



US00D949864S

(12) **United States Design Patent**  
**Beals et al.**

(10) **Patent No.:** **US D949,864 S**  
(45) **Date of Patent:** **\*\* Apr. 26, 2022**

(54) **SMART CARD INTERFACE**

(71) Applicant: **NagraStar LLC**, Englewood, CO (US)

(72) Inventors: **William Michael Beals**, Englewood, CO (US); **Hervé Goupil**, Villars sous Yens (CH)

(73) Assignee: **NagraStar LLC**, Englewood, CO (US)

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

(21) Appl. No.: **29/671,439**

(22) Filed: **Nov. 27, 2018**

**Related U.S. Application Data**

(60) Continuation of application No. 29/567,144, filed on Jun. 6, 2016, now Pat. No. Des. 840,404, which is a  
(Continued)

(51) **LOC (13) 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 29/49124-4913; 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 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; H01L 2224/05013-05017; H01L

(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

D54,610 S \* 3/1920 Evans et al. .... D19/1  
3,702,025 A \* 11/1972 Archer ..... H01L 27/118  
438/6

(Continued)

*Primary Examiner* — Susan Moon Lee

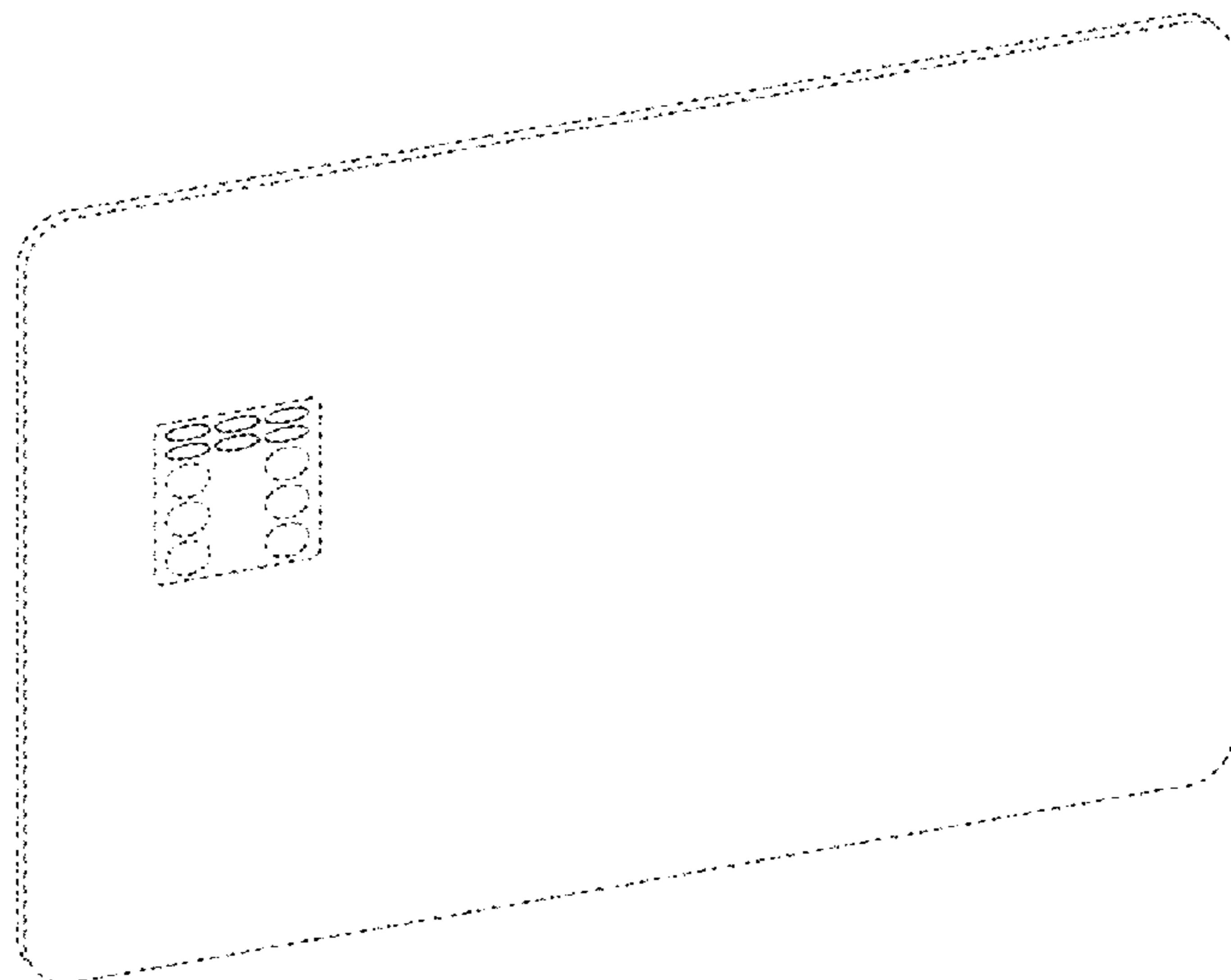
(57) **CLAIM**

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 view thereof; and, FIG. 3 is an enlarged top view thereof. The illustrative broken line showing of a base surface throughout the drawing figures depicts an exemplary component to which the smart card interface might be applied and forms no part of the claimed design.

**1 Claim, 2 Drawing Sheets**



**Related U.S. Application Data**

division of application No. 29/448,761, filed on Mar. 13, 2013, now Pat. No. Des. 758,372.

(58) **Field of Classification Search**

CPC .. 2224/0555-05557; H01L 2224/0612-06189; H01L 2224/07-09181

See application file for complete search history.

(56)

**References Cited**

U.S. PATENT DOCUMENTS

4,104,785 A \* 8/1978 Shiba ..... G01R 31/2644  
257/48  
4,264,917 A \* 4/1981 Ugon ..... G06K 19/07745  
174/521  
D267,094 S \* 11/1982 Doi ..... D14/436  
4,380,699 A \* 4/1983 Monnier ..... H01L 23/5388  
235/492  
4,394,654 A \* 7/1983 Hofmann-Cerfontaine .....  
G06Q 20/3415  
340/5.81  
4,417,413 A \* 11/1983 Hoppe ..... G06K 19/07745  
40/630  
4,532,419 A \* 7/1985 Takeda ..... G06K 19/07  
235/492  
4,535,385 A \* 8/1985 August ..... H01L 23/36  
257/E23.101  
4,549,200 A \* 10/1985 Ecker ..... H01L 23/4006  
174/252  
4,549,247 A \* 10/1985 Hoppe ..... G06K 19/07743  
174/528  
4,575,621 A \* 3/1986 Dreifus ..... G06Q 20/382  
235/380  
4,600,257 A \* 7/1986 Fushimoto ..... H01R 13/4534  
235/492  
4,603,249 A \* 7/1986 Hoppe ..... G01S 7/529  
235/492  
4,614,861 A \* 9/1986 Pavlov ..... G06Q 20/4014  
235/380  
4,628,407 A \* 12/1986 August ..... H01L 23/36  
257/E23.101  
4,639,585 A \* 1/1987 Haghiri-Tehrani .....  
G06K 19/07728  
235/487  
4,677,529 A \* 6/1987 Watanabe ..... H05K 1/167  
338/115  
4,689,103 A \* 8/1987 Elarde ..... H05K 3/0097  
156/242  
4,696,034 A \* 9/1987 Wiedemer ..... H04N 21/6581  
380/230  
4,727,246 A \* 2/1988 Hara ..... G06K 19/07745  
174/544  
4,739,448 A \* 4/1988 Rowe ..... H01L 23/66  
333/238  
4,750,089 A \* 6/1988 Derryberry ..... H05K 3/3436  
361/712  
4,754,319 A \* 6/1988 Saito ..... B32B 37/185  
257/679  
4,774,633 A \* 9/1988 Dehaine ..... H01L 24/81  
361/751  
4,792,843 A \* 12/1988 Haghiri-Tehrani .....  
G06K 19/07745  
257/679  
4,794,243 A \* 12/1988 Hamada ..... G06K 19/07743  
235/492  
4,795,895 A \* 1/1989 Hara ..... G06K 19/07745  
235/488  
4,797,542 A \* 1/1989 Hara ..... G06K 19/0719  
235/380  
4,803,542 A \* 2/1989 Haghiri-Tehrani .....  
G06K 19/07745  
257/679

4,811,082 A \* 3/1989 Jacobs ..... H01L 23/538  
174/261  
4,814,943 A \* 3/1989 Okuaki ..... H01L 23/293  
361/783  
4,822,989 A \* 4/1989 Miyamoto ..... G06K 19/07745  
235/492  
4,825,283 A \* 4/1989 Shino ..... G06K 19/07703  
174/535  
4,835,846 A \* 6/1989 Juan ..... G06K 19/07743  
29/840  
4,849,944 A \* 7/1989 Matsushita ..... G11C 5/143  
714/718  
4,868,376 A \* 9/1989 Lessin ..... G06K 19/07703  
235/492  
D304,826 S \* 11/1989 Sutoh ..... D14/436  
D305,023 S \* 12/1989 Suto ..... D14/436  
4,887,234 A \* 12/1989 Iijima ..... G06Q 20/341  
711/173  
4,889,980 A \* 12/1989 Hara ..... G06K 19/07745  
235/488  
4,896,028 A \* 1/1990 Kushima ..... G06K 19/07  
235/492  
4,897,534 A \* 1/1990 Haghiri-Tehrani .....  
G06K 19/07718  
235/488  
4,943,464 A \* 7/1990 Gloton ..... H01L 23/49855  
428/76  
4,980,802 A \* 12/1990 Champagne ..... H01L 24/73  
361/764  
4,985,920 A \* 1/1991 Seki ..... G06Q 20/341  
235/379  
4,990,759 A \* 2/1991 Gloton ..... G06K 19/07728  
235/487  
5,023,751 A \* 6/1991 Stampfli ..... H01L 21/4839  
361/751  
5,027,190 A \* 6/1991 Haghiri-Tehrani .....  
G06K 19/07747  
257/679  
5,031,026 A \* 7/1991 Ueda ..... G06K 19/077  
257/679  
5,049,718 A \* 9/1991 Spletter ..... B23K 26/18  
219/121.64  
5,049,728 A \* 9/1991 Rovin ..... G06K 19/077  
235/492  
5,055,913 A \* 10/1991 Haghiri-Tehrani .....  
G06K 19/07745  
257/676  
5,097,117 A \* 3/1992 Champagne ..... G06K 19/07745  
235/488  
5,122,860 A \* 6/1992 Kikuchi ..... G06K 19/07747  
257/679  
5,126,548 A \* 6/1992 Sekiguchi ..... G06K 7/0086  
235/492  
D327,883 S \* 7/1992 Gloton ..... D13/182  
D328,599 S \* 8/1992 Gloton ..... D13/182  
5,134,773 A \* 8/1992 LeMaire ..... B29C 45/14467  
174/545  
5,155,068 A \* 10/1992 Tada ..... G06K 19/07745  
257/E23.064  
5,203,078 A \* 4/1993 Nakanishi ..... G06K 19/077  
228/5.1  
5,208,450 A \* 5/1993 Uenishi ..... G06K 19/07728  
235/488  
5,216,278 A \* 6/1993 Lin ..... H01L 23/3121  
174/538  
5,220,598 A \* 6/1993 Bock ..... H04M 1/02  
379/110.01  
5,250,341 A \* 10/1993 Kobayashi ..... G06K 19/07745  
257/E29.022  
5,255,430 A \* 10/1993 Tallaksen ..... G06K 19/07745  
174/530  
D342,728 S \* 12/1993 Gloton ..... D14/437  
5,270,964 A \* 12/1993 Bechtolsheim ..... G11C 5/00  
365/52  
5,276,311 A \* 1/1994 Hennige ..... G07F 7/1008  
235/380

(56)

## References Cited

## U.S. PATENT DOCUMENTS

- 5,276,317 A \* 1/1994 Ozouf ..... A45C 11/18  
235/441
- D344,502 S \* 2/1994 Gloton ..... D14/437
- 5,285,352 A \* 2/1994 Pastore ..... H01L 23/3677  
361/707
- 5,304,513 A \* 4/1994 Haghiri-Tehrani .....  
G06K 19/07745  
156/245
- 5,321,297 A \* 6/1994 Enomoto ..... H01L 27/14627  
257/432
- 5,361,062 A \* 11/1994 Weiss ..... G07C 9/21  
340/5.26
- 5,362,955 A \* 11/1994 Haghiri-Tehrani ..... B26D 7/01  
235/492
- 5,363,279 A \* 11/1994 Cha ..... H01L 24/06  
361/767
- D353,135 S \* 12/1994 Gloton ..... D14/437
- D353,136 S \* 12/1994 Gloton ..... D14/437
- 5,375,037 A \* 12/1994 Le Roux ..... G07F 7/1008  
361/679.31
- 5,386,340 A \* 1/1995 Kurz ..... G06K 19/077  
206/701
- D357,909 S \* 5/1995 Gloton ..... D14/437
- D358,142 S \* 5/1995 Gloton ..... D14/437
- 5,438,481 A \* 8/1995 Murphy ..... H01L 23/495  
257/E23.031
- 5,444,301 A \* 8/1995 Song ..... H01L 23/3107  
257/737
- 5,448,511 A \* 9/1995 Paurus ..... H01L 25/0657  
257/686
- 5,457,590 A \* 10/1995 Barrett ..... G06F 21/80  
235/492
- 5,463,210 A \* 10/1995 Imura ..... G06K 7/0021  
235/441
- 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 ..... G06Q 20/341  
235/382
- 5,502,278 A \* 3/1996 Mabboux ..... H01L 23/49838  
174/261
- 5,517,752 A \* 5/1996 Sakata ..... H01L 24/81  
174/260
- 5,526,233 A \* 6/1996 Hayakawa ..... G06K 19/077  
235/488
- 5,534,720 A \* 7/1996 Song ..... H01L 27/1462  
257/232
- 5,543,585 A \* 8/1996 Booth ..... H01L 21/563  
174/260
- 5,544,014 A \* 8/1996 Atsumi ..... G06K 19/04  
257/679
- 5,552,632 A \* 9/1996 Iwasaki ..... G06K 19/07743  
257/679
- 5,563,400 A \* 10/1996 Le Roux ..... G06K 19/07741  
235/486
- 5,569,941 A \* 10/1996 Takahashi ..... H01L 29/0834  
257/132
- D375,303 S \* 11/1996 Gaumet ..... D14/436
- 5,572,779 A \* 11/1996 Adelman ..... H01F 41/046  
257/E23.061
- 5,579,207 A \* 11/1996 Hayden ..... H01L 25/0657  
174/261
- 5,581,065 A \* 12/1996 Nishikawa ..... G06K 19/072  
235/487
- 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 25/105  
257/686
- 5,604,330 A \* 2/1997 Hasan ..... H01L 23/49838  
174/261
- 5,604,379 A \* 2/1997 Mori ..... H01L 23/3157  
257/737
- 5,615,085 A \* 3/1997 Wakabayashi ..... B41J 29/00  
361/679.31
- 5,616,520 A \* 4/1997 Nishiuma ..... H01L 23/10  
438/125
- 5,623,552 A \* 4/1997 Lane ..... G06K 13/073  
382/124
- 5,637,858 A \* 6/1997 Hoppe ..... G06K 19/07718  
235/492
- 5,652,428 A \* 7/1997 Nishioka ..... G01Q 10/06  
850/4
- 5,655,917 A \* 8/1997 Kaneshige ..... H01R 13/635  
439/155
- 5,677,524 A \* 10/1997 Haghiri-Tehrani .....  
G06K 19/077  
235/487
- D387,746 S \* 12/1997 Ishihara ..... D14/437
- D387,747 S \* 12/1997 Ishihara ..... D14/437
- D388,066 S \* 12/1997 Ishihara ..... D14/437
- D389,130 S \* 1/1998 Ishihara ..... D14/437
- 5,724,545 A \* 3/1998 Skorski ..... G06F 15/0283  
705/41
- 5,729,000 A \* 3/1998 Sugimoto ..... G06K 7/0021  
235/441
- 5,736,969 A \* 4/1998 Kuga ..... G11B 20/00007  
345/6
- 5,739,515 A \* 4/1998 Takemura ..... G06K 7/0021  
235/441
- 5,742,680 A \* 4/1998 Wilson ..... H04N 7/163  
348/E7.061
- 5,745,988 A \* 5/1998 Hohmann ..... G06K 19/041  
235/488
- 5,752,857 A \* 5/1998 Knights ..... G06K 7/0021  
439/638
- 5,754,410 A \* 5/1998 Bardsley ..... G01R 31/2884  
361/777
- 5,764,522 A \* 6/1998 Shalev ..... G01G 19/414  
700/240
- 5,767,999 A \* 6/1998 Kayner ..... G06F 13/409  
398/164
- 5,780,836 A \* 7/1998 Iguchi ..... G06K 13/08  
235/441
- 5,780,837 A \* 7/1998 Garcia ..... B42D 25/00  
235/487
- 5,786,988 A \* 7/1998 Harari ..... G06K 19/07728  
235/487
- 5,787,399 A \* 7/1998 Lee ..... G11C 7/16  
704/270
- 5,789,733 A \* 8/1998 Jachimowicz ..... G06K 7/1097  
235/380
- 5,807,762 A \* 9/1998 Akram ..... H01L 23/5382  
257/E23.171
- 5,822,190 A \* 10/1998 Iwasaki ..... G06K 19/07743  
361/737
- 5,827,084 A \* 10/1998 Biernath ..... H05K 3/365  
439/262
- 5,834,747 A \* 11/1998 Cooper ..... G06K 19/06206  
235/449
- 5,837,984 A \* 11/1998 Bleier ..... G06K 7/0021  
235/441
- 5,852,290 A \* 12/1998 Chaney ..... G07F 7/1008  
235/492
- 5,856,662 A \* 1/1999 Kohama ..... G06K 19/07724  
235/492
- 5,866,950 A \* 2/1999 Iwasaki ..... H01L 24/81  
257/782
- D407,392 S \* 3/1999 Kleineidam ..... D14/479
- 5,877,488 A \* 3/1999 Klatt ..... G06K 7/0043  
235/486
- 5,877,975 A \* 3/1999 Jigour ..... G06K 7/0021  
365/52
- 5,900,655 A \* 5/1999 Shim ..... H01L 31/02162  
257/232
- 5,912,502 A \* 6/1999 Kano ..... G01R 31/2884  
257/620

(56)

References Cited

U.S. PATENT DOCUMENTS

5,932,866	A *	8/1999	Terada	G06K 19/08 235/487	6,281,450	B1 *	8/2001	Urasaki	H01L 21/563 174/258
5,933,328	A *	8/1999	Wallace	G06K 7/0021 361/737	6,285,559	B1 *	9/2001	Fukiharu	H05K 1/0243 257/E23.114
5,955,961	A *	9/1999	Wallerstein	G06Q 20/4037 340/5.4	6,292,490	B1 *	9/2001	Gratacap	H04N 21/23424 370/412
5,991,400	A *	11/1999	Kamperman	H04N 7/1675 380/239	6,296,552	B1 *	10/2001	Boutaghou	B24B 39/06 451/290
5,993,261	A *	11/1999	Klatt	G06K 7/0021 439/630	6,297,548	B1 *	10/2001	Moden	H01L 23/13 257/686
6,002,605	A *	12/1999	Iwasaki	G07F 7/1008 365/51	6,304,683	B1 *	10/2001	Kiyohara	H04N 1/0402 358/486
6,019,639	A *	2/2000	Brunker	H01R 13/6464 439/60	6,315,205	B1 *	11/2001	Bates, III	G06K 7/0021 235/441
6,019,663	A *	2/2000	Angell	B24B 19/16 451/5	6,326,243	B1 *	12/2001	Suzuya	H01L 23/49503 438/124
6,025,997	A *	2/2000	Huber	G06K 19/07745 361/777	6,328,217	B1 *	12/2001	Everett	G06K 19/0719 235/492
6,027,028	A *	2/2000	Pieterse	G06K 7/0013 235/492	6,329,228	B1 *	12/2001	Terashima	H01L 21/486 257/675
6,035,037	A *	3/2000	Chaney	H04N 7/163 348/565	6,330,164	B1 *	12/2001	Khandros	H01L 24/81 361/760
6,035,216	A *	3/2000	Cheng	H04B 1/3816 235/475	D452,864	S *	1/2002	Wallace	D14/436
6,036,099	A *	3/2000	Leighton	B32B 37/185 156/154	6,344,162	B1 *	2/2002	Miyajima	B29C 43/18 264/272.14
6,054,774	A *	4/2000	Ohmori	G06K 19/07743 257/679	D456,414	S *	4/2002	Turin	D14/437
D425,519	S *	5/2000	Merlin	D14/436	6,369,795	B1 *	4/2002	Lester	G06F 3/0395 345/156
6,062,887	A *	5/2000	Schuster	G06K 7/0021 439/218	6,372,541	B1 *	4/2002	Bouchez	G06K 19/07745 438/106
6,065,681	A *	5/2000	Trueggelmann	G06K 19/07745 235/487	6,378,774	B1 *	4/2002	Emori	G06K 7/10178 235/441
6,085,155	A *	7/2000	Hayase	G01C 15/004 702/40	6,398,114	B1 *	6/2002	Nishikawa	G06K 19/072 235/487
6,089,451	A *	7/2000	Krause	G06K 7/084 235/380	6,402,301	B1 *	6/2002	Powers	B41J 2/1603 347/63
6,097,605	A *	8/2000	Klatt	G06F 1/183 361/737	6,407,933	B1 *	6/2002	Bologna	H05K 7/1491 174/168
6,102,743	A *	8/2000	Haffenden	G06K 19/07743 439/377	6,409,089	B1 *	6/2002	Eskicioglu	H04N 21/4367 235/492
6,118,114	A *	9/2000	Fujimoto	H04N 1/00002 250/208.1	6,420,887	B1 *	7/2002	Kister	G01R 1/07378 324/754.11
6,141,210	A *	10/2000	Iwasaki	G06K 7/0021 361/679.31	6,443,361	B1 *	9/2002	Klatt	G06K 7/0021 235/384
D434,396	S *	11/2000	Iwasaki	D14/436	6,460,772	B1 *	10/2002	Stahl	G06K 7/0013 235/482
D434,418	S *	11/2000	Shinada	D14/436	6,462,273	B1 *	10/2002	Corisis	G06K 19/077 174/521
6,149,058	A *	11/2000	Albaret	G06K 7/0013 235/380	6,474,776	B1 *	11/2002	Murray	B41J 2/14 347/12
6,151,511	A *	11/2000	Cruciani	G06K 7/0021 235/486	6,492,718	B2 *	12/2002	Ohmori	H01L 24/97 257/685
6,170,116	B1 *	1/2001	Mizuta	B08B 1/00 134/42	6,513,718	B1 *	2/2003	Bouchez	G06K 19/07728 235/492
6,188,580	B1 *	2/2001	Huber	G06K 19/07743 361/737	6,548,888	B1 *	4/2003	Fidalgo	G06K 19/07743 257/679
6,191,951	B1 *	2/2001	Houdeau	G06K 19/07743 361/737	6,561,432	B1 *	5/2003	Vedder	G06K 19/077 235/492
6,195,183	B1 *	2/2001	Fujimoto	H04N 1/486 358/512	6,568,600	B1 *	5/2003	Carpier	H05K 3/3436 235/492
6,205,028	B1 *	3/2001	Matsumura	H05K 1/0201 174/252	6,570,768	B2 *	5/2003	Medina	G02B 6/4201 361/728
6,209,790	B1 *	4/2001	Houdeau	G06K 19/07743 235/491	6,581,840	B2 *	6/2003	Takeda	G06K 19/07739 235/488
6,213,403	B1 *	4/2001	Bates, III	G06K 19/0718 235/486	6,592,031	B1 *	7/2003	Klatt	G06F 21/32 235/382
6,232,937	B1 *	5/2001	Jacobsen	G02B 25/002 345/100	6,592,044	B1 *	7/2003	Wong	G06K 19/06196 235/449
6,241,557	B1 *	6/2001	Reichardt	G06K 7/0021 439/637	6,594,361	B1 *	7/2003	Chaney	G06Q 20/40975 380/221
6,257,486	B1 *	7/2001	Teicher	G06K 7/0021 235/380	6,613,610	B2 *	9/2003	Iwafuchi	H01L 21/2007 438/128
					6,617,693	B2 *	9/2003	Hikita	H01L 23/49575 257/777
					6,618,258	B2 *	9/2003	Gohs	G06K 7/0021 361/728

(56)	References Cited					
	U.S. PATENT DOCUMENTS					
6,641,049	B2 *	11/2003	Luu	.....	G06K	19/0719 235/441
6,646,957	B2 *	11/2003	Martin	.....	H04B	1/385 368/10
6,657,523	B2 *	12/2003	Tarui	.....	H01L	23/66 333/160
6,693,315	B2 *	2/2004	Kuroda	.....	H01L	29/0649 257/288
D487,747	S *	3/2004	Yu	.....	D14	436
6,705,520	B1 *	3/2004	Pitroda	.....	G06K	7/0013 235/380
6,719,206	B1 *	4/2004	Bashan	.....	G06K	19/07747 235/492
D491,951	S *	6/2004	Yu	.....	D14	436
D492,688	S *	7/2004	Wallace	.....	D14	436
6,762,537	B1 *	7/2004	Kikushima	.....	H03H	9/0547 310/313 R
6,764,005	B2 *	7/2004	Cooper	.....	G06K	19/06 235/449
D493,798	S *	8/2004	Yu	.....	D14	436
6,779,115	B1 *	8/2004	Naim	.....	G06F	21/10 380/278
6,787,469	B2 *	9/2004	Houston	.....	H01L	21/32139 257/E21.314
6,809,932	B2 *	10/2004	Wu	.....	H05K	9/0024 165/185
6,811,082	B2 *	11/2004	Wong	.....	G06K	7/10336 235/451
6,826,185	B1 *	11/2004	Montanaro	.....	H04L	12/5601 370/395.1
6,833,323	B2 *	12/2004	Yui	.....	H01L	21/7684 257/758
6,836,138	B1 *	12/2004	Park	.....	G01R	1/0483 324/756.05
6,847,265	B2 *	1/2005	Tanaka	.....	H03B	5/04 331/108 D
6,848,617	B1 *	2/2005	Fries	.....	G07C	9/37 235/492
6,870,430	B2 *	3/2005	Nakamura	.....	H03B	5/36 331/108 C
6,882,537	B2 *	4/2005	Barclay	.....	H05K	1/0206 174/252
6,882,541	B2 *	4/2005	Maruyama	.....	H05K	1/189 361/752
6,884,642	B2 *	4/2005	Farnworth	.....	G01R	31/2856 438/14
6,896,189	B2 *	5/2005	Guion	.....	G06K	19/07733 235/451
6,903,935	B1 *	6/2005	Chen	.....	G06K	19/077 235/492
6,913,198	B2 *	7/2005	Ruat	.....	G06K	7/0069 235/451
6,922,780	B1 *	7/2005	Siegel	.....	H04N	7/162 348/E7.06
6,937,191	B2 *	8/2005	Puente Baliarda	....	H01Q	1/246 343/700 MS
6,937,206	B2 *	8/2005	Puente Baliarda	....	H01Q	1/246 343/700 MS
6,945,712	B1 *	9/2005	Conn	.....	G02B	6/4246 385/94
6,950,128	B1 *	9/2005	Sawada	.....	H04N	1/00241 348/231.3
6,974,343	B2 *	12/2005	Zheng	.....	H01R	13/2421 439/326
7,001,800	B2 *	2/2006	Cappelletti	.....	H01L	27/0207 257/368
7,005,955	B2 *	2/2006	Schumacher	.....	H01F	17/0033 336/200
7,009,233	B2 *	3/2006	Uchiyama	.....	H01L	21/30625 257/296
7,019,981	B2 *	3/2006	Heinemann	.....	G06K	19/07745 361/737
7,051,128	B2 *	5/2006	Bando	.....	G06F	13/385 710/100
7,051,929	B2 *	5/2006	Li	.....	G06K	19/07 235/380
7,061,263	B1 *	6/2006	Ong	.....	G01R	31/2884 324/750.3
7,062,584	B1 *	6/2006	Worrell	.....	G06K	7/0013 710/16
7,063,267	B2 *	6/2006	Tsuchimoto	.....	G06K	19/07745 235/492
7,064,423	B2 *	6/2006	Okita	.....	G06K	19/07728 174/250
7,064,431	B2 *	6/2006	Singh	.....	H05K	1/111 257/734
7,082,034	B2 *	7/2006	Tiwari	.....	H01L	23/3675 165/185
7,136,514	B1 *	11/2006	Wong	.....	G06K	9/00026 382/124
7,140,550	B2 *	11/2006	Ramachandran	.....	G06K	19/08 235/493
7,184,093	B2 *	2/2007	Manning	.....	H04N	5/44 348/445
D537,824	S *	3/2007	Day	.....	D14	436
7,207,662	B2 *	4/2007	Shin	.....	B41J	2/17563 347/63
7,225,537	B2 *	6/2007	Reed	.....	H01L	23/3135 29/841
7,245,891	B2 *	7/2007	Hugunin	.....	H04M	19/04 455/148
7,252,242	B2 *	8/2007	Ho	.....	G06K	19/0719 235/492
7,273,234	B1 *	9/2007	Collins	.....	B42D	25/00 283/72
7,293,716	B1 *	11/2007	Miks	.....	H01L	21/561 235/451
7,294,918	B2 *	11/2007	Wada	.....	G06K	19/077 257/679
7,296,750	B2 *	11/2007	Wood	.....	G02B	26/0833 235/462.36
7,305,535	B2 *	12/2007	Harari	.....	G06K	19/077 711/164
7,317,248	B2 *	1/2008	Poechmueller	.....	G11C	5/04 257/713
7,350,714	B2 *	4/2008	Wallace	.....	G06K	19/07743 235/487
7,352,588	B2 *	4/2008	Nishizawa	.....	H01L	23/49833 361/737
7,360,688	B1 *	4/2008	Harris	.....	G06K	7/0021 235/380
D571,810	S *	6/2008	Ikeda	.....	D14	437
7,384,294	B2 *	6/2008	Washino	.....	G06K	7/0021 439/326
7,385,169	B2 *	6/2008	Saitou	.....	H04N	1/0318 250/208.1
7,416,132	B2 *	8/2008	Takiar	.....	G06K	13/0825 235/441
7,446,352	B2 *	11/2008	Becker	.....	H01L	27/092 257/206
7,469,420	B2 *	12/2008	Duffield	.....	H04N	7/1675 348/E5.004
7,485,501	B2 *	2/2009	Takiar	.....	H01L	21/561 438/127
D588,133	S *	3/2009	Nakamura	.....	D14	436
D588,134	S *	3/2009	Nakamura	.....	D14	436
7,508,942	B2 *	3/2009	Candelore	.....	H04N	7/1675 380/239
7,520,052	B2 *	4/2009	Takahashi	.....	H01L	21/561 29/841
7,530,495	B2 *	5/2009	Cooper	.....	G06K	19/06 235/380
7,552,876	B2 *	6/2009	Nishizawa	.....	G06K	19/07732 235/492
7,554,139	B2 *	6/2009	Inoue	.....	H01L	21/02381 257/288
7,559,469	B2 *	7/2009	Noda	.....	G06K	7/0021 235/441

(56)	References Cited				
	U.S. PATENT DOCUMENTS				
7,577,846	B2 *	8/2009	Kudelski	H04N 7/163	8,064,205 B2 * 11/2011 Farhan ..... H01R 27/00
				380/241	361/737
7,605,453	B2 *	10/2009	Stampka	G06K 19/07728	8,079,528 B2 * 12/2011 Song ..... G06K 19/07
				257/678	235/492
7,615,858	B2 *	11/2009	Eun	H01L 23/5387	8,093,502 B2 * 1/2012 Mikado ..... H05K 3/4691
				257/686	174/255
7,616,015	B2 *	11/2009	Lee	G01R 3/00	8,141,780 B2 * 3/2012 Lawson ..... G06K 7/083
				324/756.03	235/454
7,618,849	B2 *	11/2009	Khan	H01L 21/56	8,181,879 B2 * 5/2012 Landau ..... B65D 81/05
				257/675	235/487
7,630,203	B1 *	12/2009	Chen	G06K 19/077	8,226,013 B2 * 7/2012 Phillips ..... G06Q 20/3672
				235/492	235/486
7,647,641	B2 *	1/2010	Dubroecq	H04N 21/63345	D667,442 S * 9/2012 Phelan ..... D14/492
				726/27	D667,495 S * 9/2012 Bender ..... D19/10
7,659,606	B2 *	2/2010	Klatt	H05K 5/0269	8,256,667 B2 * 9/2012 Poznansky ..... G06K 19/12
				257/679	235/380
7,673,805	B2 *	3/2010	Onishi	G06K 19/07	D669,478 S * 10/2012 Lepp ..... D14/436
				235/486	D669,479 S * 10/2012 Lepp ..... D14/436
D615,506	S *	5/2010	Eide	D13/182	8,317,103 B1 * 11/2012 Foo ..... G06K 19/06187
7,728,422	B2 *	6/2010	Kim	H01L 23/49855	
				257/698	8,349,709 B2 * 1/2013 Inoue ..... G06F 30/398
7,745,943	B2 *	6/2010	Haba	H01L 23/3128	
				257/786	8,350,158 B2 * 1/2013 Chung ..... H05K 1/0216
7,750,464	B2 *	7/2010	Yoshikawa	H01L 23/5386	
				257/723	8,353,728 B2 * 1/2013 Wang ..... H01R 12/721
7,772,686	B2 *	8/2010	Ye	G11C 29/48	
				257/686	8,384,211 B2 * 2/2013 Soeno ..... H01L 23/473
7,784,693	B2 *	8/2010	Liao	G06K 19/077	
				235/451	D681,640 S * 5/2013 Aoki ..... D14/436
7,793,848	B2 *	9/2010	Abe	H01L 27/10	8,448,102 B2 * 5/2013 Kornachuk ..... G06F 30/39
				235/492	716/55
7,808,788	B2 *	10/2010	Gertiser	H05K 1/0206	8,449,783 B2 * 5/2013 Watanabe ..... B41J 2/1631
				361/709	216/27
7,810,718	B2 *	10/2010	Bonneau, Jr.	G06K 19/044	8,451,122 B2 * 5/2013 Narendra ..... H04B 1/3816
				235/380	340/572.1
7,828,207	B2 *	11/2010	Cooper	G06K 19/06	8,453,094 B2 * 5/2013 Kornachuk ..... H01L 23/498
				235/380	716/126
7,864,540	B2 *	1/2011	Takiar	H01L 24/97	8,456,850 B2 * 6/2013 Kang ..... G06K 19/07743
				361/737	361/737
7,871,007	B2 *	1/2011	Amiot	G06K 19/07745	8,456,852 B2 * 6/2013 Xiao ..... H05K 5/0282
				235/486	361/752
7,871,011	B2 *	1/2011	Reignoux	G06K 19/077	8,469,271 B2 * 6/2013 DePaula ..... G06K 19/07732
				235/492	235/435
7,872,979	B1 *	1/2011	Liu	H04L 12/40006	D685,375 S * 7/2013 Steinberger ..... D14/436
				370/246	D686,214 S * 7/2013 Maus ..... D14/436
7,880,286	B2 *	2/2011	Lee	H01L 23/3677	8,480,002 B2 * 7/2013 Poidomani ..... G06K 19/07722
				257/691	235/492
7,903,422	B2 *	3/2011	Watanabe	H05K 1/0207	8,490,127 B2 * 7/2013 Vantalou ..... H04N 21/6125
				361/719	725/31
7,913,916	B2 *	3/2011	Musial	G06K 19/07309	8,500,019 B2 * 8/2013 Poidomani ..... G06K 19/077
				235/492	235/449
7,922,097	B2 *	4/2011	Yoshikawa	H01Q 1/243	8,505,064 B2 * 8/2013 Hildebrand ..... H04N 21/64322
				235/492	725/152
7,925,016	B2 *	4/2011	Candelore	H04N 7/167	8,523,071 B2 * 9/2013 DePaula ..... G06K 19/041
				380/200	235/435
D638,810	S *	5/2011	Morikawa	D13/180	D691,101 S * 10/2013 Ishizawa ..... D13/182
7,944,058	B2 *	5/2011	Ishihara	H01L 25/0652	8,550,362 B2 * 10/2013 Cowcher ..... G06F 9/4406
				257/780	235/492
7,954,705	B2 *	6/2011	Mullen	G06Q 20/3674	8,582,308 B2 * 11/2013 Sugimoto ..... H05K 3/284
				235/380	361/737
7,967,214	B2 *	6/2011	Landau	G06K 19/077	8,588,561 B2 * 11/2013 Zbinden ..... H05K 7/20418
				235/492	385/14
D643,040	S *	8/2011	Sedio	D14/436	D695,636 S * 12/2013 Mullen ..... D10/10
8,009,432	B2 *	8/2011	Su	H05K 3/00	8,608,082 B2 * 12/2013 Le Garrec ..... G06K 19/07756
				361/752	235/492
8,022,526	B2 *	9/2011	Chall	G06F 1/3203	8,618,669 B2 * 12/2013 Furuta ..... H01L 23/5389
				257/686	257/777
8,030,746	B2 *	10/2011	Tan	G06K 19/07769	D699,201 S * 2/2014 Petsch ..... D13/182
				257/686	8,647,110 B2 * 2/2014 Choi ..... H01L 21/02
8,061,625	B2 *	11/2011	Yu	G06K 19/077	
				235/492	8,649,820 B2 * 2/2014 Schwandt ..... G06K 19/07732
					455/557
					8,654,535 B2 * 2/2014 Lin ..... G06K 19/07741
					361/737
					8,658,542 B2 * 2/2014 Smayling ..... H01L 21/027
					438/725

(56)

References Cited

U.S. PATENT DOCUMENTS

8,679,729	B2 *	3/2014	Lee	.....	G03F 1/38	430/319	2001/0043075	A1 *	11/2001	Suzuki	.....	G01R 1/07371
D701,864	S *	4/2014	Lepp	.....	D14/436		2001/0050846	A1 *	12/2001	Cho	.....	H05K 3/0052
D702,240	S *	4/2014	Lepp	.....	D14/436							361/784
D702,241	S *	4/2014	Lepp	.....	D14/436		2002/0003168	A1 *	1/2002	Takabayashi	.....	G06K 19/0723
D703,208	S *	4/2014	Lepp	.....	D14/436							235/492
8,684,267	B2 *	4/2014	Foo	.....	G06K 19/07722	235/449	2002/0045106	A1 *	4/2002	Baselmans	.....	G03F 1/36
8,690,283	B2 *	4/2014	Pomerantz	.....	B41J 3/407	347/14	2002/0137502	A1 *	9/2002	Cronin	.....	H04L 67/34
8,700,833	B2 *	4/2014	Cedar	.....	G06F 13/385	710/104	2002/0145049	A1 *	10/2002	Lasch	.....	B42D 25/369
8,707,237	B2 *	4/2014	Chen	.....	G06F 30/398	716/123	2002/0186542	A1 *	12/2002	Choi	.....	H01L 23/3677
8,730,009	B2 *	5/2014	Barry	.....	G06F 21/34	340/5.84	2003/0002577	A1 *	1/2003	Pinder	.....	H04N 21/4622
D707,682	S *	6/2014	Florek	.....	D14/436		2003/0057537	A1 *	3/2003	Iwasaki	.....	H01L 24/81
8,746,579	B1 *	6/2014	Cloutier	.....	G06K 19/06206	235/492	2003/0058311	A1 *	3/2003	Chen	.....	H05K 1/0266
8,794,520	B2 *	8/2014	Wang	.....	G06K 7/10752	235/454	2003/0059047	A1 *	3/2003	Iwamura	.....	H04N 21/440281
8,814,053	B2 *	8/2014	Narendra	.....	G06Q 20/204	235/492	2003/0085287	A1 *	5/2003	Gray	.....	G06K 19/072
8,826,086	B2 *	9/2014	Hook	.....	G11C 29/56016	714/718	2003/0091160	A1 *	5/2003	Enbom	.....	H04L 65/604
8,936,199	B2 *	1/2015	Lepp	.....	G06K 19/0772	235/492	2003/0099118	A1 *	5/2003	Saitoh	.....	G02B 6/0016
8,947,883	B2 *	2/2015	Upadhyayula	...	G06K 19/07735	361/737	2003/0132284	A1 *	7/2003	Reynolds	.....	G06Q 20/341
D727,861	S *	4/2015	Tang	.....	D13/182		2003/0153356	A1 *	8/2003	Liu	.....	G06K 7/10237
9,009,633	B2 *	4/2015	Wu	.....	G06F 30/398	716/53	2003/0163508	A1 *	8/2003	Goodman	.....	G06F 8/656
D729,808	S *	5/2015	Beals	.....	D14/436		2003/0169575	A1 *	9/2003	Ikuta	.....	H01L 23/5389
D730,304	S *	5/2015	Matsumoto	.....	D13/182		2003/0179910	A1 *	9/2003	Wong	.....	G07C 9/257
9,047,547	B2 *	6/2015	Okada	.....	G06K 19/07743		2003/0194091	A1 *	10/2003	Wajs	.....	H04L 9/0833
9,049,811	B2 *	6/2015	Subat	.....	H05K 7/20445		2003/0213849	A1 *	11/2003	Luu	.....	G06K 19/07739
9,054,094	B2 *	6/2015	Anthony	.....	H01L 23/49827		2003/0224553	A1 *	12/2003	Manansala	.....	H01L 23/4985
9,064,195	B2 *	6/2015	Hartwick	.....	B32B 27/06		2004/0001591	A1 *	1/2004	Mani	.....	H04N 21/4147
9,101,048	B2 *	8/2015	Nakanishi	.....	H05K 1/0201		2004/0009409	A1 *	1/2004	Hwang	.....	G03F 1/36
9,136,212	B2 *	9/2015	Kato	.....	H01L 23/49822		2004/0016804	A1 *	1/2004	Namaky	.....	G07C 5/0816
9,170,482	B2 *	10/2015	Landis	.....	G03F 1/36		2004/0066693	A1 *	4/2004	Osako	.....	H05K 3/284
9,197,218	B2 *	11/2015	Kondo	.....	H03L 1/04		2004/0096911	A1 *	5/2004	Siniaguine	.....	G01N 21/21
9,258,897	B2 *	2/2016	Ishihara	.....	H05K 1/183		2004/0111693	A1 *	6/2004	Lin	.....	G06F 30/398
9,265,148	B2 *	2/2016	Lassmann	.....	H05K 1/115		2004/0124246	A1 *	7/2004	Allen	.....	G07F 7/1008
9,291,889	B2 *	3/2016	Yoshioka	.....	G03F 1/38		2004/0129785	A1 *	7/2004	Luu	.....	G06K 7/0034
D754,083	S *	4/2016	Vinciarelli	.....	D13/182		2004/0133787	A1 *	7/2004	Doughty	.....	G06Q 20/4014
9,330,992	B2 *	5/2016	Nakagawa	.....	H01L 23/49838		2004/0135645	A1 *	7/2004	Koyama	.....	H03H 9/1014
D758,372	S *	6/2016	Beals	.....	D14/436		2004/0139412	A1 *	7/2004	Ito	.....	G06F 30/39
D759,022	S *	6/2016	Beals	.....	D14/436		2004/0143716	A1 *	7/2004	Hong	.....	G06F 13/385
9,455,517	B2 *	9/2016	Babu	.....	H01R 24/64		2004/0152392	A1 *	8/2004	Nakamura	.....	H01L 51/5246
D780,184	S *	2/2017	Beals	.....	D14/436		2004/0155715	A1 *	8/2004	Nakamura	.....	H03B 5/04
D792,411	S *	7/2017	Beals	.....	D14/436		2004/0171192	A1 *	9/2004	Morimura	.....	G06K 19/077
9,769,521	B2 *	9/2017	Beals	.....	H04N 21/44004		2004/0181800	A1 *	9/2004	Rakib	.....	H04L 9/0894
9,774,908	B2 *	9/2017	Beals	.....	H04N 21/44004							725/25
D810,195	S *	2/2018	Yoo	.....	D19/9							
9,888,283	B2 *	2/2018	Beals	.....	H04N 21/4367							
10,070,176	B2 *	9/2018	Beals	.....	H04N 21/4367							
D840,404	S *	2/2019	Beals	.....	D14/436							
10,382,816	B2 *	8/2019	Beals	.....	H04N 21/4181							
D864,968	S *	10/2019	Beals	.....	D14/436							
10,670,176	B2 *	6/2020	Byrne	.....	F04B 11/0008							
D930,000	S *	9/2021	Yang	.....	D14/436							
D930,001	S *	9/2021	Yang	.....	D14/437							
2001/0011944	A1 *	8/2001	Garrido-Gadea	....	G06Q 20/341	340/5.86	2001/0043075	A1 *	11/2001	Suzuki	.....	G01R 1/07371
2001/0011962	A1 *	8/2001	Fletout	.....	G06K 19/07745	343/767	2001/0050846	A1 *	12/2001	Cho	.....	H05K 3/0052
2001/0012366	A1 *	8/2001	Van Rijnsoever	.....	H04N 21/4623	380/241	2002/0003168	A1 *	1/2002	Takabayashi	.....	G06K 19/0723
2001/0018984	A1 *	9/2001	Takeda	.....	G06K 19/07739	174/256	2002/0045106	A1 *	4/2002	Baselmans	.....	G03F 1/36





(56)

## References Cited

## U.S. PATENT DOCUMENTS

2008/0099559	A1 *	5/2008	Lo	.....	G06K 19/07769	235/441	2009/0244858	A1 *	10/2009	Di Sirio	.....	G06K 19/07743	361/748
2008/0111254	A1 *	5/2008	Park	.....	H01L 21/486	257/786	2009/0273100	A1 *	11/2009	Aton	.....	H01L 27/0207	257/786
2008/0122894	A1 *	5/2008	Lee	.....	B41J 2/14201	347/47	2009/0275170	A1 *	11/2009	Chen	.....	G02B 26/0841	438/106
2008/0135626	A1 *	6/2008	Reignoux	.....	G06K 13/067	235/492	2009/0279243	A1 *	11/2009	Amidi	.....	G11C 5/04	361/679.31
2008/0164893	A1 *	7/2008	Lee	.....	G01R 1/07342	324/754.07	2010/0006322	A1 *	1/2010	Cheng	.....	G06K 19/077	174/250
2008/0165962	A1 *	7/2008	Kawano	.....	H04N 21/4405	380/212	2010/0019038	A1 *	1/2010	Puente Baliarda	.....	H01Q 9/42	235/439
2008/0174408	A1 *	7/2008	Takahashi	.....	H04B 5/0037	340/10.3	2010/0025480	A1 *	2/2010	Nishizawa	.....	G06K 19/077	235/492
2008/0186337	A1 *	8/2008	Hammond	.....	B41J 2/17546	347/6	2010/0072284	A1 *	3/2010	Nishizawa	.....	G06K 19/07	235/492
2008/0211074	A1 *	9/2008	Osako	.....	B29C 45/14655	257/679	2010/0085338	A1 *	4/2010	Miguchi	.....	G02F 1/133609	345/207
2008/0211302	A1 *	9/2008	Hirota	.....	B25J 13/02	307/1	2010/0109141	A1 *	5/2010	Nishiyama	.....	H01L 24/49	257/690
2008/0223937	A1 *	9/2008	Preta	.....	G06F 21/34	235/492	2010/0117800	A1 *	5/2010	Li	.....	G06K 19/077	340/10.1
2008/0228973	A1 *	9/2008	Lee	.....	G06K 7/10297	710/105	2010/0124344	A1 *	5/2010	Mizutani	.....	H04R 1/04	381/190
2008/0257967	A1 *	10/2008	Nishizawa	.....	G06K 19/07739	235/492	2010/0136816	A1 *	6/2010	Ahn	.....	G06K 7/0021	439/331
2008/0257968	A1 *	10/2008	Nishizawa	.....	G11C 5/066	235/492	2010/0138857	A1 *	6/2010	Gondkar	.....	H04N 21/26609	725/31
2008/0279379	A1 *	11/2008	Muijen	.....	H04N 7/1675	380/228	2010/0165581	A1 *	7/2010	Ziglioli	.....	B81B 7/007	361/730
2008/0314983	A1 *	12/2008	Capurso	.....	G06K 19/077	235/441	2010/0165589	A1 *	7/2010	Zhou	.....	H04B 1/3816	361/759
2009/0011538	A1 *	1/2009	Masumoto	.....	H01L 21/67144	438/106	2010/0169940	A1 *	7/2010	Howarter	.....	H04N 7/106	725/80
2009/0032593	A1 *	2/2009	Ljungcrantz	.....	G06K 19/07743	235/441	2010/0172112	A1 *	7/2010	Okada	.....	H05K 1/0246	361/782
2009/0040695	A1 *	2/2009	Fidalgo	.....	G06K 19/077	361/679.31	2010/0176207	A1 *	7/2010	Yoshikawa	.....	H01Q 1/243	235/492
2009/0057417	A1 *	3/2009	Shinohara	.....	G11C 5/14	235/492	2010/0191976	A1 *	7/2010	Chu	.....	G06F 21/10	713/176
2009/0066350	A1 *	3/2009	Lee	.....	G01R 31/3025	324/754.07	2010/0205439	A1 *	8/2010	Chu	.....	H04L 9/3273	713/169
2009/0090785	A1 *	4/2009	Ariyoshi	.....	G06Q 20/355	235/494	2010/0272257	A1 *	10/2010	Beals	.....	H04N 21/4623	380/216
2009/0101933	A1 *	4/2009	Takao	.....	H01L 33/62	257/99	2010/0318627	A1 *	12/2010	Edwards	.....	G08B 25/08	709/217
2009/0108993	A1 *	4/2009	Forster	.....	G06K 19/0739	340/10.1	2010/0327467	A1 *	12/2010	Hirabayashi	.....	G06F 30/394	257/786
2009/0131028	A1 *	5/2009	Horodezky	.....	G06Q 10/10	455/418	2011/0003493	A1 *	1/2011	Mo	.....	H01R 27/00	439/81
2009/0140415	A1 *	6/2009	Furuta	.....	H01L 23/49833	257/700	2011/0010734	A1 *	1/2011	Newell	.....	H04N 21/4181	725/31
2009/0144456	A1 *	6/2009	Gelt	.....	G06F 13/4022	710/8	2011/0012960	A1 *	1/2011	Sakuma	.....	B41J 2/14129	347/44
2009/0153622	A1 *	6/2009	Guan	.....	B41J 2/1632	347/59	2011/0028184	A1 *	2/2011	Cooper	.....	G07F 7/025	455/556.1
2009/0155953	A1 *	6/2009	Saeki	.....	H01L 24/75	438/106	2011/0042125	A1 *	2/2011	Lee	.....	H01B 1/02	174/250
2009/0156254	A1 *	6/2009	Montes	.....	H04M 1/0202	455/558	2011/0063066	A1 *	3/2011	Choi	.....	H01F 27/2804	336/200
2009/0166894	A1 *	7/2009	Azumai	.....	H01L 27/0248	257/786	2011/0076867	A1 *	3/2011	Achsaf	.....	G06K 19/077	439/131
2009/0168322	A1 *	7/2009	Okada	.....	H05K 1/181	361/679.32	2011/0138088	A1 *	6/2011	Sirio	.....	G06Q 20/3563	710/106
2009/0181314	A1 *	7/2009	Shyu	.....	G03F 1/80	430/5	2011/0161583	A1 *	6/2011	Youn	.....	H01L 25/0657	711/115
2009/0199283	A1 *	8/2009	Jain	.....	G06K 19/07773	726/7	2011/0182040	A1 *	7/2011	Ellul	.....	G06K 19/07733	361/737
2009/0228853	A1 *	9/2009	Hong	.....	G06F 30/39	716/119	2011/0205412	A1 *	8/2011	Miyazaki	.....	H01L 27/14621	348/294
2009/0232384	A1 *	9/2009	Tu	.....	G03F 1/84	382/144	2011/0221014	A1 *	9/2011	Nakatani	.....	G01L 9/0054	257/417
							2011/0259966	A1 *	10/2011	Phillips	.....	G06K 19/07762	235/492
							2011/0315779	A1 *	12/2011	Bidin	.....	H01L 23/49855	235/492

(56)

References Cited

U.S. PATENT DOCUMENTS

2012/0007096	A1*	1/2012	Yamazaki .....	G06K 19/0728 257/72	2013/0287267	A1*	10/2013	Varone .....	G06K 19/145 382/115
2012/0018522	A1*	1/2012	Le Garrec .....	G06K 19/07749 235/492	2013/0320088	A1*	12/2013	Lin .....	G06K 7/10336 235/441
2012/0048948	A1*	3/2012	Bertin .....	G06K 19/07743 235/492	2013/0334320	A1*	12/2013	Thill .....	G06K 19/073 235/492
2012/0079692	A1*	4/2012	Sinha .....	H03H 9/205 29/25.35	2014/0021264	A1*	1/2014	Pueschner .....	H01L 23/49811 235/492
2012/0138690	A1*	6/2012	Bosquet .....	G06K 19/07745 235/492	2014/0042230	A1*	2/2014	Pueschner .....	H01Q 23/00 235/492
2012/0140420	A1*	6/2012	Soyano .....	H01L 23/3736 361/715	2014/0061316	A1*	3/2014	Narayanaswami .....	G06K 19/06075 235/492
2012/0168517	A1*	7/2012	Lee .....	H01Q 1/243 235/492	2014/0158340	A1*	6/2014	Dixler .....	F28D 20/02 165/287
2012/0193435	A1*	8/2012	Hanaoka .....	H01Q 9/0407 235/492	2014/0166759	A1*	6/2014	Liu .....	G06K 7/1098 235/462.21
2012/0200366	A1*	8/2012	Nishiyama .....	H03H 9/13 331/158	2014/0193988	A1*	7/2014	Ma .....	H05K 7/00 439/83
2012/0231650	A1*	9/2012	Tian .....	G06K 7/0021 439/374	2014/0253767	A1*	9/2014	Kato .....	H01L 27/14621 348/280
2012/0248201	A1*	10/2012	Sutera .....	G06K 19/07728 235/492	2014/0256069	A1*	9/2014	Kishimoto .....	B41J 2/1628 438/21
2012/0267438	A1*	10/2012	Kato .....	G06K 19/07756 235/492	2014/0264029	A1*	9/2014	Tomioaka .....	G01J 3/42 250/338.3
2012/0289196	A1*	11/2012	Tan .....	G06K 19/07739 455/411	2014/0282685	A1*	9/2014	Beals .....	H04N 21/835 725/31
2012/0292395	A1*	11/2012	Huang .....	G07F 7/1008 235/492	2014/0292941	A1*	10/2014	Kobayashi .....	B41J 2/1634 347/68
2012/0299444	A1*	11/2012	Yokoyama .....	H03H 9/13 310/326	2014/0299667	A1*	10/2014	Baek .....	G06K 19/07771 235/492
2013/0008968	A1*	1/2013	Launay .....	G06K 19/073 235/492	2014/0304445	A1*	10/2014	Gervasi .....	G06F 13/4068 710/301
2013/0015441	A1*	1/2013	Takayama .....	G06K 19/077 257/49	2014/0313261	A1*	10/2014	Nagai .....	B41J 2/1404 347/40
2013/0099118	A1*	4/2013	Tomioaka .....	G01J 3/42 250/332	2014/0328023	A1*	11/2014	Choi .....	H01L 23/552 361/715
2013/0112757	A1*	5/2013	Lee .....	G06K 19/07707 235/492	2015/0016607	A1*	1/2015	Beals .....	H04N 21/4367 380/211
2013/0126622	A1*	5/2013	Finn .....	G06K 19/07794 235/492	2015/0049142	A1*	2/2015	Hager .....	B41J 2/1404 347/60
2013/0134227	A1*	5/2013	De Maquille ....	G06K 19/07784 235/492	2015/0092357	A1*	4/2015	Yoshikawa .....	H05K 3/4007 361/746
2013/0161390	A1*	6/2013	Rodriquez .....	G06K 19/07743 235/441	2015/0113585	A1*	4/2015	Beals .....	H04N 21/4367 725/119
2013/0168454	A1*	7/2013	Oh .....	B42D 15/022 235/492	2015/0143105	A1*	5/2015	Perrine .....	H04N 21/64715 713/153
2013/0175346	A1*	7/2013	Jenni .....	G06K 19/077 235/492	2015/0147914	A1*	5/2015	Gao .....	H01R 12/716 439/638
2013/0185566	A1*	7/2013	Pang .....	H04W 12/106 713/180	2015/0178584	A1*	6/2015	Aller .....	G06K 9/62 382/165
2013/0193534	A1*	8/2013	Nakatani .....	G01L 1/148 257/417	2015/0320506	A1*	11/2015	Sayles .....	A61B 90/98 235/385
2013/0207781	A1*	8/2013	Pagani .....	G06K 19/025 340/10.1	2015/0366061	A1*	12/2015	Noda .....	H05K 3/4697 361/803
2013/0219097	A1*	8/2013	Wang .....	G06F 1/185 710/301	2016/0132761	A1*	5/2016	Hanmer .....	G06K 19/0716 235/492
2013/0222484	A1*	8/2013	Yokoyama .....	B41J 2/1628 347/70	2016/0140433	A1*	5/2016	Padilla Alcaide ....	H01L 23/544 235/492
2013/0254445	A1*	9/2013	Burns .....	H05K 5/0265 710/301	2016/0157346	A1*	6/2016	Wu .....	H05K 1/112 174/251
2013/0277434	A1*	10/2013	Lin .....	G06F 21/77 235/492	2016/0165731	A1*	6/2016	Hurwitz .....	H05K 1/09 361/761
2013/0286603	A1*	10/2013	Okada .....	G11C 5/02 361/746	2016/0241287	A1*	8/2016	Stein .....	H04B 1/3818
					2018/0204105	A1*	7/2018	Herslow .....	G06K 19/07722

\* cited by examiner

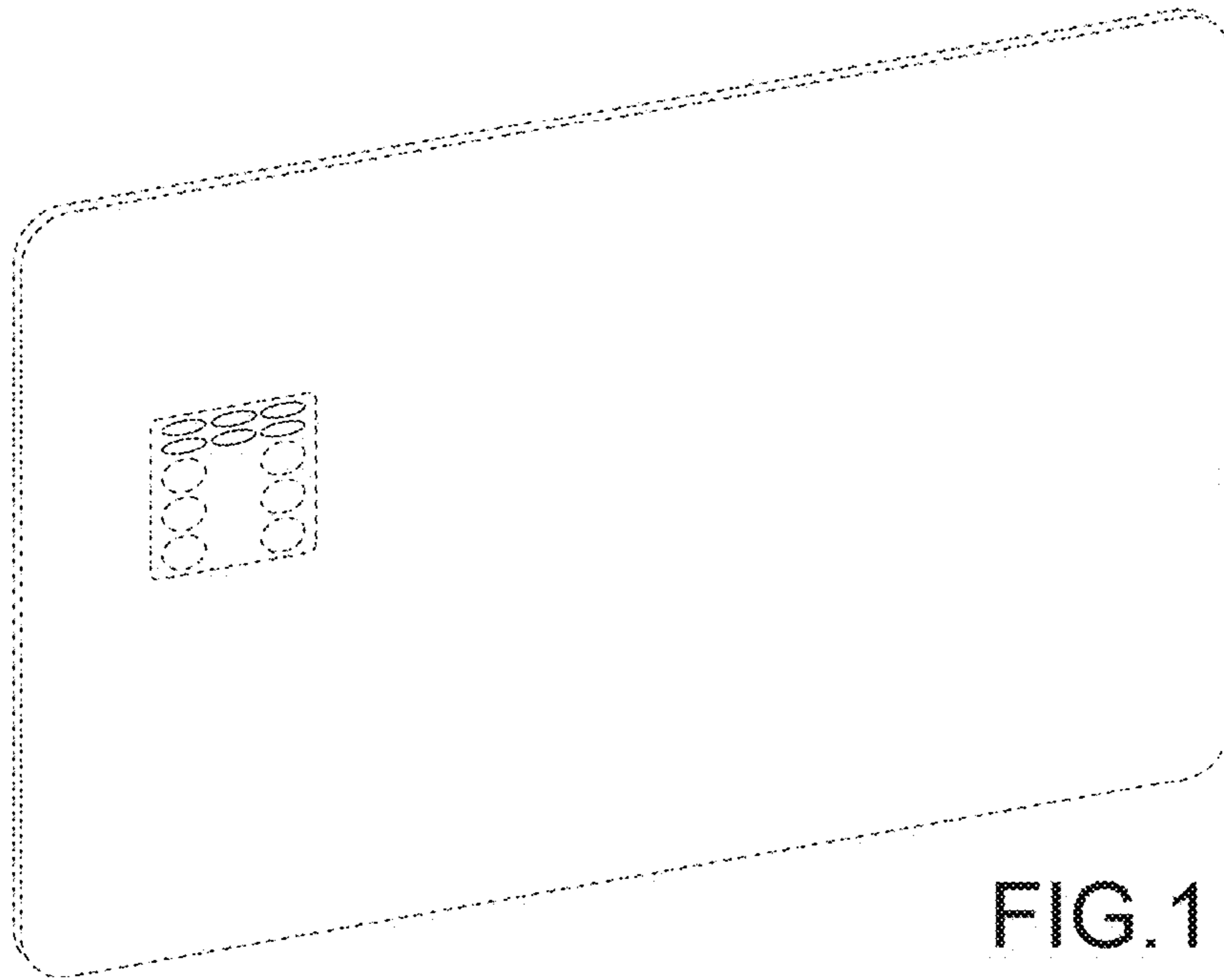


FIG.1

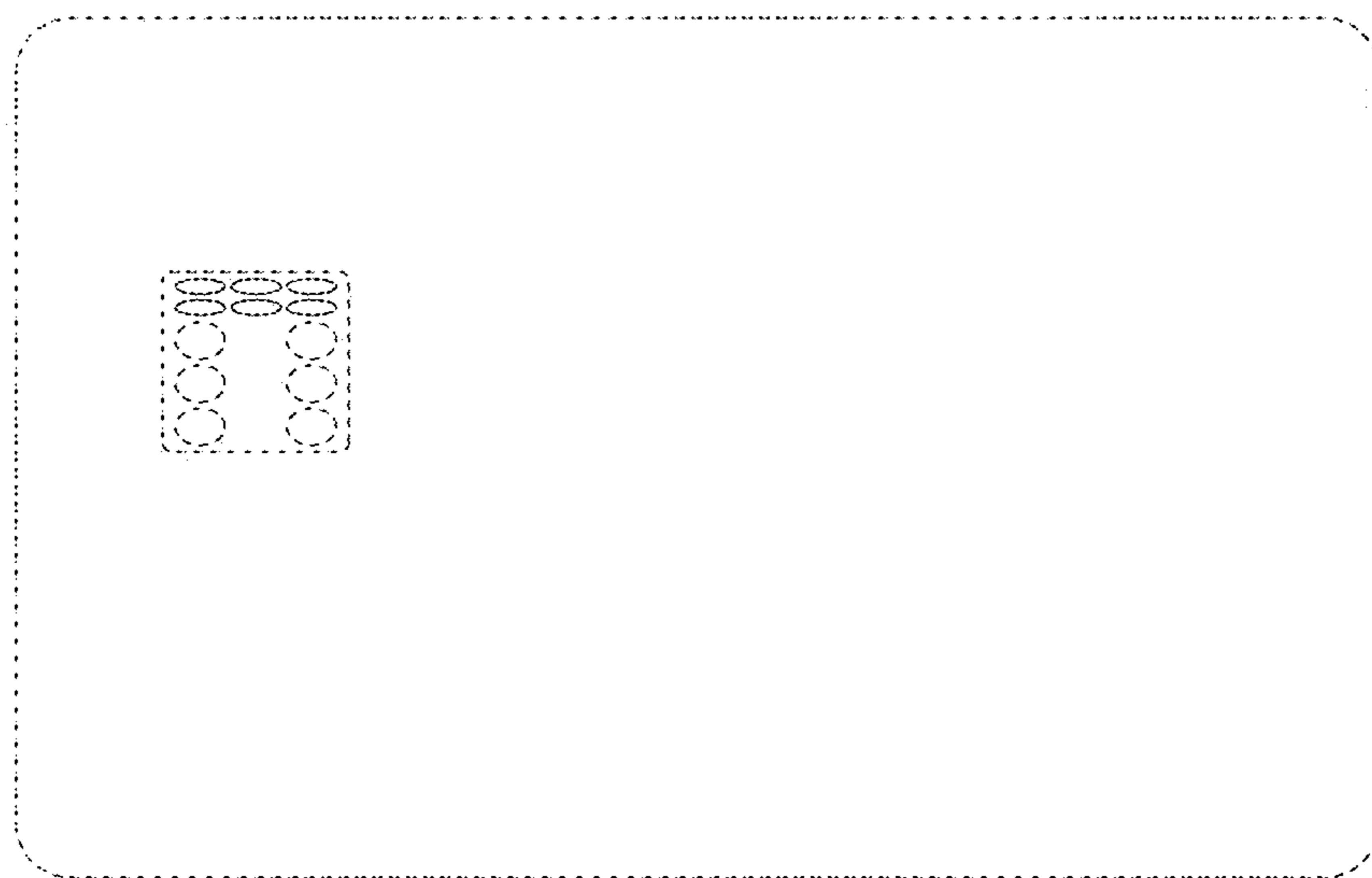


FIG.2

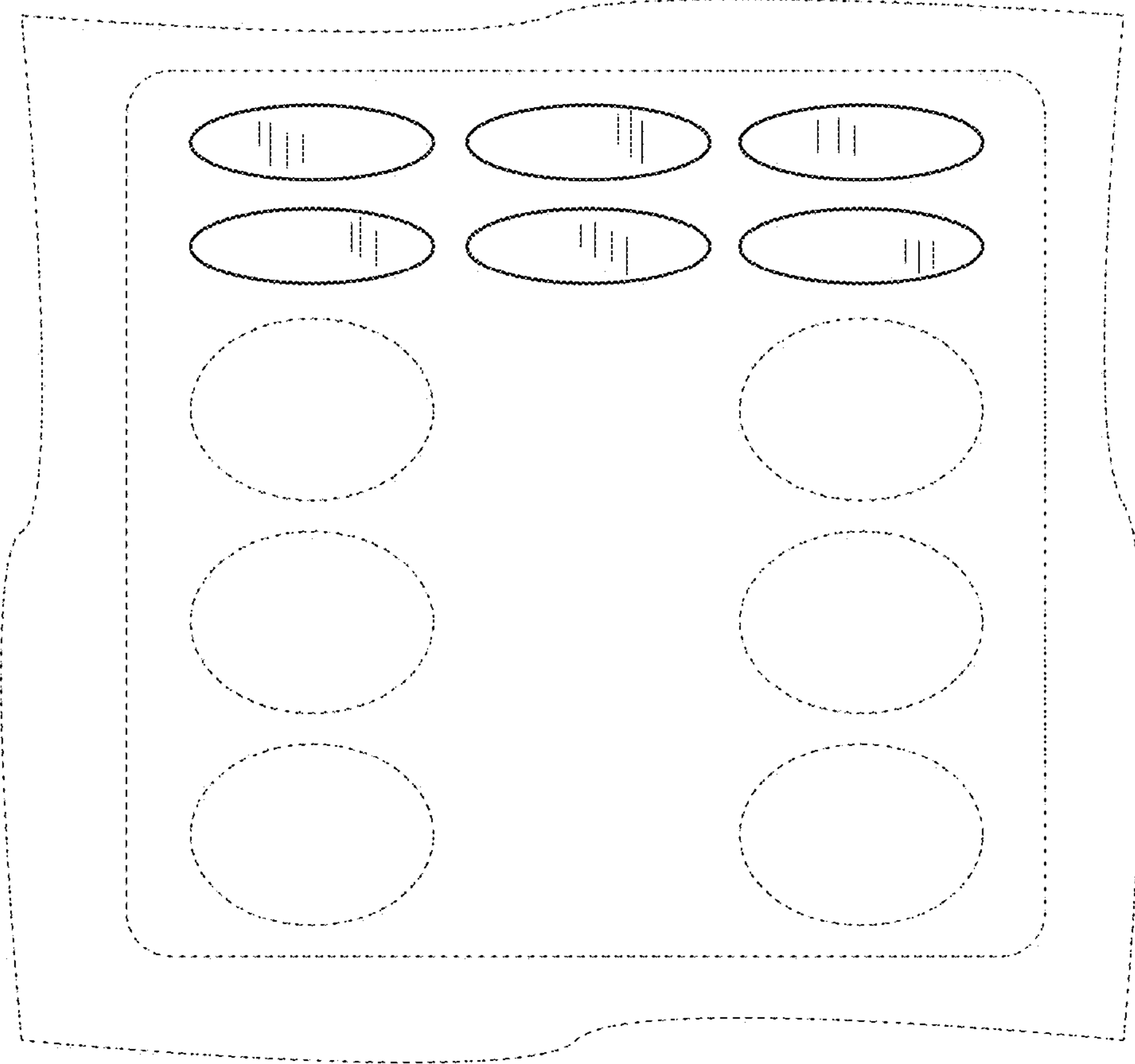


FIG.3