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(54) **PRECISE TARGETING OF SURGICAL PHOTODISRUPTION**

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(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,164,222	A	8/1979	Prokhorov et al.
4,198,143	A	4/1980	Karasawa
4,235,529	A	11/1980	Kawase et al.
4,465,348	A	8/1984	Lang
4,520,816	A	6/1985	Schachar et al.
4,533,222	A	8/1985	Ishikawa
4,538,608	A	9/1985	L'Esperance, Jr.
4,554,917	A	11/1985	Tagnon
4,635,299	A	1/1987	MacGovern
4,638,801	A	1/1987	Daly et al.
4,764,005	A	8/1988	Webb et al.
4,881,808	A	11/1989	Bille et al.
4,901,718	A	2/1990	Bille et al.
4,907,586	A	3/1990	Bille et al.
5,048,946	A	9/1991	Sklar et al.
5,049,147	A	9/1991	Danon
5,054,907	A	10/1991	Sklar et al.
5,098,426	A	3/1992	Sklar et al.
5,112,328	A	5/1992	Taboada et al.
5,139,022	A	8/1992	Lempert
5,246,435	A	9/1993	Bille et al.
5,255,025	A	10/1993	Volk
5,286,964	A	2/1994	Fountain
5,321,501	A	6/1994	Swanson et al.
5,336,215	A	8/1994	Hsueh et al.
5,391,165	A	2/1995	Fountain et al.
5,439,462	A	8/1995	Bille et al.
5,493,109	A	2/1996	Wei et al.
5,541,951	A	7/1996	Juhasz et al.
5,548,234	A	8/1996	Turi et al.
5,549,632	A	8/1996	Lai
5,561,678	A	10/1996	Juhasz et al.
5,656,186	A	8/1997	Mourou et al.
5,738,676	A	4/1998	Hammer et al.
5,779,696	A	7/1998	Berry et al.
5,789,734	A	8/1998	Torigoe et al.
5,795,295	A	8/1998	Hellmuth et al.
5,936,706	A	8/1999	Takagi
5,954,648	A	9/1999	Van Der Brug
5,954,711	A	9/1999	Ozaki et al.

(Continued)

FOREIGN PATENT DOCUMENTS

DE	10307741	9/2004
DE	10 2005 013949	9/2006
EP	0326760	8/1989
EP	0697611	2/1996
EP	1279386	1/2003
EP	1444946	8/2004
EP	1584310	10/2005
EP	1837696	9/2007
EP	2322083	5/2011
JP	4-503913	7/1992

(Continued)

OTHER PUBLICATIONS

Aslyo-Vogel et al., "Darstellung von LTK-Läsionen durch optische Kurzkoharenztomographie (OCT) and Polarisationsmikroskopie nach Sirius-Rot-Fäbung", Ophthalmologe, pp. 487-491, 7-97.

(Continued)

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(57) **ABSTRACT**

Techniques, apparatus and systems for laser surgery including imaging-guided surgery techniques, apparatus and systems.

5 Claims, 20 Drawing Sheets