

EXHIBIT 9



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

(10) **Patent No.:** **US 8,797,490 B2**
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(54) **LIQUID CRYSTAL DISPLAY DEVICE AND METHOD FOR FABRICATING THE SAME**
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(73) Assignee: **Sharp Kabushiki Kaisha**, Osaka (JP)
 (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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 US 2014/0016066 A1 Jan. 16, 2014

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 (60) Division of application No. 13/613,836, filed on Sep. 13, 2012, now Pat. No. 8,570,477, which is a division (Continued)

(30) **Foreign Application Priority Data**
 Sep. 27, 2000 (JP) 2000-295266

(51) **Int. Cl.**
G02F 1/1343 (2006.01)
G02F 1/1337 (2006.01)
G02F 1/139 (2006.01)

(52) **U.S. Cl.**
 CPC **G02F 1/1337** (2013.01); **G02F 1/133707** (2013.01); **G02F 1/139** (2013.01); **G02F 1/1393** (2013.01)

USPC **349/143**; 349/130; 349/139; 349/142; 349/144

(58) **Field of Classification Search**
 CPC **G02F 1/139**; **G02F 1/1337**; **G02F 1/1393**; **G02F 1/133707**
 USPC 349/130, 139, 142-144
 See application file for complete search history.

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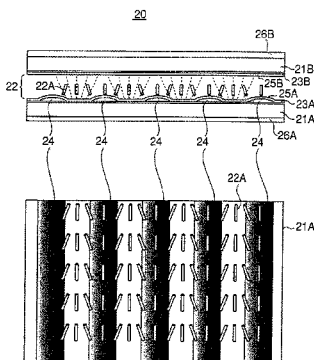
Primary Examiner — A. Sefer

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(57) **ABSTRACT**

A liquid crystal display device including first and second substrates, with a liquid crystal layer sealed therebetween. The device also includes a first electrode formed on the first substrate, 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, and a plurality of micro structures associated with at least one of the first and second electrodes, wherein at least some of the micro structures extend generally parallel to each other. When a driving voltage is applied between the first and second electrodes, liquid crystal molecules of the liquid crystal layer are oriented such that no dark line occurs in a vicinity of the plurality of micro structures and no dark line occurs between adjacent micro structures.

8 Claims, 65 Drawing Sheets



US 8,797,490 B2

Page 2

Related U.S. Application Data

of 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.

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FIG. 1A
PRIOR ART

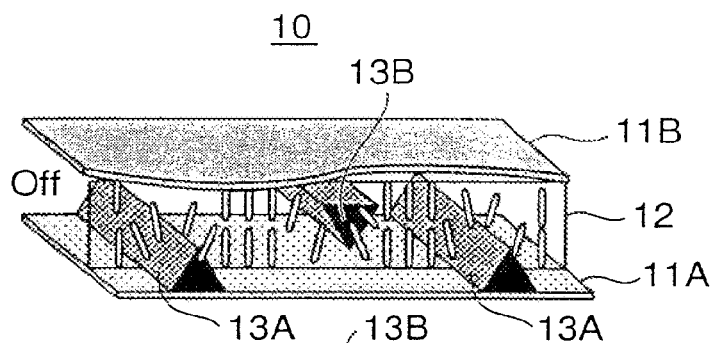


FIG. 1B
PRIOR ART

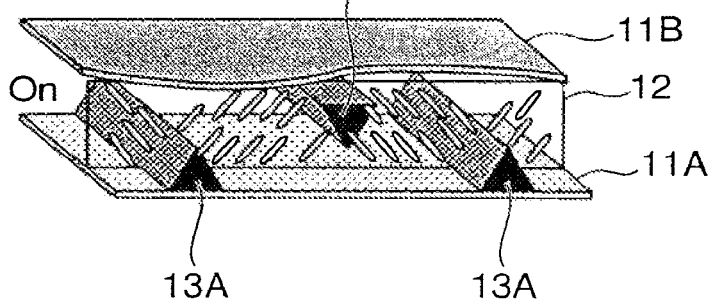
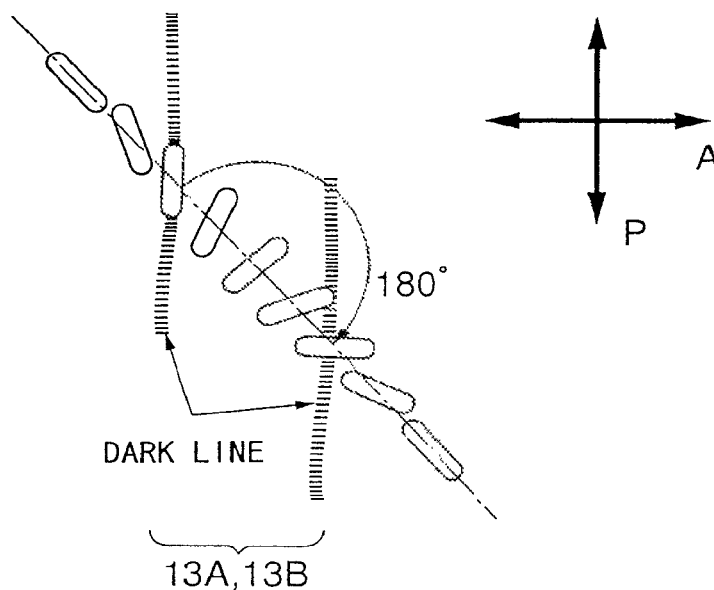
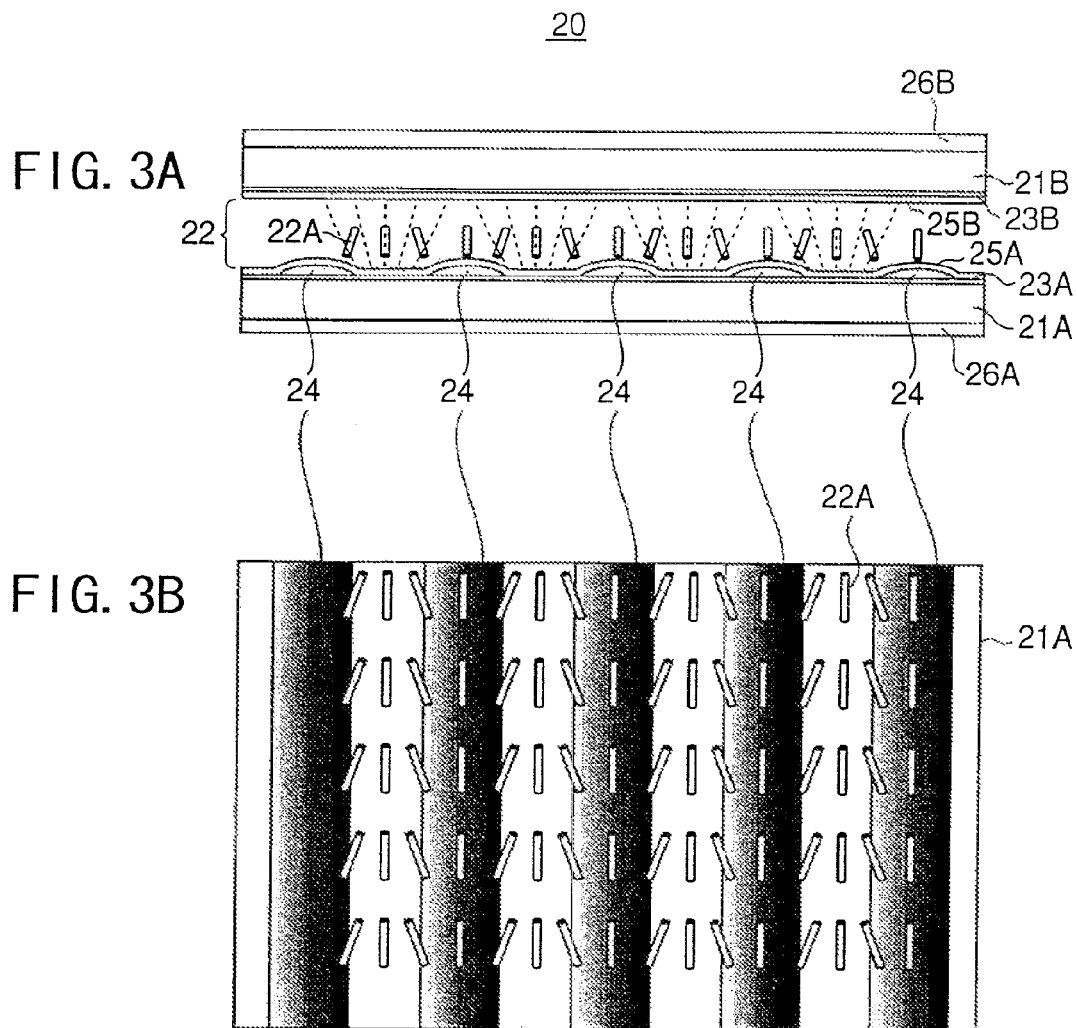


FIG. 2 PRIOR ART





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