



US00D881584S

(12) **United States Design Patent** (10) **Patent No.:** **US D881,584 S**  
**Porter et al.** (45) **Date of Patent:** **\*\* Apr. 21, 2020**

(54) **TOOTHBRUSH HANDLE**

(56) **References Cited**

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U.S. PATENT DOCUMENTS

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669,402 A 3/1901 Rose  
684,951 A 10/1901 Rothkranz  
914,501 A 3/1909 McEachern  
933,718 A 9/1909 Mahoney  
(Continued)

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FOREIGN PATENT DOCUMENTS

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

CA 2841085 C \* 2/2019 ..... A61C 15/047  
CH 435553 10/1967  
(Continued)

(21) Appl. No.: **29/680,862**

OTHER PUBLICATIONS

(22) Filed: **Feb. 20, 2019**

Sonex International: Brushing with the Ultima—The World’s Only Dual-Frequency Ultrasonic Toothbrush, Jul. 28, 1999, published at Sonipic.com.

**Related U.S. Application Data**

(62) Division of application No. 29/587,868, filed on Dec. 15, 2016, now Pat. No. Des. 845,636.

(51) **LOC (12) Cl.** ..... **04-02**

(52) **U.S. Cl.**  
USPC ..... **D4/104**

(58) **Field of Classification Search**  
USPC ..... D4/101, 104, 105, 108, 110, 111;  
D24/111, 152, 176; D8/61, 62, 68, 300,  
D8/301, 303, 307, 315; D19/65  
CPC ..... A46B 5/00; A46B 5/021; A46B 5/023;  
A46B 5/026; A46B 5/028; A46B 5/0016;  
A46B 5/0095; A46B 13/00; A46B 13/02;  
A46B 2200/10; A46B 2200/30; A46B  
2200/108; A46B 2200/302; A46B  
2200/304; A46B 2200/1066; A46B  
2200/1073; A46B 2200/1086; A46B  
2200/3026; A46B 2200/3033; A46B  
2200/3046; A61C 15/00; A61C 15/047;  
A61C 15/048; A61C 17/16; A61C 17/22;  
A61C 17/26

See application file for complete search history.

(Continued)

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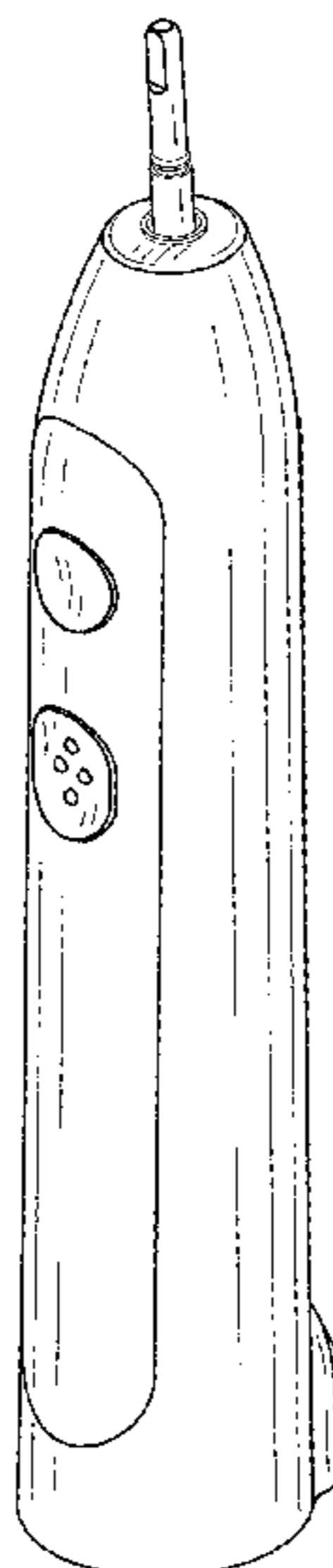
(57) **CLAIM**

We claim the ornamental design for a toothbrush handle, as shown and described.

**DESCRIPTION**

FIG. 1 is a front isometric view of a toothbrush handle.  
FIG. 2 is a front elevation view thereof.  
FIG. 3 is a rear elevation view thereof.  
FIG. 4 is a right side elevation view thereof.  
FIG. 5 is a left side elevation view thereof.  
FIG. 6 is a top plan view thereof; and,  
FIG. 7 is a bottom plan view thereof.  
The broken lines illustrate portions of the toothbrush handle that form no part of the claimed design.

**1 Claim, 4 Drawing Sheets**



(56)

## References Cited

## U.S. PATENT DOCUMENTS

958,371 A	5/1910	Danek	D160,101 S	9/1950	MacDonald
1,018,927 A	2/1912	Sarrazin	2,533,345 A	12/1950	Bennett
1,033,819 A	7/1912	McMann	2,543,999 A	3/1951	Voss
1,059,426 A	4/1913	Barnes	D163,707 S	6/1951	Pifer
D45,199 S	2/1914	McDonagh et al.	2,558,332 A	6/1951	Artale
D45,572 S	4/1914	Sarrazin	2,567,080 A	9/1951	Pifer
1,128,139 A	2/1915	Hoffman	2,577,597 A	12/1951	Wright et al.
D49,472 S	8/1916	Dierke	2,583,750 A	1/1952	Runnels
1,251,250 A	12/1917	Libby	2,598,275 A	5/1952	Lakin
1,268,544 A	6/1918	Cates	2,618,003 A	11/1952	Robey
1,278,225 A	9/1918	Schamberg	D169,131 S	3/1953	Fay
1,296,067 A	3/1919	Fuller	2,651,068 A	9/1953	Seko
D53,453 S	7/1919	Lloyd	D170,680 S	10/1953	Del Mas
1,313,490 A	8/1919	Larson	D172,693 S	7/1954	Wibbelsman et al.
1,337,173 A	4/1920	White	D173,616 S	12/1954	Hernandez
1,355,037 A	10/1920	Dziuk	2,705,335 A	4/1955	Glassman et al.
D57,327 S	3/1921	Gibson	2,709,227 A	5/1955	Foley et al.
1,382,681 A	6/1921	Segal	2,722,703 A	11/1955	Green
1,424,879 A	8/1922	Carlstedt	2,728,928 A	1/1956	Beeren
1,440,785 A	1/1923	Levis	2,734,139 A	2/1956	Murphy
1,456,535 A	5/1923	Cartwright	2,806,235 A	9/1957	Carstairs et al.
1,488,214 A	3/1924	Mason	2,819,482 A	1/1958	Applegate
1,494,448 A	5/1924	Sookne	2,868,215 A	1/1959	Mechem
1,497,495 A	6/1924	Fincke	2,875,458 A	3/1959	Tsuda
1,517,320 A	12/1924	Stoddart	2,917,758 A	12/1959	Held et al.
1,527,853 A	2/1925	Ferdon	2,931,371 A	4/1960	Petitta
1,588,785 A	6/1926	Van Sant	2,946,072 A	7/1960	Filler et al.
1,639,880 A	8/1927	Butler	2,962,033 A	11/1960	Lew
1,657,450 A	1/1928	Barnes	2,977,614 A	4/1961	Demanele
1,676,703 A	7/1928	Nuyts	2,977,682 A	4/1961	Flatray
1,696,835 A	12/1928	Burnett	3,103,027 A	9/1963	Birch
1,703,642 A	2/1929	Sticht	3,104,405 A	9/1963	Perrinjaquet
1,794,711 A	3/1931	Jacobs	3,106,216 A	10/1963	Kirby
1,796,641 A	3/1931	Zimmerman et al.	D197,048 S	12/1963	Troy
1,800,993 A	4/1931	Funk	D197,208 S	12/1963	Cassidy et al.
1,832,519 A	11/1931	Wheat et al.	3,143,697 A	8/1964	Springer
1,880,617 A	10/1932	White	3,145,404 A	8/1964	Fiedler
1,916,641 A	7/1933	Seeliger	D199,560 S	11/1964	Thompson
1,927,365 A	9/1933	Frolio	D199,893 S	12/1964	Bond et al.
1,943,225 A	1/1934	McIntyre	3,159,859 A	12/1964	Rasmussen
1,992,770 A	2/1935	Rathbun	3,160,902 A	12/1964	Aymar
2,016,597 A	10/1935	Drake	3,168,834 A	2/1965	Smithson
2,016,644 A	10/1935	Luball	3,181,189 A	5/1965	Leyden
2,042,239 A	5/1936	Planding	3,183,538 A	5/1965	Hubner
2,044,863 A	6/1936	Sticht	3,195,537 A	7/1965	Blasi
D101,080 S	9/1936	Cosad	D202,873 S	11/1965	Husted
2,114,947 A	4/1938	Warsaw	3,220,039 A	11/1965	Dayton et al.
D113,743 S	3/1939	Kahn	3,229,318 A	1/1966	Clemens
D113,744 S	3/1939	Kahn	3,230,562 A	1/1966	Birch
2,158,738 A	5/1939	Baker et al.	D204,127 S	3/1966	Syvertson
2,168,964 A	8/1939	Strasser	3,258,805 A	7/1966	Rossnan
2,206,726 A	7/1940	Lasater	3,270,416 A	9/1966	Massa
2,209,173 A	7/1940	Russell	3,278,963 A	10/1966	Bond
2,218,072 A	10/1940	Runnels	3,289,681 A	12/1966	Chambers
2,226,663 A	12/1940	Hill et al.	3,311,116 A	3/1967	Foster
2,244,098 A	6/1941	Busick	3,316,576 A	5/1967	Urbrush
2,246,523 A	6/1941	Kulik	3,335,443 A	8/1967	Parisi et al.
2,273,717 A	2/1942	Millard et al.	3,346,748 A	10/1967	McNair
2,278,365 A	3/1942	Daniels	3,358,309 A	12/1967	Richardson
2,279,355 A	4/1942	Wilensky	3,358,314 A	12/1967	Matibag
2,282,700 A	5/1942	Bobbhoff	3,359,588 A	12/1967	Kobler
2,312,828 A	3/1943	Adamsson	3,364,576 A	1/1968	Kern, Jr.
D136,156 S	8/1943	Fuller	D210,066 S	2/1968	Johnson
D139,532 S	11/1944	Trecek	3,369,265 A	2/1968	Halberstadt et al.
D141,350 S	5/1945	Alexander et al.	3,371,260 A	2/1968	Jackson et al.
D144,163 S	3/1946	Dolnick	D210,349 S	3/1968	Boldt
2,401,186 A	5/1946	Price	3,375,820 A	4/1968	Kuris et al.
2,405,029 A	7/1946	Gallanty et al.	3,394,277 A	7/1968	Satkunas et al.
D146,271 S	1/1947	Stavely	D212,208 S	9/1968	Rogers
2,414,775 A	1/1947	Stavely	3,418,552 A	12/1968	Holmes
2,429,740 A	10/1947	Aufsesser	3,421,524 A	1/1969	Waters
2,450,635 A	10/1948	Dembenski	3,430,279 A	3/1969	Hintze
D154,598 S	7/1949	Gass	3,463,994 A	8/1969	Spohr
D155,668 S	10/1949	Zandberg et al.	3,466,689 A	9/1969	Aurelio et al.
D157,669 S	3/1950	Graves, Jr.	3,472,045 A	10/1969	Nelsen et al.
			3,472,247 A	10/1969	Borsum et al.
			3,474,799 A	10/1969	Cappello
			3,509,874 A	5/1970	Stillman
			3,535,726 A	10/1970	Sawyer

(56)

## References Cited

## U.S. PATENT DOCUMENTS

3,536,065 A	10/1970	Moret	4,326,549 A	4/1982	Hinding
3,538,359 A	11/1970	Barowski	4,331,422 A	5/1982	Heyman
3,552,022 A	1/1971	Axelsson	4,333,197 A	6/1982	Kuris
3,559,292 A	2/1971	Weissman	4,336,622 A	6/1982	Teague, Jr. et al.
3,563,233 A	2/1971	Bodine	D265,515 S	7/1982	Levine
3,588,936 A	6/1971	Duve	4,338,957 A	7/1982	Meibauer
3,590,814 A	7/1971	Bennett et al.	D265,698 S	8/1982	Roth
D221,823 S	9/1971	Cook	4,346,492 A	8/1982	Solow
3,608,548 A	9/1971	Lewis	4,347,839 A	9/1982	Youngclaus, Jr.
3,638,264 A	2/1972	Walton	4,353,141 A	10/1982	Teague, Jr. et al.
3,642,344 A	2/1972	Corker	4,356,585 A	11/1982	Protell et al.
3,651,576 A	3/1972	Massa	4,381,478 A	4/1983	Saijo et al.
3,660,902 A	5/1972	Axelsson	4,395,665 A	7/1983	Buchas
3,667,483 A	6/1972	McCabe	4,397,327 A	8/1983	Hadary
3,672,378 A	6/1972	Silverman	D270,972 S	10/1983	Rosofsky
3,676,218 A	7/1972	Sawyer	D272,565 S	2/1984	Levine
3,685,080 A	8/1972	Hubner	D272,680 S	2/1984	Stocchi
3,722,020 A	3/1973	Hills	4,429,997 A	2/1984	Matthews
3,742,549 A	7/1973	Scopp et al.	4,432,729 A	2/1984	Fattaleh
3,759,274 A	9/1973	Warner	4,434,806 A	3/1984	Givens
3,760,799 A	9/1973	Crowson	4,442,830 A	4/1984	Markau
3,792,504 A	2/1974	Smith	D274,018 S	5/1984	Usui
3,809,977 A	5/1974	Balamuth et al.	4,450,599 A	5/1984	Scheller et al.
3,831,611 A	8/1974	Hendricks	4,455,704 A	6/1984	Williams
3,840,932 A	10/1974	Balamuth et al.	4,458,702 A	7/1984	Grollimund
3,847,167 A	11/1974	Brien	4,488,327 A	12/1984	Snider
3,851,984 A	12/1974	Crippa	4,490,114 A	12/1984	Kleesattel
D234,518 S	3/1975	Gerlich	4,505,678 A	3/1985	Andersson
3,882,364 A	5/1975	Wright et al.	4,517,701 A	5/1985	Stanford, Jr.
3,902,510 A	9/1975	Roth	4,519,111 A	5/1985	Cavazza
3,903,601 A	9/1975	Anderson et al.	4,522,355 A	6/1985	Moran
3,939,599 A	2/1976	Henry et al.	4,522,595 A	6/1985	Selvidge
3,967,617 A	7/1976	Krolik	4,543,679 A	10/1985	Rosofsky et al.
3,973,558 A	8/1976	Stouffer et al.	D281,202 S	11/1985	Thompson
3,977,084 A	8/1976	Sloan	4,562,413 A	12/1985	Mishiro et al.
3,978,852 A	9/1976	Annoni	4,564,794 A	1/1986	Kilen et al.
3,980,906 A	9/1976	Kuris et al.	4,571,768 A	2/1986	Kawashima
4,004,344 A	1/1977	Gold et al.	4,576,190 A	3/1986	Youssef
4,005,722 A	2/1977	Bragg	4,577,649 A	3/1986	Shimenkov
4,008,728 A	2/1977	Sanchez	4,578,033 A	3/1986	Mossle et al.
4,010,509 A	3/1977	Huish	D283,374 S	4/1986	Cheuk-Yiu
4,014,354 A	3/1977	Garrett	4,585,415 A	4/1986	Hommann
4,019,522 A	4/1977	Elbreder	4,586,521 A	5/1986	Urso
4,033,008 A	7/1977	Warren et al.	D284,236 S	6/1986	Collet
4,048,723 A	9/1977	Thorup	D284,528 S	7/1986	Jurado
4,051,571 A	10/1977	Ayers	4,603,448 A	8/1986	Middleton et al.
4,064,883 A	12/1977	Oldham	4,605,025 A	8/1986	McSpadden
4,133,339 A	1/1979	Naslund	4,608,019 A	8/1986	Kumabe et al.
4,141,352 A	2/1979	Ebner et al.	4,610,043 A	9/1986	Vezejak
4,156,620 A	5/1979	Clemens	4,617,695 A	10/1986	Amos et al.
4,173,828 A	11/1979	Lustig et al.	4,617,718 A	10/1986	Andersson
4,177,434 A	12/1979	Ida	4,619,009 A	10/1986	Rosenstatter
D254,162 S	2/1980	Barker	D287,073 S	12/1986	Thompson
4,192,035 A	3/1980	Kuris	4,634,376 A	1/1987	Mossle et al.
4,203,431 A	5/1980	Abura et al.	4,644,937 A	2/1987	Hommann
4,205,664 A	6/1980	Baccialon	4,655,198 A	4/1987	Hommann
4,219,619 A	8/1980	Zarow	4,672,706 A	6/1987	Hill
4,235,253 A	11/1980	Moore	D292,448 S	10/1987	Vianello
4,245,658 A	1/1981	Lecouturier	4,698,869 A	10/1987	Mierau et al.
RE30,536 E	3/1981	Perdreux, Jr.	4,706,322 A	11/1987	Nicolas
4,255,693 A	3/1981	Keidl	4,706,695 A	11/1987	Urso
4,265,257 A	5/1981	Salyer	D294,885 S	3/1988	Mollenhoff
4,268,933 A	5/1981	Papas	4,729,142 A	3/1988	Yoshioka
4,271,382 A	6/1981	Maeda et al.	D297,467 S	8/1988	McCann
4,271,384 A	6/1981	Beiling et al.	4,766,630 A	8/1988	Hegemann
4,271,854 A	6/1981	Bengtsson	4,776,054 A	10/1988	Rauch
4,275,363 A	6/1981	Mishiro et al.	4,787,847 A	11/1988	Martin et al.
4,288,883 A	9/1981	Dolinsky	4,791,940 A	12/1988	Hirshfeld et al.
4,289,486 A	9/1981	Sargeant	4,800,608 A	1/1989	Key
4,303,064 A	12/1981	Buffa	4,802,255 A	2/1989	Breuer et al.
4,307,740 A	12/1981	Florindez et al.	4,811,445 A	3/1989	Lagieski et al.
4,319,377 A	3/1982	Tarrson et al.	4,820,153 A	4/1989	Romhild et al.
4,319,595 A	3/1982	Ulrich	4,820,154 A	4/1989	Romhild et al.
4,326,547 A	4/1982	Verplank	4,827,550 A	5/1989	Graham et al.
4,326,548 A	4/1982	Wagner	4,827,551 A	5/1989	Maser et al.
			4,827,552 A	5/1989	Bojar et al.
			4,832,063 A	5/1989	Smole
			D301,770 S	6/1989	Bethany
			4,844,104 A	7/1989	Martin

(56)

References Cited

U.S. PATENT DOCUMENTS

4,845,795 A	7/1989	Crawford et al.	5,183,156 A	2/1993	Bruno
4,856,133 A	8/1989	Sanchez	5,184,368 A	2/1993	Holland
4,864,676 A	9/1989	Schaiper	5,184,632 A	2/1993	Gross et al.
D303,876 S	10/1989	Clemens et al.	5,186,191 A	2/1993	Loubier
4,871,396 A	10/1989	Tsujita et al.	5,188,133 A	2/1993	Romanus
4,873,496 A	10/1989	Ohgihara et al.	5,189,751 A	3/1993	Giuliani et al.
4,875,265 A	10/1989	Yoshida	5,193,678 A	3/1993	Janocik et al.
4,877,934 A	10/1989	Spinello	5,198,732 A	3/1993	Morimoto
4,879,781 A	11/1989	Desimone	D334,472 S	4/1993	Curtis et al.
4,880,382 A	11/1989	Moret et al.	5,201,092 A	4/1993	Colson
4,887,052 A	12/1989	Murakami et al.	D335,579 S	5/1993	Chuang
4,892,191 A	1/1990	Nakamara	5,207,773 A	5/1993	Henderson
4,908,902 A	3/1990	McNab et al.	5,213,434 A	5/1993	Hahn
4,913,133 A	4/1990	Tichy	5,214,819 A	6/1993	Kirchner
4,913,176 A	4/1990	DeNiro	5,217,031 A	6/1993	Santoro
4,922,936 A	5/1990	Buzzi et al.	5,224,500 A	7/1993	Stella
D308,765 S	6/1990	Johnson	5,226,206 A	7/1993	Davidovitz et al.
4,974,278 A	12/1990	Hommann	5,236,358 A	8/1993	Sieffert
4,984,173 A	1/1991	Imam et al.	5,245,117 A	9/1993	Withers et al.
4,989,287 A	2/1991	Scherer	5,246,022 A	9/1993	Israel et al.
4,991,249 A	2/1991	Suroff	5,247,716 A	9/1993	Bock
4,995,403 A	2/1991	Beckman et al.	5,253,382 A	10/1993	Beny
5,000,684 A	3/1991	Odrich	5,261,430 A	11/1993	Mochel
5,002,487 A	3/1991	Tichy	5,263,218 A	11/1993	Giuliani et al.
5,007,127 A	4/1991	Paolo	D341,943 S	12/1993	Si-Hoe
5,016,660 A	5/1991	Boggs	D342,160 S	12/1993	Curtis et al.
5,020,179 A	6/1991	Scherer	D342,161 S	12/1993	Curtis et al.
5,033,150 A	7/1991	Gross et al.	D342,162 S	12/1993	Curtis et al.
D318,918 S	8/1991	Hartwein	5,267,579 A	12/1993	Bushberger
D319,363 S	8/1991	Uemura et al.	D343,064 S	1/1994	Reno
5,046,212 A	9/1991	O'Conke	D343,344 S *	1/1994	Chapin ..... D8/61
5,050,625 A	9/1991	Siekmann	5,279,314 A	1/1994	Poulos et al.
5,054,149 A	10/1991	Si-Hoe et al.	5,289,604 A	3/1994	Kressner
D321,285 S	11/1991	Hirabayashi	5,293,886 A	3/1994	Czapor
5,062,797 A	11/1991	Gonser	5,294,896 A	3/1994	Kjellander et al.
5,067,223 A	11/1991	Bruno	D346,212 S	4/1994	Hosl
D321,986 S	12/1991	Snyder et al.	5,299,723 A	4/1994	Hempel
5,068,939 A	12/1991	Holland	5,301,381 A	4/1994	Klupt
5,069,233 A	12/1991	Ritter	5,305,492 A	4/1994	Giuliani et al.
5,069,621 A	12/1991	Paradis	D346,697 S	5/1994	O'Conke
5,071,348 A	12/1991	Woog	5,309,590 A	5/1994	Giuliani et al.
5,072,477 A	12/1991	Pai	5,309,591 A	5/1994	Hägele et al.
5,072,482 A	12/1991	Bojar et al.	5,311,632 A	5/1994	Center
5,077,855 A	1/1992	Ambasz	5,311,633 A	5/1994	Herzog et al.
5,085,236 A	2/1992	Odneal et al.	5,315,731 A	5/1994	Millar
5,088,145 A	2/1992	Whitefield	D347,943 S	6/1994	Perry
D324,699 S *	3/1992	Ohashi ..... D19/188	5,323,796 A	6/1994	Urso
D324,957 S	3/1992	Piano	5,335,389 A	8/1994	Curtis et al.
5,094,256 A	3/1992	Barth	5,337,435 A	8/1994	Krasner et al.
5,095,470 A	3/1992	Oka et al.	5,339,482 A	8/1994	Desimone et al.
5,100,321 A	3/1992	Coss et al.	5,341,534 A	8/1994	Serbinski et al.
5,120,225 A	6/1992	Amit	5,341,537 A	8/1994	Curtis et al.
5,123,841 A	6/1992	Millner	5,351,358 A	10/1994	Larrimore
5,125,837 A	6/1992	Warrin et al.	5,353,460 A	10/1994	Bauman
5,133,661 A	7/1992	Euvrard	5,354,246 A	10/1994	Gotman
5,138,733 A	8/1992	Bock	5,355,638 A	10/1994	Hoffman
5,145,369 A	9/1992	Lustig et al.	5,358,328 A	10/1994	Inoue et al.
5,146,643 A	9/1992	Bojar et al.	D352,396 S	11/1994	Curtis et al.
5,150,492 A	9/1992	Suroff	D352,829 S	11/1994	Perry
5,151,030 A	9/1992	Comeaux	5,359,747 A	11/1994	Amakasu
D330,116 S	10/1992	Crawford et al.	5,365,627 A	11/1994	Jousson et al.
D330,286 S	10/1992	Curtis et al.	D353,490 S	12/1994	Hartwein
D330,458 S	10/1992	Curtis et al.	5,369,831 A	12/1994	Bock
5,152,394 A	10/1992	Hughes	5,371,915 A	12/1994	Key
5,163,375 A	11/1992	Withers et al.	5,373,602 A	12/1994	Bang
5,165,131 A	11/1992	Suroff	D354,168 S	1/1995	Hartwein
5,167,193 A	12/1992	Withers et al.	5,378,153 A	1/1995	Giuliani et al.
5,169,313 A	12/1992	Kline	5,383,242 A	1/1995	Bigler et al.
5,170,809 A	12/1992	Imai et al.	5,392,483 A	2/1995	Heinzelman et al.
5,174,314 A	12/1992	Charatan	5,393,229 A	2/1995	Ram
5,176,157 A	1/1993	Mazza	5,396,678 A	3/1995	Bredall et al.
5,177,826 A	1/1993	Vrignaud et al.	5,398,368 A	3/1995	Elder
5,180,363 A	1/1993	Idemoto et al.	5,400,811 A	3/1995	Meibauer
D332,873 S	2/1993	Hall	5,404,811 A	4/1995	Hommann
5,183,063 A	2/1993	Ringle et al.	5,404,608 A	4/1995	Hukuba
			5,406,664 A	4/1995	Levine
			5,406,965 A	4/1995	Loew
			D358,486 S	5/1995	Perry
			D358,713 S	5/1995	Vos
			D358,801 S	5/1995	

(56)

## References Cited

## U.S. PATENT DOCUMENTS

5,411,041 A	5/1995	Ritter	5,749,380 A	5/1998	Zebuhr
5,412,827 A	5/1995	Muller et al.	5,762,078 A	6/1998	Zebuhr
5,416,942 A	5/1995	Baldacci et al.	5,775,346 A	7/1998	Szyszkowski
5,419,346 A	5/1995	Tipp	5,784,742 A	7/1998	Giuliani et al.
5,419,703 A	5/1995	Warrin et al.	5,784,743 A	7/1998	Shek
D358,938 S	6/1995	Schneider et al.	D397,251 S	8/1998	Eguchi et al.
5,421,726 A	6/1995	Okada	D397,254 S	8/1998	Moskovich
5,435,032 A	7/1995	McDougall	5,787,908 A	8/1998	Robinson
D361,433 S	8/1995	Yang	5,794,295 A	8/1998	Shen
5,438,726 A	8/1995	Leite	5,815,872 A	10/1998	Meginnis, III et al.
5,446,940 A	9/1995	Curtis et al.	5,816,271 A	10/1998	Urso
D363,605 S	10/1995	Kou et al.	5,822,821 A	10/1998	Sham
5,459,898 A	10/1995	Bacolot	5,827,064 A	10/1998	Bock
5,461,744 A	10/1995	Merbach	D400,713 S	11/1998	Solanki
5,467,494 A	11/1995	Muller et al.	5,836,030 A	11/1998	Hazeu et al.
5,467,495 A	11/1995	Boland et al.	5,842,244 A	12/1998	Hilfinger et al.
5,482,466 A	1/1996	Haynes	5,850,655 A	12/1998	Göcking et al.
5,484,281 A	1/1996	Renow et al.	5,851,514 A	12/1998	Hassan et al.
5,496,256 A	3/1996	Bock et al.	D403,511 S	1/1999	Serbinski
5,499,420 A	3/1996	Boland	5,855,216 A	1/1999	Robinson
5,504,958 A	4/1996	Herzog	5,862,558 A	1/1999	Hilfinger et al.
5,504,959 A	4/1996	Yukawa et al.	5,864,911 A	2/1999	Arnoux
5,511,270 A	4/1996	Eliachar et al.	5,864,915 A	2/1999	Ra
5,511,275 A	4/1996	Volpenhein et al.	5,867,856 A	2/1999	Herzog
D370,125 S	5/1996	Craft et al.	5,875,797 A	3/1999	Chiang et al.
5,518,012 A	5/1996	Dolan et al.	5,893,175 A	4/1999	Cooper
D370,347 S	6/1996	Heinzelman et al.	5,896,614 A	4/1999	Flewitt
5,529,494 A	6/1996	Vlacancich	5,896,615 A	4/1999	Zaksenberg
D371,242 S	7/1996	Shimatsu et al.	5,899,693 A	5/1999	Himeno et al.
5,530,981 A	7/1996	Chen	5,900,230 A	5/1999	Cutler
5,544,382 A	8/1996	Giuliani et al.	5,901,397 A	5/1999	Hafele et al.
5,545,968 A	8/1996	Hilfinger et al.	D410,787 S	6/1999	Barre et al.
5,546,624 A	8/1996	Bock	5,908,038 A	6/1999	Bennett
5,546,626 A	8/1996	Chung	D411,769 S	7/1999	Wright
5,561,881 A	10/1996	Klinger et al.	5,921,254 A	7/1999	Carlucci et al.
D375,204 S	11/1996	Okada	5,927,300 A	7/1999	Boland et al.
D375,841 S	11/1996	Serbinski	5,927,976 A	7/1999	Wu
5,573,020 A	11/1996	Robinson	5,930,858 A	8/1999	Jung
5,577,285 A	11/1996	Drossler	5,931,170 A	8/1999	Wu
D376,695 S	12/1996	Tveras	5,934,908 A	8/1999	Woog et al.
5,579,786 A	12/1996	Wolk et al.	5,943,723 A	8/1999	Hilfinger et al.
5,584,690 A	12/1996	Maassarani	5,944,033 A	8/1999	Robinson
5,588,452 A	12/1996	Peck	D413,694 S	9/1999	Bennett
5,606,984 A	3/1997	Gao	D414,937 S	10/1999	Cornu et al.
5,609,170 A	3/1997	Roth	D414,939 S	10/1999	Pedro, Jr. et al.
5,613,258 A	3/1997	Hilfinger et al.	5,974,613 A	11/1999	Herzog
5,613,259 A	3/1997	Craft et al.	5,974,615 A	11/1999	Schwarz-Hartmann et al.
5,617,601 A	4/1997	McDougall	5,980,541 A	11/1999	Tenzer
5,617,602 A	4/1997	Okada	5,987,681 A	11/1999	Hahn et al.
5,618,275 A	4/1997	Bock	5,991,957 A	11/1999	Watanabe
5,619,766 A	4/1997	Zhadanov et al.	D417,960 S	12/1999	Moskovich et al.
5,623,746 A	4/1997	Ichiro	6,000,083 A	12/1999	Blaustein et al.
5,625,916 A	5/1997	McDougall	6,009,589 A	1/2000	Driesen et al.
5,628,082 A	5/1997	Moskovich	6,021,538 A	2/2000	Kressner et al.
D380,903 S	7/1997	Moskovich	6,026,828 A	2/2000	Altshuler
D381,468 S	7/1997	Dolan et al.	6,032,313 A	3/2000	Tsang
5,651,157 A	7/1997	Hahn	6,035,476 A	3/2000	Underwood et al.
D382,407 S	8/1997	Craft et al.	6,047,429 A	4/2000	Wu
5,652,990 A	8/1997	Driesen et al.	6,047,711 A	4/2000	Wagner
5,653,591 A	8/1997	Loge	6,050,818 A	4/2000	Boland et al.
5,678,274 A	10/1997	Liu	RE36,699 E	5/2000	Murayama
5,678,578 A	10/1997	Kossak et al.	D423,784 S	5/2000	Joulin
D386,314 S	11/1997	Moskovich	6,065,176 A	5/2000	Watanabe et al.
5,687,446 A	11/1997	Chen et al.	6,081,957 A	7/2000	Webb
5,697,117 A	12/1997	Craft	6,092,252 A	7/2000	Fischer et al.
5,700,146 A	12/1997	Kucar	6,095,811 A	8/2000	Stearns
RE35,712 E	1/1998	Murayama	6,102,700 A	8/2000	Haczek et al.
D388,958 S	1/1998	Hartwein	6,106,294 A	8/2000	Daniel
5,704,087 A	1/1998	Strub	6,138,310 A	10/2000	Porper et al.
5,709,233 A	1/1998	Boland et al.	6,140,723 A	10/2000	Matsui et al.
5,718,667 A	2/1998	Sugimoto et al.	6,148,462 A	11/2000	Zseng
5,732,433 A	3/1998	Göcking et al.	D434,563 S	12/2000	Lim et al.
5,735,011 A	4/1998	Asher	6,154,912 A	12/2000	Li
5,738,575 A	4/1998	Bock	6,162,202 A	12/2000	Sicurelli et al.
5,742,972 A	4/1998	Bredall et al.	6,164,967 A	12/2000	Sale et al.
			6,165,131 A	12/2000	Cuse et al.
			D437,090 S	1/2001	Lang et al.
			D437,091 S	1/2001	Lang et al.
			6,178,579 B1	1/2001	Blaustein et al.

(56)

## References Cited

## U.S. PATENT DOCUMENTS

D437,663 S	2/2001	Lang et al.	6,709,185 B2	3/2004	Lefevre
D437,976 S	2/2001	Narayanan et al.	6,721,986 B2	4/2004	Zhuan
D437,977 S	2/2001	Lang et al.	6,725,490 B2	4/2004	Blaustein et al.
D438,306 S	2/2001	Narayanan	D489,183 S	5/2004	Akahori et al.
6,183,254 B1	2/2001	Cohen	6,735,803 B2	5/2004	Kuo
6,195,828 B1	3/2001	Fritsch	6,735,804 B2	5/2004	Carlucci et al.
6,202,242 B1	3/2001	Salmon et al.	6,739,012 B2	5/2004	Grez et al.
6,203,320 B1	3/2001	Williams et al.	6,751,823 B2	6/2004	Biro et al.
D440,766 S	4/2001	Hartwein et al.	6,760,945 B2	7/2004	Ferber et al.
6,220,857 B1	4/2001	Abels	6,760,946 B2	7/2004	DePuydt
6,230,354 B1	5/2001	Sproat	6,766,548 B1	7/2004	Lukas et al.
6,230,717 B1	5/2001	Marx et al.	6,766,549 B2	7/2004	Klupt
6,233,773 B1	5/2001	Karge et al.	6,766,807 B2	7/2004	Piccolo et al.
6,237,178 B1	5/2001	Krammer et al.	6,779,126 B1	8/2004	Lin et al.
D444,629 S	7/2001	Etter et al.	6,779,215 B2	8/2004	Hartman et al.
6,253,404 B1	7/2001	Boland et al.	6,785,926 B2	9/2004	Green
6,267,593 B1	7/2001	Haczek et al.	6,785,929 B2	9/2004	Fritsch et al.
6,299,444 B1	10/2001	Cohen	6,792,640 B2	9/2004	Lev
6,308,358 B2	10/2001	Gruber et al.	6,795,993 B2	9/2004	Lin
6,308,359 B2	10/2001	Fritsch et al.	6,798,169 B2	9/2004	Stratmann et al.
6,341,400 B1	1/2002	Kobayashi et al.	6,799,346 B2	10/2004	Jeng et al.
6,343,396 B1	2/2002	Simovitz et al.	6,802,097 B2	10/2004	Hafliger et al.
6,343,400 B1	2/2002	Massholder et al.	6,808,331 B2	10/2004	Hall et al.
6,347,425 B1	2/2002	Fattori et al.	6,810,550 B1	11/2004	Wuelknitz et al.
6,349,442 B1	2/2002	Cohen et al.	6,813,793 B2	11/2004	Eliav
D454,251 S	3/2002	De Swarte et al.	6,813,794 B2	11/2004	Weng
D454,695 S	3/2002	Greene	6,821,119 B2	11/2004	Shortt et al.
6,353,956 B1	3/2002	Berge	6,823,875 B2	11/2004	Hotta et al.
6,360,395 B2	3/2002	Blaustein et al.	D500,208 S	12/2004	Vu
6,360,398 B1	3/2002	Wiegner et al.	6,827,910 B2	12/2004	Chen
6,363,565 B1	4/2002	Paffrath	6,829,801 B2	12/2004	Schutz
6,365,108 B1	4/2002	Philyaw	6,832,819 B1	12/2004	Weihrauch
6,367,108 B1	4/2002	Fritsch et al.	D500,599 S	1/2005	Callaghan
6,374,448 B2	4/2002	Seifert	D501,084 S	1/2005	Schaefer et al.
6,375,459 B1	4/2002	Kamen et al.	6,836,917 B2	1/2005	Blaustein et al.
6,381,795 B1	5/2002	Hofmann et al.	6,845,537 B2	1/2005	Wong
D458,028 S	6/2002	McCurrach	6,848,141 B2	2/2005	Eliav et al.
6,401,288 B1	6/2002	Porper et al.	6,851,150 B2	2/2005	Chiang
6,421,865 B1	7/2002	McDougall	6,851,153 B2	2/2005	Lehman
6,421,866 B1	7/2002	McDougall	6,854,965 B2	2/2005	Ebner et al.
6,421,867 B1	7/2002	Weihrauch	6,862,771 B1	3/2005	Muller
6,422,867 B2	7/2002	Lang et al.	6,871,373 B2	3/2005	Driesen et al.
6,434,773 B1	8/2002	Kuo	6,874,509 B2	4/2005	Bergman
D463,627 S	9/2002	Lang et al.	6,886,207 B1	5/2005	Solanki
6,446,294 B1	9/2002	Specht	6,889,401 B2	5/2005	Fattori et al.
6,446,295 B1	9/2002	Calabrese	6,889,829 B2	5/2005	Lev et al.
6,447,293 B1	9/2002	Sokol et al.	6,892,412 B2	5/2005	Gatzemeyer et al.
6,453,497 B1	9/2002	Chiang et al.	6,892,413 B2	5/2005	Blaustein et al.
6,453,498 B1	9/2002	Wu	6,895,625 B2	5/2005	Lev et al.
6,453,499 B1	9/2002	Leuermann	6,895,629 B1	5/2005	Wenzler
6,463,615 B1	10/2002	Gruber et al.	6,902,337 B1	6/2005	Kuo
6,490,747 B1	12/2002	Metwally	6,907,636 B2	6/2005	Hafemann
6,497,237 B1	12/2002	Ali	6,918,153 B2	7/2005	Gruber
6,510,575 B2	1/2003	Calabrese	6,920,659 B2	7/2005	Cacka et al.
6,526,994 B1	3/2003	Santoro	6,920,660 B2	7/2005	Lam
6,536,066 B2	3/2003	Dickie	6,928,685 B1	8/2005	Blaustein et al.
D474,895 S	5/2003	Breit	6,931,688 B2	8/2005	Moskovich et al.
6,564,940 B2	5/2003	Blaustein et al.	6,938,293 B2	9/2005	Eliav et al.
6,571,804 B2	6/2003	Adler	6,938,294 B2	9/2005	Fattori et al.
6,574,820 B1	6/2003	DePuydt et al.	6,944,901 B2	9/2005	Gatzemeyer et al.
6,581,233 B1	6/2003	Cheng	6,945,397 B2	9/2005	Brattesani et al.
6,581,234 B2	6/2003	Lee et al.	6,948,209 B2	9/2005	Chan
6,588,042 B2	7/2003	Fritsch et al.	D510,662 S	10/2005	Kling et al.
6,599,048 B2	7/2003	Kuo	6,952,854 B2	10/2005	Blaustein et al.
6,609,527 B2	8/2003	Brown	6,952,855 B2	10/2005	Lev et al.
6,609,910 B2	8/2003	Narayanan	6,954,961 B2	10/2005	Ferber et al.
6,619,219 B2	9/2003	Marcon et al.	6,955,539 B2	10/2005	Shortt et al.
6,622,333 B1	9/2003	Rehkemper et al.	6,957,468 B2	10/2005	Driesen et al.
6,647,577 B2	11/2003	Tam	6,957,469 B2	10/2005	Davies
D484,311 S	12/2003	Cacka et al.	6,966,093 B2	11/2005	Eliav et al.
6,654,979 B2	12/2003	Calabrese	6,973,694 B2	12/2005	Schutz et al.
6,659,674 B2	12/2003	Carlucci et al.	6,983,507 B2	1/2006	McDougall
6,665,901 B2	12/2003	Driesen et al.	6,988,777 B2	1/2006	Pfenniger et al.
6,691,363 B2	2/2004	Huen	6,990,706 B2	1/2006	Broecker et al.
6,701,565 B2	3/2004	Hafemann	D515,318 S	2/2006	Chan et al.
			D515,815 S	2/2006	Jimenez et al.
			D515,816 S	2/2006	Jimenez et al.
			6,993,803 B2	2/2006	Chan
			6,997,191 B2	2/2006	Nudo, Sr.

(56)

References Cited

U.S. PATENT DOCUMENTS

7,007,331 B2	3/2006	Davics et al.	D718,056 S	11/2014	Massee et al.
7,008,225 B2	3/2006	Ito et al.	D718,057 S	11/2014	Massee et al.
7,020,925 B1	4/2006	Gitelis	D719,737 S	12/2014	Adriaenssen et al.
7,021,851 B1	4/2006	King	8,943,634 B2	2/2015	Sokol
7,024,717 B2	4/2006	Hilscher et al.	9,049,919 B2	6/2015	Miller
7,024,718 B2	4/2006	Chu	D749,324 S	2/2016	Cessot
7,036,180 B2	5/2006	Hanlon	D749,851 S	2/2016	Watkins
7,055,205 B2	6/2006	Aoyama	D752,868 S	4/2016	McGarry et al.
7,059,334 B2	6/2006	Dougan et al.	D757,439 S	5/2016	Shigeno et al.
7,065,821 B2	6/2006	Fattori	D758,736 S	6/2016	Shigeno et al.
RE39,185 E	7/2006	Noe et al.	D759,381 S	6/2016	Watkins
7,070,354 B1	7/2006	Gutierrez-Caro	D759,382 S	6/2016	Watkins
7,080,980 B2	7/2006	Klupt	D765,414 S	9/2016	Sosa et al.
7,082,638 B2	8/2006	Koh	D766,580 S	9/2016	Kollar et al.
7,082,950 B2	8/2006	Kossak et al.	D766,581 S	9/2016	Bloch et al.
7,086,111 B2	8/2006	Hilscher et al.	D767,895 S	10/2016	Stebila et al.
7,089,621 B2	8/2006	Hohlbein	9,468,511 B2	10/2016	Garrigues et al.
7,120,960 B2	10/2006	Hilscher et al.	D771,388 S	11/2016	Since
7,122,921 B2	10/2006	Hall et al.	D773,192 S	12/2016	Nabavi
7,124,461 B2	10/2006	Blaustein et al.	D773,822 S	12/2016	Sikora et al.
7,124,462 B2	10/2006	Lee	D778,057 S	2/2017	Sohn
7,128,492 B1	10/2006	Thames, Jr.	D780,456 S	3/2017	Shigeno et al.
7,137,136 B1	11/2006	Gatzemeyer et al.	D787,189 S	5/2017	Fretwell et al.
7,140,058 B2	11/2006	Gatzemeyer et al.	D788,469 S	6/2017	McGarry et al.
D532,974 S	12/2006	Zhuan	D790,859 S	7/2017	McGarry et al.
D533,720 S	12/2006	Vu	D791,485 S	7/2017	McGarry et al.
7,146,675 B2	12/2006	Ansari et al.	D798,060 S	9/2017	Shigeno et al.
D534,727 S	1/2007	Vu	D799,217 S	10/2017	Massee
7,162,764 B2	1/2007	Drossler et al.	D801,696 S	11/2017	McGarry et al.
7,162,767 B2	1/2007	Pfenniger et al.	D802,935 S	11/2017	Park et al.
7,168,122 B1	1/2007	Riddell	D814,195 S	4/2018	Sikora et al.
7,168,125 B2	1/2007	Hohlbein	D818,273 S	5/2018	Okada
7,174,596 B2	2/2007	Fischer et al.	D819,337 S	6/2018	Yuan et al.
7,175,238 B1	2/2007	Barman	D819,973 S	6/2018	Greve et al.
7,181,799 B2	2/2007	Gavney, Jr. et al.	D819,974 S	6/2018	Johansson
7,185,383 B2	3/2007	Gatzemeyer et al.	D838,991 S *	1/2019	Choi ..... D4/101
7,186,226 B2	3/2007	Woolley	D844,995 S *	4/2019	Wong ..... D4/101
D540,542 S	4/2007	Harada	D844,997 S *	4/2019	Au ..... D4/104
7,198,487 B2	4/2007	Luetzgen et al.	D845,636 S *	4/2019	Porter ..... D4/104
7,207,080 B2	4/2007	Hilscher et al.	D846,883 S *	4/2019	Bloch ..... D4/101
7,210,184 B2	5/2007	Eliav et al.	D847,512 S *	5/2019	Goldberg ..... D4/101
7,213,293 B1	5/2007	Schrage	D850,112 S *	6/2019	Wang ..... D4/101
7,213,995 B2	5/2007	Bravo-Loubriel	2001/0035194 A1	11/2001	Narayanan
7,217,332 B2	5/2007	Brown, Jr. et al.	2001/0039955 A1	11/2001	Winters et al.
7,222,381 B2	5/2007	Kraemer	2001/0054563 A1	12/2001	Lang et al.
7,222,382 B2	5/2007	Choi et al.	2002/0017474 A1	2/2002	Blaustein et al.
7,225,494 B2	6/2007	Chan et al.	2002/0029988 A1	3/2002	Blaustein et al.
7,228,583 B2	6/2007	Chan et al.	2002/0032941 A1	3/2002	Blaustein et al.
7,234,187 B2	6/2007	Blaustein et al.	2002/0039720 A1	4/2002	Marx et al.
7,234,192 B2	6/2007	Barbar	2002/0059685 A1	5/2002	Paffrath
D563,674 S	3/2008	Beedham	2002/0078514 A1	6/2002	Blaustein et al.
D577,198 S	9/2008	Jimenez et al.	2002/0084707 A1	7/2002	Tang
D577,974 S *	10/2008	Miller ..... D8/70	2002/0088068 A1	7/2002	Levy et al.
D580,173 S	11/2008	Beedham	2002/0090252 A1	7/2002	Hall et al.
7,469,440 B2	12/2008	Boland et al.	2002/0092104 A1	7/2002	Ferber
D586,125 S	2/2009	Winkler et al.	2002/0095734 A1	7/2002	Wong
7,554,225 B2	6/2009	Kraus et al.	2002/0100134 A1	8/2002	Dunn et al.
D607,646 S	1/2010	Ino	2002/0106607 A1	8/2002	Horowitz
D618,079 S *	6/2010	Blythe ..... D8/61	2002/0137728 A1	9/2002	Montgomery
7,732,952 B1	6/2010	Taylor	2002/0138926 A1	10/2002	Brown, Jr. et al.
7,857,623 B2	12/2010	Grez	2002/0152563 A1	10/2002	Sato
D632,483 S	2/2011	Crossman	2002/0152564 A1	10/2002	Blaustein et al.
8,032,964 B2	10/2011	Farrell et al.	2002/0152565 A1	10/2002	Klupt
D648,941 S	11/2011	Leung	2002/0174498 A1	11/2002	Li
D658,381 S	5/2012	Gebski	2002/0178519 A1	12/2002	Zarlengo
D658,382 S	5/2012	Heil et al.	2003/0005544 A1	1/2003	Felix
D661,098 S	6/2012	Nanda	2003/0033679 A1	2/2003	Fattori et al.
8,196,245 B2	6/2012	Schwarz-Hartmann et al.	2003/0033680 A1	2/2003	Davies et al.
8,256,979 B2	9/2012	Hilscher et al.	2003/0041396 A1	3/2003	Dickie
8,418,300 B2	4/2013	Miller et al.	2003/0064348 A1	4/2003	Sokol et al.
8,453,285 B2	6/2013	Dickie	2003/0066145 A1	4/2003	Prineppi
D688,464 S	8/2013	Hara	2003/0074751 A1	4/2003	Wu
D701,388 S	3/2014	Chuanzhou et al.	2003/0079305 A1	5/2003	Takahata et al.
8,769,758 B2	7/2014	Jungnickel et al.	2003/0084525 A1	5/2003	Blaustein et al.
D717,547 S	11/2014	Adriaenssen et al.	2003/0084526 A1	5/2003	Brown et al.
			2003/0084527 A1	5/2003	Brown et al.
			2003/0097723 A1	5/2003	Li
			2003/0099502 A1	5/2003	Lai
			2003/0101526 A1	6/2003	Hilscher

(56)

References Cited

U.S. PATENT DOCUMENTS

2003/0106565 A1 6/2003 Andrews  
 2003/0140435 A1 7/2003 Eliav et al.  
 2003/0140437 A1 7/2003 Eliav et al.  
 2003/0140937 A1 7/2003 Cook  
 2003/0150474 A1 8/2003 Doyscher  
 2003/0154567 A1 8/2003 Drossler et al.  
 2003/0154568 A1 8/2003 Boland et al.  
 2003/0163881 A1 9/2003 Driesen et al.  
 2003/0163882 A1 9/2003 Blaustein et al.  
 2003/0182743 A1 10/2003 Gatzemeyer et al.  
 2003/0182746 A1 10/2003 Fattori et al.  
 2003/0192139 A1 10/2003 Fattori et al.  
 2003/0196283 A1 10/2003 Eliav et al.  
 2003/0196677 A1 10/2003 Wiseman  
 2003/0213075 A1 11/2003 Hui et al.  
 2003/0221267 A1 12/2003 Chan  
 2003/0221269 A1 12/2003 Zhuan  
 2003/0226223 A1 12/2003 Chan  
 2004/0010870 A1 1/2004 McNair  
 2004/0010871 A1 1/2004 Nishinaka et al.  
 2004/0016068 A1 1/2004 Lee  
 2004/0016069 A1 1/2004 Lee  
 2004/0034951 A1 2/2004 Davies et al.  
 2004/0045106 A1 3/2004 Lam  
 2004/0045107 A1 3/2004 Egeresi  
 2004/0049867 A1 3/2004 Hui  
 2004/0049868 A1 3/2004 Ng  
 2004/0060137 A1 4/2004 Eliav  
 2004/0063603 A1 4/2004 Dave et al.  
 2004/0068811 A1 4/2004 Fulop et al.  
 2004/0074026 A1 4/2004 Blaustein et al.  
 2004/0083566 A1 5/2004 Blaustein et al.  
 2004/0087882 A1 5/2004 Roberts et al.  
 2004/0088806 A1 5/2004 DePuydt et al.  
 2004/0088807 A1 5/2004 Blaustein et al.  
 2004/0091834 A1 5/2004 Rizoju et al.  
 2004/0107521 A1 6/2004 Chan et al.  
 2004/0119344 A1 6/2004 Lau et al.  
 2004/0123409 A1 7/2004 Dickie  
 2004/0128778 A1 7/2004 Wong  
 2004/0129296 A1 7/2004 Treacy et al.  
 2004/0134001 A1 7/2004 Chan  
 2004/0143917 A1 7/2004 Ek  
 2004/0154112 A1 8/2004 Braun et al.  
 2004/0163191 A1 8/2004 Cuffaro et al.  
 2004/0168269 A1 9/2004 Kunita et al.  
 2004/0168272 A1 9/2004 Prineppi  
 2004/0177458 A1 9/2004 Chan et al.  
 2004/0187889 A1 9/2004 Kemp et al.  
 2004/0200016 A1 10/2004 Chan et al.  
 2005/0004498 A1 1/2005 Klupt  
 2005/0008986 A1 1/2005 Sokol et al.  
 2005/0102773 A1 5/2005 Obermann et al.  
 2005/0144745 A1 7/2005 Russell  
 2005/0189000 A1 9/2005 Cacka et al.  
 2005/0255427 A1 11/2005 Shortt et al.  
 2005/0266376 A1 12/2005 Sokol et al.  
 2006/0010624 A1 1/2006 Cleland  
 2006/0078844 A1 4/2006 Goldman et al.  
 2007/0151051 A1 7/2007 Filsouf  
 2007/0209127 A1 9/2007 DeVitis  
 2008/0213731 A1 9/2008 Fishburne  
 2008/0307591 A1 12/2008 Farrell et al.  
 2009/0019650 A1 1/2009 Grez et al.  
 2009/0019651 A1 1/2009 Dickie  
 2009/0178215 A1 7/2009 Gall  
 2010/0055634 A1 3/2010 Spaulding et al.  
 2010/0132139 A1 6/2010 Jungnickel  
 2010/0186179 A1 7/2010 Miller  
 2011/0010874 A1 1/2011 Dickie  
 2011/0041268 A1 2/2011 Iwahori et al.  
 2011/0047729 A1 3/2011 Iwahori  
 2011/0083288 A1 4/2011 Kressner  
 2012/0112566 A1 5/2012 Doll  
 2012/0192366 A1 8/2012 Cobabe

2012/0198635 A1 8/2012 Hilscher  
 2012/0216358 A1 8/2012 Kloster  
 2013/0239342 A1 9/2013 Hilscher et al.  
 2014/0157532 A1 6/2014 Hilscher et al.  
 2014/0259469 A1 9/2014 Garrigues  
 2014/0259474 A1 9/2014 Sokol et al.  
 2015/0107035 A1 4/2015 Sokol et al.  
 2015/0297327 A1 10/2015 Miller  
 2015/0327965 A1 11/2015 Garrigues  
 2017/0156835 A1\* 6/2017 Schaefer ..... A61C 17/222  
 2017/0189151 A1 7/2017 Fischer et al.  
 2018/0008388 A1 1/2018 Lee  
 2018/0021116 A1\* 1/2018 Storkel ..... A61C 17/222  
 2018/0049854 A1 2/2018 Hall  
 2018/0140404 A1 5/2018 Schaefer et al.  
 2018/0168332 A1 6/2018 Woodard et al.  
 2019/0059569 A1\* 2/2019 Raku ..... A46B 11/002

15/167.1

FOREIGN PATENT DOCUMENTS

CH 609238 2/1979  
 CN 1658807 8/2005  
 CN 1886885 12/2006  
 CN 201223467 4/2009  
 CN 102026588 4/2011  
 CN 102111032 6/2011  
 DE 243224 4/1910  
 DE 2019003 11/1971  
 DE 1766651 12/1981  
 DE 3431481 2/1986  
 DE 3512190 10/1986  
 DE 8626725 5/1987  
 DE 3736308 7/1989  
 DE 4142404 7/1991  
 DE 4003305 8/1991  
 DE 4223195 1/1994  
 DE 4223196 1/1994  
 DE 4226658 2/1994  
 DE 4226659 2/1994  
 DE 4241576 6/1994  
 DE 4309078 9/1994  
 DE 29715234 12/1997  
 DE 29919053 12/2000  
 DE 19961447 7/2001  
 DE 20319996 3/2004  
 DE 102006061381 6/2008  
 EP 0210094 1/1987  
 EP 0354352 2/1990  
 EP 0661025 7/1995  
 EP 0704180 4/1996  
 EP 0968686 1/2000  
 EP 3412248 A1 \* 12/2018 ..... A61C 17/222  
 FR 429447 9/1911  
 FR 1171337 1/1959  
 GB 477799 1/1938  
 GB 500517 2/1939  
 GB 838564 6/1960  
 GB 899618 6/1962  
 GB 1583558 8/1977  
 GB 2175494 12/1986  
 GB 2250428 6/1992  
 JP 53029847 3/1978  
 JP 53033753 3/1978  
 JP 3222905 10/1991  
 SE 324221 5/1970  
 WO WO 91/13570 9/1991  
 WO WO 91/19437 12/1991  
 WO WO 92/10146 6/1992  
 WO WO 92/16160 10/1992  
 WO WO 93/10721 6/1993  
 WO WO 93/15628 8/1993  
 WO WO 94/04093 3/1994  
 WO WO 94/26144 11/1994  
 WO WO 95/02375 1/1995  
 WO WO 95/33419 12/1995  
 WO WO 98/47443 10/1998  
 WO WO 01/28452 4/2001  
 WO WO 01/45582 6/2001



(56)

**References Cited**

FOREIGN PATENT DOCUMENTS

WO	WO 02/071970	9/2002
WO	WO 02/071971	9/2002
WO	WO 05/063143	7/2005
WO	WO 2006/012974	2/2006
WO	WO 2008/070730	12/2008
WO	WO 2014/145890	9/2014
WO	WO 2014/150418	9/2014

OTHER PUBLICATIONS

Teledyne Water Pik "Plaque Control 3000" plaque removal instrument (Jul. 1991).

American Dentronics Incorporated "Soniplak" sonic plaque removal system (May 1993).

Teledyne Water Pik "Sensonic" Toothbrush, sales brochure (at least as early as Sep. 1994).

International Search Report and Written Opinion, PCT Application No. PCT/US2012/036092, 7 pages, dated Jul. 10, 2012.

\* cited by examiner

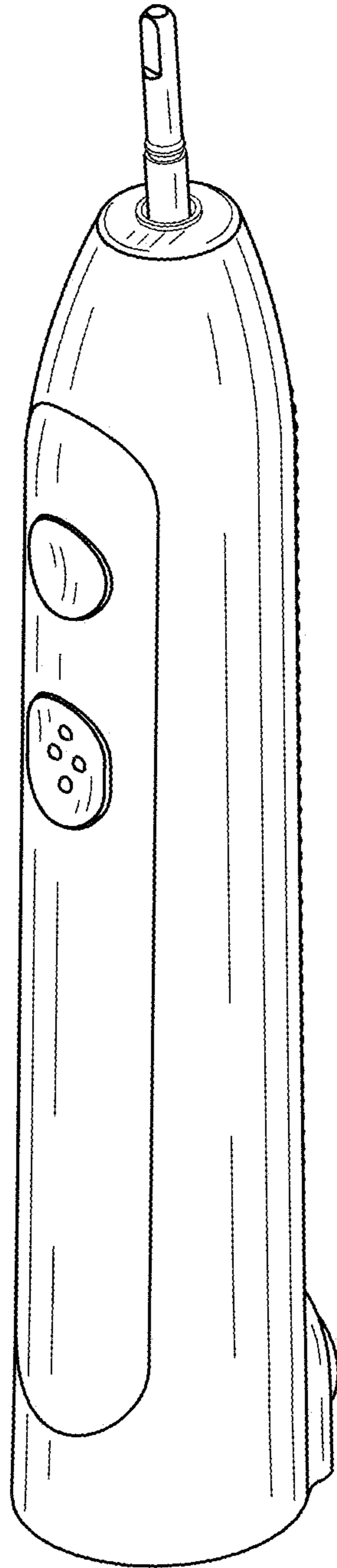


FIG. 1

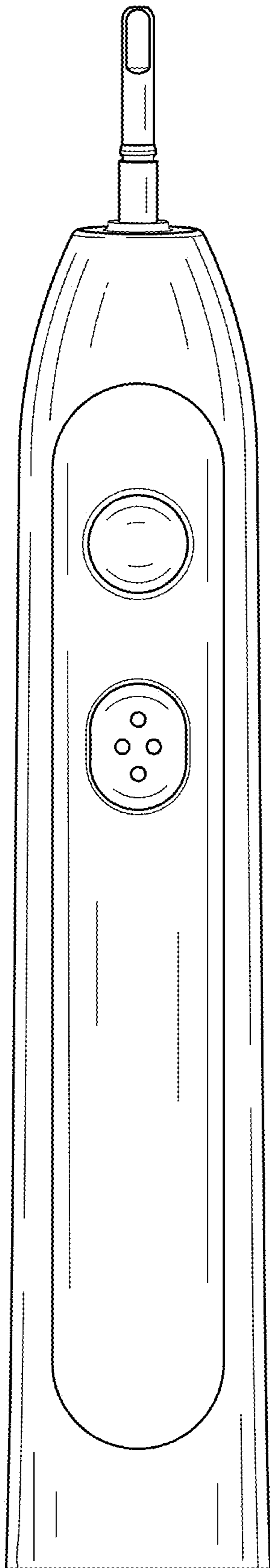


FIG. 2

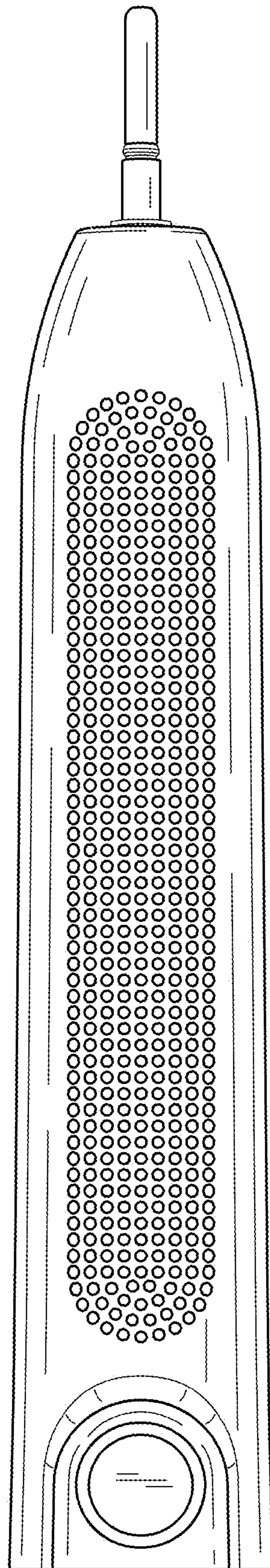


FIG. 3

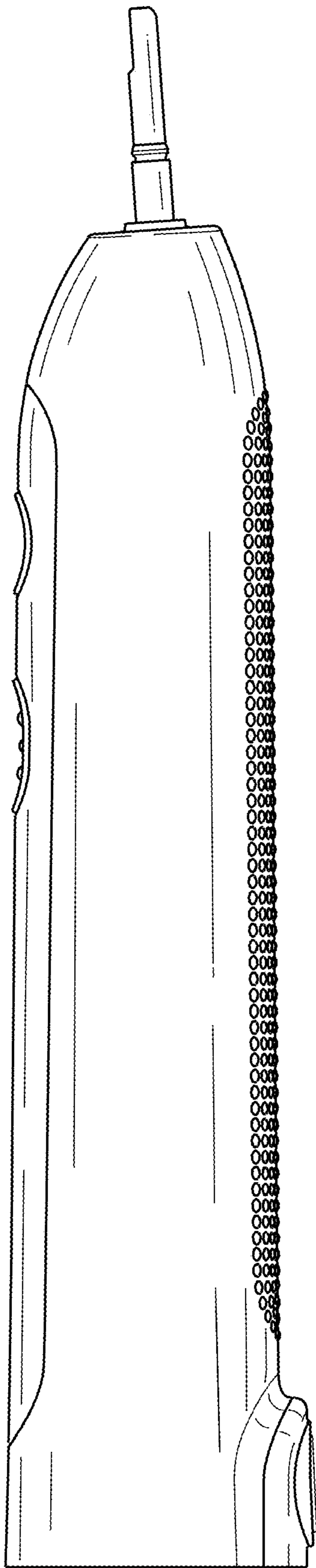


FIG. 4

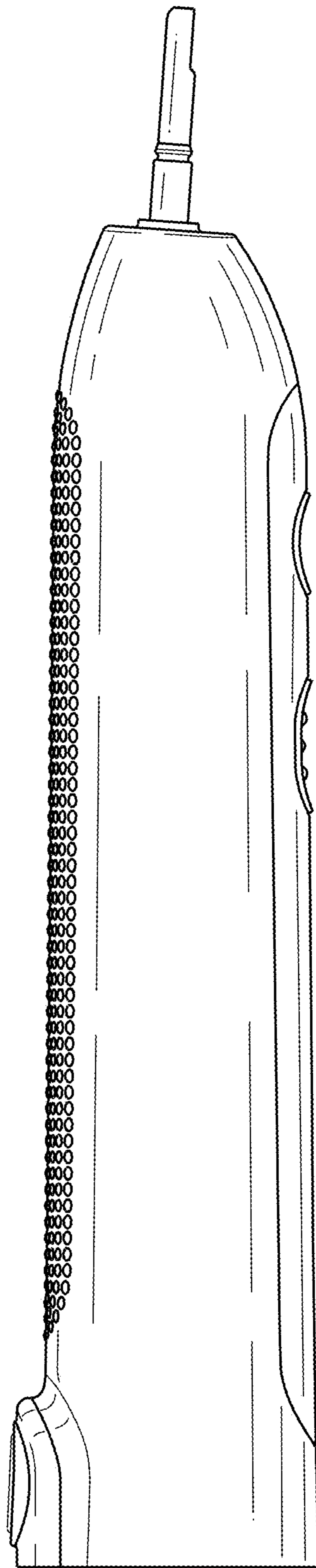


FIG. 5

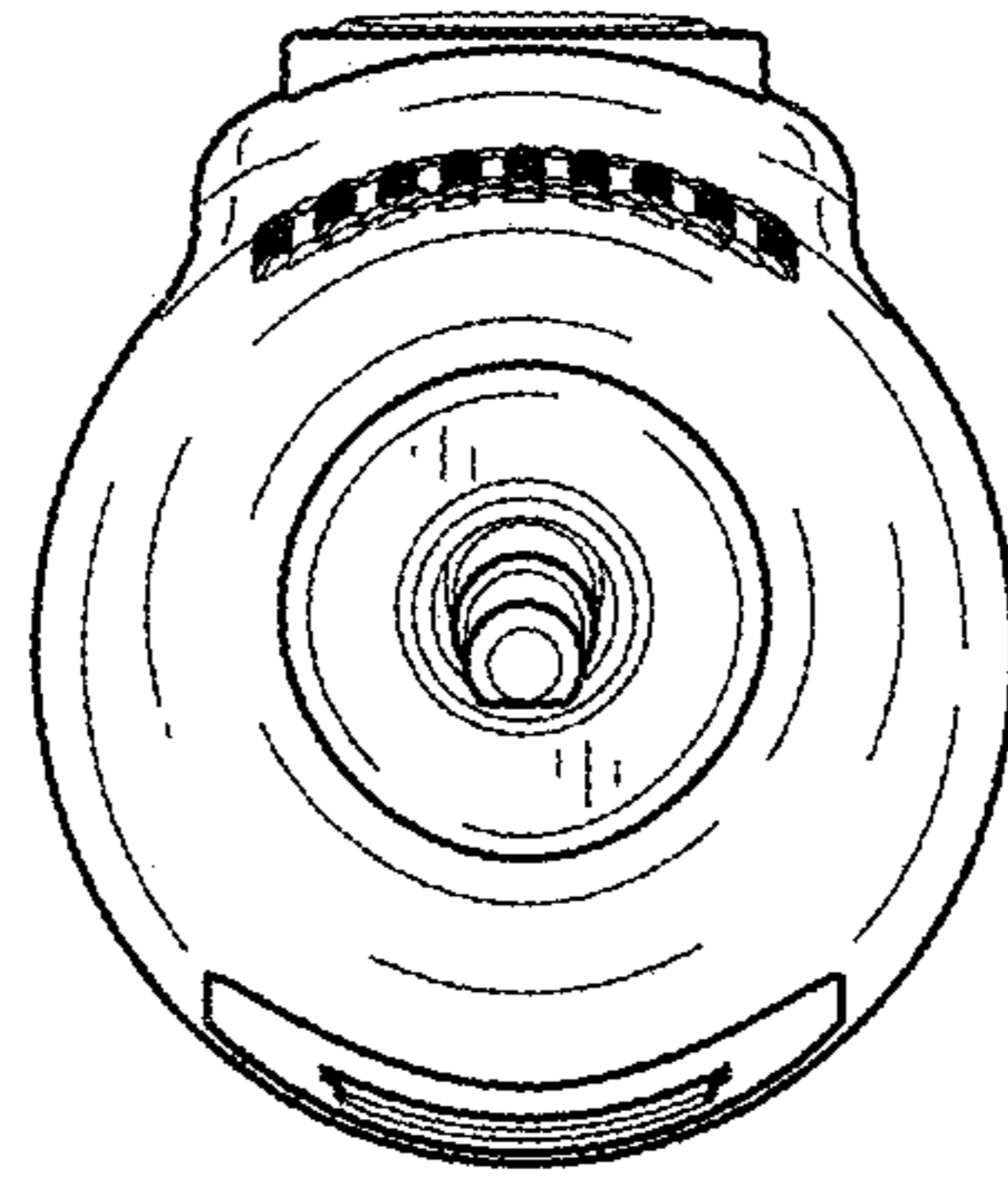


FIG. 6

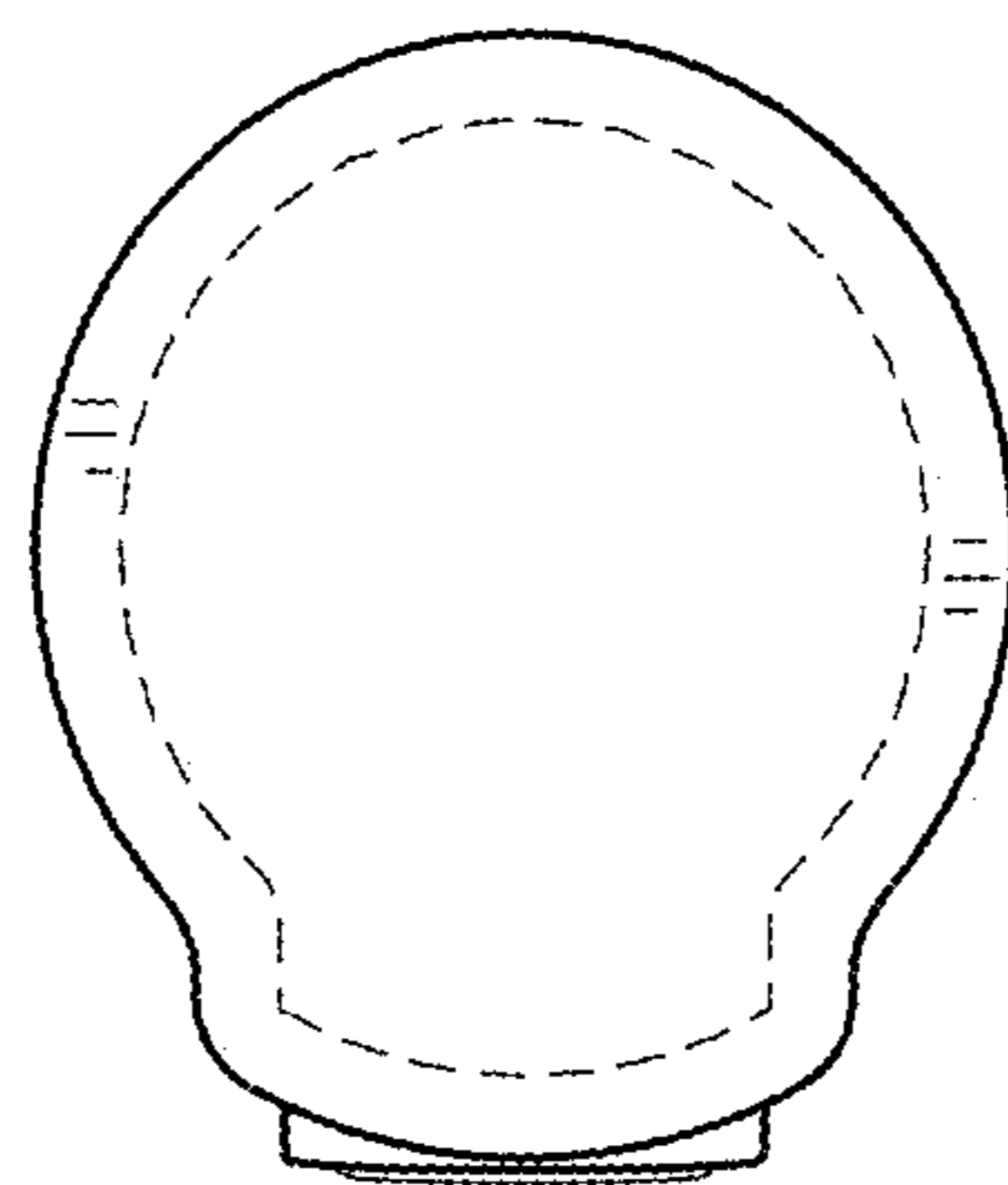


FIG. 7