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(54) **COMMAND INTERFACE USING FINGERPRINT SENSOR INPUT SYSTEM**

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G06F 7/04 (2006.01)

(52) **U.S. Cl.** **340/5.82**; 340/5.81; 382/124; 382/312

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,493,855	A	2/1970	Norwich	324/61
3,641,431	A	2/1972	Pigage et al.	324/61 R
3,781,855	A	12/1973	Killen	340/146.3 E
3,873,927	A	3/1975	Overall	328/4
3,967,310	A	6/1976	Horiuchi et al.	357/54
4,016,490	A	4/1977	Weckenmann et al.	324/61 R
4,096,758	A	6/1978	Moore	73/718
4,161,743	A	7/1979	Yonezawa et al.	357/54
4,183,060	A	1/1980	Barnette et al.	358/128
4,310,827	A *	1/1982	Asai	382/125
4,353,056	A	10/1982	Tsikos	340/146.3 E
4,394,773	A	7/1983	Ruell	382/4
4,428,670	A	1/1984	Ruell et al.	356/71
4,429,413	A	1/1984	Edwards	382/4
4,513,298	A	4/1985	Scheu	346/140 R
4,547,898	A	10/1985	Tsikos	382/4
4,571,543	A	2/1986	Raymond et al.	324/425
4,577,345	A *	3/1986	Abramov	340/5.82

(Continued)

FOREIGN PATENT DOCUMENTS

EP 0 226 082 A1 6/1987

(Continued)

OTHER PUBLICATIONS

Wolffenbuttel et al., "Integrated Tactile Imager With An Intrinsic Contour Detection Option," *Sensors and Actuators*, 16:141-153, 1989.

(Continued)

Primary Examiner—Van T. Trieu

(57) **ABSTRACT**

A substrate having a fingerprint sensing system usable as a command interface using finger movements. A user's fingerprint pattern is recognized and compared to previously stored reference patterns. If the fingerprint pattern matches a previously stored pattern, the user is then permitted to enter certain commands via the same interface system. For example, in the case of an automobile, a user may identify themselves with their fingerprint, and then perform such functions as unlocking the doors, setting the seat to a selected location, or even pre-starting the car prior to their entering the automobile. The very same devices which perform the fingerprint identification and sensing are also used for the input sensing and command recognition to perform the various commands. A user is thus able to securely control desired functions in an automobile, while being assured that an unauthorized user will not have access to the automobile, even as they were able to obtain the command interface device.

31 Claims, 5 Drawing Sheets
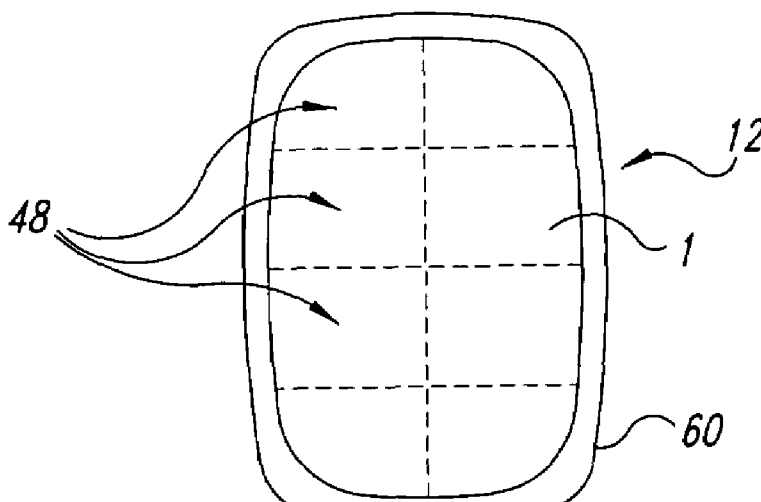
U.S. PATENT DOCUMENTS

4,626,774	A	12/1986	Regtien .... 324/61 R
4,641,350	A	2/1987	Bunn 382/4
4,656,871	A	4/1987	Czarnocki 73/724
4,686,531	A	8/1987	Shambroom et al. .. 340/870.37
4,763,063	A	8/1988	Shkedi .... 324/60 CD
4,814,691	A	3/1989	Garbini et al. .... 324/61 R
4,935,207	A	6/1990	Stanbro et al. 422/68.1
4,958,129	A	9/1990	Poduje et al. 324/661
5,028,876	A	7/1991	Cadwell 324/678
5,325,442	A	6/1994	Knapp 382/4
5,373,181	A	12/1994	Scheiter et al. 257/415
5,430,381	A	7/1995	Dower 324/452
5,467,022	A	11/1995	Aoki et al. 324/661
5,493,621	A	2/1996	Matsumura 382/125
5,530,581	A	6/1996	Cogan 359/265
5,613,014	A	3/1997	Eshera et al. 382/124
5,668,929	A *	9/1997	Foster, Jr. 340/5.52
5,767,686	A	6/1998	Kespohl 324/662
5,778,089	A	7/1998	Borza 382/124
5,825,907	A	10/1998	Russo 382/124
5,828,773	A	10/1998	Setlak et al. 382/126
5,841,888	A	11/1998	Setlak et al. 382/124
5,844,415	A	12/1998	Gershenfeld et al. 324/663
5,845,005	A	12/1998	Setlak et al. 382/124
5,852,670	A	12/1998	Setlak et al. 382/126
5,862,248	A	1/1999	Salatino et al. 382/124
5,869,791	A	2/1999	Young 178/20.01
5,869,822	A *	2/1999	Meadows, II et al. 235/380
5,903,225	A	5/1999	Schmitt et al. 340/825.31
5,920,640	A	7/1999	Salatino et al. 382/124
5,936,412	A	8/1999	Gershenfeld et al. 324/663
5,953,441	A	9/1999	Setlak 382/124
5,963,679	A *	10/1999	Setlak 382/124
5,973,623	A	10/1999	Gupta et al. 341/33
6,011,859	A	1/2000	Kalnitsky et al. 382/124
6,025,726	A	2/2000	Gershenfeld et al. 324/671
6,051,981	A	4/2000	Gershenfeld et al. 324/663
6,066,954	A	5/2000	Gershenfeld et al. 324/671
6,088,471	A	7/2000	Setlak et al. 382/124
6,091,082	A	7/2000	Thomas et al. 257/77
6,114,862	A	9/2000	Tartagni et al. 324/662
6,125,192	A *	9/2000	Bjorn et al. 340/5.83
6,191,593	B1	2/2001	Tartagni et al. 324/687
6,236,741	B1	5/2001	Kovacs-Vajna 382/125
6,420,169	B1*	7/2002	Read et al. 435/289.1
6,610,482	B1*	8/2003	Fodor et al. 435/6
6,919,211	B1*	7/2005	Fodor et al. 436/518

FOREIGN PATENT DOCUMENTS

EP	0 397 244	A2	11/1990
EP	0 397 244	A3	11/1990
EP	0 397 244	B1	11/1990
EP	0 454 883	B1	11/1991
EP	0 455 070	B1	11/1991
EP	0 710 593	A1	5/1996
EP	0 779 497	A2	6/1997
EP	0 779 497	A3	6/1997
EP	0 786 745	A2	7/1997
EP	0 786 745	A3	7/1997
EP	0 790 479	A1	8/1997
EP	0 791 899	A2	8/1997
EP	0 791 899	A3	8/1997
GB	2279756	A	1/1995
GB	2279757	A	1/1995
GB	2312514	A	10/1997
WO	WO 97/40744		11/1997
WO	WO 98/49691		11/1998
WO	WO 99/28701		6/1999

OTHER PUBLICATIONS

Sarma et al., "Capacitance-Type Blade-Tip Clearance Measurement System Using a Dual Amplifier with Ramp/DC Inputs and Integration," *IEEE Transactions on Instrumentation and Measurement* 41(5):674-678, Oct. 1992.

Young et al., "Novel Fingerprint Scanning Arrays Using Polysilicon TFT's on Glass and Polymer Substrates," *IEEE Electron Device Letters,* 8(1):19-20, 1997.

Tartagni et al., "A 390dpi Live Fingerprint Imager Based on Feedback Capacitive Sensing Scheme," *IEEE International Solid-State Circuits Conference,* Feb. 7, 1997, 5 pp.
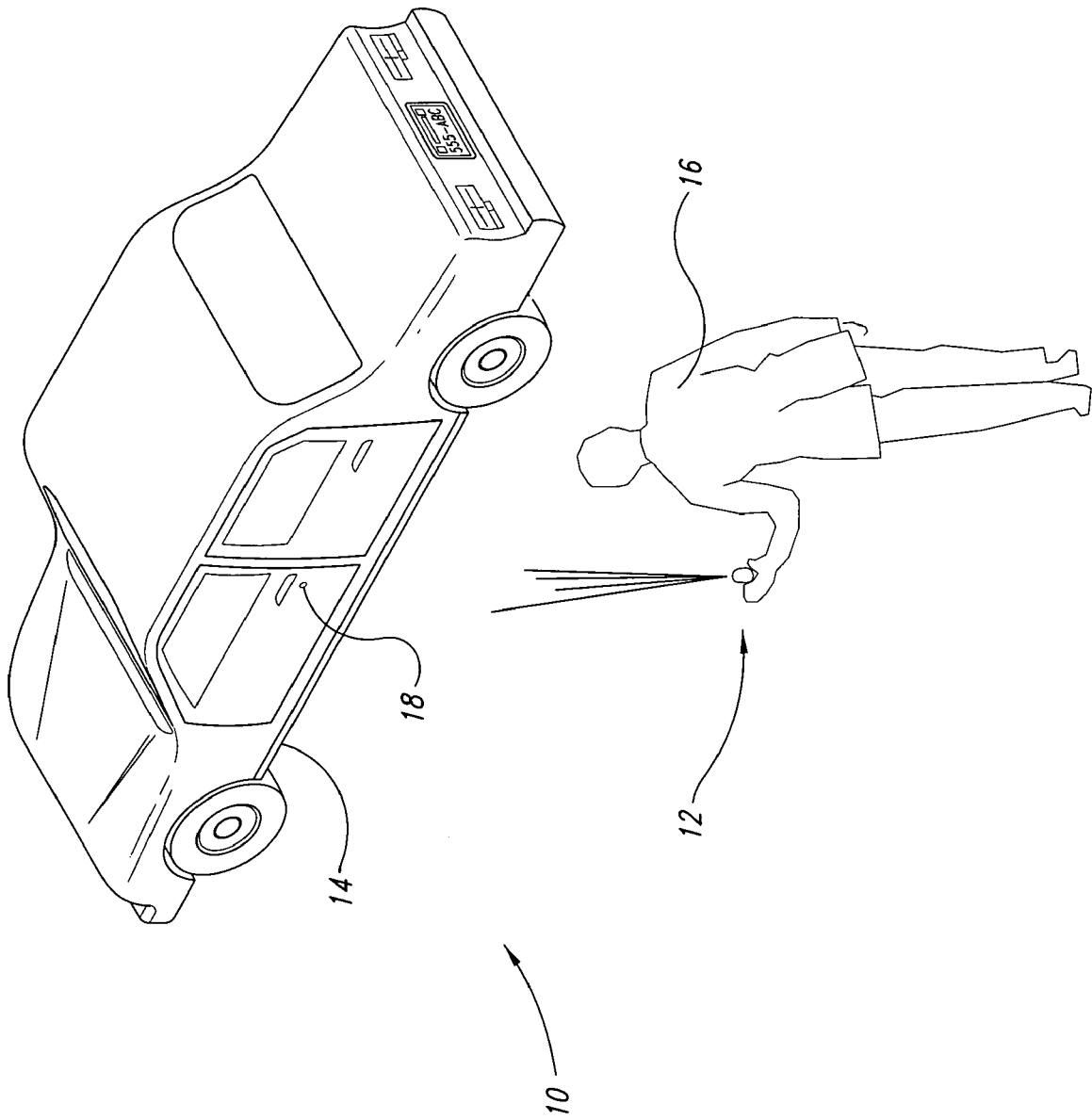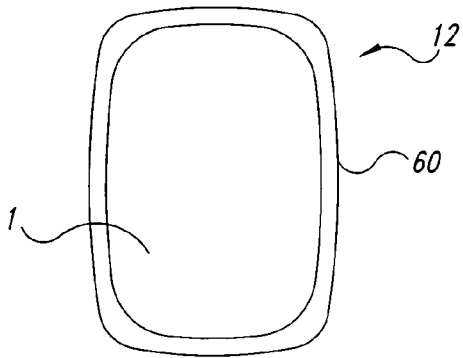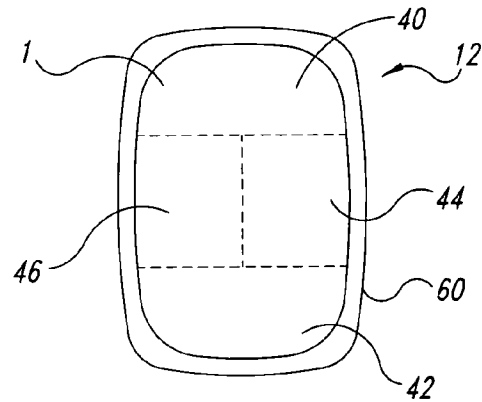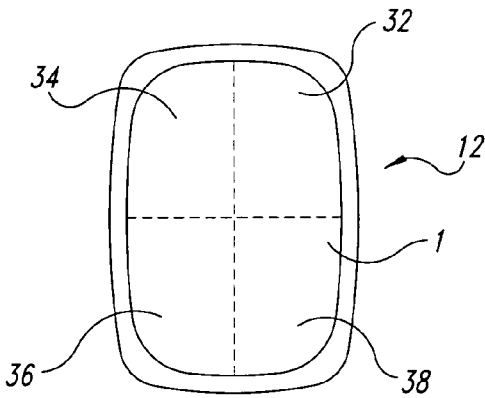
* cited by examiner

Fig. 1

Fig. 2A

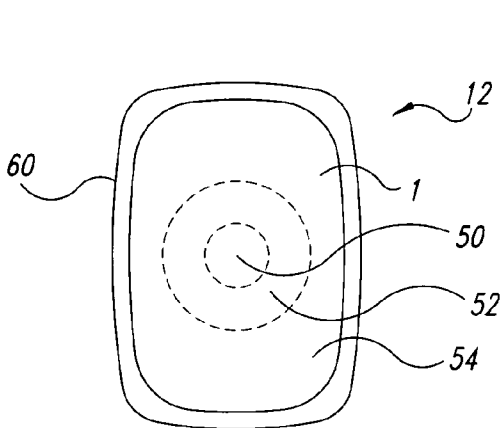*Fig. 2B*

Fig. 2C

Fig. 2D
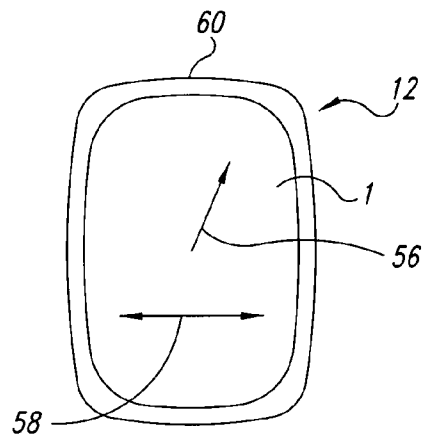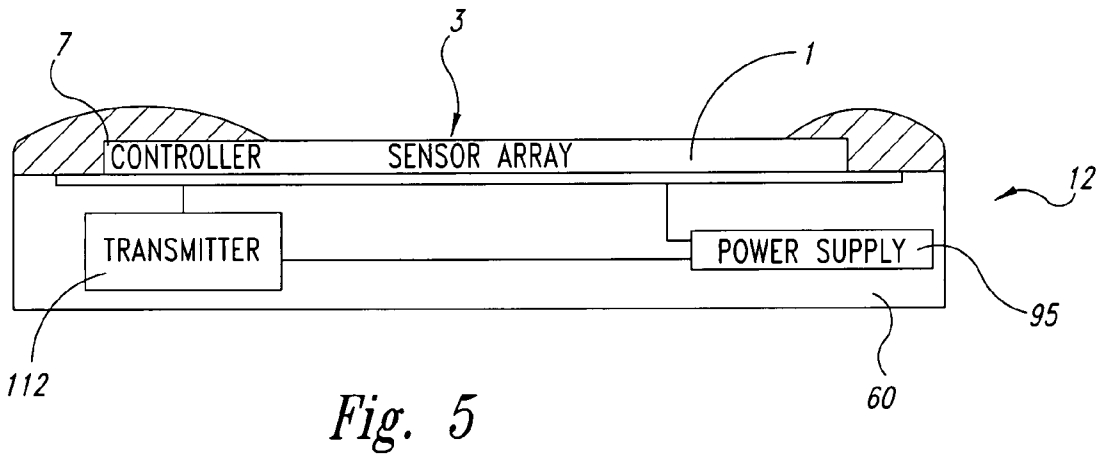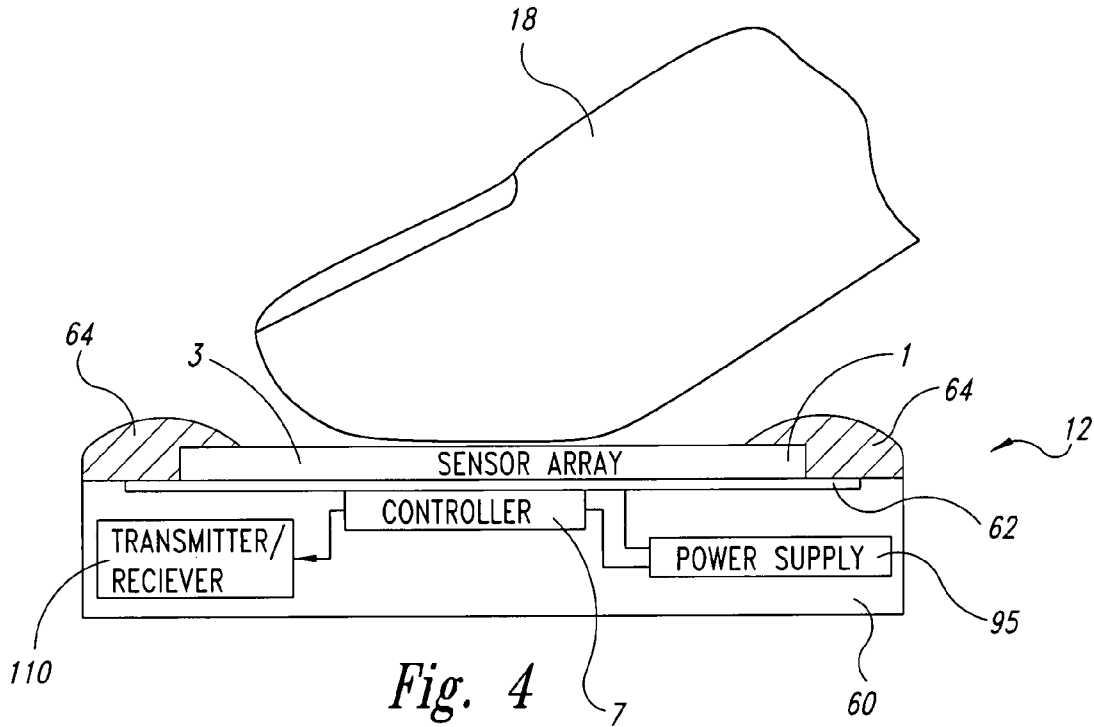
Fig. 2E

Fig. 3

Fig. 4

Fig. 5
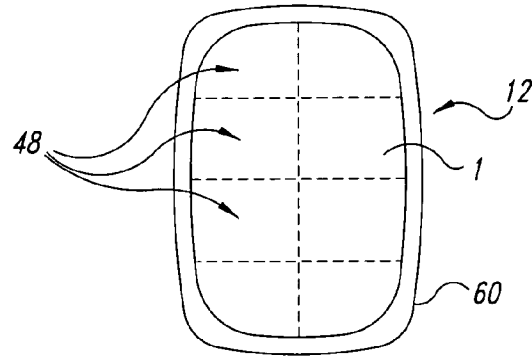
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