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(54) **DISPLAY MODULES AND METHODS OF FIXING FLEXIBLE CIRCUIT BOARDS THEREIN**

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***H05K 7/04*** (2006.01)

(52) **U.S. Cl.**
USPC ..... **361/807**; 361/749; 361/809; 361/810

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 665,455 | A | 1/1901 | Ting | |
| 5,550,342 | A | 8/1996 | Danek et al. | |
| 5,739,880 | A | 4/1998 | Suzuki et al. | |
| 5,739,887 | A | 4/1998 | Ueda et al. | |
| 5,748,179 | A | 5/1998 | Ito et al. | |
| 5,838,400 | A | 11/1998 | Ueda et al. | |
| 5,838,412 | A | 11/1998 | Ueda et al. | |
| 5,897,188 | A | 4/1999 | Sasuga et al. | |
| 6,089,442 | A * | 7/2000 | Ouchi et al. | 228/180.1 |
| 6,181,561 | B1 | 1/2001 | Albrecht et al. | |
| 6,411,359 | B1 | 6/2002 | Kobayashi et al. | |
| 6,507,484 | B2 | 1/2003 | Fukuyoshi | |
| 6,527,162 | B2 * | 3/2003 | Totani et al. | 228/175 |
| 6,583,843 | B2 | 6/2003 | Ishino | |
| 6,657,697 | B2 | 12/2003 | Yamate et al. | |
| 6,762,807 | B2 | 7/2004 | Lee et al. | |
| 7,034,913 | B2 | 4/2006 | Ishida | |
| 7,113,237 | B2 * | 9/2006 | Nitto et al. | 349/58 |
| 7,182,500 | B2 * | 2/2007 | Sugawara | 362/634 |
| 7,606,035 | B2 | 10/2009 | Park et al. | |

(Continued)

FOREIGN PATENT DOCUMENTS

| | | |
|---|---|---|
| JP | 2003195340 | 12/2001 |
| TW | 491489 | 6/2002 |

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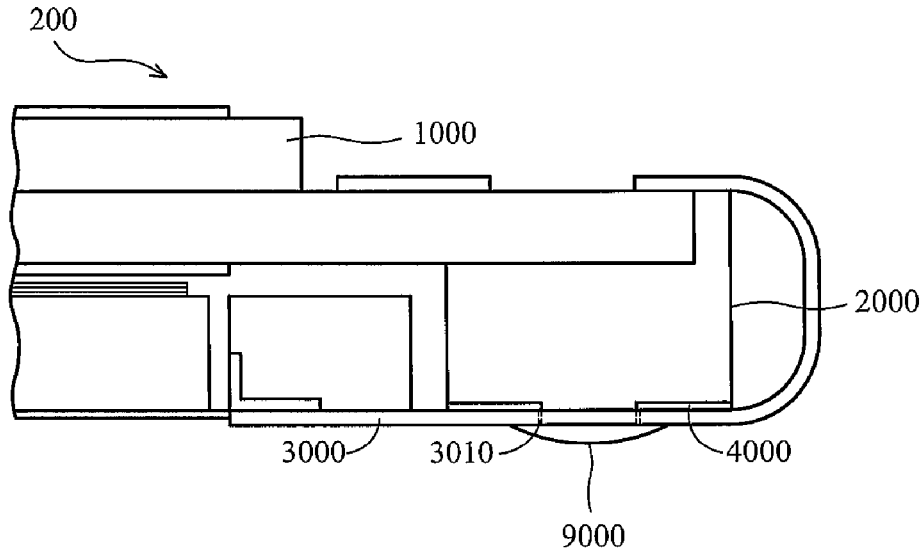
(57) **ABSTRACT**

A method of fixing a flexible circuit board. The method comprises the following steps: providing a flexible circuit board having a locating hole, providing a display module frame having a locating element corresponding to the locating hole, passing the locating element through the locating hole, bonding the flexible circuit board to the frame and deforming the locating element for to fix the flexible circuit board on the frame.

**7 Claims, 6 Drawing Sheets**