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(12) United States Design Patent

Aloise

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(54) **ENDODONTIC FILE**

(71) Applicant: **Ormco Corporation**, Orange, CA (US)

(72) Inventor: **Carlos A. Aloise**, Alta Loma, CA (US)

(73) Assignee: **Ormco Corporation**, Orange, CA (US)

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

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(52) **U.S. Cl.**
USPC **D24/152**

(58) **Field of Classification Search**
USPC D24/152, 156, 107, 146–147; D8/387; D15/139; 433/102, 81, 224
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,022,838 A 4/1912 Funk
2,234,330 A 3/1941 Zetzsche et al.
(Continued)

FOREIGN PATENT DOCUMENTS

AT 84115 5/1921
AT 503433 10/2007
(Continued)

OTHER PUBLICATIONS

"Rotary Instrumentation: An Endodontic. Perspective," American Association of Endodontics, Winter 2008.
(Continued)

Primary Examiner — Wan Laymon
(74) *Attorney, Agent, or Firm* — Weiss & Arons LLP

(57) **CLAIM**

I claim the ornamental design for an endodontic file, as shown and described.

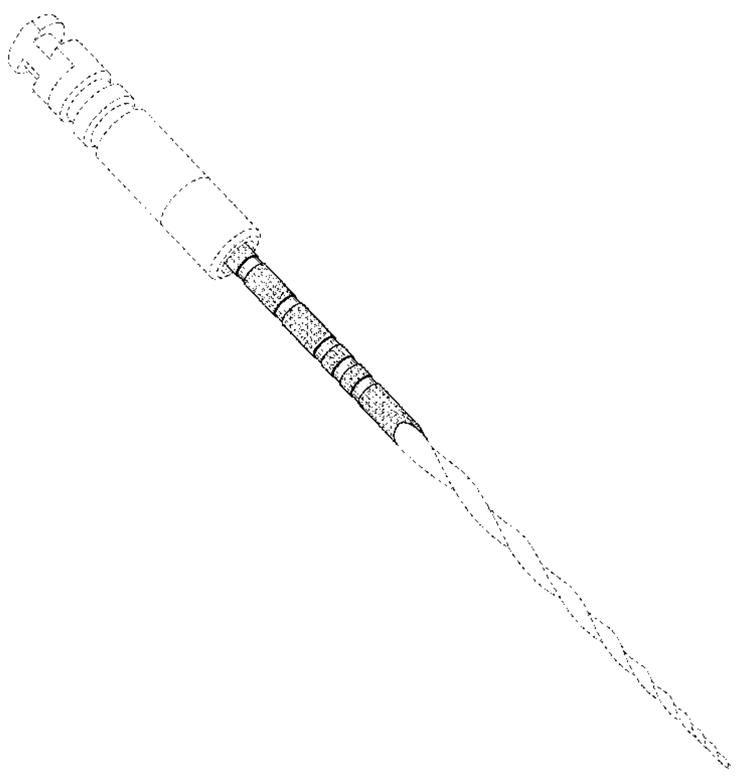
DESCRIPTION

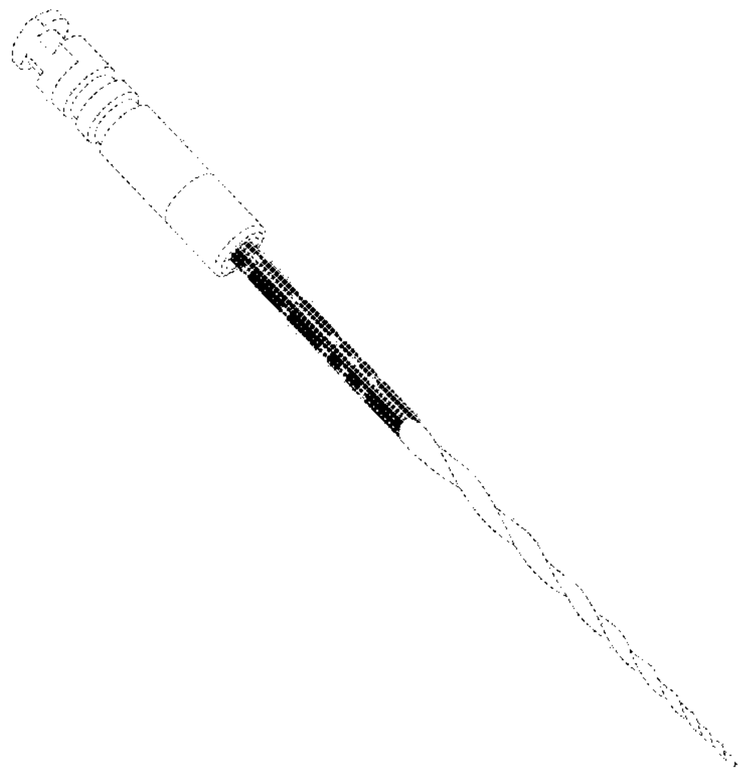
The file of this patent contains at least one drawing/photograph executed in color. Copies of this patent with color drawing(s)/photograph(s) will be provided by the Office upon request and payment of the necessary fee.

FIG. **1** is a front, right side isometric view of an endodontic file showing a first embodiment of my new design;
FIG. **2** is a front elevational view thereof;
FIG. **3** is a rear elevational view thereof;
FIG. **4** is a left side elevational view thereof;
FIG. **5** is a right side elevational view thereof;
FIG. **6** is a top plan view thereof;
FIG. **7** is a bottom plan view thereof;
FIG. **8** is a front, right side isometric view of an endodontic file showing a second embodiment of my new design;
FIG. **9** is a front elevational view thereof;
FIG. **10** is a rear elevational view thereof;
FIG. **11** is a left side elevational view thereof;
FIG. **12** is a right side elevational view thereof;
FIG. **13** is a top plan view thereof;
FIG. **14** is a bottom plan view thereof;
FIG. **15** is a front, right side isometric view of an endodontic file showing a third embodiment of my new design;
FIG. **16** is a front elevational view thereof;
FIG. **17** is a rear elevational view thereof;
FIG. **18** is a left side elevational view thereof;
FIG. **19** is a right side elevational view thereof;
FIG. **20** is a top plan view thereof; and,
FIG. **21** is a bottom plan view thereof.

The broken line showing of the endodontic file is for the purpose of illustrating environmental structure and forms no part of the claimed design.

1 Claim, 9 Drawing Sheets
(6 of 9 Drawing Sheet(s) Filed in Color)





(58) **Field of Classification Search**
CPC A61C 5/42; A61C 5/40
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,396,069	A	8/1983	Ferber et al.	
4,457,710	A *	7/1984	McSpadden	A61C 5/42 433/164
4,605,025	A	8/1986	McSpadden	
4,706,659	A	11/1987	Matthews et al.	
4,727,943	A	3/1988	Wood	
4,889,487	A	12/1989	Lovaas	
4,904,185	A	2/1990	McSpadden	
5,035,617	A	7/1991	McSpadden	
5,051,093	A	9/1991	Fitzmorris	
5,067,900	A	11/1991	McSpadden	
5,083,923	A	1/1992	McSpadden	
5,104,316	A	4/1992	McSpadden	
5,275,562	A	1/1994	McSpadden	
5,380,200	A	1/1995	Heath et al.	
5,382,161	A	1/1995	Roane	
5,421,727	A	6/1995	Stevens et al.	
RE35,070	E	10/1995	Fitzmorris	
5,464,362	A	11/1995	Heath et al.	
RE35,147	E	1/1996	Apap et al.	
5,498,158	A	3/1996	Wong	
5,503,554	A	4/1996	Schoeffel	
5,503,559	A	4/1996	Vari	
5,503,562	A	4/1996	Mays	
5,527,205	A	6/1996	Heath et al.	
5,540,766	A	7/1996	Castellani	
5,575,657	A	11/1996	Welch	
5,586,886	A	12/1996	Roane	
5,588,835	A	12/1996	Kert	
5,595,486	A	1/1997	Manocha	
5,605,460	A	2/1997	Heath et al.	
5,628,674	A	5/1997	Heath et al.	
5,639,239	A	6/1997	Earle	
5,642,998	A	7/1997	Riitano	
5,655,950	A	8/1997	Heath et al.	
5,658,145	A	8/1997	Maillefer et al.	
5,658,149	A	8/1997	Munce	
5,713,736	A	2/1998	Heath et al.	
5,735,689	A	4/1998	McSpadden	
5,746,597	A	5/1998	Maillefer et al.	
5,752,825	A	5/1998	Buchanan	
5,759,159	A	6/1998	Masreliez	
5,762,497	A	6/1998	Heath	
5,762,541	A	6/1998	Heath et al.	
5,775,903	A	7/1998	Atkins	
5,775,904	A	7/1998	Riitano	
5,797,747	A	8/1998	Badoz et al.	
5,800,165	A	9/1998	Kirsch et al.	
5,807,106	A	9/1998	Heath	
5,833,457	A	11/1998	Johnson	
5,836,764	A	11/1998	Buchanan	
5,842,861	A	12/1998	Buchanan	
5,842,862	A	12/1998	Nissan	
5,855,479	A	1/1999	Wong et al.	
5,857,852	A	1/1999	Garman	
5,879,160	A	3/1999	Ruddle	
5,882,198	A	3/1999	Taylor et al.	
5,897,316	A	4/1999	Buchanan	
5,902,106	A	5/1999	McSpadden	
5,915,964	A	6/1999	Walia	
5,915,970	A	6/1999	Sicurelli, Jr. et al.	
5,919,044	A	7/1999	Sicurelli, Jr. et al.	
5,921,775	A	7/1999	Buchanan	
5,938,440	A	8/1999	McSpadden	
5,941,705	A	8/1999	Makris et al.	
5,941,760	A	8/1999	Heath et al.	
5,947,730	A	9/1999	Kaldestad	
5,967,778	A	10/1999	Riitano	
5,980,250	A	11/1999	McSpadden	
5,984,679	A	11/1999	Farzin-Nia et al.	
6,004,133	A	12/1999	Harrison, III	
6,024,565	A	2/2000	Sicurelli et al.	
6,028,125	A	2/2000	Combe et al.	
6,036,490	A	3/2000	Johnsen et al.	
6,042,376	A	3/2000	Cohen et al.	
6,053,735	A	4/2000	Buchanan	
6,074,209	A	6/2000	Johnson	
6,079,979	A	6/2000	Riitano	
6,106,296	A	8/2000	Johnson	
6,126,521	A	10/2000	Shearer et al.	
6,128,966	A	10/2000	Usui et al.	
6,132,215	A	10/2000	Prasad et al.	
6,149,501	A	11/2000	Farzin-Nia et al.	
6,155,825	A	12/2000	Fischer et al.	
6,155,827	A	12/2000	Euvrard	
6,171,108	B1	1/2001	Roane	
6,174,165	B1	1/2001	Katsuumi et al.	
6,197,846	B1	3/2001	Combe et al.	
6,213,771	B1	4/2001	Fischer	
6,231,340	B1	5/2001	Kildea, Jr.	
6,293,795	B1	9/2001	Johnson	
6,299,445	B1	10/2001	Garman	
6,302,691	B1	10/2001	Manzoli	
6,312,255	B1	11/2001	Hudak	
6,312,261	B1	11/2001	Mays	
6,315,558	B1	11/2001	Farzin-Nia et al.	
6,331,112	B1	12/2001	Lee	
6,334,775	B2	1/2002	Xu et al.	
6,343,929	B1	2/2002	Fischer	
6,358,049	B1	3/2002	Cerniway	
6,371,763	B1	4/2002	Sicurelli, Jr. et al.	
6,400,801	B1	6/2002	Fischer et al.	
6,409,506	B1	6/2002	Graybill	
6,413,499	B1	7/2002	Clay	
6,419,488	B1	7/2002	McSpadden et al.	
6,422,865	B1	7/2002	Fischer	
6,428,317	B1	8/2002	Abel	
6,428,319	B1	8/2002	Lopez et al.	
6,431,863	B1	8/2002	Sachdeva et al.	
6,447,297	B1	9/2002	Lopez et al.	
6,464,497	B2	10/2002	Landoz	
6,464,498	B1	10/2002	Pond	
6,468,079	B1	10/2002	Fischer et al.	
6,494,713	B1	12/2002	Pond	
6,500,004	B2	12/2002	Jensen et al.	
6,514,076	B1	2/2003	Bleiweiss et al.	
6,520,773	B1	2/2003	Weber	
6,520,775	B2	2/2003	Lee	
6,575,747	B1	6/2003	Riitano et al.	
6,579,092	B1	6/2003	Senia et al.	
6,585,513	B2	7/2003	Fischer	
6,589,052	B1	7/2003	Wilcko	
6,638,064	B1	10/2003	Nance	
6,638,067	B2	10/2003	Fischer et al.	
6,644,972	B1	11/2003	Mays	
6,652,282	B2	11/2003	Jensen et al.	
6,712,610	B2	3/2004	Abdennour et al.	
6,712,611	B2	3/2004	Garman	
6,722,882	B2	4/2004	Buchanan	
6,746,245	B2	6/2004	Riitano et al.	
6,764,306	B1	7/2004	DiMarino et al.	
6,783,438	B2	8/2004	Aloise et al.	
6,877,984	B2	4/2005	Tinnin	
6,881,488	B2	4/2005	Giordano	
6,890,134	B1	5/2005	Wagner et al.	
6,910,887	B2	6/2005	Van Den Houdt	
6,921,397	B2	7/2005	Corcoran et al.	
6,924,325	B2	8/2005	Qian	
6,926,526	B2	8/2005	Hudak	
6,932,505	B2	8/2005	Yao et al.	
6,932,605	B2	8/2005	McLean et al.	
6,942,484	B2	9/2005	Scianamblo	
6,948,935	B2	9/2005	Nusstein	
6,955,536	B1	10/2005	Buchanan	
6,966,774	B2	11/2005	Brock et al.	
6,968,229	B2	11/2005	Siemons	
6,968,619	B2	11/2005	Lewis et al.	
6,986,662	B2	1/2006	Haschke	
6,991,457	B2	1/2006	Kazen et al.	

(56) **References Cited**

U.S. PATENT DOCUMENTS

7,008,223	B2	3/2006	Deutsch	
7,018,205	B2	3/2006	Abel	
RE39,174	E	7/2006	Buchanan	
7,086,864	B2	8/2006	Lopez et al.	
7,090,499	B1	8/2006	Mays	
7,094,055	B2	8/2006	Senia et al.	
7,094,056	B2	8/2006	Scianamblo	
7,097,454	B1	8/2006	Oh	
7,121,827	B2	10/2006	Lampert	
7,147,469	B2	12/2006	Garman	
7,163,401	B2	1/2007	Karmaker et al.	
7,168,952	B2	1/2007	Karmaker et al.	
7,172,421	B2	2/2007	Bina et al.	
7,198,486	B2	4/2007	Cox	
7,204,874	B2	4/2007	Jia et al.	
7,207,111	B2	4/2007	Aloise et al.	
7,223,100	B2	5/2007	Brock et al.	
7,226,288	B2	6/2007	Schoeffel	
7,232,309	B2	6/2007	Tse	
7,238,342	B2	7/2007	Torabinejad et al.	
7,252,508	B2	8/2007	Karmaker et al.	
7,261,561	B2	8/2007	Ruddle et al.	
7,261,562	B2	8/2007	Wagner et al.	
7,261,563	B2	8/2007	Haschke	
7,270,541	B1	9/2007	Johnson	
7,275,932	B2	10/2007	Jin et al.	
7,300,281	B2	11/2007	Cantatore et al.	
7,311,522	B2	12/2007	Graybill et al.	
7,322,105	B2	1/2008	Lewis	
7,331,787	B2	2/2008	Abdennour et al.	
7,338,284	B2	3/2008	Lampert	
7,367,804	B2	5/2008	Lewis	
7,398,598	B2	7/2008	Lewis et al.	
7,402,040	B2	7/2008	Turri	
7,413,563	B2	8/2008	Corcoran et al.	
7,435,086	B2 *	10/2008	Berutti	A61C 5/42 433/102
7,448,867	B2	11/2008	Aloise et al.	
7,481,652	B2	1/2009	Senia et al.	
7,498,367	B2	3/2009	Qian	
7,625,364	B2	12/2009	Corcoran et al.	
7,648,599	B2	1/2010	Berendt	
7,665,212	B2	2/2010	Lewis et al.	
7,665,991	B1	2/2010	Kert	
7,669,332	B2	3/2010	Senia et al.	
7,677,296	B2	3/2010	Mason	
7,677,892	B2	3/2010	Aleksandrovskiy et al.	
7,682,445	B2	3/2010	Hermansson et al.	
7,713,059	B2	5/2010	Hof et al.	
7,731,498	B2	6/2010	McSpadden	
7,740,480	B2	6/2010	Badoz et al.	
7,743,505	B2	6/2010	Lewis et al.	
7,766,657	B2 *	8/2010	Jaunberzins	A61C 5/42 433/102
7,771,198	B2	8/2010	Euvrard et al.	
7,779,542	B2	8/2010	Aloise et al.	
7,785,174	B2	8/2010	Badoz et al.	
7,806,690	B2	10/2010	Heath et al.	
7,828,550	B2	11/2010	Wagner et al.	
7,833,015	B2	11/2010	Tuttle et al.	
7,833,016	B2	11/2010	Gharib et al.	
7,833,017	B2	11/2010	Hof et al.	
7,863,349	B2	1/2011	Tuttle et al.	
7,891,977	B2	2/2011	Riva	
7,942,961	B2	5/2011	Asgary	
7,946,849	B2	5/2011	Abdennour et al.	
7,955,078	B2	6/2011	Scianamblo	
7,959,441	B2	6/2011	Glover et al.	
7,967,605	B2	6/2011	Goodis	
7,977,406	B2	7/2011	Hsieh et al.	
7,980,853	B2	7/2011	Riitano	
8,002,544	B2	8/2011	Rizoiu et al.	
8,043,088	B2	10/2011	Johnson	
8,047,842	B2	11/2011	Johnson	
8,062,033	B2	11/2011	Luebke	
8,075,874	B2	12/2011	Torabinejad et al.	
8,083,873	B2	12/2011	Luebke	
8,088,838	B2	1/2012	Hsieh et al.	
8,105,085	B1	1/2012	Heath et al.	
8,109,763	B2	2/2012	Levy et al.	
8,128,627	B2	3/2012	Justin et al.	
8,152,743	B2	4/2012	Mâitre et al.	
8,182,265	B2	5/2012	McSpadden	
8,215,955	B2	7/2012	Lee	
8,215,960	B2	7/2012	Wagner et al.	
8,221,117	B2	7/2012	Rizoiu et al.	
8,230,994	B2	7/2012	Johnsen et al.	
8,235,719	B2	8/2012	Ruddle et al.	
8,268,278	B2	9/2012	Boudeville et al.	
8,328,552	B2	12/2012	Ruddle et al.	
8,348,863	B2	1/2013	Gamba et al.	
8,388,345	B2	3/2013	Ruddle	
8,393,899	B2	3/2013	Heath et al.	
8,408,901	B2	4/2013	Buchanan	
8,413,330	B2	4/2013	Johnson	
8,430,879	B2	4/2013	Stoneburner et al.	
8,439,682	B1	5/2013	Heath et al.	
8,454,361	B2	6/2013	Scianamblo	
8,474,635	B2	7/2013	Johnson	
8,496,476	B2	7/2013	Scianamblo	
8,496,658	B2	7/2013	Stoneburner et al.	
8,506,293	B2	8/2013	Pond	
8,506,985	B2	8/2013	Garcia De Castro Andrews et al.	
RE44,509	E	9/2013	Pond	
8,562,341	B2	10/2013	Luebke	
8,568,142	B2	10/2013	Rzhanov et al.	
8,602,779	B2	12/2013	Simons	
8,614,263	B2	12/2013	Mante et al.	
8,644,978	B1	2/2014	Heath et al.	
8,647,116	B2	2/2014	Becker et al.	
8,702,709	B2	4/2014	Osman	
8,703,294	B2	4/2014	Zhang et al.	
RE44,917	E	5/2014	Tuttle et al.	
8,714,976	B2	5/2014	Johnson	
8,714,978	B2	5/2014	Bomschulte	
8,727,772	B2	5/2014	Jaunberzins	
8,727,773	B2	5/2014	Luebke	
8,753,120	B2	6/2014	Pitel	
8,753,121	B2	6/2014	Gharib et al.	
8,789,444	B2	7/2014	Johnson	
8,790,116	B2	7/2014	Becker et al.	
8,797,991	B2	8/2014	Diachina et al.	
8,827,705	B2	9/2014	Schoeffel	
8,876,991	B2	11/2014	Luebke	
8,882,504	B2	11/2014	Scianamblo	
8,911,573	B2	12/2014	Heath et al.	
8,916,009	B2	12/2014	Ammon et al.	
8,926,949	B2	1/2015	Dayanim	
8,932,055	B2	1/2015	Armanino	
8,932,056	B2	1/2015	Scianamblo	
8,960,576	B2	2/2015	Torabinejad et al.	
9,000,332	B2	4/2015	Brown	
9,005,377	B2	4/2015	Heath et al.	
9,033,706	B2	5/2015	Lee et al.	
9,041,323	B2	5/2015	Brown et al.	
9,078,722	B2 *	7/2015	Johnson	A61C 5/42
9,084,651	B2	7/2015	Laufer	
9,101,427	B2	8/2015	Globerman et al.	
9,101,436	B2	8/2015	Chow et al.	
9,138,299	B2	9/2015	Van Lierde et al.	
9,351,803	B2	5/2016	Scianamblo	
9,662,181	B2	5/2017	Scianamblo	
9,795,459	B2	10/2017	Heath et al.	
9,878,366	B2	1/2018	Johnson	
9,902,025	B2	2/2018	Shotton et al.	
9,931,179	B2	4/2018	Rouiller	
2002/0006599	A1	1/2002	Davidson	
2002/0137008	A1	9/2002	McSpadden et al.	
2003/0029474	A1	2/2003	Gibbs et al.	
2003/0077553	A1	4/2003	Brock	
2003/0156980	A1	8/2003	Fischer et al.	
2004/0023186	A1	2/2004	McSpadden	
2004/0191723	A1	9/2004	Shearer et al.	
2004/0219484	A1	11/2004	Scianamblo	

(56) **References Cited**

U.S. PATENT DOCUMENTS

2004/0219485	A1	11/2004	Scianamblo	
2004/0243143	A1	12/2004	Corcoran et al.	
2005/0043711	A1	2/2005	Corcoran et al.	
2005/0080400	A1	4/2005	Corcoran et al.	
2005/0118550	A1	6/2005	Turri	
2005/0266375	A1	12/2005	Brock et al.	
2005/0287498	A1	12/2005	Schoeffel	
2006/0068362	A1*	3/2006	Desrosiers	A61C 5/42 433/102
2006/0216668	A1	9/2006	Scianamblo	
2006/0228668	A1	10/2006	McSpadden	
2006/0228669	A1	10/2006	Scianamblo	
2006/0265858	A1	11/2006	McSpadden	
2006/0281047	A1	12/2006	Badoz et al.	
2007/0054238	A1	3/2007	Hof et al.	
2007/0059663	A1	3/2007	Scianamblo	
2007/0116532	A1	5/2007	Lewis	
2007/0137742	A1	6/2007	Hao et al.	
2007/0178426	A1	8/2007	Brock et al.	
2008/0153055	A1*	6/2008	Senia	A61C 5/42 433/102
2008/0213720	A1	9/2008	Lewis et al.	
2008/0287951	A1	11/2008	Stoneburner et al.	
2009/0076511	A1	3/2009	Osman	
2009/0216232	A1	8/2009	Buford, III et al.	
2009/0228007	A1	9/2009	Justin et al.	
2009/0228008	A1	9/2009	Justin et al.	
2010/0003637	A1*	1/2010	Johnson	A61C 5/42 433/102
2010/0092922	A1	4/2010	Ruddle	
2010/0233648	A1	9/2010	McSpadden et al.	
2010/0255442	A1	10/2010	McSpadden	
2011/0159458	A1	6/2011	Heath et al.	
2011/0217673	A1	9/2011	Scianamblo	
2011/0271529	A1	11/2011	Gao et al.	
2012/0107766	A1	5/2012	Borgschulte	
2012/0219927	A1	8/2012	Maxwell et al.	
2012/0231413	A1	9/2012	McSpadden et al.	
2013/0006245	A1	1/2013	Stoneburner et al.	
2013/0079829	A1	3/2013	Globerman et al.	
2013/0244200	A1*	9/2013	Rota	A61C 5/42 433/102
2013/0273497	A1	10/2013	Scianamblo	
2013/0296863	A1	11/2013	Globerman et al.	
2013/0296952	A1	11/2013	Globerman et al.	
2013/0302749	A1	11/2013	Scianamblo	
2013/0325007	A1	12/2013	Beyar et al.	
2014/0004480	A1	1/2014	Breguet	
2014/0045142	A1	2/2014	Becker et al.	
2014/0057226	A1	2/2014	Buchanan	
2014/0315147	A1	10/2014	Borgschulte	
2015/0024342	A1*	1/2015	Jaunberzins	A61C 5/42 433/102
2015/0044631	A1	2/2015	Lifshitz et al.	
2015/0072307	A1	3/2015	Scianamblo	
2015/0125811	A1	5/2015	Lifshitz et al.	
2015/0164614	A1	6/2015	Shotton et al.	
2015/0164615	A1	6/2015	Shotton et al.	
2015/0164617	A1	6/2015	Ammon et al.	
2015/0173853	A1	6/2015	Scianamblo	
2015/0216624	A1	8/2015	Shotton et al.	
2016/0008092	A1	1/2016	Heath et al.	
2016/0256237	A1*	9/2016	Lee	A61C 5/42
2017/0156818	A1	6/2017	Aloise et al.	
2017/0362694	A1	12/2017	Luebke	
2018/0008374	A1	1/2018	Rota et al.	
2018/0028280	A1	2/2018	Scianamblo	
2018/0036789	A1	2/2018	Luebke	
2018/0049845	A1	2/2018	McSpadden	
2018/0085195	A1	3/2018	Rouiller	
2018/0110588	A1	4/2018	Aloise	
2018/0125609	A1	5/2018	Malagnino	
2018/0142377	A1	5/2018	Gao et al.	
2018/0177568	A1	6/2018	Breguet et al.	

FOREIGN PATENT DOCUMENTS

AU	2008/228710	9/2008
AU	2009291863	3/2010
CA	1296708	3/1992
CA	2477098	9/2003
CA	2678911	9/2008
CA	2725324	11/2009
CA	2784175	3/2010
CH	704235	6/2012
CH	704706	9/2012
CN	1642493	7/2005
CN	1917826	2/2007
CN	1964679	5/2007
CN	100418491	9/2008
CN	101636119	1/2010
CN	201453385	5/2010
CN	102215772	10/2011
CN	1917826	7/2012
CN	103200887	7/2013
CN	103458818	12/2013
CN	103561676	2/2014
CN	104080420	10/2014
CN	104582630	4/2015
CN	204386492	6/2015
DE	202013006514	11/2013
DK	1478301	7/2010
EP	0522130	1/1993
EP	0691826	1/1996
EP	0902661	3/1999
EP	1075228	2/2001
EP	1196109	4/2002
EP	1708638	10/2006
EP	1709934	10/2006
EP	2438884	4/2012
EP	2438884	2/2013
EP	2699189	2/2014
ES	2342930	7/2010
ES	2363981	8/2011
FR	2798277	3/2001
FR	2971932	8/2012
IN	261137	8/2007
IN	1222/MUMNP/2014	3/2015
JP	4443934	8/2005
JP	2005525155	8/2005
JP	2010/522046	7/2010
JP	2011/521718	7/2011
JP	4782698	7/2011
JP	4813486	11/2011
JP	2012501762	1/2012
JP	2014533557	12/2014
JP	5768190	8/2015
KR	1020110050563	5/2011
RU	2011113964	10/2012
RU	2013150909	10/2015
WO	WO88/05492	7/1988
WO	WO9211833	7/1992
WO	WO9307828	4/1993
WO	WO9314714	8/1993
WO	WO9740771	11/1997
WO	WO9803126	1/1998
WO	WO0051516	9/2000
WO	WO0103601	1/2001
WO	WO03015652	2/2003
WO	WO03071978	9/2003
WO	WO2004091422	10/2004
WO	WO2004098434	11/2004
WO	WO2004098438	11/2004
WO	WO2004/105855	12/2004
WO	WO2005070320	8/2005
WO	WO2005122943	12/2005
WO	WO2006/041612	4/2006
WO	WO2006/042043	4/2006
WO	PCT/2006/01487/MUM	5/2007
WO	PCT/2006/03358/DEL	8/2007
WO	WO2008/116175	9/2008
WO	WO2009/143374	11/2009
WO	WO2010/030668	3/2010

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

WO	WO2011/154891	12/2011
WO	WO2012045455	4/2012
WO	WO2012079183	6/2012
WO	WO2012/107913	8/2012
WO	WO2012114052	8/2012
WO	WO2012126128	9/2012
WO	WO2012143918	10/2012
WO	WO2013074896	5/2013
WO	WO2013076717	5/2013
WO	WO2013109923	7/2013
WO	WO2013157000	10/2013
WO	WO2014/141241	9/2014
WO	WO2014/185887	11/2014
WO	WO2014205411	12/2014
WO	WO2015059707	4/2015
WO	WO2015059707	6/2015
WO	WO2015108621	7/2015
WO	WO2018/105997	6/2018

OTHER PUBLICATIONS

Y. Yahata et al, International Endodontic Journal 42, 621-626: "Effect of Heat Treatment on Transformation Temperatures and Bending Properties of Nickel-Titanium Endodontic Instruments," Jun. 1, 2009.

Dr. Mohammed Alshehri, "Medical Endodontic Instrumentation," http://www.endoexperience.com/documents/RotationReciprocationorcombination.pdf, Available as of Oct. 21, 2012.

"Vortex Blue Rotary Files," Dentsply Tulsa Dental Specialties, 2012.

"Ahead of the Curve: Using New Technology & Metallurgy to Address Endodontic Challenges," https://www.oralhealthgroup.com/features/ahead-of-the-curve-using-new-technology-metallurgy-to-address-endodontic-challenges/, May 1, 2014.

Ashok Ayer, "Nickel Titanium in Endodontics," https://www.slideshare.net/ashokayer/nickel-titanium-in-endodontics, Aug. 31, 2014.

"Surf the Canal with Confidence Wave One Gold," Dentsply Tulsa Dental Specialties, Apr. 2015.

"Nickel Titanium," https://en.wikipedia.org/wiki/Nickel_titanium, Wikimedia Foundation, Inc., Retrieved on Sep. 30, 2016.

"R-Phase," https://en.wikipedia.org/w/index.php?title=R-Phase&printable=yes, Wikimedia Foundation, Inc., Retrieved on Oct. 5, 2016.

"What is the Difference Between the Rake Angle and Cutting Angle?" http://www.endoexperience.com/filecabinet/Clinical%20Endodontics/Instruments%20-%20Files/McSpadden%20Discussions/rake%20and%20cutting%20angle.pdf, Retrieved on Dec. 5, 2016.

European Patent Office Extended Search Report in European Patent Application No. 16202063.0, dated May 16. 2017.

International Search Report in Application No. PCT/US2017/025854, dated Jul. 31, 2017.

Written Opinion in Application No. PCT/US2017/025854, dated Jul. 31, 2017.

European Patent Office Examination Report in European Patent Application No. 16202063.0, dated Apr. 23, 2018.

Extended European Search Report in Application No. 17197635.0, dated Jun. 13, 2018.

Dr. Barbara Muller, "A Short History of the NiTi File Revolution," https://www.dental-tribune.com/clinical/a-short-histary-of-the-niti-file-revolution/, May 24, 2016.

* cited by examiner

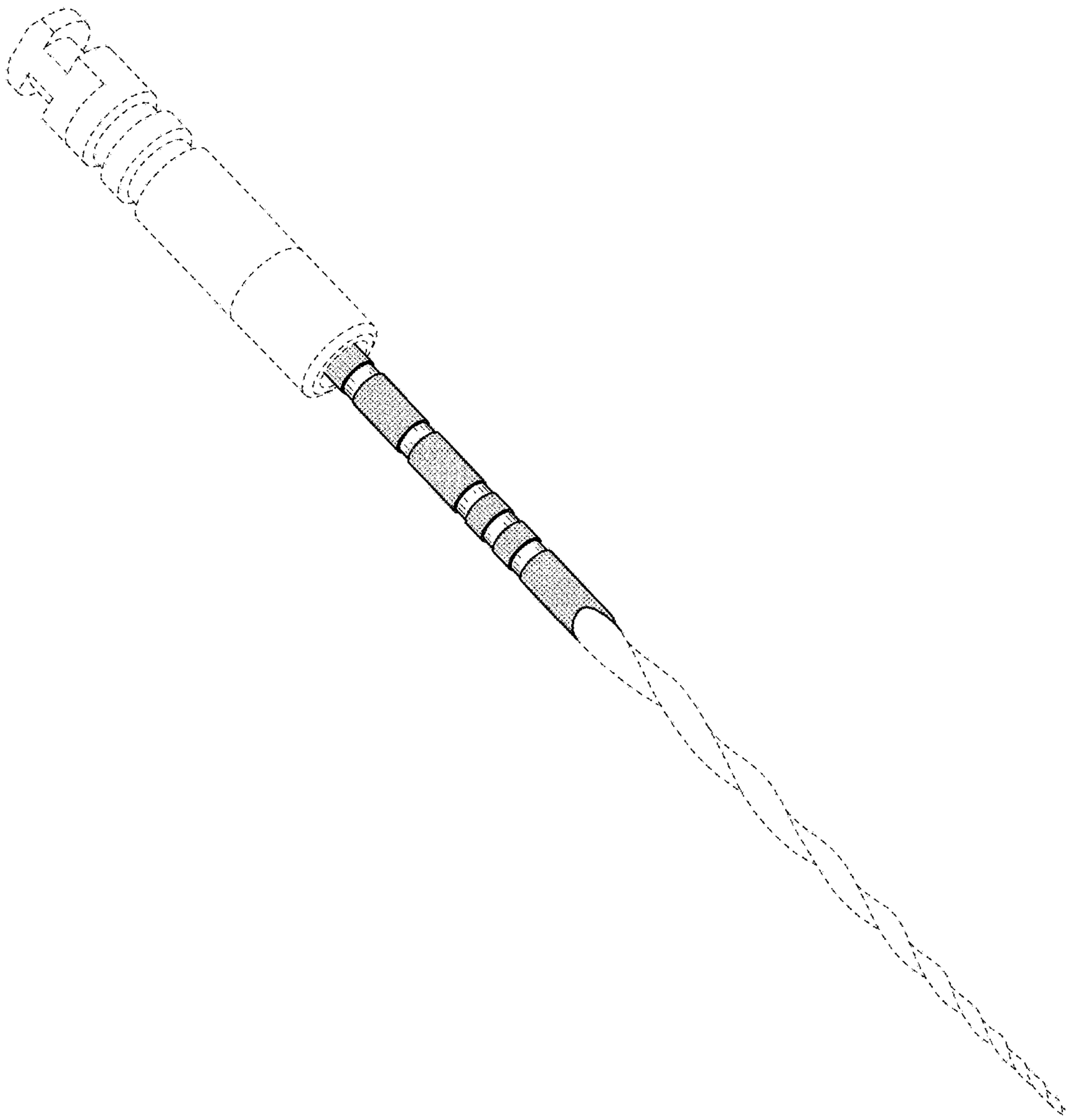


FIG. 1

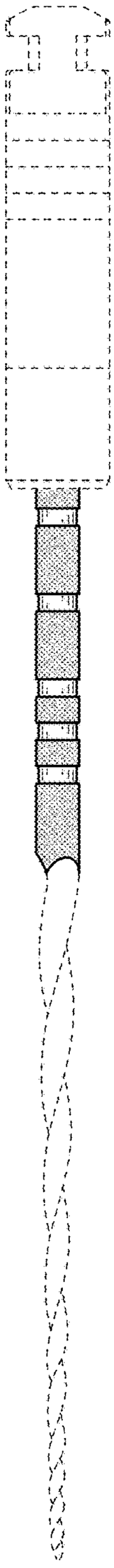


FIG. 2

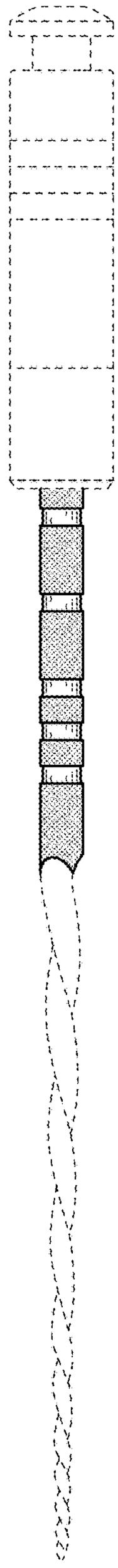


FIG. 3

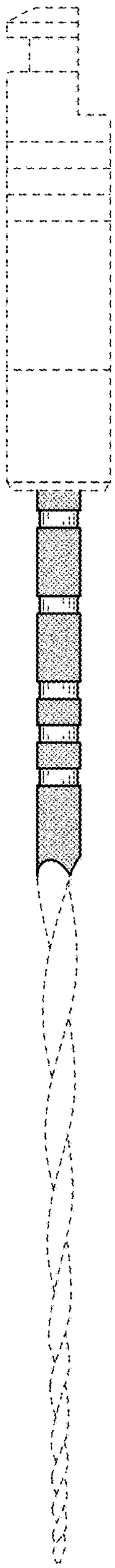


FIG. 4

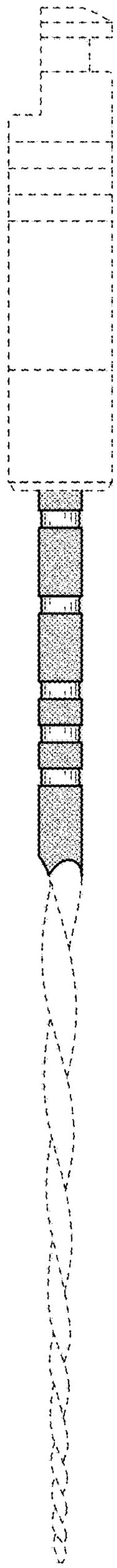


FIG. 5

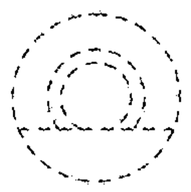


FIG. 6

FIG. 7

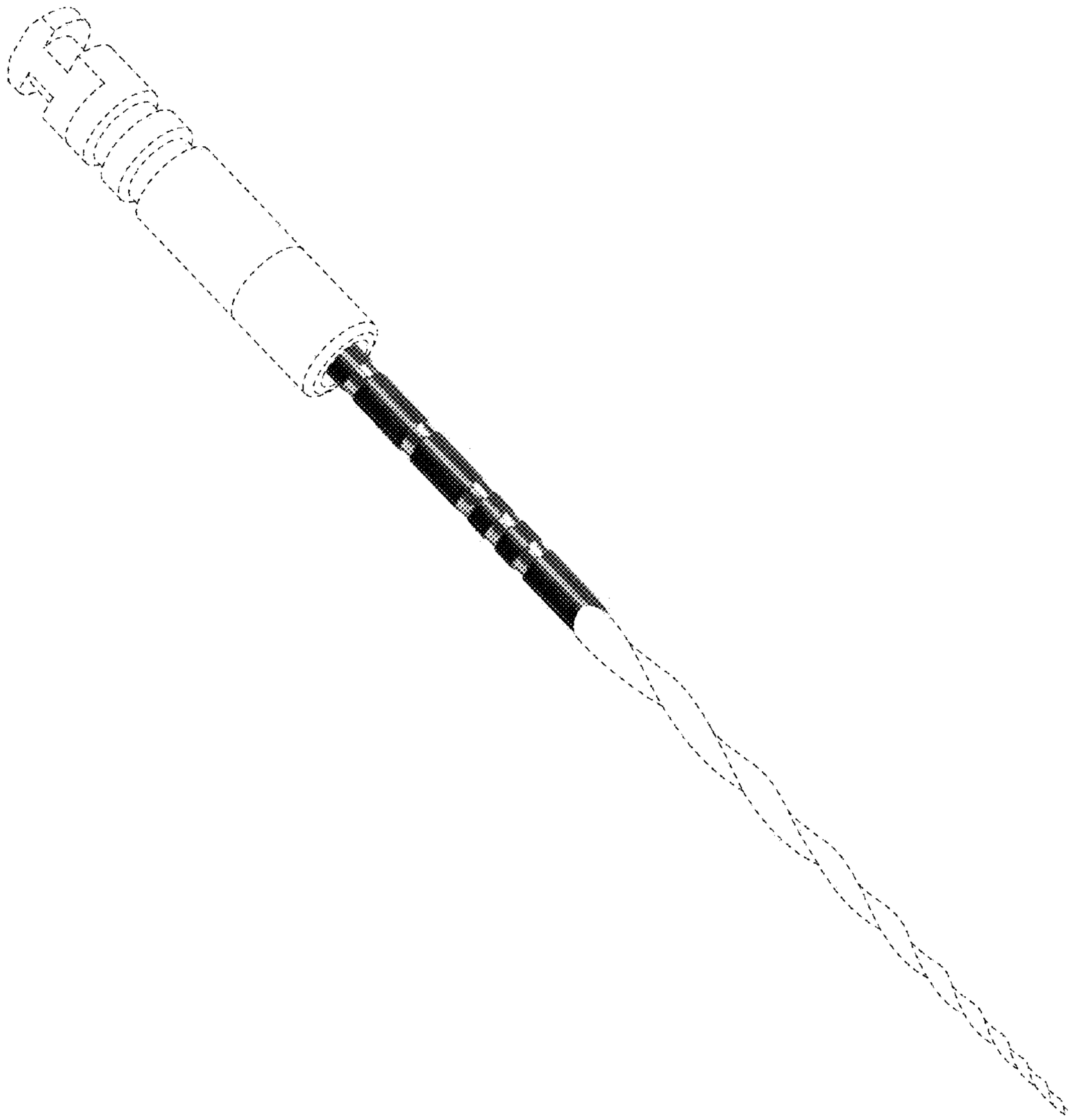


FIG. 8

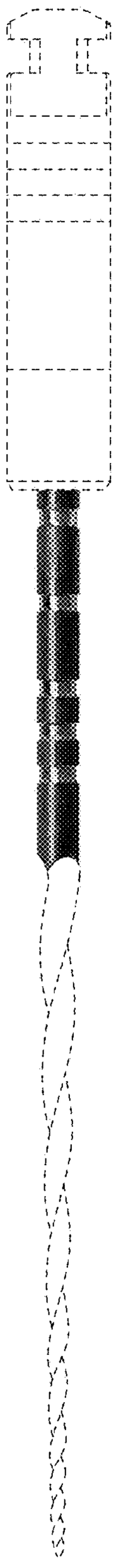


FIG. 9

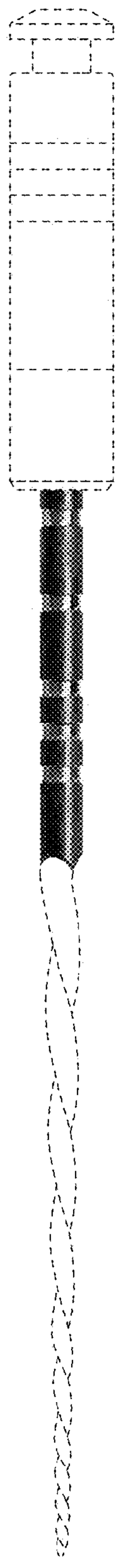


FIG. 10

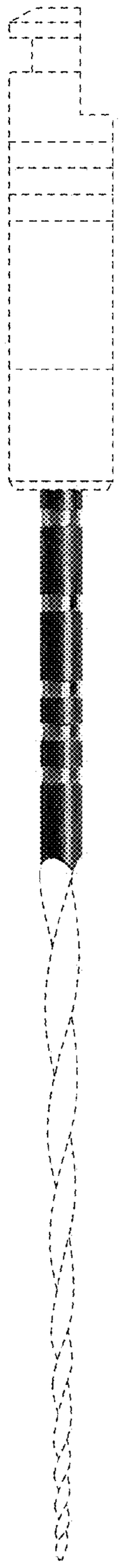


FIG. 11

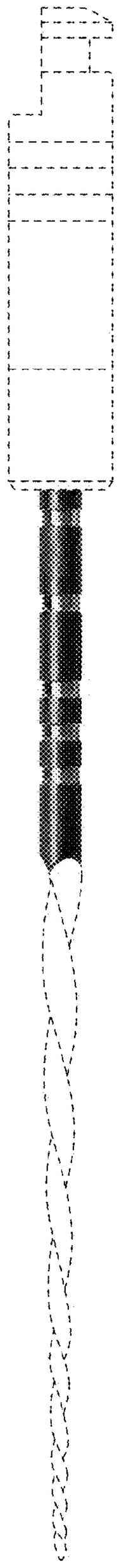


FIG. 12

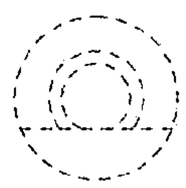


FIG. 13

FIG. 14

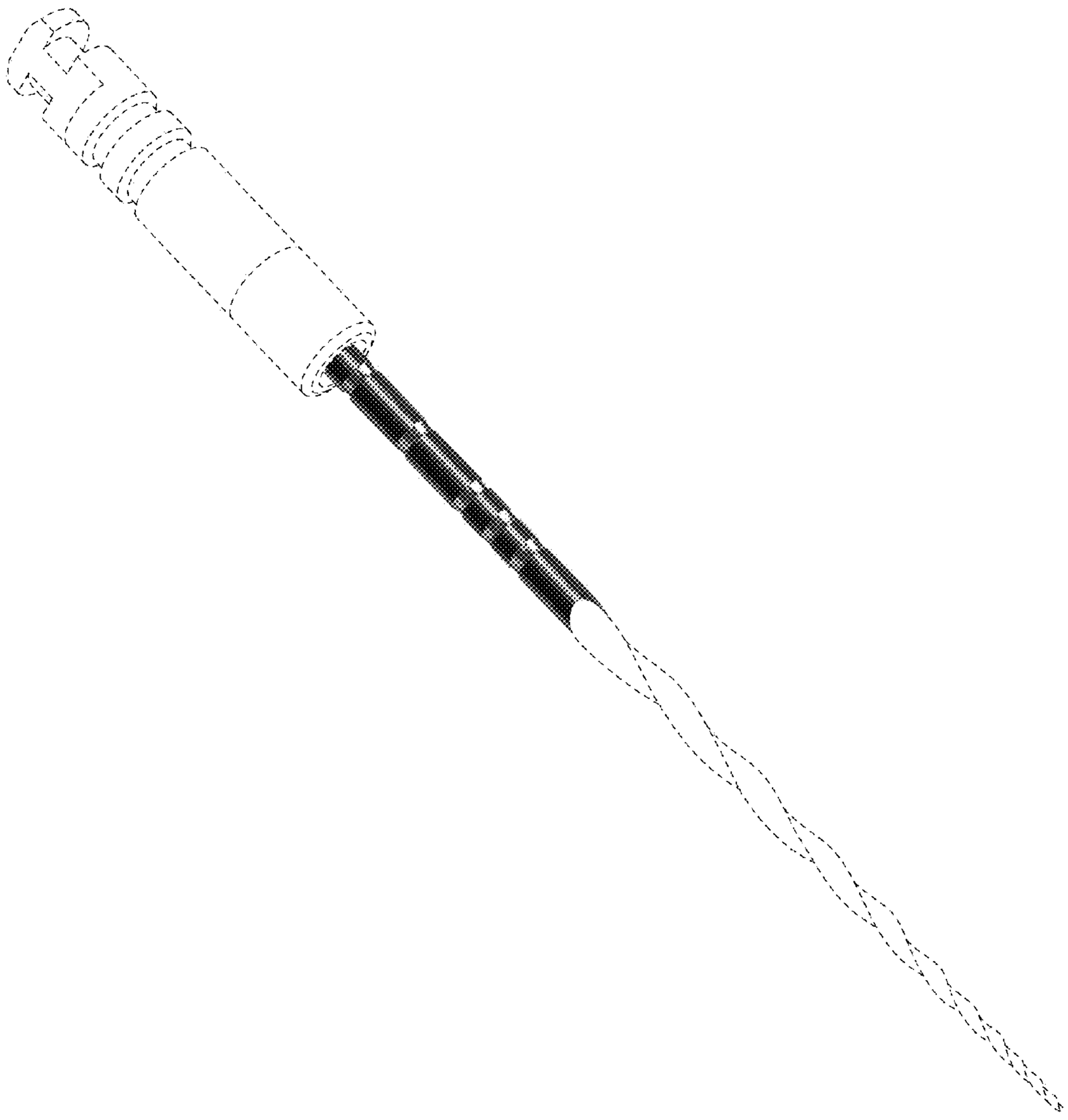


FIG. 15

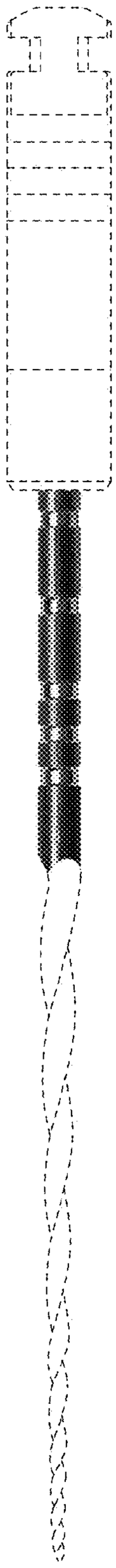


FIG. 16

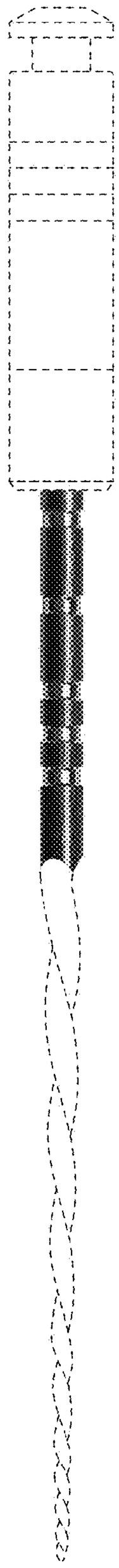


FIG. 17

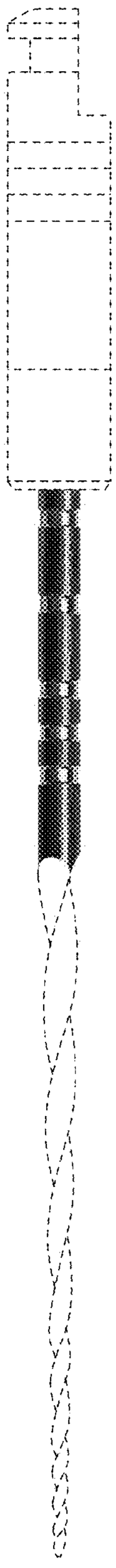


FIG. 18

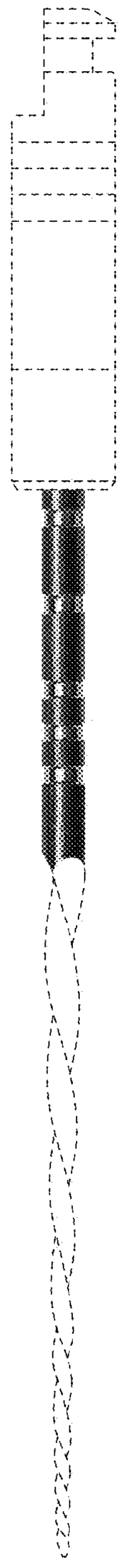


FIG. 19

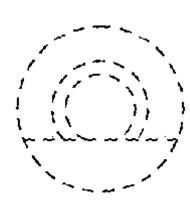


FIG. 20

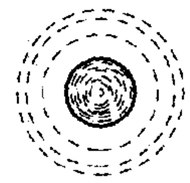


FIG. 21