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(54) **SURFACE DISPLAY ASSEMBLIES**

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(52) **U.S. Cl.**
CPC ***G06F 3/041*** (2013.01); ***G06F 3/045*** (2013.01); *G06F 2203/04103* (2013.01)

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CPC G06F 2203/04103; G06F 3/042; G06F 3/041; G06F 3/045; G06F 1/1601; G06F 1/1626; G06F 1/1637; G06F 2200/1612; G06F 2001/133331
USPC 345/173
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,534,888 A 7/1996 Lebby et al.
5,661,635 A 8/1997 Huffman et al.
5,847,698 A 12/1998 Reavey et al.
6,065,076 A 5/2000 Sorenson
6,229,502 B1 5/2001 Schwab
6,642,909 B1 11/2003 Oliva
6,930,881 B2 8/2005 Karidis et al.
7,142,195 B2 11/2006 Northway et al.
7,748,634 B1 7/2010 Zehr et al.
7,864,517 B2 1/2011 Miller et al.
8,018,431 B1 9/2011 Zehr et al.
2001/0024194 A1* 9/2001 Shigetaka G06F 3/044 345/173
2003/0026068 A1 2/2003 Tsai et al.
2004/0049743 A1 3/2004 Bogward
2004/0207568 A1 10/2004 Ooshima et al.
2006/0104012 A1 5/2006 Hsieh et al.
2006/0119615 A1 6/2006 Zhou et al.
2006/0197750 A1* 9/2006 Kerr G06F 1/1626 345/173
2006/0209039 A1* 9/2006 Destura G06F 3/0412 345/173
2007/0182663 A1 8/2007 Biech
2008/0062148 A1* 3/2008 Hotelling et al. 345/174
2009/0085894 A1* 4/2009 Gandhi et al. 345/175
2009/0273573 A1* 11/2009 Hotelling G06F 3/0362 345/173
2010/0033443 A1* 2/2010 Hashimoto 345/173
2010/0214247 A1* 8/2010 Tang et al. 345/173
2010/0245209 A1 9/2010 Miller et al.
2011/0048812 A1* 3/2011 Yilmaz 178/18.06
2011/0080704 A1 4/2011 Forrester
2011/0128216 A1 6/2011 Renwick

* cited by examiner

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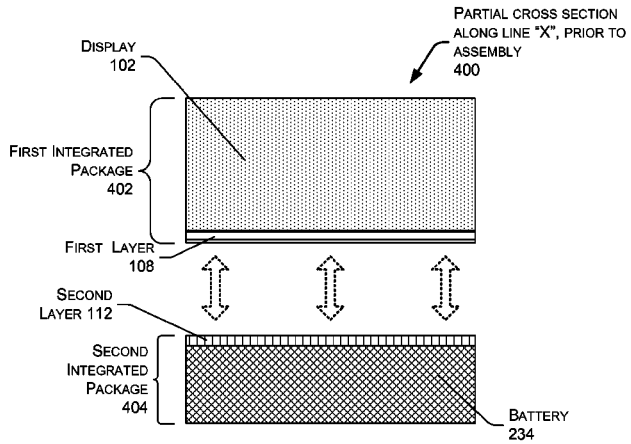
(57) **ABSTRACT**

Presentation by a display is enhanced by placing the active elements of the display at or substantially proximate to the surface of an electronic device. Such placement improves image quality, reduces shadow on the display, improves spill resistance, and minimizes the overall profile of the device.

18 Claims, 25 Drawing Sheets