



US007405779B2

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

(10) **Patent No.:** **US 7,405,779 B2**  
(45) **Date of Patent:** **Jul. 29, 2008**

(54) **SUPER BRIGHT LOW REFLECTANCE LIQUID CRYSTAL DISPLAY**

(75) Inventors: **Joseph J. Sanelle**, Westboro, MA (US);  
**Diggy R. Breiling**, Beaverton, OR (US);  
**Daniel R. Doyle**, Medway, MA (US)

(73) Assignee: **White Electronic Designs Corp.**,  
Phoenix, AZ (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/209,102**

(22) Filed: **Aug. 22, 2005**

(65) **Prior Publication Data**

US 2006/0001800 A1 Jan. 5, 2006

**Related U.S. Application Data**

(63) Continuation of application No. 09/772,197, filed on Jan. 29, 2001, now Pat. No. 6,933,991, which is a continuation-in-part of application No. 09/235,584, filed on Jan. 22, 1999, now Pat. No. 6,181,394.

(51) **Int. Cl.**

**G02F 1/1335** (2006.01)  
**G02F 1/133** (2006.01)

(52) **U.S. Cl.** ..... **349/96**; 349/12; 349/23;  
349/137

(58) **Field of Classification Search** ..... 349/137,  
349/96, 12, 23

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,148,299 A 9/1992 Terada  
5,774,107 A \* 6/1998 Inou ..... 345/104  
5,818,559 A 10/1998 Yoshida  
6,281,952 B1 \* 8/2001 Okamoto et al. .... 349/12  
6,369,865 B2 \* 4/2002 Hinata ..... 349/12

**FOREIGN PATENT DOCUMENTS**

EP 0 502 364 A1 9/1992

JP A-3-16128 2/1991  
JP A-4-13981 2/1992  
JP A-5-069171 3/1993  
JP A-5-127822 5/1993  
JP A-5-173707 7/1993  
WO WO 93/08489 A1 4/1993  
WO WO 00/43832 A1 7/2000

**OTHER PUBLICATIONS**

Bahadur, Liquid Crystals 1990, World Scientific, vol. 1, pp. 173-193.\*

\* cited by examiner

*Primary Examiner*—David C. Nelms

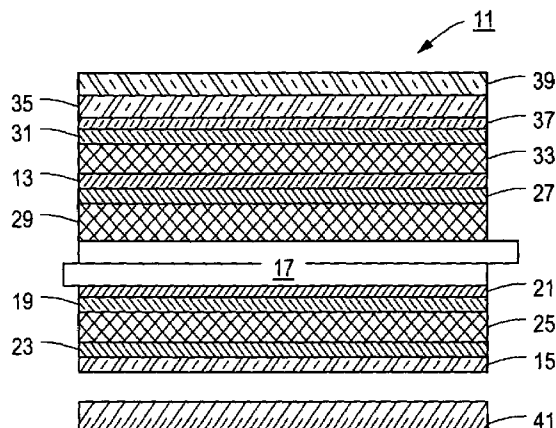
*Assistant Examiner*—David Y Chung

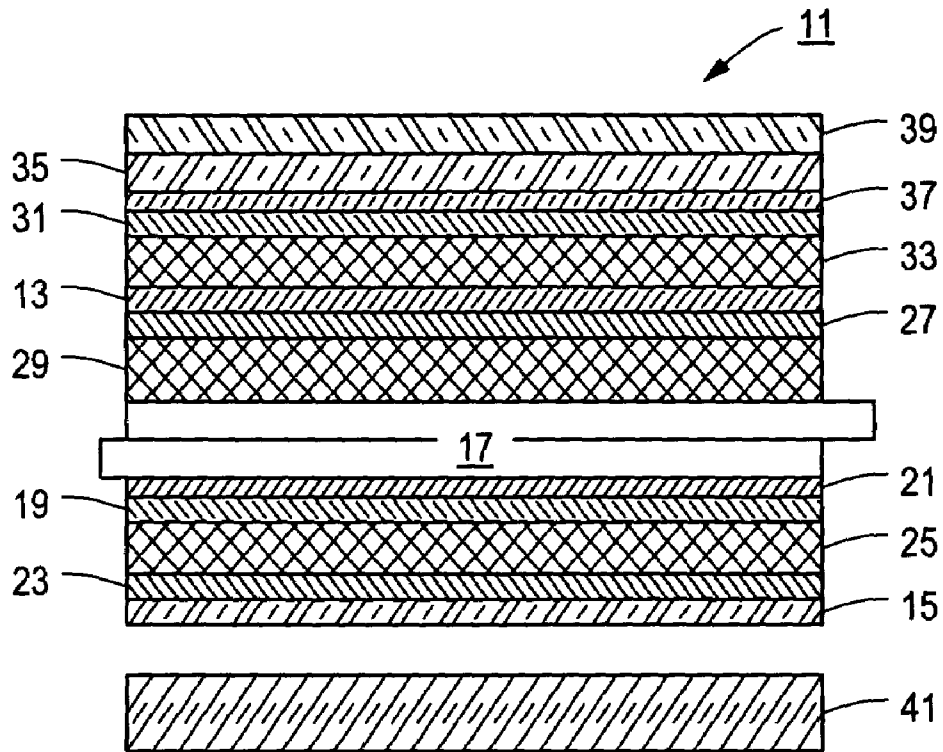
(74) *Attorney, Agent, or Firm*—Kriegsman & Kriegsman

(57) **ABSTRACT**

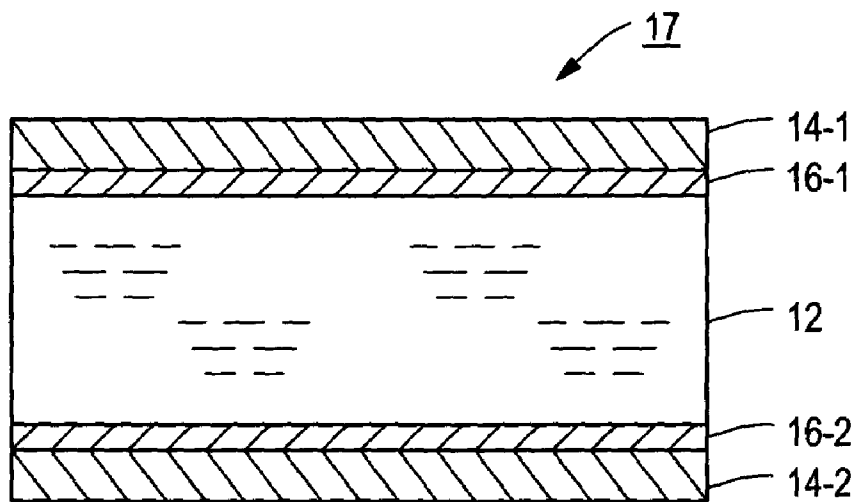
A liquid crystal display (LCD) exhibiting enhanced optical viewing performance. In a preferred embodiment, the LCD comprises a liquid crystal display panel, the liquid crystal display panel comprising a pair of transparent substrates, liquid crystal material sandwiched between the transparent substrates and transparent electrodes positioned between the liquid crystal material and the transparent substrates. The LCD also comprises a rear polarizer assembly comprising a compensation film, a polarizer mounted on the rear surface of the compensation film, and a first index-matched, pressure sensitive adhesive (PSA) mounted on the front surface of the compensation film, the PSA being adhered to the rear surface of the LCD panel. The LCD also comprises a front polarizer assembly, the front polarizer assembly comprising a front polarizer, a compensation film mounted on the rear surface of the front polarizer and an index-matched PSA mounted on the front surface of the front polarizer. The front polarizer is crossed relative to the rear polarizer. The front polarizer assembly may be adhered to the front of the LCD panel with a second index-matched, optical bonding material or may be spaced therefrom by an air gap. A transparent cover is mounted on the second index-matched PSA. The transparent cover is preferably a plastic plate. The plastic plate may be textured to reduce glare or may have an anti-reflection coating or an anti-reflection film applied to the front surface thereof. Instead of a plastic plate, the transparent cover may be a glass plate or a touch panel.

**2 Claims, 4 Drawing Sheets**

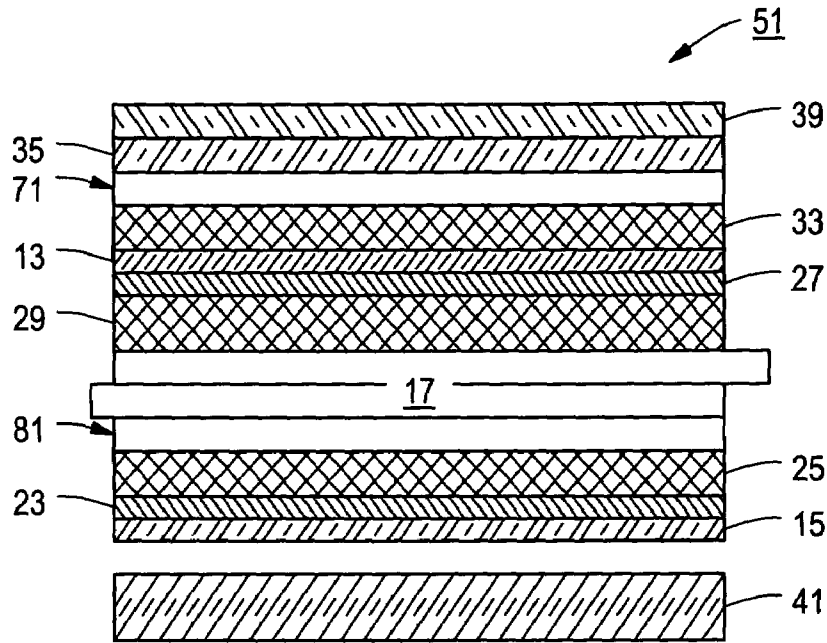




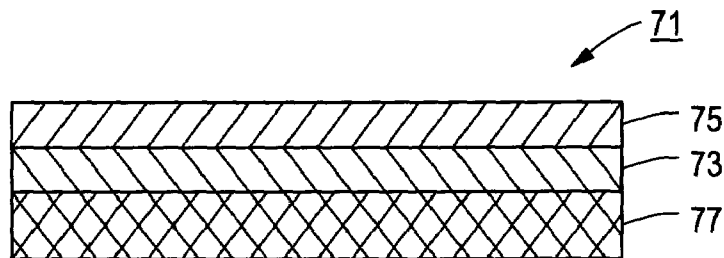
**FIG. 1**



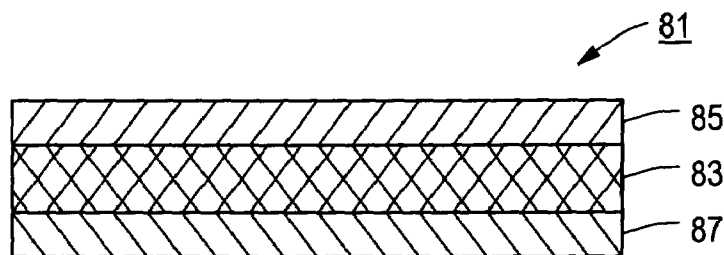
**FIG. 2**



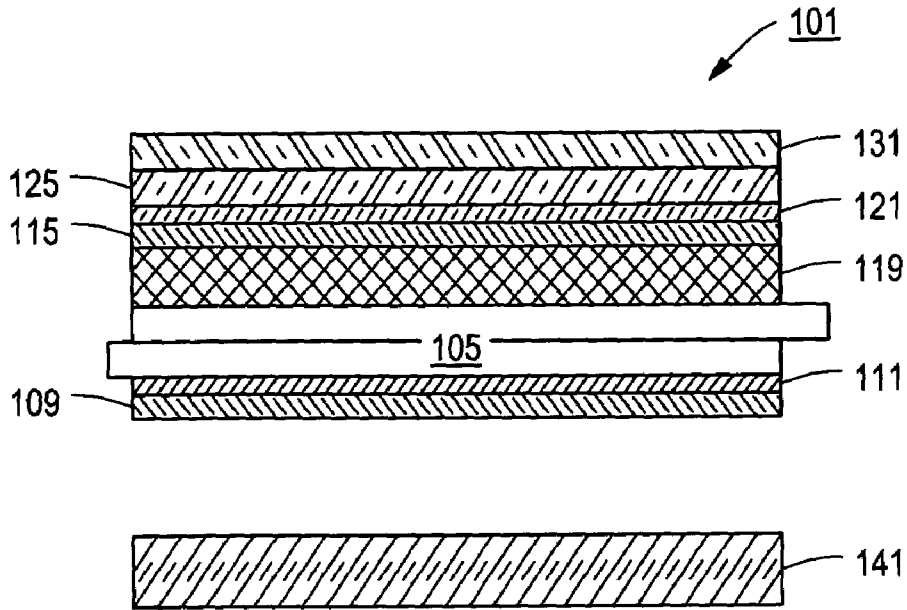
**FIG. 3**



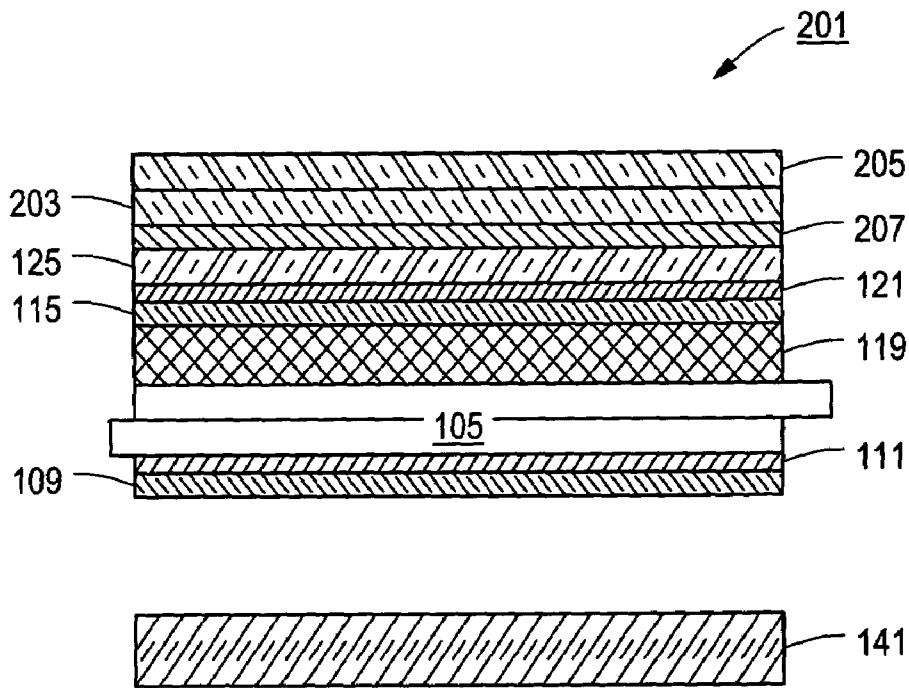
**FIG. 4**



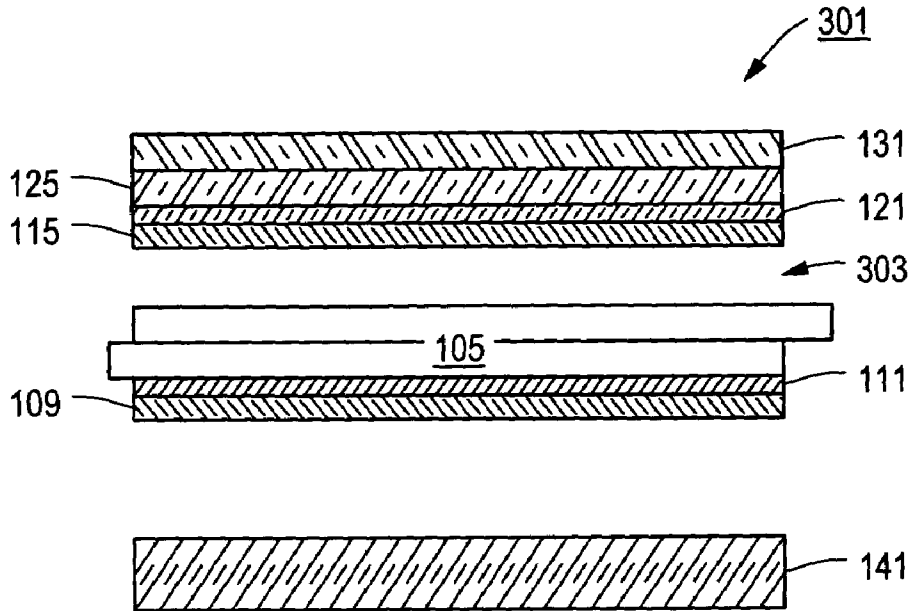
**FIG. 5**



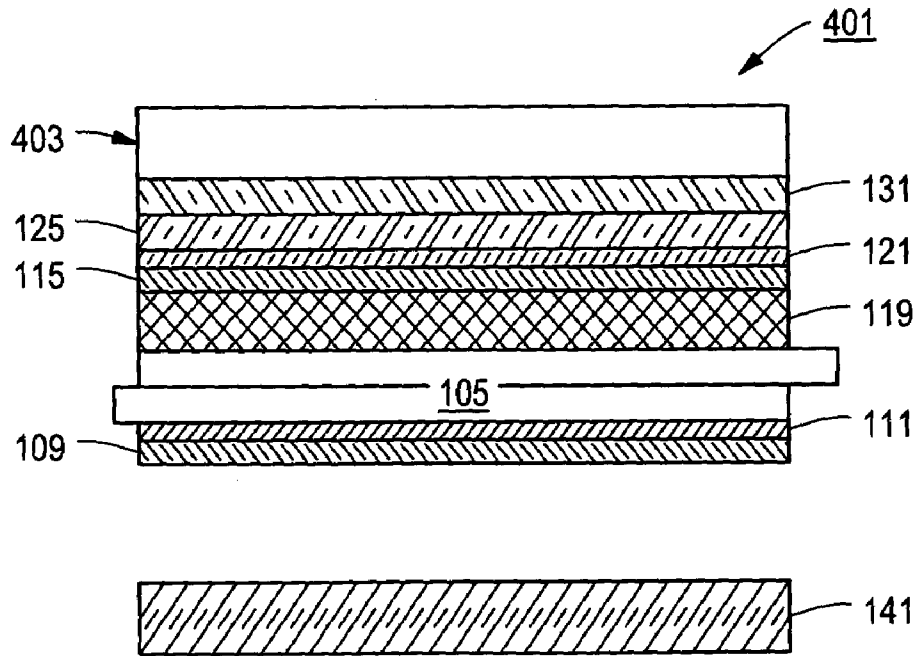
**FIG. 6**



**FIG. 7**



**FIG. 8**



**FIG. 9**

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.