 B2 1/2007 Sonnenschein et al.
7,159,750 B2 1/2007 Racenet et al.
7,160,299 B2 1/2007 Baily
7,161,036 B2 1/2007 Oikawa et al.
7,168,604 B2 1/2007 Milliman et al.
7,172,104 B2 2/2007 Scirica et al.
7,172,593 B2 2/2007 Trieu et al.
7,179,223 B2 2/2007 Motoki et al.
7,179,267 B2 2/2007 Nolan et al.
7,182,239 B1 2/2007 Myers
7,182,763 B2 2/2007 Nardella
7,183,737 B2 2/2007 Kitagawa
7,188,758 B2 3/2007 Viola et al.
7,189,207 B2 3/2007 Viola
7,195,627 B2 3/2007 Amoah et al.
7,199,537 B2 4/2007 Okamura et al.
7,202,653 B2 4/2007 Pai
7,204,404 B2 4/2007 Nguyen et al.
7,204,835 B2 4/2007 Latterell et al.
7,207,233 B2 4/2007 Wadge
7,207,471 B2 4/2007 Heinrich et al.
7,207,472 B2 4/2007 Wukusick et al.
7,207,556 B2 4/2007 Saitoh et al.
7,208,005 B2 4/2007 Frecker et al.
7,210,609 B2 5/2007 Leiboff et al.
7,211,081 B2 5/2007 Goble
7,211,084 B2 5/2007 Goble et al.
7,211,092 B2 5/2007 Hughett
7,213,736 B2 5/2007 Wales et al.
7,214,224 B2 5/2007 Goble
7,214,232 B2 5/2007 Bowman et al.
7,217,285 B2 5/2007 Vargas et al.
7,220,260 B2 5/2007 Fleming et al.
7,220,272 B2 5/2007 Weadock
7,225,963 B2 6/2007 Scirica
7,225,964 B2 6/2007 Mastri et al.
7,234,624 B2 6/2007 Gresham et al.
7,235,089 B1 6/2007 McGuckin, Jr.
7,235,302 B2 6/2007 Jing et al.
7,237,708 B1 7/2007 Guy et al.
7,238,195 B2 7/2007 Viola
7,241,288 B2 7/2007 Braun
7,241,289 B2 7/2007 Braun
7,246,734 B2 7/2007 Shelton, IV
7,247,161 B2 7/2007 Johnston et al.
7,252,660 B2 8/2007 Kunz
7,255,696 B2 8/2007 Goble et al.
7,256,695 B2 8/2007 Hamel et al.
7,258,262 B2 8/2007 Mastri et al.
7,258,546 B2 8/2007 Beier et al.
7,260,431 B2 8/2007 Libbus et al.
7,265,374 B2 9/2007 Lee et al.
7,267,679 B2 9/2007 McGuckin, Jr. et al.
7,267,682 B1 9/2007 Bender et al.
7,273,483 B2 9/2007 Wiener et al.
7,278,562 B2 10/2007 Mastri et al.
7,278,563 B1 10/2007 Green
7,278,949 B2 10/2007 Bader
7,278,994 B2 10/2007 Goble
7,282,048 B2 10/2007 Goble et al.
7,286,850 B2 10/2007 Frielink et al.
7,287,682 B1 10/2007 Ezzat et al.
7,289,139 B2 10/2007 Amling et al.
7,293,685 B2 11/2007 Ehrenfels et al.
7,295,907 B2 11/2007 Lu et al.
7,296,722 B2 11/2007 Ivanko
7,296,724 B2 11/2007 Green et al.
7,297,149 B2 11/2007 Vitali et al.
7,300,373 B2 11/2007 Jinno et al.
7,300,450 B2 11/2007 Vleugels et al.
7,303,106 B2 12/2007 Milliman et al.
7,303,107 B2 12/2007 Milliman et al.
7,303,108 B2 12/2007 Shelton, IV
7,303,502 B2 12/2007 Thompson
7,303,556 B2 12/2007 Metzger

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,306,597 B2 12/2007 Manzo
7,308,998 B2 12/2007 Mastri et al.
7,322,975 B2 1/2008 Goble et al.
7,322,994 B2 1/2008 Nicholas et al.
7,324,572 B2 1/2008 Chang
7,326,203 B2 2/2008 Papineau et al.
7,326,213 B2 2/2008 Benderev et al.
7,328,828 B2 2/2008 Ortiz et al.
7,328,829 B2 2/2008 Arad et al.
7,330,004 B2 2/2008 DeJonge et al.
7,331,340 B2 2/2008 Barney
7,331,969 B1 2/2008 Inganas et al.
7,334,717 B2 2/2008 Rethy et al.
7,334,718 B2 2/2008 McAlister et al.
7,335,199 B2 2/2008 Goble et al.
7,336,048 B2 2/2008 Lohr
7,336,184 B2 2/2008 Smith et al.
7,338,513 B2 3/2008 Lee et al.
7,341,591 B2 3/2008 Grinberg
7,343,920 B2 3/2008 Toby et al.
7,344,532 B2 3/2008 Goble et al.
7,348,763 B1 3/2008 Reinhart et al.
RE40,237 E 4/2008 Bilotti et al.
7,351,258 B2 4/2008 Ricotta et al.
7,354,447 B2 4/2008 Shelton, IV et al.
7,354,502 B2 4/2008 Polat et al.
7,357,287 B2 4/2008 Shelton, IV et al.
7,357,806 B2 4/2008 Rivera et al.
7,361,195 B2 4/2008 Schwartz et al.
7,364,060 B2 4/2008 Milliman
7,364,061 B2 4/2008 Swayze et al.
7,367,973 B2 5/2008 Manzo et al.
7,377,918 B2 5/2008 Amoah
7,377,928 B2 5/2008 Zubik et al.
7,380,695 B2 6/2008 Doll et al.
7,380,696 B2 6/2008 Shelton, IV et al.
7,384,417 B2 6/2008 Cucin
7,386,730 B2 6/2008 Uchikubo
7,388,217 B2 6/2008 Buschbeck et al.
7,391,173 B2 6/2008 Schena
7,396,356 B2 7/2008 Mollenauer
7,397,364 B2 7/2008 Govari
7,398,907 B2 7/2008 Racenet et al.
7,398,908 B2 7/2008 Holsten et al.
7,400,752 B2 7/2008 Zacharias
7,401,721 B2 7/2008 Holsten et al.
7,404,508 B2 7/2008 Smith et al.
7,404,509 B2 7/2008 Ortiz et al.
7,404,822 B2 7/2008 Viart et al.
7,407,074 B2 8/2008 Ortiz et al.
7,407,075 B2 8/2008 Holsten et al.
7,407,076 B2 8/2008 Racenet et al.
7,407,077 B2 8/2008 Ortiz et al.
7,407,078 B2 8/2008 Shelton, IV et al.
7,410,086 B2 8/2008 Ortiz et al.
7,413,563 B2 8/2008 Corcoran et al.
7,416,101 B2 8/2008 Shelton, IV et al.
7,418,078 B2 8/2008 Blanz et al.
RE40,514 E 9/2008 Mastri et al.
7,419,080 B2 9/2008 Smith et al.
7,419,081 B2 9/2008 Ehrenfels et al.
7,419,321 B2 9/2008 Tereschouk
7,419,495 B2 9/2008 Menn et al.
7,422,136 B1 9/2008 Marczyk
7,422,138 B2 9/2008 Bilotti et al.
7,422,139 B2 9/2008 Shelton, IV et al.
7,424,965 B2 9/2008 Racenet et al.
7,427,607 B2 9/2008 Suzuki
7,431,188 B1 10/2008 Marczyk
7,431,189 B2 10/2008 Shelton, IV et al.
7,431,694 B2 10/2008 Stefanchik et al.
7,431,730 B2 10/2008 Viola
7,434,715 B2 10/2008 Shelton, IV et al.
7,434,717 B2 10/2008 Shelton, IV et al.
7,438,209 B1 10/2008 Hess et al.
7,438,718 B2 10/2008 Milliman et al.
7,439,354 B2 10/2008 Lenges et al.
7,441,684 B2 10/2008 Shelton, IV et al.
7,441,685 B1 10/2008 Boudreaux
7,442,201 B2 10/2008 Pugsley et al.
7,448,525 B2 11/2008 Shelton, IV et al.
7,451,904 B2 11/2008 Shelton, IV
7,455,208 B2 11/2008 Wales et al.
7,455,676 B2 11/2008 Holsten et al.
7,455,682 B2 11/2008 Viola
7,461,767 B2 12/2008 Viola et al.
7,462,187 B2 12/2008 Johnston et al.
7,464,846 B2 12/2008 Shelton, IV et al.
7,464,847 B2 12/2008 Viola et al.
7,464,849 B2 12/2008 Shelton, IV et al.
7,467,740 B2 12/2008 Shelton, IV et al.
7,467,849 B2 12/2008 Silverbrook et al.
7,472,814 B2 1/2009 Mastri et al.
7,472,815 B2 1/2009 Shelton, IV et al.
7,472,816 B2 1/2009 Holsten et al.
7,473,253 B2 1/2009 Dycus et al.
7,473,263 B2 1/2009 Johnston et al.
7,476,237 B2 1/2009 Taniguchi et al.
7,479,608 B2 1/2009 Smith
7,481,347 B2 1/2009 Roy
7,481,348 B2 1/2009 Marczyk
7,481,349 B2 1/2009 Holsten et al.
7,481,824 B2 1/2009 Boudreaux et al.
7,485,133 B2 2/2009 Cannon et al.
7,485,142 B2 2/2009 Milo
7,487,899 B2 2/2009 Shelton, IV et al.
7,490,749 B2 2/2009 Schall et al.
7,494,039 B2 2/2009 Racenet et al.
7,494,499 B2 2/2009 Nagase et al.
7,494,501 B2 2/2009 Ahlberg et al.
7,500,979 B2 3/2009 Hueil et al.
7,501,198 B2 3/2009 Barley et al.
7,503,474 B2 3/2009 Hillstead et al.
7,506,790 B2 3/2009 Shelton, IV
7,506,791 B2 3/2009 Omaits et al.
7,507,202 B2 3/2009 Schoellhorn
7,510,107 B2 3/2009 Timm et al.
7,510,566 B2 3/2009 Jacobs et al.
7,513,408 B2 4/2009 Shelton, IV et al.
7,517,356 B2 4/2009 Heinrich
7,524,320 B2 4/2009 Tierney et al.
7,530,984 B2 5/2009 Sonnenschein et al.
7,530,985 B2 5/2009 Takemoto et al.
7,533,906 B2 5/2009 Luettgen et al.
7,534,259 B2 5/2009 Lashinski et al.
7,543,730 B1 6/2009 Marczyk
7,546,939 B2 6/2009 Adams et al.
7,546,940 B2 6/2009 Milliman et al.
7,547,312 B2 6/2009 Bauman et al.
7,549,563 B2 6/2009 Mather et al.
7,549,564 B2 6/2009 Boudreaux
7,549,998 B2 6/2009 Braun
7,552,854 B2 6/2009 Wixey et al.
7,556,185 B2 7/2009 Viola
7,556,186 B2 7/2009 Milliman
7,556,647 B2 7/2009 Drews et al.
7,559,449 B2 7/2009 Viola
7,559,450 B2 7/2009 Wales et al.
7,559,452 B2 7/2009 Wales et al.
7,559,937 B2 7/2009 de la Torre et al.
7,563,862 B2 7/2009 Sieg et al.
7,565,993 B2 7/2009 Milliman et al.
7,566,300 B2 7/2009 Devierre et al.
7,567,045 B2 7/2009 Fristedt
7,568,603 B2 8/2009 Shelton, IV et al.
7,568,604 B2 8/2009 Ehrenfels et al.
7,568,619 B2 8/2009 Todd et al.
7,575,144 B2 8/2009 Ortiz et al.
7,588,174 B2 9/2009 Holsten et al.
7,588,175 B2 9/2009 Timm et al.
7,588,176 B2 9/2009 Timm et al.
7,588,177 B2 9/2009 Racenet
7,591,783 B2 9/2009 Boulais et al.
7,597,229 B2 10/2009 Boudreaux et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,597,230 B2 10/2009 Racenet et al.
7,600,663 B2 10/2009 Green
7,604,150 B2 10/2009 Boudreaux
7,604,151 B2 10/2009 Hess et al.
7,607,557 B2 10/2009 Shelton, IV et al.
7,611,038 B2 11/2009 Racenet et al.
7,611,474 B2 11/2009 Hibner et al.
7,615,003 B2 11/2009 Stefanchik et al.
7,615,067 B2 11/2009 Lee et al.
7,617,961 B2 11/2009 Viola
D605,762 S 12/2009 Nalagatla et al.
7,624,902 B2 12/2009 Marczyk et al.
7,624,903 B2 12/2009 Green et al.
7,625,370 B2 12/2009 Hart et al.
7,631,793 B2 12/2009 Rethy et al.
7,631,794 B2 12/2009 Rethy et al.
7,635,074 B2 12/2009 Olson et al.
7,637,409 B2 12/2009 Marczyk
7,637,410 B2 12/2009 Marczyk
7,638,958 B2 12/2009 Philipp et al.
7,641,091 B2 1/2010 Olson et al.
7,641,092 B2 1/2010 Kruszynski et al.
7,641,093 B2 1/2010 Doll et al.
7,641,095 B2 1/2010 Viola
7,644,783 B2 1/2010 Roberts et al.
7,644,848 B2 1/2010 Swayze et al.
7,645,230 B2 1/2010 Mikkaichi et al.
7,648,457 B2 1/2010 Stefanchik et al.
7,648,519 B2 1/2010 Lee et al.
7,651,017 B2 1/2010 Ortiz et al.
7,651,498 B2 1/2010 Shifrin et al.
7,654,431 B2 2/2010 Hueil et al.
7,655,288 B2 2/2010 Bauman et al.
7,656,131 B2 2/2010 Embrey et al.
7,658,311 B2 2/2010 Boudreaux
7,658,312 B2 2/2010 Vidal et al.
7,659,219 B2 2/2010 Biran et al.
7,662,161 B2 2/2010 Briganti et al.
7,665,646 B2 2/2010 Prommersberger
7,665,647 B2 2/2010 Shelton, IV et al.
7,669,746 B2 3/2010 Shelton, IV
7,669,747 B2 3/2010 Weisenburgh, II et al.
7,670,334 B2 3/2010 Hueil et al.
7,673,780 B2 3/2010 Shelton, IV et al.
7,673,781 B2 3/2010 Swayze et al.
7,673,782 B2 3/2010 Hess et al.
7,673,783 B2 3/2010 Morgan et al.
7,674,253 B2 3/2010 Fisher et al.
7,674,255 B2 3/2010 Braun
7,674,263 B2 3/2010 Ryan
7,674,270 B2 3/2010 Layer
7,682,307 B2 3/2010 Danitz et al.
7,682,367 B2 3/2010 Shah et al.
7,686,201 B2 3/2010 Csiky
7,686,826 B2 3/2010 Lee et al.
7,688,028 B2 3/2010 Phillips et al.
7,691,098 B2 4/2010 Wallace et al.
7,691,106 B2 4/2010 Schenberger et al.
7,694,865 B2 4/2010 Scirica
7,695,485 B2 4/2010 Whitman et al.
7,699,204 B2 4/2010 Viola
7,699,835 B2 4/2010 Lee et al.
7,699,844 B2 4/2010 Utley et al.
7,699,846 B2 4/2010 Ryan
7,699,856 B2 4/2010 Van Wyk et al.
7,699,859 B2 4/2010 Bombard et al.
7,699,860 B2 4/2010 Huitema et al.
7,703,653 B2 4/2010 Shah et al.
7,708,180 B2 5/2010 Murray et al.
7,708,181 B2 5/2010 Cole et al.
7,708,182 B2 5/2010 Viola
7,708,758 B2 5/2010 Lee et al.
7,714,239 B2 5/2010 Smith
7,717,312 B2 5/2010 Beetel
7,717,313 B2 5/2010 Criscuolo et al.
7,717,846 B2 5/2010 Zirps et al.
7,718,180 B2 5/2010 Karp
7,718,556 B2 5/2010 Matsuda et al.
7,721,930 B2 5/2010 McKenna et al.
7,721,931 B2 5/2010 Shelton, IV et al.
7,721,933 B2 5/2010 Ehrenfels et al.
7,721,934 B2 5/2010 Shelton, IV et al.
7,721,936 B2 5/2010 Shalton, IV et al.
7,722,527 B2 5/2010 Bouchier et al.
7,722,607 B2 5/2010 Dumbauld et al.
7,722,610 B2 5/2010 Viola et al.
7,726,537 B2 6/2010 Olson et al.
7,726,538 B2 6/2010 Holsten et al.
7,726,539 B2 6/2010 Holsten et al.
7,727,954 B2 6/2010 McKay
7,729,742 B2 6/2010 Govari
7,731,072 B2 6/2010 Timm et al.
7,731,073 B2 6/2010 Wixey et al.
7,731,724 B2 6/2010 Huitema et al.
7,735,703 B2 6/2010 Morgan et al.
7,736,374 B2 6/2010 Vaughan et al.
7,738,971 B2 6/2010 Swayze et al.
7,740,159 B2 6/2010 Shelton, IV et al.
7,743,960 B2 6/2010 Whitman et al.
7,744,624 B2 6/2010 Bettuchi
7,744,627 B2 6/2010 Orban, III et al.
7,744,628 B2 6/2010 Viola
7,748,587 B2 7/2010 Haramiishi et al.
7,749,204 B2 7/2010 Dhanaraj et al.
7,751,870 B2 7/2010 Whitman
7,753,245 B2 7/2010 Boudreaux et al.
7,753,904 B2 7/2010 Shelton, IV et al.
7,758,612 B2 7/2010 Shipp
7,766,207 B2 8/2010 Mather et al.
7,766,209 B2 8/2010 Baxter, III et al.
7,766,210 B2 8/2010 Shelton, IV et al.
7,766,821 B2 8/2010 Brunnen et al.
7,766,894 B2 8/2010 Weitzner et al.
7,770,773 B2 8/2010 Whitman et al.
7,770,774 B2 8/2010 Mastri et al.
7,770,775 B2 8/2010 Shelton, IV et al.
7,770,776 B2 8/2010 Chen et al.
7,771,396 B2 8/2010 Stefanchik et al.
7,772,720 B2 8/2010 McGee et al.
7,776,037 B2 8/2010 Odom
7,776,060 B2 8/2010 Mooradian et al.
7,778,004 B2 8/2010 Nerheim et al.
7,780,054 B2 8/2010 Wales
7,780,055 B2 8/2010 Scirica et al.
7,780,663 B2 8/2010 Yates et al.
7,780,685 B2 8/2010 Hunt et al.
7,784,662 B2 8/2010 Wales et al.
7,784,663 B2 8/2010 Shelton, IV
7,789,875 B2 9/2010 Brock et al.
7,789,883 B2 9/2010 Takashino et al.
7,789,889 B2 9/2010 Zubik et al.
7,793,812 B2 9/2010 Moore et al.
7,794,475 B2 9/2010 Hess et al.
7,798,386 B2 9/2010 Schall et al.
7,799,039 B2 9/2010 Shelton, IV et al.
7,799,044 B2 9/2010 Johnston et al.
7,799,965 B2 9/2010 Patel et al.
7,803,151 B2 9/2010 Whitman
7,806,871 B2 10/2010 Li et al.
7,806,891 B2 10/2010 Nowlin et al.
7,810,690 B2 10/2010 Bilotti et al.
7,810,691 B2 10/2010 Boyden et al.
7,810,692 B2 10/2010 Hail et al.
7,810,693 B2 10/2010 Broehl et al.
7,815,092 B2 10/2010 Whitman et al.
7,815,565 B2 10/2010 Stefanchik et al.
7,819,296 B2 10/2010 Hueil et al.
7,819,297 B2 10/2010 Doll et al.
7,819,298 B2 10/2010 Hall et al.
7,819,299 B2 10/2010 Shelton, IV et al.
7,819,884 B2 10/2010 Lee et al.
7,819,886 B2 10/2010 Whitfield et al.
7,823,592 B2 11/2010 Bettuchi et al.
7,823,760 B2 11/2010 Zemlok et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,824,401 B2 11/2010 Manzo et al.
7,824,426 B2 11/2010 Racenet et al.
7,828,189 B2 11/2010 Holsten et al.
7,828,794 B2 11/2010 Sartor
7,828,808 B2 11/2010 Hinman et al.
7,832,408 B2 11/2010 Shelton, IV et al.
7,832,611 B2 11/2010 Boyden et al.
7,832,612 B2 11/2010 Baxter, III et al.
7,833,234 B2 11/2010 Bailly et al.
7,836,400 B2 11/2010 May et al.
7,837,079 B2 11/2010 Holsten et al.
7,837,080 B2 11/2010 Schwemberger
7,837,081 B2 11/2010 Holsten et al.
7,837,694 B2 11/2010 Tethrake et al.
7,838,789 B2 11/2010 Stoffers et al.
7,841,503 B2 11/2010 Sonnenschein et al.
7,842,025 B2 11/2010 Coleman et al.
7,842,028 B2 11/2010 Lee
7,845,533 B2 12/2010 Marczyk et al.
7,845,534 B2 12/2010 Viola et al.
7,845,535 B2 12/2010 Scircia
7,845,536 B2 12/2010 Viola et al.
7,845,537 B2 12/2010 Shelton, IV et al.
7,846,149 B2 12/2010 Jankowski
7,850,623 B2 12/2010 Griffin et al.
7,850,642 B2 12/2010 Moll et al.
7,850,982 B2 12/2010 Stopek et al.
7,854,736 B2 12/2010 Ryan
7,857,183 B2 12/2010 Shelton, IV
7,857,185 B2 12/2010 Swayze et al.
7,857,186 B2 12/2010 Baxter et al.
7,857,813 B2 12/2010 Schmitz et al.
7,861,906 B2 1/2011 Doll et al.
7,862,579 B2 1/2011 Ortiz et al.
7,866,525 B2 1/2011 Scirica
7,866,527 B2 1/2011 Hall et al.
7,866,528 B2 1/2011 Olson et al.
7,870,989 B2 1/2011 Viola et al.
7,871,418 B2 1/2011 Thompson et al.
7,879,070 B2 2/2011 Ortiz et al.
7,883,465 B2 2/2011 Donofrio et al.
7,886,951 B2 2/2011 Hessler
7,886,952 B2 2/2011 Scirica et al.
7,887,530 B2 2/2011 Zemlok et al.
7,887,535 B2 2/2011 Lands et al.
7,887,563 B2 2/2011 Cummins
7,891,531 B1 2/2011 Ward
7,891,532 B2 2/2011 Mastri et al.
7,892,245 B2 2/2011 Liddicoat et al.
7,893,586 B2 2/2011 West et al.
7,896,214 B2 3/2011 Farascioni
7,896,215 B2 3/2011 Adams et al.
7,896,877 B2 3/2011 Hall et al.
7,896,895 B2 3/2011 Boudreaux et al.
7,900,805 B2 3/2011 Shelton, IV et al.
7,905,380 B2 3/2011 Shelton, IV et al.
7,905,381 B2 3/2011 Baxter, III et al.
7,905,889 B2 3/2011 Catanese, III et al.
7,905,893 B2 3/2011 Kuhns et al.
7,905,902 B2 3/2011 Huitema et al.
7,909,039 B2 3/2011 Hur
7,909,191 B2 3/2011 Baker et al.
7,909,220 B2 3/2011 Viola
7,909,221 B2 3/2011 Viola et al.
7,913,891 B2 3/2011 Doll et al.
7,913,893 B2 3/2011 Mastri et al.
7,914,543 B2 3/2011 Roth et al.
7,914,551 B2 3/2011 Ortiz et al.
7,918,230 B2 4/2011 Whitman et al.
7,918,376 B1 4/2011 Knodel et al.
7,918,377 B2 4/2011 Measamer et al.
7,918,845 B2 4/2011 Saadat et al.
7,918,848 B2 4/2011 Lau et al.
7,918,867 B2 4/2011 Dana et al.
7,918,873 B2 4/2011 Cummins
7,922,061 B2 4/2011 Shelton, IV et al.
7,922,063 B2 4/2011 Zemlok et al.
7,922,743 B2 4/2011 Heinrich et al.
7,926,691 B2 4/2011 Viola et al.
7,927,328 B2 4/2011 Orszulak et al.
7,928,281 B2 4/2011 Augustine
7,931,660 B2 4/2011 Aranyi et al.
7,931,695 B2 4/2011 Ringeisen
7,934,630 B2 5/2011 Shelton, IV et al.
7,934,631 B2 5/2011 Balbierz et al.
7,935,773 B2 5/2011 Hadba et al.
7,938,307 B2 5/2011 Bettuchi
7,941,865 B2 5/2011 Seman, Jr. et al.
7,942,301 B2 5/2011 Sater
7,942,303 B2 5/2011 Shah
7,942,890 B2 5/2011 D'Agostino et al.
7,944,175 B2 5/2011 Mori et al.
7,946,453 B2 5/2011 Voegele et al.
7,950,560 B2 5/2011 Zemlok et al.
7,950,561 B2 5/2011 Aranyi
7,951,071 B2 5/2011 Whitman et al.
7,951,166 B2 5/2011 Orban, III et al.
7,954,682 B2 6/2011 Giordano et al.
7,954,684 B2 6/2011 Boudreaux
7,954,686 B2 6/2011 Baxter, III et al.
7,954,687 B2 6/2011 Zemlok et al.
7,954,688 B2 6/2011 Argentine et al.
7,955,257 B2 6/2011 Frasier et al.
7,959,050 B2 6/2011 Smith et al.
7,959,051 B2 6/2011 Smith et al.
7,959,052 B2 6/2011 Sonnenschein et al.
7,963,432 B2 6/2011 Knodel et al.
7,963,433 B2 6/2011 Whitman et al.
7,963,963 B2 6/2011 Francischelli et al.
7,963,964 B2 6/2011 Santilli et al.
7,966,799 B2 6/2011 Morgan et al.
7,967,178 B2 6/2011 Scirica et al.
7,967,179 B2 6/2011 Olson et al.
7,967,180 B2 6/2011 Scirica
7,967,181 B2 6/2011 Viola et al.
7,967,839 B2 6/2011 Flock et al.
7,972,298 B2 7/2011 Wallace et al.
7,976,563 B2 7/2011 Summerer
7,980,443 B2 7/2011 Scheib et al.
7,988,015 B2 8/2011 Mason, II et al.
7,988,026 B2 8/2011 Knodel et al.
7,988,027 B2 8/2011 Olson et al.
7,988,028 B2 8/2011 Farascioni et al.
7,988,779 B2 8/2011 Disalvo et al.
7,992,757 B2 8/2011 Wheeler et al.
7,993,360 B2 8/2011 Hacker et al.
7,997,468 B2 8/2011 Farascioni
7,997,469 B2 8/2011 Olson et al.
8,002,696 B2 8/2011 Suzuki
8,002,784 B2 8/2011 Jinno et al.
8,002,785 B2 8/2011 Weiss et al.
8,002,795 B2 8/2011 Beetel
8,006,365 B2 8/2011 Levin et al.
8,006,885 B2 8/2011 Marczyk
8,006,889 B2 8/2011 Adams et al.
8,007,511 B2 8/2011 Brock et al.
8,007,513 B2 8/2011 Nalagatla et al.
8,011,550 B2 9/2011 Aranyi et al.
8,011,551 B2 9/2011 Marczyk et al.
8,011,553 B2 9/2011 Mastri et al.
8,011,555 B2 9/2011 Tarinelli et al.
8,012,170 B2 9/2011 Whitman et al.
8,016,176 B2 9/2011 Kasvikis et al.
8,016,177 B2 9/2011 Bettuchi et al.
8,016,178 B2 9/2011 Olson et al.
8,016,849 B2 9/2011 Wenchell
8,016,855 B2 9/2011 Whitman et al.
8,016,858 B2 9/2011 Whitman
8,016,881 B2 9/2011 Furst
8,020,742 B2 9/2011 Marczyk
8,020,743 B2 9/2011 Shelton, IV
8,021,375 B2 9/2011 Aldrich et al.
8,021,377 B2 9/2011 Eskuri
8,025,199 B2 9/2011 Whitman et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,028,883 B2 10/2011 Stopek
8,028,884 B2 10/2011 Sniffin et al.
8,028,885 B2 10/2011 Smith et al.
8,033,438 B2 10/2011 Scirica
8,033,442 B2 10/2011 Racenet et al.
8,034,077 B2 10/2011 Smith et al.
8,034,363 B2 10/2011 Li et al.
8,035,487 B2 10/2011 Malackowski
8,037,591 B2 10/2011 Spivey et al.
8,038,045 B2 10/2011 Bettuchi et al.
8,038,046 B2 10/2011 Smith et al.
8,038,686 B2 10/2011 Huitema et al.
8,043,207 B2 10/2011 Adams
8,043,328 B2 10/2011 Hahnen et al.
8,047,236 B2 11/2011 Perry
8,048,503 B2 11/2011 Farnsworth et al.
8,056,787 B2 11/2011 Boudreaux et al.
8,056,788 B2 11/2011 Mastri et al.
8,056,789 B1 11/2011 White et al.
8,057,508 B2 11/2011 Shelton, IV
8,058,771 B2 11/2011 Giordano et al.
8,061,576 B2 11/2011 Cappola
8,062,330 B2 11/2011 Prommersberger et al.
8,066,167 B2 11/2011 Measamer et al.
8,066,168 B2 11/2011 Vidal et al.
D650,074 S 12/2011 Hunt et al.
8,070,033 B2 12/2011 Milliman et al.
8,070,035 B2 12/2011 Holsten et al.
8,070,743 B2 12/2011 Kagan et al.
8,075,571 B2 12/2011 Vitali et al.
8,083,118 B2 12/2011 Milliman et al.
8,083,119 B2 12/2011 Prommersberger
8,083,120 B2 12/2011 Shelton, IV et al.
8,084,001 B2 12/2011 Burns et al.
8,085,013 B2 12/2011 Wei et al.
8,087,563 B2 1/2012 Milliman et al.
8,091,756 B2 1/2012 Viola
8,092,443 B2 1/2012 Bischoff
8,092,932 B2 1/2012 Phillips et al.
8,096,458 B2 1/2012 Hessler
8,097,017 B2 1/2012 Viola
8,100,310 B2 1/2012 Zemlok
8,100,872 B2 1/2012 Patel
8,102,278 B2 1/2012 Deck et al.
8,105,350 B2 1/2012 Lee et al.
8,108,072 B2 1/2012 Zhao et al.
8,109,426 B2 2/2012 Milliman et al.
8,110,208 B1 2/2012 Hen
8,113,405 B2 2/2012 Milliman
8,113,410 B2 2/2012 Hall et al.
8,114,100 B2 2/2012 Smith et al.
8,123,103 B2 2/2012 Milliman
8,123,766 B2 2/2012 Bauman et al.
8,123,767 B2 2/2012 Bauman et al.
8,127,975 B2 3/2012 Olson et al.
8,127,976 B2 3/2012 Scirica et al.
8,128,624 B2 3/2012 Couture et al.
8,128,643 B2 3/2012 Aranyi et al.
8,128,645 B2 3/2012 Sonnenschein et al.
8,132,703 B2 3/2012 Milliman et al.
8,132,706 B2 3/2012 Marczyk et al.
8,136,712 B2 3/2012 Zingman
8,136,713 B2 3/2012 Hathaway et al.
8,140,417 B2 3/2012 Shibata
8,141,762 B2 3/2012 Bedi et al.
8,141,763 B2 3/2012 Milliman
8,146,790 B2 4/2012 Milliman
8,147,485 B2 4/2012 Wham et al.
8,152,041 B2 4/2012 Kostrzewski
8,157,145 B2 4/2012 Shelton, IV et al.
8,157,148 B2 4/2012 Scirica
8,157,151 B2 4/2012 Ingmanson et al.
8,157,152 B2 4/2012 Holsten et al.
8,157,153 B2 4/2012 Shelton, IV et al.
8,157,793 B2 4/2012 Omori et al.
8,161,977 B2 4/2012 Shelton, IV et al.
8,162,138 B2 4/2012 Bettenhausen et al.
8,162,197 B2 4/2012 Mastri et al.
8,167,185 B2 5/2012 Shelton, IV et al.
8,167,895 B2 5/2012 D'Agostino et al.
8,167,898 B1 5/2012 Schaller et al.
8,170,241 B2 5/2012 Roe et al.
8,172,120 B2 5/2012 Boyden et al.
8,172,122 B2 5/2012 Kasvikis et al.
8,172,124 B2 5/2012 Shelton, IV et al.
8,177,797 B2 5/2012 Shimoji et al.
8,180,458 B2 5/2012 Kane et al.
8,181,840 B2 5/2012 Milliman
8,186,555 B2 5/2012 Shelton, IV et al.
8,186,556 B2 5/2012 Viola
8,186,560 B2 5/2012 Hess et al.
8,191,752 B2 6/2012 Scirica
8,192,460 B2 6/2012 Orban, III et al.
8,196,795 B2 6/2012 Moore et al.
8,196,796 B2 6/2012 Shelton, IV et al.
8,201,720 B2 6/2012 Hessler
8,201,721 B2 6/2012 Zemlok et al.
8,202,549 B2 6/2012 Stucky et al.
8,205,779 B2 6/2012 Ma et al.
8,205,780 B2 6/2012 Sorrentino et al.
8,205,781 B2 6/2012 Baxter, III et al.
8,206,291 B2 6/2012 Fischvogt et al.
8,210,411 B2 7/2012 Yates et al.
8,210,414 B2 7/2012 Bettuchi et al.
8,210,415 B2 7/2012 Ward
8,210,416 B2 7/2012 Milliman et al.
8,211,123 B2 7/2012 Gross et al.
8,211,125 B2 7/2012 Spivey
8,214,019 B2 7/2012 Govari et al.
8,215,531 B2 7/2012 Shelton, IV et al.
8,215,533 B2 7/2012 Viola et al.
8,220,468 B2 7/2012 Cooper et al.
8,220,688 B2 7/2012 Laurent et al.
8,220,690 B2 7/2012 Hess et al.
8,221,424 B2 7/2012 Cha
8,225,799 B2 7/2012 Bettuchi
8,225,980 B1 7/2012 Rivera
8,226,715 B2 7/2012 Hwang et al.
8,227,946 B2 7/2012 Kim
8,231,040 B2 7/2012 Zemlok et al.
8,231,042 B2 7/2012 Hessler et al.
8,231,043 B2 7/2012 Tarinelli et al.
8,236,010 B2 8/2012 Ortiz et al.
8,241,271 B2 8/2012 Millman et al.
8,241,308 B2 8/2012 Kortenbach et al.
8,241,322 B2 8/2012 Whitman et al.
8,245,594 B2 8/2012 Rogers et al.
8,245,898 B2 8/2012 Smith et al.
8,245,899 B2 8/2012 Swensgard et al.
8,245,900 B2 8/2012 Scirica
8,245,901 B2 8/2012 Stopek
8,246,637 B2 8/2012 Viola et al.
8,256,654 B2 9/2012 Bettuchi et al.
8,256,655 B2 9/2012 Sniffin et al.
8,256,656 B2 9/2012 Milliman et al.
8,257,251 B2 9/2012 Shelton, IV et al.
8,257,356 B2 9/2012 Bleich et al.
8,257,391 B2 9/2012 Orban, III et al.
8,257,634 B2 9/2012 Scirica
8,261,958 B1 9/2012 Knodel
8,262,655 B2 9/2012 Ghabrial et al.
8,267,300 B2 9/2012 Boudreaux
8,267,924 B2 9/2012 Zemlok et al.
8,267,946 B2 9/2012 Whitfield et al.
8,267,951 B2 9/2012 Whayne et al.
8,269,121 B2 9/2012 Smith
8,272,553 B2 9/2012 Mastri et al.
8,272,554 B2 9/2012 Whitman et al.
8,272,918 B2 9/2012 Lam
8,273,404 B2 9/2012 Dave et al.
8,276,801 B2 10/2012 Zemlok et al.
8,276,802 B2 10/2012 Kostrzewski
8,281,973 B2 10/2012 Wenchell et al.
8,281,974 B2 10/2012 Hessler et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,285,367 B2 10/2012 Hyde et al.
8,286,845 B2 10/2012 Perry et al.
8,286,846 B2 10/2012 Smith et al.
8,287,561 B2 10/2012 Nunez et al.
8,292,147 B2 10/2012 Viola
8,292,150 B2 10/2012 Bryant
8,292,151 B2 10/2012 Viola
8,292,152 B2 10/2012 Milliman et al.
8,292,155 B2 10/2012 Shelton, IV et al.
8,292,157 B2 10/2012 Smith et al.
8,292,888 B2 10/2012 Whitman
8,298,161 B2 10/2012 Vargas
8,298,677 B2 10/2012 Wiesner et al.
8,302,323 B2 11/2012 Fortier et al.
8,308,040 B2 11/2012 Huang et al.
8,308,042 B2 11/2012 Aranyi
8,308,043 B2 11/2012 Bindra et al.
8,308,046 B2 11/2012 Prommersberger
8,308,659 B2 11/2012 Scheibe et al.
8,313,496 B2 11/2012 Sauer et al.
8,313,509 B2 11/2012 Kostrzewski
8,317,070 B2 11/2012 Hueil et al.
8,317,071 B1 11/2012 Knodel
8,317,074 B2 11/2012 Ortiz et al.
8,317,790 B2 11/2012 Bell et al.
8,319,002 B2 11/2012 Daniels et al.
8,322,455 B2 12/2012 Shelton, IV et al.
8,322,589 B2 12/2012 Boudreaux
8,322,590 B2 12/2012 Patel et al.
8,323,314 B2 12/2012 Blier
8,323,789 B2 12/2012 Rozhin et al.
8,328,061 B2 12/2012 Kasvikis
8,328,062 B2 12/2012 Viola
8,328,063 B2 12/2012 Milliman et al.
8,328,064 B2 12/2012 Racenet et al.
8,328,802 B2 12/2012 Deville et al.
8,328,823 B2 12/2012 Aranyi et al.
8,333,313 B2 12/2012 Boudreaux et al.
8,333,691 B2 12/2012 Schaaf
8,333,764 B2 12/2012 Francischelli et al.
8,336,753 B2 12/2012 Olson et al.
8,336,754 B2 12/2012 Cappola et al.
8,342,377 B2 1/2013 Milliman et al.
8,342,378 B2 1/2013 Marczyk et al.
8,342,379 B2 1/2013 Whitman et al.
8,348,123 B2 1/2013 Scirica et al.
8,348,125 B2 1/2013 Viola et al.
8,348,126 B2 1/2013 Olson et al.
8,348,127 B2 1/2013 Marczyk
8,348,129 B2 1/2013 Bedi et al.
8,348,130 B2 1/2013 Shah et al.
8,348,131 B2 1/2013 Omaits et al.
8,348,972 B2 1/2013 Soltz et al.
8,353,437 B2 1/2013 Boudreaux
8,353,438 B2 1/2013 Baxter, III et al.
8,353,439 B2 1/2013 Baxter, III et al.
8,356,740 B1 1/2013 Knodel
8,357,144 B2 1/2013 Whitman et al.
8,360,296 B2 1/2013 Zingman
8,360,297 B2 1/2013 Shelton, IV et al.
8,360,298 B2 1/2013 Farascioni et al.
8,360,299 B2 1/2013 Zemlok et al.
8,361,501 B2 1/2013 DiTizio et al.
8,365,973 B1 2/2013 White et al.
8,365,975 B1 2/2013 Manoux et al.
8,365,976 B2 2/2013 Hess et al.
8,366,559 B2 2/2013 Papenfuss et al.
8,366,787 B2 2/2013 Brown et al.
8,371,491 B2 2/2013 Huitema et al.
8,371,492 B2 2/2013 Aranyi et al.
8,371,493 B2 2/2013 Aranyi et al.
8,372,094 B2 2/2013 Bettuchi et al.
8,376,865 B2 2/2013 Forster et al.
8,377,029 B2 2/2013 Nagao et al.
8,377,044 B2 2/2013 Coe et al.
8,382,761 B2 2/2013 Holsten et al.
8,387,848 B2 3/2013 Johnson et al.
8,388,633 B2 3/2013 Rousseau et al.
8,393,513 B2 3/2013 Jankowski
8,393,514 B2 3/2013 Shelton, IV et al.
8,393,516 B2 3/2013 Kostrzewski
8,397,971 B2 3/2013 Yates et al.
8,397,973 B1 3/2013 Hausen
8,398,633 B2 3/2013 Mueller
8,398,673 B2 3/2013 Hinchliffe et al.
8,403,138 B2 3/2013 Weisshaupt et al.
8,403,197 B2 3/2013 Vidal et al.
8,403,198 B2 3/2013 Sorrentino et al.
8,403,945 B2 3/2013 Whitfield et al.
8,403,950 B2 3/2013 Palmer et al.
8,408,439 B2 4/2013 Huang et al.
8,408,442 B2 4/2013 Racenet et al.
8,409,079 B2 4/2013 Okamoto et al.
8,409,174 B2 4/2013 Omori
8,409,222 B2 4/2013 Whitfield et al.
8,409,223 B2 4/2013 Sorrentino et al.
8,413,870 B2 4/2013 Pastorelli et al.
8,413,871 B2 4/2013 Racenet et al.
8,413,872 B2 4/2013 Patel
8,414,577 B2 4/2013 Boudreaux et al.
8,418,908 B1 4/2013 Beardsley
8,418,909 B2 4/2013 Kostrzewski
8,424,737 B2 4/2013 Scirica
8,424,739 B2 4/2013 Racenet et al.
8,424,740 B2 4/2013 Shelton, IV et al.
8,424,741 B2 4/2013 McGuckin, Jr. et al.
8,425,600 B2 4/2013 Maxwell
8,430,292 B2 4/2013 Patel et al.
8,430,892 B2 4/2013 Bindra et al.
8,430,898 B2 4/2013 Wiener et al.
8,439,246 B1 5/2013 Knodel
8,444,036 B2 5/2013 Shelton, IV
8,444,549 B2 5/2013 Viola et al.
8,453,904 B2 6/2013 Eskaros et al.
8,453,906 B2 6/2013 Huang et al.
8,453,907 B2 6/2013 Laurent et al.
8,453,908 B2 6/2013 Bedi et al.
8,453,912 B2 6/2013 Mastri et al.
8,453,914 B2 6/2013 Laurent et al.
8,454,628 B2 6/2013 Smith et al.
8,454,640 B2 6/2013 Johnston et al.
8,457,757 B2 6/2013 Cauller et al.
8,459,520 B2 6/2013 Giordano et al.
8,459,525 B2 6/2013 Yates et al.
8,464,922 B2 6/2013 Marczyk
8,464,923 B2 6/2013 Shelton, IV
8,464,924 B2 6/2013 Gresham et al.
8,464,925 B2 6/2013 Hull et al.
8,465,502 B2 6/2013 Zergiebel
8,469,973 B2 6/2013 Meade et al.
8,470,355 B2 6/2013 Skalla et al.
8,474,677 B2 7/2013 Woodard, Jr. et al.
8,475,453 B2 7/2013 Marczyk et al.
8,475,454 B1 7/2013 Alshemari
8,475,474 B2 7/2013 Bombard et al.
8,475,491 B2 7/2013 Milo
8,479,969 B2 7/2013 Shelton, IV
8,480,703 B2 7/2013 Nicholas et al.
8,485,412 B2 7/2013 Shelton, IV et al.
8,485,413 B2 7/2013 Scheib et al.
8,490,853 B2 7/2013 Criscuolo et al.
8,491,603 B2 7/2013 Yeung et al.
8,496,153 B2 7/2013 Demmy et al.
8,496,154 B2 7/2013 Marczyk et al.
8,496,156 B2 7/2013 Sniffin et al.
8,496,683 B2 7/2013 Prommersberger et al.
8,499,992 B2 8/2013 Whitman et al.
8,499,993 B2 8/2013 Shelton, IV et al.
8,500,762 B2 8/2013 Sholev et al.
8,506,555 B2 8/2013 Ruiz Morales
8,506,557 B2 8/2013 Zemlok et al.
8,506,580 B2 8/2013 Zergiebel et al.
8,506,581 B2 8/2013 Wingardner, III et al.
8,512,359 B2 8/2013 Whitman et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,517,239 B2 8/2013 Scheib et al.
8,517,241 B2 8/2013 Nicholas et al.
8,517,243 B2 8/2013 Giordano et al.
8,517,244 B2 8/2013 Shelton, IV et al.
8,521,273 B2 8/2013 Kliman
8,523,042 B2 9/2013 Masiakos et al.
8,523,043 B2 9/2013 Ullrich et al.
8,523,881 B2 9/2013 Cabiri et al.
8,523,900 B2 9/2013 Jinno et al.
8,529,588 B2 9/2013 Ahlberg et al.
8,529,600 B2 9/2013 Woodard, Jr. et al.
8,529,819 B2 9/2013 Ostapoff et al.
8,532,747 B2 9/2013 Nock et al.
8,534,528 B2 9/2013 Shelton, IV
8,535,304 B2 9/2013 Sklar et al.
8,540,128 B2 9/2013 Shelton, IV et al.
8,540,129 B2 9/2013 Baxter, III et al.
8,540,130 B2 9/2013 Moore et al.
8,540,131 B2 9/2013 Swayze
8,540,133 B2 9/2013 Bedi et al.
8,540,733 B2 9/2013 Whitman et al.
8,540,735 B2 9/2013 Mitelberg et al.
8,550,984 B2 10/2013 Takemoto
8,551,076 B2 10/2013 Duval et al.
8,556,151 B2 10/2013 Viola
8,556,918 B2 10/2013 Bauman et al.
8,556,935 B1 10/2013 Knodel et al.
8,561,870 B2 10/2013 Baxter, III et al.
8,561,873 B2 10/2013 Ingmanson et al.
8,567,656 B2 10/2013 Shelton, IV et al.
8,568,425 B2 10/2013 Ross et al.
8,573,459 B2 11/2013 Smith et al.
8,573,461 B2 11/2013 Shelton, IV et al.
8,573,462 B2 11/2013 Smith et al.
8,573,465 B2 11/2013 Shelton, IV
8,574,263 B2 11/2013 Mueller
8,579,176 B2 11/2013 Smith et al.
8,579,178 B2 11/2013 Holsten et al.
8,579,937 B2 11/2013 Gresham
8,579,938 B2 11/2013 Heinrich et al.
8,584,919 B2 11/2013 Hueil et al.
8,585,721 B2 11/2013 Kirsch
8,590,760 B2 11/2013 Cummins et al.
8,590,762 B2 11/2013 Hess et al.
8,590,764 B2 11/2013 Hartwick et al.
8,596,515 B2 12/2013 Okoniewski
8,602,287 B2 12/2013 Yates et al.
8,602,288 B2 12/2013 Shelton, IV et al.
8,603,135 B2 12/2013 Mueller
8,608,043 B2 12/2013 Scirica
8,608,044 B2 12/2013 Hueil et al.
8,608,045 B2 12/2013 Smith et al.
8,608,046 B2 12/2013 Laurent et al.
8,608,745 B2 12/2013 Guzman et al.
8,613,383 B2 12/2013 Beckman et al.
8,613,384 B2 12/2013 Pastorelli et al.
8,616,431 B2 12/2013 Timm et al.
8,622,274 B2 1/2014 Yates et al.
8,622,275 B2 1/2014 Baxter, III et al.
8,627,993 B2 1/2014 Smith et al.
8,627,995 B2 1/2014 Smith et al.
8,628,518 B2 1/2014 Blumenkranz et al.
8,628,544 B2 1/2014 Farascioni
8,631,987 B2 1/2014 Shelton, IV et al.
8,631,992 B1 1/2014 Hausen et al.
8,631,993 B2 1/2014 Kostrzewski
8,632,462 B2 1/2014 Yoo et al.
8,632,525 B2 1/2014 Kerr et al.
8,632,535 B2 1/2014 Shelton, IV et al.
8,632,563 B2 1/2014 Nagase et al.
8,636,187 B2 1/2014 Hueil et al.
8,636,191 B2 1/2014 Meagher
8,636,193 B2 1/2014 Whitman et al.
8,636,736 B2 1/2014 Yates et al.
8,636,766 B2 1/2014 Milliman et al.
8,640,788 B2 2/2014 Dachs, II et al.
8,646,674 B2 2/2014 Schulte et al.
8,647,258 B2 2/2014 Aranyi et al.
8,647,350 B2 2/2014 Mohan et al.
8,652,120 B2 2/2014 Giordano et al.
8,652,151 B2 2/2014 Lehman et al.
8,657,174 B2 2/2014 Yates et al.
8,657,176 B2 2/2014 Shelton, IV et al.
8,657,177 B2 2/2014 Scirica et al.
8,657,178 B2 2/2014 Hueil et al.
8,657,814 B2 2/2014 Werneth et al.
8,662,370 B2 3/2014 Takei
8,663,192 B2 3/2014 Hester et al.
8,664,792 B2 3/2014 Rebsdorf
8,668,129 B2 3/2014 Olson
8,668,130 B2 3/2014 Hess et al.
8,672,206 B2 3/2014 Aranyi et al.
8,672,207 B2 3/2014 Shelton, IV et al.
8,672,208 B2 3/2014 Hess et al.
8,672,951 B2 3/2014 Smith et al.
8,678,263 B2 3/2014 Viola
8,679,093 B2 3/2014 Farra
8,679,137 B2 3/2014 Bauman et al.
8,679,154 B2 3/2014 Smith et al.
8,679,156 B2 3/2014 Smith et al.
8,679,454 B2 3/2014 Guire et al.
8,684,250 B2 4/2014 Bettuchi et al.
8,684,253 B2 4/2014 Giordano et al.
8,685,020 B2 4/2014 Weizman et al.
8,695,866 B2 4/2014 Leimbach et al.
8,696,665 B2 4/2014 Hunt et al.
8,701,958 B2 4/2014 Shelton, IV et al.
8,701,959 B2 4/2014 Shah
8,701,960 B1 4/2014 Manoux et al.
8,708,210 B2 4/2014 Zemlok et al.
8,708,211 B2 4/2014 Zemlok et al.
8,708,213 B2 4/2014 Shelton, IV et al.
8,714,429 B2 5/2014 Demmy
8,715,226 B2 5/2014 Webster et al.
8,720,766 B2 5/2014 Hess et al.
8,721,630 B2 5/2014 Ortiz et al.
8,721,646 B2 5/2014 Fox
8,721,666 B2 5/2014 Schroeder et al.
8,727,197 B2 5/2014 Hess et al.
8,728,119 B2 5/2014 Cummins
8,728,120 B2 5/2014 Blier
8,733,612 B2 5/2014 Ma
8,733,613 B2 5/2014 Huitema et al.
8,733,614 B2 5/2014 Ross et al.
8,734,478 B2 5/2014 Widenhouse et al.
D706,927 S 6/2014 Cheney et al.
8,740,034 B2 6/2014 Morgan et al.
8,740,037 B2 6/2014 Shelton, IV et al.
8,740,038 B2 6/2014 Shelton, IV et al.
8,746,529 B2 6/2014 Shelton, IV et al.
8,746,530 B2 6/2014 Giordano et al.
8,746,533 B2 6/2014 Whitman et al.
8,746,535 B2 6/2014 Shelton, IV et al.
8,747,238 B2 6/2014 Shelton, IV et al.
8,752,264 B2 6/2014 Ackley et al.
8,752,699 B2 6/2014 Morgan et al.
8,752,747 B2 6/2014 Shelton, IV et al.
8,752,749 B2 6/2014 Moore et al.
8,757,287 B2 6/2014 Mak et al.
8,757,465 B2 6/2014 Woodard, Jr. et al.
8,757,467 B2 6/2014 Racenet et al.
8,758,235 B2 6/2014 Jaworek
8,758,366 B2 6/2014 McLean et al.
8,758,391 B2 6/2014 Swayze et al.
8,758,438 B2 6/2014 Boyce et al.
8,763,875 B2 7/2014 Morgan et al.
8,763,877 B2 7/2014 Schall et al.
8,763,879 B2 7/2014 Shelton, IV et al.
8,770,458 B2 7/2014 Scirica
8,770,459 B2 7/2014 Racenet et al.
8,770,460 B2 7/2014 Belzer
8,771,169 B2 7/2014 Whitman et al.
8,771,312 B1 7/2014 Knodel et al.
8,777,004 B2 7/2014 Shelton, IV et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,783,541 B2 7/2014 Shelton, IV et al.
8,783,542 B2 7/2014 Riestenberg et al.
8,783,543 B2 7/2014 Shelton, IV et al.
8,784,304 B2 7/2014 Mikkaichi et al.
8,784,404 B2 7/2014 Doyle et al.
8,784,415 B2 7/2014 Malackowski et al.
8,789,737 B2 7/2014 Hodgkinson et al.
8,789,739 B2 7/2014 Swensgard
8,789,740 B2 7/2014 Baxter, III et al.
8,789,741 B2 7/2014 Baxter, III et al.
8,790,684 B2 7/2014 Dave et al.
8,794,496 B2 8/2014 Scirica
8,794,497 B2 8/2014 Zingman
8,795,276 B2 8/2014 Dietz et al.
8,795,308 B2 8/2014 Valin
8,800,837 B2 8/2014 Zemlok
8,800,838 B2 8/2014 Shelton, IV
8,800,840 B2 8/2014 Jankowski
8,800,841 B2 8/2014 Ellerhorst et al.
8,801,732 B2 8/2014 Harris et al.
8,801,734 B2 8/2014 Shelton, IV et al.
8,801,735 B2 8/2014 Shelton, IV et al.
8,801,752 B2 8/2014 Fortier et al.
8,806,973 B2 8/2014 Ross et al.
8,808,294 B2 8/2014 Fox et al.
8,808,311 B2 8/2014 Heinrich et al.
8,808,325 B2 8/2014 Hess et al.
8,814,024 B2 8/2014 Woodard, Jr. et al.
8,814,025 B2 8/2014 Miller et al.
8,820,603 B2 9/2014 Shelton, IV et al.
8,820,605 B2 9/2014 Shelton, IV
8,820,606 B2 9/2014 Hodgkinson
8,827,133 B2 9/2014 Shelton, IV et al.
8,827,134 B2 9/2014 Viola et al.
8,827,903 B2 9/2014 Shelton, IV et al.
8,833,632 B2 9/2014 Swensgard
8,834,498 B2 9/2014 Byrum et al.
8,834,518 B2 9/2014 Faller et al.
8,840,003 B2 9/2014 Morgan et al.
8,840,603 B2 9/2014 Shelton, IV et al.
8,840,609 B2 9/2014 Stuebe
8,844,789 B2 9/2014 Shelton, IV et al.
8,851,354 B2 10/2014 Swensgard et al.
8,852,185 B2 10/2014 Twomey
8,852,199 B2 10/2014 Deslauriers et al.
8,857,693 B2 10/2014 Schuckmann et al.
8,857,694 B2 10/2014 Shelton, IV et al.
8,858,538 B2 10/2014 Belson et al.
8,858,571 B2 10/2014 Shelton, IV et al.
8,858,590 B2 10/2014 Shelton, IV et al.
8,864,007 B2 10/2014 Widenhouse et al.
8,864,009 B2 10/2014 Shelton, IV et al.
8,870,049 B2 10/2014 Amid et al.
8,870,050 B2 10/2014 Hodgkinson
8,870,912 B2 10/2014 Brisson et al.
8,875,971 B2 11/2014 Hall et al.
8,875,972 B2 11/2014 Weisenburgh, II et al.
8,876,857 B2 11/2014 Burbank
8,876,858 B2 11/2014 Braun
8,888,792 B2 11/2014 Harris et al.
8,893,946 B2 11/2014 Boudreaux et al.
8,893,949 B2 11/2014 Shelton, IV et al.
8,894,647 B2 11/2014 Beardsley et al.
8,899,462 B2 12/2014 Kostrzewski et al.
8,899,463 B2 12/2014 Schall et al.
8,899,464 B2 12/2014 Hueil et al.
8,899,465 B2 12/2014 Shelton, IV et al.
8,899,466 B2 12/2014 Baxter, III et al.
8,905,287 B2 12/2014 Racenet et al.
8,905,977 B2 12/2014 Shelton et al.
8,911,426 B2 12/2014 Coppeta et al.
8,911,471 B2 12/2014 Spivey et al.
8,920,433 B2 12/2014 Barrier et al.
8,920,435 B2 12/2014 Smith et al.
8,920,438 B2 12/2014 Aranyi et al.
8,920,443 B2 12/2014 Hiles et al.
8,920,444 B2 12/2014 Hiles et al.
8,925,782 B2 1/2015 Shelton, IV
8,925,783 B2 1/2015 Zemlok et al.
8,925,788 B2 1/2015 Hess et al.
8,926,598 B2 1/2015 Mollere et al.
8,931,682 B2 1/2015 Timm et al.
8,936,614 B2 1/2015 Allen, IV
8,939,343 B2 1/2015 Milliman et al.
8,939,344 B2 1/2015 Olson et al.
8,939,974 B2 1/2015 Boudreaux et al.
8,945,163 B2 2/2015 Voegele et al.
8,955,732 B2 2/2015 Zemlok et al.
8,956,390 B2 2/2015 Shah et al.
8,960,519 B2 2/2015 Whitman et al.
8,960,520 B2 2/2015 McCuen
8,960,521 B2 2/2015 Kostrzewski
8,967,443 B2 3/2015 McCuen
8,967,446 B2 3/2015 Beardsley et al.
8,967,448 B2 3/2015 Carter et al.
8,968,276 B2 3/2015 Zemlok et al.
8,968,337 B2 3/2015 Whitfield et al.
8,968,355 B2 3/2015 Malkowski et al.
8,968,358 B2 3/2015 Reschke
8,973,803 B2 3/2015 Hall et al.
8,973,804 B2 3/2015 Hess et al.
8,974,440 B2 3/2015 Farritor et al.
8,978,954 B2 3/2015 Shelton, IV et al.
8,978,955 B2 3/2015 Aronhalt et al.
8,978,956 B2 3/2015 Schall et al.
8,979,890 B2 3/2015 Boudreaux
8,982,195 B2 3/2015 Claus et al.
8,985,428 B2 3/2015 Natarajan et al.
8,991,676 B2 3/2015 Hess et al.
8,991,677 B2 3/2015 Moore et al.
8,991,678 B2 3/2015 Wellman et al.
8,992,422 B2 3/2015 Spivey et al.
8,996,165 B2 3/2015 Wang et al.
8,998,058 B2 4/2015 Moore et al.
8,998,059 B2 4/2015 Smith et al.
8,998,061 B2 4/2015 Williams et al.
8,998,935 B2 4/2015 Hart
9,004,339 B1 4/2015 Park
9,005,230 B2 4/2015 Yates et al.
9,005,238 B2 4/2015 DeSantis et al.
9,005,243 B2 4/2015 Stopek et al.
9,010,608 B2 4/2015 Casasanta, Jr. et al.
9,016,540 B2 4/2015 Whitman et al.
9,016,541 B2 4/2015 Viola et al.
9,016,542 B2 4/2015 Shelton, IV et al.
9,017,331 B2 4/2015 Fox
9,023,014 B2 5/2015 Chowaniec et al.
9,027,817 B2 5/2015 Milliman et al.
9,028,494 B2 5/2015 Shelton, IV et al.
9,028,495 B2 5/2015 Mueller et al.
9,028,519 B2 5/2015 Yates et al.
9,033,203 B2 5/2015 Woodard, Jr. et al.
9,033,204 B2 5/2015 Shelton, IV et al.
9,038,881 B1 5/2015 Schaller et al.
9,044,227 B2 6/2015 Shelton, IV et al.
9,044,228 B2 6/2015 Woodard, Jr. et al.
9,044,229 B2 6/2015 Scheib et al.
9,044,230 B2 6/2015 Morgan et al.
9,050,083 B2 6/2015 Yates et al.
9,050,084 B2 6/2015 Schmid et al.
9,050,120 B2 6/2015 Swarup et al.
9,055,941 B2 6/2015 Schmid et al.
9,055,942 B2 6/2015 Balbierz et al.
9,055,943 B2 6/2015 Zemlok et al.
9,055,944 B2 6/2015 Hodgkinson et al.
9,060,769 B2 6/2015 Coleman et al.
9,060,770 B2 6/2015 Shelton, IV et al.
9,060,894 B2 6/2015 Wubbeling
9,072,515 B2 7/2015 Hall et al.
9,072,523 B2 7/2015 Houser et al.
9,072,535 B2 7/2015 Shelton, IV et al.
9,072,536 B2 7/2015 Shelton, IV et al.
9,078,653 B2 7/2015 Leimbach et al.
9,084,601 B2 7/2015 Moore et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,084,602 B2 7/2015 Gleiman
9,089,326 B2 7/2015 Krumanaker et al.
9,089,330 B2 7/2015 Widenhouse et al.
9,089,352 B2 7/2015 Jeong
9,095,339 B2 8/2015 Moore et al.
9,095,362 B2 8/2015 Dachs, II et al.
9,096,033 B2 8/2015 Holop et al.
9,101,358 B2 8/2015 Kerr et al.
9,101,385 B2 8/2015 Shelton, IV et al.
9,107,663 B2 8/2015 Swensgard
9,110,587 B2 8/2015 Kim et al.
9,113,862 B2 8/2015 Morgan et al.
9,113,864 B2 8/2015 Morgan et al.
9,113,865 B2 8/2015 Shelton, IV et al.
9,113,870 B2 8/2015 Viola
9,113,874 B2 8/2015 Shelton, IV et al.
9,113,880 B2 8/2015 Zemlok et al.
9,113,881 B2 8/2015 Scirica
9,113,883 B2 8/2015 Aronhalt et al.
9,113,884 B2 8/2015 Shelton, IV et al.
9,119,657 B2 9/2015 Shelton, IV et al.
9,119,898 B2 9/2015 Bayon et al.
9,119,957 B2 9/2015 Gantz et al.
9,123,286 B2 9/2015 Park
9,125,649 B2 9/2015 Bruewer et al.
9,125,654 B2 9/2015 Aronhalt et al.
9,125,662 B2 9/2015 Shelton, IV
9,131,940 B2 9/2015 Huitema et al.
9,138,225 B2 9/2015 Huang et al.
9,138,226 B2 9/2015 Racenet et al.
9,149,274 B2 10/2015 Spivey et al.
9,149,324 B2 10/2015 Huang et al.
9,149,325 B2 10/2015 Worrell et al.
9,168,038 B2 10/2015 Shelton, IV et al.
9,168,039 B1 10/2015 Knodel
9,179,911 B2 11/2015 Morgan et al.
9,179,912 B2 11/2015 Yates et al.
9,186,046 B2 11/2015 Ramamurthy et al.
9,186,137 B2 11/2015 Farascioni et al.
9,186,140 B2 11/2015 Hiles et al.
9,186,143 B2 11/2015 Timm et al.
9,192,380 B2 11/2015 (Tarinelli) Racenet et al.
9,192,384 B2 11/2015 Bettuchi
9,198,661 B2 12/2015 Swensgard
9,198,662 B2 12/2015 Barton et al.
9,204,830 B2 12/2015 Zand et al.
9,204,877 B2 12/2015 Whitman et al.
9,204,878 B2 12/2015 Hall et al.
9,204,879 B2 12/2015 Shelton, IV
9,204,880 B2 12/2015 Baxter, III et al.
9,204,923 B2 12/2015 Manzo et al.
9,211,120 B2 12/2015 Scheib et al.
9,211,121 B2 12/2015 Hall et al.
9,211,122 B2 12/2015 Hagerty et al.
9,216,019 B2 12/2015 Schmid et al.
9,216,020 B2 12/2015 Zhang et al.
9,216,062 B2 12/2015 Duque et al.
9,220,500 B2 12/2015 Swayze et al.
9,220,501 B2 12/2015 Baxter, III et al.
9,220,502 B2 12/2015 Zemlok et al.
9,220,559 B2 12/2015 Worrell et al.
9,226,751 B2 1/2016 Shelton, IV et al.
9,232,941 B2 1/2016 Mandakolathur Vasudevan et al.
9,232,945 B2 1/2016 Zingman
9,237,891 B2 1/2016 Shelton, IV
9,237,892 B2 1/2016 Hodgkinson
9,241,714 B2 1/2016 Timm et al.
9,241,758 B2 1/2016 Franer et al.
9,254,131 B2 2/2016 Soltz et al.
9,265,500 B2 2/2016 Sorrentino et al.
9,271,753 B2 3/2016 Butler et al.
9,271,799 B2 3/2016 Shelton, IV et al.
9,272,406 B2 3/2016 Aronhalt et al.
9,277,919 B2 3/2016 Timmer et al.
9,277,922 B2 3/2016 Carter et al.
9,282,962 B2 3/2016 Schmid et al.
9,282,963 B2 3/2016 Bryant
9,282,966 B2 3/2016 Shelton, IV et al.
9,282,974 B2 3/2016 Shelton, IV
9,283,054 B2 3/2016 Morgan et al.
9,289,206 B2 3/2016 Hess et al.
9,289,207 B2 3/2016 Shelton, IV
9,289,210 B2 3/2016 Baxter, III et al.
9,289,212 B2 3/2016 Shelton, IV et al.
9,289,225 B2 3/2016 Shelton, IV et al.
9,289,256 B2 3/2016 Shelton, IV et al.
9,295,464 B2 3/2016 Shelton, IV et al.
9,295,466 B2 3/2016 Hodgkinson et al.
9,301,752 B2 4/2016 Mandakolathur Vasudevan et al.
9,301,753 B2 4/2016 Aldridge et al.
9,301,755 B2 4/2016 Shelton, IV et al.
9,301,759 B2 4/2016 Spivey et al.
9,307,965 B2 4/2016 Ming et al.
9,307,986 B2 4/2016 Hall et al.
9,307,987 B2 4/2016 Swensgard et al.
9,307,988 B2 4/2016 Shelton, IV
9,307,989 B2 4/2016 Shelton, IV et al.
9,307,994 B2 4/2016 Gresham et al.
9,308,009 B2 4/2016 Madan et al.
9,314,246 B2 4/2016 Shelton, IV et al.
9,314,247 B2 4/2016 Shelton, IV et al.
9,314,594 B2 4/2016 Kirschenman
9,320,518 B2 4/2016 Henderson et al.
9,320,520 B2 4/2016 Shelton, IV et al.
9,320,521 B2 4/2016 Shelton, IV et al.
9,320,523 B2 4/2016 Shelton, IV et al.
9,326,767 B2 5/2016 Koch et al.
9,326,768 B2 5/2016 Shelton, IV
9,326,769 B2 5/2016 Shelton, IV et al.
9,326,770 B2 5/2016 Shelton, IV et al.
9,326,771 B2 5/2016 Baxter, III et al.
9,332,974 B2 5/2016 Henderson et al.
9,332,984 B2 5/2016 Weaner et al.
9,332,987 B2 5/2016 Leimbach et al.
9,333,082 B2 5/2016 Wei et al.
9,345,477 B2 5/2016 Anim et al.
9,345,481 B2 5/2016 Hall et al.
9,351,726 B2 5/2016 Leimbach et al.
9,351,727 B2 5/2016 Leimbach et al.
9,351,730 B2 5/2016 Schmid et al.
9,351,731 B2 5/2016 Carter et al.
9,358,003 B2 6/2016 Hall et al.
9,358,005 B2 6/2016 Shelton, IV et al.
9,358,015 B2 6/2016 Sorrentino et al.
9,364,217 B2 6/2016 Kostrzewski et al.
9,364,219 B2 6/2016 Olson et al.
9,364,220 B2 6/2016 Williams
9,364,229 B2 6/2016 D'Agostino et al.
9,364,230 B2 6/2016 Shelton, IV et al.
9,364,233 B2 6/2016 Alexander et al.
9,370,341 B2 6/2016 Ceniccola et al.
9,370,358 B2 6/2016 Shelton, IV et al.
9,370,364 B2 6/2016 Smith et al.
9,386,983 B2 7/2016 Swensgard et al.
9,386,984 B2 7/2016 Aronhalt et al.
9,386,985 B2 7/2016 Koch, Jr. et al.
9,386,988 B2 7/2016 Baxter et al.
9,393,015 B2 7/2016 Laurent et al.
9,393,018 B2 7/2016 Wang et al.
9,398,911 B2 7/2016 Auld
9,402,604 B2 8/2016 Williams et al.
9,402,626 B2 8/2016 Ortiz et al.
9,402,628 B2 8/2016 Beardsley
9,408,604 B2 8/2016 Shelton, IV et al.
9,408,606 B2 8/2016 Shelton, IV
9,408,622 B2 8/2016 Stulen et al.
9,414,838 B2 8/2016 Shelton, IV et al.
9,414,848 B2 8/2016 Edwards et al.
9,414,880 B2 8/2016 Monson et al.
9,421,013 B2 * 8/2016 Patel A61B 17/068
9,421,014 B2 8/2016 Ingmanson et al.
9,427,223 B2 8/2016 Park et al.
9,427,232 B2 * 8/2016 Gupta A61B 17/064
9,433,411 B2 9/2016 Racenet et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,433,419 B2 9/2016 Gonzalez et al.
9,433,420 B2 9/2016 Hodgkinson
9,439,649 B2 9/2016 Shelton, IV et al.
9,439,651 B2 9/2016 Smith et al.
9,445,808 B2 9/2016 Woodard, Jr. et al.
9,445,813 B2 9/2016 Shelton, IV et al.
9,451,956 B2 9/2016 Balbierz et al.
9,451,958 B2 9/2016 Shelton, IV et al.
9,463,260 B2 10/2016 Stopek
9,468,438 B2 10/2016 Baber et al.
9,480,476 B2 11/2016 Aldridge et al.
9,480,492 B2 11/2016 Aranyi et al.
9,486,213 B2 11/2016 Altman et al.
9,486,214 B2 11/2016 Shelton, IV
9,486,302 B2 11/2016 Boey et al.
9,492,146 B2 11/2016 Kostrzewski et al.
9,492,167 B2 11/2016 Shelton, IV et al.
9,492,170 B2 11/2016 Bear et al.
9,492,189 B2 11/2016 Williams et al.
9,498,211 B2 * 11/2016 Cohn A61B 17/064
9,498,215 B2 11/2016 Duque et al.
9,498,219 B2 11/2016 Moore et al.
D775,336 S * 12/2016 Shelton, IV D24/145
9,510,827 B2 12/2016 Kostrzewski
9,510,828 B2 12/2016 Yates et al.
9,510,830 B2 12/2016 Shelton, IV et al.
9,510,846 B2 12/2016 Sholev et al.
9,510,925 B2 12/2016 Hotter et al.
9,517,063 B2 12/2016 Swayze et al.
9,517,068 B2 12/2016 Shelton, IV et al.
9,522,029 B2 12/2016 Yates et al.
9,539,020 B2 1/2017 Conlon et al.
9,545,258 B2 1/2017 Smith et al.
9,549,732 B2 1/2017 Yates et al.
9,549,735 B2 * 1/2017 Shelton, IV A61B 17/0644
9,554,794 B2 1/2017 Baber et al.
9,554,796 B2 1/2017 Kostrzewski
9,561,032 B2 2/2017 Shelton, IV et al.
9,561,038 B2 2/2017 Shelton, IV et al.
9,561,045 B2 2/2017 Hinman et al.
9,566,061 B2 2/2017 Aronhalt et al.
9,572,574 B2 2/2017 Shelton, IV et al.
9,572,577 B2 2/2017 Lloyd et al.
9,574,644 B2 2/2017 Parihar
9,585,657 B2 3/2017 Shelton, IV et al.
9,585,658 B2 3/2017 Shelton, IV
9,585,660 B2 3/2017 Laurent et al.
9,585,662 B2 3/2017 Shelton, IV et al.
9,585,663 B2 3/2017 Shelton, IV et al.
9,592,050 B2 3/2017 Schmid et al.
9,592,052 B2 3/2017 Shelton, IV
9,592,053 B2 3/2017 Shelton, IV et al.
9,592,054 B2 3/2017 Schmid et al.
9,597,073 B2 3/2017 Sorrentino et al.
9,597,074 B2 3/2017 Felder et al.
9,597,075 B2 3/2017 Shelton, IV et al.
9,597,080 B2 3/2017 Milliman et al.
9,597,104 B2 3/2017 Nicholas et al.
9,603,595 B2 3/2017 Shelton, IV et al.
9,603,598 B2 3/2017 Shelton, IV et al.
9,603,991 B2 3/2017 Shelton, IV et al.
9,610,080 B2 4/2017 Whitfield et al.
9,615,826 B2 4/2017 Shelton, IV et al.
9,629,623 B2 4/2017 Lytle, IV et al.
9,629,626 B2 4/2017 Soltz et al.
9,629,629 B2 4/2017 Leimbach et al.
9,629,814 B2 4/2017 Widenhouse et al.
9,636,113 B2 5/2017 Wenchell
9,642,620 B2 5/2017 Baxter, III et al.
9,649,096 B2 5/2017 Sholev
9,649,110 B2 5/2017 Parihar et al.
9,649,111 B2 5/2017 Shelton, IV et al.
9,655,613 B2 5/2017 Schaller
9,655,614 B2 5/2017 Swensgard et al.
9,655,615 B2 5/2017 Knodel et al.
9,655,624 B2 5/2017 Shelton, IV et al.
9,656,024 B2 5/2017 Eggert et al.
9,662,110 B2 5/2017 Huang et al.
9,662,131 B2 5/2017 Omori et al.
9,668,729 B2 6/2017 Williams et al.
9,668,732 B2 6/2017 Patel et al.
9,675,344 B2 6/2017 Combrowski et al.
9,675,351 B2 6/2017 Hodgkinson et al.
9,675,355 B2 6/2017 Shelton, IV et al.
9,675,372 B2 6/2017 Laurent et al.
9,675,375 B2 6/2017 Houser et al.
9,681,870 B2 6/2017 Baxter, III et al.
9,681,873 B2 6/2017 Smith et al.
9,687,230 B2 6/2017 Leimbach et al.
9,687,231 B2 6/2017 Baxter, III et al.
9,687,232 B2 * 6/2017 Shelton, IV A61B 17/068
9,687,236 B2 6/2017 Leimbach et al.
9,687,237 B2 6/2017 Schmid et al.
9,690,362 B2 6/2017 Leimbach et al.
9,693,772 B2 7/2017 Ingmanson et al.
9,693,777 B2 7/2017 Schellin et al.
9,693,819 B2 7/2017 Francischelli et al.
9,700,309 B2 7/2017 Jaworek et al.
9,700,310 B2 7/2017 Morgan et al.
9,700,312 B2 7/2017 Kostrzewski et al.
9,700,317 B2 7/2017 Aronhalt et al.
9,700,319 B2 7/2017 Motooka et al.
9,700,321 B2 7/2017 Shelton, IV et al.
9,706,991 B2 7/2017 Hess et al.
9,706,993 B2 7/2017 Hessler et al.
9,707,043 B2 7/2017 Bozung
9,724,091 B2 8/2017 Shelton, IV et al.
9,724,092 B2 8/2017 Baxter, III et al.
9,724,094 B2 8/2017 Baber et al.
9,724,096 B2 8/2017 Thompson et al.
9,724,098 B2 8/2017 Baxter, III et al.
9,730,692 B2 8/2017 Shelton, IV et al.
9,730,695 B2 8/2017 Leimbach et al.
9,730,697 B2 8/2017 Morgan et al.
9,733,663 B2 8/2017 Leimbach et al.
9,737,301 B2 8/2017 Baber et al.
9,737,302 B2 8/2017 Shelton, IV et al.
9,737,303 B2 8/2017 Shelton, IV et al.
9,737,365 B2 8/2017 Hegeman et al.
9,743,928 B2 8/2017 Shelton, IV et al.
9,743,929 B2 8/2017 Leimbach et al.
9,750,498 B2 9/2017 Timm et al.
9,750,499 B2 9/2017 Leimbach et al.
9,750,501 B2 9/2017 Shelton, IV et al.
9,750,502 B2 9/2017 Scirica et al.
9,757,123 B2 9/2017 Giordano et al.
9,757,124 B2 9/2017 Schellin et al.
9,757,126 B2 9/2017 Cappola
9,757,128 B2 9/2017 Baber et al.
9,757,130 B2 9/2017 Shelton, IV
9,763,662 B2 9/2017 Shelton, IV et al.
9,770,245 B2 9/2017 Swayze et al.
9,770,317 B2 * 9/2017 Nering A61B 17/064
9,775,608 B2 10/2017 Aronhalt et al.
9,775,609 B2 10/2017 Shelton, IV et al.
9,775,613 B2 10/2017 Shelton, IV et al.
9,775,614 B2 10/2017 Shelton, IV et al.
9,782,169 B2 10/2017 Kimsey et al.
9,788,834 B2 10/2017 Schmid et al.
9,788,836 B2 10/2017 Overmyer et al.
9,795,379 B2 10/2017 Leimbach et al.
9,795,380 B2 10/2017 Shelton, IV et al.
9,795,381 B2 10/2017 Shelton, IV
9,795,382 B2 10/2017 Shelton, IV
9,795,384 B2 10/2017 Weaner et al.
9,801,626 B2 10/2017 Parihar et al.
9,801,627 B2 10/2017 Harris et al.
9,801,628 B2 10/2017 Harris et al.
9,801,634 B2 10/2017 Shelton, IV et al.
9,804,618 B2 10/2017 Leimbach et al.
9,808,244 B2 11/2017 Leimbach et al.
9,808,246 B2 11/2017 Shelton, IV et al.
9,808,247 B2 11/2017 Shelton, IV et al.
9,808,249 B2 11/2017 Shelton, IV

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,814,460 B2 11/2017 Kimsey et al.
9,814,462 B2 11/2017 Woodard, Jr. et al.
9,820,738 B2 11/2017 Lytle, IV et al.
9,820,741 B2 11/2017 Kostrzewski
9,820,770 B2 11/2017 Palermo
9,826,976 B2 11/2017 Parihar et al.
9,826,977 B2 11/2017 Leimbach et al.
9,826,978 B2 11/2017 Shelton, IV et al.
9,833,236 B2 12/2017 Shelton, IV et al.
9,833,238 B2 12/2017 Baxter, III et al.
9,833,241 B2 12/2017 Huitema et al.
9,833,242 B2 12/2017 Baxter, III et al.
9,839,420 B2 12/2017 Shelton, IV et al.
9,839,421 B2 12/2017 Zerkle et al.
9,839,422 B2 12/2017 Schellin et al.
9,839,423 B2 12/2017 Vendely et al.
9,839,425 B2 12/2017 Zergiebel et al.
9,839,427 B2 12/2017 Swayze et al.
9,839,428 B2 12/2017 Baxter, III et al.
9,839,429 B2 12/2017 Weisenburgh, II et al.
9,839,480 B2 12/2017 Pribanic et al.
9,844,368 B2 12/2017 Boudreaux et al.
9,844,369 B2 12/2017 Huitema et al.
9,844,372 B2 12/2017 Shelton, IV et al.
9,844,373 B2 12/2017 Swayze et al.
9,844,374 B2 12/2017 Lytle, IV et al.
9,844,375 B2 12/2017 Overmyer et al.
9,844,376 B2 12/2017 Baxter, III et al.
9,844,379 B2 12/2017 Shelton, IV et al.
9,848,873 B2 12/2017 Shelton, IV
9,848,875 B2 12/2017 Aronhalt et al.
9,848,877 B2 12/2017 Shelton, IV et al.
9,848,898 B2 12/2017 Friedman et al.
9,855,040 B2 1/2018 Kostrzewski
9,855,041 B2 * 1/2018 Nering A61B 17/064
9,861,359 B2 1/2018 Shelton, IV et al.
9,861,361 B2 1/2018 Aronhalt et al.
9,867,612 B2 1/2018 Parihar et al.
9,867,613 B2 * 1/2018 Marczyk A61B 17/068
9,867,616 B2 1/2018 Marczyk
9,867,618 B2 1/2018 Hall et al.
9,868,198 B2 1/2018 Nicholas et al.
9,872,682 B2 1/2018 Hess et al.
9,872,683 B2 1/2018 Hopkins et al.
9,872,684 B2 1/2018 Hall et al.
9,877,721 B2 1/2018 Schellin et al.
9,883,860 B2 2/2018 Leimbach
9,883,861 B2 2/2018 Shelton, IV et al.
9,884,456 B2 2/2018 Schellin et al.
9,888,919 B2 2/2018 Leimbach et al.
9,888,924 B2 2/2018 Ebersole et al.
9,889,230 B2 2/2018 Bennett et al.
9,895,147 B2 2/2018 Shelton, IV
9,895,148 B2 2/2018 Shelton, IV et al.
9,895,813 B2 2/2018 Blumenkranz et al.
9,901,342 B2 2/2018 Shelton, IV et al.
9,901,343 B2 2/2018 Vold et al.
9,907,620 B2 3/2018 Shelton, IV et al.
9,913,642 B2 3/2018 Leimbach et al.
9,913,647 B2 3/2018 Weisenburgh, II et al.
9,913,648 B2 3/2018 Shelton, IV et al.
9,913,694 B2 3/2018 Brisson
9,918,704 B2 3/2018 Shelton, IV et al.
9,918,716 B2 3/2018 Baxter, III et al.
9,918,717 B2 3/2018 Czernik
9,918,778 B2 3/2018 Walberg et al.
9,924,942 B2 3/2018 Swayze et al.
9,924,944 B2 3/2018 Shelton, IV et al.
9,924,947 B2 3/2018 Shelton, IV et al.
9,924,961 B2 3/2018 Shelton, IV et al.
9,931,118 B2 4/2018 Shelton, IV et al.
9,943,309 B2 4/2018 Shelton, IV et al.
9,943,310 B2 4/2018 Harris et al.
9,962,158 B2 5/2018 Hall et al.
9,962,161 B2 5/2018 Scheib et al.
9,968,354 B2 5/2018 Shelton, IV et al.
9,968,355 B2 5/2018 Shelton, IV et al.
9,968,356 B2 5/2018 Shelton, IV et al.
9,968,397 B2 5/2018 Taylor et al.
9,974,529 B2 5/2018 Shelton, IV et al.
9,974,538 B2 5/2018 Baxter, III et al.
9,980,630 B2 5/2018 Larkin et al.
9,980,713 B2 5/2018 Aronhalt et al.
9,980,729 B2 5/2018 Moore et al.
9,987,000 B2 6/2018 Shelton, IV et al.
9,987,006 B2 6/2018 Morgan et al.
9,987,011 B2 6/2018 Williams et al.
9,987,012 B2 6/2018 Shah
9,987,095 B2 6/2018 Chowaniec et al.
9,987,099 B2 6/2018 Chen et al.
9,993,248 B2 6/2018 Shelton, IV et al.
9,993,258 B2 6/2018 Shelton, IV et al.
9,999,408 B2 6/2018 Boudreaux et al.
9,999,426 B2 6/2018 Moore et al.
9,999,431 B2 6/2018 Shelton, IV et al.
10,004,497 B2 6/2018 Overmyer et al.
10,004,498 B2 6/2018 Morgan et al.
10,004,501 B2 6/2018 Shelton, IV et al.
10,004,505 B2 6/2018 Moore et al.
D822,206 S 7/2018 Shelton, IV et al.
10,010,322 B2 7/2018 Shelton, IV et al.
10,010,324 B2 7/2018 Huitema et al.
10,013,049 B2 7/2018 Leimbach et al.
10,016,199 B2 7/2018 Baber et al.
10,028,742 B2 7/2018 Shelton, IV et al.
10,028,743 B2 7/2018 Shelton, IV et al.
10,028,744 B2 * 7/2018 Shelton, IV A61B 17/068
10,028,761 B2 7/2018 Leimbach et al.
D826,405 S 8/2018 Shelton, IV et al.
10,039,529 B2 8/2018 Kerr et al.
10,045,769 B2 8/2018 Aronhalt et al.
10,045,776 B2 8/2018 Shelton, IV et al.
10,045,779 B2 8/2018 Savage et al.
10,045,781 B2 8/2018 Cropper et al.
10,052,044 B2 8/2018 Shelton, IV et al.
10,052,099 B2 8/2018 Morgan et al.
10,052,100 B2 8/2018 Morgan et al.
10,052,102 B2 8/2018 Baxter, III et al.
10,052,104 B2 8/2018 Shelton, IV et al.
10,058,317 B2 8/2018 Fan et al.
10,058,327 B2 8/2018 Weisenburgh, II et al.
10,058,963 B2 8/2018 Shelton, IV et al.
10,064,618 B2 * 9/2018 Allen A61B 17/064
10,064,621 B2 9/2018 Kerr et al.
10,064,624 B2 9/2018 Shelton, IV et al.
10,064,688 B2 9/2018 Shelton, IV et al.
10,070,861 B2 9/2018 Spivey et al.
10,070,863 B2 9/2018 Swayze et al.
10,071,452 B2 9/2018 Shelton, IV et al.
10,076,325 B2 9/2018 Huang et al.
10,080,552 B2 9/2018 Nicholas et al.
D831,209 S 10/2018 Huitema et al.
10,085,748 B2 10/2018 Morgan et al.
10,085,749 B2 10/2018 Cappola et al.
10,085,806 B2 10/2018 Hagn et al.
10,092,292 B2 10/2018 Boudreaux et al.
10,098,642 B2 10/2018 Baxter, III et al.
10,111,679 B2 10/2018 Baber et al.
10,117,649 B2 11/2018 Baxter, III et al.
10,117,652 B2 11/2018 Schmid et al.
10,123,798 B2 11/2018 Baxter, III et al.
10,123,799 B2 11/2018 Zergiebel et al.
10,130,352 B2 11/2018 Widenhouse et al.
10,130,359 B2 11/2018 Hess et al.
10,130,363 B2 11/2018 Huitema et al.
10,130,366 B2 11/2018 Shelton, IV et al.
10,135,242 B2 11/2018 Baber et al.
10,136,887 B2 11/2018 Shelton, IV et al.
10,136,888 B2 11/2018 Chen et al.
10,136,890 B2 11/2018 Shelton, IV et al.
D836,198 S 12/2018 Harris et al.
10,149,679 B2 12/2018 Shelton, IV et al.
10,149,680 B2 12/2018 Parihar et al.
10,149,682 B2 12/2018 Shelton, IV et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

10,149,683 B2 12/2018 Smith et al.
10,159,482 B2 12/2018 Swayze et al.
10,159,483 B2 12/2018 Beckman et al.
10,166,025 B2 1/2019 Leimbach et al.
10,166,026 B2 1/2019 Shelton, IV et al.
10,172,616 B2 1/2019 Murray et al.
10,172,619 B2 1/2019 Harris et al.
10,178,992 B2 1/2019 Wise et al.
10,180,463 B2 1/2019 Beckman et al.
10,182,816 B2 1/2019 Shelton, IV et al.
10,182,818 B2 1/2019 Hensel et al.
10,182,819 B2 1/2019 Shelton, IV
10,188,385 B2 1/2019 Kerr et al.
10,188,393 B2 1/2019 Smith et al.
10,188,394 B2 1/2019 Shelton, IV et al.
10,194,910 B2 2/2019 Shelton, IV et al.
10,194,913 B2 2/2019 Nalagatla et al.
10,201,364 B2 2/2019 Leimbach et al.
10,206,605 B2 2/2019 Shelton, IV et al.
10,206,677 B2 2/2019 Harris et al.
10,206,678 B2 2/2019 Shelton, IV et al.
10,213,198 B2 2/2019 Aronhalt et al.
10,213,201 B2 2/2019 Shelton, IV et al.
10,213,203 B2 2/2019 Swayze et al.
10,213,262 B2 2/2019 Shelton, IV et al.
10,226,250 B2 3/2019 Beckman et al.
10,226,251 B2 3/2019 Scheib et al.
10,231,733 B2 3/2019 Ehrenfels et al.
10,238,385 B2 3/2019 Yates et al.
10,238,387 B2 3/2019 Yates et al.
10,238,390 B2 3/2019 Harris et al.
10,238,391 B2 3/2019 Leimbach et al.
10,245,027 B2 4/2019 Shelton, IV et al.
10,245,028 B2 4/2019 Shelton, IV et al.
10,245,029 B2 4/2019 Hunter et al.
10,245,030 B2 4/2019 Hunter et al.
10,245,032 B2 4/2019 Shelton, IV
10,245,033 B2 4/2019 Overmyer et al.
10,245,035 B2 4/2019 Swayze et al.
10,245,058 B2 4/2019 Omori et al.
10,251,648 B2 4/2019 Harris et al.
10,258,330 B2 4/2019 Shelton, IV et al.
10,258,331 B2 4/2019 Shelton, IV et al.
10,258,333 B2 4/2019 Shelton, IV et al.
10,258,336 B2 4/2019 Baxter, III et al.
10,265,065 B2 4/2019 Shelton, IV et al.
10,265,067 B2 4/2019 Yates et al.
10,265,068 B2 4/2019 Harris et al.
10,265,072 B2 4/2019 Shelton, IV et al.
10,265,073 B2 4/2019 Scheib et al.
10,265,074 B2 4/2019 Shelton, IV et al.
10,271,845 B2 4/2019 Shelton, IV
10,271,846 B2 4/2019 Shelton, IV et al.
10,271,851 B2 4/2019 Shelton, IV et al.
D847,989 S 5/2019 Shelton, IV et al.
10,278,697 B2 5/2019 Shelton, IV et al.
10,278,722 B2 5/2019 Shelton, IV et al.
10,285,700 B2 5/2019 Scheib
10,285,705 B2 5/2019 Shelton, IV et al.
10,292,702 B2 * 5/2019 Cardinale A61B 17/068
10,292,704 B2 5/2019 Harris et al.
10,299,792 B2 5/2019 Huitema et al.
10,299,817 B2 5/2019 Shelton, IV et al.
D850,617 S 6/2019 Shelton, IV et al.
10,307,159 B2 6/2019 Harris et al.
10,314,582 B2 6/2019 Shelton, IV et al.
10,314,587 B2 6/2019 Harris et al.
10,314,589 B2 6/2019 Shelton, IV et al.
10,321,907 B2 6/2019 Shelton, IV et al.
10,321,909 B2 6/2019 Shelton, IV et al.
10,327,764 B2 6/2019 Harris et al.
10,327,765 B2 6/2019 Timm et al.
10,327,776 B2 6/2019 Harris et al.
10,335,144 B2 7/2019 Shelton, IV et al.
10,335,148 B2 7/2019 Shelton, IV et al.
10,335,149 B2 7/2019 Baxter, III et al.
10,335,150 B2 7/2019 Shelton, IV
10,335,151 B2 7/2019 Shelton, IV et al.
10,342,533 B2 7/2019 Shelton, IV et al.
10,342,535 B2 7/2019 Scheib et al.
10,342,541 B2 7/2019 Shelton, IV et al.
10,342,543 B2 7/2019 Shelton, IV et al.
10,349,941 B2 7/2019 Marczyk et al.
10,357,246 B2 7/2019 Shelton, IV et al.
10,357,251 B2 7/2019 Shelton, IV et al.
10,357,252 B2 7/2019 Harris et al.
10,363,031 B2 7/2019 Alexander, III et al.
10,368,861 B2 8/2019 Baxter, III et al.
10,368,865 B2 8/2019 Harris et al.
10,376,263 B2 8/2019 Morgan et al.
10,383,628 B2 8/2019 Kang et al.
10,383,629 B2 8/2019 Ross et al.
10,383,633 B2 8/2019 Shelton, IV et al.
10,390,823 B2 8/2019 Shelton, IV et al.
10,390,825 B2 8/2019 Shelton, IV et al.
10,390,829 B2 8/2019 Eckert et al.
10,398,433 B2 9/2019 Boudreaux et al.
10,398,436 B2 9/2019 Shelton, IV et al.
10,405,854 B2 9/2019 Schmid et al.
10,405,857 B2 9/2019 Shelton, IV et al.
10,405,863 B2 9/2019 Wise et al.
10,413,291 B2 9/2019 Worthington et al.
10,413,293 B2 9/2019 Shelton, IV et al.
10,413,297 B2 9/2019 Harris et al.
10,420,552 B2 9/2019 Shelton, IV et al.
10,420,553 B2 9/2019 Shelton, IV et al.
10,420,558 B2 9/2019 Nalagatla et al.
10,420,559 B2 9/2019 Marczyk et al.
10,420,560 B2 9/2019 Shelton, IV et al.
10,420,561 B2 9/2019 Shelton, IV et al.
10,426,463 B2 10/2019 Shelton, IV et al.
10,426,471 B2 10/2019 Shelton, IV et al.
10,426,476 B2 10/2019 Harris et al.
10,426,477 B2 10/2019 Harris et al.
10,426,478 B2 10/2019 Shelton, IV et al.
10,433,837 B2 10/2019 Worthington et al.
10,433,844 B2 10/2019 Shelton, IV et al.
10,433,845 B2 10/2019 Baxter, III et al.
10,433,849 B2 10/2019 Shelton, IV et al.
10,433,918 B2 10/2019 Shelton, IV et al.
10,441,279 B2 10/2019 Shelton, IV et al.
10,441,280 B2 10/2019 Timm et al.
10,441,285 B2 10/2019 Shelton, IV et al.
10,441,369 B2 10/2019 Shelton, IV et al.
10,448,948 B2 10/2019 Shelton, IV et al.
10,448,950 B2 10/2019 Shelton, IV et al.
10,456,132 B2 10/2019 Gettinger et al.
10,456,133 B2 10/2019 Yates et al.
10,456,140 B2 10/2019 Shelton, IV et al.
10,463,367 B2 11/2019 Kostrzewski et al.
10,463,369 B2 11/2019 Shelton, IV et al.
10,463,383 B2 11/2019 Shelton, IV et al.
10,470,762 B2 11/2019 Leimbach et al.
10,470,763 B2 11/2019 Yates et al.
10,470,764 B2 11/2019 Baxter, III et al.
10,470,768 B2 11/2019 Harris et al.
10,470,769 B2 11/2019 Shelton, IV et al.
10,478,190 B2 11/2019 Miller et al.
10,485,536 B2 11/2019 Ming et al.
10,485,541 B2 11/2019 Shelton, IV
10,485,542 B2 11/2019 Shelton, IV et al.
10,485,543 B2 11/2019 Shelton, IV et al.
10,485,546 B2 11/2019 Shelton, IV et al.
10,492,785 B2 12/2019 Overmyer et al.
10,492,787 B2 12/2019 Smith et al.
10,499,890 B2 12/2019 Shelton, IV et al.
10,499,908 B2 12/2019 Abbott et al.
10,499,914 B2 12/2019 Huang et al.
10,500,309 B2 12/2019 Shah et al.
10,517,594 B2 12/2019 Shelton, IV et al.
10,517,595 B2 12/2019 Hunter et al.
10,517,596 B2 12/2019 Hunter et al.
10,517,599 B2 12/2019 Baxter, III et al.
10,517,682 B2 12/2019 Giordano et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

10,524,789 B2 1/2020 Swayze et al.
10,524,795 B2 1/2020 Nalagatla et al.
10,531,874 B2 1/2020 Morgan et al.
10,537,324 B2 1/2020 Shelton, IV et al.
10,537,325 B2 1/2020 Bakos et al.
10,542,978 B2 1/2020 Chowaniec et al.
10,542,979 B2 1/2020 Shelton, IV et al.
10,542,982 B2 1/2020 Beckman et al.
10,542,988 B2 1/2020 Schellin et al.
10,542,991 B2 1/2020 Shelton, IV et al.
10,548,504 B2 2/2020 Shelton, IV et al.
10,561,422 B2 2/2020 Schellin et al.
10,568,624 B2 2/2020 Shelton, IV et al.
10,568,625 B2 2/2020 Harris et al.
10,568,626 B2 2/2020 Shelton, IV et al.
10,568,632 B2 2/2020 Miller et al.
10,568,652 B2 2/2020 Hess et al.
10,575,868 B2 3/2020 Hall et al.
10,582,928 B2 3/2020 Hunter et al.
10,588,623 B2 3/2020 Schmid et al.
10,588,624 B2 3/2020 Shelton, IV et al.
10,588,625 B2 3/2020 Weaner et al.
10,588,629 B2 3/2020 Malinouskas et al.
10,588,630 B2 3/2020 Shelton, IV et al.
10,588,631 B2 3/2020 Shelton, IV et al.
10,588,632 B2 3/2020 Shelton, IV et al.
2001/0025183 A1 9/2001 Shahidi
2002/0022836 A1 2/2002 Goble et al.
2002/0029036 A1 3/2002 Goble et al.
2002/0095175 A1 7/2002 Brock et al.
2002/0103494 A1 8/2002 Pacey
2002/0117534 A1 8/2002 Green et al.
2002/0127265 A1 9/2002 Bowman et al.
2002/0134811 A1 9/2002 Napier et al.
2002/0143340 A1 10/2002 Kaneko
2003/0009193 A1 1/2003 Corsaro
2003/0039689 A1 2/2003 Chen et al.
2003/0078647 A1 4/2003 Vallana et al.
2003/0084983 A1 5/2003 Rangachari et al.
2003/0093103 A1 5/2003 Malackowski et al.
2003/0096158 A1 5/2003 Takano et al.
2003/0139741 A1 7/2003 Goble et al.
2003/0153908 A1 8/2003 Goble et al.
2003/0163085 A1 8/2003 Tanner et al.
2003/0181900 A1 9/2003 Long
2003/0195387 A1 10/2003 Kortenbach et al.
2003/0205029 A1 11/2003 Chapolini et al.
2003/0216732 A1 11/2003 Truckai et al.
2003/0236505 A1 12/2003 Bonadio et al.
2004/0006335 A1 1/2004 Garrison
2004/0006340 A1 1/2004 Latterell et al.
2004/0028502 A1 2/2004 Cummins
2004/0030333 A1 2/2004 Goble
2004/0034357 A1 2/2004 Beane et al.
2004/0044364 A1 3/2004 DeVries et al.
2004/0068161 A1 4/2004 Couvillon
2004/0068224 A1 4/2004 Couvillon et al.
2004/0068307 A1 4/2004 Goble
2004/0070369 A1 4/2004 Sakakibara
2004/0073222 A1 4/2004 Koseki
2004/0078037 A1 4/2004 Batchelor et al.
2004/0093024 A1 5/2004 Lousararian et al.
2004/0098040 A1 5/2004 Taniguchi et al.
2004/0101822 A1 5/2004 Wiesner et al.
2004/0102783 A1 5/2004 Sutterlin et al.
2004/0108357 A1 6/2004 Milliman et al.
2004/0110439 A1 6/2004 Chaikof et al.
2004/0115022 A1 6/2004 Albertson et al.
2004/0116952 A1 6/2004 Sakurai et al.
2004/0147909 A1 7/2004 Johnston et al.
2004/0164123 A1 8/2004 Racenet et al.
2004/0167572 A1 8/2004 Roth et al.
2004/0181219 A1 9/2004 Goble et al.
2004/0193189 A1 9/2004 Kortenbach et al.
2004/0199181 A1 10/2004 Knodel et al.
2004/0222268 A1 11/2004 Bilotti et al.
2004/0225186 A1 11/2004 Horne et al.
2004/0232201 A1 11/2004 Wenchell et al.
2004/0236352 A1 11/2004 Wang et al.
2004/0243147 A1 12/2004 Lipow
2004/0243151 A1 12/2004 Demmy et al.
2004/0243163 A1 12/2004 Casiano et al.
2004/0247415 A1 12/2004 Mangone
2004/0254566 A1 12/2004 Plicchi et al.
2004/0254590 A1 12/2004 Hoffman et al.
2004/0260315 A1 12/2004 Dell et al.
2004/0267310 A1 12/2004 Racenet et al.
2005/0010213 A1 1/2005 Stad et al.
2005/0032511 A1 2/2005 Malone et al.
2005/0033352 A1 2/2005 Zepf et al.
2005/0054946 A1 3/2005 Krzyzanowski
2005/0059997 A1 3/2005 Bauman et al.
2005/0070929 A1 3/2005 Dalessandro et al.
2005/0075561 A1 4/2005 Golden
2005/0080342 A1 4/2005 Gilreath et al.
2005/0085693 A1 4/2005 Belson et al.
2005/0090817 A1 4/2005 Phan
2005/0096605 A1 5/2005 Green et al.
2005/0096683 A1 5/2005 Ellins et al.
2005/0124855 A1 6/2005 Jaffe et al.
2005/0125897 A1 6/2005 Wyslucha et al.
2005/0131173 A1 6/2005 McDaniel et al.
2005/0131211 A1 6/2005 Bayley et al.
2005/0131390 A1 6/2005 Heinrich et al.
2005/0131436 A1 6/2005 Johnston et al.
2005/0131457 A1 6/2005 Douglas et al.
2005/0137454 A1 6/2005 Saadat et al.
2005/0137455 A1 6/2005 Ewers et al.
2005/0139636 A1 6/2005 Schwemberger et al.
2005/0143759 A1 6/2005 Kelly
2005/0143769 A1 6/2005 White et al.
2005/0154258 A1 7/2005 Tartaglia et al.
2005/0154406 A1 7/2005 Bombard et al.
2005/0165419 A1 7/2005 Sauer et al.
2005/0169974 A1 8/2005 Tenerz et al.
2005/0171522 A1 8/2005 Christopherson
2005/0177181 A1 8/2005 Kagan et al.
2005/0182298 A1 8/2005 Ikeda et al.
2005/0187545 A1 8/2005 Hooven et al.
2005/0203550 A1 9/2005 Laufer et al.
2005/0216055 A1 9/2005 Scirica et al.
2005/0228224 A1 10/2005 Okada et al.
2005/0240178 A1 10/2005 Morley et al.
2005/0245965 A1 11/2005 Orban, III et al.
2005/0246881 A1 11/2005 Kelly et al.
2005/0256452 A1 11/2005 DeMarchi et al.
2005/0261676 A1 11/2005 Hall et al.
2005/0263563 A1 12/2005 Racenet et al.
2005/0267455 A1 12/2005 Eggers et al.
2005/0283188 A1 12/2005 Loshakove et al.
2006/0008787 A1 1/2006 Hayman et al.
2006/0015009 A1 1/2006 Jaffe et al.
2006/0020258 A1 1/2006 Strauss et al.
2006/0020336 A1 1/2006 Liddicoat
2006/0025812 A1 2/2006 Shelton
2006/0041188 A1 2/2006 Dirusso et al.
2006/0047275 A1 3/2006 Goble
2006/0049229 A1 3/2006 Milliman et al.
2006/0052824 A1 3/2006 Ransick et al.
2006/0052825 A1 3/2006 Ransick et al.
2006/0064086 A1 3/2006 Odom
2006/0079735 A1 4/2006 Martone et al.
2006/0086032 A1 4/2006 Valencic et al.
2006/0087746 A1 4/2006 Lipow
2006/0089535 A1 4/2006 Raz et al.
2006/0100649 A1 5/2006 Hart
2006/0173470 A1 8/2006 Oray et al.
2006/0180634 A1 8/2006 Shelton et al.
2006/0185682 A1 8/2006 Marczyk
2006/0201989 A1 9/2006 Ojeda
2006/0212071 A1 9/2006 Ginn et al.
2006/0235368 A1 10/2006 Oz
2006/0252993 A1 11/2006 Freed et al.
2006/0271102 A1 11/2006 Bosshard et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0287576 A1 12/2006 Tsuji et al.
2006/0289602 A1 12/2006 Wales et al.
2006/0291981 A1 12/2006 Viola et al.
2007/0010838 A1 1/2007 Shelton et al.
2007/0026039 A1 2/2007 Drumheller et al.
2007/0026040 A1 2/2007 Crawley et al.
2007/0027468 A1 2/2007 Wales et al.
2007/0027551 A1 2/2007 Farnsworth et al.
2007/0049951 A1 3/2007 Menn
2007/0049966 A1 3/2007 Bonadio et al.
2007/0051375 A1 3/2007 Milliman
2007/0073341 A1 3/2007 Smith et al.
2007/0078484 A1 4/2007 Talarico et al.
2007/0084897 A1 4/2007 Shelton et al.
2007/0093869 A1 4/2007 Bloom et al.
2007/0102472 A1 5/2007 Shelton
2007/0106113 A1 5/2007 Ravo
2007/0106317 A1 5/2007 Shelton et al.
2007/0134251 A1 6/2007 Ashkenazi et al.
2007/0135686 A1 6/2007 Pruitt et al.
2007/0135803 A1 6/2007 Belson
2007/0155010 A1 7/2007 Farnsworth et al.
2007/0170225 A1 7/2007 Shelton et al.
2007/0173687 A1 7/2007 Shima et al.
2007/0173813 A1 7/2007 Odom
2007/0175950 A1 8/2007 Shelton et al.
2007/0175951 A1 8/2007 Shelton et al.
2007/0175955 A1 8/2007 Shelton et al.
2007/0190110 A1 8/2007 Pameijer et al.
2007/0191868 A1 8/2007 Theroux et al.
2007/0194079 A1 8/2007 Hueil et al.
2007/0194082 A1 8/2007 Morgan et al.
2007/0203510 A1 8/2007 Bettuchi
2007/0208359 A1 9/2007 Hoffman
2007/0213750 A1 9/2007 Weadock
2007/0225562 A1 9/2007 Spivey et al.
2007/0233163 A1 10/2007 Bombard et al.
2007/0243227 A1 10/2007 Gertner
2007/0244471 A1 10/2007 Malackowski
2007/0246505 A1 10/2007 Pace-Floridia et al.
2007/0275035 A1 11/2007 Herman et al.
2007/0276409 A1 11/2007 Ortiz et al.
2007/0279011 A1 12/2007 Jones et al.
2007/0286892 A1 12/2007 Herzberg et al.
2008/0003196 A1 1/2008 Jonn et al.
2008/0015598 A1 1/2008 Prommersberger
2008/0021278 A1 1/2008 Leonard et al.
2008/0029570 A1 2/2008 Shelton et al.
2008/0029573 A1 2/2008 Shelton et al.
2008/0029574 A1 2/2008 Shelton et al.
2008/0029575 A1 2/2008 Shelton et al.
2008/0030170 A1 2/2008 Dacquay et al.
2008/0051833 A1 2/2008 Gramuglia et al.
2008/0065153 A1* 3/2008 Allard A61B 17/064 606/219
2008/0078802 A1 4/2008 Hess et al.
2008/0082114 A1 4/2008 McKenna et al.
2008/0082125 A1 4/2008 Murray et al.
2008/0082126 A1 4/2008 Murray et al.
2008/0085296 A1 4/2008 Powell et al.
2008/0086078 A1 4/2008 Powell et al.
2008/0091072 A1 4/2008 Omori et al.
2008/0108443 A1 5/2008 Jinno et al.
2008/0128469 A1 6/2008 Dalessandro et al.
2008/0129253 A1 6/2008 Shiue et al.
2008/0135600 A1 6/2008 Hiranuma et al.
2008/0140115 A1 6/2008 Stopek
2008/0154299 A1 6/2008 Livneh
2008/0169328 A1 7/2008 Shelton
2008/0169332 A1 7/2008 Shelton et al.
2008/0169333 A1 7/2008 Shelton et al.
2008/0172087 A1 7/2008 Fuchs et al.
2008/0190989 A1 8/2008 Crews et al.
2008/0197167 A1 8/2008 Viola et al.
2008/0200762 A1 8/2008 Stokes et al.
2008/0200835 A1 8/2008 Monson et al.
2008/0200933 A1 8/2008 Bakos et al.
2008/0249536 A1 10/2008 Stahler et al.
2008/0255413 A1 10/2008 Zemlok et al.
2008/0262654 A1 10/2008 Omori et al.
2008/0287944 A1 11/2008 Pearson et al.
2008/0294179 A1 11/2008 Balbierz et al.
2008/0296346 A1 12/2008 Shelton, IV et al.
2008/0297287 A1 12/2008 Shachar et al.
2008/0308602 A1 12/2008 Timm et al.
2008/0308603 A1 12/2008 Shelton et al.
2008/0315829 A1 12/2008 Jones et al.
2009/0001121 A1 1/2009 Hess et al.
2009/0001130 A1 1/2009 Hess et al.
2009/0004455 A1 1/2009 Gravagna et al.
2009/0005809 A1 1/2009 Hess et al.
2009/0012534 A1 1/2009 Madhani et al.
2009/0020958 A1 1/2009 Soul
2009/0048589 A1 2/2009 Takashino et al.
2009/0076506 A1 3/2009 Baker
2009/0078736 A1 3/2009 Van Lue
2009/0081313 A1 3/2009 Aghion et al.
2009/0090763 A1 4/2009 Zemlok et al.
2009/0099579 A1 4/2009 Nentwick et al.
2009/0099876 A1 4/2009 Whitman
2009/0119011 A1 5/2009 Kondo et al.
2009/0143855 A1 6/2009 Weber et al.
2009/0149871 A9 6/2009 Kagan et al.
2009/0171147 A1 7/2009 Lee et al.
2009/0177201 A1 7/2009 Soltz et al.
2009/0177226 A1 7/2009 Reinprecht et al.
2009/0188964 A1 7/2009 Orlov
2009/0198272 A1 8/2009 Kerver et al.
2009/0204108 A1 8/2009 Steffen
2009/0206125 A1 8/2009 Huitema et al.
2009/0206126 A1 8/2009 Huitema et al.
2009/0206131 A1 8/2009 Weisenburgh, II et al.
2009/0206133 A1 8/2009 Morgan et al.
2009/0206137 A1 8/2009 Hall et al.
2009/0206139 A1 8/2009 Hall et al.
2009/0206141 A1 8/2009 Huitema et al.
2009/0206142 A1 8/2009 Huitema et al.
2009/0242610 A1 10/2009 Shelton, IV et al.
2009/0247901 A1 10/2009 Zimmer
2009/0255974 A1 10/2009 Viola
2009/0270895 A1 10/2009 Churchill et al.
2009/0275957 A1 11/2009 Harris et al.
2009/0292283 A1 11/2009 Odom
2009/0308907 A1 12/2009 Nalagatla et al.
2009/0318957 A1 12/2009 Viola et al.
2010/0016888 A1 1/2010 Calabrese et al.
2010/0023024 A1 1/2010 Zeiner et al.
2010/0023052 A1 1/2010 Heinrich et al.
2010/0036370 A1 2/2010 Mirel et al.
2010/0069942 A1 3/2010 Shelton, IV
2010/0076483 A1 3/2010 Imuta
2010/0076489 A1 3/2010 Stopek et al.
2010/0100124 A1 4/2010 Calabrese et al.
2010/0133316 A1 6/2010 Lizee et al.
2010/0133317 A1 6/2010 Shelton, IV et al.
2010/0145146 A1 6/2010 Melder
2010/0147921 A1 6/2010 Olson
2010/0147922 A1 6/2010 Olson
2010/0179022 A1 7/2010 Shirokoshi
2010/0191262 A1 7/2010 Harris et al.
2010/0193566 A1 8/2010 Scheib et al.
2010/0204717 A1 8/2010 Knodel
2010/0222901 A1 9/2010 Swayze et al.
2010/0249497 A1 9/2010 Peine et al.
2010/0267662 A1 10/2010 Fielder et al.
2010/0274160 A1 10/2010 Yachi et al.
2010/0292540 A1 11/2010 Hess et al.
2010/0298636 A1 11/2010 Castro et al.
2010/0312261 A1 12/2010 Suzuki et al.
2010/0318085 A1 12/2010 Austin et al.
2010/0331856 A1 12/2010 Carlson et al.
2011/0006101 A1 1/2011 Hall et al.
2011/0011916 A1 1/2011 Levine
2011/0022032 A1 1/2011 Zemlok et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2011/0024477 A1 2/2011 Hall
2011/0024478 A1 2/2011 Shelton, IV
2011/0036891 A1 2/2011 Zemlok et al.
2011/0046667 A1 2/2011 Culligan et al.
2011/0060363 A1 3/2011 Hess et al.
2011/0082485 A1 4/2011 Nohilly et al.
2011/0082538 A1 4/2011 Dahlgren et al.
2011/0087276 A1 4/2011 Bedi et al.
2011/0091515 A1 4/2011 Zilberman et al.
2011/0114697 A1 5/2011 Baxter, III et al.
2011/0125176 A1 5/2011 Yates et al.
2011/0137340 A1 6/2011 Cummins
2011/0147433 A1 6/2011 Shelton, IV et al.
2011/0163146 A1 7/2011 Ortiz et al.
2011/0174861 A1 7/2011 Shelton, IV et al.
2011/0192882 A1 8/2011 Hess et al.
2011/0275901 A1 11/2011 Shelton, IV
2011/0276083 A1 11/2011 Shelton, IV et al.
2011/0278343 A1 11/2011 Knodel et al.
2011/0290856 A1 12/2011 Shelton, IV et al.
2011/0293690 A1 12/2011 Griffin et al.
2011/0295295 A1 12/2011 Shelton, IV et al.
2011/0313894 A1 12/2011 Dye et al.
2011/0315413 A1 12/2011 Fisher et al.
2012/0004636 A1 1/2012 Lo
2012/0016413 A1 1/2012 Timm et al.
2012/0029272 A1 2/2012 Shelton, IV et al.
2012/0074200 A1 3/2012 Schmid et al.
2012/0080336 A1 4/2012 Shelton, IV et al.
2012/0080344 A1 4/2012 Shelton, IV
2012/0080478 A1 4/2012 Morgan et al.
2012/0080497 A1 4/2012 White et al.
2012/0080498 A1 4/2012 Shelton, IV et al.
2012/0109186 A1 5/2012 Parrott et al.
2012/0125792 A1 5/2012 Cassivi
2012/0130421 A1 5/2012 Hafez et al.
2012/0175398 A1 7/2012 Sandborn et al.
2012/0234895 A1 9/2012 O'Connor et al.
2012/0234897 A1 9/2012 Shelton, IV et al.
2012/0248169 A1 10/2012 Widenhouse et al.
2012/0283707 A1 11/2012 Giordano et al.
2012/0289979 A1 11/2012 Eskaros et al.
2012/0292367 A1 11/2012 Morgan et al.
2012/0298722 A1 11/2012 Hess et al.
2013/0006227 A1 1/2013 Takashino
2013/0012983 A1 1/2013 Kleyman
2013/0020375 A1 1/2013 Shelton, IV et al.
2013/0020376 A1 1/2013 Shelton, IV et al.
2013/0023861 A1 1/2013 Shelton, IV et al.
2013/0026208 A1 1/2013 Shelton, IV et al.
2013/0026210 A1 1/2013 Shelton, IV et al.
2013/0030462 A1 1/2013 Keating et al.
2013/0041406 A1 2/2013 Bear et al.
2013/0087597 A1 4/2013 Shelton, IV et al.
2013/0098970 A1 4/2013 Racenet et al.
2013/0116669 A1 5/2013 Shelton, IV et al.
2013/0131651 A1 5/2013 Strobl et al.
2013/0153641 A1 6/2013 Shelton, IV et al.
2013/0175317 A1 7/2013 Yates et al.
2013/0214025 A1 8/2013 Zemlok et al.
2013/0233906 A1 9/2013 Hess et al.
2013/0256373 A1 10/2013 Schmid et al.
2013/0256380 A1 10/2013 Schmid et al.
2013/0261661 A1 10/2013 Piraka
2013/0270322 A1 10/2013 Scheib et al.
2013/0317305 A1 11/2013 Stevenson et al.
2013/0334280 A1 12/2013 Krehel et al.
2013/0334283 A1 12/2013 Swayze et al.
2013/0334285 A1 12/2013 Swayze et al.
2013/0341374 A1 12/2013 Shelton, IV et al.
2014/0001231 A1 1/2014 Shelton, IV et al.
2014/0001234 A1 1/2014 Shelton, IV et al.
2014/0005640 A1 1/2014 Shelton, IV et al.
2014/0005678 A1 1/2014 Shelton, IV et al.
2014/0005702 A1 1/2014 Timm et al.
2014/0005718 A1 1/2014 Shelton, IV et al.
2014/0012299 A1 1/2014 Stoddard et al.
2014/0014705 A1 1/2014 Baxter, III
2014/0018832 A1 1/2014 Shelton, IV
2014/0039549 A1 2/2014 Belsky et al.
2014/0041191 A1 2/2014 Knodel
2014/0048580 A1 2/2014 Merchant et al.
2014/0103098 A1 4/2014 Choi et al.
2014/0107640 A1 4/2014 Yates et al.
2014/0151433 A1 6/2014 Shelton, IV et al.
2014/0158747 A1 6/2014 Measamer et al.
2014/0166724 A1 6/2014 Schellin et al.
2014/0166725 A1 6/2014 Schellin et al.
2014/0166726 A1 6/2014 Schellin et al.
2014/0175152 A1 6/2014 Hess et al.
2014/0188159 A1 7/2014 Steege
2014/0224857 A1 8/2014 Schmid
2014/0243865 A1 8/2014 Swayze et al.
2014/0246475 A1 9/2014 Hall et al.
2014/0248167 A1 9/2014 Sugimoto et al.
2014/0249557 A1 9/2014 Koch et al.
2014/0263541 A1 9/2014 Leimbach et al.
2014/0263552 A1 9/2014 Hall et al.
2014/0263558 A1 9/2014 Hausen et al.
2014/0284371 A1 9/2014 Morgan et al.
2014/0291379 A1 10/2014 Schellin et al.
2014/0291383 A1 10/2014 Spivey et al.
2014/0299648 A1 10/2014 Shelton, IV et al.
2014/0303645 A1 10/2014 Morgan et al.
2014/0330161 A1 11/2014 Swayze et al.
2015/0008248 A1 1/2015 Giordano et al.
2015/0053737 A1 2/2015 Leimbach et al.
2015/0053742 A1 2/2015 Shelton, IV et al.
2015/0053743 A1 2/2015 Yates et al.
2015/0053746 A1 2/2015 Shelton, IV et al.
2015/0053748 A1 2/2015 Yates et al.
2015/0060518 A1 3/2015 Shelton, IV et al.
2015/0060519 A1 3/2015 Shelton, IV et al.
2015/0060520 A1 3/2015 Shelton, IV et al.
2015/0060521 A1 3/2015 Weisenburgh, II et al.
2015/0076208 A1 3/2015 Shelton, IV
2015/0076209 A1 3/2015 Shelton, IV et al.
2015/0076210 A1 3/2015 Shelton, IV et al.
2015/0076212 A1 3/2015 Shelton, IV
2015/0080868 A1 3/2015 Kerr
2015/0083781 A1 3/2015 Giordano et al.
2015/0083782 A1 3/2015 Scheib et al.
2015/0090760 A1 4/2015 Giordano et al.
2015/0090762 A1 4/2015 Giordano et al.
2015/0122870 A1 5/2015 Zemlok et al.
2015/0144679 A1 5/2015 Scirica et al.
2015/0150620 A1 6/2015 Miyamoto et al.
2015/0173749 A1 6/2015 Shelton, IV et al.
2015/0173756 A1 6/2015 Baxter, III et al.
2015/0173789 A1 6/2015 Baxter, III et al.
2015/0196295 A1 7/2015 Shelton, IV et al.
2015/0196296 A1 7/2015 Swayze et al.
2015/0196299 A1 7/2015 Swayze et al.
2015/0201932 A1 7/2015 Swayze et al.
2015/0201936 A1 7/2015 Swayze et al.
2015/0201937 A1 7/2015 Swayze et al.
2015/0201938 A1 7/2015 Swayze et al.
2015/0201939 A1 7/2015 Swayze et al.
2015/0201940 A1 7/2015 Swayze et al.
2015/0201941 A1 7/2015 Swayze et al.
2015/0231409 A1 8/2015 Racenet et al.
2015/0272557 A1 10/2015 Overmyer et al.
2015/0272571 A1 10/2015 Leimbach et al.
2015/0272580 A1 10/2015 Leimbach et al.
2015/0272582 A1 10/2015 Leimbach et al.
2015/0297222 A1 10/2015 Huitema et al.
2015/0297223 A1 10/2015 Huitema et al.
2015/0297225 A1 10/2015 Huitema et al.
2015/0297228 A1 10/2015 Huitema et al.
2015/0297233 A1 10/2015 Huitema et al.
2015/0313594 A1 11/2015 Shelton, IV et al.
2015/0324317 A1 11/2015 Collins et al.
2015/0327864 A1 11/2015 Hodgkinson et al.
2015/0374369 A1 12/2015 Yates et al.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2015/0374378 A1 12/2015 Giordano et al.
2016/0000431 A1 1/2016 Giordano et al.
2016/0000437 A1 1/2016 Giordano et al.
2016/0000438 A1 1/2016 Swayze et al.
2016/0000442 A1 1/2016 Shelton, IV
2016/0000452 A1 1/2016 Yates et al.
2016/0000453 A1 1/2016 Yates et al.
2016/0058443 A1 3/2016 Yates et al.
2016/0066913 A1 3/2016 Swayze et al.
2016/0074040 A1 3/2016 Widenhouse et al.
2016/0089137 A1 3/2016 Hess et al.
2016/0095585 A1 4/2016 Zergiebel et al.
2016/0106431 A1 4/2016 Shelton, IV et al.
2016/0113653 A1 4/2016 Zingman
2016/0120545 A1 5/2016 Shelton, IV et al.
2016/0166256 A1 6/2016 Baxter, III et al.
2016/0183939 A1 6/2016 Shelton, IV et al.
2016/0183943 A1 6/2016 Shelton, IV
2016/0183944 A1 6/2016 Swensgard et al.
2016/0192916 A1 7/2016 Shelton, IV et al.
2016/0192918 A1 7/2016 Shelton, IV et al.
2016/0199063 A1 7/2016 Mandakolathur Vasudevan et al.
2016/0199956 A1 7/2016 Shelton, IV et al.
2016/0206314 A1 7/2016 Scheib et al.
2016/0235404 A1 8/2016 Shelton, IV
2016/0235409 A1 8/2016 Shelton, IV et al.
2016/0235494 A1 8/2016 Shelton, IV et al.
2016/0242783 A1 8/2016 Shelton, IV et al.
2016/0249910 A1 9/2016 Shelton, IV et al.
2016/0249922 A1 9/2016 Morgan et al.
2016/0256154 A1 9/2016 Shelton, IV et al.
2016/0256160 A1 9/2016 Shelton, IV et al.
2016/0256229 A1 9/2016 Morgan et al.
2016/0262745 A1 9/2016 Morgan et al.
2016/0262746 A1 9/2016 Shelton, IV et al.
2016/0270789 A1 9/2016 Gupta et al.
2016/0374678 A1 12/2016 Becerra et al.
2017/0027572 A1 2/2017 Nalagatla et al.
2017/0056000 A1 3/2017 Nalagatla et al.
2017/0056002 A1 3/2017 Nalagatla et al.
2017/0056005 A1 3/2017 Shelton, IV et al.
2017/0105727 A1 4/2017 Scheib et al.
2017/0105731 A1 4/2017 Scheib et al.
2017/0105733 A1 4/2017 Scheib et al.
2017/0119388 A1 5/2017 Kostrzewski
2017/0224331 A1 8/2017 Worthington et al.
2017/0224332 A1 8/2017 Hunter et al.
2017/0224334 A1 8/2017 Worthington et al.
2017/0231627 A1 8/2017 Shelton, IV et al.
2017/0231628 A1 8/2017 Shelton, IV et al.
2017/0245856 A1 8/2017 Baxter, III et al.
2017/0281164 A1 10/2017 Harris et al.
2017/0281169 A1 10/2017 Harris et al.
2017/0281171 A1 10/2017 Shelton, IV et al.
2017/0281173 A1 10/2017 Shelton, IV et al.
2017/0281174 A1 10/2017 Harris et al.
2017/0281186 A1 10/2017 Shelton, IV et al.
2017/0281187 A1 10/2017 Shelton, IV et al.
2017/0281189 A1 10/2017 Nalagatla et al.
2017/0360423 A1 12/2017 Stevenson et al.
2017/0367695 A1 12/2017 Shelton, IV et al.
2017/0367696 A1 12/2017 Shelton, IV et al.
2017/0367697 A1 12/2017 Shelton, IV et al.
2017/0367698 A1 12/2017 Shelton, IV et al.
2018/0103948 A1 4/2018 Baxter, III et al.
2018/0110513 A1 4/2018 Baxter, III et al.
2018/0110517 A1 4/2018 Baxter, III et al.
2018/0125484 A1 5/2018 Kostrzewski
2018/0168575 A1 6/2018 Simms et al.
2018/0168577 A1 6/2018 Aronhalt et al.
2018/0168578 A1 6/2018 Aronhalt et al.
2018/0168579 A1 6/2018 Aronhalt et al.
2018/0168580 A1 6/2018 Hunter et al.
2018/0168584 A1 6/2018 Harris et al.
2018/0168586 A1 6/2018 Shelton, IV et al.
2018/0168589 A1 6/2018 Swayze et al.
2018/0168590 A1 6/2018 Overmyer et al.
2018/0168591 A1 6/2018 Swayze et al.
2018/0168592 A1 6/2018 Overmyer et al.
2018/0168593 A1 6/2018 Overmyer et al.
2018/0168594 A1 6/2018 Shelton, IV et al.
2018/0168597 A1 6/2018 Fanelli et al.
2018/0168598 A1 6/2018 Shelton, IV et al.
2018/0168600 A1 6/2018 Shelton, IV et al.
2018/0168601 A1 6/2018 Bakos et al.
2018/0168602 A1 6/2018 Bakos et al.
2018/0168603 A1 6/2018 Morgan et al.
2018/0168604 A1 6/2018 Shelton, IV et al.
2018/0168605 A1 6/2018 Baber et al.
2018/0168606 A1 6/2018 Shelton, IV et al.
2018/0168607 A1 6/2018 Shelton, IV et al.
2018/0168608 A1 6/2018 Shelton, IV et al.
2018/0168609 A1 6/2018 Fanelli et al.
2018/0168610 A1 6/2018 Shelton, IV et al.
2018/0168614 A1 6/2018 Shelton, IV et al.
2018/0168615 A1 6/2018 Shelton, IV et al.
2018/0168616 A1 6/2018 Shelton, IV et al.
2018/0168617 A1 6/2018 Shelton, IV et al.
2018/0168618 A1 6/2018 Scott et al.
2018/0168619 A1 6/2018 Scott et al.
2018/0168621 A1 6/2018 Shelton, IV et al.
2018/0168623 A1 6/2018 Simms et al.
2018/0168624 A1 6/2018 Shelton, IV et al.
2018/0168625 A1 6/2018 Posada et al.
2018/0168626 A1 6/2018 Shelton, IV et al.
2018/0168627 A1 6/2018 Weaner et al.
2018/0168628 A1 6/2018 Hunter et al.
2018/0168629 A1 6/2018 Shelton, IV et al.
2018/0168630 A1 6/2018 Shelton, IV et al.
2018/0168631 A1 6/2018 Harris et al.
2018/0168632 A1 6/2018 Harris et al.
2018/0168633 A1 6/2018 Shelton, IV et al.
2018/0168637 A1 6/2018 Harris et al.
2018/0168638 A1 6/2018 Harris et al.
2018/0168639 A1 6/2018 Shelton, IV et al.
2018/0168641 A1 6/2018 Harris et al.
2018/0168642 A1 6/2018 Shelton, IV et al.
2018/0168643 A1 6/2018 Shelton, IV et al.
2018/0168644 A1 6/2018 Shelton, IV et al.
2018/0168646 A1 6/2018 Shelton, IV et al.
2018/0168647 A1 6/2018 Shelton, IV et al.
2018/0168648 A1 6/2018 Shelton, IV et al.
2018/0168649 A1 6/2018 Shelton, IV et al.
2018/0168650 A1 6/2018 Shelton, IV et al.
2018/0168651 A1 6/2018 Shelton, IV et al.
2018/0296213 A1 10/2018 Strobl
2019/0059886 A1 2/2019 Shelton, IV et al.
2019/0059887 A1 2/2019 Beardsley et al.
2019/0105047 A1 4/2019 Nalagatla et al.
2019/0125344 A1 5/2019 DiNardo et al.
2019/0150927 A1 5/2019 Aranyi et al.
2019/0183503 A1 6/2019 Shelton, IV et al.
2019/0261992 A1 8/2019 Shelton, IV et al.
2019/0269402 A1 9/2019 Murray et al.
2019/0290279 A1 9/2019 Harris et al.
2019/0343526 A1 11/2019 Harris et al.
2019/0388093 A1 12/2019 Shelton, IV et al.
2020/0046355 A1 2/2020 Harris et al.
2020/0046356 A1 2/2020 Baxter, III et al.
2020/0069308 A1 3/2020 Baxter, III et al.
2020/0085425 A1 3/2020 Baxter, III et al.

FOREIGN PATENT DOCUMENTS

CA 2813230 A1 4/2012
CA 2795323 A1 5/2014
CN 1163558 A 10/1997
CN 2488482 Y 5/2002
CN 1634601 A 7/2005
CN 2716900 Y 8/2005
CN 2738962 Y 11/2005
CN 2868212 Y 2/2007
CN 201949071 U 8/2011
CN 101779977 B 12/2011

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

CN	202397539	U	8/2012
CN	202982106	U	6/2013
CN	203777011	U	8/2014
DE	273689	C	5/1914
DE	1775926	A	1/1972
DE	3036217	A1	4/1982
DE	3210466	A1	9/1983
DE	3709067	A1	9/1988
DE	19851291	A1	1/2000
DE	19924311	A1	11/2000
DE	20016423	U1	2/2001
DE	20112837	U1	10/2001
DE	20121753	U1	4/2003
DE	202004012389	U1	9/2004
DE	10314072	A1	10/2004
DE	202007003114	U1	6/2007
EP	0000756	A1	2/1979
EP	0122046	A1	10/1984
EP	0129442	B1	11/1987
EP	0169044	B1	6/1991
EP	0548998	A1	6/1993
EP	0594148	A1	4/1994
EP	0646357	A1	4/1995
EP	0505036	B1	5/1995
EP	0669104	A1	8/1995
EP	0705571	A1	4/1996
EP	0528478	B1	5/1996
EP	0770355	A1	5/1997
EP	0625335	B1	11/1997
EP	0879742	A1	11/1998
EP	0650701	B1	3/1999
EP	0923907	A1	6/1999
EP	0484677	B2	7/2000
EP	1034747	A1	9/2000
EP	1034748	A1	9/2000
EP	1053719	A1	11/2000
EP	1055399	A1	11/2000
EP	1055400	A1	11/2000
EP	1080694	A1	3/2001
EP	1090592	A1	4/2001
EP	1095627	A1	5/2001
EP	0806914	B1	9/2001
EP	1284120	A1	2/2003
EP	0869742	B1	5/2003
EP	1374788	A1	1/2004
EP	1407719	A2	4/2004
EP	0996378	B1	6/2004
EP	1157666	B1	9/2005
EP	0880338	B1	10/2005
EP	1158917	B1	11/2005
EP	1344498	B1	11/2005
EP	1330989	B1	12/2005
EP	1632191	A2	3/2006
EP	1082944	B1	5/2006
EP	1253866	B1	7/2006
EP	1285633	B1	12/2006
EP	1011494	B1	1/2007
EP	1767163	A1	3/2007
EP	1837041	A1	9/2007
EP	0922435	B1	10/2007
EP	1599146	B1	10/2007
EP	1330201	B1	6/2008
EP	2039302	A2	3/2009
EP	1719461	B1	6/2009
EP	1769754	B1	6/2010
EP	1627605	B1	12/2010
EP	2316345	A1	5/2011
EP	1936253	B1	10/2011
EP	2486862	A2	8/2012
EP	2517638	A1	10/2012
EP	2649948	A1	10/2013
EP	2649949	A1	10/2013
EP	2713902	A1	4/2014
EP	2621364	B1	6/2017
FR	459743	A	11/1913
FR	999646	A	2/1952
FR	1112936	A	3/1956
FR	2598905	A1	11/1987
FR	2765794	A1	1/1999
FR	2815842	A1	5/2002
GB	939929	A	10/1963
GB	1210522	A	10/1970
GB	1217159	A	12/1970
GB	1339394	A	12/1973
GB	2024012	A	1/1980
GB	2109241	A	6/1983
GB	2272159	A	5/1994
GB	2336214	A	10/1999
GR	930100110	A	11/1993
JP	S4711908	Y1	5/1972
JP	S56112235	A	9/1981
JP	S62170011	U	10/1987
JP	H04215747	A	8/1992
JP	H04131860	U	12/1992
JP	H0584252	A	4/1993
JP	H05123325	A	5/1993
JP	H0630945	A	2/1994
JP	H06237937	A	8/1994
JP	H06327684	A	11/1994
JP	H079622	U	2/1995
JP	H07124166	A	5/1995
JP	H07255735	A	10/1995
JP	H07285089	A	10/1995
JP	H08164141	A	6/1996
JP	H08182684	A	7/1996
JP	H08507708	A	8/1996
JP	H08229050	A	9/1996
JP	H10118090	A	5/1998
JP	2000014632	A	1/2000
JP	2000033071	A	2/2000
JP	2000112002	A	4/2000
JP	2000166932	A	6/2000
JP	2000171730	A	6/2000
JP	2000287987	A	10/2000
JP	2000325303	A	11/2000
JP	2001087272	A	4/2001
JP	2001514541	A	9/2001
JP	2001276091	A	10/2001
JP	2002051974	A	2/2002
JP	2002085415	A	3/2002
JP	2002143078	A	5/2002
JP	2002528161	A	9/2002
JP	2002314298	A	10/2002
JP	2003135473	A	5/2003
JP	2003521301	A	7/2003
JP	2003300416	A	10/2003
JP	2004147701	A	5/2004
JP	2004162035	A	6/2004
JP	2004229976	A	8/2004
JP	2005013573	A	1/2005
JP	2005080702	A	3/2005
JP	2005131163	A	5/2005
JP	2005131164	A	5/2005
JP	2005131173	A	5/2005
JP	2005131211	A	5/2005
JP	2005131212	A	5/2005
JP	2005137423	A	6/2005
JP	2005328882	A	12/2005
JP	2005335432	A	12/2005
JP	2005342267	A	12/2005
JP	2006187649	A	7/2006
JP	2006281405	A	10/2006
JP	2006346445	A	12/2006
JP	2009507526	A	2/2009
JP	2009189838	A	8/2009
JP	2009539420	A	11/2009
JP	2010069310	A	4/2010
JP	2010098844	A	4/2010
JP	2011524199	A	9/2011
JP	2013541982	A	11/2013
KR	20110003229	A	1/2011
RU	2008830	C1	3/1994
RU	2052979	C1	1/1996
RU	94026118	A	7/1996

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

RU	2098025	C1	12/1997
RU	2141279	C1	11/1999
RU	2144791	C1	1/2000
RU	2161450	C1	1/2001
RU	2181566	C2	4/2002
RU	2187249	C2	8/2002
RU	32984	U1	10/2003
RU	2225170	C2	3/2004
RU	42750	U1	12/2004
RU	2242183	C2	12/2004
RU	61114	U1	2/2007
SU	189517	A	1/1967
SU	328636	A	9/1972
SU	674747	A1	7/1979
SU	1009439	A	4/1983
SU	1333319	A2	8/1987
SU	1377053	A1	2/1988
SU	1509051	A1	9/1989
SU	1561964	A1	5/1990
SU	1708312	A1	1/1992
SU	1722476	A1	3/1992
SU	1752361	A1	8/1992
SU	1814161	A1	5/1993
WO	WO-9315648	A1	8/1993
WO	WO-9420030	A1	9/1994
WO	WO-9517855	A1	7/1995
WO	WO-9520360	A1	8/1995
WO	WO-9623448	A1	8/1996
WO	WO-9635464	A1	11/1996
WO	WO-9639086	A1	12/1996
WO	WO-9639088	A1	12/1996
WO	WO-9724073	A1	7/1997
WO	WO-9734533	A1	9/1997
WO	WO-9903407	A1	1/1999
WO	WO-9903409	A1	1/1999
WO	WO-9948430	A1	9/1999
WO	WO-0024322	A1	5/2000
WO	WO-0024330	A1	5/2000
WO	WO-0053112	A2	9/2000
WO	WO-0057796	A1	10/2000
WO	WO-0105702	A1	1/2001
WO	WO-0154594	A1	8/2001
WO	WO-0158371	A1	8/2001
WO	WO-0162164	A2	8/2001
WO	WO-0162169	A2	8/2001
WO	WO-0191646	A1	12/2001
WO	WO-0219932	A1	3/2002
WO	WO-0226143	A1	4/2002
WO	WO-0236028	A1	5/2002
WO	WO-02065933	A2	8/2002
WO	WO-03055402	A1	7/2003
WO	WO-03094747	A1	11/2003
WO	WO-03079909	A3	3/2004
WO	WO-2004019803	A1	3/2004
WO	WO-2004032783	A1	4/2004
WO	WO-2004047626	A1	6/2004
WO	WO-2004047653	A2	6/2004
WO	WO-2004056277	A1	7/2004
WO	WO-2004078050	A2	9/2004
WO	WO-2004078051	A2	9/2004
WO	WO-2004096015	A2	11/2004
WO	WO-2006044581	A2	4/2006
WO	WO-2006051252	A1	5/2006
WO	WO-2006059067	A1	6/2006
WO	WO-2006085389	A1	8/2006
WO	WO-2007074430	A1	7/2007
WO	WO-2007129121	A1	11/2007
WO	WO-2007137304	A2	11/2007
WO	WO-2007142625	A2	12/2007
WO	WO-2008021969	A2	2/2008
WO	WO-2008089404	A2	7/2008
WO	WO-2009005969	A2	1/2009
WO	WO-2009067649	A2	5/2009
WO	WO-2009091497	A2	7/2009
WO	WO-2011008672	A2	1/2011
WO	WO-2011044343	A2	4/2011
WO	WO-2012006306	A2	1/2012
WO	WO-2012013577	A1	2/2012
WO	WO-2012044606	A2	4/2012
WO	WO-2012166503	A1	12/2012
WO	WO-2013151888	A1	10/2013
WO	WO-2015153340	A2	10/2015

OTHER PUBLICATIONS

Indian Standard: Automotive Vehicles—Brakes and Braking Systems (IS 11852-1:2001), Mar. 1, 2001.

Allegro MicroSystems, LLC, Automotive Full Bridge MOSFET Driver, A3941-DS, Rev. 5, 21 pages, http://www.allegromicro.com/~/media/Files/Datasheets/A3941-Datasheet.ashx?la=en.

Anonymous: "Stamping (metalworking)—Wikipedia," Jun. 6, 2016, Retrieved from the Internet: URL: https://en.wikipedia.org/w/index.php?title=Stamping_(metalworking)&oldid=723906245 [retrieved on May 15, 2018].

ASTM procedure D2240-00, "Standard Test Method for Rubber Property-Durometer Hardness," (Published Aug. 2000).

ASTM procedure D2240-05, "Standard Test Method for Rubber Property-Durometer Hardness," (Published Apr. 2010).

B.R. Coolman, DVM, MS et al., "Comparison of Skin Staples With Sutures for Anastomosis of the Small Intestine in Dogs," Abstract; http://www.blackwell-synergy.com/doi/abs/10.1053/jvet.2000.7539?cookieSet=1&journalCode=vsu which redirects to http://www3.interscience.wiley.com/journal/119040681/abstract?CRETRY=1&SRETRY=0; [online] accessed: Sep. 22, 2008 (2 pages).

Brar et al., "Investigation of the mechanical and degradation properties of Mg—Sr and Mg—Zn—Sr alloys for use as potential biodegradable implant materials," J. Mech. Behavior of Biomed. Mater. 7 (2012) pp. 87-95.

Breedveld et al., "A New, Easily Miniaturized Sterrable Endoscope," IEEE Engineering in Medicine and Biology Magazine (Nov./Dec. 2005).

Byrne et al., "Molecular Imprinting Within Hydrogels," Advanced Drug Delivery Reviews, 54 (2002) pp. 149-161.

C.C. Thompson et al., "Peroral Endoscopic Reduction of Dilated Gastrojejunal Anastomosis After Roux-en-Y Gastric Bypass: A Possible New Option for Patients with Weight Regain," Surg Endosc (2006) vol. 20., pp. 1744-1748.

Chen et al., "Elastomeric Biomaterials for Tissue Engineering," Progress in Polymer Science 38 (2013), pp. 584-671.

Covidien Brochure, "Endo GIA™ Curved Tip Reload with Tri-Staple™ Technology," (2012), 2 pages.

Covidien Brochure, "Endo GIA™ Reloads with Tri-Staple™ Technology and Endo GIA™ Ultra Universal Staplers," (2010), 2 pages.

Covidien Brochure, "Endo GIA™ Reloads with Tri-Staple™ Technology," (2010), 1 page.

Covidien Brochure, "Endo GIA™ Reloads with Tri-Staple™ Technology," (2010), 2 pages.

Covidien Brochure, "Endo GIA™ Black Reload with Tri-Staple™ Technology," (2012), 2 pages.

Covidien Brochure, "Endo GIA™ Ultra Universal Stapler," (2010), 2 pages.

D. Tuite, Ed., "Get the Lowdown on Ultracapacitors," Nov. 15, 2007; [online] URL: http://electronicdesign.com/Articles/Print.cfm?ArticleID=17465, accessed Jan. 15, 2008 (5 pages).

Datasheet for Panasonic TK Relays Ultra Low Profile 2 A Polarized Relay, Copyright Matsushita Electric Works, Ltd. (Known of at least as early as Aug. 17, 2010), 5 pages.

Disclosed Anonymously, "Motor-Driven Surgical Stapler Improvements," Research Disclosure Database No. 526041, Published: Feb. 2008.

Ebara, "Carbohydrate-Derived Hydrogels and Microgels," Engineered Carbohydrate-Based Materials for Biomedical Applications: Polymers, Surfaes, Dendrimers, Nanoparticles, and Hydrogels, Edited by Ravin Narain, 2011, pp. 337-345.

Erdmann et al., "Evaluation of the Soft Tissue Biocompatibility of MgCa0.8 and Surgical Steel 316L in Vivo: A Comparative Study in Rabbits," *Biomed. Eng. OnLine* 2010 9:63 (17 pages).

(56) **References Cited**

OTHER PUBLICATIONS

Fast, Versatile Blackfin Processors Handle Advanced RFID Reader Applications; Analog Dialogue: vol. 40—Sep. 2006; http://www.analog.com/library/analogDialogue/archives/40-09/rfid.pdf; Wayback Machine to Feb. 15, 2012.
Hoffman, "Hydrogels for Biomedical Applications," Advanced Drug Delivery Reviews, 43 (2002) pp. 3-12.
Hoffman, "Hydrogels for Biomedical Applications," Advanced Drug Delivery Reviews, 54 (2002) pp. 3-12.
http://ninpgan.net/publications/51-100/89.pdf; 2004, Ning Pan, On Uniqueness of Fibrous Materials, Design & Nature II. Eds: Colins, M. and Brebbia, C. WIT Press, Boston, 493-504.
Jeong et al., "Thermosensitive Sol-Gel Reversible Hydrogels," Advanced Drug Delivery Reviews, 54 (2002) pp. 37-51.
Li et al. "Mg—Zr—Sr Alloys as Biodegradable Implant Materials," *Acta Biomaterialia* 8 (2012) 3177-3188 (12 pages).
Matsuda, "Thermodynamics of Formation of Porous Polymeric Membrane from Solutions," Polymer Journal, vol. 23, No. 5, pp. 435-444 (1991).
Miyata et al., "Biomolecule-Sensitive Hydrogels," Advanced Drug Delivery Reviews, 54 (2002) pp. 79-98.
Pellicer et al. "On the biodegradability, mechanical behavior, and cytocompatibility of amorphous Mg72Zn23Ca5 and crystalline Mg70Zn23Ca5Pd2 alloys as temporary implant materials," J Biomed Mater Res Part A, 2013:101A:502-517.
Peppas, "Physiologically Responsive Hydrogels," Journal of Bioactive and Compatible Polymers, vol. 6 (Jul. 1991) pp. 241-246.
Peppas, Editor "Hydrogels in Medicine and Pharmacy," vol. I, Fundamentals, CRC Press, 1986.
Pitt et al., "Attachment of Hyaluronan to Metallic Surfaces," J. Biomed. Mater. Res. 68A: pp. 95-106, 2004.
Qiu et al., "Environment-Sensitive Hydrogels for Drug Delivery," Advanced Drug Delivery Reviews, 53 (2001) pp. 321-339.
Schellhammer et al., "Poly-Lactic-Acid for Coating of Endovascular Stents: Preliminary Results in Canine Experimental Av-Fistulae," Mat.-wiss. u. Werkstofftech., 32, pp. 193-199 (2001).
Serial Communication Protocol; Michael Lemmon Feb. 1, 2009; http://www3.nd.edu/~lemmon/courses/ee224/web-manual/web-manual/lab12/node2.html; Wayback Machine to Apr. 29, 2012.
Solorio et al., "Gelatin Microspheres Crosslinked with Genipin for Local Delivery of Growth Factors," J. Tissue Eng. Regen. Med. (2010), 4(7): pp. 514-523.
The Sodem Aseptic Battery Transfer Kit, Sodem Systems, 2000, 3 pages.
Van Meer et al., "A Disposable Plastic Compact Wrist for Smart Minimally Invasive Surgical Tools," LAAS/CNRS (Aug. 2005).
Yan et al, Comparison of the effects of Mg—6Zn and Ti—3Al—2.5V alloys on TGF-β/TNF-α/VEGF/b-FGF in the healing of the intestinal track in vivo, Biomed. Mater. 9 (2014), 11 pages.
Yan et al., "Comparison of the effects of Mg—6Zn and titanium on intestinal tract in vivo," J Mater Sci: Mater Med (2013), 11 pages.
Young, "Microcellular foams via phase separation," Journal of Vacuum Science & Technology A 4(3), (May/Jun. 1986).

* cited by examiner

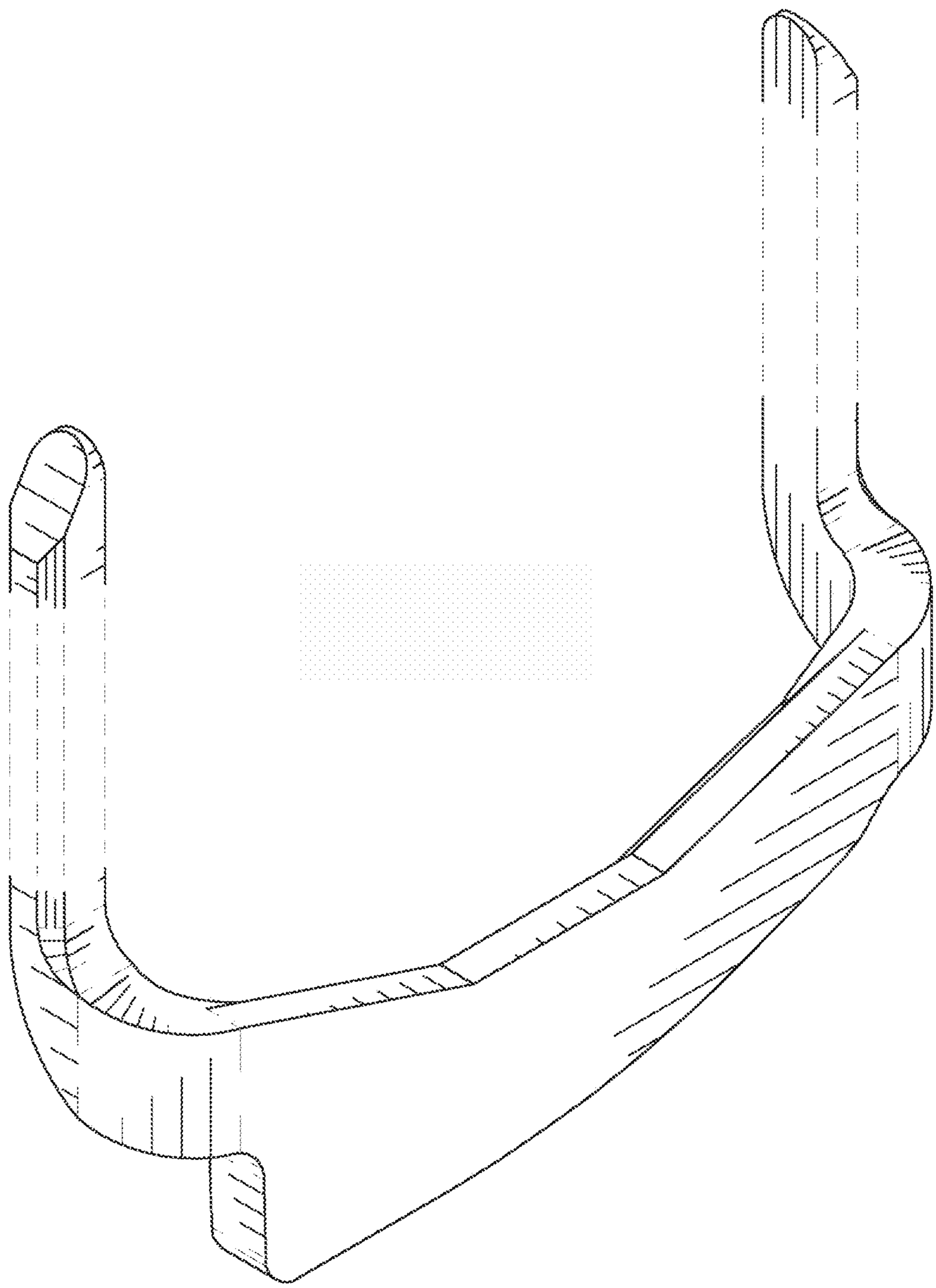


FIG. 1

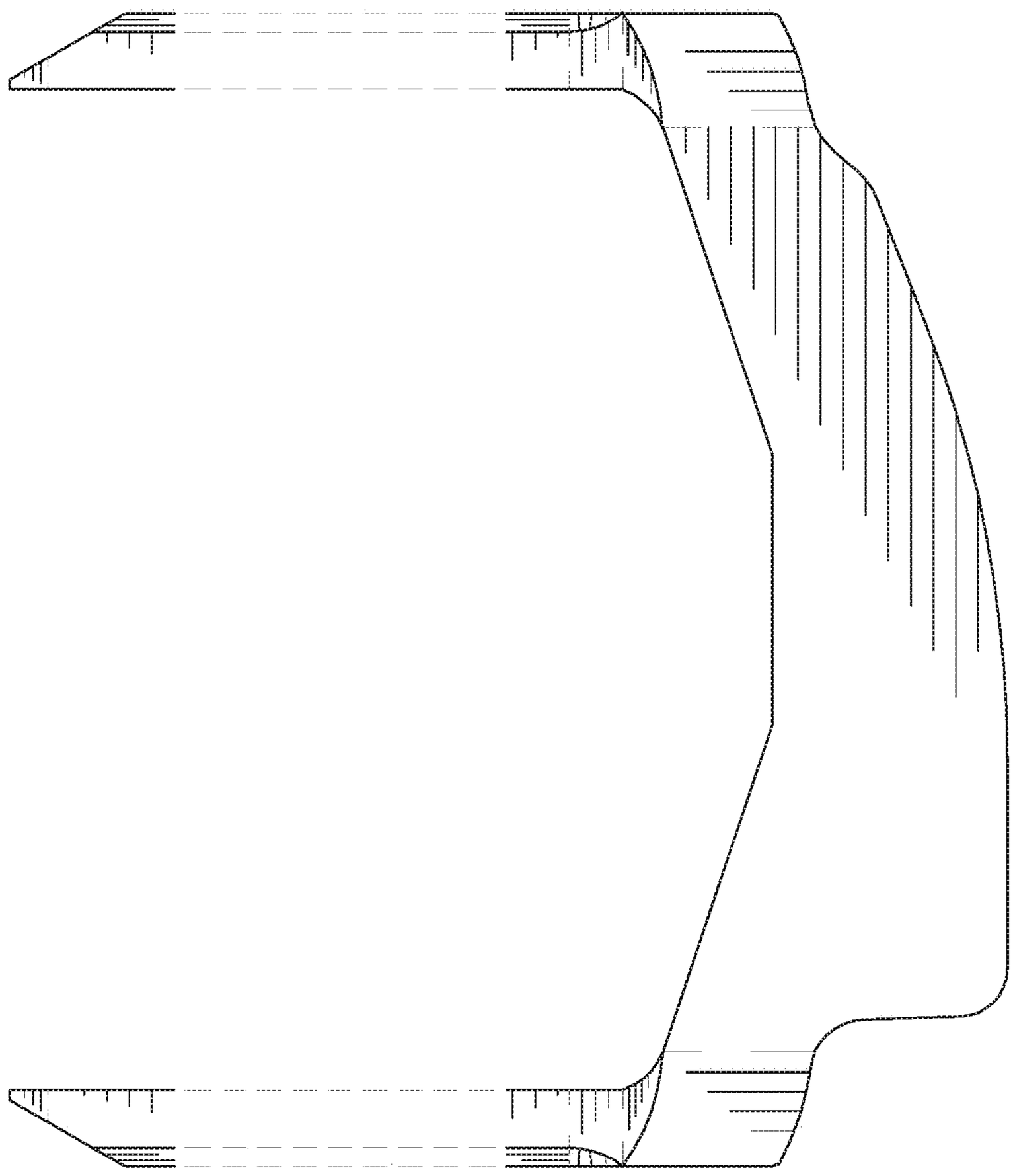


FIG. 2

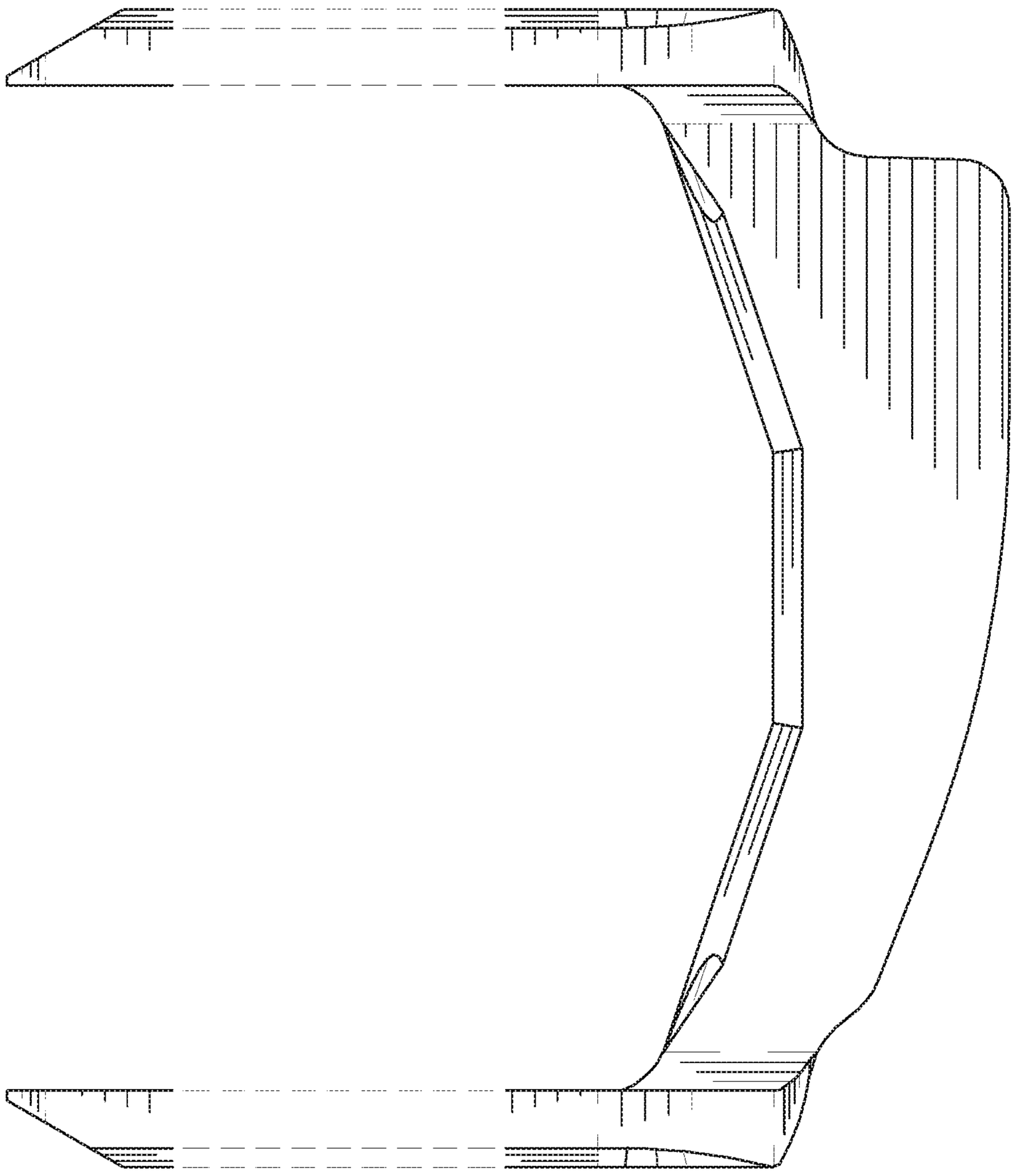


FIG. 3

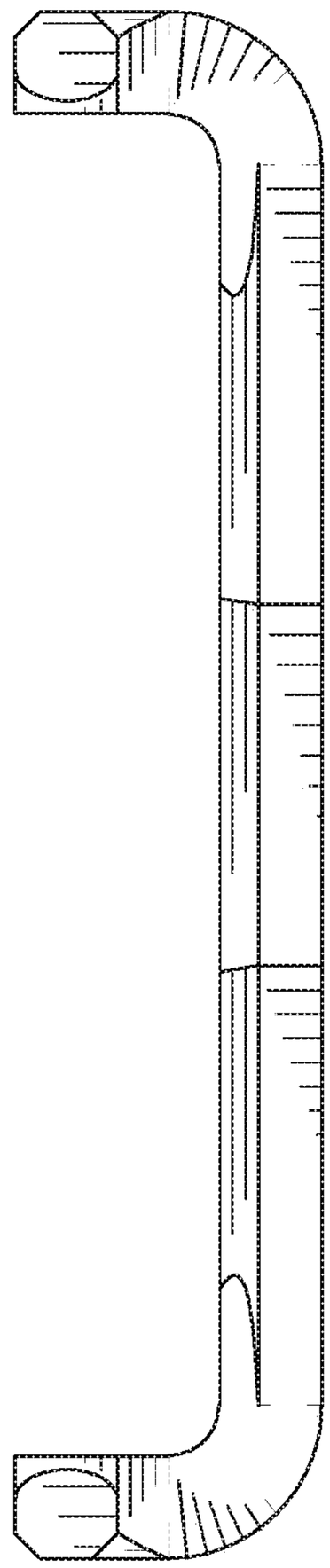


FIG. 4

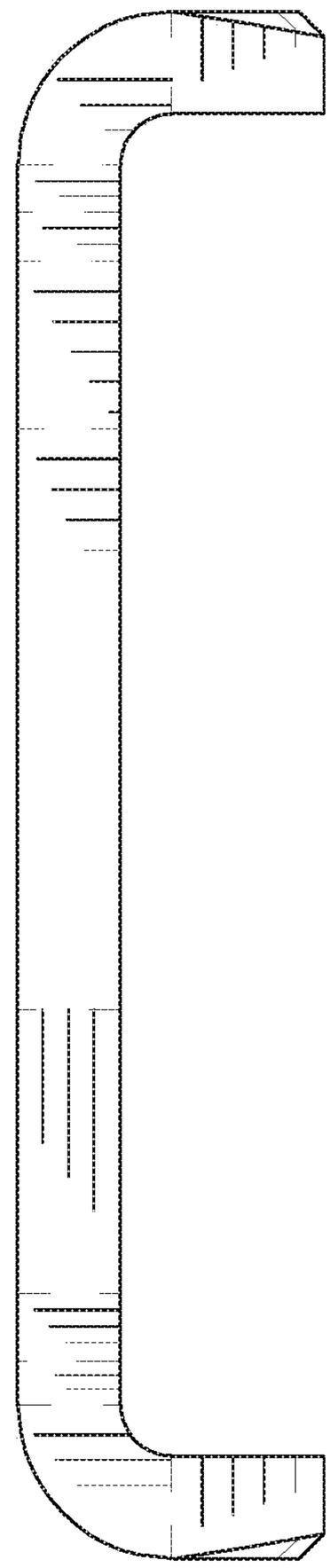


FIG. 5

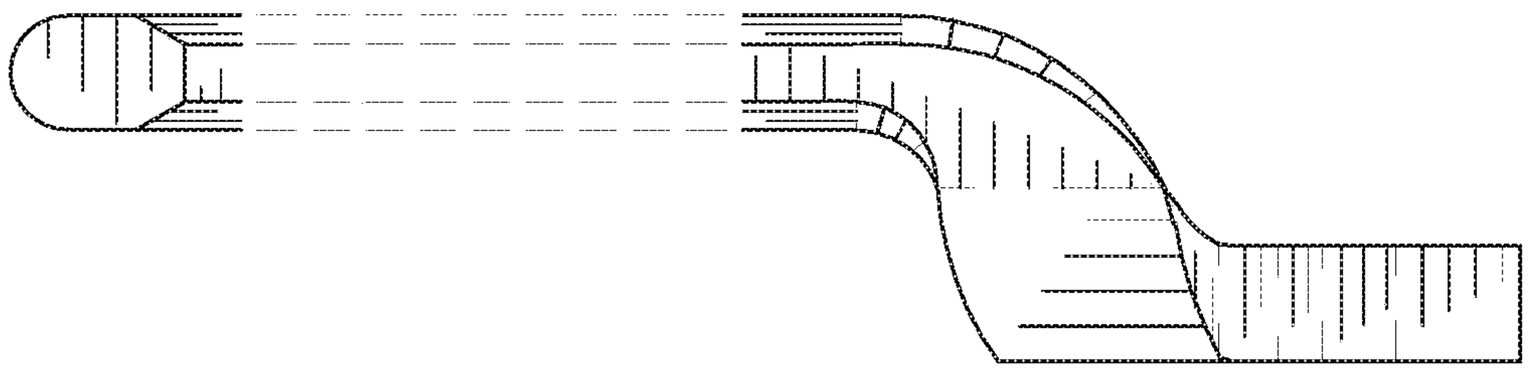


FIG. 7

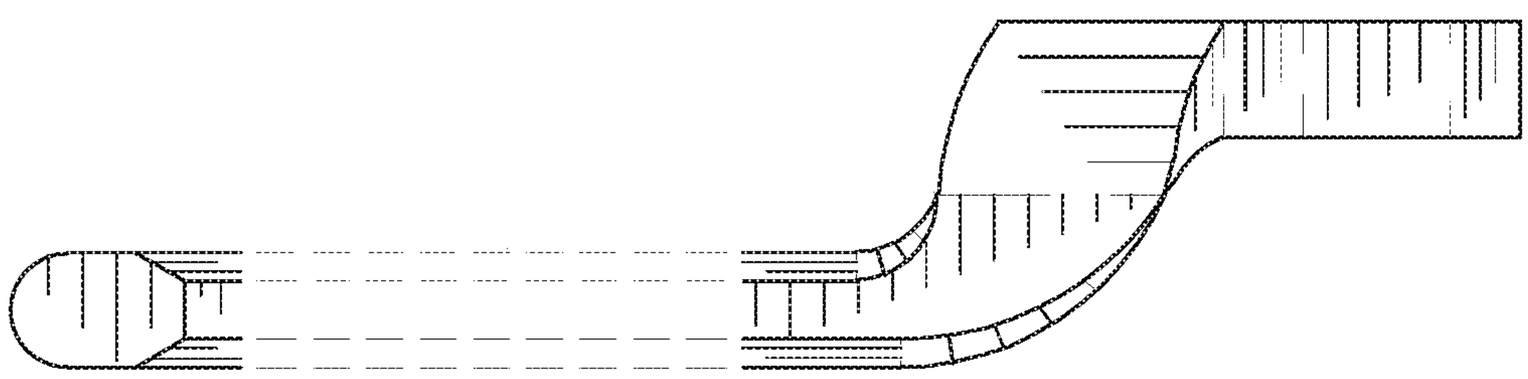


FIG. 6

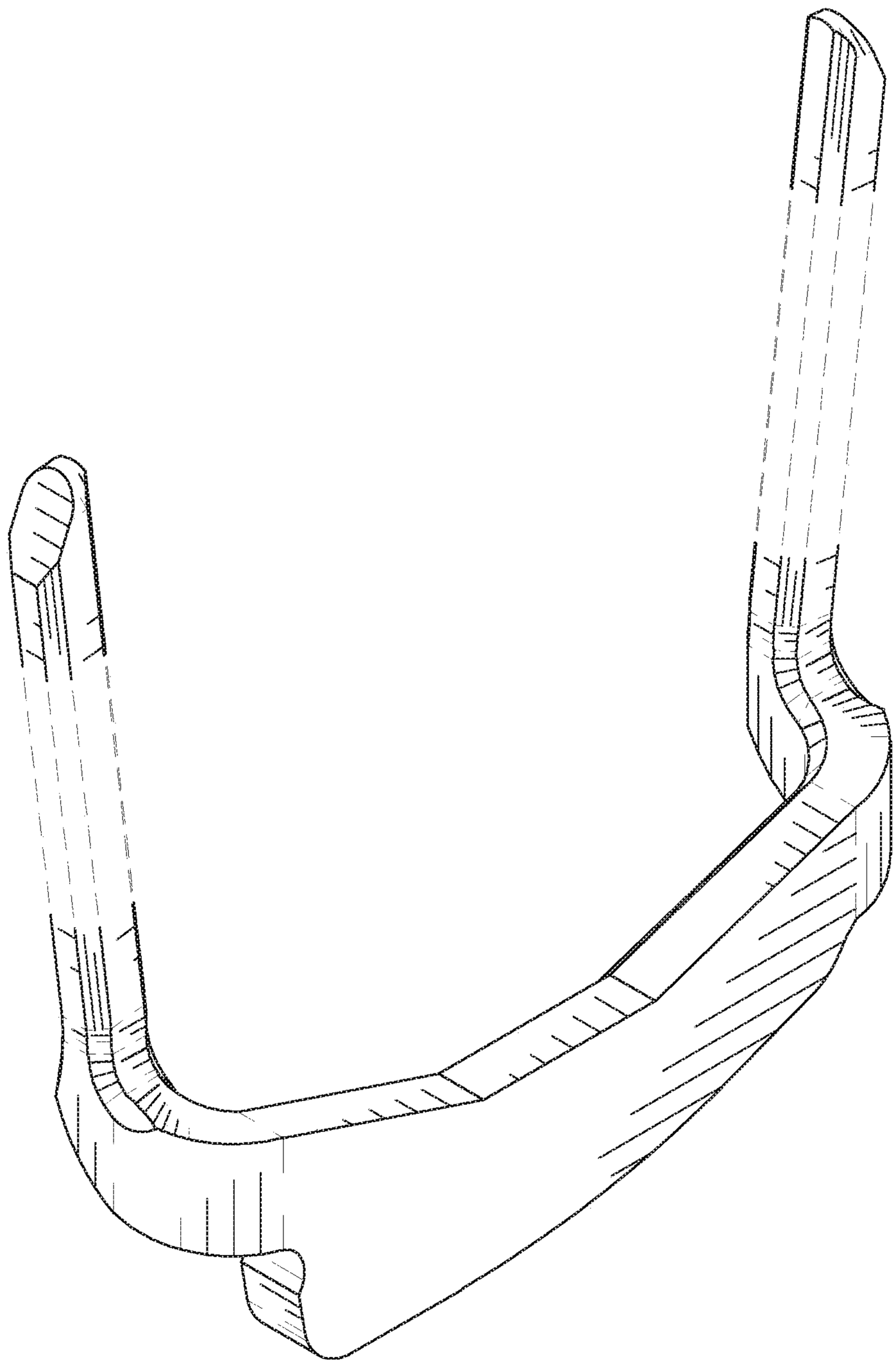


FIG. 8

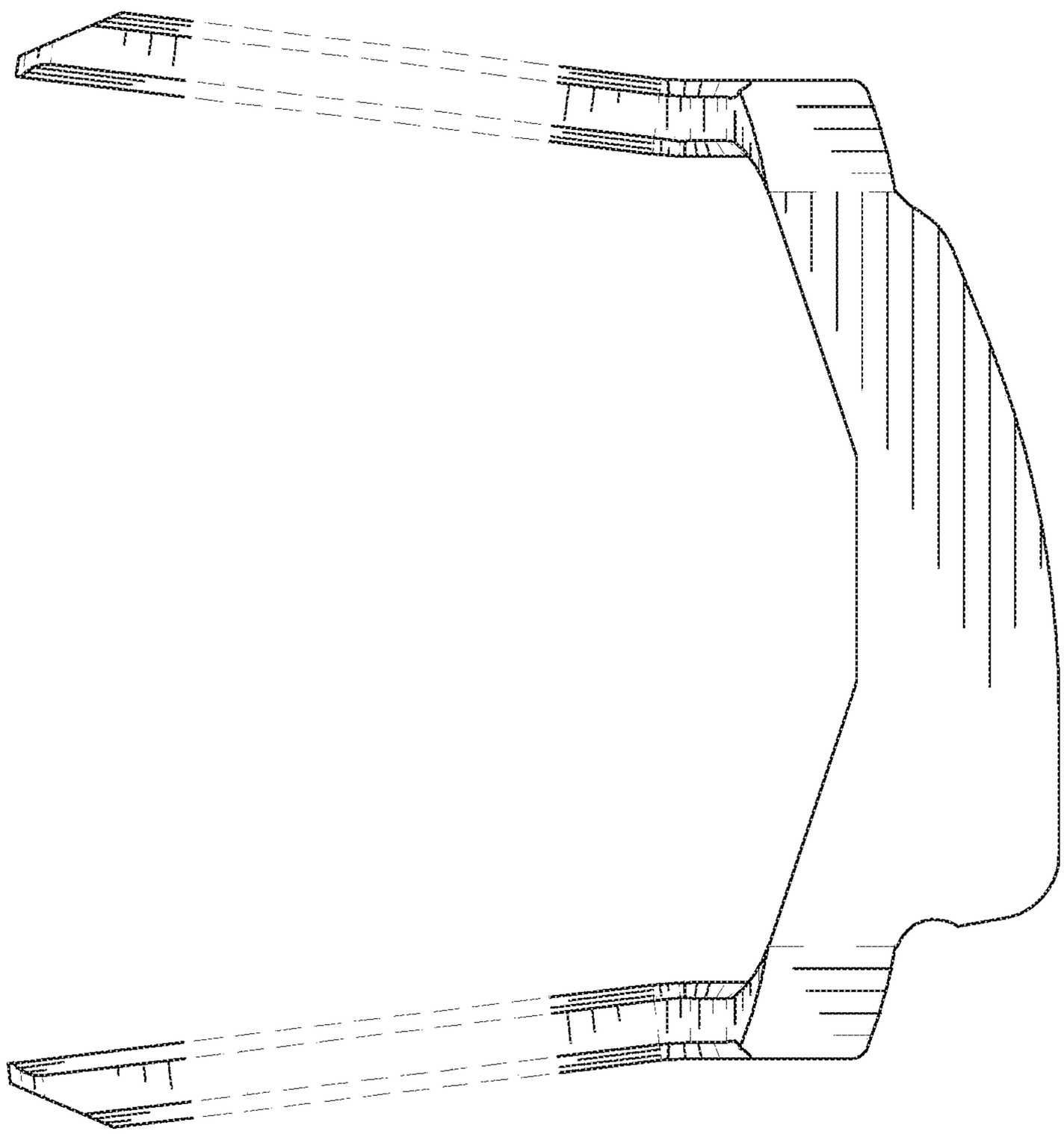


FIG. 9

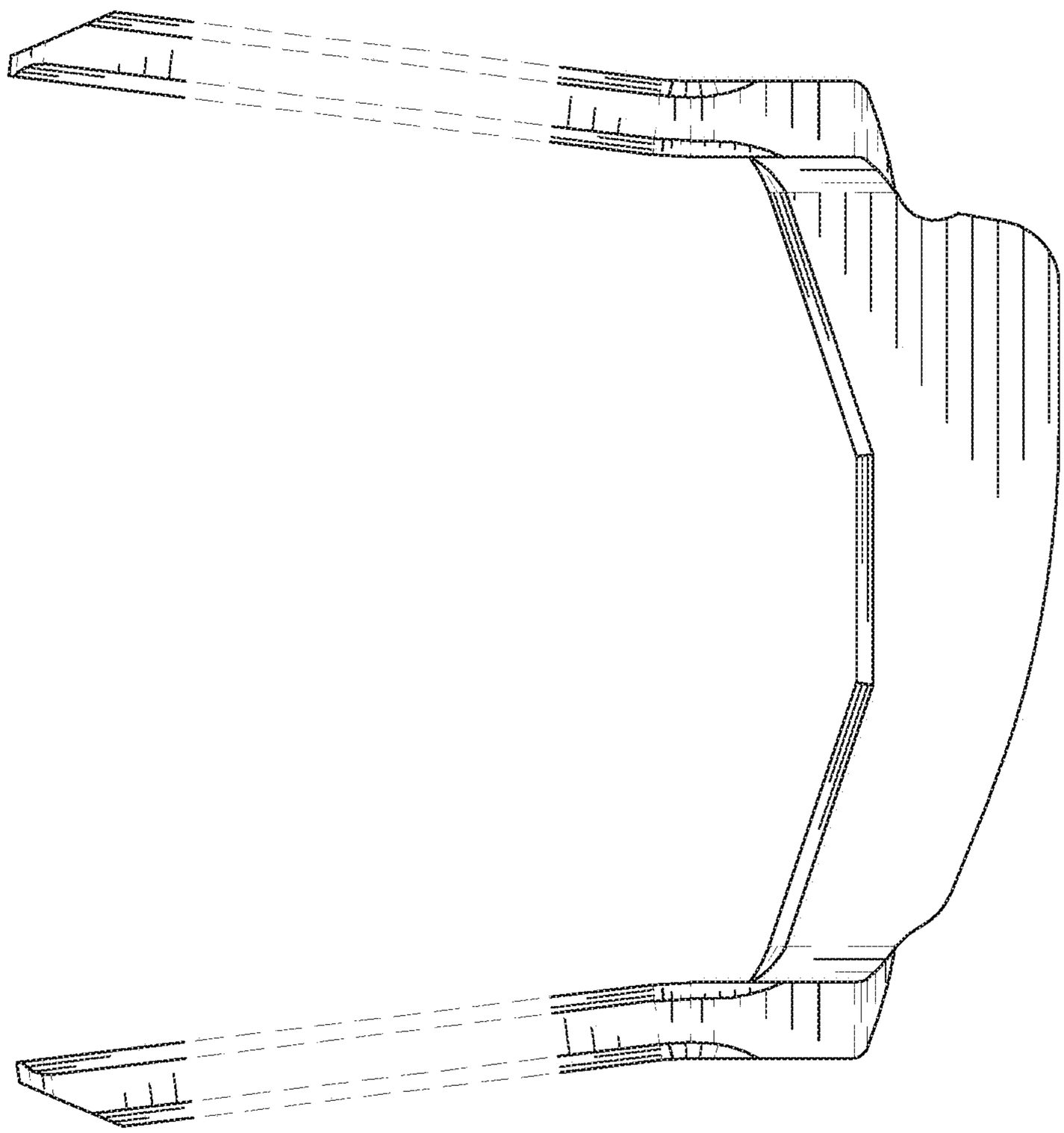


FIG. 10

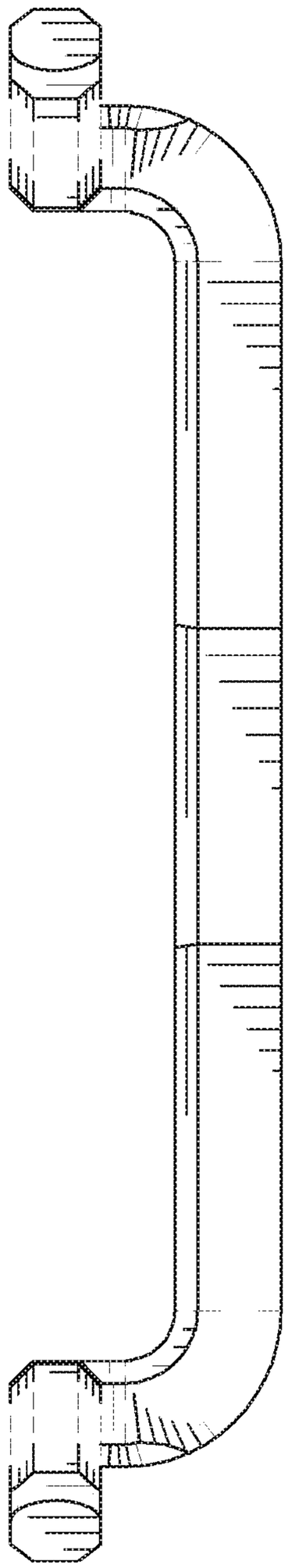


FIG. 11

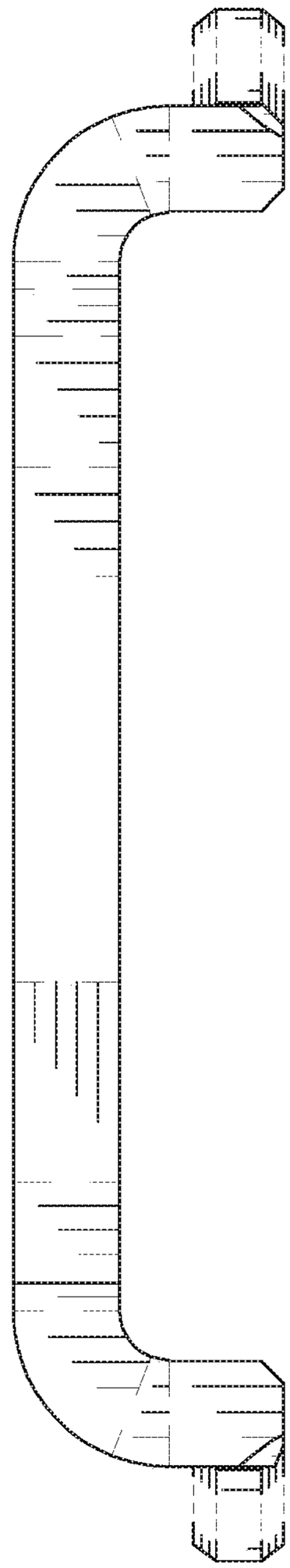


FIG. 12

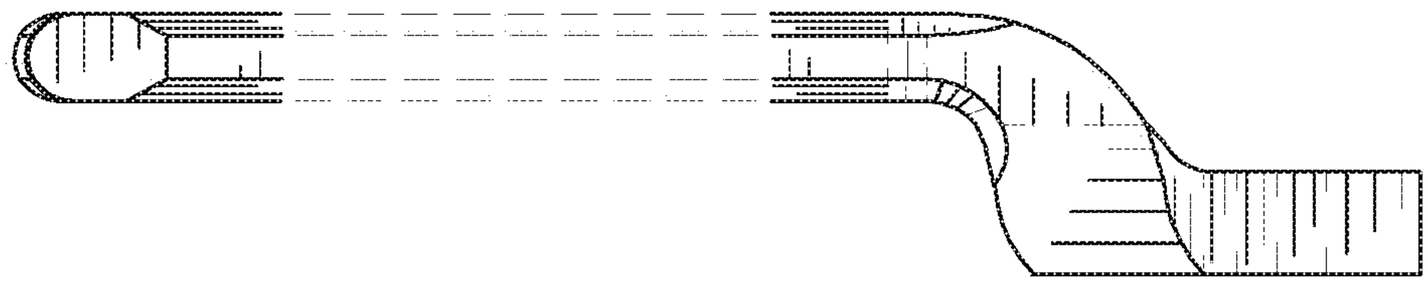


FIG. 14

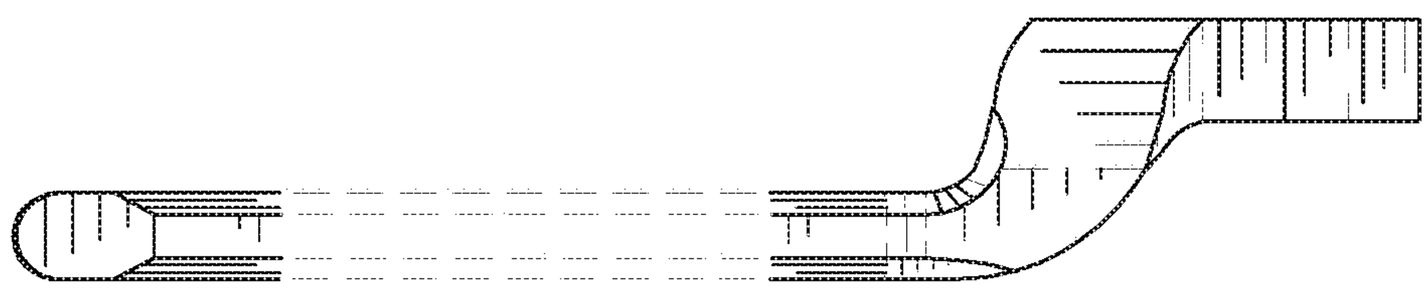


FIG. 13