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(12) **United States Design Patent**  
**O’Leary et al.**

(10) **Patent No.:** **US D700,699 S**  
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(54) **HANDLE FOR PORTABLE SURGICAL DEVICE**

FOREIGN PATENT DOCUMENTS

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CN 1634601 A 7/2005  
CN 1640365 A 7/2005

(Continued)

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(57) **CLAIM**  
The ornamental design for a handle for portable surgical device, as shown and described.

(\*\*) Term: **14 Years**

**DESCRIPTION**

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(Under 37 CFR 1.47)

FIG. 1 is an elevational view of a right side of a handle for portable surgical device in accordance with the present design;  
FIG. 2 is an elevational view of a left side of the handle for portable surgical device of FIG. 1;  
FIG. 3 is an elevational view of a rear side of the handle for portable surgical device of FIG. 1;  
FIG. 4 is an elevational view of a front side of the handle for portable surgical device of FIG. 1;  
FIG. 5 is an elevational top plan view of the handle for portable surgical device of FIG. 1;  
FIG. 6 is an elevational bottom plan view of the handle for portable surgical device of FIG. 1;  
FIG. 7 is a perspective view of the left side of the handle for portable surgical device of FIG. 1 from above the front thereof;  
FIG. 8 is a perspective view of the left side of the handle for portable surgical device of FIG. 1 from below the front thereof;  
FIG. 9 is a perspective view of the right side of the handle for portable surgical device of FIG. 1 from below the rear thereof; and,  
FIG. 10 is a perspective view of the right side of the handle for portable surgical device of FIG. 1 from above the rear thereof.  
The broken line showing is for environmental purposes only and forms no part of the claimed design.

**Related U.S. Application Data**

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(51) **LOC (10) Cl.** ..... **24-02**

(52) **U.S. Cl.**  
USPC ..... **D24/146**

(58) **Field of Classification Search**  
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604/22; 606/167, 169, 170  
See application file for complete search history.

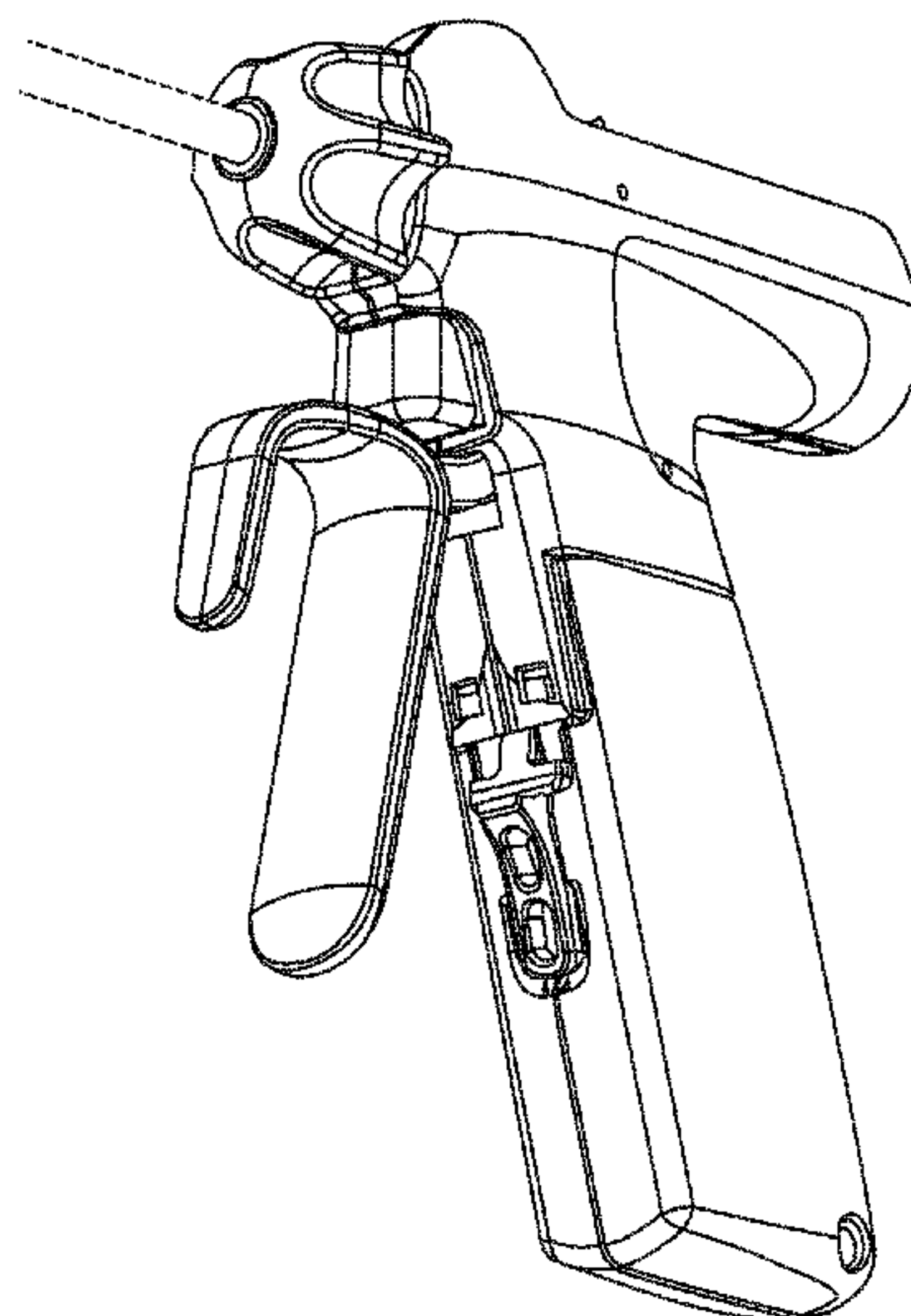
(56) **References Cited**

U.S. PATENT DOCUMENTS

2,736,960 A 3/1956 Armstrong  
2,849,788 A 9/1958 Creek  
3,015,961 A 1/1962 Roney  
3,513,848 A 5/1970 Garvey et al.  
3,526,219 A 9/1970 Balamuth

(Continued)

**1 Claim, 8 Drawing Sheets**



(56)

References Cited

U.S. PATENT DOCUMENTS

|              |         |                            |               |         |                          |
|--------------|---------|----------------------------|---------------|---------|--------------------------|
| 3,614,484 A  | 10/1971 | Shoh                       | 5,618,492 A   | 4/1997  | Auten                    |
| 3,636,943 A  | 1/1972  | Balamuth                   | 5,628,760 A   | 5/1997  | Knoepfler et al.         |
| 3,776,238 A  | 12/1973 | Peyman et al.              | 5,630,420 A   | 5/1997  | Vaitekunas               |
| 3,805,787 A  | 4/1974  | Banko                      | D381,077 S    | 7/1997  | Hunt                     |
| 3,862,630 A  | 1/1975  | Balamuth et al.            | 5,651,780 A   | 7/1997  | Jackson et al.           |
| 3,900,823 A  | 8/1975  | Sokal et al.               | 5,653,713 A   | 8/1997  | Michelson et al.         |
| 3,918,442 A  | 11/1975 | Nikolaev et al.            | 5,669,922 A   | 9/1997  | Hood                     |
| 3,946,738 A  | 3/1976  | Newton et al.              | 5,674,235 A   | 10/1997 | Parisi                   |
| 3,955,859 A  | 5/1976  | Stella                     | 5,690,269 A   | 11/1997 | Bolanos et al.           |
| 3,956,826 A  | 5/1976  | Perdreux                   | 5,694,936 A   | 12/1997 | Fujimoto et al.          |
| 4,156,187 A  | 5/1979  | Brumbach et al.            | 5,713,896 A   | 2/1998  | Nardella et al.          |
| 4,188,927 A  | 2/1980  | Harris                     | 5,733,074 A   | 3/1998  | Stoeck et al.            |
| 4,200,106 A  | 4/1980  | Douvas et al.              | 5,741,226 A   | 4/1998  | Strukel et al.           |
| 4,445,063 A  | 4/1984  | Smith et al.               | 5,810,859 A   | 9/1998  | DiMatteo et al.          |
| 4,491,132 A  | 1/1985  | Aikins et al.              | 5,827,323 A   | 10/1998 | Klieman et al.           |
| 4,574,615 A  | 3/1986  | Bower                      | 5,828,160 A   | 10/1998 | Sugishita                |
| 4,617,927 A  | 10/1986 | Manes et al.               | 5,843,109 A   | 12/1998 | Mehta et al.             |
| 4,633,119 A  | 12/1986 | Thompson et al.            | D404,484 S *  | 1/1999  | Lahr et al. .... D24/133 |
| 4,634,420 A  | 1/1987  | Spinosa et al.             | 5,879,364 A   | 3/1999  | Bromfield et al.         |
| 4,640,279 A  | 2/1987  | Beard et al.               | 5,893,835 A   | 4/1999  | Witt et al.              |
| 4,708,127 A  | 11/1987 | Abdelghani et al.          | 5,897,569 A   | 4/1999  | Kellogg et al.           |
| 4,712,722 A  | 12/1987 | Hood et al.                | 5,913,869 A * | 6/1999  | Reil ..... 606/188       |
| 4,827,911 A  | 5/1989  | Broadwin et al.            | 5,935,143 A   | 8/1999  | Hood et al.              |
| 4,832,683 A  | 5/1989  | Idemoto et al.             | 5,935,144 A   | 8/1999  | Estabrook et al.         |
| 4,838,853 A  | 6/1989  | Parisi et al.              | 5,938,633 A   | 8/1999  | Beaupre                  |
| 4,850,354 A  | 7/1989  | McGurk-Burleson et al.     | 5,944,718 A   | 8/1999  | Austin et al.            |
| 4,865,159 A  | 9/1989  | Jamison                    | 5,944,737 A   | 8/1999  | Tsonton et al.           |
| 4,896,009 A  | 1/1990  | Pawlowski                  | 5,954,736 A   | 9/1999  | Bishop et al.            |
| 4,922,902 A  | 5/1990  | Wuchinich et al.           | 5,954,746 A   | 9/1999  | Holthaus et al.          |
| 4,965,532 A  | 10/1990 | Sakurai                    | 5,957,882 A   | 9/1999  | Nita et al.              |
| 4,981,756 A  | 1/1991  | Rhandhawa                  | 5,957,943 A   | 9/1999  | Vaitekunas               |
| 5,026,387 A  | 6/1991  | Thomas et al.              | 5,968,007 A   | 10/1999 | Simon et al.             |
| 5,112,300 A  | 5/1992  | Ureche et al.              | 5,968,060 A   | 10/1999 | Kellogg                  |
| 5,123,903 A  | 6/1992  | Quaid et al.               | D416,089 S    | 11/1999 | Barton et al.            |
| 5,126,618 A  | 6/1992  | Takahashi et al.           | 5,980,510 A   | 11/1999 | Tsonton et al.           |
| 5,162,044 A  | 11/1992 | Gahn et al.                | 5,989,274 A   | 11/1999 | Davison et al.           |
| 5,167,725 A  | 12/1992 | Clark et al.               | 5,989,275 A   | 11/1999 | Estabrook et al.         |
| D332,660 S   | 1/1993  | Rawson et al.              | 5,993,972 A   | 11/1999 | Reich et al.             |
| 5,176,695 A  | 1/1993  | Dulebohn                   | 6,024,741 A   | 2/2000  | Williamson et al.        |
| 5,184,605 A  | 2/1993  | Grzeszykowski              | 6,024,750 A   | 2/2000  | Mastri et al.            |
| 5,213,569 A  | 5/1993  | Davis                      | 6,033,375 A   | 3/2000  | Brumbach                 |
| 5,221,282 A  | 6/1993  | Wuchinich et al.           | 6,036,667 A   | 3/2000  | Manna et al.             |
| 5,226,910 A  | 7/1993  | Kajiyama et al.            | 6,063,098 A   | 5/2000  | Houser et al.            |
| 5,241,236 A  | 8/1993  | Sasaki et al.              | 6,066,132 A   | 5/2000  | Chen et al.              |
| 5,257,988 A  | 11/1993 | L'Esperance                | 6,068,647 A   | 5/2000  | Witt et al.              |
| 5,261,922 A  | 11/1993 | Hood et al.                | 6,077,285 A   | 6/2000  | Boukhny                  |
| 5,263,957 A  | 11/1993 | Davison et al.             | 6,083,191 A   | 7/2000  | Rose                     |
| 5,275,609 A  | 1/1994  | Pingleton et al.           | 6,086,584 A   | 7/2000  | Miller                   |
| 5,282,800 A  | 2/1994  | Foshee                     | 6,090,120 A   | 7/2000  | Wright et al.            |
| 5,304,115 A  | 4/1994  | Pflueger et al.            | 6,109,500 A   | 8/2000  | Alli et al.              |
| D347,474 S   | 5/1994  | Olson                      | 6,110,127 A   | 8/2000  | Suzuki                   |
| 5,322,055 A  | 6/1994  | Davison et al.             | 6,113,594 A   | 9/2000  | Savage                   |
| 5,324,299 A  | 6/1994  | Davison et al.             | 6,113,618 A * | 9/2000  | Nic ..... 606/176        |
| 5,344,420 A  | 9/1994  | Hilal et al.               | 6,139,320 A   | 10/2000 | Hahn                     |
| 5,346,502 A  | 9/1994  | Estabrook et al.           | 6,152,902 A   | 11/2000 | Christian et al.         |
| 5,366,466 A  | 11/1994 | Christian                  | 6,159,160 A   | 12/2000 | Hsei et al.              |
| D353,888 S * | 12/1994 | Raines ..... D24/146       | 6,159,175 A   | 12/2000 | Strukel et al.           |
| D354,564 S   | 1/1995  | Medema                     | 6,204,592 B1  | 3/2001  | Hur                      |
| 5,381,067 A  | 1/1995  | Greenstein                 | 6,206,844 B1  | 3/2001  | Reichel et al.           |
| 5,403,312 A  | 4/1995  | Yates et al.               | 6,210,403 B1  | 4/2001  | Klicek                   |
| 5,411,481 A  | 5/1995  | Allen et al.               | 6,214,023 B1  | 4/2001  | Whipple et al.           |
| 5,419,761 A  | 5/1995  | Narayanan et al.           | 6,233,476 B1  | 5/2001  | Strommer et al.          |
| 5,421,829 A  | 6/1995  | Olichney et al.            | 6,238,366 B1  | 5/2001  | Savage et al.            |
| 5,449,370 A  | 9/1995  | Vaitekunas                 | D444,365 S    | 7/2001  | Bass                     |
| D364,463 S * | 11/1995 | Pitzen et al. .... D24/146 | 6,254,623 B1  | 7/2001  | Haibel, Jr. et al.       |
| 5,483,501 A  | 1/1996  | Park et al.                | 6,258,034 B1  | 7/2001  | Hanafy                   |
| 5,486,162 A  | 1/1996  | Brumbach et al.            | 6,267,761 B1  | 7/2001  | Ryan                     |
| 5,500,216 A  | 3/1996  | Julian                     | 6,270,831 B2  | 8/2001  | Kumar et al.             |
| 5,501,654 A  | 3/1996  | Failla et al.              | 6,273,852 B1  | 8/2001  | Lehe et al.              |
| 5,505,693 A  | 4/1996  | Mackool et al.             | 6,274,963 B1  | 8/2001  | Estabrook et al.         |
| 5,562,609 A  | 10/1996 | Brumbach et al.            | 6,277,115 B1  | 8/2001  | Saadat                   |
| 5,562,610 A  | 10/1996 | Brumbach et al.            | 6,278,218 B1  | 8/2001  | Madan et al.             |
| D377,094 S * | 12/1996 | Foshee et al. .... D24/143 | 6,283,981 B1  | 9/2001  | Beaupre                  |
| 5,601,601 A  | 2/1997  | Tal et al.                 | 6,309,400 B2  | 10/2001 | Beaupre                  |
| 5,607,436 A  | 3/1997  | Pratt et al.               | 6,319,221 B1  | 11/2001 | Savage et al.            |
|              |         |                            | 6,325,811 B1  | 12/2001 | Messerly                 |
|              |         |                            | 6,328,751 B1  | 12/2001 | Beaupre                  |
|              |         |                            | 6,352,532 B1  | 3/2002  | Kramer et al.            |
|              |         |                            | 6,379,320 B1  | 4/2002  | Lafon et al.             |



(56)

References Cited

U.S. PATENT DOCUMENTS

|           |     |         |                              |           |      |         |                               |
|-----------|-----|---------|------------------------------|-----------|------|---------|-------------------------------|
| D457,958  | S   | 5/2002  | Dycus et al.                 | 7,041,088 | B2   | 5/2006  | Nawrocki et al.               |
| 6,383,194 | B1  | 5/2002  | Pothula                      | 7,041,102 | B2   | 5/2006  | Truckai et al.                |
| 6,387,109 | B1  | 5/2002  | Davison et al.               | 7,070,597 | B2   | 7/2006  | Truckai et al.                |
| 6,388,657 | B1  | 5/2002  | Natoli                       | 7,074,219 | B2   | 7/2006  | Levine et al.                 |
| 6,391,042 | B1  | 5/2002  | Cimino                       | 7,077,039 | B2   | 7/2006  | Gass et al.                   |
| 6,405,733 | B1  | 6/2002  | Fogarty et al.               | 7,077,853 | B2   | 7/2006  | Kramer et al.                 |
| 6,416,486 | B1  | 7/2002  | Wampler                      | 7,083,619 | B2   | 8/2006  | Truckai et al.                |
| 6,423,073 | B2  | 7/2002  | Bowman                       | 7,087,054 | B2   | 8/2006  | Truckai et al.                |
| 6,423,082 | B1  | 7/2002  | Houser et al.                | 7,108,695 | B2   | 9/2006  | Witt et al.                   |
| 6,432,118 | B1  | 8/2002  | Messerly                     | 7,112,201 | B2   | 9/2006  | Truckai et al.                |
| 6,436,114 | B1  | 8/2002  | Novak et al.                 | 7,118,564 | B2   | 10/2006 | Ritchie et al.                |
| 6,436,115 | B1  | 8/2002  | Beaupre                      | 7,124,932 | B2   | 10/2006 | Isaacson et al.               |
| 6,443,969 | B1  | 9/2002  | Novak et al.                 | 7,125,409 | B2   | 10/2006 | Truckai et al.                |
| 6,454,781 | B1  | 9/2002  | Witt et al.                  | 7,135,018 | B2   | 11/2006 | Ryan et al.                   |
| 6,454,782 | B1  | 9/2002  | Schwemberger                 | 7,135,030 | B2   | 11/2006 | Schwemberger et al.           |
| 6,458,142 | B1  | 10/2002 | Faller et al.                | 7,153,315 | B2   | 12/2006 | Miller                        |
| D466,213  | S * | 11/2002 | Snitkin et al. .... D24/145  | D536,093  | S    | 1/2007  | Nakajima et al.               |
| 6,480,796 | B2  | 11/2002 | Wiener                       | 7,156,189 | B1   | 1/2007  | Bar-Cohen et al.              |
| 6,485,490 | B2  | 11/2002 | Wampler et al.               | 7,156,853 | B2   | 1/2007  | Muratsu                       |
| 6,491,708 | B2  | 12/2002 | Madan et al.                 | 7,157,058 | B2   | 1/2007  | Marhasin et al.               |
| 6,497,715 | B2  | 12/2002 | Satou                        | 7,159,750 | B2   | 1/2007  | Racenet et al.                |
| 6,500,176 | B1  | 12/2002 | Truckai et al.               | 7,163,548 | B2   | 1/2007  | Stulen et al.                 |
| 6,500,188 | B2  | 12/2002 | Harper et al.                | 7,169,146 | B2   | 1/2007  | Truckai et al.                |
| 6,524,316 | B1  | 2/2003  | Nicholson et al.             | 7,172,104 | B2 * | 2/2007  | Scirica et al. .... 227/175.2 |
| 6,533,784 | B2  | 3/2003  | Truckai et al.               | 7,179,271 | B2   | 2/2007  | Friedman et al.               |
| 6,537,291 | B2  | 3/2003  | Friedman et al.              | 7,186,253 | B2   | 3/2007  | Truckai et al.                |
| 6,543,452 | B1  | 4/2003  | Lavigne                      | 7,189,233 | B2   | 3/2007  | Truckai et al.                |
| 6,543,456 | B1  | 4/2003  | Freeman                      | 7,204,820 | B2   | 4/2007  | Akahoshi                      |
| 6,544,260 | B1  | 4/2003  | Markel et al.                | 7,220,951 | B2   | 5/2007  | Truckai et al.                |
| 6,561,983 | B2  | 5/2003  | Cronin et al.                | 7,223,229 | B2   | 5/2007  | Inman et al.                  |
| 6,572,632 | B2  | 6/2003  | Zisterer et al.              | 7,229,455 | B2   | 6/2007  | Sakurai et al.                |
| 6,575,969 | B1  | 6/2003  | Rittman, III et al.          | 7,273,483 | B2   | 9/2007  | Wiener et al.                 |
| 6,582,451 | B1  | 6/2003  | Marucci et al.               | 7,309,849 | B2   | 12/2007 | Truckai et al.                |
| 6,589,200 | B1  | 7/2003  | Schwemberger et al.          | 7,311,709 | B2   | 12/2007 | Truckai et al.                |
| 6,589,239 | B2  | 7/2003  | Khandkar et al.              | 7,317,955 | B2   | 1/2008  | McGreevy                      |
| D478,986  | S * | 8/2003  | Johnston et al. .... D24/133 | 7,326,236 | B2   | 2/2008  | Andreas et al.                |
| 6,616,450 | B2  | 9/2003  | Mössle et al.                | 7,331,410 | B2   | 2/2008  | Yong et al.                   |
| 6,623,501 | B2  | 9/2003  | Heller et al.                | 7,353,068 | B2   | 4/2008  | Tanaka et al.                 |
| 6,626,926 | B2  | 9/2003  | Friedman et al.              | 7,354,440 | B2   | 4/2008  | Truckal et al.                |
| 6,633,234 | B2  | 10/2003 | Wiener et al.                | 7,380,695 | B2   | 6/2008  | Doll et al.                   |
| 6,656,177 | B2  | 12/2003 | Truckai et al.               | 7,381,209 | B2   | 6/2008  | Truckai et al.                |
| 6,662,127 | B2  | 12/2003 | Wiener et al.                | 7,390,317 | B2   | 6/2008  | Taylor et al.                 |
| 6,663,941 | B2  | 12/2003 | Brown et al.                 | D575,401  | S *  | 8/2008  | Hixson et al. .... D24/144    |
| 6,676,660 | B2  | 1/2004  | Wampler et al.               | 7,408,288 | B2   | 8/2008  | Hara                          |
| 6,678,621 | B2  | 1/2004  | Wiener et al.                | D576,725  | S    | 9/2008  | Shumer et al.                 |
| 6,679,899 | B2  | 1/2004  | Wiener et al.                | D578,643  | S    | 10/2008 | Shumer et al.                 |
| 6,682,544 | B2  | 1/2004  | Mastri et al.                | D578,644  | S    | 10/2008 | Shumer et al.                 |
| 6,716,215 | B1  | 4/2004  | David et al.                 | D578,645  | S    | 10/2008 | Shumer et al.                 |
| 6,731,047 | B2  | 5/2004  | Kauf et al.                  | 7,431,704 | B2   | 10/2008 | Babaev                        |
| 6,733,506 | B1  | 5/2004  | McDevitt et al.              | D582,038  | S *  | 12/2008 | Swoyer et al. .... D24/144    |
| 6,762,535 | B2  | 7/2004  | Take et al.                  | D583,051  | S *  | 12/2008 | Lee et al. .... D24/133       |
| 6,770,072 | B1  | 8/2004  | Truckai et al.               | 7,472,815 | B2   | 1/2009  | Shelton, IV et al.            |
| 6,773,444 | B2  | 8/2004  | Messerly                     | 7,479,148 | B2   | 1/2009  | Beaupré et al.                |
| 6,786,382 | B1  | 9/2004  | Hoffman                      | 7,479,160 | B2   | 1/2009  | Branch et al.                 |
| 6,786,383 | B2  | 9/2004  | Stegelmann                   | D586,916  | S *  | 2/2009  | Faulkner et al. .... D24/146  |
| 6,790,216 | B1  | 9/2004  | Ishikawa                     | 7,494,468 | B2   | 2/2009  | Rabiner et al.                |
| 6,802,843 | B2  | 10/2004 | Truckai et al.               | 7,503,893 | B2   | 3/2009  | Kucklick                      |
| 6,828,712 | B2  | 12/2004 | Battaglin et al.             | 7,534,243 | B1   | 5/2009  | Chin et al.                   |
| 6,869,439 | B2  | 3/2005  | White et al.                 | D594,983  | S    | 6/2009  | Price et al.                  |
| 6,875,220 | B2  | 4/2005  | Du et al.                    | 7,567,012 | B2   | 7/2009  | Namikawa                      |
| 6,905,497 | B2  | 6/2005  | Truckai et al.               | D618,797  | S    | 6/2010  | Price et al.                  |
| 6,908,472 | B2  | 6/2005  | Wiener et al.                | D620,593  | S *  | 7/2010  | Tran et al. .... D24/144      |
| 6,913,579 | B2  | 7/2005  | Truckai et al.               | 7,751,115 | B2   | 7/2010  | Song                          |
| 6,926,716 | B2  | 8/2005  | Baker et al.                 | 7,770,774 | B2   | 8/2010  | Mastri et al.                 |
| 6,929,632 | B2  | 8/2005  | Nita et al.                  | 7,780,659 | B2   | 8/2010  | Okada et al.                  |
| 6,929,644 | B2  | 8/2005  | Truckai et al.               | 7,799,028 | B2 * | 9/2010  | Schechter et al. .... 606/51  |
| D509,589  | S   | 9/2005  | Wells                        | 7,799,039 | B2 * | 9/2010  | Shelton et al. .... 606/142   |
| 6,945,981 | B2  | 9/2005  | Donofrio et al.              | D631,155  | S    | 1/2011  | Peine et al.                  |
| D511,145  | S   | 11/2005 | Donofrio et al.              | 7,876,030 | B2   | 1/2011  | Taki et al.                   |
| 6,976,844 | B2  | 12/2005 | Hickok et al.                | D631,965  | S    | 2/2011  | Price et al.                  |
| 6,976,969 | B2  | 12/2005 | Messerly                     | 7,892,606 | B2   | 2/2011  | Thies et al.                  |
| 6,977,495 | B2  | 12/2005 | Donofrio                     | 7,901,423 | B2   | 3/2011  | Stulen et al.                 |
| 6,984,220 | B2  | 1/2006  | Wuchinich                    | 7,935,052 | B2 * | 5/2011  | Dumbauld .... 600/205         |
| 7,011,657 | B2  | 3/2006  | Truckai et al.               | D640,789  | S *  | 6/2011  | Peine et al. .... D24/133     |
| 7,041,083 | B2  | 5/2006  | Chu et al.                   | 7,959,050 | B2   | 6/2011  | Smith et al.                  |
|           |     |         |                              | 7,959,626 | B2   | 6/2011  | Hong et al.                   |
|           |     |         |                              | 7,976,544 | B2   | 7/2011  | McClurken et al.              |
|           |     |         |                              | 8,038,693 | B2 * | 10/2011 | Allen .... 606/169            |
|           |     |         |                              | 8,057,498 | B2   | 11/2011 | Robertson                     |



(56)

References Cited

U.S. PATENT DOCUMENTS

8,058,771 B2 11/2011 Giordano et al.  
 8,142,473 B2 \* 3/2012 Cunningham ..... 606/205  
 8,167,185 B2 \* 5/2012 Shelton et al. .... 227/175.1  
 8,267,945 B2 \* 9/2012 Nguyen et al. .... 606/143  
 8,274,273 B2 \* 9/2012 Nguyen et al. .... 324/126  
 D668,337 S \* 10/2012 Schurg ..... D24/144  
 8,292,152 B2 \* 10/2012 Milliman et al. .... 227/175.1  
 8,292,155 B2 \* 10/2012 Shelton et al. .... 227/176.1  
 8,298,232 B2 \* 10/2012 Unger ..... 606/51  
 8,328,822 B2 \* 12/2012 Huitema et al. .... 606/142  
 8,338,726 B2 \* 12/2012 Palmer et al. .... 200/1 B  
 8,342,377 B2 \* 1/2013 Milliman et al. .... 227/175.2  
 8,361,072 B2 \* 1/2013 Dumbauld et al. .... 606/51  
 8,372,099 B2 \* 2/2013 Deville et al. .... 606/169  
 8,377,085 B2 \* 2/2013 Smith et al. .... 606/169  
 2001/0025184 A1 9/2001 Messerly  
 2001/0031950 A1 10/2001 Ryan  
 2001/0039419 A1 11/2001 Francischelli et al.  
 2002/0002377 A1 1/2002 Cimino  
 2002/0019649 A1 2/2002 Sikora et al.  
 2002/0022836 A1 2/2002 Goble et al.  
 2002/0077550 A1 6/2002 Rabiner et al.  
 2002/0156493 A1 10/2002 Houser et al.  
 2003/0055443 A1 3/2003 Spotnitz  
 2003/0212332 A1 11/2003 Fenton et al.  
 2004/0030254 A1 2/2004 Babaev  
 2004/0047485 A1 3/2004 Sherrit et al.  
 2004/0092921 A1 5/2004 Kadziauskas et al.  
 2004/0097919 A1 5/2004 Wellman et al.  
 2004/0097996 A1 5/2004 Rabiner et al.  
 2004/0199193 A1 10/2004 Hayashi et al.  
 2004/0204728 A1 10/2004 Haefner  
 2004/0243157 A1 12/2004 Connor et al.  
 2004/0260300 A1 12/2004 Gorenssek et al.  
 2005/0033337 A1 2/2005 Muir et al.  
 2005/0049546 A1 3/2005 Messerly et al.  
 2005/0143769 A1 6/2005 White et al.  
 2005/0149108 A1 7/2005 Cox  
 2005/0165345 A1 7/2005 Laufer et al.  
 2005/0177184 A1 8/2005 Easley  
 2005/0192610 A1 9/2005 Houser et al.  
 2005/0209620 A1 9/2005 Du et al.  
 2005/0261581 A1 11/2005 Hughes et al.  
 2005/0261588 A1 11/2005 Makin et al.  
 2005/0288659 A1 12/2005 Kimura et al.  
 2006/0030797 A1 2/2006 Zhou et al.  
 2006/0063130 A1 3/2006 Hayman et al.  
 2006/0079878 A1 4/2006 Houser  
 2006/0084963 A1 4/2006 Messerly  
 2006/0190034 A1 8/2006 Nishizawa et al.  
 2006/0211943 A1 9/2006 Beaupre  
 2006/0235306 A1 10/2006 Cotter et al.  
 2006/0253050 A1 11/2006 Yoshimine et al.  
 2007/0016235 A1 1/2007 Tanaka et al.  
 2007/0016236 A1 1/2007 Beaupre  
 2007/0055228 A1 3/2007 Berg  
 2007/0060915 A1 3/2007 Kucklick  
 2007/0063618 A1 3/2007 Bromfield  
 2007/0129716 A1 6/2007 Daw et al.  
 2007/0130771 A1 6/2007 Ehlert et al.  
 2007/0131034 A1 6/2007 Ehlert et al.  
 2007/0149881 A1 6/2007 Rabin  
 2007/0162050 A1 7/2007 Sartor  
 2007/0173872 A1 7/2007 Neuenfeldt  
 2007/0185380 A1 8/2007 Kucklick  
 2007/0219481 A1 9/2007 Babaev  
 2007/0249941 A1 10/2007 Salehi et al.  
 2007/0260234 A1 11/2007 McCullagh et al.  
 2007/0265560 A1 11/2007 Soltani et al.  
 2007/0275348 A1 11/2007 Lemon  
 2007/0282335 A1 12/2007 Young et al.  
 2007/0287933 A1 12/2007 Phan et al.  
 2008/0009848 A1 1/2008 Paraschiv et al.  
 2008/0058585 A1 3/2008 Novak et al.  
 2008/0058775 A1 3/2008 Darian et al.

2008/0058845 A1 3/2008 Shimizu et al.  
 2008/0082039 A1 4/2008 Babaev  
 2008/0082098 A1 4/2008 Tanaka et al.  
 2008/0172051 A1 7/2008 Masuda et al.  
 2008/0177268 A1 7/2008 Daum et al.  
 2008/0188878 A1 8/2008 Young  
 2008/0200940 A1 8/2008 Eichmann et al.  
 2008/0208231 A1 8/2008 Ota et al.  
 2008/0234708 A1 9/2008 Houser et al.  
 2008/0234709 A1 9/2008 Houser  
 2008/0234710 A1 9/2008 Neurohr et al.  
 2008/0234711 A1 9/2008 Houser et al.  
 2008/0262490 A1 10/2008 Williams  
 2008/0281200 A1 11/2008 Voic et al.  
 2008/0287948 A1 11/2008 Newton et al.  
 2009/0030311 A1 1/2009 Stulen et al.  
 2009/0030351 A1 1/2009 Wiener et al.  
 2009/0030437 A1 1/2009 Houser et al.  
 2009/0030438 A1 1/2009 Stulen  
 2009/0030439 A1 1/2009 Stulen  
 2009/0036911 A1 2/2009 Stulen  
 2009/0036912 A1 2/2009 Wiener et al.  
 2009/0036913 A1 2/2009 Wiener et al.  
 2009/0036914 A1 2/2009 Houser  
 2009/0076506 A1 3/2009 Baker  
 2009/0082716 A1 3/2009 Akahoshi  
 2009/0105750 A1 4/2009 Price et al.  
 2009/0118802 A1 5/2009 Mioduski et al.  
 2009/0143806 A1 6/2009 Witt et al.  
 2009/0270853 A1 10/2009 Yachi et al.  
 2010/0036370 A1 2/2010 Mirel et al.  
 2010/0036405 A1 2/2010 Giordano et al.  
 2010/0158307 A1 6/2010 Kubota et al.  
 2010/0179577 A1 7/2010 Houser  
 2010/0187283 A1 7/2010 Crainich et al.  
 2010/0298743 A1 11/2010 Nield et al.  
 2010/0298851 A1 11/2010 Nield  
 2010/0331869 A1 12/2010 Voegele et al.  
 2010/0331870 A1 12/2010 Wan et al.  
 2010/0331871 A1 12/2010 Nield et al.  
 2010/0331872 A1 12/2010 Houser et al.  
 2011/0009850 A1 1/2011 Main et al.  
 2011/0015627 A1 1/2011 DiNardo et al.  
 2011/0015631 A1 1/2011 Wiener et al.  
 2011/0015660 A1 1/2011 Wiener et al.  
 2011/0082486 A1 4/2011 Messerly et al.  
 2011/0087212 A1 4/2011 Aldridge et al.  
 2011/0087213 A1 4/2011 Messerly et al.  
 2011/0087214 A1 4/2011 Giordano et al.  
 2011/0087215 A1 4/2011 Aldridge et al.  
 2011/0087216 A1 4/2011 Aldridge et al.  
 2011/0087217 A1 4/2011 Yates et al.  
 2011/0087218 A1 4/2011 Boudreaux et al.  
 2011/0087256 A1 4/2011 Wiener et al.  
 2011/0092972 A1 4/2011 Allen  
 2011/0125175 A1 5/2011 Stulen et al.  
 2011/0196286 A1 8/2011 Robertson et al.  
 2011/0196287 A1 8/2011 Robertson et al.  
 2011/0196398 A1 8/2011 Robertson et al.  
 2011/0196399 A1 8/2011 Robertson et al.  
 2011/0196400 A1 8/2011 Robertson et al.  
 2011/0196401 A1 8/2011 Robertson et al.  
 2011/0196402 A1 8/2011 Robertson et al.  
 2011/0196403 A1 8/2011 Robertson et al.  
 2011/0196404 A1 8/2011 Dietz et al.  
 2011/0196405 A1 8/2011 Dietz  
 2011/0288452 A1 11/2011 Houser et al.  
 2012/0029546 A1 2/2012 Robertson

FOREIGN PATENT DOCUMENTS

CN 1694649 A 11/2005  
 CN 1922563 A 2/2007  
 CN 101040799 A 9/2007  
 EP 171967 A3 11/1987  
 EP 443256 A1 8/1991  
 EP 456470 B1 1/1996  
 EP 482195 A1 1/1996  
 EP 612570 A2 6/1997

(56)

**References Cited**

FOREIGN PATENT DOCUMENTS

EP 908148 A1 1/2002  
EP 908155 A1 6/2003  
EP 1199044 A1 12/2005  
EP 1832259 A1 9/2007  
EP 1844720 A1 10/2007  
EP 1862133 A1 12/2007  
EP 1974771 A1 10/2008  
EP 2074959 B1 12/2012  
GB 2032221 A 4/1980  
GB 2447767 A 9/2008  
WO 92/22259 12/1992

WO 93/14708 8/1993  
WO 98/37815 9/1998  
WO 01/54590 B1 8/2001  
WO 2005122917 A1 12/2005  
WO 2006129465 A1 12/2006  
WO 2006042210 A3 1/2007  
WO 2007143665 A3 4/2008  
WO 2008130793 A1 10/2008  
WO 2008016886 A3 12/2008  
WO 2009027065 A1 3/2009  
WO 2007047531 A3 4/2009  
WO 2006058223 A3 5/2009  
WO 2009018406 A3 7/2009

\* cited by examiner

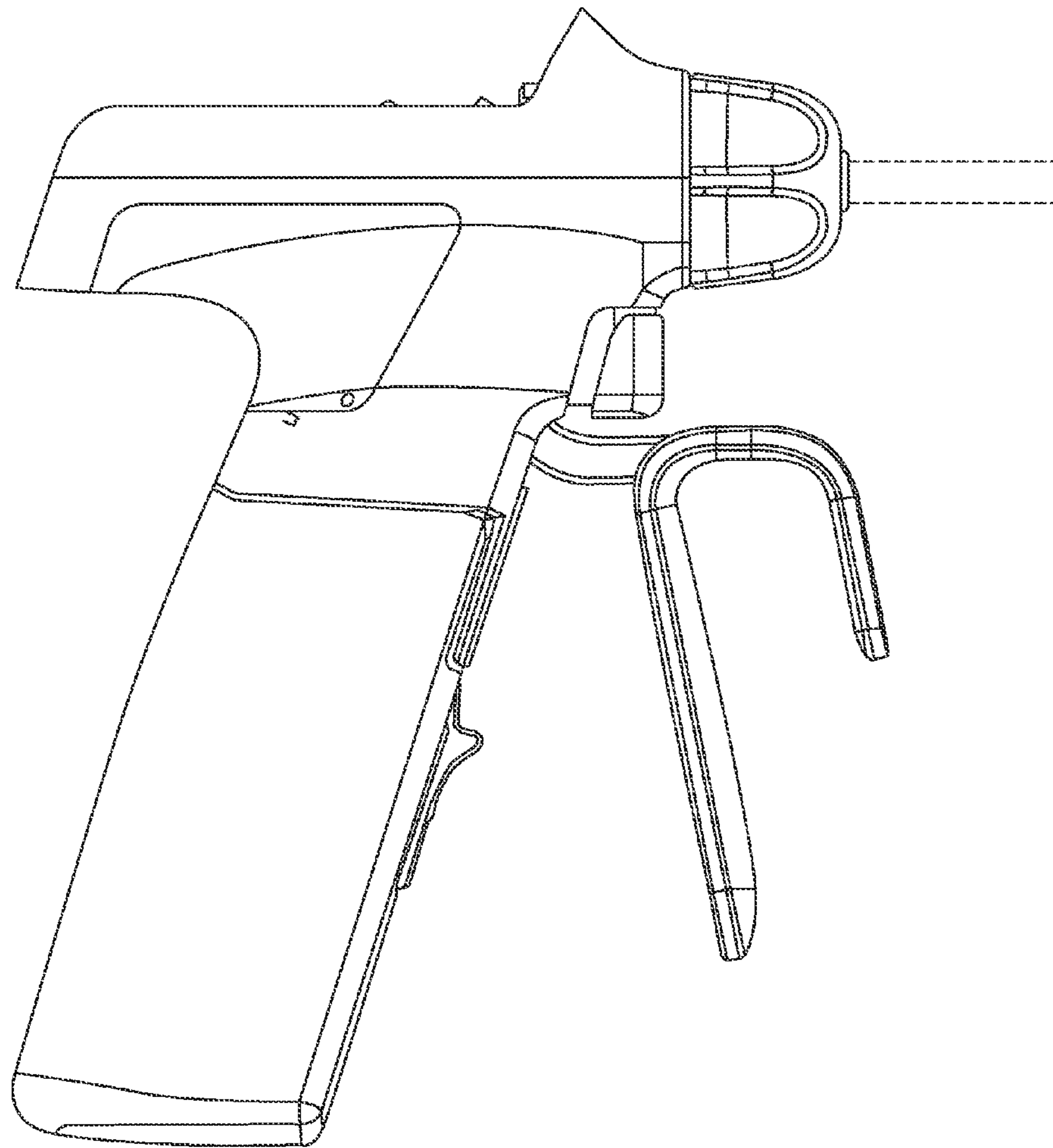


FIG. 1



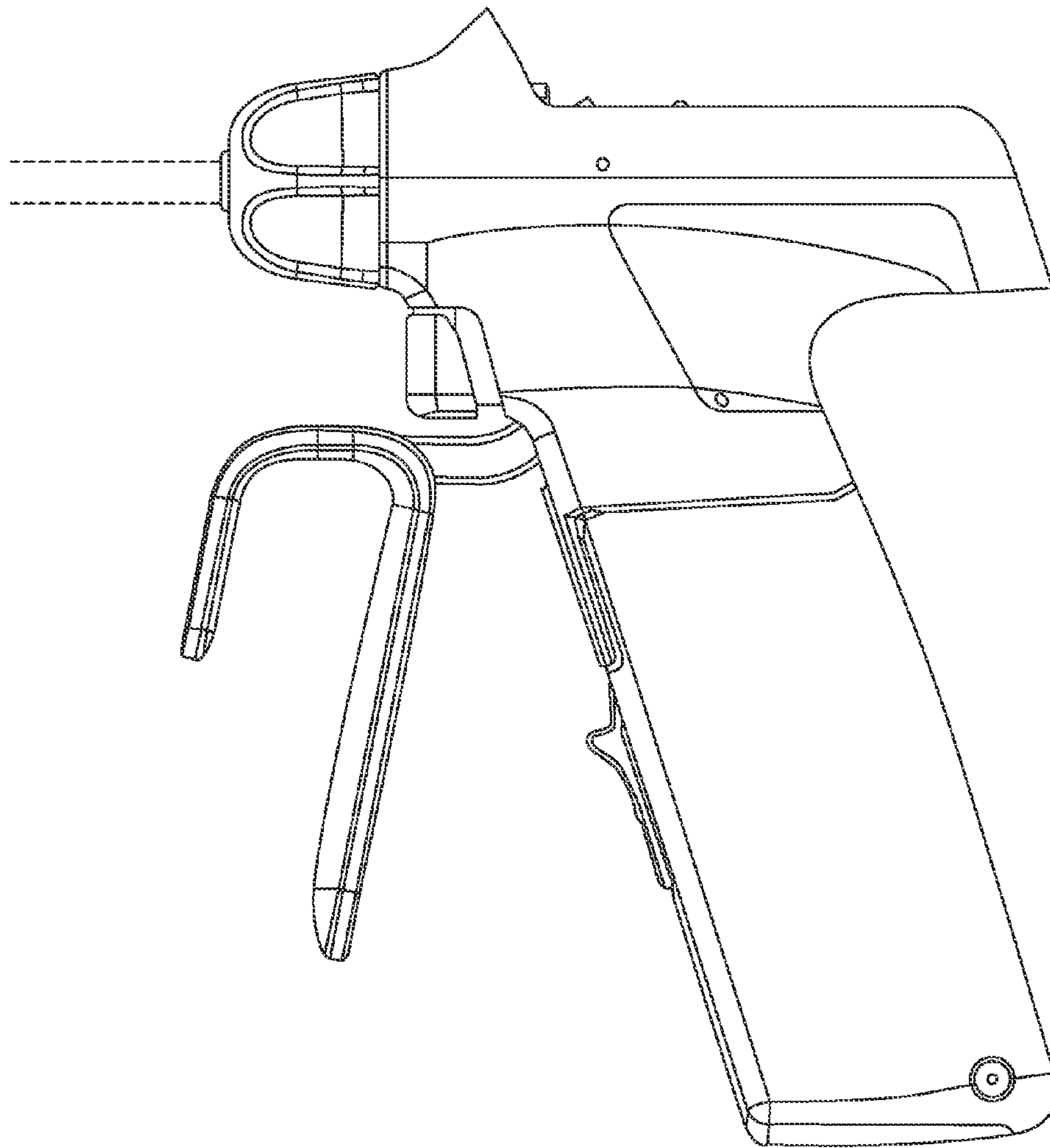


FIG. 2

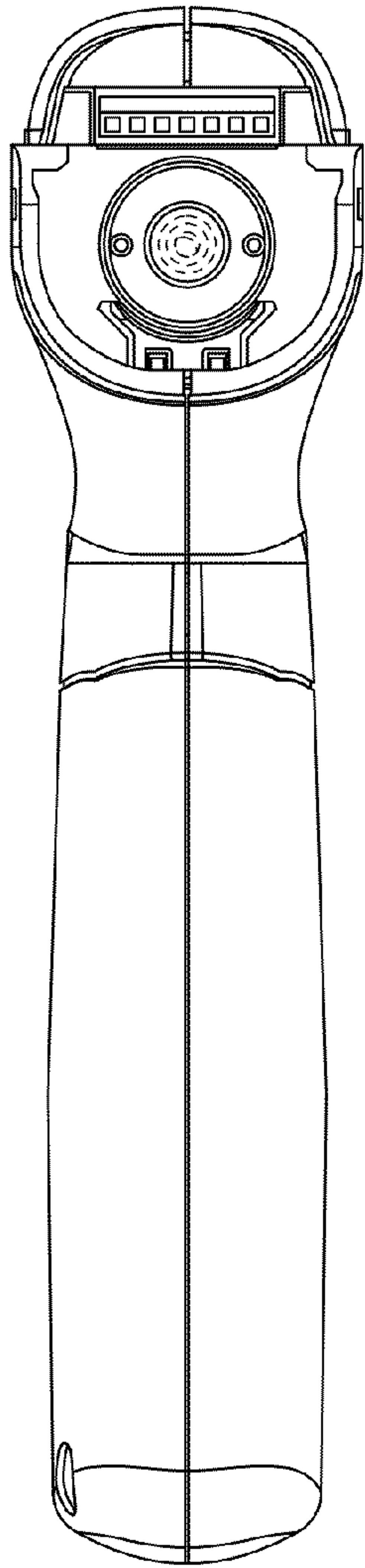


FIG. 3

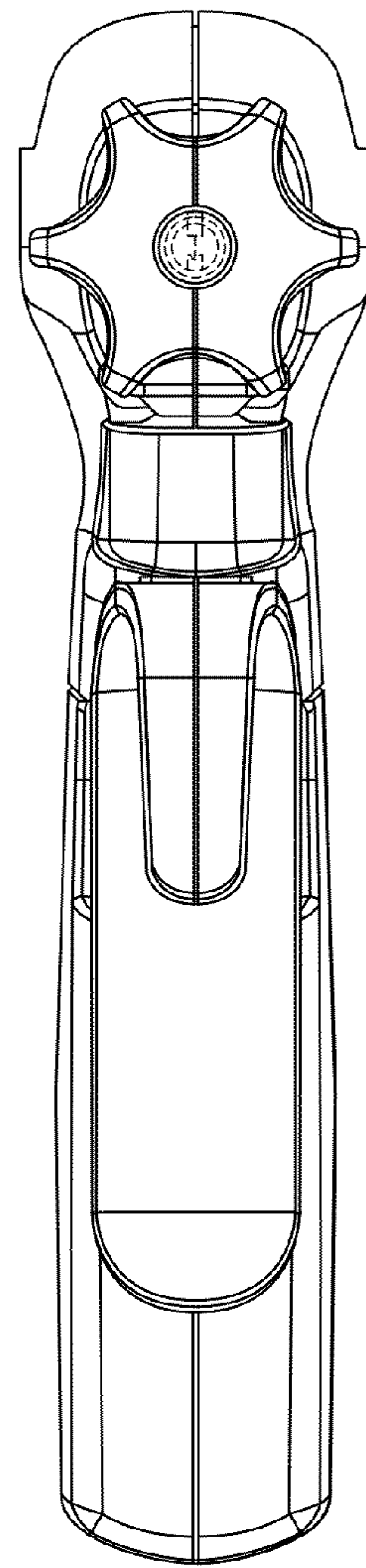


FIG. 4



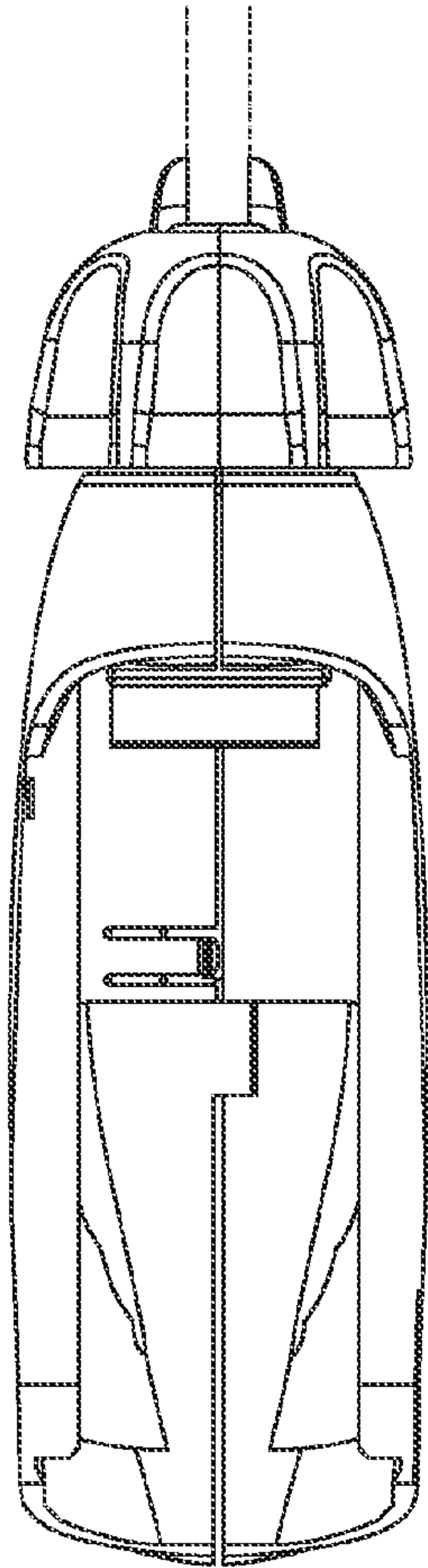


FIG. 5

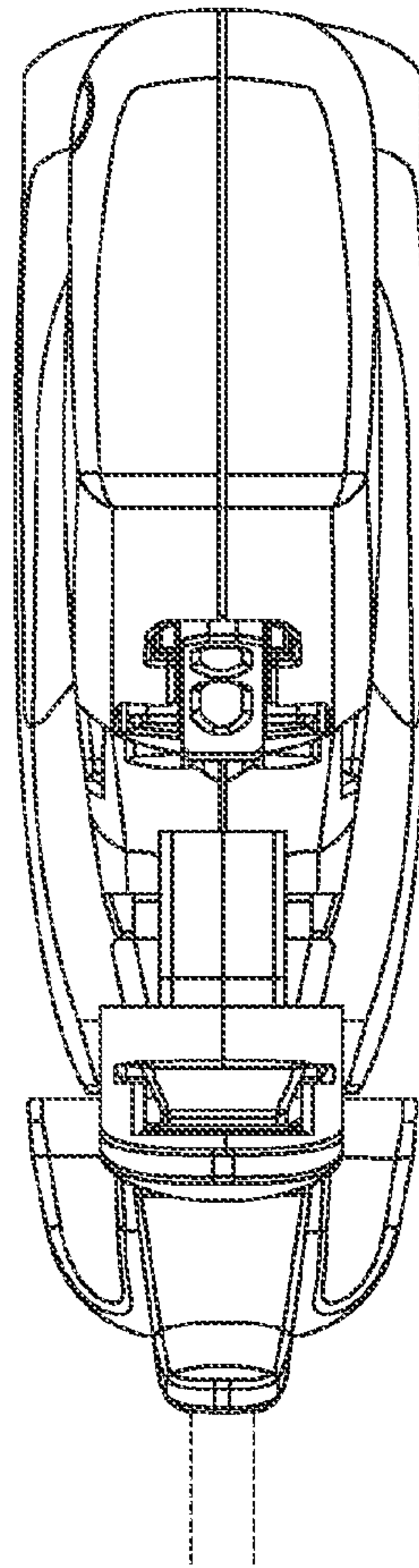


FIG. 6

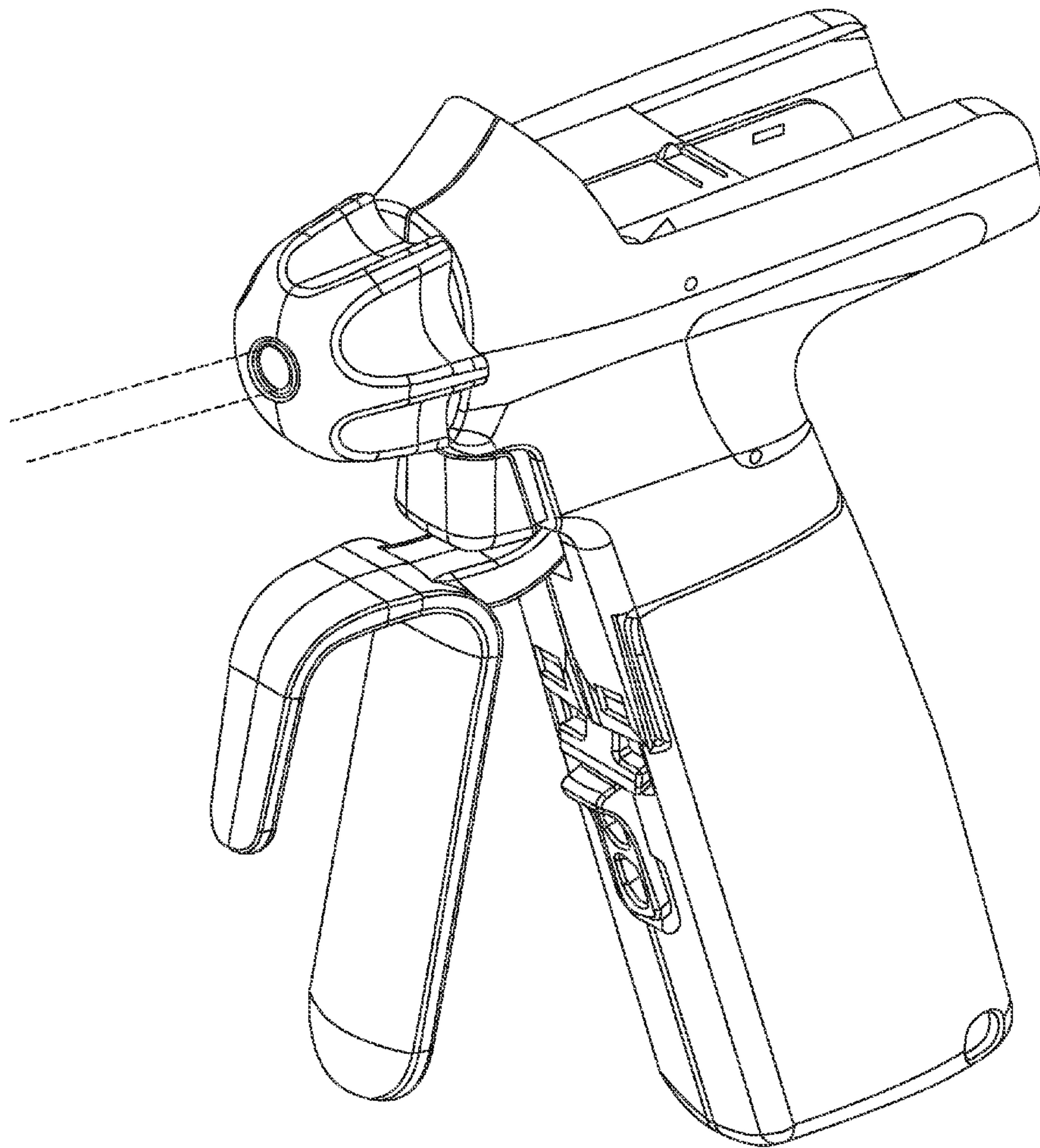


FIG. 7



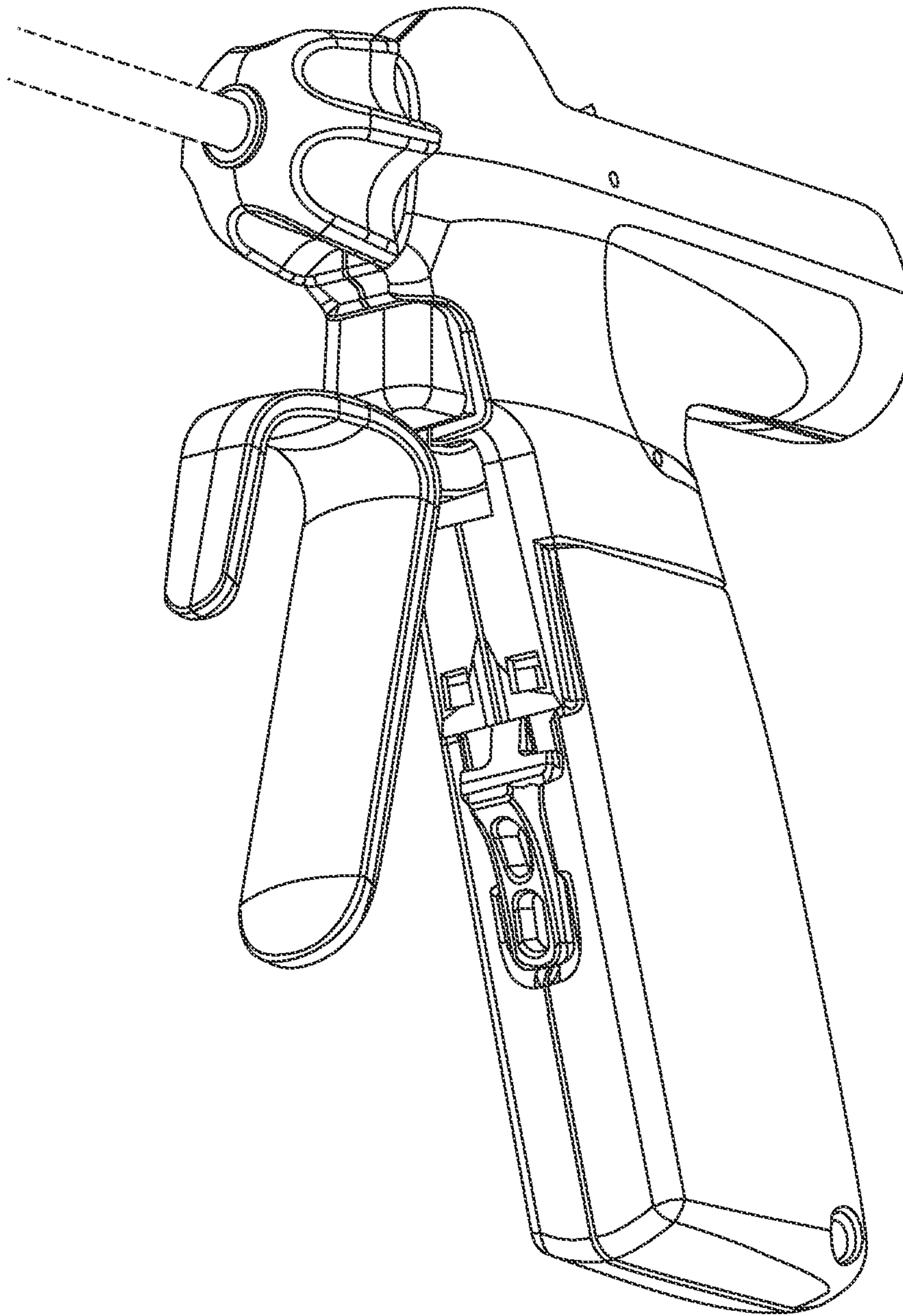


FIG. 8

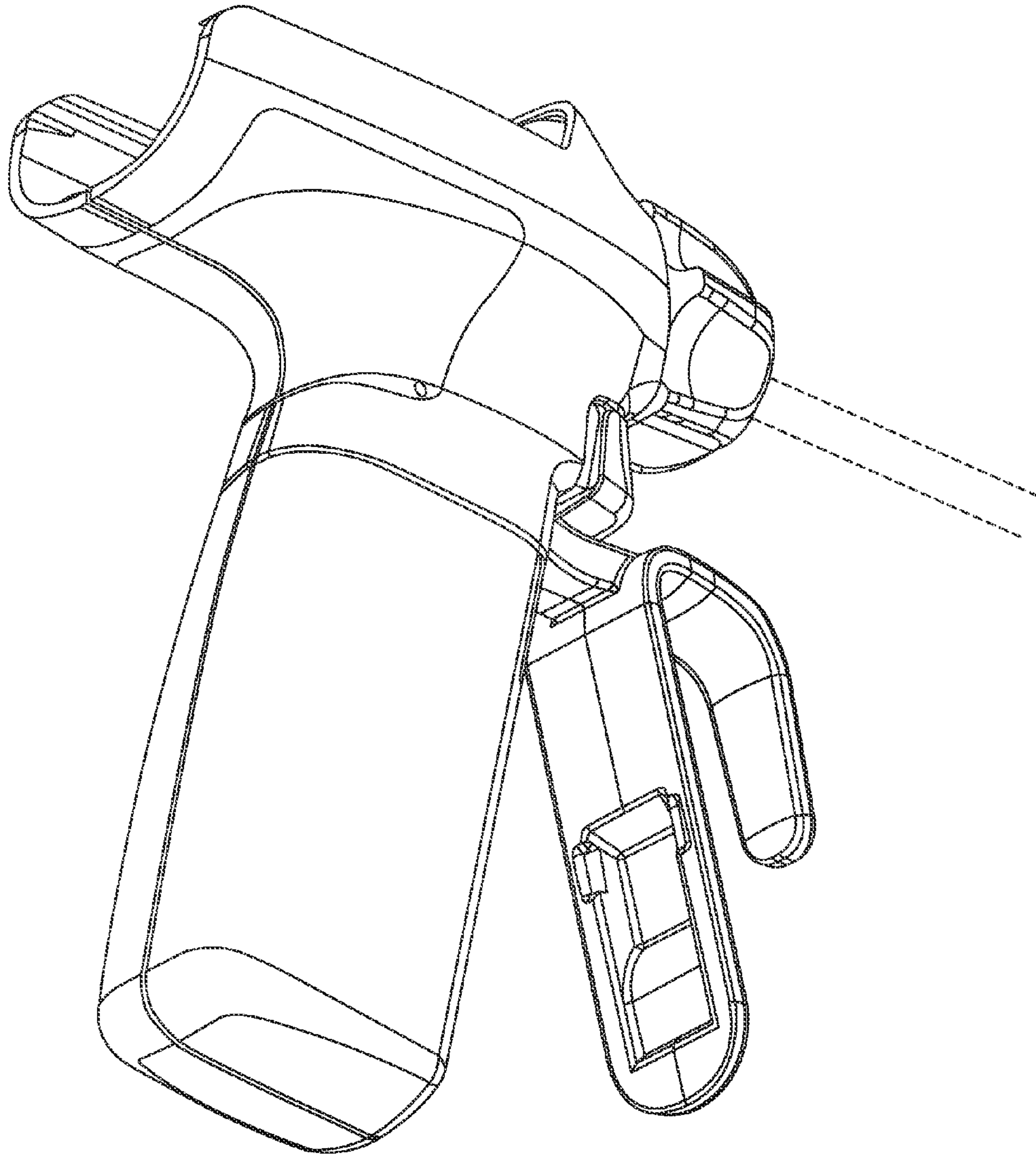


FIG. 9



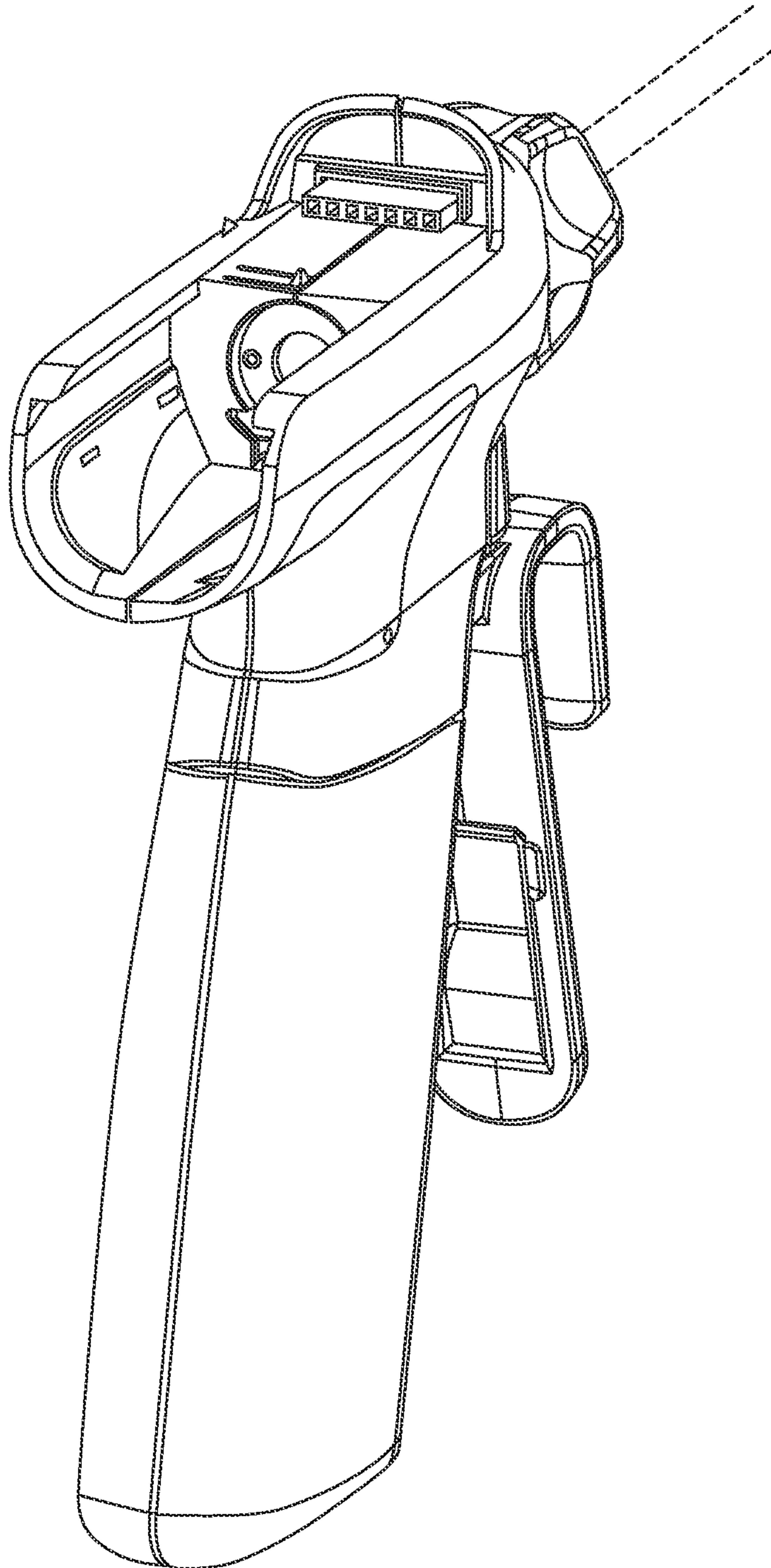


FIG. 10