



US0D1100189S

(12)

United States Design Patent

Fangrow

(10)

Patent No.:

US D1,100,189 S

(45)

Date of Patent:

\*\* Oct. 28, 2025

(54)

MEDICAL CONNECTOR

604/187, 158, 164.01–164.11, 181, 184, 604/227; 600/101, 139, 143; 128/200.24, 207.14, 207.15

(71)

Applicant: ICU Medical, Inc., San Clemente, CA (US)

CPC ..... A61M 39/165; A61M 39/1011; A61M 2039/1033; A61M 2039/1066

(72)

Inventor: Thomas F. Fangrow, Mission Viejo, CA (US)

See application file for complete search history.

(73)

Assignee: ICU Medical, Inc., San Clemente, CA (US)

(56) References Cited

(\*\*) Term: 15 Years

U.S. PATENT DOCUMENTS

(21)

Appl. No.: 29/962,906

2,254,997 A 9/1941 Fisher

(22)

Filed: Sep. 13, 2024

2,456,045 A 12/1948 Brock

(Continued)

FOREIGN PATENT DOCUMENTS

Related U.S. Application Data

(60)

Division of application No. 29/829,264, filed on Mar. 3, 2022, now Pat. No. Des. 1,042,817, which is a continuation of application No. 17/508,346, filed on Oct. 22, 2021, now Pat. No. 11,808,389, which is a continuation of application No. 16/879,528, filed on May 20, 2020, now Pat. No. 11,168,818, which is a continuation of application No. 16/185,579, filed on Nov. 9, 2018, now Pat. No. 10,697,570, which is a continuation of application No. 15/900,658, filed on Feb. 20, 2018, now Pat. No. 10,156,306, which is a (Continued)

(51)

LOC (15) Cl. .... 24-02

(52)

U.S. Cl.

USPC ..... D24/129

CPC ..... F16L 29/00 (2013.01); A61M 39/1011 (2013.01); A61M 39/18 (2013.01); A61M 39/26 (2013.01); A61M 2039/1027 (2013.01); A61M 2039/1033 (2013.01); A61M 2039/1066 (2013.01); A61M 2039/262 (2013.01); A61M 2039/263 (2013.01); A61M 2039/267 (2013.01); F16L 29/04 (2013.01); F16L 37/34 (2013.01); F16L 37/35 (2013.01)

(58)

Field of Classification Search

USPC ..... D24/127–131, 112–114, 133, 186; 606/181, 185; 604/264, 523–528, 272,

OTHER PUBLICATIONS

U.S. Appl. No. 29/829,264, filed Mar. 3, 2022, Fangrow. (Continued)

Primary Examiner — Nathan M Johnston

(74)

Attorney, Agent, or Firm — Knobbe Martens Olson & Bear LLP

(57)

CLAIM

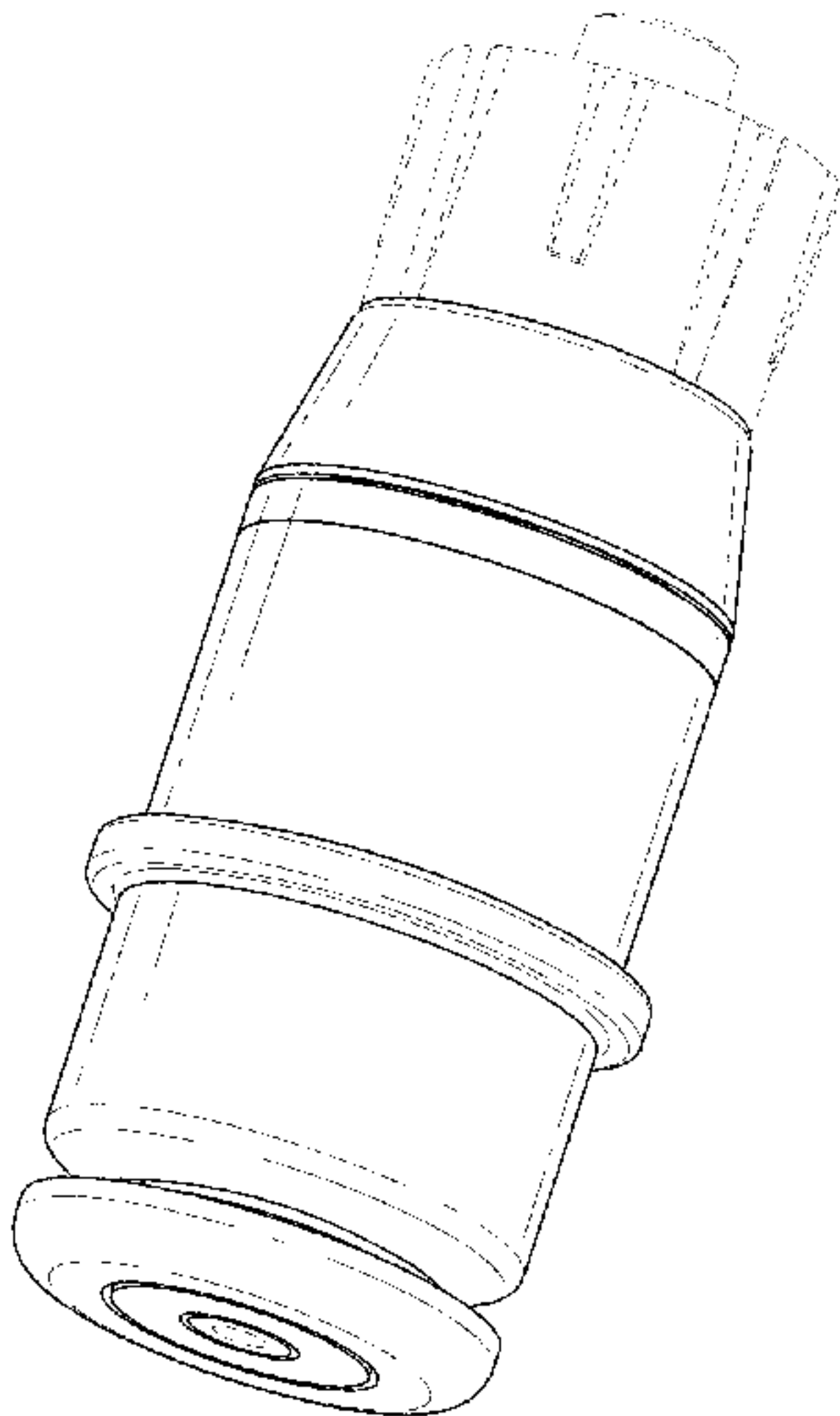
The ornamental design for a medical connector, as shown and described.

DESCRIPTION

FIG. 1 illustrates a side view of an embodiment of a medical connector, the other side being a mirror image thereof; and, FIG. 2 illustrates a front perspective view of the embodiment of FIG. 1.

The broken lines shown in the figures are included for the purpose of illustrating unclaimed portions of the medical connector and form no part of the claimed design.

1 Claim, 2 Drawing Sheets



**Related U.S. Application Data**

continuation of application No. 14/199,836, filed on Mar. 6, 2014, now Pat. No. 9,933,094, which is a continuation of application No. PCT/US2012/054289, filed on Sep. 7, 2012.

(56)

**References Cited**

## U.S. PATENT DOCUMENTS

|             |         |                     |             |         |                  |
|-------------|---------|---------------------|-------------|---------|------------------|
| 2,457,052 A | 12/1948 | Le Clair            | 4,935,010 A | 6/1990  | Cox et al.       |
| 2,485,006 A | 10/1949 | Main, Jr. et al.    | 4,949,745 A | 8/1990  | McKeon           |
| 2,842,382 A | 7/1958  | Franck              | 4,950,260 A | 8/1990  | Bonaldo          |
| 2,931,668 A | 4/1960  | Baley               | 4,969,879 A | 11/1990 | Lichte           |
| 2,968,497 A | 1/1961  | Treleman            | D313,277 S  | 12/1990 | Haining          |
| 3,127,892 A | 4/1964  | Bellamy, Jr. et al. | D314,050 S  | 1/1991  | Sone             |
| 3,191,972 A | 6/1965  | Collar              | 5,006,114 A | 4/1991  | Rogers et al.    |
| 3,304,047 A | 2/1967  | Martin              | 5,021,059 A | 6/1991  | Kensey et al.    |
| 3,334,860 A | 8/1967  | Bolton, Jr.         | 5,047,021 A | 9/1991  | Utterberg        |
| 3,538,950 A | 11/1970 | Porteners           | 5,053,015 A | 10/1991 | Gross            |
| 3,707,972 A | 1/1973  | Villari et al.      | 5,065,783 A | 11/1991 | Ogle, II         |
| 3,729,031 A | 4/1973  | Baldwin             | 5,066,286 A | 11/1991 | Ryan             |
| 3,824,556 A | 7/1974  | Berkovits et al.    | 5,070,885 A | 12/1991 | Bonaldo          |
| 3,986,508 A | 10/1976 | Barrington          | 5,083,819 A | 1/1992  | Bynum            |
| 4,055,179 A | 10/1977 | Manschot et al.     | 5,098,385 A | 3/1992  | Walsh            |
| 4,066,067 A | 1/1978  | Micheli             | 5,108,376 A | 4/1992  | Bonaldo          |
| 4,076,285 A | 2/1978  | Martinez            | 5,122,123 A | 6/1992  | Vaillancourt     |
| 4,080,965 A | 3/1978  | Phillips            | 5,139,483 A | 8/1992  | Ryan             |
| 4,084,606 A | 4/1978  | Mittleman           | 5,147,333 A | 9/1992  | Raines           |
| 4,121,585 A | 10/1978 | Becker, Jr.         | 5,154,703 A | 10/1992 | Bonaldo          |
| 4,133,441 A | 1/1979  | Mittleman et al.    | 5,176,406 A | 1/1993  | Straghan         |
| 4,143,853 A | 3/1979  | Abramson            | RE34,223 E  | 4/1993  | Bonaldo          |
| 4,150,845 A | 4/1979  | Kopacz et al.       | 5,199,948 A | 4/1993  | McPhee           |
| 4,187,848 A | 2/1980  | Taylor              | 5,201,717 A | 4/1993  | Wyatt et al.     |
| 4,195,632 A | 4/1980  | Parker et al.       | 5,201,725 A | 4/1993  | Kling            |
| 4,233,982 A | 11/1980 | Bauer et al.        | 5,203,775 A | 4/1993  | Frank et al.     |
| 4,245,635 A | 1/1981  | Kontos              | 5,211,634 A | 5/1993  | Vaillancourt     |
| 4,324,239 A | 4/1982  | Gordon et al.       | 5,215,537 A | 6/1993  | Lynn et al.      |
| 4,334,551 A | 6/1982  | Pfister             | 5,215,538 A | 6/1993  | Larkin           |
| 4,340,049 A | 7/1982  | Munsch              | 5,224,939 A | 7/1993  | Holman et al.    |
| 4,379,458 A | 4/1983  | Bauer et al.        | 5,242,393 A | 9/1993  | Brimhall et al.  |
| 4,387,879 A | 6/1983  | Tauschinski         | 5,242,425 A | 9/1993  | White et al.     |
| 4,397,442 A | 8/1983  | Larkin              | 5,251,873 A | 10/1993 | Atkinson et al.  |
| 4,430,073 A | 2/1984  | Bemis et al.        | 5,269,771 A | 12/1993 | Thomas et al.    |
| 4,436,125 A | 3/1984  | Blenkush            | 5,273,533 A | 12/1993 | Bonaldo          |
| 4,452,473 A | 6/1984  | Ruschke             | 5,279,571 A | 1/1994  | Larkin           |
| 4,457,749 A | 7/1984  | Bellotti et al.     | 5,281,206 A | 1/1994  | Lopez            |
| 4,511,359 A | 4/1985  | Vaillancourt        | 5,284,475 A | 2/1994  | Mackal           |
| 4,538,836 A | 9/1985  | Kruetten            | 5,295,657 A | 3/1994  | Atkinson         |
| 4,541,457 A | 9/1985  | Blenkush            | 5,301,686 A | 4/1994  | Newman           |
| 4,576,359 A | 3/1986  | Oetiker             | 5,306,243 A | 4/1994  | Bonaldo          |
| 4,610,469 A | 9/1986  | Wolff-Mooij         | 5,312,377 A | 5/1994  | Dalton           |
| 4,619,640 A | 10/1986 | Potolsky et al.     | 5,322,518 A | 6/1994  | Schneider et al. |
| 4,623,332 A | 11/1986 | Lindmayer et al.    | 5,324,270 A | 6/1994  | Kayan et al.     |
| 4,629,159 A | 12/1986 | Wellenstam          | 5,330,235 A | 7/1994  | Wagner et al.    |
| 4,660,803 A | 4/1987  | Johnston et al.     | 5,330,450 A | 7/1994  | Lopez            |
| 4,662,878 A | 5/1987  | Lindmayer           | 5,334,159 A | 8/1994  | Turkel           |
| 4,673,400 A | 6/1987  | Martin              | 5,344,414 A | 9/1994  | Lopez et al.     |
| 4,700,744 A | 10/1987 | Rutter et al.       | 5,360,413 A | 11/1994 | Leason et al.    |
| 4,723,603 A | 2/1988  | Plummer             | 5,370,636 A | 12/1994 | Von Witzleben    |
| 4,723,948 A | 2/1988  | Clark et al.        | 5,380,306 A | 1/1995  | Brinon           |
| 4,728,075 A | 3/1988  | Paradis             | 5,385,372 A | 1/1995  | Utterberg        |
| 4,745,950 A | 5/1988  | Mathieu             | 5,390,898 A | 2/1995  | Smedley et al.   |
| 4,758,023 A | 7/1988  | Vermillion          | 5,391,150 A | 2/1995  | Richmond         |
| 4,774,964 A | 10/1988 | Bonaldo             | 5,395,348 A | 3/1995  | Ryan             |
| 4,774,965 A | 10/1988 | Rodriguez et al.    | 5,397,314 A | 3/1995  | Farley et al.    |
| 4,781,702 A | 11/1988 | Herrli              | 5,400,500 A | 3/1995  | Behnke et al.    |
| 4,804,015 A | 2/1989  | Albinsson           | 5,401,245 A | 3/1995  | Haining          |
| 4,816,024 A | 3/1989  | Sitar et al.        | 5,402,826 A | 4/1995  | Molnar et al.    |
| 4,819,692 A | 4/1989  | Olson et al.        | 5,402,982 A | 4/1995  | Atkinson et al.  |
| 4,834,271 A | 5/1989  | Litwin              | 5,405,323 A | 4/1995  | Rogers et al.    |
| 4,844,512 A | 7/1989  | Gahwiler            | 5,405,331 A | 4/1995  | Behnke et al.    |
| 4,862,913 A | 9/1989  | Wildfang            | 5,405,333 A | 4/1995  | Richmond         |
| 4,863,201 A | 9/1989  | Carstens            | D358,882 S  | 5/1995  | Metz et al.      |
| 4,883,483 A | 11/1989 | Lindmayer           | 5,411,499 A | 5/1995  | Dudar et al.     |
| 4,915,687 A | 4/1990  | Sivert              | 5,417,673 A | 5/1995  | Gordon           |
| 4,917,669 A | 4/1990  | Bonaldo             | 5,423,791 A | 6/1995  | Bartlett         |
|             |         |                     | 5,425,465 A | 6/1995  | Healy            |
|             |         |                     | 5,433,330 A | 7/1995  | Yatsko et al.    |
|             |         |                     | 5,439,451 A | 8/1995  | Collinson et al. |
|             |         |                     | 5,441,487 A | 8/1995  | Vedder           |
|             |         |                     | 5,445,623 A | 8/1995  | Richmond         |
|             |         |                     | 5,447,177 A | 9/1995  | Ricken et al.    |
|             |         |                     | 5,456,668 A | 10/1995 | Ogle, II         |
|             |         |                     | 5,456,675 A | 10/1995 | Wolbring et al.  |
|             |         |                     | 5,462,255 A | 10/1995 | Rosen et al.     |
|             |         |                     | 5,464,399 A | 11/1995 | Boettger         |
|             |         |                     | 5,470,319 A | 11/1995 | Mayer            |
|             |         |                     | 5,470,327 A | 11/1995 | Helgren et al.   |

(56)

## References Cited

## U.S. PATENT DOCUMENTS

|             |         |                      |              |         |                        |
|-------------|---------|----------------------|--------------|---------|------------------------|
| 5,474,536 A | 12/1995 | Bonaldo              | 6,068,617 A  | 5/2000  | Richmond               |
| 5,480,393 A | 1/1996  | Bommarito            | 6,079,432 A  | 6/2000  | Paradis                |
| 5,489,274 A | 2/1996  | Chu et al.           | 6,106,502 A  | 8/2000  | Richmond               |
| 5,492,147 A | 2/1996  | Challender et al.    | 6,113,068 A  | 9/2000  | Ryan                   |
| 5,501,426 A | 3/1996  | Atkinson et al.      | 6,142,446 A  | 11/2000 | Leinsing               |
| 5,507,744 A | 4/1996  | Tay et al.           | 6,152,913 A  | 11/2000 | Feith et al.           |
| 5,514,177 A | 5/1996  | Kurz et al.          | 6,168,137 B1 | 1/2001  | Paradis                |
| 5,518,026 A | 5/1996  | Benjey               | 6,170,522 B1 | 1/2001  | Tanida                 |
| 5,520,665 A | 5/1996  | Fleetwood            | 6,171,287 B1 | 1/2001  | Lynn et al.            |
| 5,520,666 A | 5/1996  | Choudhury et al.     | 6,183,464 B1 | 2/2001  | Sharp et al.           |
| 5,527,284 A | 6/1996  | Ohnemus et al.       | 6,189,859 B1 | 2/2001  | Rohrbough et al.       |
| 5,533,708 A | 7/1996  | Atkinson et al.      | 6,206,860 B1 | 3/2001  | Richmond               |
| 5,533,983 A | 7/1996  | Haining              | 6,221,029 B1 | 4/2001  | Mathis et al.          |
| 5,533,996 A | 7/1996  | Murphey et al.       | 6,224,578 B1 | 5/2001  | Davis et al.           |
| 5,535,785 A | 7/1996  | Werge et al.         | 6,224,588 B1 | 5/2001  | Jentzen                |
| 5,540,661 A | 7/1996  | Tomisaka et al.      | 6,231,552 B1 | 5/2001  | Jentzen                |
| 5,549,566 A | 8/1996  | Elias et al.         | 6,242,393 B1 | 6/2001  | Ishida et al.          |
| 5,549,577 A | 8/1996  | Siegel et al.        | 6,245,048 B1 | 6/2001  | Fangrow et al.         |
| 5,549,651 A | 8/1996  | Lynn                 | 6,290,206 B1 | 9/2001  | Doyle                  |
| 5,552,118 A | 9/1996  | Mayer                | 6,299,132 B1 | 10/2001 | Weinheimer et al.      |
| 5,555,908 A | 9/1996  | Edwards et al.       | 6,325,100 B1 | 12/2001 | Bunschoten et al.      |
| 5,569,235 A | 10/1996 | Ross et al.          | 6,332,633 B1 | 12/2001 | Fitoussi et al.        |
| 5,573,516 A | 11/1996 | Tyner                | 6,402,207 B1 | 6/2002  | Segal et al.           |
| 5,575,769 A | 11/1996 | Vaillancourt         | 6,428,520 B1 | 8/2002  | Lopez                  |
| 5,578,059 A | 11/1996 | Patzer               | 6,431,219 B1 | 8/2002  | Redler et al.          |
| 5,584,819 A | 12/1996 | Kopfer               | 6,485,472 B1 | 11/2002 | Richmond               |
| 5,591,137 A | 1/1997  | Stevens              | 6,499,719 B1 | 12/2002 | Clancy et al.          |
| 5,591,143 A | 1/1997  | Trombley, III et al. | 6,508,792 B2 | 1/2003  | Szames et al.          |
| 5,597,536 A | 1/1997  | Mayer                | 6,508,807 B1 | 1/2003  | Peters                 |
| 5,616,129 A | 4/1997  | Mayer                | 6,541,802 B2 | 4/2003  | Doyle                  |
| 5,616,130 A | 4/1997  | Mayer                | 6,543,745 B1 | 4/2003  | Enerson                |
| RE35,539 E  | 6/1997  | Bonaldo              | 6,581,906 B2 | 6/2003  | Pott et al.            |
| 5,643,224 A | 7/1997  | Szapiro et al.       | 6,585,229 B2 | 7/2003  | Cote et al.            |
| 5,645,538 A | 7/1997  | Richmond             | 6,595,964 B2 | 7/2003  | Finley et al.          |
| 5,651,776 A | 7/1997  | Appling et al.       | 6,595,981 B2 | 7/2003  | Huet                   |
| 5,658,260 A | 8/1997  | Desecki et al.       | 6,609,696 B2 | 8/2003  | Enerson                |
| 5,674,206 A | 10/1997 | Allton et al.        | 6,612,624 B1 | 9/2003  | Segal et al.           |
| 5,676,346 A | 10/1997 | Leinsing             | 6,666,852 B2 | 12/2003 | Niedospial, Jr.        |
| 5,685,866 A | 11/1997 | Lopez                | 6,673,059 B2 | 1/2004  | Guala                  |
| 5,685,868 A | 11/1997 | Lundquist            | 6,681,803 B2 | 1/2004  | Taneya et al.          |
| 5,699,821 A | 12/1997 | Paradis              | 6,695,817 B1 | 2/2004  | Fangrow                |
| 5,700,248 A | 12/1997 | Lopez                | 6,745,998 B2 | 6/2004  | Doyle                  |
| 5,702,374 A | 12/1997 | Johnson              | 6,808,161 B1 | 10/2004 | Hishikawa              |
| 5,709,243 A | 1/1998  | Wells et al.         | 6,840,501 B2 | 1/2005  | Doyle                  |
| 5,735,826 A | 4/1998  | Richmond             | 6,843,513 B2 | 1/2005  | Guala                  |
| 5,738,144 A | 4/1998  | Rogers               | 6,869,426 B2 | 3/2005  | Ganem                  |
| 5,741,084 A | 4/1998  | Del Rio et al.       | 6,875,205 B2 | 4/2005  | Leinsing               |
| 5,749,861 A | 5/1998  | Guala et al.         | 6,893,056 B2 | 5/2005  | Guala                  |
| D395,502 S  | 6/1998  | Deily et al.         | 6,899,315 B2 | 5/2005  | Mailville et al.       |
| RE35,841 E  | 7/1998  | Frank et al.         | 6,911,025 B2 | 6/2005  | Miyahara               |
| 5,776,116 A | 7/1998  | Lopez                | 6,955,669 B2 | 10/2005 | Curutcharry            |
| 5,782,816 A | 7/1998  | Werschmidt et al.    | 6,964,406 B2 | 11/2005 | Doyle                  |
| 5,784,750 A | 7/1998  | Sankovic et al.      | 6,991,608 B2 | 1/2006  | Young et al.           |
| 5,785,693 A | 7/1998  | Haining              | 6,997,917 B2 | 2/2006  | Niedospial, Jr. et al. |
| 5,788,215 A | 8/1998  | Ryan                 | 7,004,934 B2 | 2/2006  | Vaillancourt           |
| 5,806,831 A | 9/1998  | Paradis              | 7,033,339 B1 | 4/2006  | Lynn et al.            |
| 5,810,398 A | 9/1998  | Matkovich            | 7,037,302 B2 | 5/2006  | Vaillancourt           |
| 5,810,792 A | 9/1998  | Fangrow, Jr. et al.  | 7,040,598 B2 | 5/2006  | Raybuck                |
| 5,814,024 A | 9/1998  | Thompson et al.      | 7,044,441 B2 | 5/2006  | Doyle                  |
| 5,820,601 A | 10/1998 | Mayer                | 7,100,891 B2 | 9/2006  | Doyle                  |
| 5,820,614 A | 10/1998 | Erksine et al.       | 7,125,396 B2 | 10/2006 | Leinsing et al.        |
| 5,830,189 A | 11/1998 | Chang                | 7,137,654 B2 | 11/2006 | Segal et al.           |
| 5,830,195 A | 11/1998 | Peters et al.        | 7,140,592 B2 | 11/2006 | Phillips               |
| 5,839,715 A | 11/1998 | Leinsing             | 7,160,272 B1 | 1/2007  | Eyal et al.            |
| 5,848,994 A | 12/1998 | Richmond             | 7,182,313 B2 | 2/2007  | Doyle                  |
| 5,855,568 A | 1/1999  | Battiato et al.      | 7,195,228 B2 | 3/2007  | Tiberghien et al.      |
| 5,947,954 A | 9/1999  | Bonaldo              | 7,244,249 B2 | 7/2007  | Leinsing et al.        |
| 5,984,373 A | 11/1999 | Fitoussi et al.      | 7,306,197 B2 | 12/2007 | Parrino et al.         |
| 6,029,946 A | 2/2000  | Doyle                | 7,306,198 B2 | 12/2007 | Doyle                  |
| 6,036,171 A | 3/2000  | Weinheimer et al.    | 7,306,566 B2 | 12/2007 | Raybuck                |
| 6,039,302 A | 3/2000  | Cote, Sr. et al.     | 7,309,326 B2 | 12/2007 | Fangrow, Jr.           |
| 6,041,805 A | 3/2000  | Gydesen et al.       | 7,316,679 B2 | 1/2008  | Bierman                |
| 6,050,978 A | 4/2000  | Orr et al.           | 7,347,458 B2 | 3/2008  | Rome et al.            |
| 6,063,062 A | 5/2000  | Paradis              | 7,350,764 B2 | 4/2008  | Raybuck                |
| 6,068,011 A | 5/2000  | Paradis              | 7,361,164 B2 | 4/2008  | Simpson et al.         |
|             |         |                      | 7,396,051 B2 | 7/2008  | Baldwin et al.         |
|             |         |                      | 7,448,653 B2 | 11/2008 | Jensen et al.          |
|             |         |                      | 7,497,484 B2 | 3/2009  | Ziman                  |
|             |         |                      | 7,530,546 B2 | 5/2009  | Ryan                   |

(56)

## References Cited

## U.S. PATENT DOCUMENTS

|              |         |                        |              |         |                     |
|--------------|---------|------------------------|--------------|---------|---------------------|
| 7,559,530 B2 | 7/2009  | Korogi et al.          | 8,448,994 B2 | 5/2013  | Pisula, Jr. et al.  |
| 7,588,563 B2 | 9/2009  | Guala                  | 8,454,579 B2 | 6/2013  | Fangrow, Jr.        |
| 7,591,449 B2 | 9/2009  | Raines et al.          | 8,511,352 B2 | 8/2013  | Kraus et al.        |
| 7,600,515 B2 | 10/2009 | Matlock                | 8,529,524 B2 | 9/2013  | Newton et al.       |
| 7,601,141 B2 | 10/2009 | Dikeman et al.         | 8,556,868 B2 | 10/2013 | Simpson et al.      |
| 7,628,781 B2 | 12/2009 | Roy et al.             | 8,596,688 B2 | 12/2013 | Pisula, Jr. et al.  |
| 7,645,274 B2 | 1/2010  | Whitley                | 8,603,047 B2 | 12/2013 | Stroup              |
| 7,648,491 B2 | 1/2010  | Rogers                 | 8,628,516 B2 | 1/2014  | Naftalovitz et al.  |
| 7,651,481 B2 | 1/2010  | Raybuck                | 8,636,720 B2 | 1/2014  | Truitt et al.       |
| 7,666,170 B2 | 2/2010  | Guala                  | 8,640,725 B2 | 2/2014  | Truitt et al.       |
| D612,939 S   | 3/2010  | Boone, III et al.      | 8,641,685 B2 | 2/2014  | Mansour et al.      |
| 7,670,326 B2 | 3/2010  | Shemesh                | 8,647,310 B2 | 2/2014  | Fangrow, Jr. et al. |
| 7,717,874 B2 | 5/2010  | Landau et al.          | 8,667,997 B2 | 3/2014  | Costanzo            |
| 7,722,090 B2 | 5/2010  | Burton et al.          | 8,671,964 B2 | 3/2014  | Py                  |
| 7,758,566 B2 | 7/2010  | Simpson et al.         | 8,679,090 B2 | 3/2014  | Anderson et al.     |
| 7,762,524 B2 | 7/2010  | Cawthon et al.         | 8,684,994 B2 | 4/2014  | Lev et al.          |
| 7,763,013 B2 | 7/2010  | Baldwin et al.         | 8,702,675 B2 | 4/2014  | Imai                |
| 7,766,304 B2 | 8/2010  | Phillips               | 8,715,222 B2 | 5/2014  | Truitt et al.       |
| 7,766,897 B2 | 8/2010  | Ramsey et al.          | 8,715,247 B2 | 5/2014  | Mansour et al.      |
| 7,770,939 B2 | 8/2010  | Jensen et al.          | 8,721,614 B2 | 5/2014  | Takemoto et al.     |
| 7,771,383 B2 | 8/2010  | Truitt et al.          | 8,721,627 B2 | 5/2014  | Albert              |
| 7,799,009 B2 | 9/2010  | Niedospial, Jr. et al. | 8,721,628 B2 | 5/2014  | Ziman               |
| 7,803,139 B2 | 9/2010  | Fangrow, Jr.           | 8,746,278 B2 | 6/2014  | Py                  |
| 7,803,140 B2 | 9/2010  | Fangrow, Jr.           | 8,764,731 B2 | 7/2014  | Burgess et al.      |
| 7,806,139 B2 | 10/2010 | Packham et al.         | 8,777,908 B2 | 7/2014  | Fangrow, Jr.        |
| 7,815,614 B2 | 10/2010 | Fangrow, Jr.           | 8,777,909 B2 | 7/2014  | Fangrow, Jr.        |
| 7,837,658 B2 | 11/2010 | Cote et al.            | 8,777,931 B2 | 7/2014  | Davis et al.        |
| 7,857,805 B2 | 12/2010 | Raines                 | 8,801,678 B2 | 8/2014  | Panian et al.       |
| 7,867,215 B2 | 1/2011  | Akerlund et al.        | 8,834,432 B2 | 9/2014  | Winsor et al.       |
| 7,875,019 B2 | 1/2011  | Barron et al.          | 8,864,725 B2 | 10/2014 | Ranalletta et al.   |
| D636,079 S   | 4/2011  | Leybold et al.         | 8,864,737 B2 | 10/2014 | Hasegawa et al.     |
| 7,976,532 B2 | 7/2011  | Kitani et al.          | 8,870,832 B2 | 10/2014 | Raday et al.        |
| 7,998,134 B2 | 8/2011  | Fangrow et al.         | 8,870,846 B2 | 10/2014 | Davis et al.        |
| 8,057,442 B2 | 11/2011 | Dikeman et al.         | 8,876,784 B2 | 11/2014 | Coete, Sr. et al.   |
| 8,066,692 B2 | 11/2011 | Simpson et al.         | 8,882,742 B2 | 11/2014 | Dikeman et al.      |
| 8,096,525 B2 | 1/2012  | Ryan                   | 8,888,758 B2 | 11/2014 | Mansour et al.      |
| 8,113,546 B2 | 2/2012  | Jensen et al.          | 8,899,267 B2 | 12/2014 | Diodati et al.      |
| 8,123,738 B2 | 2/2012  | Vaillancourt           | 8,910,919 B2 | 12/2014 | Bonnal et al.       |
| 8,157,784 B2 | 4/2012  | Rogers                 | 8,951,233 B2 | 2/2015  | Mansour             |
| 8,162,914 B2 | 4/2012  | Kraushaar et al.       | 8,968,261 B2 | 3/2015  | Kimball et al.      |
| 8,177,760 B2 | 5/2012  | Rome et al.            | 8,968,271 B2 | 3/2015  | Guala               |
| D662,122 S   | 6/2012  | Goodwin et al.         | 8,974,425 B2 | 3/2015  | Tachizaki et al.    |
| 8,196,606 B2 | 6/2012  | Kitagawa               | 8,979,804 B2 | 3/2015  | Ho et al.           |
| 8,196,614 B2 | 6/2012  | Kriheli                | 9,017,295 B2 | 4/2015  | Pan                 |
| 8,197,452 B2 | 6/2012  | Harding et al.         | 9,032,997 B2 | 5/2015  | Abura et al.        |
| 8,197,466 B2 | 6/2012  | Yokota et al.          | 9,039,047 B2 | 5/2015  | Imai                |
| 8,211,069 B2 | 7/2012  | Fangrow, Jr.           | 9,044,554 B2 | 6/2015  | Wu et al.           |
| 8,225,826 B2 | 7/2012  | Horppu et al.          | 9,044,585 B2 | 6/2015  | Masuda et al.       |
| 8,231,567 B2 | 7/2012  | Tennican et al.        | 9,061,130 B2 | 6/2015  | Truitt et al.       |
| 8,235,426 B2 | 8/2012  | Pisula, Jr. et al.     | 9,067,049 B2 | 6/2015  | Panian et al.       |
| 8,251,346 B2 | 8/2012  | Stroup                 | 9,089,680 B2 | 7/2015  | Ueda et al.         |
| 8,262,628 B2 | 9/2012  | Fangrow, Jr.           | 9,089,681 B2 | 7/2015  | Ueda et al.         |
| 8,277,424 B2 | 10/2012 | Panian et al.          | 9,114,242 B2 | 8/2015  | Fangrow et al.      |
| 8,281,824 B2 | 10/2012 | Molema et al.          | 9,114,244 B2 | 8/2015  | Yeh et al.          |
| 8,286,657 B2 | 10/2012 | Belley et al.          | 9,119,950 B2 | 9/2015  | Mansour et al.      |
| 8,286,936 B2 | 10/2012 | Kitani et al.          | 9,126,028 B2 | 9/2015  | Fangrow et al.      |
| 8,287,513 B2 | 10/2012 | Ellstrom et al.        | 9,126,029 B2 | 9/2015  | Fangrow et al.      |
| 8,287,518 B2 | 10/2012 | Kitani et al.          | 9,138,572 B2 | 9/2015  | Zeytoonian et al.   |
| 8,298,195 B2 | 10/2012 | Peppel                 | 9,149,622 B2 | 10/2015 | Bonnet et al.       |
| 8,328,769 B2 | 12/2012 | Dikeman et al.         | 9,168,203 B2 | 10/2015 | Rosenquist et al.   |
| 8,336,587 B2 | 12/2012 | Rosenquist et al.      | 9,168,366 B2 | 10/2015 | Fangrow et al.      |
| 8,337,483 B2 | 12/2012 | Harding et al.         | 9,198,831 B2 | 12/2015 | Rogers              |
| 8,361,408 B2 | 1/2013  | Lynn                   | 9,220,882 B2 | 12/2015 | Belley et al.       |
| 8,366,658 B2 | 2/2013  | Davis et al.           | 9,234,616 B2 | 1/2016  | Carrez et al.       |
| 8,366,676 B2 | 2/2013  | Harding et al.         | 9,238,128 B2 | 1/2016  | Yamaguchi et al.    |
| 8,372,059 B2 | 2/2013  | Ziman                  | 9,314,604 B2 | 4/2016  | Bonnal et al.       |
| 8,377,010 B2 | 2/2013  | Harding et al.         | 9,345,641 B2 | 5/2016  | Kraus et al.        |
| 8,392,756 B2 | 3/2013  | Nakayama et al.        | 9,351,906 B2 | 5/2016  | Garfield et al.     |
| 8,397,756 B2 | 3/2013  | Packham et al.         | 9,358,182 B2 | 6/2016  | Garfield et al.     |
| 8,403,894 B2 | 3/2013  | Lynn et al.            | 9,358,379 B2 | 6/2016  | Fangrow             |
| 8,403,905 B2 | 3/2013  | Yow                    | 9,393,398 B2 | 7/2016  | Truitt et al.       |
| 8,408,226 B2 | 4/2013  | Raines et al.          | 9,409,007 B2 | 8/2016  | Yeh                 |
| 8,409,165 B2 | 4/2013  | Niedospial, Jr. et al. | 9,433,768 B2 | 9/2016  | Tekesté et al.      |
| 8,414,554 B2 | 4/2013  | Garfield et al.        | 9,592,344 B2 | 3/2017  | Simpson et al.      |
| 8,414,555 B2 | 4/2013  | Garfield et al.        | 9,636,492 B2 | 5/2017  | Fangrow, Jr.        |
|              |         |                        | 9,707,346 B2 | 7/2017  | Simpson et al.      |
|              |         |                        | 9,724,504 B2 | 8/2017  | Fangrow, Jr. et al. |
|              |         |                        | D799,938 S   | 10/2017 | Lowitz              |
|              |         |                        | D799,939 S   | 10/2017 | Lowitz              |

(56)

## References Cited

## U.S. PATENT DOCUMENTS

|                 |         |                               |                 |         |                        |
|-----------------|---------|-------------------------------|-----------------|---------|------------------------|
| 9,913,945 B2    | 3/2018  | Simpson et al.                | 2007/0088292 A1 | 4/2007  | Fangrow                |
| 9,933,094 B2    | 4/2018  | Fangrow                       | 2007/0088293 A1 | 4/2007  | Fangrow                |
| 9,974,939 B2    | 5/2018  | Fangrow, Jr.                  | 2007/0088294 A1 | 4/2007  | Fangrow                |
| 9,974,940 B2    | 5/2018  | Fangrow, Jr.                  | 2007/0088324 A1 | 4/2007  | Fangrow                |
| 10,046,154 B2   | 8/2018  | Fangrow et al.                | 2007/0088327 A1 | 4/2007  | Guala                  |
| 10,105,492 B2   | 10/2018 | Simpson                       | 2007/0102923 A1 | 5/2007  | Niemela                |
| 10,156,306 B2   | 12/2018 | Fangrow                       | 2007/0120083 A1 | 5/2007  | Simpson et al.         |
| D859,650 S      | 9/2019  | Steele et al.                 | 2007/0179453 A1 | 8/2007  | Lim et al.             |
| 10,398,887 B2   | 9/2019  | Fangrow, Jr. et al.           | 2007/0179454 A1 | 8/2007  | Ziman et al.           |
| D879,956 S      | 3/2020  | Klenner et al.                | 2007/0191786 A1 | 8/2007  | Raines et al.          |
| 10,697,570 B2   | 6/2020  | Fangrow                       | 2008/0103485 A1 | 5/2008  | Kruger                 |
| 10,716,928 B2   | 7/2020  | Fangrow et al.                | 2008/0125756 A1 | 5/2008  | Dicarilo et al.        |
| 10,842,982 B2   | 11/2020 | Fangrow, Jr.                  | 2008/0140020 A1 | 6/2008  | Shirley                |
| 11,168,818 B2   | 11/2021 | Fangrow                       | 2008/0190485 A1 | 8/2008  | Guala                  |
| 11,266,785 B2   | 3/2022  | Simpson et al.                | 2008/0200900 A1 | 8/2008  | Aeschlimann et al.     |
| 11,478,624 B2   | 10/2022 | Fangrow et al.                | 2008/0287920 A1 | 11/2008 | Fangrow et al.         |
| D976,982 S      | 1/2023  | Meyer                         | 2008/0290657 A1 | 11/2008 | McKeon, III            |
| D982,140 S      | 3/2023  | Mitrovic                      | 2009/0001720 A1 | 1/2009  | Cheon et al.           |
| 11,808,389 B2   | 11/2023 | Fangrow                       | 2009/0200504 A1 | 8/2009  | Ryan                   |
| D1,029,247 S *  | 5/2024  | Janzen ..... D24/129          | 2010/0036328 A1 | 2/2010  | Dikeman et al.         |
| D1,037,443 S *  | 7/2024  | Kawachi ..... D24/129         | 2010/0063482 A1 | 3/2010  | Mansour et al.         |
| D1,038,388 S *  | 8/2024  | Kawachi ..... D24/129         | 2010/0174242 A1 | 7/2010  | Anderson et al.        |
| D1,038,389 S *  | 8/2024  | Kawachi ..... D24/129         | 2010/0211019 A1 | 8/2010  | Greco                  |
| D1,038,390 S *  | 8/2024  | Kawachi ..... D24/129         | 2010/0249723 A1 | 9/2010  | Fangrow, Jr.           |
| D1,038,391 S *  | 8/2024  | Kawachi ..... D24/129         | 2010/0253070 A1 | 10/2010 | Cheon et al.           |
| D1,042,800 S *  | 9/2024  | Sender ..... D24/130          | 2010/0256574 A1 | 10/2010 | Simpson et al.         |
| D1,042,822 S *  | 9/2024  | Sender ..... D24/130          | 2010/0264343 A1 | 10/2010 | Jeory                  |
| 12,076,522 B2 * | 9/2024  | Erekovcanski ..... A61M 39/10 | 2010/0292673 A1 | 11/2010 | Korogi et al.          |
| D1,059,589 S *  | 1/2025  | Reed ..... D24/133            | 2010/0298805 A1 | 11/2010 | Niedospial, Jr. et al. |
| D1,065,524 S *  | 3/2025  | Kawachi ..... D24/129         | 2011/0046572 A1 | 2/2011  | Fangrow                |
| D1,069,110 S *  | 4/2025  | Hund ..... D24/130            | 2011/0062703 A1 | 3/2011  | Lopez                  |
| D1,071,162 S *  | 4/2025  | Neby ..... D13/103            | 2011/0074148 A1 | 3/2011  | Imai                   |
| D1,071,169 S *  | 4/2025  | Consolaro ..... D24/114       | 2011/0175347 A1 | 7/2011  | Okiyama                |
| D1,071,202 S *  | 4/2025  | Ubbesen ..... D24/129         | 2011/0276035 A1 | 11/2011 | Fangrow, Jr.           |
| D1,073,939 S *  | 5/2025  | Sender ..... D24/130          | 2011/0306931 A1 | 12/2011 | Kamen et al.           |
| D1,075,002 S *  | 5/2025  | Yang ..... D24/133            | 2011/0319859 A1 | 12/2011 | Zeytoonian et al.      |
| D1,077,216 S *  | 5/2025  | Kawachi ..... D24/129         | 2012/0031515 A1 | 2/2012  | Whitaker               |
| 2002/0066715 A1 | 6/2002  | Niedospial, Jr.               | 2012/0041391 A1 | 2/2012  | Fangrow et al.         |
| 2002/0082586 A1 | 6/2002  | Finley et al.                 | 2012/0046636 A1 | 2/2012  | Kriheli                |
| 2002/0115980 A1 | 8/2002  | Niedospial, Jr. et al.        | 2012/0059312 A1 | 3/2012  | Dikeman et al.         |
| 2002/0148514 A1 | 10/2002 | Taneya et al.                 | 2012/0089101 A1 | 4/2012  | Carlyon et al.         |
| 2002/0153503 A1 | 10/2002 | Newton et al.                 | 2012/0109077 A1 | 5/2012  | Ryan                   |
| 2003/0060804 A1 | 3/2003  | Vaillancourt                  | 2012/0130305 A1 | 5/2012  | Bonnal et al.          |
| 2003/0066978 A1 | 4/2003  | Enerson                       | 2012/0153201 A1 | 6/2012  | Larose et al.          |
| 2003/0111623 A1 | 6/2003  | Enerson                       | 2012/0203193 A1 | 8/2012  | Rogers                 |
| 2003/0136932 A1 | 7/2003  | Doyle                         | 2012/0220955 A1 | 8/2012  | Maseda et al.          |
| 2003/0208165 A1 | 11/2003 | Christensen et al.            | 2012/0220984 A1 | 8/2012  | Christensen et al.     |
| 2004/0074541 A1 | 4/2004  | Sharpe                        | 2012/0271244 A1 | 10/2012 | Simpson et al.         |
| 2004/0102738 A1 | 5/2004  | Dikeman et al.                | 2012/0271246 A1 | 10/2012 | Guala                  |
| 2004/0124388 A1 | 7/2004  | Kiehne                        | 2012/0277688 A1 | 11/2012 | Rogier                 |
| 2004/0124389 A1 | 7/2004  | Phillips                      | 2012/0310179 A1 | 12/2012 | Truitt et al.          |
| 2004/0238776 A1 | 12/2004 | Peters et al.                 | 2012/0316536 A1 | 12/2012 | Carrez et al.          |
| 2004/0244848 A1 | 12/2004 | Maldavs                       | 2012/0330247 A1 | 12/2012 | Fangrow, Jr.           |
| 2005/0015075 A1 | 1/2005  | Wright et al.                 | 2013/0006211 A1 | 1/2013  | Takemoto               |
| 2005/0033268 A1 | 2/2005  | Decaria                       | 2013/0012870 A1 | 1/2013  | Dikeman et al.         |
| 2005/0090805 A1 | 4/2005  | Shaw et al.                   | 2013/0030386 A1 | 1/2013  | Panian et al.          |
| 2005/0124942 A1 | 6/2005  | Richmond                      | 2013/0035668 A1 | 2/2013  | Kitani et al.          |
| 2005/0124964 A1 | 6/2005  | Niedospial, Jr. et al.        | 2013/0053815 A1 | 2/2013  | Mucientes et al.       |
| 2005/0212292 A1 | 9/2005  | Parrino et al.                | 2013/0060205 A1 | 3/2013  | Mansour et al.         |
| 2005/0228362 A1 | 10/2005 | Vaillancourt                  | 2013/0066923 A1 | 3/2013  | Garfield et al.        |
| 2005/0245872 A1 | 11/2005 | Simpson et al.                | 2013/0076019 A1 | 3/2013  | Takemoto               |
| 2006/0025751 A1 | 2/2006  | Roy et al.                    | 2013/0079730 A1 | 3/2013  | Mosler et al.          |
| 2006/0058734 A1 | 3/2006  | Phillips                      | 2013/0150806 A1 | 6/2013  | Fangrow, Jr.           |
| 2006/0118749 A1 | 6/2006  | Ryan                          | 2013/0193359 A1 | 8/2013  | Yeh                    |
| 2006/0129109 A1 | 6/2006  | Shaw et al.                   | 2013/0197453 A1 | 8/2013  | Yeh                    |
| 2006/0142730 A1 | 6/2006  | Proulx et al.                 | 2013/0231616 A1 | 9/2013  | Fangrow, Jr.           |
| 2006/0142735 A1 | 6/2006  | Whitley                       | 2013/0304037 A1 | 11/2013 | Fangrow                |
| 2006/0157971 A1 | 7/2006  | Baldwin et al.                | 2013/0317483 A1 | 11/2013 | Reichart et al.        |
| 2006/0157984 A1 | 7/2006  | Rome et al.                   | 2014/0020792 A1 | 1/2014  | Kraus et al.           |
| 2006/0161115 A1 | 7/2006  | Fangrow                       | 2014/0142519 A1 | 5/2014  | Truitt et al.          |
| 2006/0192164 A1 | 8/2006  | Korogi et al.                 | 2014/0174578 A1 | 6/2014  | Bonnal et al.          |
| 2006/0202146 A1 | 9/2006  | Doyle                         | 2014/0209197 A1 | 7/2014  | Carrez et al.          |
| 2006/0211996 A1 | 9/2006  | Trinchera et al.              | 2014/0246616 A1 | 9/2014  | Fangrow                |
| 2006/0253084 A1 | 11/2006 | Nordgren                      | 2014/0257198 A1 | 9/2014  | Truitt et al.          |
| 2007/0073270 A1 | 3/2007  | Christensen et al.            | 2014/0303601 A1 | 10/2014 | Fangrow                |
|                 |         |                               | 2014/0316350 A1 | 10/2014 | Yamaguchi et al.       |
|                 |         |                               | 2014/0358033 A1 | 12/2014 | Lynn                   |
|                 |         |                               | 2014/0358073 A1 | 12/2014 | Panian et al.          |
|                 |         |                               | 2014/0371686 A1 | 12/2014 | Sano et al.            |

(56)

References Cited

U.S. PATENT DOCUMENTS

2015/0008664 A1 1/2015 Tachizaki  
2015/0045746 A1 2/2015 Macy, Jr. et al.  
2015/0051555 A1 2/2015 Fangrow, Jr.  
2015/0073380 A1 3/2015 Mansour et al.  
2015/0148756 A1 5/2015 Lynn  
2015/0157848 A1 6/2015 Wu et al.  
2015/0196749 A1 7/2015 Ziv et al.  
2015/0202424 A1 7/2015 Harton  
2015/0209233 A1 7/2015 Fukuoka  
2015/0209572 A1 7/2015 Garfield et al.  
2015/0258324 A1 9/2015 Chida et al.  
2015/0258325 A1 9/2015 Panian et al.  
2015/0265829 A1 9/2015 Truitt et al.  
2015/0320992 A1 11/2015 Bonnet et al.  
2016/0114147 A1 4/2016 Siopes et al.  
2016/0144109 A1 5/2016 Stroup  
2016/0213910 A1 7/2016 Fangrow, Jr. et al.  
2016/0250102 A1 9/2016 Garfield et al.  
2016/0263367 A1 9/2016 Fangrow et al.  
2016/0263369 A1 9/2016 Naftalovitz et al.  
2016/0271327 A1 9/2016 Simpson et al.  
2017/0296801 A1 10/2017 Fangrow, Jr.  
2017/0304547 A1 10/2017 Simpson  
2018/0015275 A1 1/2018 Fangrow, Jr. et al.  
2018/0036524 A1 2/2018 Fangrow, Jr.  
2018/0333568 A1 11/2018 Fangrow, Jr.  
2019/0046731 A1 2/2019 Simpson et al.  
2020/0284385 A1 9/2020 Fangrow  
2021/0162191 A1 6/2021 Fangrow et al.  
2021/0252267 A1 8/2021 Fangrow, Jr.  
2022/0370697 A1 11/2022 Parikh et al.  
2023/0302268 A1 9/2023 Fangrow  
2024/0011588 A1 1/2024 Fangrow  
2024/0173531 A1 \* 5/2024 Kumar ..... A61M 39/165  
2024/0173537 A1 \* 5/2024 Nalawade ..... A61M 39/165  
2024/0245898 A1 \* 7/2024 Malviya ..... A61M 39/20  
2024/0261555 A1 \* 8/2024 Nelson ..... A61M 39/26  
2024/0293657 A1 \* 9/2024 Kuriyama ..... A61M 39/1011  
2025/0018165 A1 \* 1/2025 Callahan ..... A61M 39/14  
2025/0032769 A1 \* 1/2025 Callahan ..... A61M 39/26  
2025/0114587 A1 \* 4/2025 Wells ..... A61M 39/22

FOREIGN PATENT DOCUMENTS

CN 1390286 A 1/2003  
DE 11306014.9 8/2011  
EP 0 158 030 10/1985  
EP 0 368 473 5/1990  
EP 0 791 371 8/1997

EP 0 795 342 9/1997  
EP 1 946 792 7/2008  
EP 2 123 322 11/2009  
FR 1252412 3/2012  
GB 2 116 277 9/1983  
GB 2 118 440 11/1983  
GB 2 353 078 2/2001  
JP 56-72659 U1 6/1981  
JP 58-13216 1/1983  
JP 59-41429 3/1984  
JP 60-89488 6/1985  
JP 62-65779 4/1987  
JP 63-175383 11/1988  
JP 11-311234 11/1999  
JP 2001-187990 A 7/2001  
JP 2004-000483 A 1/2004  
WO WO 1988/08499 11/1988  
WO WO 1995/32748 12/1995  
WO WO 2001/03756 1/2001  
WO WO 2001/23026 4/2001  
WO WO 2002/096500 12/2002  
WO WO 2003/013646 2/2003  
WO WO 2004/060474 7/2004  
WO WO 2004/082756 9/2004  
WO WO 2006/076656 7/2006  
WO WO 2006/088858 8/2006  
WO WO 2006/124756 11/2006  
WO WO 2008/144447 11/2008  
WO WO 2009/095760 8/2009  
WO WO 2013/036854 3/2013

OTHER PUBLICATIONS

Charney, “Baxter Healthcare Interlink™ IV Access System” in 4 pages, from Handbook of Modern Hospital Safety. Published Mar. 1999.  
European extended Search Report, re EP Application No. 12830016. 7, dated May 19, 2015.  
International Search Report and Written Opinion re PCT Application No. PCT/US2012/054289, mailed Jan. 24, 2013.  
International Preliminart Report on Patentability and Written Opinion re PCT Application No. PCT/US2012/054289, mailed Mar. 12, 2014.  
ICU Medical, Inc. U.S. Appl. No. 11/417,882, filed May 3, 2006.  
ICU Medical, Inc. U.S. Appl. No. 11/417,923, filed May 3, 2006.  
ICU Medical, Inc. U.S. Appl. No. 11/417,671, filed May 3, 2006.  
ICU Medical, Inc. U.S. Appl. No. 11/417,648, filed May 3, 2006.  
ICU Medical, Inc. U.S. Appl. No. 11/417,909, filed May 3, 2006.  
ICU Medical, Inc. U.S. Appl. No. 17/508,346, filed Oct. 22, 2021.

\* cited by examiner

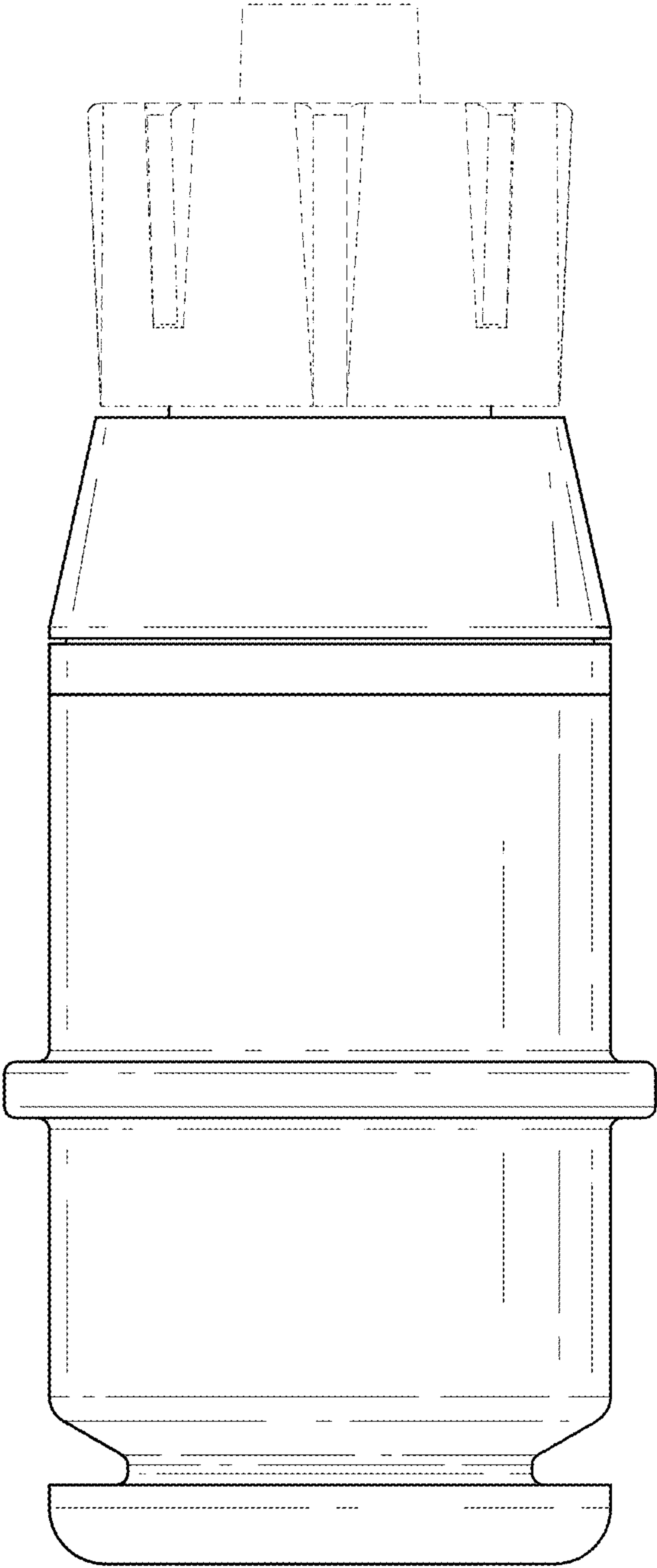
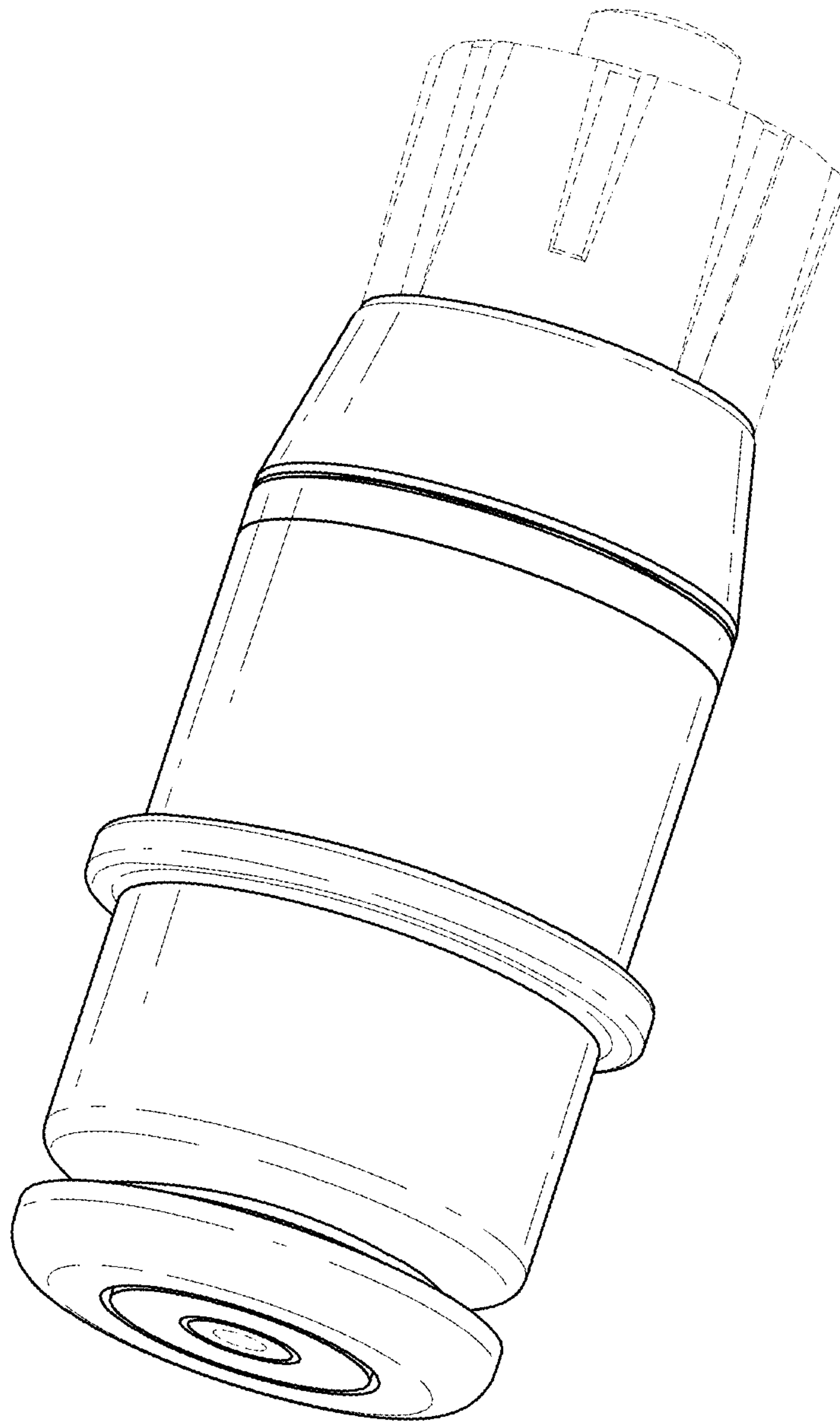


FIG. 1



*FIG. 2*