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(12) **United States Design Patent**  
**Smith et al.**

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(54) **IMPLANT REMOVAL TOOL AND ASSEMBLY**

2,168,437 A 8/1939 Buercklin  
2,531,724 A 11/1950 Cevasco  
D179,537 S 1/1957 Floyd et al.

(Continued)

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**FOREIGN PATENT DOCUMENTS**

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EP 1300129 A2 4/2003  
EP 1600187 1/2009

(Continued)

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

(57) **CLAIM**

The ornamental design for an implant removal tool and assembly, as shown and described.

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**DESCRIPTION**

(51) **LOC (13) Cl.** ..... **24-02**

(52) **U.S. Cl.**  
USPC ..... **D24/143**

(58) **Field of Classification Search**  
USPC ..... D24/133, 143, 144, 169; D8/57, 52, 58, D8/72; 604/59, 60, 73  
CPC ..... A61B 17/08; A61B 17/10; A61B 17/28; A61B 17/29; A61B 17/68; A61B 17/083; A61B 17/122; A61B 17/128; A61B 17/0487; A61B 17/0491; A61B 17/221; A61B 17/3403; A61B 17/2468; A61B 2017/2808; A61B 2017/2926; A61B 2017/2946; A61M 27/00; A61M 27/002  
See application file for complete search history.

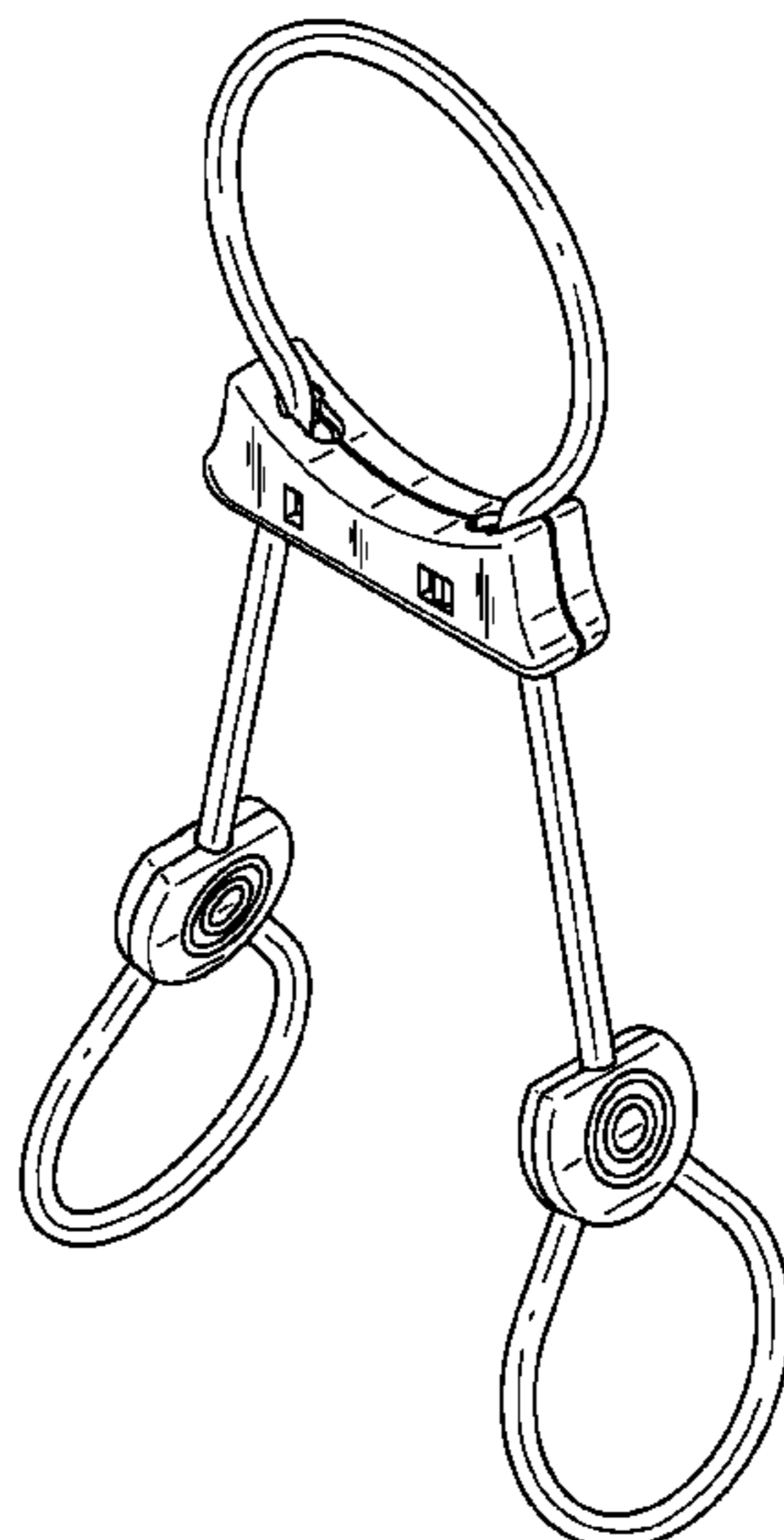
FIG. 1 is a perspective view of the implant removal tool and assembly;  
FIG. 2 is a front view of the design for the implant removal tool and assembly of FIG. 1;  
FIG. 3 is a back view of the design for the implant removal tool and assembly of FIG. 1;  
FIG. 4 is a first side view of the design for the implant removal tool and assembly of FIG. 1;  
FIG. 5 is a second side view of the design for the implant removal tool and assembly of FIG. 1;  
FIG. 6 is a top view for the design for the implant removal tool and assembly of FIG. 1;  
FIG. 7 is a bottom view for the design of the implant removal tool and assembly of FIG. 1; and,  
FIG. 8 is a perspective exploded view for the design of the implant removal tool and assembly of FIG. 1.  
The broken line showing in the drawings is included for the purpose of illustrating portions of the implant removal tool and assembly and forms no part of the claimed design.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

1,560,687 A \* 11/1925 Arthurh ..... A61B 17/122 606/120  
1,655,158 A 1/1928 Muir

**1 Claim, 8 Drawing Sheets**



(56)

References Cited

U.S. PATENT DOCUMENTS

3,025,991 A	3/1962	Gillon	5,994,028 A	2/1991	Leonard et al.	
3,122,162 A	2/1964	Sands	5,006,346 A	4/1991	Theeuwes et al.	
3,538,916 A	11/1970	Groff et al.	5,023,088 A	6/1991	Wong et al.	
3,620,216 A	11/1971	Szymanski	5,024,842 A	6/1991	Edgren et al.	
3,625,214 A	12/1971	Higuchi	5,030,216 A	7/1991	Theeuwes et al.	
3,669,104 A	6/1972	Wyatt et al.	5,030,224 A *	7/1991	Wright .....	A61B 17/083 600/209
D226,915 S	5/1973	Huggins	5,034,229 A	7/1991	Magruder et al.	
3,732,865 A	5/1973	Higuchi et al.	5,053,014 A	10/1991	Heugten	
3,766,915 A	10/1973	Rychlik	5,057,318 A	10/1991	Magruder et al.	
3,797,492 A	3/1974	Place	5,059,423 A	10/1991	Magruder et al.	
D236,035 S	7/1975	Ciencewicki	5,072,070 A	12/1991	Balsells	
3,987,790 A	10/1976	Eckenhoff et al.	5,079,388 A	1/1992	Balsells	
3,995,631 A	12/1976	Higuchi et al.	5,090,962 A	2/1992	Landry et al.	
3,995,632 A	12/1976	Nakano et al.	5,108,078 A	4/1992	Balsells	
4,008,719 A	2/1977	Theeuwes et al.	5,110,596 A	5/1992	Magruder et al.	
4,034,756 A	7/1977	Higuchi et al.	5,112,614 A	5/1992	Magruder et al.	
4,105,030 A	8/1978	Kercso	5,113,938 A	5/1992	Clayton	
4,111,201 A	9/1978	Theeuwes	5,117,066 A	5/1992	Balsells	
4,111,202 A	9/1978	Theeuwes	D326,718 S	6/1992	Maxwell et al.	
4,111,203 A	9/1978	Theeuwes	5,122,128 A	6/1992	Cardinal et al.	
4,203,439 A	5/1980	Theeuwes	5,126,142 A	6/1992	Ayer et al.	
4,223,674 A	9/1980	Fluent et al.	5,134,244 A	7/1992	Balsells	
4,243,030 A	1/1981	Lynch et al.	5,137,727 A	8/1992	Eckenhoff	
D258,837 S	4/1981	Spranger et al.	D329,278 S	9/1992	Gallup	
D259,056 S *	4/1981	Zwart .....	5,147,295 A	9/1992	Stewart	
D259,458 S	6/1981	Fuller et al.	5,151,093 A	9/1992	Theeuwes et al.	
4,340,054 A	7/1982	Michaels	5,160,122 A	11/1992	Balsells	
4,350,271 A	9/1982	Eckenhoff	5,161,806 A	11/1992	Balsells	
4,373,527 A	2/1983	Fischell	5,180,591 A	1/1993	Margruder et al.	
D271,990 S	12/1983	Lyne	5,190,765 A	3/1993	Jao et al.	
4,439,196 A	3/1984	Higuchi	5,192,273 A	3/1993	Bierman	
4,444,187 A *	4/1984	Perlin .....	5,203,849 A	4/1993	Balsells	
		A61B 17/1227 606/158	5,207,752 A	5/1993	Sorensen et al.	
4,444,498 A	4/1984	Heinemann	5,209,746 A	5/1993	Balaban et al.	
4,451,253 A	5/1984	Harman	5,213,809 A	5/1993	Wright et al.	
4,455,143 A	6/1984	Theeuwes et al.	5,219,572 A	6/1993	Sivaramakrishnan	
4,455,145 A	6/1984	Theeuwes	5,221,278 A	6/1993	Linkwitz et al.	
4,474,572 A	10/1984	McNaughton et al.	5,223,265 A	6/1993	Wong	
4,530,840 A	7/1985	Tice et al.	5,234,424 A	8/1993	Yum et al.	
4,552,561 A	11/1985	Eckenhoff et al.	5,234,692 A	8/1993	Magruder et al.	
4,588,614 A	5/1986	Lauchenauer	5,234,693 A	8/1993	Magruder et al.	
4,597,753 A	7/1986	Turley	5,250,026 A	10/1993	Ehrlich et al.	
4,609,374 A	9/1986	Ayer	5,252,338 A	10/1993	Jao et al.	
4,639,244 A	1/1987	Rizk et al.	5,260,069 A	11/1993	Chen	
4,655,462 A	4/1987	Balsells	D342,855 S	1/1994	Butler, II	
4,673,405 A	6/1987	Guittard et al.	5,276,926 A	1/1994	Lopez	
4,753,651 A	6/1988	Eckenhoff	5,279,544 A	1/1994	Gross et al.	
4,765,989 A	8/1988	Wong et al.	5,279,554 A	1/1994	Turley	
4,783,337 A	11/1988	Wong et al.	5,279,555 A	1/1994	Lifshey	
4,818,517 A	4/1989	Kwee et al.	5,279,608 A	1/1994	Cheikh	
4,820,267 A	4/1989	Harman	5,290,271 A	3/1994	Berg	
4,826,144 A	5/1989	Balsells	5,300,079 A	4/1994	Niezink et al.	
4,830,344 A	5/1989	Balsells	5,308,348 A	5/1994	Balaban et al.	
4,834,708 A	5/1989	Pillari	5,312,335 A	5/1994	McKinnon et al.	
4,851,228 A	7/1989	Zentner et al.	5,312,389 A	5/1994	Theeuwes et al.	
4,865,845 A	9/1989	Eckenhoff et al.	5,312,390 A	5/1994	Wong	
4,871,094 A	10/1989	Gall et al.	5,318,558 A	6/1994	Linkwitz et al.	
4,874,388 A	10/1989	Wong et al.	5,320,616 A	6/1994	Magndu et al.	
4,876,781 A	10/1989	Balsells	5,324,152 A *	6/1994	Anderson, IV .....	F16B 21/12 267/182
4,886,668 A	12/1989	Haslam et al.	5,324,280 A	6/1994	Wong et al.	
4,892,778 A	1/1990	Theeuwes et al.	5,336,057 A	8/1994	Fukuda et al.	
4,893,795 A	1/1990	Balsells	5,348,544 A	9/1994	Sweeney et al.	
4,907,788 A	3/1990	Balsells	5,368,588 A	11/1994	Bettinger	
4,915,366 A	4/1990	Balsells	5,368,863 A	11/1994	Eckenhoff et al.	
4,915,949 A	4/1990	Wong et al.	5,395,319 A	3/1995	Hirsch et al.	
4,915,954 A	4/1990	Ayer et al.	D358,644 S	5/1995	Park	
4,917,895 A	4/1990	Lee et al.	5,413,572 A	5/1995	Wong et al.	
4,927,687 A	5/1990	Nuwayser	5,429,602 A	7/1995	Hauser	
4,934,666 A	6/1990	Balsells	5,443,459 A	8/1995	Wong et al.	
4,940,465 A	7/1990	Theeuwes et al.	5,456,679 A	10/1995	Balaban et al.	
4,961,253 A	10/1990	Balsells	5,472,708 A	12/1995	Chen	
4,964,204 A	10/1990	Balsells	5,484,403 A	1/1996	Yoakum et al.	
4,969,884 A	11/1990	Yum	5,498,255 A	3/1996	Wong et al.	
4,974,821 A	12/1990	Balsells	5,511,355 A	4/1996	Dingier	
4,976,966 A	12/1990	Theeuwes et al.	5,512,293 A	4/1996	Landrau et al.	
			5,514,110 A	5/1996	Teh	
			5,531,736 A	7/1996	Wong et al.	

(56)

## References Cited

## U.S. PATENT DOCUMENTS

5,540,665 A	7/1996	Mercado et al.	6,283,949 B1	9/2001	Roorda
5,542,682 A	8/1996	Goldstein et al.	6,287,295 B1	9/2001	Chen et al.
5,545,618 A	8/1996	Buckley et al.	6,375,978 B1	4/2002	Kleiner et al.
5,557,318 A	9/1996	Gabriel	D456,776 S	5/2002	Lindekugel
5,558,637 A	9/1996	Allonen et al.	6,395,292 B2	5/2002	Peery et al.
5,569,289 A	10/1996	Yoon	6,402,716 B1	6/2002	Ryoo et al.
5,613,954 A	3/1997	Nelson et al.	6,419,952 B2	7/2002	Wong et al.
5,630,796 A	5/1997	Bellhouse et al.	6,428,517 B1	8/2002	Hochman et al.
5,639,477 A	6/1997	Maruyama et al.	6,436,091 B1	8/2002	Harper et al.
5,654,008 A	8/1997	Herbert et al.	6,447,522 B2	9/2002	Gambale et al.
5,660,847 A	8/1997	Magruder et al.	6,464,688 B1	10/2002	Harper et al.
5,660,861 A	8/1997	Jao et al.	6,471,688 B1	10/2002	Harper et al.
5,668,170 A	9/1997	Gyory	6,478,768 B1	11/2002	Kneer
5,672,549 A	9/1997	Minami et al.	6,508,808 B1	1/2003	Carr et al.
5,683,405 A *	11/1997	Yacoubian ..... A61B 17/1227 24/545	6,514,517 B2	2/2003	Jamilolkowski et al.
5,686,097 A	11/1997	Taskovich et al.	6,524,305 B1	2/2003	Peterson et al.
5,688,801 A	11/1997	Mesens et al.	D472,896 S	4/2003	Peiker
5,690,952 A	11/1997	Magruder et al.	6,541,021 B1	4/2003	Johnson et al.
5,695,463 A	12/1997	Cherif-Cheikh	6,544,239 B2	4/2003	Kinsey et al.
5,697,113 A	12/1997	Shatz et al.	6,544,252 B1	4/2003	Theeuwes et al.
5,697,914 A	12/1997	Brimhall	6,547,250 B1	4/2003	Noble et al.
5,713,847 A	2/1998	Howard, III et al.	6,551,613 B1	4/2003	Dong et al.
5,725,497 A	3/1998	Woodruff et al.	6,572,890 B2	6/2003	Faour et al.
5,728,088 A	3/1998	Margruder et al.	6,589,157 B2	7/2003	Fontayne et al.
5,728,396 A	3/1998	Peery et al.	6,589,157 B2	7/2003	Fontayne et al.
5,733,572 A	3/1998	Unger et al.	6,592,508 B1	7/2003	Ravins et al.
5,770,231 A	6/1998	Mesens et al.	6,607,529 B1	8/2003	Jones et al.
5,782,396 A	7/1998	Mastri et al.	6,626,863 B1	9/2003	Berler
5,795,591 A	8/1998	Lee et al.	6,635,268 B2	10/2003	Peery et al.
5,810,769 A	9/1998	Schlegel et al.	6,645,192 B2	11/2003	Kenison et al.
D399,821 S	10/1998	Tyneski	6,682,522 B2	1/2004	Carr et al.
5,817,129 A	10/1998	Labrecque et al.	6,703,225 B1	3/2004	Kojima et al.
5,827,297 A	10/1998	Boudjema	6,752,753 B1	6/2004	Hoskins et al.
5,830,501 A	11/1998	Dong et al.	6,835,194 B2	12/2004	Johnson et al.
5,836,935 A	11/1998	Ashton et al.	6,840,931 B2	1/2005	Peterson et al.
5,861,166 A	1/1999	Eckenhoff	6,899,398 B2	5/2005	Albayrak
5,871,770 A	2/1999	Margruder et al.	6,899,887 B2	5/2005	Ayer
5,874,388 A	2/1999	Hsu	6,923,800 B2	8/2005	Chen et al.
5,882,676 A	3/1999	Lee et al.	6,939,556 B2	9/2005	Lautenbach
D408,917 S	4/1999	Hacker	6,960,192 B1	11/2005	Flaherty et al.
5,904,935 A	5/1999	Eckenhoff et al.	6,976,981 B2	12/2005	Ayer
5,906,599 A	5/1999	Kaldany	6,997,922 B2	2/2006	Theeuwes et al.
5,922,253 A	7/1999	Herbert et al.	7,008,439 B1	3/2006	Janzen et al.
5,938,654 A	8/1999	Wong et al.	7,014,636 B2	3/2006	Gilbert
5,951,521 A	9/1999	Mastrototaro et al.	7,074,423 B2	7/2006	Fereira et al.
D415,073 S	10/1999	Meehan et al.	7,090,681 B2	8/2006	Weber et al.
5,965,168 A	10/1999	Mesens et al.	7,112,335 B2	9/2006	Lautenbach
5,972,370 A	10/1999	Eckenhoff et al.	7,163,688 B2	1/2007	Peery et al.
5,976,109 A	11/1999	Heruth	7,207,982 B2	4/2007	Dionne et al.
5,984,890 A	11/1999	Gast et al.	7,214,206 B2	5/2007	Rue et al.
5,985,305 A	11/1999	Peery et al.	7,241,457 B2	7/2007	Chen et al.
5,997,527 A	12/1999	Gumucio et al.	D555,589 S	11/2007	Hussain et al.
5,997,902 A	12/1999	Maruyama et al.	7,316,680 B2	1/2008	Gilbert
6,023,802 A	2/2000	King	7,407,499 B2	8/2008	Trautman
6,029,361 A	2/2000	Newman	7,604,647 B2	10/2009	Chen
6,053,927 A	4/2000	Hamas	7,632,256 B2	12/2009	Mosier et al.
6,056,718 A	5/2000	Funderburk et al.	D608,447 S	1/2010	Meyer
6,074,377 A	6/2000	Sanfilippo, II	7,655,257 B2	2/2010	Peery et al.
6,074,673 A	6/2000	Guillen	7,682,356 B2	3/2010	Alessi et al.
D430,671 S	9/2000	Shute	7,736,665 B2	6/2010	Patel et al.
6,113,938 A	9/2000	Chen et al.	7,766,924 B1	8/2010	Bombard et al.
6,132,420 A	10/2000	Dionne et al.	7,879,028 B2	2/2011	Alessi et al.
6,146,139 A	11/2000	Harrison, III	7,919,109 B2	4/2011	Berry et al.
6,156,331 A	12/2000	Peery et al.	D638,478 S	5/2011	Block
6,174,547 B1	1/2001	Dong et al.	8,048,438 B2	11/2011	Berry et al.
6,183,461 B1	2/2001	Matsuura et al.	8,052,996 B2	11/2011	Lautenbach et al.
6,187,095 B1	2/2001	Labrecque et al.	8,158,150 B2	4/2012	Lautenbach et al.
6,190,350 B1	2/2001	Davis et al.	8,173,150 B2	5/2012	Berry et al.
6,217,906 B1	4/2001	Gumucio et al.	8,251,946 B2	8/2012	Bardy
6,245,357 B1	6/2001	Edgren et al.	8,262,667 B1	9/2012	Silver et al.
6,248,112 B1	6/2001	Gambale et al.	8,273,365 B2	9/2012	Lautenbach et al.
D445,975 S	7/2001	Stratford	D669,589 S	10/2012	Delaey
6,261,584 B1	7/2001	Peery et al.	8,343,140 B2	1/2013	Alessi et al.
6,270,787 B1	8/2001	Ayer	8,367,095 B2	2/2013	Lautenbach et al.
			D678,889 S	3/2013	Chiu
			8,454,552 B2	6/2013	Bardy
			8,470,353 B2	6/2013	Lautenbach et al.
			8,556,861 B2	10/2013	Tsals
			8,747,412 B2	6/2014	Bae et al.
			8,801,700 B2	8/2014	Alessi et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

8,845,726 B2 9/2014 Tebbe  
 8,858,621 B2 10/2014 Oba et al.  
 8,888,745 B2 11/2014 Van Der Graaf et al.  
 8,926,595 B2 1/2015 Alessi et al.  
 8,992,962 B2 3/2015 Lautenbach et al.  
 9,044,209 B2 6/2015 Dayton et al.  
 9,078,900 B2 7/2015 Kuzma et al.  
 9,241,722 B2 1/2016 Yu  
 D750,764 S 3/2016 DeSocio  
 9,332,995 B2 5/2016 Russo et al.  
 9,539,200 B2 1/2017 Lautenbach  
 9,572,889 B2 2/2017 Alessi et al.  
 D789,539 S 6/2017 Kleiner et al.  
 D789,540 S 6/2017 Gyorgy  
 RE46,577 E 10/2017 Collins et al.  
 D805,199 S 12/2017 Chen et al.  
 D810,289 S 2/2018 Jutila et al.  
 D816,843 S 5/2018 Lewis  
 D819,820 S 6/2018 Radau et al.  
 10,314,617 B2 6/2019 Bratlie  
 D860,451 S \* 9/2019 Smith ..... D24/143  
 10,512,483 B1 \* 12/2019 Ujifusa ..... A61B 17/44  
 D912,249 S \* 3/2021 Smith ..... D24/143  
 2001/0021822 A1 9/2001 Ayer  
 2001/0022974 A1 9/2001 Ayer  
 2001/0027311 A1 10/2001 Chen et al.  
 2001/0031940 A1 10/2001 Loos  
 2001/0036472 A1 11/2001 Wong et al.  
 2001/0040326 A1 11/2001 Balczun  
 2002/0048600 A1 4/2002 Bhatt et al.  
 2002/0077599 A1 6/2002 Wojcik  
 2003/0032947 A1 2/2003 Harper et al.  
 2003/0040699 A1 2/2003 Talling et al.  
 2003/0078618 A1 4/2003 Fey et al.  
 2003/0097121 A1 5/2003 Jolly et al.  
 2003/0114837 A1 6/2003 Peterson et al.  
 2003/0135153 A1 7/2003 Hagemeier  
 2003/0220617 A1 11/2003 Dickerson  
 2003/0233101 A1 12/2003 Lubock et al.  
 2004/0001689 A1 1/2004 Goldsmith et al.  
 2004/0039376 A1 2/2004 Peery et al.  
 2004/0047888 A1 3/2004 Kenison et al.  
 2004/0097906 A1 5/2004 Ferreira et al.  
 2004/0102762 A1 5/2004 Gilbert  
 2004/0115236 A1 6/2004 Chan et al.  
 2004/0142902 A1 7/2004 Struijker-Boudier  
 2004/0199140 A1 10/2004 Rue et al.  
 2004/0215133 A1 10/2004 Weber et al.  
 2004/0243106 A1 12/2004 Ayer  
 2004/0266692 A1 12/2004 Young et al.  
 2005/0004557 A1 1/2005 Russell  
 2005/0010196 A1 1/2005 Ferreira et al.  
 2005/0010942 A1 1/2005 Kim et al.  
 2005/0070883 A1 3/2005 Brown et al.  
 2005/0070927 A1 3/2005 Feinberg  
 2005/0095284 A1 5/2005 Trautman  
 2005/0101943 A1 5/2005 Ayer et al.  
 2005/0131386 A1 6/2005 Freeman et al.  
 2005/0131389 A1 6/2005 Peterson et al.  
 2005/0143749 A1 6/2005 Zalenski et al.  
 2005/0175701 A1 8/2005 Pan et al.  
 2005/0216087 A1 9/2005 Zucherman et al.  
 2006/0030526 A1 2/2006 Liu et al.  
 2006/0084922 A1 4/2006 Botha  
 2006/0106399 A1 5/2006 Taras et al.  
 2006/0224145 A1 10/2006 Gills  
 2006/0264890 A1 11/2006 Moberg et al.  
 2007/0149011 A1 6/2007 Kent et al.  
 2007/0281024 A1 12/2007 Lautenbach et al.  
 2008/0065090 A1 3/2008 Scribner et al.  
 2008/0091176 A1 4/2008 Alessi et al.  
 2008/0110515 A1 5/2008 Angelosanto et al.  
 2008/0194985 A1 8/2008 Nicoson et al.  
 2008/0208194 A1 8/2008 Bickenbach

2008/0269725 A1 10/2008 Deem et al.  
 2009/0012463 A1 1/2009 Beelen et al.  
 2009/0125030 A1 5/2009 Tebbe et al.  
 2009/0202608 A1 8/2009 Alessi et al.  
 2009/0210019 A1 8/2009 Kim et al.  
 2009/0234392 A1 9/2009 Dziedzic et al.  
 2010/0094252 A1 4/2010 Wengreen et al.  
 2010/0185184 A1 7/2010 Alessi et al.  
 2010/0298807 A1 11/2010 Jansen et al.  
 2010/0298840 A1 \* 11/2010 Schwartz ..... A61M 29/02  
 606/118  
 2010/0331868 A1 12/2010 Bardy  
 2011/0091527 A1 4/2011 Moonen et al.  
 2011/0166554 A1 7/2011 Alessi et al.  
 2012/0178687 A1 7/2012 Alessi et al.  
 2012/0208755 A1 8/2012 Leung  
 2012/0265232 A1 10/2012 Surbone  
 2012/0303045 A1 11/2012 Cooper et al.  
 2013/0296661 A1 11/2013 Bornzin et al.  
 2013/0324977 A1 12/2013 Vanderpool  
 2013/0338683 A1 \* 12/2013 Williams ..... A61B 17/1285  
 606/142  
 2014/0058409 A1 2/2014 Bratlie  
 2014/0058425 A1 2/2014 Porat  
 2014/0121741 A1 5/2014 Bennett et al.  
 2014/0148837 A1 5/2014 Levitan  
 2014/0236162 A1 8/2014 Barongan  
 2014/0257272 A1 9/2014 Clark, III et al.  
 2014/0324067 A1 10/2014 Emken et al.  
 2014/0378900 A1 12/2014 Alessi et al.  
 2015/0001118 A1 1/2015 Selepack et al.  
 2015/0111818 A1 1/2015 Alessi et al.  
 2015/0057227 A1 2/2015 Leung  
 2015/0133791 A1 5/2015 Sato et al.  
 2015/0164510 A1 \* 6/2015 Pleil ..... A61B 17/1227  
 606/157  
 2015/0231062 A1 8/2015 Lautenbach et al.  
 2015/0231256 A1 8/2015 Berry et al.  
 2015/0359553 A1 \* 12/2015 Harnisch ..... A61N 1/36036  
 606/210  
 2016/0030337 A1 2/2016 Kuzma et al.  
 2016/0354115 A1 12/2016 Smith et al.  
 2016/0354305 A1 12/2016 Alessi et al.  
 2017/0079906 A1 3/2017 Alessi et al.  
 2017/0119854 A1 5/2017 Alessi et al.  
 2017/0119855 A1 5/2017 Berry et al.  
 2017/0181964 A1 6/2017 Lautenbach et al.  
 2017/0273706 A1 9/2017 Mirza et al.  
 2018/0193059 A1 7/2018 Bae et al.  
 2020/0197012 A1 \* 6/2020 Kim ..... A61B 17/122

FOREIGN PATENT DOCUMENTS

GB 2501400 10/2013  
 JP 2010-200838 9/2010  
 RU 2154501 8/2000  
 RU 87915 10/2009  
 WO WO 1991/07160 5/1991  
 WO WO 1992/019241 A1 11/1992  
 WO WO 1994/09743 5/1994  
 WO WO 1994/21262 9/1994  
 WO WO 1995/34285 12/1995  
 WO WO 1997/47339 12/1997  
 WO WO 98/013092 A1 4/1998  
 WO WO 1998/17315 4/1998  
 WO WO 1998/20930 5/1998  
 WO WO 02/083216 10/2002  
 WO WO 2002/085428 10/2002  
 WO WO 2003/024357 3/2003  
 WO WO 2003/024503 3/2003  
 WO WO 2006/023526 3/2006  
 WO WO 2008/131440 A1 10/2008  
 WO WO 2008/139303 A2 11/2008  
 WO WO 2011/011697 1/2011  
 WO WO 2013/118109 A1 8/2013  
 WO WO 2013/160347 10/2013

\* cited by examiner

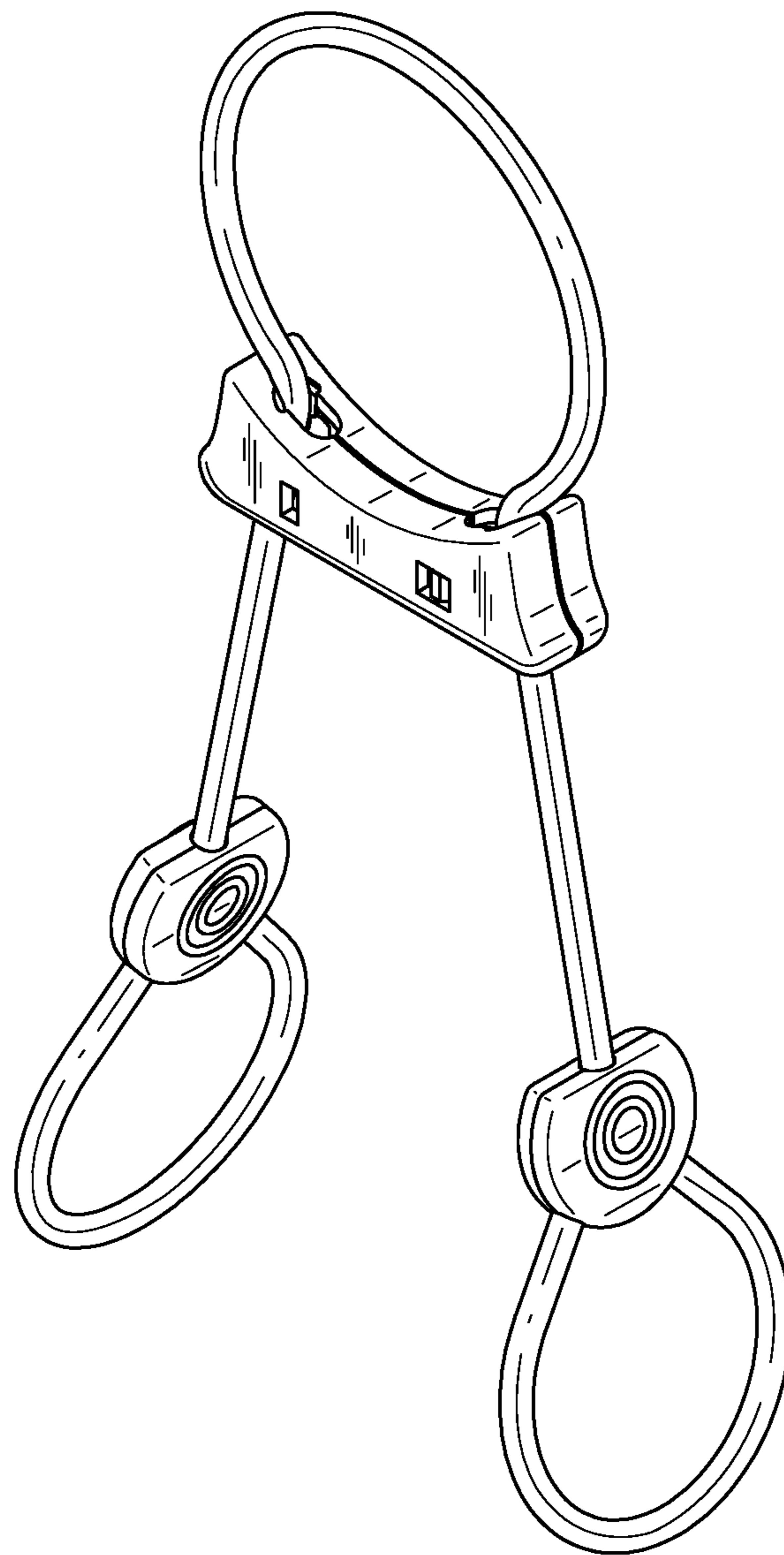


FIG. 1

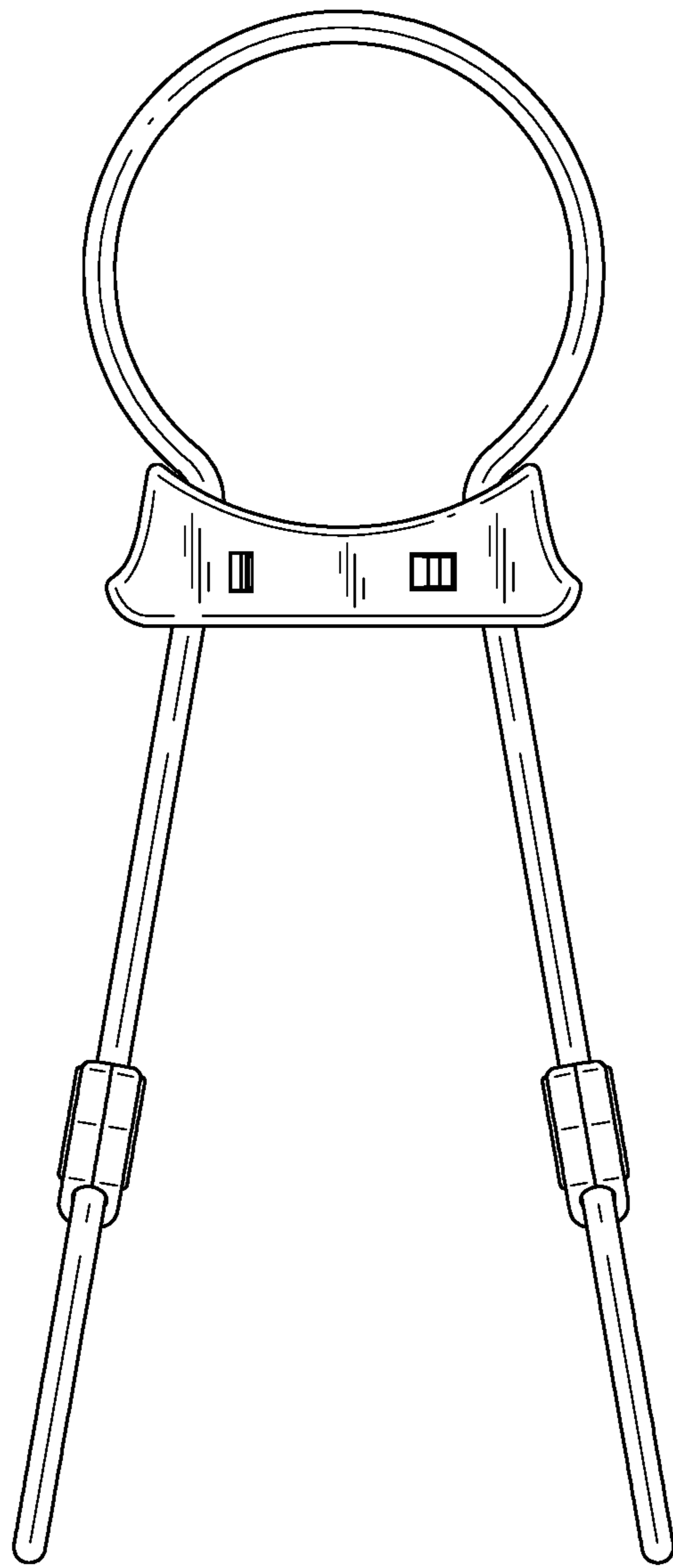


FIG. 2

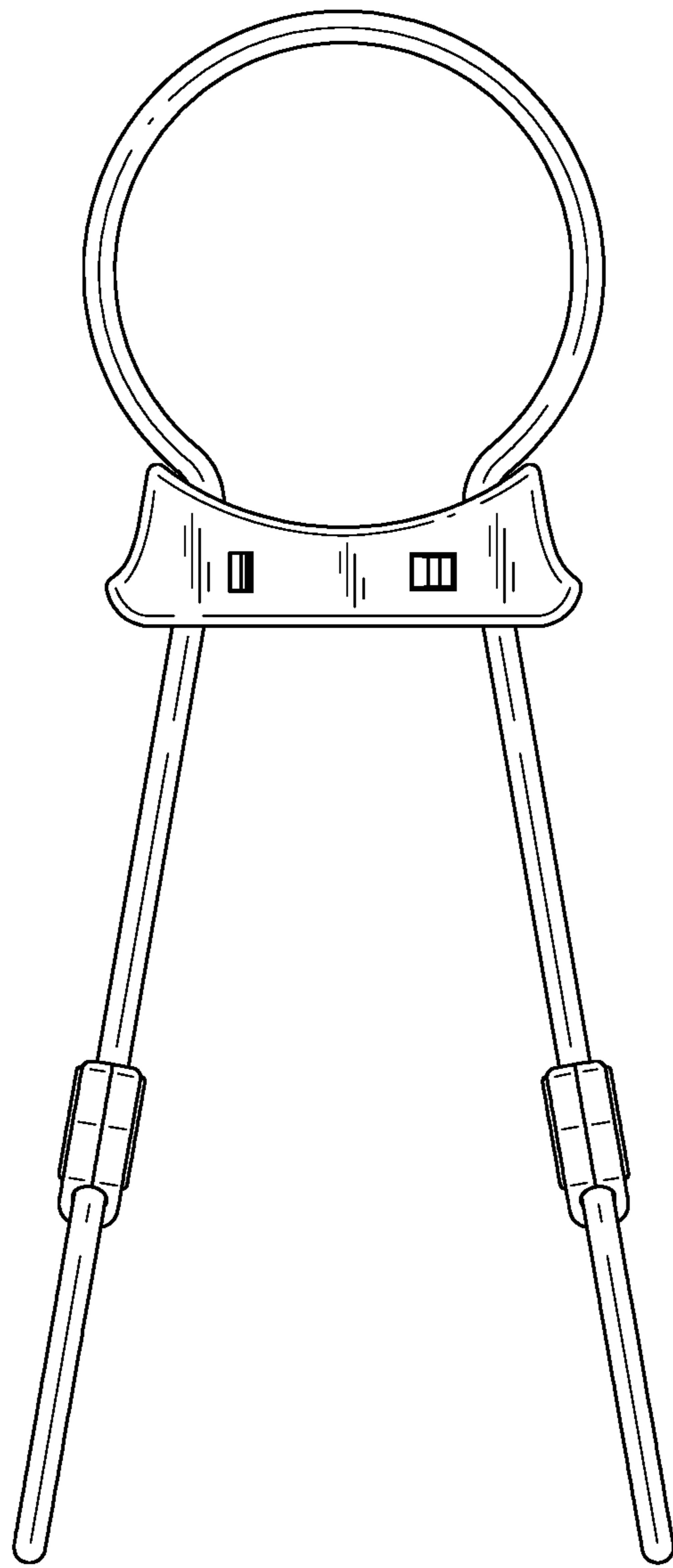


FIG. 3

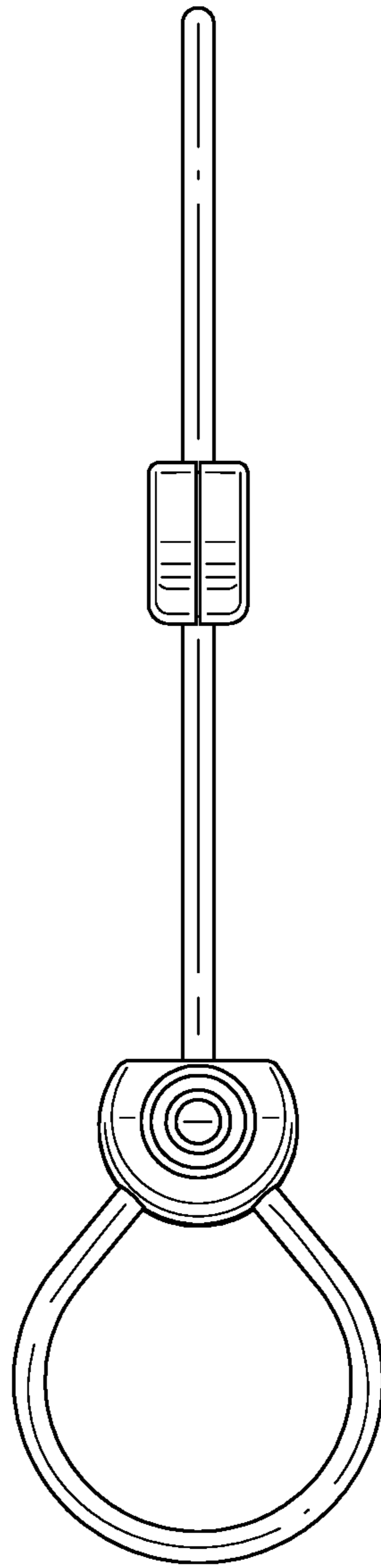


FIG. 4



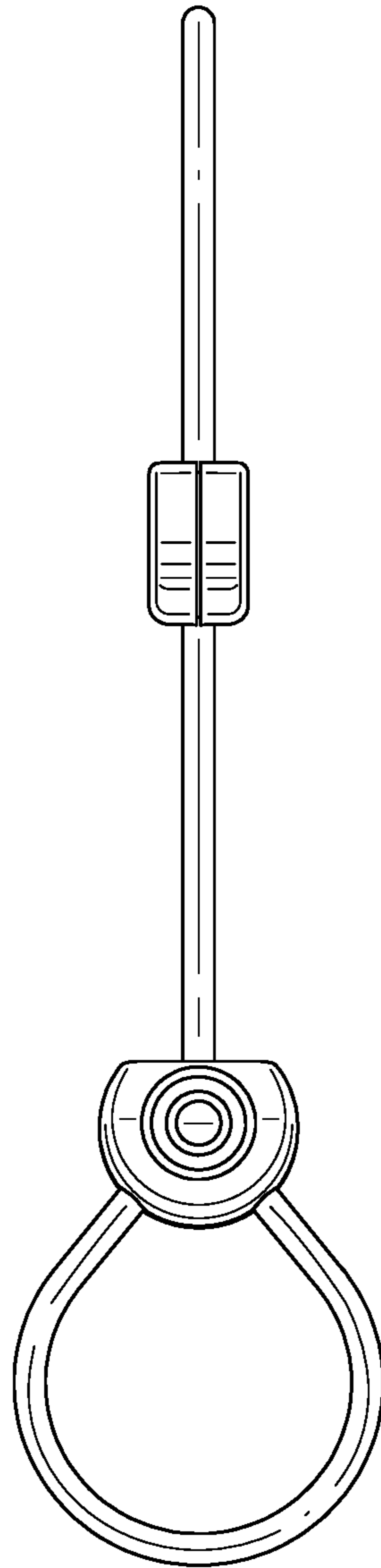


FIG. 5

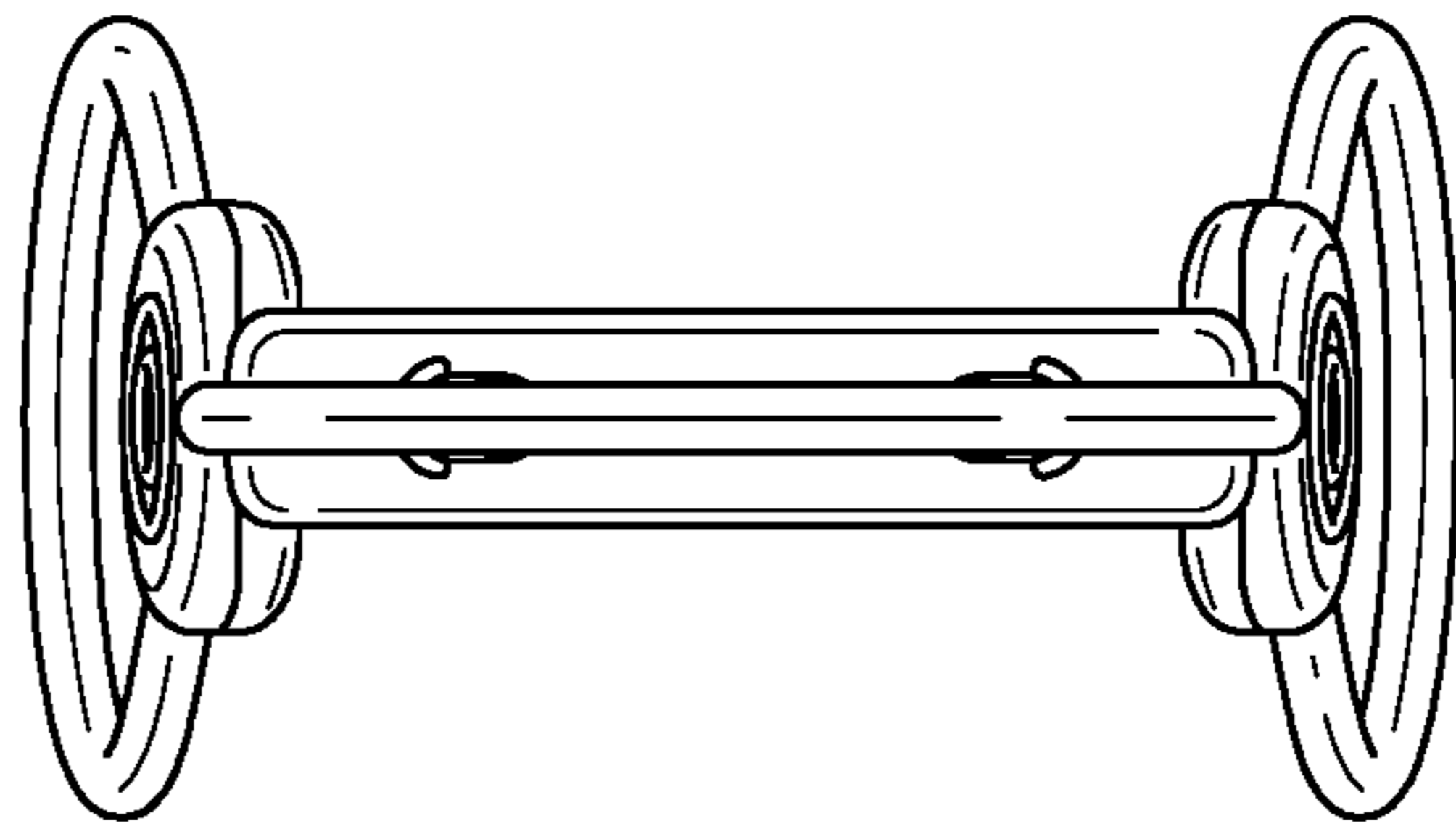


FIG. 6

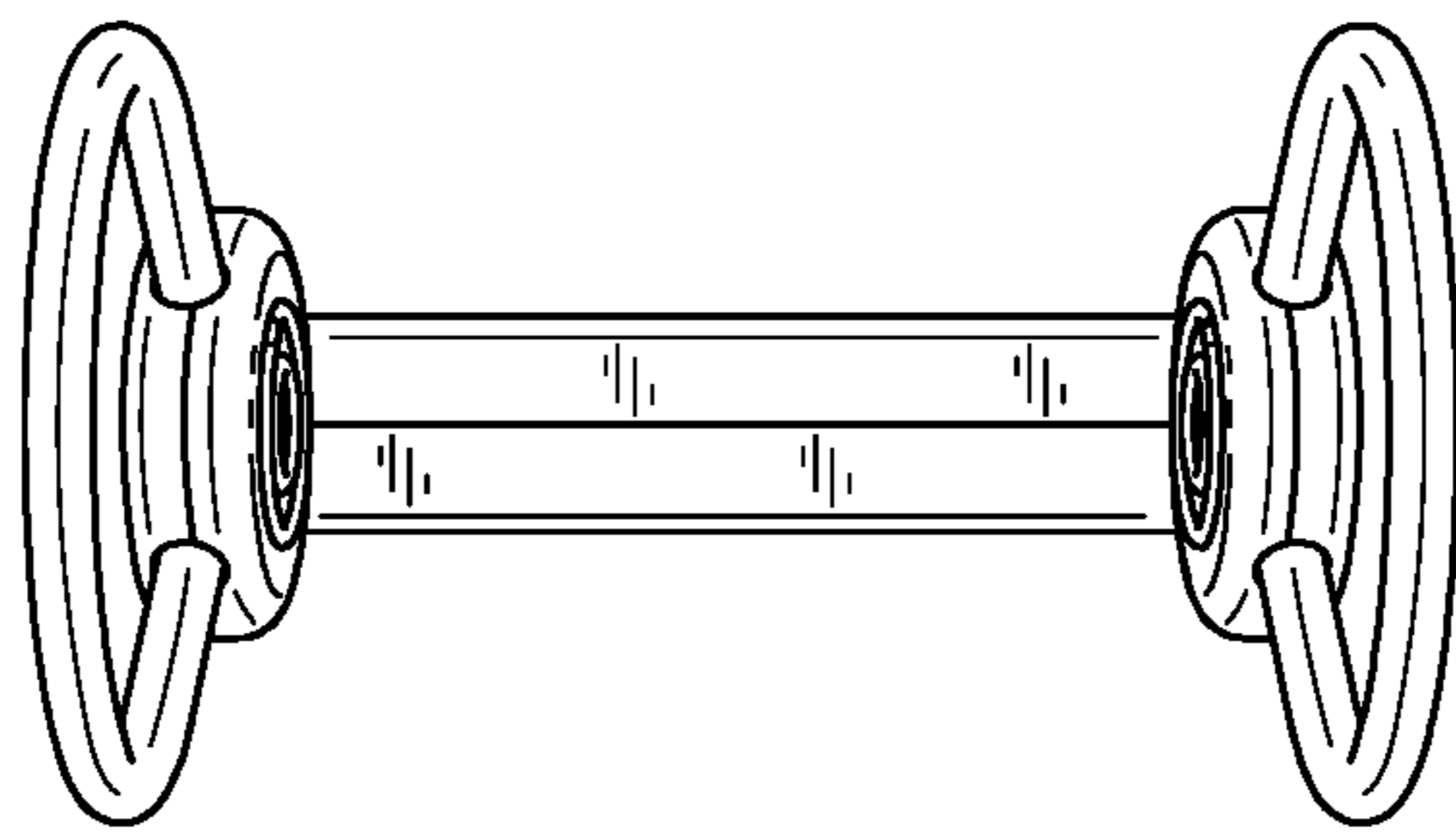


FIG. 7

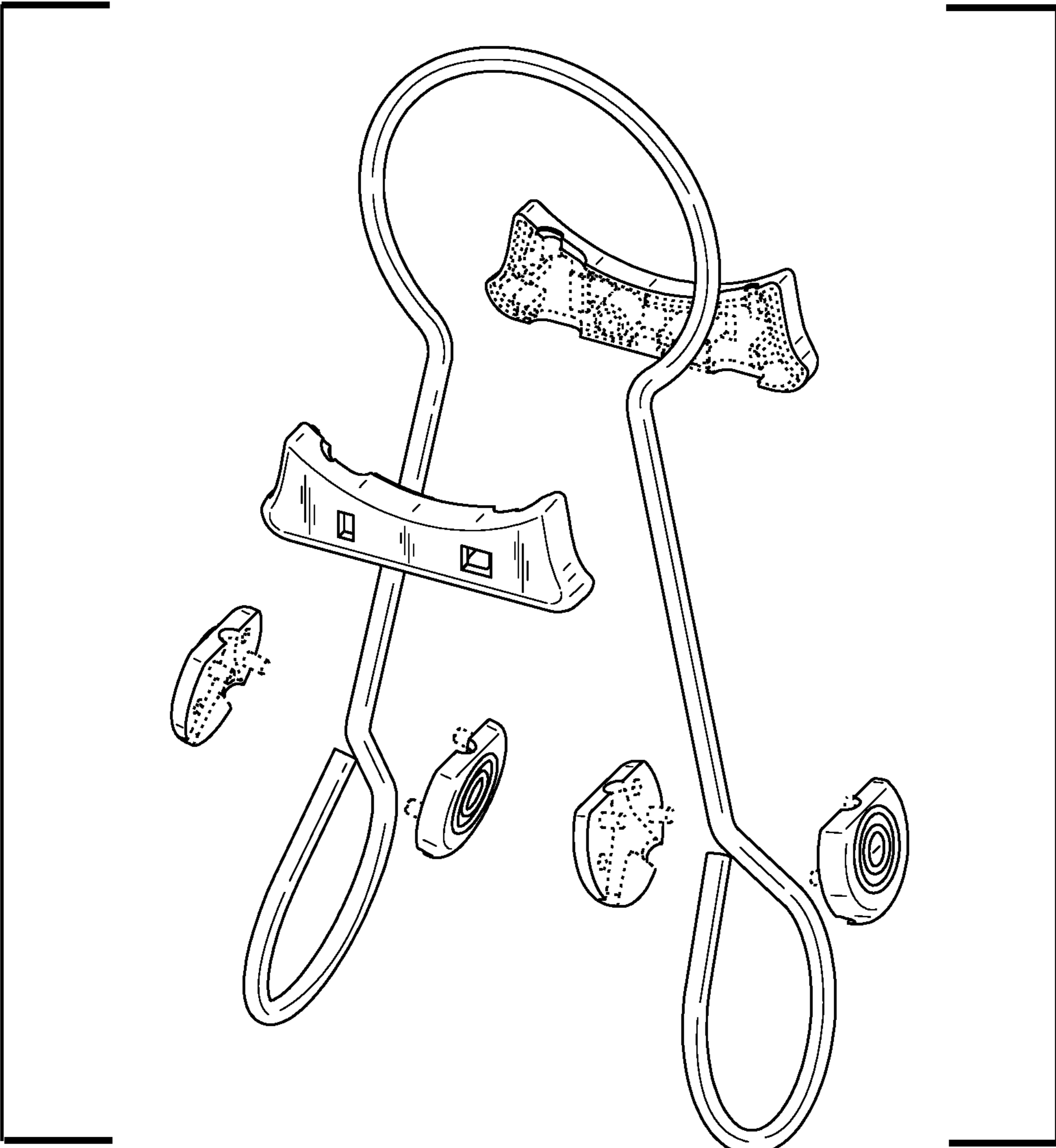


FIG. 8