

# EXHIBIT 11

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(12) **United States Patent**  
**Kataoka et al.**

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(54) **LIQUID CRYSTAL DISPLAY DEVICE AND METHOD FOR FABRICATING THE SAME**

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**Related U.S. Application Data**

(60) Division of application No. 14/030,881, filed on Sep. 18, 2013, now Pat. No. 8,797,490, which is a division of application No. 13/613,836, filed on Sep. 13, 2012, now Pat. No. 8,570,477, which is a division of

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**

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(52) **U.S. Cl.**

CPC ..... **G02F 1/134309** (2013.01); **G02F 1/139** (2013.01); **G02F 1/1337** (2013.01); (Continued)

(58) **Field of Classification Search**

None

See application file for complete search history.

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*Primary Examiner* — A. Sefer

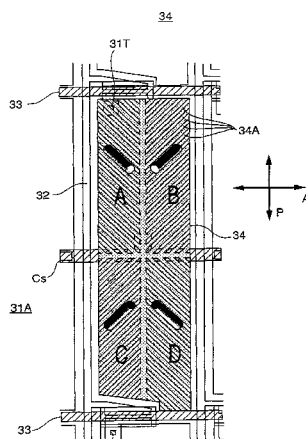
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(57)

**ABSTRACT**

A liquid crystal display device including first and second substrates, and a liquid crystal layer sealed therebetween. The device also includes a first electrode formed on the first substrate and a second electrode formed on the second substrate; a first molecule orientation film formed on the first substrate so as to cover the first electrode; a second molecule orientation film formed on the second substrate so as to cover the second electrode; a plurality of micro structures associated with at least one of the first and second electrodes; and a plurality of rough structural patterns associated with at least one of the first and second electrodes. At least some of the micro structures extend generally parallel to each other, and the rough structural patterns extend in directions different from directions in which the micro structures extend.

**6 Claims, 65 Drawing Sheets**



## US 9,081,239 B2

Page 2

## Related U.S. Application Data

application No. 13/051,386, filed on Mar. 18, 2011, now Pat. No. 8,471,994, which is a division of application No. 12/268,722, filed on Nov. 11, 2008, now Pat. No. 7,952,675, which is a continuation of application No. 11/542,308, filed on Oct. 2, 2006, now Pat. No. 7,486,366, which is a division of application No. 09/903,010, filed on Jul. 11, 2001, now Pat. No. 7,145,622.

## (51) Int. Cl.

**G02F 1/1337** (2006.01)**G02F 1/1335** (2006.01)**G02F 1/1362** (2006.01)

## (52) U.S. Cl.

CPC ..... **G02F1/1362** (2013.01); **G02F 1/1393** (2013.01); **G02F 1/133528** (2013.01); **G02F 1/133707** (2013.01)

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FIG. 1A  
PRIOR ART

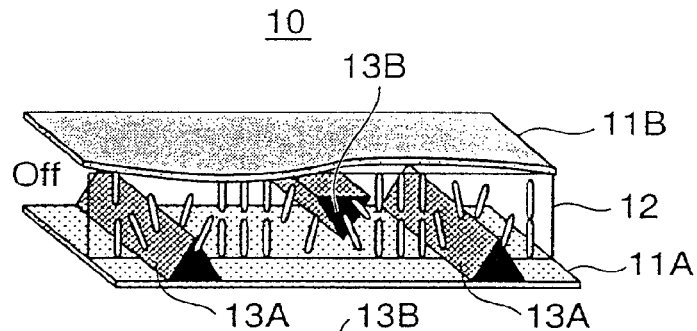


FIG. 1B  
PRIOR ART

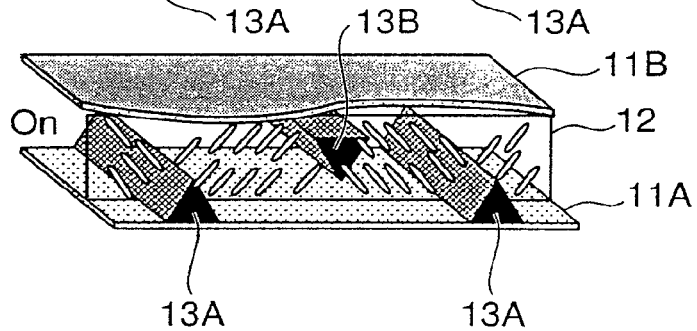
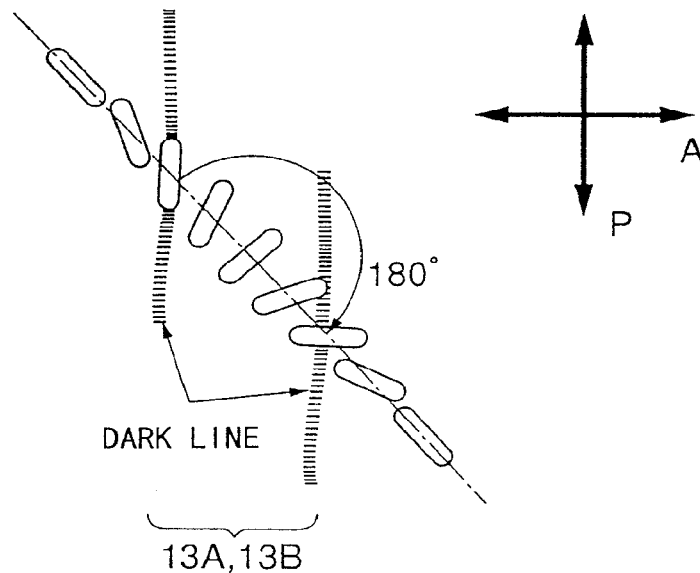
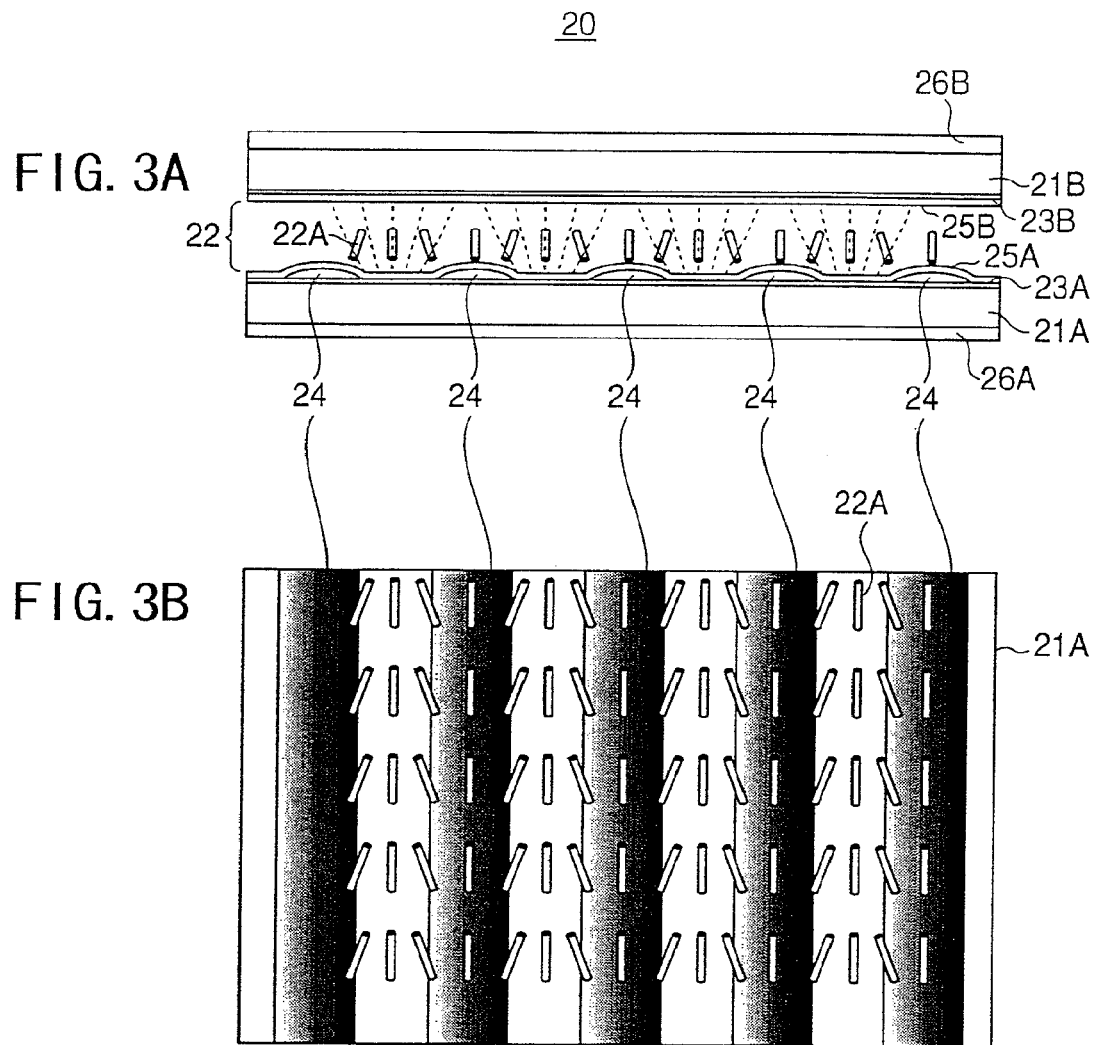


FIG. 2 PRIOR ART





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