



US010376191B1

(12) **United States Patent**
Poeze et al.

(10) **Patent No.:** **US 10,376,191 B1**
(45) **Date of Patent:** ***Aug. 13, 2019**

(54) **MULTI-STREAM DATA COLLECTION SYSTEM FOR NONINVASIVE MEASUREMENT OF BLOOD CONSTITUENTS**

(58) **Field of Classification Search**
CPC . A61B 5/0205; A61B 5/1455; A61B 5/14551; A61B 5/14552; A61B 5/14532;
(Continued)

(71) Applicant: **Masimo Corporation**, Irvine, CA (US)

(56) **References Cited**

(72) Inventors: **Jeroen Poeze**, Rancho Santa Margarita, CA (US); **Marcelo Lamego**, Cupertino, CA (US); **Sean Merritt**, Lake Forest, CA (US); **Cristiano Dalvi**, Lake Forest, CA (US); **Hung Vo**, Fountain Valley, CA (US); **Johannes Bruinsma**, Opeinde (NL); **Ferdyan Lesmana**, Irvine, CA (US); **Massi Joe E. Kiani**, Laguna Niguel, CA (US); **Greg Olsen**, Lake Forest, CA (US)

U.S. PATENT DOCUMENTS

3,910,701 A 10/1975 Henderson et al.
4,114,604 A 9/1978 Shaw et al.
(Continued)

FOREIGN PATENT DOCUMENTS

EP 419223 3/1991
EP 1 518 494 3/2005
(Continued)

OTHER PUBLICATIONS

US 8,845,543 B2, 09/2014, Diab et al. (withdrawn)
(Continued)

Primary Examiner — Eric F Winakur
Assistant Examiner — Chu Chuan Liu

(74) *Attorney, Agent, or Firm* — Knobbe Martens Olson & Bear LLP

(73) Assignee: **Masimo Corporation**, Irvine, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **16/409,515**

(22) Filed: **May 10, 2019**

Related U.S. Application Data

(63) Continuation of application No. 16/261,326, filed on Jan. 29, 2019, now Pat. No. 10,292,628, which is a
(Continued)

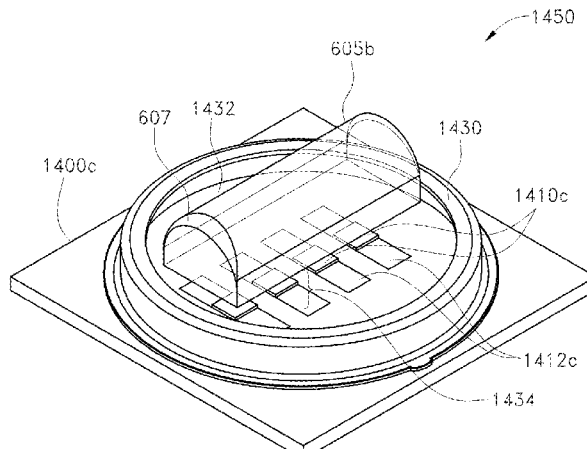
(51) **Int. Cl.**
A61B 5/1455 (2006.01)
A61B 5/00 (2006.01)
A61B 5/145 (2006.01)

(52) **U.S. Cl.**
CPC **A61B 5/1455** (2013.01); **A61B 5/14532** (2013.01); **A61B 5/14546** (2013.01);
(Continued)

(57) **ABSTRACT**

The present disclosure relates to noninvasive methods, devices, and systems for measuring various blood constituents or analytes, such as glucose. In an embodiment, a light source comprises LEDs and super-luminescent LEDs. The light source emits light at at least wavelengths of about 1610 nm, about 1640 nm, and about 1665 nm. In an embodiment, the detector comprises a plurality of photodetectors arranged in a special geometry comprising one of a substantially linear substantially equal spaced geometry, a substantially linear substantially non-equal spaced geometry, and a substantially grid geometry.

19 Claims, 65 Drawing Sheets



Related U.S. Application Data

- continuation of application No. 16/212,537, filed on Dec. 6, 2018, now Pat. No. 10,258,266, which is a continuation of application No. 14/981,290, filed on Dec. 28, 2015, now Pat. No. 10,335,068, which is a continuation of application No. 12/829,352, filed on Jul. 1, 2010, now Pat. No. 9,277,880, which is a continuation of application No. 12/534,827, filed on Aug. 3, 2009, and a continuation-in-part of application No. 12/497,528, filed on Jul. 2, 2009, now Pat. No. 8,577,431, which is a continuation-in-part of application No. 29/323,408, filed on Aug. 25, 2008, now Pat. No. Des. 606,659, and a continuation-in-part of application No. 29/323,409, filed on Aug. 25, 2008, now Pat. No. Des. 621,516, said application No. 12/829,352 is a continuation-in-part of application No. 12/497,523, filed on Jul. 2, 2009, now Pat. No. 8,437,825, which is a continuation-in-part of application No. 29/323,408, said application No. 12/497,523 is a continuation-in-part of application No. 29/323,409.
- (60) Provisional application No. 61/086,060, filed on Aug. 4, 2008, provisional application No. 61/086,108, filed on Aug. 4, 2008, provisional application No. 61/086,063, filed on Aug. 4, 2008, provisional application No. 61/086,057, filed on Aug. 4, 2008, provisional application No. 61/091,732, filed on Aug. 25, 2008, provisional application No. 61/078,228, filed on Jul. 3, 2008, provisional application No. 61/078,207, filed on Jul. 3, 2008.
- (52) **U.S. Cl.**
CPC *A61B 5/14552* (2013.01); *A61B 5/6816* (2013.01); *A61B 5/6826* (2013.01); *A61B 5/6829* (2013.01); *A61B 5/6838* (2013.01); *A61B 5/6843* (2013.01); *A61B 2562/0233* (2013.01); *A61B 2562/04* (2013.01); *A61B 2562/046* (2013.01); *A61B 2562/146* (2013.01)
- (58) **Field of Classification Search**
CPC . A61B 5/14546; A61B 5/6829; A61B 5/6843; A61B 5/6826; A61B 5/6816; A61B 5/6838
See application file for complete search history.
- (56) **References Cited**
U.S. PATENT DOCUMENTS
- | | | | | | | | |
|-----------|---|---------|------------------|-----------|---|---------|--------------------------|
| 4,258,719 | A | 3/1981 | Lewyn | 5,077,476 | A | 12/1991 | Rosenthal |
| 4,267,844 | A | 5/1981 | Yamanishi | 5,086,229 | A | 2/1992 | Rosenthal et al. |
| 4,438,338 | A | 3/1984 | Stitt | 5,099,842 | A | 3/1992 | Mannheimer et al. |
| 4,444,471 | A | 4/1984 | Ford et al. | D326,715 | S | 6/1992 | Schmidt |
| 4,653,498 | A | 3/1987 | New, Jr. et al. | 5,122,925 | A | 6/1992 | Inpyun |
| 4,655,225 | A | 4/1987 | Dahne et al. | 5,131,391 | A | 7/1992 | Sakai et al. |
| 4,684,245 | A | 8/1987 | Goldring | 5,137,023 | A | 8/1992 | Mendelson et al. |
| 4,709,413 | A | 11/1987 | Forrest | 5,159,929 | A | 11/1992 | McMillen et al. |
| 4,755,676 | A | 7/1988 | Gaalema et al. | 5,163,438 | A | 11/1992 | Gordon et al. |
| 4,781,195 | A | 11/1988 | Martin | 5,222,295 | A | 6/1993 | Dorris, Jr. |
| 4,805,623 | A | 2/1989 | Jöbsis | 5,222,495 | A | 6/1993 | Clarke et al. |
| 4,880,304 | A | 11/1989 | Jaeb et al. | 5,222,496 | A | 6/1993 | Clarke et al. |
| 4,960,128 | A | 10/1990 | Gordon et al. | 5,249,576 | A | 10/1993 | Goldberger et al. |
| 4,964,408 | A | 10/1990 | Hink et al. | 5,250,342 | A | 10/1993 | Lang |
| 5,028,787 | A | 7/1991 | Rosenthal et al. | 5,278,627 | A | 1/1994 | Aoyagi et al. |
| 5,035,243 | A | 7/1991 | Muz | 5,297,548 | A | 3/1994 | Pologe |
| 5,041,187 | A | 8/1991 | Hink et al. | 5,319,355 | A | 6/1994 | Russek |
| 5,043,820 | A | 8/1991 | Wyles et al. | 5,337,744 | A | 8/1994 | Branigan |
| | | | | 5,337,745 | A | 8/1994 | Benaron |
| | | | | 5,341,805 | A | 8/1994 | Stavridi et al. |
| | | | | 5,362,966 | A | 11/1994 | Rosenthal et al. |
| | | | | D353,195 | S | 12/1994 | Savage et al. |
| | | | | D353,196 | S | 12/1994 | Savage et al. |
| | | | | 5,377,676 | A | 1/1995 | Vari et al. |
| | | | | D356,870 | S | 3/1995 | Ivers et al. |
| | | | | D359,546 | S | 6/1995 | Savage et al. |
| | | | | 5,427,093 | A | 6/1995 | Ogawa et al. |
| | | | | 5,431,170 | A | 7/1995 | Mathews |
| | | | | D361,840 | S | 8/1995 | Savage et al. |
| | | | | 5,437,275 | A | 8/1995 | Amundsen et al. |
| | | | | 5,441,054 | A | 8/1995 | Tsuchiya |
| | | | | D362,063 | S | 9/1995 | Savage et al. |
| | | | | 5,452,717 | A | 9/1995 | Branigan et al. |
| | | | | D363,120 | S | 10/1995 | Savage et al. |
| | | | | 5,456,252 | A | 10/1995 | Vari et al. |
| | | | | 5,479,934 | A | 1/1996 | Imran |
| | | | | 5,482,034 | A | 1/1996 | Lewis et al. |
| | | | | 5,482,036 | A | 1/1996 | Diab et al. |
| | | | | 5,490,505 | A | 2/1996 | Diab et al. |
| | | | | 5,490,506 | A | 2/1996 | Takatani et al. |
| | | | | 5,494,043 | A | 2/1996 | O'Sullivan et al. |
| | | | | 5,511,546 | A | 4/1996 | Hon |
| | | | | 5,533,511 | A | 7/1996 | Kaspari et al. |
| | | | | 5,534,851 | A | 7/1996 | Russek |
| | | | | 5,551,422 | A | 9/1996 | Simonsen et al. |
| | | | | 5,553,615 | A | 9/1996 | Carim et al. |
| | | | | 5,553,616 | A | 9/1996 | Ham et al. |
| | | | | 5,561,275 | A | 10/1996 | Savage et al. |
| | | | | 5,562,002 | A | 10/1996 | Lalin |
| | | | | 5,590,649 | A | 1/1997 | Caro et al. |
| | | | | 5,601,079 | A | 2/1997 | Wong et al. |
| | | | | 5,602,924 | A | 2/1997 | Durand et al. |
| | | | | D378,414 | S | 3/1997 | Allen et al. |
| | | | | 5,625,458 | A | 4/1997 | Alfano et al. |
| | | | | 5,632,272 | A | 5/1997 | Diab et al. |
| | | | | 5,638,816 | A | 6/1997 | Kiani-Azarbayjany et al. |
| | | | | 5,638,818 | A | 6/1997 | Diab et al. |
| | | | | 5,645,440 | A | 7/1997 | Tobler et al. |
| | | | | 5,676,143 | A | 10/1997 | Simonsen et al. |
| | | | | 5,685,299 | A | 11/1997 | Diab et al. |
| | | | | D390,666 | S | 2/1998 | Lagerlof |
| | | | | D393,830 | S | 4/1998 | Tobler et al. |
| | | | | 5,743,262 | A | 4/1998 | Lepper, Jr. et al. |
| | | | | 5,750,927 | A | 5/1998 | Baltazar |
| | | | | 5,752,914 | A | 5/1998 | Delonzor et al. |
| | | | | 5,758,644 | A | 6/1998 | Diab et al. |
| | | | | 5,760,910 | A | 6/1998 | Lepper, Jr. et al. |
| | | | | 5,766,131 | A | 6/1998 | Kondo et al. |
| | | | | 5,769,785 | A | 6/1998 | Diab et al. |
| | | | | 5,782,757 | A | 7/1998 | Diab et al. |
| | | | | 5,785,659 | A | 7/1998 | Caro et al. |
| | | | | 5,791,347 | A | 8/1998 | Flaherty et al. |
| | | | | 5,792,052 | A | 8/1998 | Isaacson et al. |
| | | | | 5,810,734 | A | 9/1998 | Caro et al. |
| | | | | 5,823,950 | A | 10/1998 | Diab et al. |
| | | | | 5,826,885 | A | 10/1998 | Helgeland |
| | | | | 5,830,131 | A | 11/1998 | Caro et al. |

(56)

References Cited

U.S. PATENT DOCUMENTS

5,851,178	A	12/1998	Aronow	6,505,059	B1	1/2003	Kollias et al.
5,860,919	A	1/1999	Kiani-Azarbayjany et al.	6,515,273	B2	2/2003	Al-Ali
5,890,929	A	4/1999	Mills et al.	6,519,487	B1	2/2003	Parker
5,902,235	A	5/1999	Lewis et al.	6,522,521	B2	2/2003	Mizuno et al.
5,903,357	A	5/1999	Colak	6,525,386	B1	2/2003	Mills et al.
5,904,654	A	5/1999	Wohltmann et al.	6,526,300	B1	2/2003	Kiani et al.
5,919,134	A	7/1999	Diab	6,541,756	B2	4/2003	Schulz et al.
5,934,925	A	8/1999	Tobler et al.	6,542,764	B1	4/2003	Al-Ali et al.
5,940,182	A	8/1999	Lepper, Jr. et al.	6,580,086	B1	6/2003	Schulz et al.
5,957,840	A	9/1999	Terasawa et al.	6,584,336	B1	6/2003	Ali et al.
D414,870	S	10/1999	Saltzstein et al.	6,595,316	B2	7/2003	Cybulski et al.
5,995,855	A	11/1999	Kiani et al.	6,597,932	B2	7/2003	Tian et al.
5,997,343	A	12/1999	Mills et al.	6,597,933	B2	7/2003	Kiani et al.
6,002,952	A	12/1999	Diab et al.	6,606,509	B2	8/2003	Schmitt
6,011,986	A	1/2000	Diab et al.	6,606,511	B1	8/2003	Ali et al.
6,027,452	A	2/2000	Flaherty et al.	D481,459	S	10/2003	Nahm
6,036,642	A	3/2000	Diab et al.	6,632,181	B2	10/2003	Flaherty et al.
6,045,509	A	4/2000	Caro et al.	6,636,759	B2	10/2003	Robinson
6,049,727	A	4/2000	Crothall	6,639,668	B1	10/2003	Trepagnier
6,067,462	A	5/2000	Diab et al.	6,639,867	B2	10/2003	Shim
6,081,735	A	6/2000	Diab et al.	6,640,116	B2	10/2003	Diab
6,088,607	A	7/2000	Diab et al.	6,643,530	B2	11/2003	Diab et al.
6,110,522	A	8/2000	Lepper, Jr. et al.	6,650,917	B2	11/2003	Diab et al.
6,124,597	A	9/2000	Shehada	6,654,624	B2	11/2003	Diab et al.
6,128,521	A	10/2000	Marro et al.	6,658,276	B2	12/2003	Kiani et al.
6,129,675	A	10/2000	Jay	6,661,161	B1	12/2003	Lanzo et al.
6,144,866	A	11/2000	Miesel et al.	6,668,185	B2	12/2003	Toida
6,144,868	A	11/2000	Parker	6,671,531	B2	12/2003	Al-Ali et al.
6,151,516	A	11/2000	Kiani-Azarbayjany et al.	6,678,543	B2	1/2004	Diab et al.
6,152,754	A	11/2000	Gerhardt et al.	6,681,133	B2	1/2004	Chaiken et al.
6,157,850	A	12/2000	Diab et al.	6,684,090	B2	1/2004	Ali et al.
6,165,005	A	12/2000	Mills et al.	6,684,091	B2	1/2004	Parker
6,172,743	B1	1/2001	Kley et al.	6,697,656	B1	2/2004	Al-Ali
6,181,958	B1	1/2001	Steuer et al.	6,697,657	B1	2/2004	Shehada et al.
6,184,521	B1	2/2001	Coffin, IV et al.	6,697,658	B2	2/2004	Al-Ali
6,206,830	B1	3/2001	Diab et al.	RE38,476	E	3/2004	Diab et al.
6,223,063	B1	4/2001	Chaiken et al.	6,699,194	B1	3/2004	Diab et al.
6,229,856	B1	5/2001	Diab et al.	6,714,804	B2	3/2004	Al-Ali et al.
6,232,609	B1	5/2001	Snyder et al.	RE38,492	E	4/2004	Diab et al.
6,236,872	B1	5/2001	Diab et al.	6,721,582	B2	4/2004	Trepagnier et al.
6,241,683	B1	6/2001	Macklem et al.	6,721,585	B1	4/2004	Parker
6,253,097	B1	6/2001	Aronow et al.	6,725,075	B2	4/2004	Al-Ali
6,256,523	B1	7/2001	Diab et al.	6,728,560	B2	4/2004	Kollias et al.
6,263,222	B1	7/2001	Diab et al.	6,735,459	B2	5/2004	Parker
6,278,522	B1	8/2001	Lepper, Jr. et al.	6,745,060	B2	6/2004	Diab et al.
6,278,889	B1	8/2001	Robinson	6,748,254	B2	6/2004	O'Neil et al.
6,280,213	B1	8/2001	Tobler et al.	6,760,607	B2	7/2004	Al-Ali
6,285,896	B1	9/2001	Tobler et al.	6,770,028	B1	8/2004	Ali et al.
6,301,493	B1	10/2001	Marro et al.	6,771,994	B2	8/2004	Kiani et al.
6,317,627	B1	11/2001	Ennen et al.	6,792,300	B1	9/2004	Diab et al.
6,321,100	B1	11/2001	Parker	6,813,511	B2	11/2004	Diab et al.
D452,012	S	12/2001	Phillips	6,816,010	B2	11/2004	Seetharaman et al.
6,325,761	B1	12/2001	Jay	6,816,241	B2	11/2004	Grubisic et al.
6,334,065	B1	12/2001	Al-Ali et al.	6,816,741	B2	11/2004	Diab
6,343,223	B1	1/2002	Chin et al.	6,822,564	B2	11/2004	Al-Ali
6,343,224	B1	1/2002	Parker	6,826,419	B2	11/2004	Diab et al.
6,345,194	B1	2/2002	Nelson et al.	6,830,711	B2	12/2004	Mills et al.
6,349,228	B1	2/2002	Kiani et al.	6,850,787	B2	2/2005	Weber et al.
6,353,750	B1	3/2002	Kimura et al.	6,850,788	B2	2/2005	Al-Ali
6,360,113	B1	3/2002	Dettling	6,852,083	B2	2/2005	Caro et al.
6,360,114	B1	3/2002	Diab et al.	D502,655	S	3/2005	Huang
6,360,115	B1	3/2002	Greenwald et al.	6,861,639	B2	3/2005	Al-Ali
D455,834	S	4/2002	Donars et al.	6,898,452	B2	5/2005	Al-Ali et al.
6,368,283	B1	4/2002	Xu et al.	6,912,413	B2	6/2005	Rantala et al.
6,371,921	B1	4/2002	Caro et al.	6,920,345	B2	7/2005	Al-Ali et al.
6,377,829	B1	4/2002	Al-Ali	D508,862	S	8/2005	Behar et al.
6,388,240	B2	5/2002	Schulz et al.	6,931,268	B1	8/2005	Kiani-Azarbayjany et al.
6,397,091	B2	5/2002	Diab et al.	6,934,570	B2	8/2005	Kiani et al.
6,430,437	B1	8/2002	Marro	6,939,305	B2	9/2005	Flaherty et al.
6,430,525	B1	8/2002	Weber et al.	6,943,348	B1	9/2005	Coffin, IV
D463,561	S	9/2002	Fukatsu et al.	6,950,687	B2	9/2005	Al-Ali
6,463,311	B1	10/2002	Diab	D510,625	S	10/2005	Widener et al.
6,470,199	B1	10/2002	Kopotic et al.	6,961,598	B2	11/2005	Diab
				6,970,792	B1	11/2005	Diab
				6,979,812	B2	12/2005	Al-Ali
				6,985,764	B2	1/2006	Mason et al.
				6,993,371	B2	1/2006	Kiani et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

6,996,427 B2	2/2006	Ali et al.	7,454,240 B2	11/2008	Diab et al.
6,999,904 B2	2/2006	Weber et al.	7,467,002 B2	12/2008	Weber et al.
7,003,338 B2	2/2006	Weber et al.	7,469,157 B2	12/2008	Diab et al.
7,003,339 B2	2/2006	Diab et al.	7,471,969 B2	12/2008	Diab et al.
7,015,451 B2	3/2006	Dalke et al.	7,471,971 B2	12/2008	Diab et al.
7,024,233 B2	4/2006	Ali et al.	7,483,729 B2	1/2009	Al-Ali et al.
7,026,619 B2	4/2006	Cranford	7,483,730 B2	1/2009	Diab et al.
7,027,849 B2	4/2006	Al-Ali	7,489,958 B2	2/2009	Diab et al.
7,030,749 B2	4/2006	Al-Ali	7,496,391 B2	2/2009	Diab et al.
7,039,449 B2	5/2006	Al-Ali	7,496,393 B2	2/2009	Diab et al.
7,041,060 B2	5/2006	Flaherty et al.	D587,657 S	3/2009	Al-Ali et al.
7,044,918 B2	5/2006	Diab	7,499,741 B2	3/2009	Diab et al.
7,047,054 B2	5/2006	Benni	7,499,835 B2	3/2009	Weber et al.
7,067,893 B2	6/2006	Mills et al.	7,500,950 B2	3/2009	Al-Ali et al.
7,092,757 B2	8/2006	Larson et al.	7,509,153 B2	3/2009	Blank et al.
7,096,052 B2	8/2006	Mason et al.	7,509,154 B2	3/2009	Diab et al.
7,096,054 B2	8/2006	Abdul-Hafiz et al.	7,509,494 B2	3/2009	Al-Ali
7,113,815 B2	9/2006	O'Neil et al.	7,510,849 B2	3/2009	Schurman et al.
7,132,641 B2	11/2006	Schulz et al.	7,519,327 B2	4/2009	White
7,142,901 B2	11/2006	Kiani et al.	7,526,328 B2	4/2009	Diab et al.
7,149,561 B2	12/2006	Diab	7,530,942 B1	5/2009	Diab
D535,031 S	1/2007	Barrett et al.	7,530,949 B2	5/2009	Al Ali et al.
D537,164 S	2/2007	Shigemori et al.	7,530,955 B2	5/2009	Diab et al.
7,186,966 B2	3/2007	Al-Ali	7,563,110 B2	7/2009	Al-Ali et al.
7,190,261 B2	3/2007	Al-Ali	7,596,398 B2	9/2009	Al-Ali et al.
7,215,984 B2	5/2007	Diab	7,601,123 B2	10/2009	Tweed et al.
7,215,986 B2	5/2007	Diab	7,606,606 B2	10/2009	Laakkonen
7,221,971 B2	5/2007	Diab	D603,966 S	11/2009	Jones et al.
7,225,006 B2	5/2007	Al-Ali et al.	7,618,375 B2	11/2009	Flaherty
7,225,007 B2	5/2007	Al-Ali	D606,659 S	12/2009	Kiani et al.
RE39,672 E	6/2007	Shehada et al.	7,647,083 B2	1/2010	Al-Ali et al.
7,230,227 B2	6/2007	Wilcken et al.	D609,193 S	2/2010	Al-Ali et al.
D547,454 S	7/2007	Hsieh	7,657,294 B2	2/2010	Eghbal et al.
7,239,905 B2	7/2007	Kiani-Azərbayjany et al.	7,657,295 B2	2/2010	Coakley et al.
7,245,953 B1	7/2007	Parker	7,657,296 B2	2/2010	Raridan et al.
D549,830 S	8/2007	Behar et al.	D614,305 S	4/2010	Al-Ali et al.
7,254,429 B2	8/2007	Schurman et al.	RE41,317 E	5/2010	Parker
7,254,431 B2	8/2007	Al-Ali	7,726,209 B2	6/2010	Ruotoistenmäki
7,254,433 B2	8/2007	Diab et al.	7,729,733 B2	6/2010	Al-Ali et al.
7,254,434 B2	8/2007	Schulz et al.	7,734,320 B2	6/2010	Al-Ali
D550,364 S	9/2007	Glover et al.	7,761,127 B2	7/2010	Al-Ali et al.
D551,350 S	9/2007	Lorimer et al.	7,761,128 B2	7/2010	Al-Ali et al.
7,272,425 B2	9/2007	Al-Ali	7,764,982 B2	7/2010	Dalke et al.
7,274,955 B2	9/2007	Kiani et al.	D621,516 S	8/2010	Kiani et al.
D553,248 S	10/2007	Nguyen	7,791,155 B2	9/2010	Diab
D554,263 S	10/2007	Al-Ali	7,801,581 B2	9/2010	Diab
7,280,858 B2	10/2007	Al-Ali et al.	7,809,418 B2	10/2010	Xu
7,289,835 B2	10/2007	Mansfield et al.	7,822,452 B2	10/2010	Schurman et al.
7,292,883 B2	11/2007	De Felice et al.	RE41,912 E	11/2010	Parker
7,295,866 B2	11/2007	Al-Ali	7,844,313 B2	11/2010	Kiani et al.
D562,985 S	2/2008	Brefka et al.	7,844,314 B2	11/2010	Al-Ali
7,328,053 B1	2/2008	Diab et al.	7,844,315 B2	11/2010	Al-Ali
7,332,784 B2	2/2008	Mills et al.	7,862,523 B2	1/2011	Ruotoistenmaki
7,340,287 B2	3/2008	Mason et al.	7,865,222 B2	1/2011	Weber et al.
7,341,559 B2	3/2008	Schulz et al.	7,873,497 B2	1/2011	Weber et al.
7,343,186 B2	3/2008	Lamego et al.	7,880,606 B2	2/2011	Al-Ali
D566,282 S	4/2008	Al-Ali et al.	7,880,626 B2	2/2011	Al-Ali et al.
D567,125 S	4/2008	Okabe et al.	7,891,355 B2	2/2011	Al-Ali et al.
7,355,512 B1	4/2008	Al-Ali	7,894,868 B2	2/2011	Al-Ali et al.
7,356,365 B2	4/2008	Schurman	7,899,506 B2	3/2011	Xu et al.
7,365,923 B2	4/2008	Hargis et al.	7,899,507 B2	3/2011	Al-Ali et al.
D569,001 S	5/2008	Omaki	7,899,518 B2	3/2011	Trepagnier et al.
D569,521 S	5/2008	Omaki	7,904,132 B2	3/2011	Weber et al.
7,371,981 B2	5/2008	Abdul-Hafiz	7,909,772 B2	3/2011	Popov et al.
7,373,193 B2	5/2008	Al-Ali et al.	7,910,875 B2	3/2011	Al-Ali
7,373,194 B2	5/2008	Weber et al.	7,919,713 B2	4/2011	Al-Ali et al.
7,376,453 B1	5/2008	Diab et al.	7,937,128 B2	5/2011	Al-Ali
7,377,794 B2	5/2008	Al Ali et al.	7,937,129 B2	5/2011	Mason et al.
7,377,899 B2	5/2008	Weber et al.	7,937,130 B2	5/2011	Diab et al.
7,383,070 B2	6/2008	Diab et al.	7,941,199 B2	5/2011	Kiani
7,395,189 B2	7/2008	Qing et al.	7,951,086 B2	5/2011	Flaherty et al.
7,415,297 B2	8/2008	Al-Ali et al.	7,957,780 B2	6/2011	Lamego et al.
7,428,432 B2	9/2008	Ali et al.	7,962,188 B2	6/2011	Kiani et al.
			7,962,190 B1	6/2011	Diab et al.
			7,976,472 B2	7/2011	Kiani
			7,988,637 B2	8/2011	Diab
			7,990,382 B2	8/2011	Kiani

(56)

References Cited

U.S. PATENT DOCUMENTS

8,008,088	B2	8/2011	Bellott et al.	8,463,349	B2	6/2013	Diab et al.
RE42,753	E	9/2011	Kiani-Azarbayjany et al.	8,466,286	B2	6/2013	Bellot et al.
8,019,400	B2	9/2011	Diab et al.	8,471,713	B2	6/2013	Poeze et al.
8,028,701	B2	10/2011	Al-Ali et al.	8,473,020	B2	6/2013	Kiani et al.
8,029,765	B2	10/2011	Bellott et al.	8,483,787	B2	7/2013	Al-Ali et al.
8,036,728	B2	10/2011	Diab et al.	8,489,364	B2	7/2013	Weber et al.
8,044,998	B2	10/2011	Heenan	8,498,684	B2	7/2013	Weber et al.
8,046,040	B2	10/2011	Ali et al.	8,504,128	B2	8/2013	Blank et al.
8,046,041	B2	10/2011	Diab et al.	8,509,867	B2	8/2013	Workman et al.
8,046,042	B2	10/2011	Diab et al.	8,515,509	B2	8/2013	Bruinsma et al.
8,048,040	B2	11/2011	Kiani	8,523,781	B2	9/2013	Al-Ali
8,050,728	B2	11/2011	Al-Ali et al.	8,529,301	B2	9/2013	Al-Ali et al.
RE43,169	E	2/2012	Parker	8,532,727	B2	9/2013	Ali et al.
8,118,620	B2	2/2012	Al-Ali et al.	8,532,728	B2	9/2013	Diab et al.
8,126,528	B2	2/2012	Diab et al.	D692,145	S	10/2013	Al-Ali et al.
8,126,531	B2	2/2012	Crowley	8,547,209	B2	10/2013	Kiani et al.
8,128,572	B2	3/2012	Diab et al.	8,548,548	B2	10/2013	Al-Ali
8,130,105	B2	3/2012	Al-Ali et al.	8,548,549	B2	10/2013	Schurman et al.
8,145,287	B2	3/2012	Diab et al.	8,548,550	B2	10/2013	Al-Ali et al.
8,150,487	B2	4/2012	Diab et al.	8,560,032	B2	10/2013	Al-Ali et al.
8,175,672	B2	5/2012	Parker	8,560,034	B1	10/2013	Diab et al.
8,180,420	B2	5/2012	Diab et al.	8,570,167	B2	10/2013	Al-Ali
8,182,443	B1	5/2012	Kiani	8,570,503	B2	10/2013	Vo et al.
8,185,180	B2	5/2012	Diab et al.	8,571,617	B2	10/2013	Reichgott et al.
8,190,223	B2	5/2012	Al-Ali et al.	8,571,618	B1	10/2013	Lamego et al.
8,190,227	B2	5/2012	Diab et al.	8,571,619	B2	10/2013	Al-Ali et al.
8,203,438	B2	6/2012	Kiani et al.	8,577,431	B2	11/2013	Lamego et al.
8,203,704	B2	6/2012	Merritt et al.	8,581,732	B2	11/2013	Al-Ali et al.
8,219,170	B2	7/2012	Hausmann et al.	8,584,345	B2	11/2013	Al-Ali et al.
8,224,411	B2	7/2012	Al-Ali et al.	8,588,880	B2	11/2013	Abdul-Hafiz et al.
8,228,181	B2	7/2012	Al-Ali	8,600,467	B2	12/2013	Al-Ali et al.
8,229,532	B2	7/2012	Davis	8,602,971	B2	12/2013	Farr
8,229,533	B2	7/2012	Diab et al.	8,606,342	B2	12/2013	Diab
8,233,955	B2	7/2012	Al-Ali et al.	8,615,290	B2	12/2013	Lin et al.
8,244,325	B2	8/2012	Al-Ali et al.	8,626,255	B2	1/2014	Al-Ali et al.
8,255,026	B1	8/2012	Al-Ali	8,630,691	B2	1/2014	Lamego et al.
8,255,027	B2	8/2012	Al-Ali et al.	8,634,889	B2	1/2014	Al-Ali et al.
8,255,028	B2	8/2012	Al-Ali et al.	8,641,631	B2	2/2014	Sierra et al.
8,260,577	B2	9/2012	Weber et al.	8,652,060	B2	2/2014	Al-Ali
8,265,723	B1	9/2012	McHale et al.	8,655,004	B2	2/2014	Prest et al.
8,274,360	B2	9/2012	Sampath et al.	8,663,107	B2	3/2014	Kiani
8,289,130	B2	10/2012	Nakajima et al.	8,666,468	B1	3/2014	Al-Ali
8,301,217	B2	10/2012	Al-Ali et al.	8,667,967	B2	3/2014	Al-Ali et al.
8,306,596	B2	11/2012	Schurman et al.	8,670,811	B2	3/2014	O'Reilly
8,310,336	B2	11/2012	Muhsin et al.	8,670,814	B2	3/2014	Diab et al.
8,315,683	B2	11/2012	Al-Ali et al.	8,676,286	B2	3/2014	Weber et al.
RE43,860	E	12/2012	Parker	8,682,407	B2	3/2014	Al-Ali
8,332,006	B2	12/2012	Naganuma et al.	RE44,823	E	4/2014	Parker
8,337,403	B2	12/2012	Al-Ali et al.	RE44,875	E	4/2014	Kiani et al.
8,346,330	B2	1/2013	Lamego	8,688,183	B2	4/2014	Bruinsma et al.
8,353,842	B2	1/2013	Al-Ali et al.	8,690,799	B2	4/2014	Telfort et al.
8,355,766	B2	1/2013	MacNeish, III et al.	8,700,111	B2	4/2014	LeBoeuf et al.
8,359,080	B2	1/2013	Diab et al.	8,700,112	B2	4/2014	Kiani
8,364,223	B2	1/2013	Al-Ali et al.	8,702,627	B2	4/2014	Telfort et al.
8,364,226	B2	1/2013	Diab et al.	8,706,179	B2	4/2014	Parker
8,364,389	B2	1/2013	Dorogusker et al.	8,712,494	B1	4/2014	MacNeish, III et al.
8,374,665	B2	2/2013	Lamego	8,715,206	B2	5/2014	Telfort et al.
8,380,272	B2	2/2013	Barrett et al.	8,718,735	B2	5/2014	Lamego et al.
8,385,995	B2	2/2013	Al-Ali et al.	8,718,737	B2	5/2014	Diab et al.
8,385,996	B2	2/2013	Smith et al.	8,718,738	B2	5/2014	Blank et al.
8,388,353	B2	3/2013	Kiani et al.	8,720,249	B2	5/2014	Al-Ali
8,399,822	B2	3/2013	Al-Ali	8,721,541	B2	5/2014	Al-Ali et al.
8,401,602	B2	3/2013	Kiani	8,721,542	B2	5/2014	Al-Ali et al.
8,405,608	B2	3/2013	Al-Ali et al.	8,723,677	B1	5/2014	Kiani
8,414,499	B2	4/2013	Al-Ali et al.	8,740,792	B1	6/2014	Kiani et al.
8,418,524	B2	4/2013	Al-Ali	8,754,776	B2	6/2014	Poeze et al.
8,421,022	B2	4/2013	Rozenfeld	8,755,535	B2	6/2014	Telfort et al.
8,423,106	B2	4/2013	Lamego et al.	8,755,856	B2	6/2014	Diab et al.
8,428,674	B2	4/2013	Duffy et al.	8,755,872	B1	6/2014	Marinow
8,428,967	B2	4/2013	Olsen et al.	8,760,517	B2	6/2014	Sarwar et al.
8,430,817	B1	4/2013	Al-Ali et al.	8,761,850	B2	6/2014	Lamego
8,437,825	B2	5/2013	Dalvi et al.	8,764,671	B2	7/2014	Kiani
8,455,290	B2	6/2013	Siskavich	8,768,423	B2	7/2014	Shakespeare et al.
				8,771,204	B2	7/2014	Telfort et al.
				8,777,634	B2	7/2014	Kiani et al.
				8,781,543	B2	7/2014	Diab et al.
				8,781,544	B2	7/2014	Al-Ali et al.

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.