



US00D864968S

(12) **United States Design Patent**
Beals

(10) **Patent No.:** **US D864,968 S**

(45) **Date of Patent:** **** Oct. 29, 2019**

(54) **SMART CARD INTERFACE**
(71) Applicant: **NagraStar LLC**, Englewood, CO (US)
(72) Inventor: **William Michael Beals**, Englewood, CO (US)
(73) Assignee: **EHOSTAR TECHNOLOGIES L.L.C.**, Englewood, CO (US)
(**) Term: **14 Years**

(21) Appl. No.: **29/525,632**
(22) Filed: **Apr. 30, 2015**
(51) **LOC (12) Cl.** **14-02**
(52) **U.S. Cl.**
USPC **D14/436**; D14/437

(58) **Field of Classification Search**
USPC D14/435-437, 478-480, 485-495, 474, D14/217; D13/182; 369/275.1-275.5, 369/44.26, 100, 52.1, 272, 273, 280-288; 283/81; 720/718; 435/6, 287.2; 604/891.1; 216/2; D11/80; 235/492, 235/488, 493, 487, 375, 379, 439, 440, 235/441, 451, 486; 361/737, 748-752; D19/9, 10; D9/457; 705/51; 257/707, 257/686; 340/5.52, 5.25, 5.74
CPC .. G06K 9/00973-00986; G06K 19/063-0701; G06K 19/0708-0712; G06K 19/0715-07771; G06K 19/083-18; G06K 21/00-06; G06K 2207/00-1018; G06F 3/08; G06F 3/12; G06F 7/40; G06F 17/5068; G06F 21/00; G06F 21/30; G06F 21/31; G06F 21/34; G06F 21/45; G06F 21/77-80; Y10T 29/49018; Y10T 29/49124-29/4913; Y10T 29/49117; H01L 23/13; H01L 23/31; H01L 23/3128; H01L 23/48; H01L 23/49541; H01L 23/498; H01L 23/49811; H01L 23/49816; H01L 23/49833; H01L 23/49838; H01L 23/49844; H01L 23/4985; H01L

23/49855; H01L 23/49888; H01L 23/50; H01L 23/522; H01L 23/528; H01L
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

216,075 A 6/1879 Wiselogel
D54,610 S 3/1920 Evans et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CA 2318936 4/2004
CN 1659819 4/2002
(Continued)

OTHER PUBLICATIONS

U.S. Appl. No. 13/799,891, Office Action dated Dec. 30, 2016, 12 pages.

(Continued)

Primary Examiner — Susan Moon Lee

(57) **CLAIM**

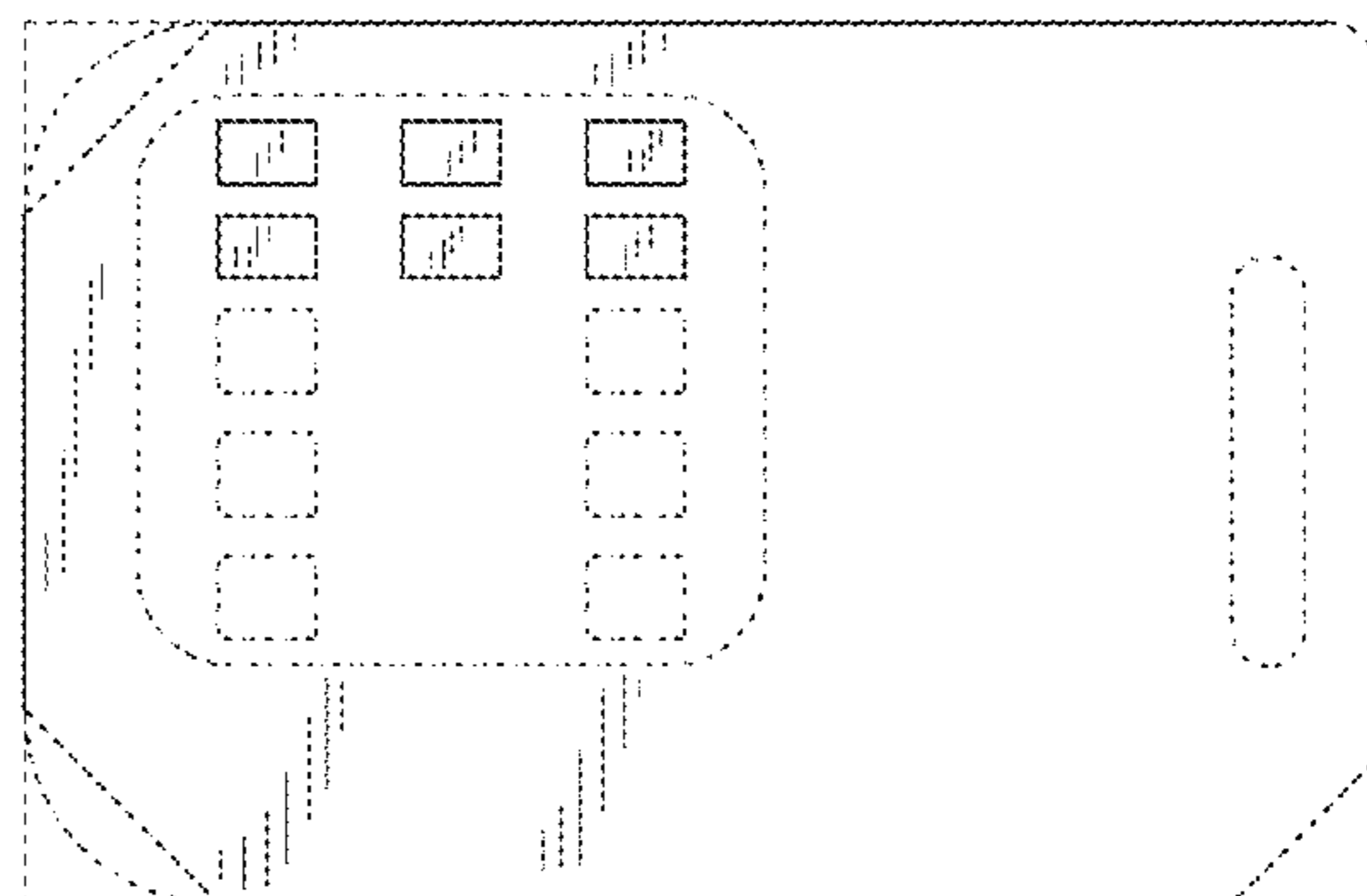
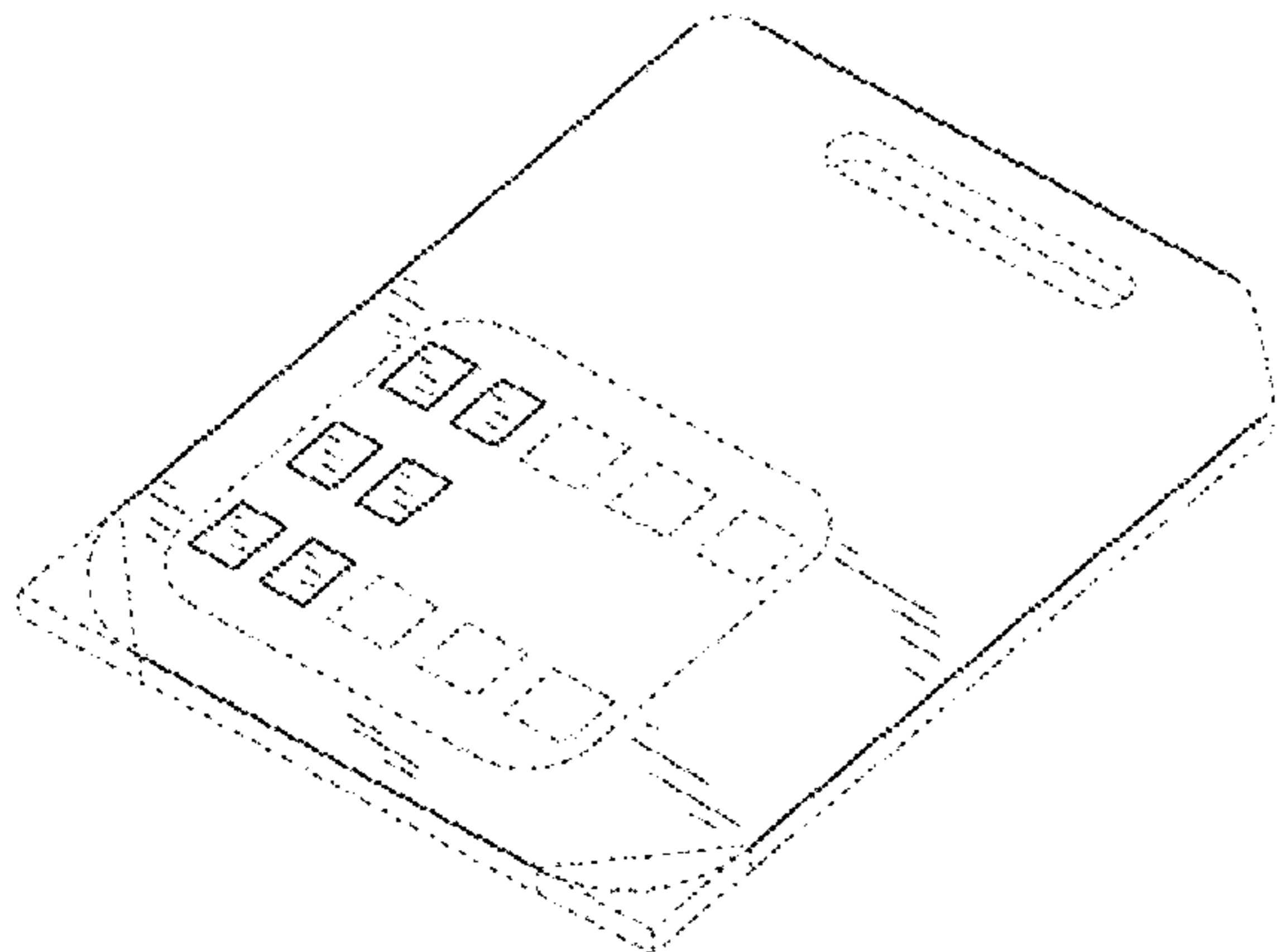
The ornamental design for a smart card interface, as shown and described.

DESCRIPTION

FIG. 1 is a perspective view of a smart card interface; FIG. 2 is a top plan view thereof; FIG. 3 is a bottom view thereof; FIG. 4 is a front elevation view thereof; FIG. 5 is a rear elevation view thereof; FIG. 6 is a right side elevation view thereof; and, FIG. 7 is a left side elevation view thereof.

The broken lines and unshaded surfaces contained within broken lines depict portions of the smart card interface that form no part of the claimed design but are shown for illustrative purposes.

1 Claim, 3 Drawing Sheets



(58) **Field of Classification Search**
 CPC 23/5283; H01L 23/538; H01L 23/5386;
 H01L 23/5388; H01L 23/5389; H01L
 25/00; H01L 25/0655; H01L 27/0203;
 H01L 27/0207; H01L 27/12; H01L
 27/1218; H01L 27/1222; H01L 27/127;
 H01L 24/00-17; H01L 24/94-98; H01L
 2224/01; H01L 2224/0501

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,474,365 A 6/1949 Munn
 2,640,647 A 6/1953 Rand
 3,311,084 A 3/1967 Edenbaum
 3,465,361 A 9/1969 Lode
 3,502,437 A 3/1970 Mass
 3,702,025 A 11/1972 Archer
 3,832,134 A 8/1974 Sohn
 3,853,468 A 12/1974 Haymond
 3,898,172 A 8/1975 Reif
 3,924,239 A 12/1975 Fletcher
 3,990,850 A 11/1976 Friedman
 4,029,945 A 6/1977 Yamada
 4,099,886 A 7/1978 Oliveria
 4,104,785 A 8/1978 Shiba et al.
 4,125,841 A 11/1978 Munk
 D254,687 S 4/1980 Fadler
 4,205,043 A 5/1980 Esch
 D258,281 S 2/1981 Murphy
 4,249,302 A 2/1981 Crepeau
 4,264,917 A * 4/1981 Ugon G06K 19/07745
 174/521
 4,305,721 A 12/1981 Bernstein
 D267,094 S 11/1982 Doi
 4,380,699 A 4/1983 Monnier
 4,387,972 A 6/1983 Valencia
 4,394,654 A 7/1983 Hofmann-Cerfontaine
 4,417,413 A 11/1983 Hoppe et al.
 4,532,419 A 7/1985 Takeda
 4,535,385 A * 8/1985 August H01L 23/36
 257/E23.101
 4,549,200 A 10/1985 Ecker et al.
 4,549,247 A 10/1985 Hoppe et al.
 4,575,621 A 3/1986 Dreifus
 D284,215 S 6/1986 Sherwin
 4,600,257 A 7/1986 Fushimoto
 4,603,249 A 7/1986 Hoppe et al.
 4,614,861 A 9/1986 Pavlov et al.
 4,628,407 A * 12/1986 August H01L 23/36
 257/E23.101
 4,639,585 A 1/1987 Haghiri-Tehrani et al.
 4,677,529 A 6/1987 Watanabe et al.
 4,689,103 A 8/1987 Elarde
 4,696,034 A 9/1987 Wiedemer
 4,727,246 A 2/1988 Hara et al.
 4,739,448 A * 4/1988 Rowe H01L 23/66
 333/238
 4,754,319 A * 6/1988 Saito B32B 37/185
 235/492
 4,774,633 A 9/1988 Dehaine et al.
 4,783,823 A 11/1988 Tasaki
 4,789,214 A 12/1988 Vilhemsson
 4,792,843 A 12/1988 Haghiri-Tehrani et al.
 4,794,243 A * 12/1988 Hamada G06K 19/07743
 235/492
 4,795,895 A 1/1989 Hara et al.
 4,797,542 A 1/1989 Hara
 4,803,154 A 2/1989 Uo
 4,803,542 A 2/1989 Haghiri-Tehrani et al.
 4,814,943 A 3/1989 Okuaki
 4,817,183 A 3/1989 Sparrow
 4,822,989 A 4/1989 Miyamoto et al.
 4,825,283 A 4/1989 Shino
 4,835,846 A 6/1989 Juan et al.

D302,294 S 7/1989 Hillman
 4,844,866 A 7/1989 Wallace
 4,849,944 A 7/1989 Matsushita
 4,868,376 A 9/1989 Lessin et al.
 D304,826 S 11/1989 Sutoh
 D305,023 S 12/1989 Suto
 4,887,234 A 12/1989 Iijima
 4,889,980 A 12/1989 Hara et al.
 4,896,028 A * 1/1990 Kushima G06K 19/07743
 235/492
 4,897,534 A 1/1990 Haghiri-Tehrani
 4,943,464 A * 7/1990 Gloton G06K 19/07745
 174/535
 4,980,802 A * 12/1990 Champagne G06K 19/07743
 235/488
 4,984,358 A 1/1991 Nelson
 4,985,920 A 1/1991 Seki
 4,990,759 A * 2/1991 Gloton G06K 19/07728
 235/487
 5,023,751 A 6/1991 Stampfli
 5,027,190 A 6/1991 Haghiri-Tehrani et al.
 5,031,026 A 7/1991 Ueda
 5,049,718 A 9/1991 Spletter et al.
 5,049,728 A * 9/1991 Rovin G06K 19/072
 235/487
 5,055,913 A 10/1991 Haghiri-Tehrani
 5,097,117 A 3/1992 Champagne et al.
 5,122,860 A 6/1992 Kikuchi et al.
 5,126,548 A 6/1992 Sekiguchi
 D327,883 S 7/1992 Gloton
 D328,599 S 8/1992 Gloton
 5,134,773 A 8/1992 LeMaire et al.
 5,155,068 A 10/1992 Tada
 5,187,461 A 2/1993 Brommer
 5,203,078 A 4/1993 Nakanishi et al.
 5,208,450 A 5/1993 Uenishi et al.
 5,216,278 A * 6/1993 Lin H01L 23/3121
 174/538
 5,220,598 A 6/1993 Böck
 D340,289 S 10/1993 Gerber
 5,250,341 A 10/1993 Kobayashi et al.
 5,255,430 A 10/1993 Tallaksen
 5,264,722 A 11/1993 Tonucci
 D342,728 S 12/1993 Gloton
 5,276,311 A 1/1994 Hennige
 5,276,317 A 1/1994 Ozouf et al.
 D344,502 S 2/1994 Gloton
 5,285,352 A * 2/1994 Pastore H01L 23/36
 165/185
 5,304,513 A 4/1994 Haghiri-Tehrani et al.
 5,312,297 A 5/1994 Dieckert et al.
 5,321,297 A * 6/1994 Enomoto H01L 27/14627
 257/432
 5,332,681 A 7/1994 Tonucci
 5,361,062 A 11/1994 Weiss et al.
 5,362,955 A 11/1994 Haghiri-Tehrani
 5,363,279 A 11/1994 Cha
 D353,135 S 12/1994 Gloton
 D353,136 S 12/1994 Gloton
 5,375,037 A 12/1994 Le Roux
 5,386,215 A 1/1995 Brown
 5,386,340 A 1/1995 Kurz
 D357,909 S 5/1995 Gloton
 D358,142 S 5/1995 Gloton
 5,438,481 A 8/1995 Murphy et al.
 5,444,301 A 8/1995 Song et al.
 5,448,511 A 9/1995 Paurus et al.
 5,457,590 A * 10/1995 Barrett G06F 21/80
 235/492
 5,463,210 A 10/1995 Imura
 5,467,251 A * 11/1995 Katchmar H01L 23/3672
 174/252
 D365,092 S * 12/1995 Mundigl D14/437
 5,486,687 A 1/1996 Le Roux
 5,502,278 A 3/1996 Mabboux et al.
 5,517,752 A 3/1996 Sakata et al.
 5,512,490 A 4/1996 Walt
 5,521,366 A 5/1996 Wang

US D864,968 S

(56)

References Cited

U.S. PATENT DOCUMENTS

				5,865,470	A	2/1999	Thompson
				5,866,950	A *	2/1999	Iwasaki H01L 21/563 257/780
				5,869,791	A	2/1999	Young
				D407,392	S	3/1999	Kleineidam
				5,877,488	A	3/1999	Klatt et al.
				5,877,975	A	3/1999	Jigour et al.
				5,900,655	A *	5/1999	Shim H01L 27/14627 257/232
				5,912,502	A	6/1999	Kano
				5,923,225	A	7/1999	De Los Santos
				5,932,866	A	8/1999	Terada et al.
				5,933,328	A	8/1999	Wallace et al.
				5,942,761	A	8/1999	Tuli
				5,948,673	A	9/1999	Cottingham
				5,955,961	A	9/1999	Wallerstein
				5,991,400	A	11/1999	Kamperman
				5,993,261	A	11/1999	Klatt et al.
				5,998,220	A	12/1999	Chandler
				5,999,308	A	12/1999	Nelson
				6,002,605	A *	12/1999	Iwasaki G06K 7/0021 235/380
				D420,452	S	2/2000	Cardy
				D420,745	S	2/2000	Cardy
				6,019,639	A *	2/2000	Brunker H01R 13/6464 439/60
				6,019,663	A	2/2000	Angell
				6,024,920	A	2/2000	Cunanan
				6,025,997	A	2/2000	Huber et al.
				6,027,028	A	2/2000	Pieterse et al.
				6,035,037	A	3/2000	Chaney
				6,035,216	A *	3/2000	Cheng H04B 1/3816 235/475
				6,036,099	A	3/2000	Leighton
				6,048,734	A	4/2000	Burns
				6,054,774	A	4/2000	Ohmori et al.
				D425,519	S	5/2000	Merlin et al.
				6,060,332	A	5/2000	Martin
				6,062,887	A	5/2000	Schuster et al.
				6,064,506	A	5/2000	Koops
				6,065,681	A	5/2000	Trueggelmann
				6,075,915	A	6/2000	Koops
				6,085,155	A	7/2000	Hayase et al.
				6,086,740	A	7/2000	Kennedy
				6,089,451	A *	7/2000	Krause G06K 7/084 235/380
				6,097,605	A	8/2000	Klatt et al.
				6,101,300	A	8/2000	Fan
				6,102,517	A	8/2000	Kobayashi
				6,102,743	A	8/2000	Haffenden et al.
				6,118,114	A *	9/2000	Fujimoto H04N 1/00002 250/208.1
				6,130,969	A	10/2000	Villeneuve
				6,134,043	A	10/2000	Johnson
				6,134,369	A	10/2000	Kurosawa
				6,141,210	A	10/2000	Iwasaki
				D434,396	S	11/2000	Iwasaki
				D434,418	S	11/2000	Shinada
				6,149,058	A *	11/2000	Albaret G06K 7/10297 235/380
				6,151,511	A	11/2000	Cruciani
				6,170,116	B1	1/2001	Mizuta
				6,175,671	B1	1/2001	Roberts
				6,188,580	B1	2/2001	Huber et al.
				6,191,951	B1	2/2001	Houdeau et al.
				6,195,183	B1 *	2/2001	Fujimoto H04N 1/486 358/512
				6,198,860	B1	3/2001	Johnson
				6,205,028	B1	3/2001	Matsumura et al.
				6,209,790	B1	4/2001	Houdeau et al.
				6,213,403	B1	4/2001	Bates, III
				6,222,737	B1	4/2001	Ross
				6,232,937	B1	5/2001	Jacobsen
				6,241,557	B1	6/2001	Reichardt
				6,255,038	B1	7/2001	Hobbs
				6,257,486	B1 *	7/2001	Teicher G06K 7/0021 235/380
				6,274,926	B1	8/2001	Iwakaski
5,526,233	A	6/1996	Hayakawa				
5,526,449	A	6/1996	Meade				
5,534,720	A *	7/1996	Song H01L 27/1462 257/232				
5,543,585	A	8/1996	Booth et al.				
5,544,014	A	8/1996	Atsumi				
5,552,632	A *	9/1996	Iwasaki G06K 19/07743 257/679				
5,563,400	A	10/1996	Le Roux				
5,569,941	A *	10/1996	Takahashi H01L 29/0834 257/132				
D375,303	S	11/1996	Gaumet				
5,572,779	A *	11/1996	Adelman H01F 41/046 257/E23.061				
5,579,207	A	11/1996	Hayden et al.				
5,581,065	A	12/1996	Nishikawa et al.				
5,584,043	A *	12/1996	Burkart G06K 7/0013 710/2				
5,590,596	A *	1/1997	Tani B41F 15/0818 101/115				
5,594,275	A *	1/1997	Kwon H01L 23/3128 257/685				
5,689,275	A	1/1997	Moore				
5,604,330	A *	2/1997	Hasan H01L 23/49838 174/261				
5,615,085	A	3/1997	Wakabayashi et al.				
5,616,520	A	4/1997	Nishiuma				
5,623,552	A	4/1997	Lane				
5,637,858	A	6/1997	Hoppe et al.				
5,652,428	A	7/1997	Nishioka				
D382,647	S	8/1997	Staples				
5,655,917	A	8/1997	Kaneshige et al.				
5,677,524	A	10/1997	Haghiri-Tehrani				
D387,746	S	12/1997	Ishihara				
D387,747	S	12/1997	Ishihara				
D388,066	S	12/1997	Ishihara				
D389,130	S	1/1998	Ishihara				
5,721,781	A	2/1998	Deo				
5,724,545	A	3/1998	Skorski				
5,727,153	A	3/1998	Powell				
5,729,000	A	3/1998	Sugimoto				
5,736,969	A	4/1998	Kuga				
5,739,515	A	4/1998	Takemura				
5,742,680	A	4/1998	Wilson				
5,745,988	A	5/1998	Hohmann et al.				
5,747,274	A	5/1998	Jackowski				
5,748,057	A	5/1998	De Los Santos				
5,752,857	A	5/1998	Knights				
5,754,410	A	5/1998	Bradsley				
5,764,522	A	6/1998	Shalev				
5,767,999	A *	6/1998	Kayner G06F 13/409 398/164				
5,773,812	A	6/1998	Kreft				
5,776,797	A	7/1998	Nicewarner				
5,780,098	A	7/1998	Battles				
5,780,836	A	7/1998	Iguchi et al.				
5,780,837	A	7/1998	Garcia				
5,784,400	A	7/1998	Joannopoulos				
5,786,988	A *	7/1998	Harari G06K 19/07728 235/487				
5,787,399	A	7/1998	Lee				
5,789,733	A	8/1998	Jachimowicz et al.				
5,802,236	A	9/1998	DiGiovanni				
5,807,762	A	9/1998	Akram et al.				
5,818,309	A	10/1998	De Los Santos				
5,822,190	A	10/1998	Iwasaki				
5,827,084	A *	10/1998	Biernath H01R 12/79 29/829				
5,834,747	A *	11/1998	Cooper G06K 19/06 235/449				
5,837,984	A	11/1998	Bieier et al.				
5,852,290	A	12/1998	Chaney				
5,856,662	A *	1/1999	Kohama G06K 19/07703 235/488				

(56)

References Cited

U.S. PATENT DOCUMENTS							
6,278,105	B1	8/2001	Mattia	6,613,610	B2	9/2003	Iwafuchi
6,281,450	B1 *	8/2001	Urasaki H01L 21/563 174/258	6,617,693	B2	9/2003	Hikita et al.
6,281,577	B1	8/2001	Oppermann	6,618,258	B2	9/2003	Goris
6,285,559	B1	9/2001	Fukiharu	6,636,668	B1	10/2003	Al-hermyari
6,292,490	B1	9/2001	Gratacap et al.	6,640,034	B1	10/2003	Charlton
6,296,552	B1 *	10/2001	Boutaghou B24B 39/06 451/290	6,641,049	B2	11/2003	Luu
6,297,548	B1	10/2001	Moden	6,646,957	B2	11/2003	Martin et al.
6,304,683	B1 *	10/2001	Kiyohara H04N 1/0402 358/486	6,657,523	B2	12/2003	Tarui et al.
6,310,991	B1	10/2001	Koops	6,663,831	B2	12/2003	Konecke
6,312,304	B1	11/2001	Duthaler	6,673,630	B2	1/2004	Albarella
6,315,205	B1	11/2001	Bates, III	6,681,616	B2	1/2004	Spaid
6,317,554	B1	11/2001	Kosaka	6,687,447	B2	2/2004	Flory
6,326,243	B1 *	12/2001	Suzuya H01L 23/49503 257/E23.034	6,693,315	B2 *	2/2004	Kuroda H01L 21/31053 257/288
6,328,217	B1 *	12/2001	Everett G06K 19/0719 235/380	D487,747	S	3/2004	Yu et al.
6,329,228	B1	12/2001	Terashima	6,698,378	B1	3/2004	Dick
6,330,164	B1	12/2001	Khandros	6,705,520	B1	3/2004	Pitroda et al.
6,333,989	B1	12/2001	Borza	6,710,912	B1	3/2004	Filkins
D452,864	S	1/2002	Wallace et al.	6,719,206	B1	4/2004	Bashan et al.
6,338,967	B1	1/2002	Bickar	6,728,457	B2	4/2004	Sigalas
6,344,162	B1	2/2002	Miyajima	6,731,846	B2	5/2004	Hosomi
D456,414	S	4/2002	Turin	6,735,368	B2	5/2004	Parker
6,368,558	B1	4/2002	Suslick	D491,276	S	6/2004	Langille
6,369,795	B1	4/2002	Lester et al.	D491,951	S	6/2004	Yu et al.
6,372,541	B1 *	4/2002	Bouchez G06K 19/07745 438/106	D492,688	S	7/2004	Wallace et al.
6,378,774	B1	4/2002	Emori et al.	6,760,514	B2	7/2004	Wilson
D456,910	S	5/2002	Clark	6,762,537	B1 *	7/2004	Kikushima H03H 9/0547 310/313 R
6,398,114	B1	6/2002	Nishikawa et al.	6,764,005	B2	7/2004	Cooper
6,402,301	B1	6/2002	Powers et al.	D493,798	S	8/2004	Yu et al.
6,407,933	B1 *	6/2002	Bologna H05K 7/1491 174/168	6,778,722	B1	8/2004	Klocek
6,409,089	B1	6/2002	Eskicioglu	6,779,115	B1	8/2004	Naim
6,411,752	B1	6/2002	Little	6,782,169	B2	8/2004	Shi
6,420,887	B1 *	7/2002	Kister G01R 1/07378 324/754.11	6,787,469	B2	9/2004	Houston
D461,251	S	8/2002	Pham	6,788,863	B2	9/2004	Parker
D461,561	S	8/2002	Pham	6,791,732	B2	9/2004	Simon
D461,906	S	8/2002	Pham	6,804,446	B1	10/2004	Nordin
D462,125	S	8/2002	Pham	6,809,932	B2 *	10/2004	Wu H05K 9/0024 165/185
6,433,919	B1	8/2002	Chowdhury	6,811,082	B2	11/2004	Wong
6,443,361	B1	9/2002	Klatt et al.	6,822,784	B2	11/2004	Fukshima
6,452,713	B1	9/2002	White	6,825,741	B2	11/2004	Chappell
6,460,772	B1	10/2002	Stahl	6,826,185	B1	11/2004	Montanaro et al.
6,462,273	B1	10/2002	Corisis et al.	6,832,029	B2	12/2004	Roberson
6,466,709	B1	10/2002	Scherer	6,833,323	B2	12/2004	Yui et al.
D466,093	S	11/2002	Ebihara	6,836,138	B1	12/2004	Park
6,474,776	B1	11/2002	Murray	6,847,265	B2 *	1/2005	Tanaka H03B 5/368 331/108 D
6,483,640	B1	11/2002	Tonucci	6,848,617	B1	2/2005	Fries et al.
6,492,182	B1	12/2002	Bright	6,853,087	B2	2/2005	Neuhaus
6,492,718	B2	12/2002	Ohmori	6,859,304	B2	2/2005	Miller
6,512,580	B1	1/2003	Behringer	6,884,642	B2	2/2005	Farnworth et al.
6,513,718	B1	2/2003	Bouchez	6,870,430	B2 *	3/2005	Nakamura H03B 5/36 331/108 C
6,514,328	B1	2/2003	Katoh	6,873,777	B2	3/2005	Bourelle
6,542,682	B2	4/2003	Cotteverte	6,879,432	B1	4/2005	Chen
6,548,888	B1	4/2003	Fidalgo et al.	6,879,766	B2	4/2005	Tomaru
6,552,910	B1	4/2003	Moon	6,882,537	B2 *	4/2005	Barclely H05K 1/0206 174/252
6,560,006	B2	5/2003	Sigalas	6,882,541	B2	4/2005	Maruyama et al.
6,561,432	B1	5/2003	Vedder et al.	6,896,189	B2	5/2005	Guion et al.
6,568,600	B1	5/2003	Carpier et al.	6,903,935	B1	6/2005	Chen
6,570,768	B2 *	5/2003	Medina G02B 6/4261 361/728	6,913,198	B2	7/2005	Ruat
6,576,992	B1	6/2003	Cady	6,916,207	B2	7/2005	Fielding
6,580,547	B2	6/2003	Liu	6,922,780	B1	7/2005	Siegel
6,581,840	B2	6/2003	Takeda et al.	6,934,441	B2	8/2005	Toney
6,592,031	B1	7/2003	Klatt	6,936,854	B2	8/2005	Iwasaki
6,592,044	B1	7/2003	Wong et al.	6,937,191	B2	8/2005	Baliarda et al.
6,594,361	B1	7/2003	Chaney et al.	6,937,206	B2	8/2005	Baliarda et al.
6,597,721	B1	7/2003	Hutchinson	6,940,637	B2	9/2005	Toney
6,600,222	B1	7/2003	Levardo	6,945,712	B1 *	9/2005	Conn G02B 6/3897 385/92
				6,950,128	B1	9/2005	Sawada
				6,959,127	B2	10/2005	Zoorob
				6,961,501	B2	11/2005	Matsuura
				6,974,343	B2	12/2005	Zheng et al.
				7,001,800	B2	2/2006	Cappelletti
				7,005,955	B2	2/2006	Schumacher
				7,009,233	B2	3/2006	Uchiyama

(56)

References Cited

U.S. PATENT DOCUMENTS

7,012,946 B2	3/2006	Kim	7,554,139 B2	6/2009	Inoue
7,019,981 B2	3/2006	Heinemann et al.	7,559,469 B2	7/2009	Noda et al.
7,023,706 B2	4/2006	Negishi	7,577,846 B2	8/2009	Kudelski et al.
7,045,052 B2	5/2006	Kochergin	7,605,453 B2	10/2009	Stampka et al.
7,051,128 B2	5/2006	Bando	7,615,858 B2	11/2009	Eun
7,051,929 B2	5/2006	Li	7,616,015 B2	11/2009	Lee
7,054,524 B2	5/2006	Miller	7,618,849 B2	11/2009	Khandros
7,061,263 B1 *	6/2006	Ong G01R 31/2884 324/750.3	D605,304 S	12/2009	Aoki
7,062,584 B1	6/2006	Worrell et al.	7,630,203 B1 *	12/2009	Chen G06K 19/077 235/492
7,063,267 B2	6/2006	Tsuchimoto	7,636,070 B2	12/2009	De Lustrac
7,064,423 B2 *	6/2006	Okita G06K 19/07728 174/250	7,647,641 B2	1/2010	Dubroeuq et al.
7,064,431 B2 *	6/2006	Singh H01L 23/49838 174/260	7,657,188 B2	2/2010	Covey
7,065,272 B2	6/2006	Taillaert	7,659,606 B2	2/2010	Klatt
7,078,697 B2	7/2006	Barker	7,673,805 B2	3/2010	Onishi et al.
7,082,034 B2 *	7/2006	Tiwari H01L 23/3675 165/185	D615,506 S	5/2010	Eide et al.
7,088,902 B2	8/2006	Katoh	7,728,422 B2	6/2010	Kim
7,101,660 B2	9/2006	Cunningham	7,733,198 B1	6/2010	Olsson
7,110,630 B2	9/2006	Suzuki	7,745,943 B2	7/2010	Haba et al.
D530,021 S	10/2006	Muraca	7,750,464 B2 *	7/2010	Yoshikawa G11C 5/02 257/723
7,136,514 B1	11/2006	Wong	7,753,266 B2	7/2010	Harris
7,140,550 B2	11/2006	Ramachandran	7,772,686 B2 *	8/2010	Ye G11C 29/1201 257/48
7,184,093 B2	2/2007	Manning	7,784,693 B2	8/2010	Liao et al.
D537,824 S *	3/2007	Day D14/436	7,793,848 B2	9/2010	Abe et al.
7,194,174 B2	3/2007	Dridi	7,799,416 B1	9/2010	Chan
7,207,662 B2	4/2007	Shin et al.	7,808,788 B2	10/2010	Gertiser
7,215,861 B2	5/2007	Sakai	7,810,718 B2	10/2010	Bonneau et al.
7,225,537 B2	6/2007	Reed	7,828,207 B2	11/2010	Cooper
7,233,729 B2	6/2007	Romagnoli	7,854,505 B2	12/2010	Cunningham
7,245,891 B2 *	7/2007	Hugunin H04M 19/04 455/148	7,861,029 B2	12/2010	Djordjevic
7,252,242 B2	8/2007	Ho	7,864,540 B2	1/2011	Takiar
7,253,363 B2	8/2007	Iwakaki	7,866,996 B2	1/2011	Achsaf
7,272,290 B2	9/2007	Sugita	7,871,007 B2	1/2011	Amiot et al.
7,273,234 B1 *	9/2007	Collins B42D 25/369 283/72	7,871,011 B2	1/2011	Reignoux et al.
7,291,903 B2 *	11/2007	Nishizawa G06K 7/0021 235/492	7,872,979 B1 *	1/2011	Liu H04L 12/40006 370/246
7,292,740 B1	11/2007	Barker	7,880,286 B2 *	2/2011	Lee H01L 23/3677 257/691
7,293,716 B1	11/2007	Miks	7,903,422 B2	3/2011	Watanabe
7,294,918 B2	11/2007	Wada et al.	7,913,916 B2	3/2011	Musial et al.
7,295,744 B2	11/2007	Benisty	7,922,097 B2	4/2011	Yoshikawa et al.
7,296,750 B2	11/2007	Wood et al.	7,925,016 B2	4/2011	Candelore
7,305,535 B2	12/2007	Harari et al.	D638,810 S	5/2011	Morikawa et al.
7,307,719 B2	12/2007	Wang	7,940,249 B2	5/2011	Perrault
7,317,248 B2	1/2008	Pochemueller	7,944,058 B2	5/2011	Ishihara et al.
7,343,059 B2	3/2008	Beausoleil	7,954,705 B2	6/2011	Mullen et al.
7,346,239 B2	3/2008	Romagnoli	7,967,214 B2	6/2011	Landau
7,350,714 B2	4/2008	Wallace et al.	D643,040 S	8/2011	Sedio et al.
7,352,588 B2	4/2008	Nishizawa et al.	7,991,289 B2	8/2011	Hill
7,360,688 B1	4/2008	Harris	7,999,353 B1	8/2011	Odom
7,384,294 B2	6/2008	Washino et al.	8,009,432 B2	8/2011	Su et al.
7,385,169 B2	6/2008	Saitou	8,022,526 B2	9/2011	Chall et al.
D571,810 S	7/2008	Ikeda	8,026,496 B2	9/2011	Barker
7,416,132 B2	8/2008	Takiar et al.	8,030,746 B2	10/2011	Tan
7,417,310 B2	8/2008	Szewerenco	8,054,145 B2	11/2011	Mohammadi
7,424,136 B2	9/2008	Setlak	8,061,625 B2 *	11/2011	Yu G06K 19/077 235/487
7,428,352 B2	9/2008	Noda	8,064,205 B2	11/2011	Farhan et al.
7,442,050 B1	10/2008	Bhakta	8,072,764 B2	12/2011	Yeates
7,446,352 B2	11/2008	Becker et al.	8,079,528 B2	12/2011	Song
7,466,407 B2	12/2008	Spillane	8,082,844 B1	12/2011	Barker
7,469,420 B2	12/2008	Duffield et al.	8,083,150 B2	12/2011	Sakurai
7,485,501 B2	2/2009	Takiar et al.	8,093,502 B2 *	1/2012	Mikado H05K 1/0281 174/254
7,492,979 B2	2/2009	Wang	8,097,939 B2 *	1/2012	Okada H05K 1/181 257/679
D588,133 S	3/2009	Nakamura	8,111,566 B1	2/2012	Wang
D588,134 S	3/2009	Nakamura	8,141,780 B2	3/2012	Lawson et al.
7,503,899 B2	3/2009	Caillouette	8,143,720 B2	3/2012	Lambrecht
7,508,942 B2	3/2009	Candelore	8,181,879 B2 *	5/2012	Landau A45C 11/182 150/131
7,520,052 B2	4/2009	Takahashi et al.	D667,442 S	9/2012	Phelan
7,530,495 B2	5/2009	Cooper	D667,495 S	9/2012	Bender
7,552,876 B2	6/2009	Nishizawa et al.	8,256,667 B2 *	9/2012	Poznansky G06K 19/12 235/380
			8,261,557 B2	9/2012	Barker

(56)

References Cited

U.S. PATENT DOCUMENTS

D669,478 S	10/2012	Lepp et al.	9,009,633 B2	4/2015	Wu
D669,479 S	10/2012	Lepp et al.	D729,808 S	5/2015	Beals et al.
D669,594 S	10/2012	Cao	D730,304 S	5/2015	Matsumoto et al.
8,317,103 B1	11/2012	Foo et al.	9,047,547 B2 *	6/2015	Okada G06K 19/07743
8,349,709 B2	1/2013	Inoue et al.	9,049,811 B2 *	6/2015	Subat H05K 7/20445
8,350,158 B2 *	1/2013	Chung H01L 23/4985	9,054,094 B2	6/2015	Anthony et al.
			9,058,897 B2	6/2015	Yu
			9,064,195 B2 *	6/2015	Hartwick G06K 19/06206
			9,093,277 B2	7/2015	Yamaguchi
			9,101,048 B2	8/2015	Nakanishi et al.
			9,136,212 B2	9/2015	Kato
8,353,728 B2 *	1/2013	Wang H01R 12/721	9,139,972 B2	9/2015	Mo
			9,170,482 B2	10/2015	Landis
			9,197,218 B2 *	11/2015	Kondo H03L 1/028
			9,258,897 B2	2/2016	Ishihara et al.
			9,265,148 B2	2/2016	Lassmann et al.
			9,291,889 B2	3/2016	Yoshioka
8,395,465 B2	3/2013	Lauder	D754,083 S *	4/2016	Vinciarelli D13/182
8,422,263 B2	4/2013	Saito	D755,741 S	5/2016	Prajuckamol
D681,640 S	5/2013	Aoki et al.	D757,015 S	5/2016	Amit
8,448,102 B2	5/2013	Kornachuk	9,330,992 B2	5/2016	Nakagawa
8,448,867 B2	5/2013	Liu	D758,372 S	6/2016	Beals et al.
8,449,783 B2	5/2013	Watanabe	D759,022 S	6/2016	Beals et al.
8,451,122 B2	5/2013	Narendra et al.	D764,424 S	8/2016	Matsumoto
8,453,094 B2	5/2013	Kornachuk et al.	9,435,959 B2	9/2016	Doerr
8,456,850 B2	6/2013	Kang et al.	9,455,517 B2 *	9/2016	Babu H01R 13/26
8,456,852 B2	6/2013	Xiao et al.	D775,093 S	12/2016	Vinciarelli
8,469,271 B2 *	6/2013	DePaula G06K 19/041	D778,850 S	2/2017	Matsumoto
			D778,851 S	2/2017	Matsumoto
			D778,852 S	2/2017	Matsumoto
			D780,184 S	2/2017	Beals et al.
			D792,410 S	7/2017	Beals et al.
			D792,411 S	7/2017	Beals et al.
			9,702,813 B2	7/2017	Lavchiev
			9,806,017 B2	10/2017	Haba
			9,815,057 B2	11/2017	Handique
			9,880,137 B2	1/2018	Lim
			9,881,564 B2	1/2018	Wilcox
			9,895,692 B2	2/2018	Battrell
			9,956,562 B2	5/2018	Huang
			D840,404 S	2/2019	Beals
			2001/0043075 A1	5/2001	Suzuki
			2001/0011944 A1	8/2001	Garrido-Gadea et al.
			2001/0011962 A1	8/2001	Fletout
			2001/0012366 A1	8/2001	Van Rijnsoever et al.
			2001/0018984 A1	9/2001	Takeda et al.
			2001/0026659 A1	10/2001	Sekine
			2001/0050846 A1	12/2001	Cho
			2002/0003168 A1	1/2002	Takabayashi
			2002/0009277 A1	1/2002	Noda
			2002/0014535 A1	2/2002	Okada
			2002/0021878 A1	2/2002	Allan
			2002/0045106 A1	4/2002	Baselmans et al.
			2002/0105000 A1	8/2002	Abe
			2002/0115224 A1	8/2002	Rudel
			2002/0137502 A1	9/2002	Cronin et al.
			2002/0145049 A1	10/2002	Lasch et al.
			2002/0152048 A1	10/2002	Hayes
			2002/0186542 A1 *	12/2002	Choi H01L 23/36
					361/719
			2002/0191905 A1	12/2002	Prather
			2003/0002577 A1	1/2003	Pinder
			2003/0030870 A1	2/2003	Joannopoulos
			2003/0059047 A1	3/2003	Iwamura
			2003/0068152 A1	4/2003	Gunn
			2003/0085287 A1	5/2003	Gray
			2003/0091160 A1	5/2003	Enbom et al.
			2003/0099118 A1 *	5/2003	Saitoh G02B 6/0016
					362/561
			2003/0123827 A1	7/2003	Salerno
			2003/0129085 A1	7/2003	Suslick
			2003/0132284 A1 *	7/2003	Reynolds G06Q 20/341
					235/380
			2003/0057537 A1	8/2003	Iwasaki et al.
			2003/0153356 A1	8/2003	Liu
			2003/0163508 A1	8/2003	Goodman
			2003/0058311 A1	9/2003	Chen et al.
			2003/0169575 A1 *	9/2003	Ikuta H01L 23/3677
					361/761
D715,854 S	10/2014	Sippola			
8,854,624 B2	10/2014	Pervez			
8,936,199 B2	1/2015	Lepp et al.			
8,947,883 B2 *	2/2015	Upadhyayula ... G06K 19/07732			
D724,660 S	3/2015	Sippola			
D725,187 S	3/2015	Sippola			
D727,861 S	4/2015	Tang			

(56)

References Cited

U.S. PATENT DOCUMENTS

2003/0179910	A1	9/2003	Wong		2006/0072293	A1	4/2006	Peele	
2003/0194091	A1	10/2003	Wajs		2006/0093296	A1	5/2006	Jin	
2003/0213849	A1	11/2003	Luu		2006/0097059	A1	5/2006	Miyazaki	
2003/0221066	A1	11/2003	Kaneko		2006/0112197	A1*	5/2006	Yao	G06F 13/409 710/15
2003/0223720	A1	12/2003	Li		2006/0125067	A1	6/2006	Wehrly	
2003/0224553	A1	12/2003	Manansala		2006/0131396	A1	6/2006	Blossom	
2003/0231822	A1	12/2003	Li		2006/0133051	A1	6/2006	Calvas et al.	
2004/0001591	A1	1/2004	Mani et al.		2006/0155913	A1	7/2006	Nishikawa et al.	
2004/0009409	A1*	1/2004	Hwang	G03F 1/36 430/5	2006/0040189	A1	8/2006	Yang	
2004/0229135	A1	2/2004	Wang et al.		2006/0198238	A1	9/2006	Partridge	
2004/0053290	A1	3/2004	Terbrueggen		2006/0202125	A1	9/2006	Suhami	
2004/0016804	A1	4/2004	Namaky et al.		2006/0208077	A1	9/2006	Hirata	
2004/0062505	A1	4/2004	Sugitatsu		2006/0228256	A1	10/2006	McDevitt	
2004/0185763	A1	4/2004	Ishihara et al.		2006/0261454	A1	11/2006	Takiar	
2004/0109644	A1	6/2004	Assefa		2006/0283946	A1	12/2006	Riester et al.	
2004/0124246	A1	7/2004	Allen et al.		2006/0286847	A1	12/2006	Zuo et al.	
2004/0129785	A1	7/2004	Luu		2007/0009219	A1	1/2007	Hatsuda	
2004/0135645	A1*	7/2004	Koyama	H03H 9/1021 331/158	2007/0009386	A1	1/2007	Padmanabhan	
2004/0143716	A1	7/2004	Hong		2007/0018313	A1	1/2007	Gomyo et al.	
2004/0139412	A1	8/2004	Ito et al.		2007/0020764	A1	1/2007	Miller	
2004/0152392	A1	8/2004	Nakamura		2007/0028260	A1	2/2007	Williams et al.	
2004/0155715	A1*	8/2004	Nakamura	H03B 5/36 331/158	2007/0033490	A1	2/2007	Moosrainer	
2004/0166140	A1	8/2004	Santini		2007/0042613	A1*	2/2007	Yoda	B41J 2/14233 439/34
2004/0066693	A1	9/2004	Osako et al.		2007/0060198	A1	3/2007	Kuo	
2004/0171192	A1	9/2004	Morimura et al.		2007/0067810	A1	3/2007	Durden et al.	
2004/0175174	A1	9/2004	Suhami		2007/0067820	A1	3/2007	Cha	
2004/0181800	A1	9/2004	Rakib et al.		2007/0228536	A1	3/2007	Aoki et al.	
2004/0189311	A1	9/2004	Glezer		2007/0081165	A1	4/2007	Kilic	
2004/0133787	A1	10/2004	Doughty et al.		2007/0117550	A1	5/2007	Boris et al.	
2004/0238210	A1*	12/2004	Droz	G06K 19/02 174/258	2007/0121008	A1	5/2007	Kanoh	
2004/0245891	A1*	12/2004	Kawachi	H03H 3/08 310/313 R	2007/0033606	A1	6/2007	Yamada et al.	
2004/0256150	A1	12/2004	Barchmann et al.		2007/0125855	A1	6/2007	Jiang et al.	
2004/0258762	A1	12/2004	Boppart		2007/0127185	A1	6/2007	Watanabe	
2004/0260823	A1	12/2004	Tiwari et al.		2007/0138301	A1	6/2007	Cinkler	
2005/0002605	A1	1/2005	Sakai		2007/0143784	A1	6/2007	Kubota et al.	
2005/0005287	A1	1/2005	Claussen		2007/0145133	A1*	6/2007	Jolivet	G06K 7/0008 235/441
2005/0076321	A1	1/2005	Smith		2007/0146542	A1	6/2007	Strasser	
2005/0023361	A1	2/2005	Ikefuji et al.		2007/0035002	A1	7/2007	Moto et al.	
2005/0033688	A1	2/2005	Peart et al.		2007/0153487	A1	7/2007	Frallicciardi et al.	
2005/0048695	A1*	3/2005	Chia	H01L 23/3114 438/106	2007/0165295	A1	7/2007	Kim	
2005/0058574	A1	3/2005	Bysouth		2007/0172388	A1	7/2007	Iwasaki	
2005/0061884	A1	3/2005	Stewart		2007/0035031	A1	8/2007	Jessen et al.	
2005/0191787	A1	4/2005	Bolken		2007/0176622	A1	8/2007	Yamazaki	
2005/0011671	A1	5/2005	Takiar et al.		2007/0090534	A1	10/2007	Iwasaki et al.	
2005/0111280	A1*	5/2005	Takiar	G06K 13/0825 365/222	2007/0235545	A1	10/2007	Martinez et al.	
2005/0017336	A1	6/2005	Kung et al.		2007/0237243	A1	10/2007	Fagan	
2005/0230853	A1	6/2005	Yoshikawa et al.		2007/0243661	A1*	10/2007	Jackson	H01L 23/5389 438/106
2005/0148121	A1	7/2005	Yamazaki et al.		2007/0246536	A1	10/2007	Tuin	
2005/0152656	A1	7/2005	Talneau		2007/0250872	A1	10/2007	Dua	
2005/0158781	A1	7/2005	Woudenberg		2007/0262156	A1	11/2007	Chen et al.	
2005/0197169	A1	9/2005	Son		2007/0266182	A1	11/2007	Lanning	
2005/0212657	A1	9/2005	Simon		2007/0269176	A1	11/2007	Mitomi	
2005/0212690	A1	9/2005	Nishikawa		2007/0269178	A1	11/2007	Sarukura	
2005/0231921	A1	10/2005	Noda et al.		2007/0085187	A1	12/2007	Sun et al.	
2005/0232471	A1	10/2005	Baer		2008/0012860	A1*	1/2008	Klefenz	G06K 9/0061 345/441
2005/0247784	A1	11/2005	Klatt		2008/0020800	A1	1/2008	Xu	
2005/0252978	A1	11/2005	Nishizawa et al.		2008/0186337	A1	1/2008	Hammond	
2005/0265660	A1	12/2005	Miller		2008/0228973	A1	1/2008	Lee	
2005/0281524	A1	12/2005	Mouli		2008/0031449	A1	2/2008	Osen	
2006/0018594	A1	1/2006	Sugitatsu		2008/0041952	A1	2/2008	Kang	
2006/0026295	A1	2/2006	Iwamura		2008/0056948	A1	3/2008	Dale	
2006/0029522	A1	2/2006	Theil		2008/0062066	A1	3/2008	Arai	
2006/0043202	A1	3/2006	Kim et al.		2008/0079565	A1	4/2008	Koyama	
2006/0053345	A1	3/2006	Goodwin		2008/0083831	A1	4/2008	Lafuente et al.	
2006/0057039	A1	3/2006	Morse		2008/0094788	A1	4/2008	Choe	
2006/0058065	A1	3/2006	Shen et al.		2008/0095366	A1	4/2008	Taniguchi	
2006/0059391	A1	3/2006	Park et al.		2008/0096317	A1	4/2008	Middlekauff et al.	
					2008/0099559	A1	5/2008	Lo et al.	
					2008/0107565	A1	5/2008	Vivienne	
					2008/0111254	A1*	5/2008	Park	H01L 21/486 257/786
					2008/0122894	A1	5/2008	Lee et al.	
					2008/0135626	A1	6/2008	Reignoux et al.	
					2008/0137278	A1	6/2008	Chih	

(56)

References Cited

U.S. PATENT DOCUMENTS

2008/0163290	A1	7/2008	Marko		2011/0010734	A1	1/2011	Newell
2008/0164893	A1*	7/2008	Lee	G01R 1/07342 324/754.07	2011/0028184	A1	2/2011	Cooper
2008/0165962	A1	7/2008	Kawano et al.		2011/0205412	A1	2/2011	Miyazaki et al.
2008/0174408	A1	7/2008	Takahashi		2011/0221014	A1	3/2011	Nakatani
2008/0211074	A1	9/2008	Osako et al.		2011/0080331	A1	4/2011	Kato
2008/0211302	A1	9/2008	Hirota et al.		2011/0114856	A1	5/2011	Cooke
2008/0223937	A1	9/2008	Preta et al.		2011/0119487	A1	5/2011	Alexander et al.
2008/0257967	A1	10/2008	Nishizawa et al.		2011/0042125	A1	6/2011	Lee et al.
2008/0257968	A1	10/2008	Nishizawa et al.		2011/0138088	A1	6/2011	Sirio et al.
2008/0262213	A1	10/2008	Wu		2011/0012960	A1	7/2011	Sakuma et al.
2008/0263623	A1	10/2008	Hildebrand et al.		2011/0170750	A1	7/2011	Kropp
2008/0314983	A1	10/2008	Capurso et al.		2011/0182040	A1	7/2011	Ellul
2008/0279379	A1	11/2008	Muijen		2011/0221385	A1	9/2011	Partovi
2009/0011538	A1	1/2009	Masumoto et al.		2011/0259966	A1	10/2011	Phillips
2009/0181314	A1	1/2009	Shyu et al.		2011/0063066	A1	12/2011	Choi et al.
2009/0032593	A1	2/2009	Ljungcrantz		2011/0076867	A1	12/2011	Achsaf et al.
2009/0040695	A1	2/2009	Fidalgo et al.		2011/0161583	A1	12/2011	Youn
2009/0057417	A1	3/2009	Shinohara et al.		2011/0315779	A1	12/2011	Bidin et al.
2009/0061450	A1	3/2009	Hunter		2012/0007096	A1	1/2012	Yamazaki
2009/0228853	A1	3/2009	Hong et al.		2012/0018522	A1	1/2012	Le Garrec et al.
2009/0232384	A1	3/2009	Tu et al.		2012/0200366	A1	1/2012	Nishiyama
2009/0086657	A1	4/2009	Alpert et al.		2012/0028342	A1	2/2012	Ismagilov
2009/0101933	A1	4/2009	Takaao		2012/0048948	A1	3/2012	Bertin et al.
2009/0116029	A1	5/2009	Ohtera		2012/0105081	A1	5/2012	Shaikh
2009/0131028	A1*	5/2009	Horodezky	H04M 1/274516 455/418	2012/0138690	A1	6/2012	Bosquet et al.
2009/0273100	A1	5/2009	Alton		2012/0140420	A1*	6/2012	Soyano
2009/0279243	A1	5/2009	Amidi et al.		2012/0168517	A1	7/2012	Lee
2009/0140415	A1	6/2009	Furuta		2012/0177543	A1	7/2012	Battrell
2009/0144456	A1	6/2009	Gelf et al.		2012/0193435	A1	8/2012	Hanaoka et al.
2009/0153163	A1	6/2009	Han		2012/0231650	A1	9/2012	Tian et al.
2009/0155953	A1*	6/2009	Saeki	H01L 24/75 438/106	2012/0241615	A1	9/2012	Tomioka
2009/0156254	A1	6/2009	Montes		2012/0248201	A1	10/2012	Sutera
2009/0066350	A1	8/2009	Lee		2012/0261575	A1	10/2012	Averitt
2009/0199283	A1	8/2009	Jain		2012/0267438	A1	10/2012	Kato et al.
2009/0244858	A1	10/2009	Di Sirio et al.		2012/0287587	A1	11/2012	Los
2009/0108993	A1	11/2009	Forster		2012/0289196	A1	11/2012	Tan et al.
2009/0275170	A1	11/2009	Chen		2012/0292395	A1	11/2012	Huang et al.
2009/0153622	A1	12/2009	Guan		2012/0299444	A1*	11/2012	Yokoyama
2009/0166894	A1	12/2009	Azumai		2012/0079692	A1	12/2012	Sinha et al.
2009/0168322	A1	12/2009	Okada		2013/0008968	A1	1/2013	Launay et al.
2009/0303624	A1	12/2009	Fujii		2013/0015441	A1	1/2013	Takayama et al.
2009/0309952	A1	12/2009	Akatsu		2013/0193534	A1	2/2013	Nakatani
2010/0006322	A1	1/2010	Cheng		2013/0222484	A1	2/2013	Yokoyama
2010/0013887	A1	1/2010	Suh		2013/0112757	A1	5/2013	Lee
2010/0019038	A1	1/2010	Puente Baliarda et al.		2013/0130262	A1	5/2013	Battrell
2010/0025480	A1	2/2010	Nishizawa et al.		2013/0134227	A1	5/2013	De Maquille et al.
2010/0072284	A1	3/2010	Nishizawa et al.		2013/0161390	A1	6/2013	Rodriquez
2010/0097080	A1	4/2010	Kobauyashi		2013/0175346	A1	7/2013	Jenni
2010/0109141	A1	5/2010	Nishiyama et al.		2013/0185566	A1	7/2013	Pang
2010/0117800	A1	5/2010	Li et al.		2013/0193591	A1	8/2013	Groening
2010/0136816	A1	6/2010	Ahn		2013/0194071	A1	8/2013	Slogedal
2010/0138857	A1	6/2010	Gondkar		2013/0207781	A1	8/2013	Pagani et al.
2010/0165581	A1*	7/2010	Ziglioli	B81B 7/007 361/730	2013/0219097	A1	8/2013	Wang
2010/0165589	A1	7/2010	Zhou		2013/0254445	A1*	9/2013	Burns
2010/0169940	A1	7/2010	Howarter et al.		2013/0099118	A1	10/2013	Tomioka
2010/0176207	A1	7/2010	Yoshikawa et al.		2013/0277434	A1	10/2013	Lin
2010/0205439	A1	8/2010	Chu		2013/0286603	A1	10/2013	Okada et al.
2010/0244166	A1	9/2010	Shibuta		2013/0287267	A1	10/2013	Varone
2010/0085338	A1	10/2010	Miguchi		2013/0320088	A1	12/2013	Lin et al.
2010/0272257	A1	10/2010	Beals		2013/0334320	A1	12/2013	Thill et al.
2010/0124344	A1	11/2010	Mizutani et al.		2013/0337686	A1	12/2013	Wang
2010/0172112	A1	11/2010	Okada		2014/0021264	A1	1/2014	Pueschner et al.
2010/0191976	A1	12/2010	Chu		2014/0042230	A1	2/2014	Pueschner et al.
2010/0302516	A1	12/2010	Rehn		2014/0061316	A1	3/2014	Narayanaswami et al.
2010/0303687	A1	12/2010	Blaga		2014/0253767	A1	3/2014	Kato
2010/0318627	A1	12/2010	Edwards et al.		2014/0256069	A1	3/2014	Kishimoto et al.
2010/0327467	A1	12/2010	Hirabayashi		2014/0304445	A1	4/2014	Gervasi
2011/0003303	A1	1/2011	Pagano		2014/0138449	A1	5/2014	Goldman
2011/0003493	A1*	1/2011	Mo	H01R 27/00 439/81	2014/0193988	A1*	7/2014	Ma
					2014/0166759	A1	9/2014	Liu
					2014/0264029	A1*	9/2014	Tomioka
					2014/0282685	A1	9/2014	Beals et al.
					2014/0282808	A1	9/2014	Beals et al.
								H01L 23/3672 361/715
								H03H 9/13 310/326
								H05K 5/0265 710/301
								H01R 12/7082 439/83
								G01J 3/42 250/338.3

(56)

References Cited

U.S. PATENT DOCUMENTS

2014/0292941 A1* 10/2014 Kobayashi B06B 1/0629
347/68
2014/0299667 A1* 10/2014 Baek G06K 19/07722
235/492
2014/0313261 A1 10/2014 Nagai
2014/0328023 A1* 11/2014 Choi H01L 23/552
361/715
2014/0347818 A1 11/2014 Uhlemann
2014/0158340 A1 12/2014 Dixler et al.
2015/0016607 A1 1/2015 Beals et al.
2015/0113585 A1 4/2015 Beals et al.
2015/0143105 A1 5/2015 Beals et al.
2015/0320506 A1 5/2015 Sayles
2015/0154998 A1 6/2015 Gallo
2015/0178584 A1* 6/2015 Aller G06K 9/3216
382/165
2015/0049142 A1 8/2015 Hager et al.
2015/0092357 A1 10/2015 Yoshikawa et al.
2015/0147914 A1 11/2015 Gao
2015/0321193 A1 11/2015 Sprague
2015/0352549 A1 12/2015 Kolb
2015/0366061 A1 12/2015 Noda
2016/0022570 A1 1/2016 Adams
2016/0117714 A1 4/2016 Salihu
2016/0132761 A1* 5/2016 Hanmer G06Q 20/3572
235/492
2016/0140433 A1* 5/2016 Padilla Alcaide
G06K 19/07758
235/492
2016/0217087 A1 7/2016 Lim
2016/0250393 A1 9/2016 Jeong
2016/0157346 A1 12/2016 Wu
2016/0165731 A1 12/2016 Hurwitz
2016/0365140 A1 12/2016 Azuma
2017/0010639 A1 1/2017 Matsumoto
2018/0027288 A1 1/2018 Beals et al.

FOREIGN PATENT DOCUMENTS

CN 1960552 5/2007
CN 101005563 7/2007
CN 101267532 9/2008
CN 101267639 9/2008
CN 102164320 8/2011
CN 102164329 8/2011
CN 102447955 5/2012
DE 202007015387 3/2008
EP 740478 10/1996
EP 1463322 9/2004
EP 1662361 5/2006
EP 1765013 3/2007
EP 2204997 7/2010
EP 2407916 1/2012
EP 2541959 1/2013
KR 3004415620000 2/2007
KR 3006175300000 10/2011
KR 3006364910000 3/2012
KR 3006364910001 3/2012
TW 201246815 11/2012
TW 201247009 11/2012
TW 201301832 1/2013
WO 2007072211 6/2007
WO 2011120901 10/2011
WO 2012101420 1/2012

OTHER PUBLICATIONS

U.S. Appl. No. 14/608,900, Notice of Allowance dated Jan. 3, 2017, 8 pages.
Taiwanese Office Action in Application 102144271, dated Jan. 20, 2017, 9 pages.
U.S. Appl. No. 13/799,891, Amendment and Response filed Nov. 18, 2016, 17 pages.

U.S. Appl. No. 14/499,956, Office Action dated Nov. 8, 2016, 10 pages.
U.S. Appl. No. 14/500,037, Office Action dated Nov. 10, 2016, 9 pages.
U.S. Appl. No. 14/500,113, Office Action dated Nov. 28, 2016, 10 pages.
U.S. Appl. No. 14/608,900, Amendment and Response filed Dec. 5, 2016, 17 pages.
Chinese Patent Application No. 201330395635.2, Notice of Allowance, dated Dec. 2, 2013.
Chinese Patent Application No. 201330395780.0, Notice of Allowance dated Jan. 10, 2014.
Chinese Patent Application No. 201330395895.X, Notice of Allowance dated Nov. 19, 2013.
European Patent Application No. 15184485.9, EESR dated Mar. 3, 2016, 9 pages.
International Standard (1999) "Information technology—Identification cards—Integrated circuit(s) cards with contacts—Part 2: Dimensions and location of the contacts" Reference No. ISO/IEC 7816-2: 1999E, 11 pages.
PCT International Search Report and Written Opinion for PCT/US2013/039803, dated Jan. 23, 2014, 13 pages.
Smart Card Module Poster compiled by Endre Nagy of Hungary 1 page poster, edition Mar. 2004, www.wranks.de/Uthings/Training.html.
TW Patent Application No. 102304015, Office Action dated Mar. 24, 2014, 3 pages. (English Translation).
TW Patent Application No. 102304016, Office Action dated Mar. 24, 2014, 3 pages. (English Translation).
TW Patent Application No. 102304017, Office Action dated Mar. 24, 2014, 3 pages. (English Translation).
U.S. Appl. No. 13/799,891, Amendment and Response filed Dec. 1, 2014, 8 pages.
U.S. Appl. No. 13/799,891, Amendment and Response filed Dec. 10, 2015, 14 pages.
U.S. Appl. No. 13/799,891, Amendment and Response filed Jul. 6, 2015, 13 pages.
U.S. Appl. No. 13/799,891, Amendment and Response filed Jun. 14, 2016, 16 pages.
U.S. Appl. No. 13/799,891, Office Action dated Aug. 10, 2015, 14 pages.
U.S. Appl. No. 13/799,891, Office Action dated Feb. 3, 2015, 22 pages.
U.S. Appl. No. 13/799,891, Office Action dated Jan. 14, 2016, 10 pages.
U.S. Appl. No. 13/799,891, Office Action dated Jul. 18, 2016, 12 pages.
U.S. Appl. No. 14/499,956, Amendment and Response filed May 31, 2016, 11 pages.
U.S. Appl. No. 14/499,956, Amendment and Response filed Nov. 30, 2015, 7 pages.
U.S. Appl. No. 14/499,956, Office Action dated Jan. 29, 2016, 8 pages.
U.S. Appl. No. 14/499,956, Office Action dated Jul. 30, 2015, 23 pages.
U.S. Appl. No. 14/499,956, Office Action dated Jun. 17, 2016, 13 pages.
U.S. Appl. No. 14/500,037, Amendment and Response filed Dec. 10, 2015, 8 pages.
U.S. Appl. No. 14/500,037, Amendment and Response filed Jun. 16, 2016, 12 pages.
U.S. Appl. No. 14/500,037, Office Action dated Aug. 10, 2015, 20 pages.
U.S. Appl. No. 14/500,037, Office Action dated Feb. 16, 2016, 9 pages.
U.S. Appl. No. 14/500,037, Office Action dated Jun. 24, 2016, 10 pages.
U.S. Appl. No. 14/500,113, Amendment and Response filed Dec. 14, 2015, 8 pages.
U.S. Appl. No. 14/500,113, Amendment and Response filed Jun. 17, 2016, 12 pages.
U.S. Appl. No. 14/500,113, Office Action dated Aug. 12, 2015, 21 pages.

(56)

References Cited

OTHER PUBLICATIONS

- U.S. Appl. No. 14/500,113, Office Action dated Feb. 17, 2016, 8 pages.
- U.S. Appl. No. 14/500,113, Office Action dated Jun. 28, 2016, 10 pages.
- U.S. Appl. No. 14/608,900, Amendment and Response filed Jun. 21, 2016, 17 pages.
- U.S. Appl. No. 14/608,900, Office Action mailed Aug. 5, 2016, 14 pages.
- U.S. Appl. No. 14/608,900, Office Action dated Mar. 21, 2016, 12 pages.
- U.S. Appl. No. 29/448,754, Amendment and Response filed Apr. 15, 2015, 10 pages.
- U.S. Appl. No. 29/448,754, Amendment and Response filed Dec. 10, 2014, 5 pages.
- U.S. Appl. No. 29/448,754, Amendment and Response filed Dec. 30, 2015, 7 pages.
- U.S. Appl. No. 29/448,754, Notice of Allowance dated Jan. 29, 2016, 6 pages.
- U.S. Appl. No. 29/448,754, Office Action dated Apr. 1, 2015, 11 pages.
- U.S. Appl. No. 29/448,754, Office Action dated Jul. 31, 2015, 8 pages.
- U.S. Appl. No. 29/448,754, Office Action dated Sep. 10, 2014, 26 pages.
- U.S. Appl. No. 29/448,761, Amendment and Response filed Apr. 20, 2015, 9 pages.
- U.S. Appl. No. 29/448,761, Amendment and Response filed Dec. 10, 2014, 6 pages.
- U.S. Appl. No. 29/448,761, Amendment and Response filed Dec. 30, 2015, 8 pages.
- U.S. Appl. No. 29/448,761, Notice of Allowance dated Jan. 22, 2016, 6 pages.
- U.S. Appl. No. 29/448,761, Office Action dated Aug. 14, 2015, 7 pages.
- U.S. Appl. No. 29/448,761, Office Action dated Mar. 26, 2015, 11 pages.
- U.S. Appl. No. 29/448,761, Office Action dated Sep. 10, 2014, 26 pages.
- U.S. Appl. No. 29/448,766, Notice of Allowance dated Apr. 22, 2015, 5 pages.
- U.S. Appl. No. 29/448,766, Notice of Allowance dated Jan. 12, 2015, 36 pages.
- U.S. Appl. No. 29/448,766, Notice of Allowance dated Sep. 18, 2014, 28 pages.
- U.S. Appl. No. 29/521,234, Notice of Allowance dated Sep. 8, 2016, 26 pages.
- U.S. Appl. No. 29/521,236, Notice of Allowance dated Sep. 12, 2016, 26 pages.
- Chinese Notice of Allowance in 201530425865.8 dated Jun. 7, 2016, 4 pages.
- Taiwanese Office Action in 104306112 dated Jun. 23, 2016, 9 pages.
- ISO 7816—Smart Card Standards Overview. Artemis Solutions Group LLC, 2004 (17 pages).
- PCT International Search Report and Written Opinion for PCT/US2013/039806, dated Jan. 23, 2014, 12 pages.
- U.S. Appl. No. 13/799,774, Notice of Allowance dated Apr. 28, 2016, 7 pages.
- U.S. Appl. No. 13/799,774, Amendment and Response filed Feb. 16, 2016, 11 pages.
- U.S. Appl. No. 13/799,774, Amendment and Response filed Jan. 15, 2015, 12 pages.
- U.S. Appl. No. 13/799,774, Amendment and Response filed Oct. 1, 2015, 11 pages.
- U.S. Appl. No. 13/799,774, Office Action dated Nov. 16, 2015, 10 pages.
- U.S. Appl. No. 13/799,774, Office Action dated Apr. 1, 2015, 10 pages.
- U.S. Appl. No. 13/799,774, Office Action dated Jul. 15, 2014, 12 pages.
- European Patent Application No. 13877922.1, EESR dated Sep. 7, 2016, 8 pages.
- European Communication in 13878216.4, dated Sep. 21, 2016, 7 pages.
- U.S. Appl. No. 14/499,956, Amendment and Response filed Sep. 23, 2016, 12 pages.
- U.S. Appl. No. 14/500,037, Amendment and Response filed Sep. 26, 2016, 11 pages.
- U.S. Appl. No. 14/500,113, Amendment and Response filed Sep. 28, 2016, 12 pages.
- U.S. Appl. No. 29/521,234, Notice of Allowance dated Oct. 14, 2016, 5 pages.
- U.S. Appl. No. 29/521,236, Notice of Allowance dated Oct. 17, 2016, 5 pages.
- European Search Report in Application 13878216.4, dated Jan. 13, 2017, 16 pages.
- Taiwanese Office Action in Application 102144270, dated Feb. 10, 2017, 13 pages.
- U.S. Appl. No. 13/799,891, Amendment and Response filed Aug. 10, 2017, 16 pages.
- U.S. Appl. No. 13/799,891, Notice of Allowance dated Sep. 22, 2017, 7 pages.
- U.S. Appl. No. 14/499,956, Notice of Allowance dated Aug. 24, 2017, 2 pages.
- U.S. Appl. No. 14/500,113, Office Action dated Sep. 15, 2017, 11 pages.
- U.S. Appl. No. 14/499,956, Amendment and Response filed Mar. 8, 2017, 12 pages.
- U.S. Appl. No. 14/500,037, Amendment and Response filed Mar. 10, 2017, 11 pages.
- U.S. Appl. No. 29/567,139, Notice of Allowance dated Mar. 10, 2017, 28 pages.
- U.S. Appl. No. 29/567,135, Notice of Allowance dated Mar. 10, 2017, 30 pages.
- U.S. Appl. No. 13/799,891, Amendment and Response filed Mar. 30, 2017, 15 pages.
- U.S. Appl. No. 14/500,113, Office Action dated Apr. 6, 2017, 10 pages.
- U.S. Appl. No. 14/608,900, Notice of Allowance dated Apr. 12, 2017, 2 pages.
- U.S. Appl. No. 29/567,139, Notice of Allowance dated Apr. 3, 2017, 2 pages.
- Taiwanese Notice of Allowance in Application 104306112, dated Feb. 10, 2017, 5 pages.
- U.S. Appl. No. 14/500,037, Notice of Allowance dated Mar. 26, 2017, 8 pages.
- Chinese Notice of Allowance in 102144271 dated May 31, 2017, 3 pages. (No English Translation.).
- U.S. Appl. No. 14/500,037, Notice of Allowance dated Jun. 15, 2017, 2 pages.
- U.S. Appl. No. 13/799,891, Office Action dated May 10, 2017, 13 pages.
- U.S. Appl. No. 14/499,956, Notice of Allowance dated May 9, 2017, 7 pages.
- U.S. Appl. No. 14/499,956, Notice of Allowance dated Jun. 6, 2017, 4 pages.
- U.S. Appl. No. 29/567,139, Notice of Allowance dated May 16, 2017, 2 pages.
- Taiwanese Notice of Allowance in Application 105307889, dated May 17, 2017, 5 pages.
- Taiwanese Notice of Allowance in Application 105307888, dated May 17, 2017, 5 pages.
- Taiwanese Notice of Allowance in Application 105307887, dated May 17, 2017, 5 pages.
- U.S. Appl. No. 14/500,113, Amendment and Response filed Jul. 6, 2017, 11 pages.
- Taiwanese Notice of Allowance in Application 105307890, dated Jul. 13, 2017, 5 pages.
- Taiwanese Office Action in Application 102144270, dated Dec. 14, 2017, 4 pages.
- Chinese Office Action in Application 201380074223.6, dated Jan. 23, 2018, 9 pages.

(56)

References Cited

OTHER PUBLICATIONS

European Office Action in Application 13878216.4, dated Jan. 18, 2018, 8 pages.

ISO/IEC 7816-3 Identification cards—Integrated circuit(s) cards with contacts—Part 3: Cards with contacts—Electrical Interface and transmission protocols Nov. 1, 2006, 58 pages, <http://read.pudn.com/downloads132/doc/comm/563504/ISO-IEC7816/ISO+IEC7816-3-2006.pdf>.

Chinese Office Action in Application 201380074371.8, dated Feb. 23, 2018, 8 pages.

U.S. Appl. No. 14/500,113, Notice of Allowance dated Apr. 6, 2018, 8 pages.

U.S. Appl. No. 15/710,340, Office Action dated Apr. 17, 2018, 13 pages.

U.S. Appl. No. 29/567,144, Office Action dated May 30, 2018, 22 pages.

U.S. Appl. No. 14/500,113, Amendment and Repsonse filed Feb. 15, 2018, 11 pages.

European Summons in Application 13878216.4, dated Dec. 18, 2018, 10 pages.

Anonymous: "OpenCable(TM) Specifications CableCARD(TM) Copy Protection 2.0 Specification", May 31, 2012 (May 31, 2012), XP055517755, Retrieved from the Internet: URL:<https://apps.cablelabs.com/specification/opencable-cablecard-copy-protection-2-0-specification>, 19 pages.

Anonymous: "OpenCable(TM) Specifications CableCARD Interface 2.0 Specification", May 31, 2012 (May 31, 2012), XP055517769,

Retrieved from the Internet: URL:<https://apps.cablelabs.com/specification/opencable-cablecard-interface-2-0-specification>, 83 pages.

Nate Anderson: "CableCARD: A Primer", Feb. 7, 2006 (Feb. 7, 2006), XP055517459, Retrieved from the Internet: URL:<https://arstechnica.com/gadgets/2006/02/cablecard/2/>, 2 pages.

U.S. Appl. No. 15/710,340, Office Action dated Dec. 3, 2018, 6 pages.

U.S. Appl. No. 15/710,340, Amendment and Response filed Mar. 4, 2019, 7 pages.

U.S. Appl. No. 15/710,340, Notice of Allowance dated Apr. 1, 2019, 7 pages.

European Office Action in Application 15184485.9, dated Feb. 26, 2019, 7 pages.

European Written Submissions in Application 13878216.4, date Mar. 22, 2019, 12 pages.

Chinese Office Action in Application 201380074371.8. dated Mar. 12, 2019, 11 pages.

U.S. Appl. No. 14/500,113, Notice of Allowance dated Aug. 1, 2018, 3 pages.

U.S. Appl. No. 15/710,340, Amendment and Response filed Sep. 17, 2018, 11 pages.

U.S. Appl. No. 29/567,145, Office Action dated Jul. 31, 2018, 16 pages.

U.S. Appl. No. 29/567,144, Amendment and Response filed Aug. 30, 2018, 12 pages.

U.S. Appl. No. 29/567,144, Notice of Allowance dated Sep. 28, 2018, 6 pages.

* cited by examiner

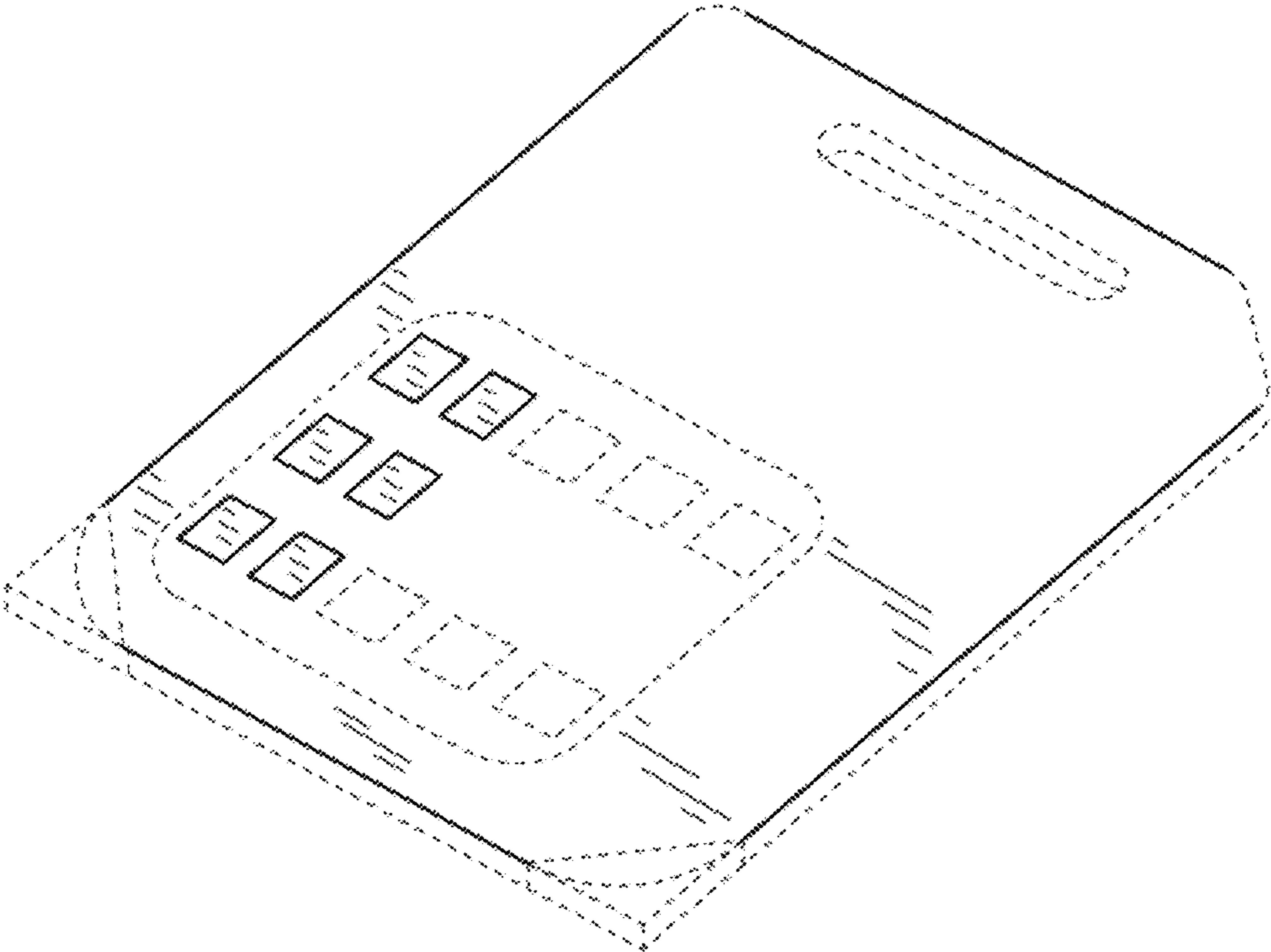


FIG.1

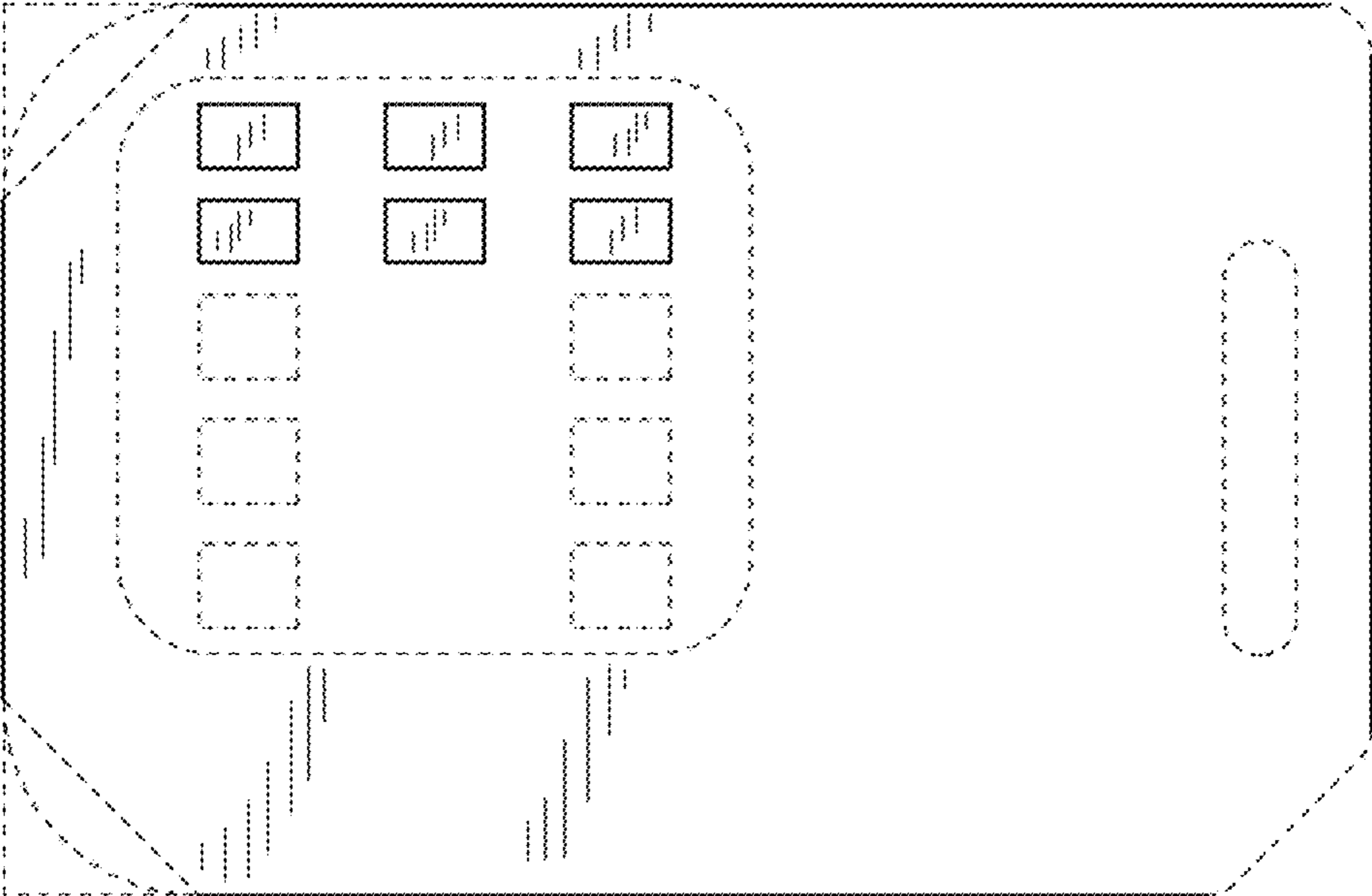


FIG. 2



FIG. 3

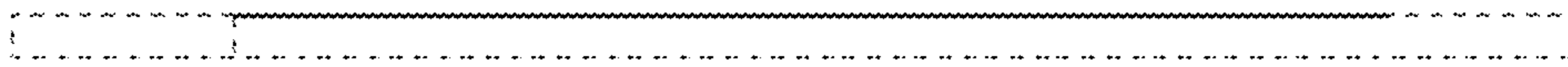


FIG. 4



FIG. 5

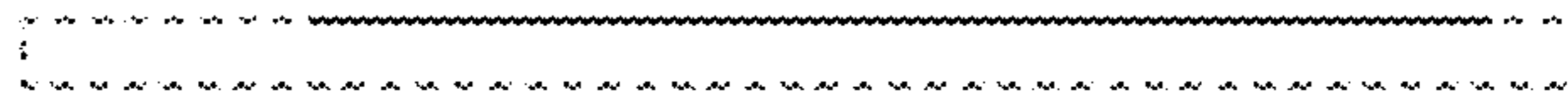


FIG. 6



FIG. 7