



US00786880B2

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

(10) **Patent No.:** **US 7,868,880 B2**  
(45) **Date of Patent:** **Jan. 11, 2011**

(54) **DISPLAY APPARATUS AND DRIVE CONTROL METHOD THEREOF**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1056 days.

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(21) Appl. No.: **11/438,967**

Notification Concerning Transmittal of International Search Report and Written Opinion of the International Searching Authority for PCT/JP2006/310616, dated Mar. 15, 2007, 23 sheets.

(22) Filed: **May 23, 2006**

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(65) **Prior Publication Data**

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US 2006/0267886 A1 Nov. 30, 2006

(74) *Attorney, Agent, or Firm*—Holtz, Holtz, Goodman & Chick, PC

(30) **Foreign Application Priority Data**

(57) **ABSTRACT**

May 24, 2005 (JP) ..... 2005-150566  
May 26, 2005 (JP) ..... 2005-153382

A display apparatus is disclosed. A display panel includes a plurality of display pixels arranged at intersections of a plurality of scanning lines and a plurality of data lines. A scanning drive unit sequentially applies a scanning signal to each of the scanning lines and sets the corresponding display pixels to a selection state. A data drive unit generates a gradation signal corresponding to the display data and supplies the gradation signal to the display pixels. A power source drive unit supplies to the display pixels a drive voltage for controlling a drive state of each of the display pixels. A drive control unit controls the power source drive unit to operate to set the display pixels to a non-display operation state during a non-display period, and controls the scanning drive unit to operate to set the display pixels to the selection state during the non-display period.

(51) **Int. Cl.**  
**G09G 5/00** (2006.01)

(52) **U.S. Cl.** ..... **345/204**; 345/100; 345/207;  
345/210; 345/211; 345/690

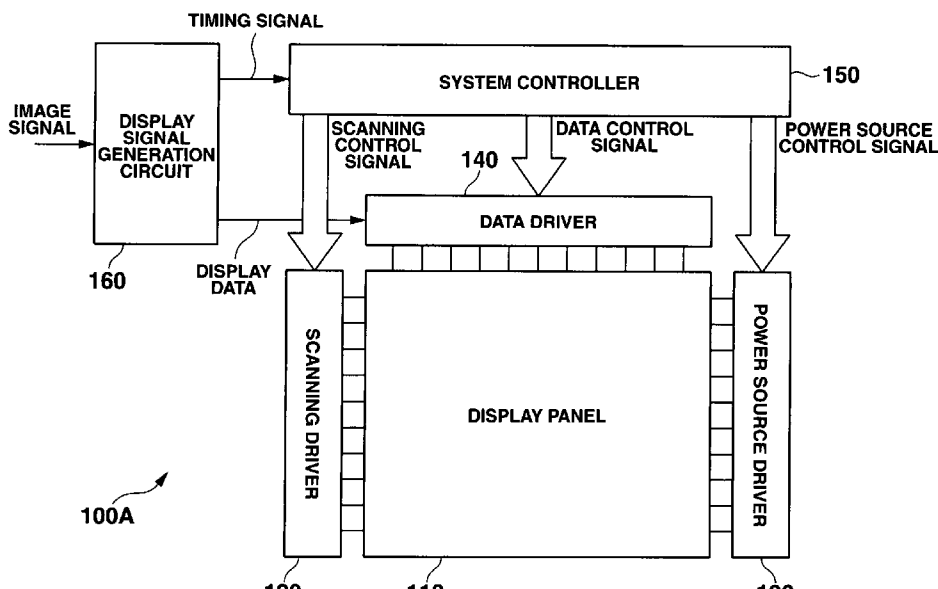
(58) **Field of Classification Search** ..... 345/76-84,  
345/87-104, 204-215, 690-699; 315/169.1-169.4  
See application file for complete search history.

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**40 Claims, 27 Drawing Sheets**



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FIG.1

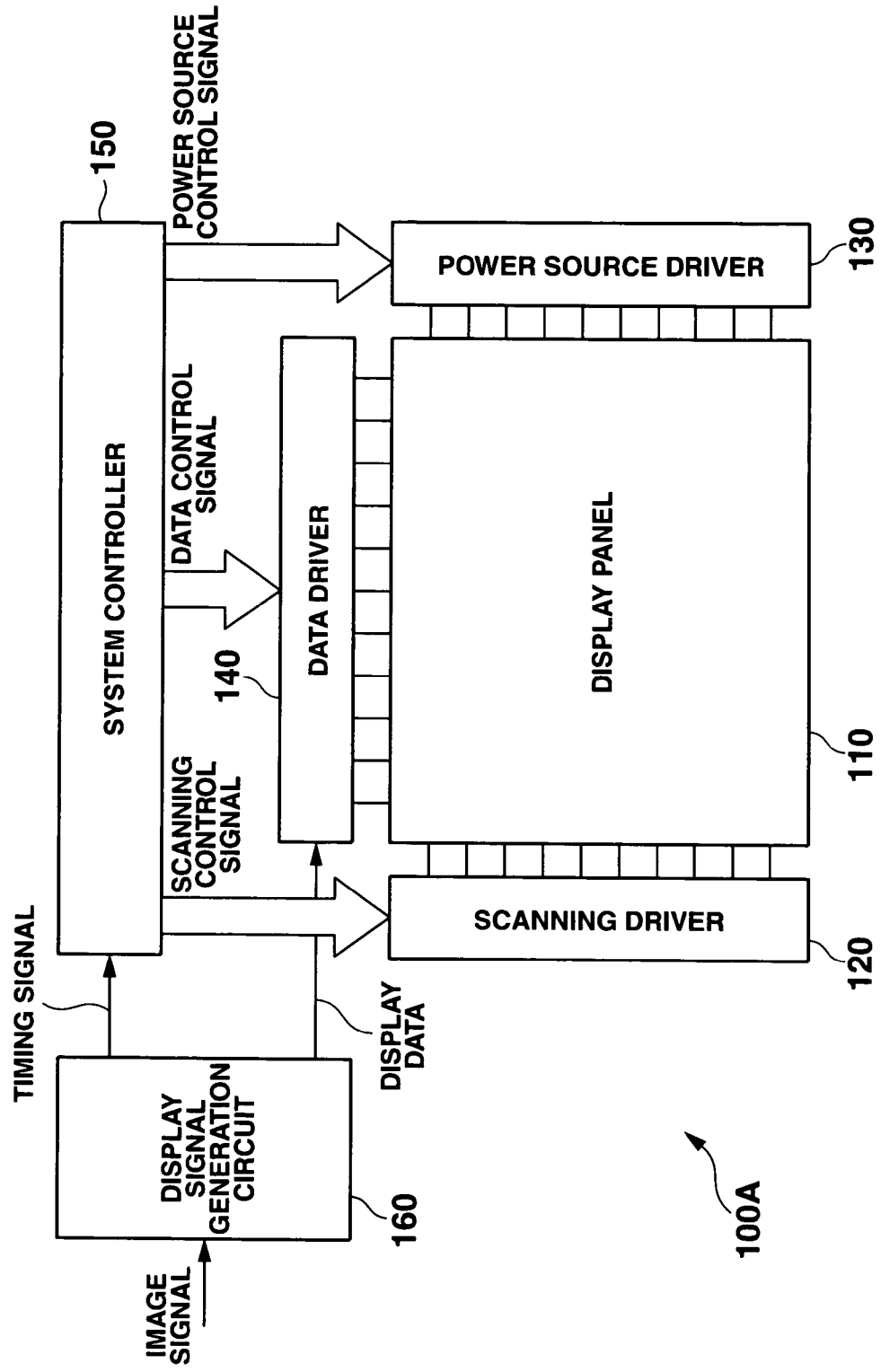
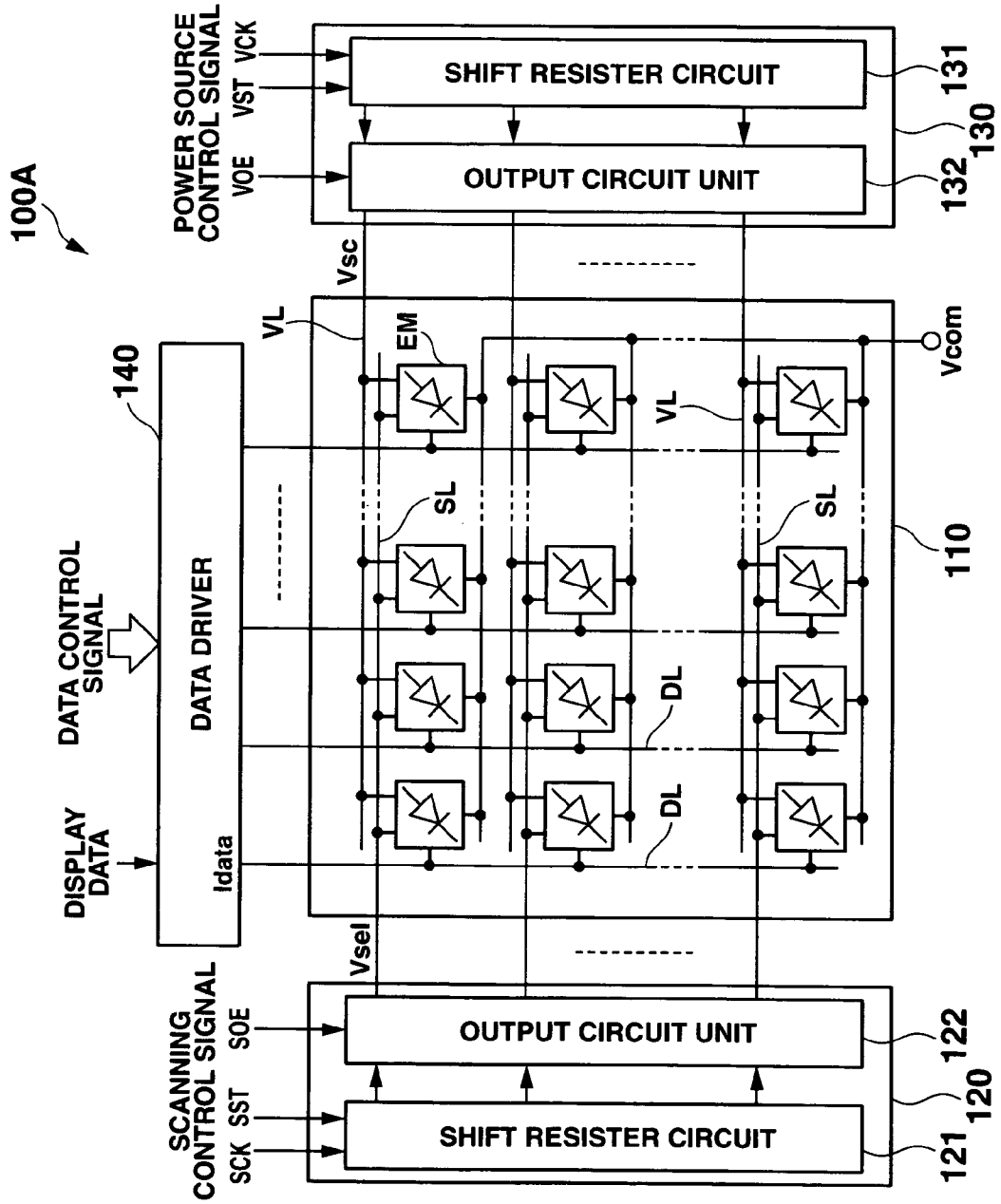
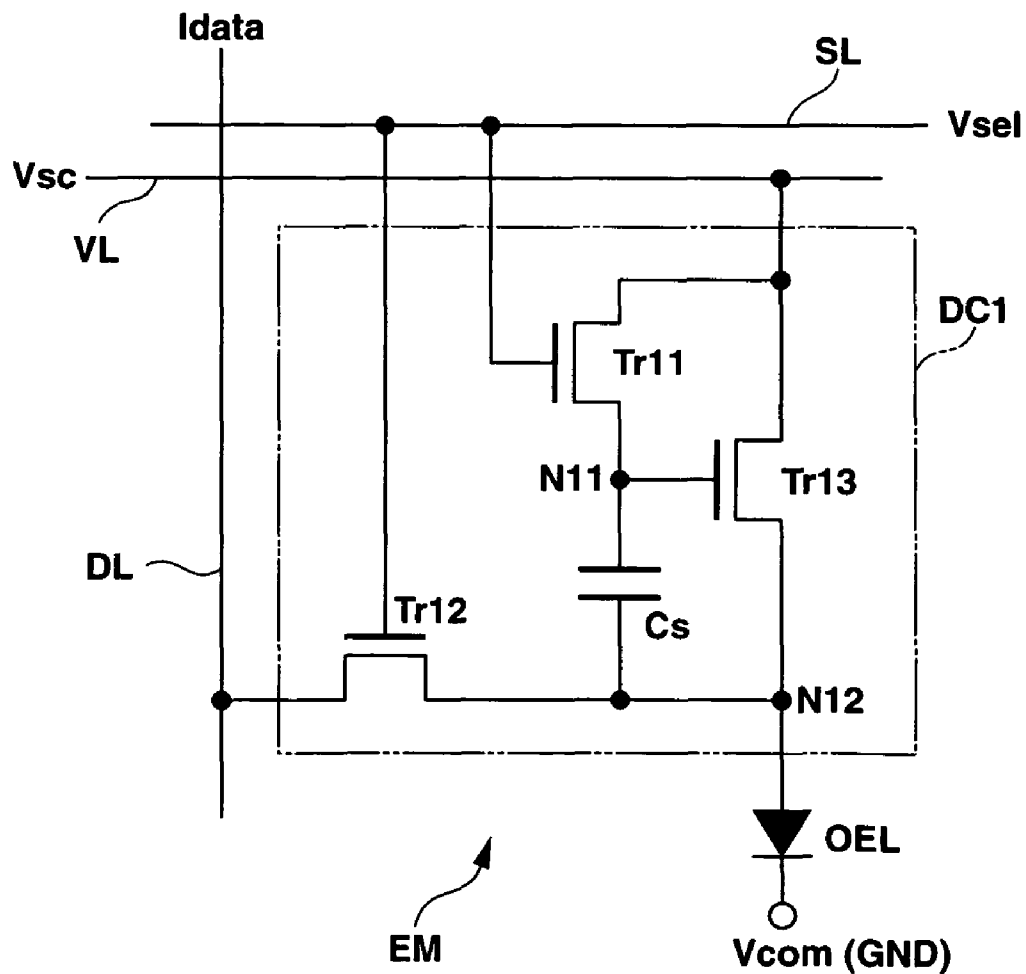


FIG. 2



# FIG.3



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