



United States Patent [19]
Yamada et al.

[11] **Patent Number:** **6,072,450**
[45] **Date of Patent:** **Jun. 6, 2000**

[54] DISPLAY APPARATUS	5,302,966	4/1994	Stewart	315/169.3
	5,427,858	6/1995	Nakamura et al.	428/421
[75] Inventors: Hiroyasu Yamada, Hachioji; Tomoyuki Shirasaki, Higashiyamoto; Yoshihiro Kawamura, Fussa, all of Japan	5,640,067	6/1997	Yamauchi et al.	313/504
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	5,828,181	10/1998	Okuda	345/76
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[73] Assignee: Casio Computer Co., Ltd., Tokyo, Japan	5,909,081	6/1999	Eida et al.	313/504

[21] Appl. No.: **08/976,217**

[22] Filed: **Nov. 21, 1997**

[30] **Foreign Application Priority Data**

Nov. 28, 1996	[JP]	Japan	8-331388
Nov. 28, 1996	[JP]	Japan	8-331389

[51] **Int. Cl.⁷** **H01L 27/12**

[52] **U.S. Cl.** **345/76; 345/36; 345/45; 313/500; 313/504; 315/169.3**

[58] **Field of Search** **345/36, 45, 76; 313/498-512; 315/169.3**

[56] **References Cited**

U.S. PATENT DOCUMENTS

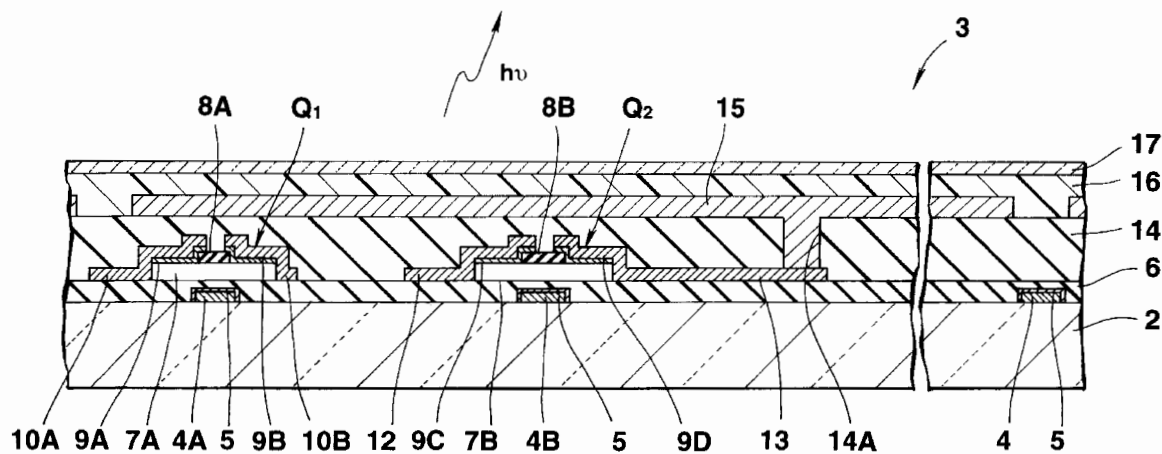
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Assistant Examiner—Vincent E. Kovalick
Attorney, Agent, or Firm—Frishauf, Holtz, Goodman, Langer & Chick, P.C.

[57] **ABSTRACT**

Selection transistors and drive transistors are formed in individual pixel areas on a substrate. Cathode electrodes which reflect visible light are formed above the selection transistors and the drive transistors so as to cover the pixel areas, with flat insulation films between the cathode electrodes and the selection and drive transistors. An organic EL layer and an anode electrode are sequentially formed on the cathode electrodes.

18 Claims, 21 Drawing Sheets



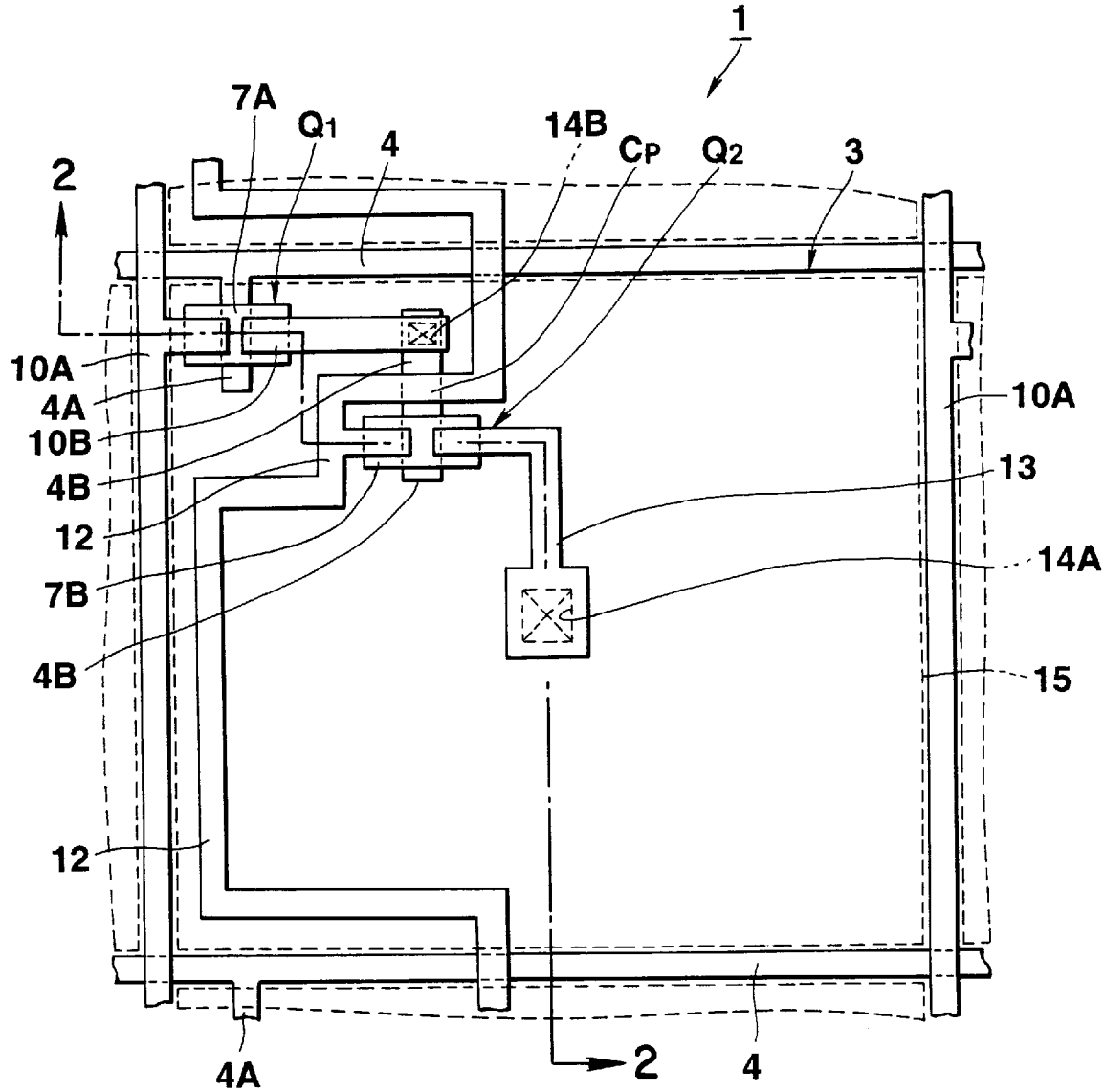


FIG.1

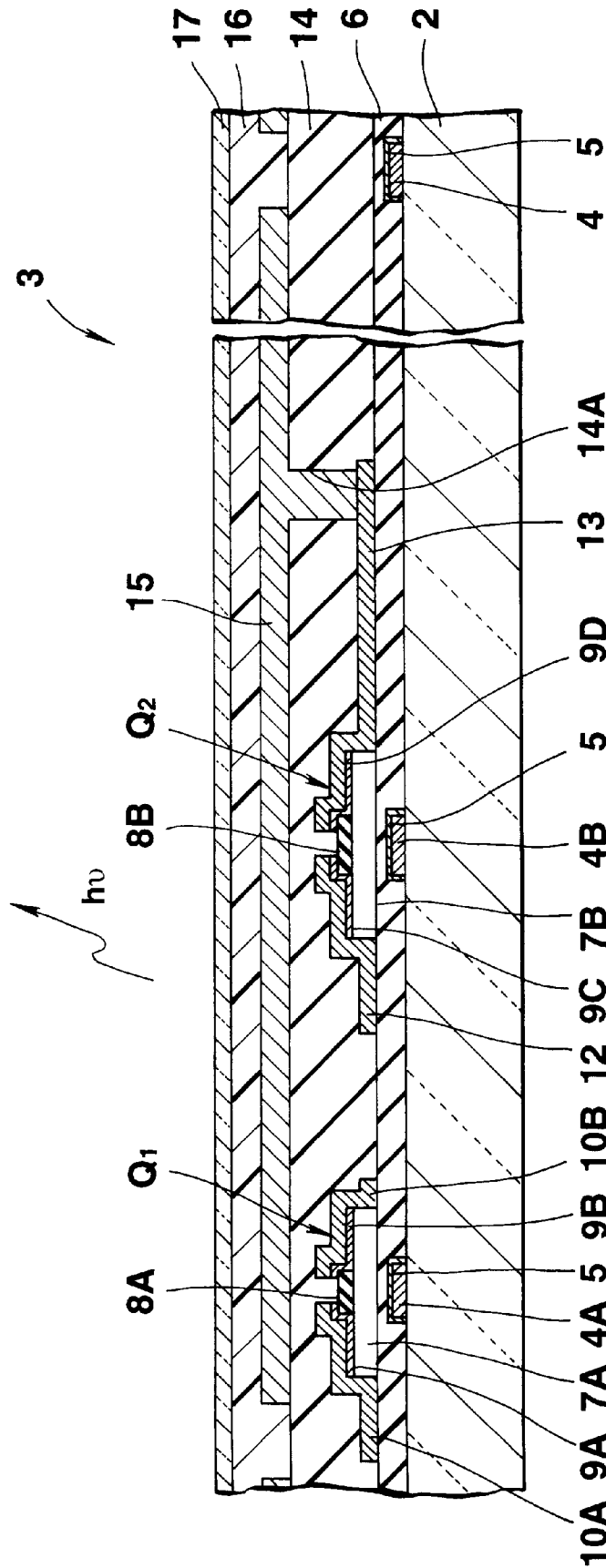


FIG. 2

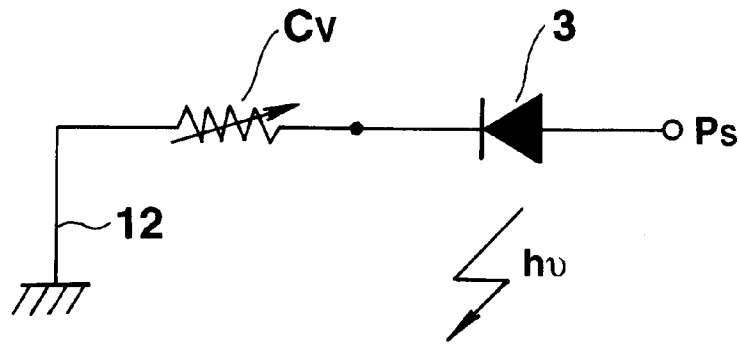


FIG.3

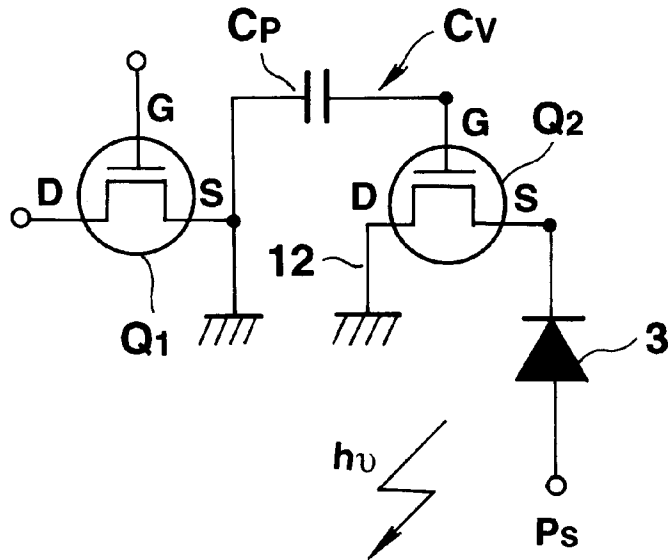


FIG.4

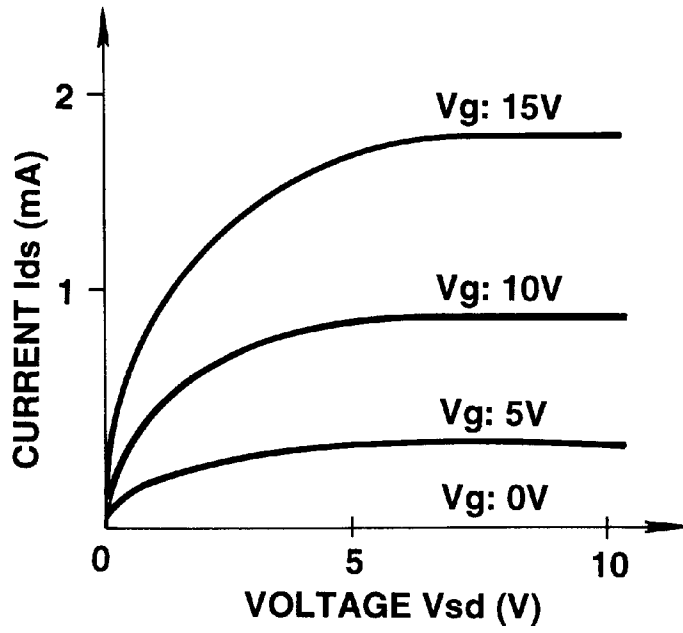


FIG.5

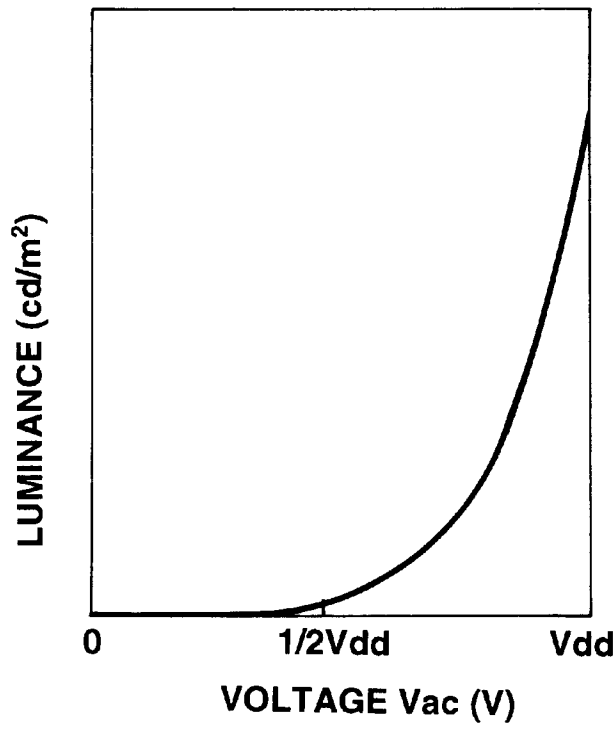


FIG.6

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